

**GALENA PARK INDEPENDENT SCHOOL DISTRICT**

**Student Nutrition Generator Replacement Project  
GPISD Project # 900-2023**

**CSP # 23-009**

Volume 02



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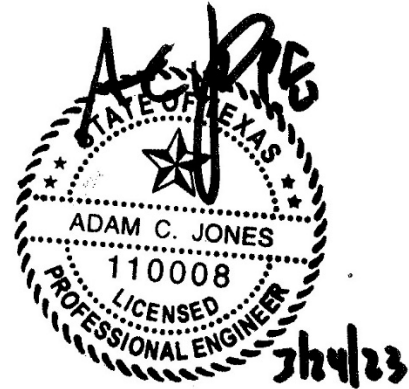
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**SECTION 01 11 00**

**SUMMARY OF WORK**

**CONDITIONS OF THE CONTRACT AND DIVISION 1, AS APPLICABLE, APPLY TO THIS SECTION**

**PART 1 - GENERAL**

**1.1 PROJECT DESCRIPTION**

Tice Elementary School, North Shore Middle School, Havard Elementary School

Replacement of existing natural gas generator and upgrade emergency electrical system as required to separate life safety circuits from stand by emergency circuits.

**1.2 INSTRUCTIONS TO OFFERORS**

- A. No work on school test dates. Outside work can be performed anytime during the day. Inside work shall be performed according to construction schedule.
- B. The majority of the work is planned to occur during the summer of 2024. Contractor will be able to work on items that won't affect school operation during holidays, breaks, weekends and after hours as determined with district after project award.

**1.3 SALVAGED MATERIALS**

- A. Owner may salvage all items deemed reusable or necessary to keep from facilities to be demolished prior to the start of demolition.
- B. Contractor shall remove and turn additional items over to the Owner, as directed.
- C. Contractor shall demolish, remove and salvage all other items of demolished work.

**1.4 CONTRACTS AND USE OF SITE**

- A. Contractor Use of Premises:
  - 1. Confine operations at site to areas permitted by:
    - a. Law
    - b. Ordinances
    - c. Permits
    - d. Contract Documents
  - 2. Do not unreasonably encumber site with materials or equipment.
  - 3. Assume full responsibility for protection and safekeeping of products stored on premises.
  - 4. Obtain and pay for use of additional storage or work areas as needed for operations.
  - 5. Contractor shall establish secured staging area for work and coordinate and provide for safe passage and exit from building areas during construction, as determined by City and District officials.
  - 6. Contractor shall coordinate all construction activities with Owner.
  - 7. Owner reserves the right to perform construction operations with its own forces or to employ separate contractors on portions of the Project. Contractor shall coordinate with this work in terms of providing site access, work space, and storage space, cooperation of work forces, scheduling, and technical requirements.
  - 8. Coordinate all utility shutdowns with Owner and, as required, with local utility companies, prior to commencement of shutdown.
- B. Owner Occupancy:

1. Partial Owner Occupancy: The Owner reserves the right to place and install equipment in completed areas of the building, prior to Substantial Completion provided that such occupancy does not interfere with completion of the Work. Such placing of equipment and partial occupancy shall not constitute acceptance of the total Work.
2. A Certificate of Substantial Completion will be executed in accordance with conditions of the Contract.
3. Contractor shall obtain a Certificate of Occupancy from local building officials prior to Owner occupancy.
4. Prior to partial Owner occupancy, mechanical and electrical systems shall be fully operational. Required inspections and tests shall have been successfully completed. Upon occupancy the Owner will provide operation and maintenance of mechanical and electrical systems in occupied portions of the building.
5. Prior to partial Owner occupancy, emergency and life safety systems shall be fully operational. Emergency and life safety systems include, but are not limited to, fire sprinkler systems, fire alarm systems, and emergency egress devices. For emergency exiting purposes, the path of travel shall be clearly delineated and functional. If required, temporary barricades shall separate on-going construction from occupied spaces as allowed by the governing agency holding jurisdiction over the Project. Required inspections and tests shall have been successfully completed. Upon occupancy the Owner will provide operation and maintenance of emergency and life safety systems in occupied portions of the building.

C. Owner-Furnished Items:

1. The Owner may provide items to the Contractor for installation in accordance with manufacturer's recommendations and instructions.
2. The Owner will arrange and pay for delivery of Owner-furnished items in accordance with the Contractor's Construction Schedule, and will inspect deliveries for damage.
3. If Owner-furnished items are damaged, defective or missing, through no fault of the Contractor, the Owner will arrange for replacement.
4. The Contractor is responsible for designating the delivery dates of Owner-furnished items in the Contractor's Construction Schedule and for receiving, unloading and handling Owner-furnished items at the site. The Contractor is responsible for protecting Owner-furnished items from damage, including damage from exposure to elements, and to repair or replace items damaged as a result of his operations.

D. Coordination with Owner's Forces or Owner's Contractors:

1. Provide site access, space allocation, scheduling, scheduling coordination, coordination of work forces and coordination of technical requirements with the contractors that may be selected and employed by Owner to perform work simultaneously and in conjunction with the Work, which may include, but shall not be limited to the following, as applicable to the Project:
  - a. Materials Inspection and Testing Agency
  - b. HVAC Testing, Adjusting and Balancing Agency
  - c. Energy Management System Contractor
  - d. Data and Cabling System Contractor
  - e. Telephone System Contractor
  - f. Modular Furniture Installer
  - g. Lighting and Sound
  - h. Surveying

1.5 PROTECTION OF EXISTING PROPERTY

- A. Contractor shall provide and maintain adequate protection of all Owner's existing property during duration of Project.
- B. Contractor shall verify location of all existing underground pipelines on site with the owner of such pipelines and authorities having jurisdiction and shall provide and maintain adequate protection of all such pipelines during duration of project.

C. Protection of Trees:

1. Provide wood barricades around trees and shrubs at their drip line in traffic areas to protect them from construction operations until Substantial Completion, or until barricade removal is direct by Architect/Engineer.

1.6 USE OF ASBESTOS FREE MATERIALS, PRODUCTS AND SYSTEMS

- A. The Contractor is reminded to refer to Document AB, Instructions to Offerors for requirements regarding asbestos containing materials (ACM).

**PART 2 - PRODUCTS**

2.1 MATERIALS

- A. Refer to Specification Sections.

**PART 3 - EXECUTION**

3.1 CONSTRUCTION SCHEDULE

- A. Completion Time: The owner has a critical need for the entire project to be completed within the period with on-site work commencing on May 25, 2024 and achieving substantial completion not later than July 31, 2024.
- B. Proposers shall structure their pricing and proposal as required to meet the designated schedule.
- C. Submission of a proposal for consideration shall be construed as proposer's agreement to meet the stipulated schedule without qualification or exclusion.

**END OF SECTION**

## SECTION 01 21 00

### ALLOWANCES

**CONDITIONS OF THE CONTRACT, SUPPLEMENTARY CONDITIONS AND DIVISION 1 APPLY TO THIS SECTION.**

#### **PART 1 - GENERAL**

##### 1.1 DESCRIPTION

- A. The following Allowances shall be included in the Base Proposal. These sums shall be reconciled per Article 3.8 of the General Conditions.

##### 1.2 CONDITIONS

- A. The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents.
- B. These allowances shall cover the net cost of the materials and equipment delivered and unloaded at the site and cost of installation where applicable.
  - 1. Use of Owner Contingency shall be solely at the discretion of the Owner, and the Contractor shall expend funds for the purpose and amounts as directed by the Owner.
- C. The Contractor's handling costs on site, labor, installation, overhead, profit and other expenses contemplated for the original allowance shall be included in the Contractor's Base Proposal sum, and not in the allowance.
- D. The Contractor shall cause the work covered by these allowances to be performed for such amounts and by such persons as the Engineer may direct, but he will not be required to employ persons against whom he makes reasonable objection.
- E. If the cost, when determined, is more than or less than the allowance, the Contract sum shall be adjusted accordingly by Change Order, which will include additional handling costs on the site, labor, installation costs, overhead, profit and other expenses resulting to the Contractor from any increase over the original allowance.
  - 1. All labor, equipment and installation required for the installation and / or performance of the designated work shall be included in the allowance amount, unless noted otherwise in the Allowance description.
- F. Unexpended balance of allowance sums shall revert to the Owner in the final settlement Change Order of the Contract.

#### **PART 2 - ALLOWANCES**

##### 2.1 ITEMS

- A. Owner Contingency:

Contractor shall include in the Base Proposal the following sums as a contingency to cover the cost of hidden, concealed or otherwise unforeseen conditions which develop during completion of the work. Contractor shall proceed with the work in question only after receiving written directions executed by the Owner and the Engineer. Owner will not be obligated to pay the cost of any work performed without prior written authorization. The Contractor's overhead and profit relative to this contingency sum and work performed in accordance herewith, shall be included in the total Base Proposal price, but not included in the contingency sum. Unexpended balance of contingency sums shall revert to the Owner in the final settlement of the Contract.

Allow the sum of \$20,000.00 for Owner's Contingency.....\$20,000.00

**END OF SECTION**

## SECTION 01 23 00

### ALTERNATES

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. This Section includes administrative and procedural requirements governing Alternates.

##### 1.2 DEFINITIONS

- A. Definition: An alternate is an amount proposed by bidders and stated on the Bid Form for certain work defined in the Bidding Requirements that may be added to or deducted from the Base Bid amount if the Owner decides to accept a corresponding change in either the amount of construction to be completed, or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.
1. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate the Alternate into the Work. No other adjustments are made to the Contract Sum.

##### 1.3 PROCEDURES

- A. Coordination: Modify or adjust affected adjacent Work as necessary to completely and fully integrate that Work into the Project.
1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not mentioned as part of the Alternate.
  2. Include as part of each alternate, costs coordination, modification, and/or adjustment to accommodate the accepted alternate.
- B. Notification: Immediately following the award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate whether alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated modifications to alternates.
- C. Execute accepted alternates under the same conditions as other Work of this Contract.
- D. Schedule: A "Schedule of Alternates" is included at the end of this Section. Specification Sections referenced in the Schedule contain requirements for materials necessary to achieve the Work described under each alternate.

#### PART 2 - PRODUCTS (NOT APPLICABLE)

#### PART 3 - EXECUTION

##### 3.1 SCHEDULE OF ALTERNATES

- A. Alternate No.1: Havard Elementary: Provide add to the base proposal for the scope of work at Havard Elementary. Scope of work shown on sheets PE2.01, PE2.02 and the Havard one line diagram on sheet E4.01

**END OF SECTION**



## SECTION 01 25 13

### PRODUCTS AND SUBSTITUTIONS

#### PART 1 - GENERAL

##### 1.1 DESCRIPTION OF REQUIREMENTS:

- A. **DEFINITIONS:** Definitions used in this Section are not intended to negate the meaning of other terms used in the Contract Documents, including such terms as, "specialties", "systems", "structure", "finishes", "accessories", "furnishings", "special construction" and similar terms. Such terms are self-explanatory and have recognized meanings in the construction industry.
- B. "Products" are items purchased for incorporation in the Work, regardless of whether they were specifically purchased for the project or taken from the Contractor's previously purchased stock. The term "product" as used herein includes the terms "material", "equipment", "system" and other terms of similar intent.
- C. The Contract is based on the products, materials, and equipment described in the Contract Documents, and added by Addenda.
- D. **AVAILABILITY OF SPECIFIED ITEMS:** Verify prior to bidding that all specified items will be available in time for installation during orderly and timely progress of the Work.
  - 1. In the event specified items or items will not be so available, notify the Engineer at least 10 days prior to receipt of Bids.
  - 2. Additional costs due to delays because of non-availability of specified items, when such delays could have been avoided, will be back-charged to the Contractor and shall not be borne by the Owner.
- E. Where the questions of appearance, artistic effect, or harmony of design are concerned, the Engineer reserves the right to refuse approval of any product proposed to be substituted for that specified if in his opinion the item to be substituted is not harmonious to the finished effect and appearance desired, as portrayed in the Drawings and Specifications. The Engineer's said refusal to approve, established by this Article, is final.

##### 1.2 SUBSTITUTIONS:

- A. The Contractor's requests for changes in the products, materials, equipment and methods of construction required by the Contract Documents are considered requests for "substitutions", and are subject to the requirements specified herein. The following are not considered as substitutions:
  - 1. Revisions to the Contract Documents, where requested by the Owner, Engineer are considered as "changes" not substitutions.
  - 2. Substitutions requested during the bidding period, which have been accepted prior to the Contract Date, are included in the Contract Documents and are not subject to the requirements for substitutions a herein specified.
  - 3. Specified Contractor options on products and construction methods included in the Contract Documents are choices available to the Contractor and are not subject to the requirements for substitutions as herein specified.
  - 4. Except as otherwise provided in the Contract Documents, the Contractor's determination of and compliance with governing regulations and orders as issued by governing authorities do not constitute "substitutions" and do not constitute a basis for change orders.

##### 1.3 QUALITY ASSURANCE

- A. **SOURCE LIMITATIONS:** To the fullest extent possible, provide products of the same generic kind, from a single source, for each unit of work.

1. COMPATIBILITY OF OPTIONS: Compatibility of products is a basic requirement of product selection. When the Contractor is given the option of selecting between two or more products for use on the project, the product selected must be compatible with other products previously selected, even if the products previously selected were also Contractor options. The complete compatibility between the various choices available to the Contractor is not assured by the various requirements of the Contract documents, but must be provided by the Contractor.

#### 1.4 SUBMITTALS

- A. PRODUCT LISTING SUBMITTAL: Prepare a product-listing schedule in a form acceptable to the Engineer. Show names of the principal products required for the work, by generic name. Show proprietary product names and the name of the manufacturer for each item listed that is to be purchased and incorporated into the Work.
  1. Refer to Division 26 General Provisions sections for a special separate listing of products required for mechanical and electrical Work.
  2. FORM: Prepare the product-listing schedule with information on each item tabulated under the following scheduled column headings:
    - a. Generic name as used in Contract Documents.
    - b. Proprietary name, model number and similar product designation.
    - c. Manufacturer's and supplier's name and city/state addresses.
    - d. Related unit-of-work specification section number.
  3. SUBMITTAL: Submit 3 copies of the product-listing schedule within 30 days after the date of commencement of the Work. Provide a written explanation for omissions of data, and for known variations from contract requirements.
    - a. At the Contractor's option, the initial submittal of the product-listing schedule may be limited to product selections and product designations that must be established early in the Contract Time.
    - b. Submit the completed product-listing schedule within 60 days after commencement of the Work.
  4. ENGINEER'S ACTION: The Engineer will respond to the Contractor in writing within 2 weeks of receipt of the product-listing schedule. No response by the Engineer within the 2 week time period constitutes no objection to the listed products or manufacturers, but does not constitute a waiver of the requirement that products comply with the requirements of the contract documents. The Engineer's response will include the following:
    - a. The Engineer's listing of unacceptable product selections, if any, containing an explanation of the reasons for this action.
    - b. A request for additional data necessary for the review and possible acceptance of the products and manufacturer's listed.
- B. SUBSTITUTION REQUEST SUBMITTAL: Submit 3 copies of each request for substitution. In each request identify the product, fabrication, and installation method to be replaced by the substitution; include related Specification Section and Drawing numbers, and complete documentation showing compliance with the requirements for substitutions. Include the following information, as appropriate, with each request.
  1. Provide complete product data, drawings and descriptions of products, and fabrication and installation procedures.
  2. Provide samples where applicable or requested.
  3. Provide a detailed comparison of the significant qualities of the proposed substitution with those of the work originally specified. Significant qualities include elements such as size, weight, durability, performance and visual effect where applicable.
  4. Provide complete coordination information. Include all changes required in other elements of the work to accommodate the substitution, including work performed by the Owner and separate Contractors.
  5. Provide a statement indicating the effect the substitution will have on the work schedule in comparison to the schedule without approval of the proposed substitution. Include information regarding the effect of the proposed substitution on the Contract Time.

6. Provide complete cost information, including a proposal of the net change, if any in the contract Sum.
7. Provide certification by the manufacturer to the effect that the proposed substitution is suitable for the application as further defined in Article 2.02 herein.
8. Provide certification by the Contractor to the effect that, in the Contractor's opinion, after thorough evaluation, the proposed substitution will result in work that in every significant respect is equal-to or better than the work required by the Contract documents, and that it will perform adequately in the application indicated.
  - a. Include in this certification, the Contractor's waiver of rights to additional payment or time, which may subsequently be necessary because of the failure of the substitution to perform adequately.
9. ENGINEER'S ACTION: As soon as possible after receipt of the Contractor's request for substitution, the Engineer will notify the contractor of either the acceptance or rejection of the proposed substitution. Acceptance of substitute products will be contingent upon submission of substantiating data, satisfactory to the Engineer, that:
  - a. Item is equal to quality and serviceability to specified product.
  - b. Use of item will not entail changes in details and construction of related work.
  - c. Item conforms to required design and artistic effect.
  - d. There will be a cost advantage to the Owner.
10. The burden of proof shall be upon the Contractor.

## 1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. GENERAL: Deliver, store, and handle products in accordance with manufacturer's recommendations, using means and methods that will prevent damage, deterioration and loss, including theft. Control delivery schedules to minimize long-term storage at the site and to prevent overcrowding of construction spaces. In particular coordinate delivery and installation to ensure minimum holding or storage times for items known or recognized to be flammable, hazardous, easily damaged, or sensitive to deterioration, theft and other sources of loss.
  1. Deliver products to the site in the manufacturer's sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting and installing.
  2. Store products at the site in a manner that will facilitate inspection and measurement of quantity or counting of units.
  3. Store heavy materials away from the project structure in a manner that will not endanger the supporting construction.
  4. Containers which are broken, opened, watermarked, or otherwise damaged, and which contain caked, lumpy or otherwise damaged materials are unacceptable and shall be immediately removed from the premises.
  5. Store all cement, lime, plaster, aggregates, roofing materials, and similar items above ground and protected from dampness, weather and other damage.
  6. Retain all loose and small detachable parts of apparatus and equipment until the completion of the Work. Turn over to Owner or his representative designated to receive them, and obtain from him an itemized receipt thereof in triplicate. Retain one copy of this receipt for final payment for the Work.
- B. Contractor shall ensure that products are delivered to the Project in accordance with the Progress Schedule of the Project. In determining date of delivery, sufficient time shall be allowed for submittal approvals, including the possibility of having to resubmit improperly prepared submittals or products other than those specified, and the necessary fabrication or procurement time along with the delivery method and distance involved.

## PART 2 - PRODUCTS

### 2.1 GENERAL PRODUCT COMPLIANCE

- A. GENERAL: Requirements for individual products are indicated in the Contract Documents; compliance with these requirements is in itself a contract requirement. These requirements may be specified in any one of several different specifying methods, or in any combination of these methods. These methods include the following:

1. Proprietary.
  2. Descriptive.
  3. Performance.
  4. Compliance with Reference Standards.
- B. PROCEDURES FOR SELECTING PRODUCTS: The Contractor's options in selecting products are limited by requirements for the Contract Documents and governing regulations. They are not controlled by industry traditions or procedures experienced by the Contractor on previous construction projects. Required procedures include but are not limited to the following for the various indicated methods of specifying:
1. PROPRIETARY AND SEMIPROPRIETARY SPECIFICATION REQUIREMENTS:
    - a. SINGLE PRODUCT NAME: Where only a single product or manufacturer is named, provide the product indicated, unless the specification indicates consideration of other products. Advise the Engineer before proceeding, when it is discovered that the named product is not a reasonable or a feasible solution.
    - b. TWO OR MORE PRODUCT NAMES: Where two or more products or manufacturers are named, provide one of the products named, at the Contractor's option. Do not provide or offer to provide an unnamed product, unless the specification indicates consideration of other products. Advise the Engineer before proceeding where none of the named products comply with specification requirements, or are feasible for use.
    - c. Where products or manufacturers are specified by name, accompanied by the term "or-equal" or similar language, comply with the contract document provisions concerning "substitutions" to obtain approval from the Engineer for the use of an unnamed product.
  2. DESCRIPTIVE SPECIFICATION REQUIREMENTS: Where the specifications describe a product or assembly generically, in detail, listing the exact characteristics required, but without use of a brand or trade name, provide products or assemblies that provide the characteristics indicated and otherwise comply with contract requirements.
  3. PERFORMANCE SPECIFICATION REQUIREMENTS: Where the specifications require compliance with indicated performance requirements, provide products that comply with the specific performance requirements indicated, and that are recommended by the manufacturer for the application indicated. The manufacturer's recommendations may be contained in published product literature, or by the manufacturer's individual certification of performance. General overall performance of a product is implied where the product is specified for specific performances.
  4. COMPLIANCE WITH STANDARDS, CODES AND REGULATIONS: Where the specifications require only compliance with an imposed standard, code or regulation, the Contractor has the option of selecting a product that complies with specification requirements, including the standards, codes and regulations.
  5. VISUAL MATCHING: Where matching an established sample is required, the final judgment of whether a product proposed by the Contractor matches the sample satisfactorily will be determined by the Engineer. Where there is no product available within the specified product category that matches the sample satisfactorily and also complies with other specified requirements, comply with the provisions of the contract documents concerning "substitutions" and "change orders" for the selection of a matching product in another product category, or for non-compliance with specified requirements.
  6. VISUAL SELECTION: Except as otherwise indicated, where specified product requirements include the phrase "...as selected from the manufacturer's standard colors, patterns, textures..." or similar phrases, the Contractor has the option of selecting the product and manufacturer, provided the selection complies with other specified requirements. The Engineer is subsequently responsible for selecting the color, pattern and texture from the product line selected by the Contractor.
- C. For each product specifically specified or as requested by Engineer, submit a written certified statement from the manufacturer of each specified, or accepted substitute, product, material, and equipment item warranting that each product, material, and item of equipment furnished by him and installed in this Project is suitable for the application shown and specified in the Contract Documents, and includes all features, accessories, and performing characteristics listed in the manufacturer's catalog in force on the date bids are requested for the Work. This warranty is intended as a assurance by the manufacturer that his material or equipment is not being misapplied

and is fit and sufficient for the service intended. This warranty is in addition to and not in limitation of any other warranty or remedy required by law or by the Contract Documents. It shall be the responsibility of the Contractor to obtain this warranty in writing.

## 2.2 SUBSTITUTIONS

- A. With each request for substitution, submit written certified statement from the manufacturer of the substitute warranting that each product, material, and item of equipment is equal to or better than the specified product in all respects and is suitable for application on this specific project.
- B. CONDITIONS: The Contractor's request for a substitution will be received and considered when extensive revisions to the contract documents are not required, when the proposed changes are in keeping with the general intent of the contract documents, when the requests are timely, fully documented and properly submitted, and when one or more of the following conditions is satisfied, all as judged by the Engineer; otherwise the requests will be returned without action except to record non-compliance with these requirements.
  - 1. The Engineer will consider a request for substitution where the request is directly related to an "or equal" clause or similar language in the Contract Documents.
  - 2. The Engineer will consider a request for substitution where the specified product or method cannot be provided within the Contract Time. However, the request will not be considered if the product or method cannot be provided as a result of the Contractor's failure to pursue the work promptly or to coordinate the various activities properly.
  - 3. The Engineer will consider a request for substitution where the specified product or method cannot receive necessary approval by a governing authority, and the requested substitution can be approved.
  - 4. The Engineer will consider a request for a substitution where a substantial advantage is offered the Owner, in terms of cost, time, energy conservation or other considerations of merit, after deducting offsetting responsibilities the Owner may be required to bear. These additional responsibilities may include such considerations as additional compensation to the Engineer for redesign and evaluation services, the increased cost of other work by the Owner or separate contractors, and similar considerations.
  - 5. The Engineer will consider a request for substitution when the specified product or method cannot be properly coordinated with other materials in the work, and where the Contractor certifies that the proposed substitution can be properly coordinated.

## 2.3 GENERAL PRODUCT REQUIREMENTS

- A. GENERAL: Provide products that comply with the requirements of the Contract Documents and that are undamaged and, unless otherwise indicated, unused at the time of installation. Provide products that are complete with all accessories, trim, finish, safety guards and other devices and details needed for a complete installation and for the intended use and effect.
  - 1. STANDARD PRODUCTS: Where they are available, provide standard products of types that have been produced and used successfully in similar situations on other projects.
  - 2. CONTINUED AVAILABILITY: Where, because of the nature of its application, the Owner is likely to need replacement parts or additional amounts of a product at a later date, either for maintenance and repair or replacement, provide standard products for which the manufacturer has published assurances that the products and its parts are likely to be available to the Owner at a later date.
- B. Except for code required labels, equipment nameplate data or other similar labels containing manufacturer's name, address, model number, capacity, and other rating information securely attached to each piece of equipment, the installation of any item, element or assembly, which bears on any exposed surface any name, trademark or other insignia which is intended to identify the manufacturer, the vendor, or other sources from which such object has been obtained, is prohibited. Also forbidden is the installation of any article which bears visible evidence that a name, trademark, or other insignia has been removed.
  - 1. CODE REQUIRED LABELS: Locate required product labels and stamps on a concealed surface or, where required for observation after installation, on an accessible surface

- which, in occupied spaces, is not conspicuous.
2. EQUIPMENT NAMEPLATES: Provide a permanent nameplate on each item of service-connected or power-operated equipment. Locate the nameplate on an easily accessible surface which is inconspicuous in occupied spaces. The nameplate shall contain the following information and other essential operating data.
- a. Name of manufacturer.
  - b. Name of product.
  - c. Model number.
  - d. Serial number.
  - e. Capacity.
  - f. Speed.
  - g. Ratings.

### **PART 3 - EXECUTION**

#### **3.1 INSTALLATION OF PRODUCTS**

- A. All manufactured products shall be applied, installed, connected, erected, used, cleaned, and conditioned in accordance with the manufacturer's printed directions, unless herein specified to the contrary. Where manufacturer's printed directions are available and where reference is made to manufacturer's directions in the specifications, the Contractor shall submit copies of such directions to the Engineer in accordance with the requirements of Section 01300 prior to the beginning of any work covered thereby.
- B. Where specific installation instructions are not part of these Specifications and Drawings, all products, materials, and equipment shall be installed in strict accordance with instructions from the respective manufacturer. Where installation instructions included in these Specifications or Drawings are at a variance with instructions furnished by the manufacturer, the Contractor shall make written request for clarification from the Engineer.
- C. In accepting or assenting to the use of any apparatus or material, or make or arrangement thereof, the Engineer in no way waives any of the requirements of these Specifications or the warranty embodied therein.

#### **3.2 ACCEPTANCE OF EQUIPMENT OR SYSTEMS**

- A. The Owner will not accept the start of the warranty period on systems or equipment until Substantial Completion is issued for Owner's occupancy of the building, in part or whole. Contractor shall make such provisions as required to extend the manufacturer's warranty from time of initial operation of systems or equipment until Substantial Completion is given in writing.

**END OF SECTION**

## SECTION 01 29 73

### SCHEDULE OF VALUES

CONDITIONS OF THE CONTRACT, SUPPLEMENTARY CONDITIONS AND DIVISION 1 APPLY TO THIS SECTION.

#### PART 1 - GENERAL

##### 1.1 DESCRIPTION

- A. Work Included: Provide a detailed breakdown of the agreed Contract Sum showing values allocated to each of the various parts of the work, as specified herein and in other provisions of the Contract Documents.
- B. Related Work:
  - 1. Documents affecting work of this section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
- C. QUALITY ASSURANCE
  - 1. Use required means to assure arithmetical accuracy of the sums described. When so required by the Engineer, provide copies of the subcontracts or other data acceptable to the Engineer, substantiating the sums described.
  - 2. The Schedule of Values shall be broken down into costs for each specification section as labor and materials at a minimum.
- D. APPLICATION FOR PAYMENT SCHEDULE OF VALUES
  - 1. The schedule of values, once approved shall be transferred to columns B and C of AIA G702/G703 – Application for Payment to be used for all progress payments.
  - 2. Once AIA G702/G703 – Application for Payment has been submitted for payment, individual line item amounts in column C must remain unchanged throughout the progress of the work.
  - 3. In the beginning stages of the construction, total amounts for entire divisions may be used if complete breakdowns are not available; and shall be line item populated as soon as practical.
  - 4. No payments will be approved in divisions that do not have a line item breakdown.
  - 5. Allowances shall be shown, and remain throughout construction, as a single line item on the master application for payment in amount(s) as stipulated in the Contract Documents.
  - 6. For each Allowance, expenditures and accounting shall be included on a separate, attached spread sheet of the same format as the master application for payment.
  - 7. The master application for payment shall reflect only the summary of each allowance; and shall not contain individual allowance activity(s).
- E. SUBMITTALS
  - 1. Prior to the first Application for Payment, submit a proposed schedule of values to the Engineer, as outlined below.
  - 2. Meet with the Engineer and determine additional data, if any, is required to be submitted.
  - 3. Secure the Engineer's approval of the schedule of values prior to submitting the first Application for Payment.

## **PART 2 - PRODUCTS**

### **2.1 SCHEDULE OF VALUES**

- A. Schedule of values for division 2 through 32 shall be broken down for each separate section of work, and include multiple items covered where appropriate.
  - 1. Each item of work shall be broken down by material and labor at a minimum.
  - 2. Schedule of Values shall be broken out by campus.
  - 3. Where payment for shop drawings, submittals, record drawings and similar are expected, the items must be included as a separate item on the schedule of values.

**END OF SECTION**



## SECTION 01 31 13

### PROJECT COORDINATION

#### CONDITIONS OF THE CONTRACT, AND DIVISION 1 SECTIONS APPLY TO THIS SECTION

#### PART 1 - GENERAL

##### 1.1 DESCRIPTION

- A. This Section specifies administrative and procedural requirements necessary for coordinating Work operations including, but not limited to, the following:
  - 1. General coordination procedures.
  - 2. Sequential work of trades.
- B. Related Work:
  - 1. Section 01 32 16 – Construction Schedule

#### PART 2 - PRODUCTS

##### 2.1 NOT USED

#### PART 3 – EXECUTION

##### 3.1 COORDINATION - GENERAL

- A. Contractor shall coordinate operations included in various sections of Contract Documents to assure efficient and orderly installation of each part of Work. Coordinate Work operations included under related sections of Contract Documents that depend on each other for proper installation, connection, and operation of Work, including but not limited to:
  - 1. Schedule construction operations in sequence required where installation of one part of Work depends on installation of other components, before or after its own installation.
  - 2. Coordinate installation of different components to assure maximum accessibility for required maintenance, service, and repair.
  - 3. Provide provisions to accommodate items scheduled for later installation.
  - 4. Prepare and administer provisions for coordination drawings.
- B. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and assure orderly progress of Work. Such administrative activities include, but are not limited to, following:
  - 1. Preparation of schedules.
  - 2. Installation, relocation, and removal of temporary facilities.
  - 3. Delivery and processing of submittals.
  - 4. Progress meetings.
  - 5. Project closeout activities.
- C. Contractor will be responsible for the overall coordination review. As each coordination drawing is completed, Contractor will meet with Engineer and Owner to review and resolve all conflicts on coordination drawings.

- D. The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of shop drawings, product data, samples or similar submittals until the respective submittal has been reviewed by the Engineer / Consultant without request for re-submittal.

**END OF SECTION**

**SECTION 01 32 16**  
**CONSTRUCTION SCHEDULE**

**CONDITIONS OF THE CONTRACT AND DIVISION 1, AS APPLICABLE, APPLY TO THIS SECTION.**

**PART 1 - GENERAL**

**1.1 SUBMITTALS**

A. Schedules:

1. Preliminary Analysis: Within 7 (seven) days after receipt of Notice to Proceed, submit a preliminary construction schedule for review.
2. Construction Schedule: Within 14 (fourteen) days after receipt of Notice to Proceed, submit one (1) reproducible and four (4) prints of the construction schedule.

**1.2 RELIANCE UPON SCHEDULE**

- A. The construction schedule as approved by the Engineer will be an integral part of the contract and will establish conditions for various activities and phases of constructions.

**1.3 CONSTRUCTION SCHEDULE**

- A. Diagram: Graphically show the order of all activities necessary to complete the work and the sequence in which each activity is to be accomplished.

B. Activities shown on the diagram shall include but not necessarily be limited to:

1. Project mobilization
2. Submittals and approvals of shop drawings and samples
3. Phasing of construction
4. Procurement of equipment and critical materials
5. Fabrication and installation of special material and equipment
6. Final clean up
7. Final inspection and testing

- C. Contractor shall follow and include the critical dates, as indicated below, in the construction schedule. There shall be no deviations from these critical dates unless authorized by Owner/Engineer.

Notice to Proceed Date	Construction Start Date	Substantial Completion Date
May 19, 2023	May 25, 2024	July 31, 2024

**1.4 CONSTRUCTION SCHEDULE LIMITATIONS**

A. Work performed under this Contract shall be done in accordance with the following paragraphs:

1. All work may proceed immediately upon Construction State Date and continue uninterrupted.
2. The Owner has a critical need for all submittals to be ready for review upon Notice to Proceed and the work to begin on Construction Start Date and be Substantially Complete by the substantial completion date.
3. Under the Base Proposal only, the successful Offeror will be 1) entitled to certain extensions of time and 2) subject to liquidated damages for work not completed beyond the agreed date which the Contractor shall required for Substantial Completion of the work included in this contract. Refer to Supplementary Conditions for additional requirements and liquidated damages.

4. Failure to complete and close-out project after substantial completion may result in liquidated damages. Refer to Supplementary Conditions for additional requirements and liquidated damages.
5. The Owner may at his discretion approve changes recommended by the successful Offeror to the above-mentioned schedule provided that the Owner's use of newly completed areas are not disrupted.

**PART 2 - PRODUCTS**

2.1 NOT USED

**PART 3 - EXECUTION**

3.1 NOT USED

**END OF SECTION**

## SECTION 01 33 00

### SUBMITTAL PROCEDURES

#### PART 1 - GENERAL

##### 1.1 GENERAL DESCRIPTION OF WORK OF THIS SECTION

- A. Work of this Section includes procedural requirements for submittals including but not limited to the following items:
1. ADMINISTRATIVE SUBMITTALS INCLUDING:
    - a. Listing of subcontractors.
    - b. Insurance certificates.
    - c. Schedule of Values.
    - d. Performance and Payment Bonds.
    - e. Construction Progress Schedule.
    - f. Inspection and test reports.
    - g. Payment applications.
    - h. Submittal Schedule.
    - i. Product Listing Schedule.
    - j. Project meeting minutes.
  2. SHOP DRAWINGS, INCLUDING:
    - a. Fabrication and installation drawings.
    - b. Patterns.
    - c. Coordination drawings (for use on-site).
    - d. Schedules.
  3. PRODUCT DATA, INCLUDING:
    - a. Manufacturer's product specifications and installation instructions.
    - b. Standard color charts.
    - c. Catalog cuts.
    - d. Roughing-in diagram and templates.
    - e. Standard wiring diagrams.
    - f. Standard product operating and maintenance manuals.
    - g. Manufacturer's product certifications for specified products and as requested by Engineer, and as specified (refer to Section 01600).
  4. SAMPLES, INCLUDING:
    - a. Partial sections of manufactured or fabricated work.
    - b. Small cuts or containers of materials.
    - c. Complete units of repetitively-used materials.
    - d. Swatches showing color, texture and pattern.
    - e. Color range sets.
    - f. Units of work to be used for independent inspection and testing.
  5. MISCELLANEOUS SUBMITTALS, INCLUDING:
    - a. Field measurement data.
    - b. Survey data and reports.
    - c. Testing and certification reports.
  6. CLOSEOUT SUBMITTALS: Refer to Section 01700 for additional requirements.
    - a. Specially-prepared and standard printed warranties.
    - b. Maintenance agreements.
    - c. Workmanship bonds.
    - d. Record drawings.
    - e. Operating and maintenance manuals.
    - f. Keys and other security protection devices.
    - g. Maintenance tools and spare parts.
    - h. Overrun stock.

## PART 2 - PRODUCTS

### 2.1 SHOP DRAWINGS

#### A. SPECIAL SUBMITTAL REQUIREMENTS:

1. OWNER REVIEW OF SHOP DRAWINGS: Owner review will be in addition to Engineer's review. Submit Shop Drawings promptly and allow additional time for the additional review.
2. Schedule of Values.
3. Construction Progress Schedule.
4. Record Drawings: Refer to Section 01700.

#### B. SUBMITTAL PREPARATION: Mark each submittal with a permanent label or title block, as appropriate, for identification with the following information on the label or title block for proper processing and recording of action taken.

1. Title of submittal and date submitted.
2. Sheet number and number of sheets included (as applicable). Number drawings consecutively.
3. Name and location of Project.
4. Name of Engineer and Engineer's Job Number.
5. Name of Contractor, subcontractor, fabrication supplier, and manufacturer, as appropriate.
6. Name of drawing and scale (as applicable).
7. Name and date of each revision.
8. Cross reference to Engineer's Drawings and Specification Section, as appropriate.
9. Provide a space on the label or adjacent to title block for the Contractor's review and approval markings, and appropriate space for the Engineer's "Action" stamp.
10. Number each submitted transmittal sequentially and individually.
11. Contractor's stamp shall provide Project name, date of Contractor review, and number of submittal.

#### C. SUBMITTAL TRANSMITTAL: Package each submittal appropriately for transmittal and handling. Transmit each submittal from the Contractor to the Engineer, and to other destinations as indicated, by use of a transmittal form. Contractor shall be responsible for delivery and pick-up of all submittals. Submittals received from sources other than the Contractor will be returned to the sender "without action". Use a transmittal form with places for the following information:

1. Project name.
2. Date.
3. To:
4. From:
5. Names of subcontractor, manufacturer and supplier.
6. References.
7. Category and type of submittal.
8. Submittal purpose and description.
9. Submittal and transmittal distribution record.
10. Signature of transmitter.
11. Contractor's certification stating that the information submitted complies with the requirements of the Contract Documents, with a place for the Contractor's signature.
12. Record relevant information and requests for data on the transmittal form. On the transmittal form, or on a separate sheet attached to the form, record deviations from the requirements of the Contract Documents, if any, including minor variations and limitations.

#### D. REPRODUCTION AND DISTRIBUTION OF SUBMITTALS AFTER ENGINEER'S REVIEW: Make blue-line prints of reviewed drawing reproducible transparencies as required to provide 1 copy for Job Site file ("Approved" and "Approved as Corrected" status only), and copies necessary for Contractor operations. Distribute sets of data and brochures to provide 1 copy for Job Site file ("Approved" and "Approved as Corrected" status only) and others as necessary for Contractor operations. Retain Job Site mock-ups and samples until removal is approved by Engineer.

## 2.2 SPECIFIC SUBMITTAL REQUIREMENTS:

- A. GENERAL: Specific submittal requirements for individual units of work are specified in the applicable Specification Section. Except as otherwise indicated in the individual Specification Sections, comply with the requirements specified herein for each type of submittal.
1. Refer to Section 01600 for additional submittal requirements relating to the Product Listing Schedule and Substitution Requests.
- B. CONSTRUCTION PROGRESS SCHEDULE: Upon award of the Contract, the Contractor shall consult with the Engineer and Owner regarding the order in which the Work is to be performed and shall prepare a Construction Progress Schedule for the Owner's and Engineer's review. This Schedule shall be in a form approved by Engineer and Owner, and shall show a sequence of operations mutually agreeable to all parties concerned, including the work in connection with or affecting the use of streets, services, and utilities, based on final completion of all Work on or before the completion date stated in the Contract. Revise regularly as required. Schedule early completion of designated areas for Owner's usage prior to Substantial Completion of entire Project.
- C. SCHEDULE OF VALUES:
1. Submit Schedule of Values to Engineer for approval.
    - a. Upon request by Engineer support values given with data that will substantiate their correctness.
    - b. Submit quantities of designated materials.
    - c. Use Schedule of Values only as basis for Contractor's Application for Payment.
      - 1) Submit updated Schedule of Values with each Application for Payment.
  2. Submit typewritten Schedule of Values on AIA Document G703 Continuation Sheet.
    - a. Use Specification Table of contents as basis of format for listing costs of Work for Sections under Divisions 2 through 16.
    - b. Identify each line item with number and title as listed in Specification Table of Contents.
  3. Itemize separate line item cost for each of the following cost items:
    - a. Performance and Payment Bonds.
    - b. Field supervision and layout.
    - c. Temporary facilities and controls.
  4. Itemize separate line item cost for work required by each Section of the Specifications.
  5. Round off figures to nearest ten dollars.
  6. Make sum of total costs of all items listed in Schedule equal to total Contract Sum.
  7. After review by Engineer, revise and resubmit Schedule of Values as required.
  8. Resubmit revised Schedule(s) in same manner.

## PART 3 - EXECUTION

### 3.1 REVIEW PROCEDURE

- A. Upon receipt of submittals requiring review, the Engineer will review submittals and return them to the Contractor with results of the review indicated as follows:
1. NO EXCEPTION TAKEN: Means the submittals has been reviewed for conformance with the design concept of the Work and with the information given in the Contract Documents and no exceptions are taken; fabrication/installation may be undertaken. Approval does not authorize changes to the Contract Sum or Contract Time.
  2. MAKE CORRECTIONS NOTED: Means submittal has been reviewed as above and certain exceptions are noted; Contractor may proceed with the work incorporating the notes, but shall revise and resubmit the submittal to the Engineer until no exceptions are taken.
  3. REVISE AND RESUBMIT: Means submittal has been reviewed as above and is not acceptable for one of the reasons specified below. In resubmitting, limit corrections to items marked.

- a. Not enough information is provided to make a determination.
  - b. Submittal contains too many errors or omissions to make a determination.
  - c. Information provided is not in conformance with the information given in the Contract Documents. Fabrication/installation may not be undertaken until submittal has been revised and resubmitted and approved by the Engineer.
4. REJECTED/SUBMIT SPECIFIED ITEM: Means submittal has been reviewed as above and been found to be not in compliance with information given in the Contract Documents and fabricated/installation may not be undertaken. Do not revise or resubmit submittals marked Rejected or Submit Specific Item.

**END OF SECTION**



**SECTION 01 36 13**  
**CUTTING AND PATCHING**

**CONDITIONS OF THE CONTRACT AND DIVISION 1, AS INDEXED, APPLY TO THIS SECTION.**

**PART 1 - GENERAL**

1.1 REQUIREMENTS INCLUDED

- A. Requirements and limitations for cutting and patching of work.

1.2 DESCRIPTION OF REQUIREMENTS

- A. Definition: "Cutting and patching" includes cutting into existing construction to provide for the installation or performance of other work and subsequent fitting, and patching required to restore surfaces to their original condition. This includes removal and replacement of existing ACT ceilings.
1. Cutting and patching is performed for coordination of the work, installation of the work, to uncover work for access or inspection, to obtain samples for testing, to permit alterations to be performed, to remove and replace work not conforming to Contract requirements, or for other similar purposes.
  2. during the initial fabrication, erection of installation processes is not considered to be "cutting and patching" under this definition. Drilling of holes to install fasteners and similar operations are also not considered to be cutting and patching.
- B. Refer to other sections of these specifications for specific cutting and patching requirements, and limitations applicable to individual units or work.
1. Unless otherwise specified, requirements of this Section apply to mechanical and electrical work. Refer to Division 26 sections for additional requirements and limitations on cutting and patching of mechanical and electrical work.

1.3 RELATED REQUIREMENTS

- A. Individual Specifications Sections:
1. Cutting and patching incidental to work of this Section.
  2. Advance notification to other trades of openings required in work of those trades.
  3. Limitations on cutting structural members.

1.4 QUALITY ASSURANCE

- A. Requirements for Structural Work: Do not cut and patch structural work in a manner that would result in a reduction of load-carrying capacity or load-deflection ratio.
- B. Before cutting and patching the following categories of work, submit a written request and obtain the Architect's consent to proceed with cutting and patching, as described in the procedural proposal for cutting and patching.
1. Structural steel
  2. Miscellaneous structural metals, including lintels, equipment supports, stair systems and similar categories of work
  3. Structural concrete
  4. Foundation construction
  5. Shoring assemblies
  6. Bearing and retaining walls
  7. Structural decking

8. Exterior wall construction
  9. Piping, ductwork, vessels and equipment
- C. Operational and Safety Limitations: Do not cut and patch operational elements or safety related components in a manner that would result in a reduction of their capacity, to perform in the manner intended, including energy performances, or that would result in increased maintenance, or decreased operational life, or decreasing safety. Before cutting and patching the following elements of work, and similar work elements where directed, obtain the Architect's consent to proceed with cutting and patching.
1. Shoring, bracing, and sheeting
  2. Primary operational systems and equipment
  3. Water/moisture vapor/air/smoke barriers, membranes and flashings
  4. Noise and vibration control elements and systems
  5. Control, communication, conveying, and electrical wiring systems
  6. Special construction, as specified by Division 13 sections
- D. Visual Requirements: Do not cut and patch work exposed on the building's exterior or in its occupied spaces, in a manner that would, in the Architect's opinion, result in lessening the building's aesthetic qualities. Do not cut and patch work in a manner that would result in substantial visual evidence of cut and patch work. Remove and replace work judged by the Architect to be cut or patched in a visually unsatisfactory manner. If possible, retain the original installer or fabricator, or another recognized, experienced and specialized firm to cut and patch the following categories of exposed work:
1. Architectural concrete finishes
  2. Brick and concrete unit masonry
  3. Ornamental metal
  4. Roofing
  5. Preformed metal panels
  6. Window system
  7. Gypsum or cement plaster
  8. Acoustical ceilings
  9. Carpeting
  10. Wall covering
  11. HVAC enclosure, cabinets or covers

## 1.5 SUBMITTALS

- A. Submit written request in advance of cutting or alteration which affects:
1. Structural integrity of any element of the project
  2. Integrity of weather-exposed or moisture-resistant element
  3. Efficiency, maintenance, or safety of any operational element
  4. Visual qualities of sight-exposed elements
  5. Work of Owner or separate contractor
  6. Any work in or around any known or potential area in which asbestos or lead based products exist.
- B. Procedural Proposal for Cutting and Patching: Where prior consent for cutting and patching is required, submit proposed procedures for this work well in advance of the time work will be performed, and request consent to proceed. Include the following information, as applicable, in the submittal:
1. Describe the nature of the work and how it is to be performed, indicating why cutting and patching cannot be avoided. Describe anticipated results of the work in terms of changes to and effects upon existing work, including structural, operational and visual changes, as well as other significant elements.
  2. List products to be used and firms that will perform work.
  3. Give dates when work is expected to be performed.

4. List utilities that will be disturbed or otherwise be affected by work, including those that will be relocated and those that will be temporarily out of service. Indicate how long utility services will be disrupted.
5. Where cutting and patching of structural work involves the additional reinforcement, submit details and engineering calculations to show how that reinforcement is integrated with the original structure to satisfy requirements.
6. Consent by the Architect to proceed with cutting and patching work does not waive the Architect's right to later require complete removal and replacement of work found to be cut and patched in an unsatisfactory manner.

#### 1.6 PAYMENT FOR COSTS

- A. Cost for work necessary to accommodate installation of new work shall be borne by the Contractor or subcontractor responsible for installing new work.
- B. Costs caused by ill-timed or defective work, or work not conforming to contract documents, including costs for additional services of the Architect and other Design Consultants shall be borne by the party responsible in the judgment of Architect, for ill-timed, rejected or non-conforming work.
- C. Costs for work performed on instruction of Owner, other than the correction of defective or non-conforming work shall be responsibility of the Owner, who shall issue an appropriate Change Order for the increase in costs.

### **PART 2 - PRODUCTS**

#### 2.1 MATERIALS

- A. General: Except as otherwise indicated, or as directed by the Architect, use materials for cutting and patching that are identical to existing materials. If identical materials are not available or cannot be used, use materials that match existing adjacent surfaces to the fullest extent possible, with regard to visual effect. Use materials for cutting and patching that will result in equal-or-better performance characteristics.
- B. For any change in material, submit a request for substitution under the provisions of Section 01600.

### **PART 3 - EXECUTION**

#### 3.1 GENERAL

- A. Execute cutting, fitting, and patching to complete work, and to:
  1. Fit several parts together which will integrate with other work.
  2. Uncover work to install ill-timed work.
  3. Remove and replace defective and non-conforming work.
  4. Remove samples of installed work for testing.
  5. Provide openings in elements of work for penetrations of mechanical and electrical work.
  6. Fill and refinish existing holes and damaged areas.

#### 3.2 INSPECTION

- A. Before cutting, examine the surface to be cut and patched and the conditions under which the work is to be performed. If unsafe or otherwise unsatisfactory conditions are encountered, take corrective action before proceeding with the work.

#### 3.3 PREPARATION

- A. To prevent failure, provide temporary support of work to be cut.

- B. Protect other work during cutting and patching to prevent damage. Provide protection from adverse weather conditions for that part of the project that may be exposed during cutting and patching operations.
- C. Take precautions not to cut existing pipe, conduit or duct serving the building, but scheduled to be relocated until provisions have been made to bypass them.

### 3.4 PERFORMANCE

- A. Employ skilled workmen to perform cutting and patching work. Except as otherwise indicated or as approved by the Architect, proceed with cutting and patching at the earliest feasible time and complete work without delay.
- B. Cut the work using methods that are least likely to damage work to be retained or adjoining work. Where possible, review the proposed procedures with the original installer; comply with original installer's recommendations.
  - 1. In general, where cutting is required, use hand or small power tools designed for sawing or grinding, not hammering and chipping. Cut through concrete and masonry using a cutting machine such as a carborundum saw or core drill to ensure a neat hole. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces. Temporarily cover the opening when not in use.
  - 2. Comply with requirements of applicable sections of Division 2 when cutting and patching, excavating and backfilling.
  - 3. Bypass utility services such as pipe and conduit, before cutting, where such utility services are shown or required to be removed, relocated or abandoned. Cut-off conduit and pipe in walls or partitions to be removed. After bypassing and cutting, cap, valve or plug, and seal tight the remaining portion of pipe and conduit to prevent entrance of moisture or other foreign matter.
- C. Patching: Patch with seams which are durable and as visible as possible. Comply with specified tolerances for the work.
  - 1. Where feasible, inspect and test patched areas to demonstrate integrity of work.
  - 2. Restore exposed finishes of patched areas, and where necessary, extend finish restoration into retained adjoining work in a manner which will eliminate evidence of patching and refinishing.
  - 3. Where removal of walls or partitions extend one finished area into another finished area, patch and repair floor and wall surfaces in the new space to provide an even surface of uniform color and appearance. If necessary to achieve uniform color and appearance, remove the existing floor and wall coverings and replace with new materials.
    - a. Where a patch occurs in a smooth painted surface, extend final paint coat over the entire unbroken surface containing the patch, after the patched area has received prime and base coat.
  - 4. Patch, repair or rehang existing ceilings as necessary to provide an even plane surface of uniform appearance.
- D. Fit work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- E. At penetrations of fire-rated wall, ceiling, or floor construction, completely seal voids with fire-rated material, full thickness of the construction element.
- F. Refinish surfaces to match adjacent finishes. For continuous surfaces, refinish to nearest intersection; for an assembly, refinish entire unit.

### 3.5 CLEANING

- A. Thoroughly clean areas and spaces where work is performed or used as access to work. Completely remove paint, mortar, oils, putty and items of similar nature. Thoroughly clean piping, conduit and similar features before painting or other finish is applied. Restore damaged pipe covering to its original condition.

**END OF SECTION**

## SECTION 01 36 16

### REMODELING AND ALTERATION PROCEDURES

CONDITIONS OF THE CONTRACT AND DIVISION 1, AS INDEXED, APPLY TO THIS SECTION.

#### PART 1 - GENERAL

##### 1.1 REQUIREMENTS INCLUDED

- A. This Section contains general provisions and requirements pertaining to all remodeling, removal and relocation work in the existing building, and becomes a part of each Section and Division performing remodeling, removal and relocation work for this project, with the same force and effect as if written in full therein.
- B. Take all necessary precautions to keep trespassers out of the work areas. Secure work areas from entry when work is not in progress.
- C. Perform all remodeling, demolition, removal and relocation work in strict accordance with Owner's instructions and applicable Federal, State and local health and safety standards, codes and ordinances. Where conflicts occur, the more restrictive requirement shall govern.

##### 1.2 EXISTING CONDITIONS

- A. Obvious existing conditions, installations and obstructions affecting the work shall be taken into consideration as necessary. Work to be done is the same as though they were completely shown or described.
- B. Items of existing construction indicated to remain upon completion of the Contract, but which require removal to complete the work, shall be carefully removed and replaced as required. The replaced work shall match its condition at the start of the work, unless otherwise required.
- C. Visit the site and inspect all existing conditions, including access to the site, the nature of structures, objects and materials to be encountered, and all other facts concerning or affecting the work. Information on the drawings showing existing conditions does not constitute a guarantee that other items may not be found or encountered.
- D. Utilities: Do not interrupt existing utilities serving occupied or used facilities, except when authorized by the Architect in writing two weeks in advance. Provide temporary services during interruptions to existing utilities.
- E. Stop work and notify Architect and owner immediately if any hazardous materials are encountered (especially asbestos or lead based products).

#### PART 2 - PRODUCTS

##### 2.1 SALVAGED MATERIALS

- A. The Owner reserves the right of first refusal on all salvaged items. Remove remaining items from the site as work progresses. Storage or sale of items on site is not permitted. Burning of removed materials on site is not permitted.
- B. Store salvaged items in a dry, secure place on site.
- C. Salvaged items not required for use in repair of existing work shall remain the property of the Owner.

- D. Do not incorporate salvaged or used material in new construction, except with permission of the Architect.

## 2.2 PRODUCTS FOR PATCHING, EXTENDING AND MATCHING

- A. Contract documents do not define products or standards of workmanship present in existing construction. Determine products by inspection and by use of the existing construction. Provide same or similar quality products or types of construction such as the existing structure, where needed to patch or extend existing work.
- B. If reasonably matched products are not obtainable, improve appearance by minor relocating some of the existing products, and grouping new ones in a pattern arranged by the Architect. Do not replace products scheduled for retaining because matching ones are not obtainable, except as directed by a Change Order.

## PART 3 - EXECUTION

### 3.1 PROTECTION OF WORK TO REMAIN

- A. Protect existing work from damage by use of barricades, tarpaulins, temporary walls, plywood, planking, masking, or other suitable means and methods as approved by the Architect.
- B. If work to remain in place is damaged, restore to original condition at no additional cost to the Owner.
- C. Concealed Conditions: If conditions cause changes in the work from requirements of the Contract Documents, the Contract Sum will be adjusted in accordance with the General Conditions.

### 3.2 PROCEDURES

- A. Refinishing at Removed Work: Cut below the surface of substrate materials and patch over the area of removal with finish materials so removal is not apparent.
- B. Remove and replace existing ceilings, cut, patch, or replace existing walls, partitions and floors, as may be necessary for access to valves, ductwork, piping, conduit and tubing by mechanical and electrical trades, as directed and approved by the Architect. Work involved shall be performed by the appropriate subcontractor, or by other properly qualified subcontractors.
- C. Patch and extend existing work using skilled mechanics who are capable of matching existing quality of workmanship. Quality of patched or extended work shall not be less than that specified for new work.
- D. Cutting:
  - 1. Concrete and Masonry: Saw cut where feasible.
  - 2. Plaster: Cut back to sound plaster on straight lines, and back-bevel edges of remaining plaster. Trim and prepare existing lath for tie-in of new lath.
  - 3. Woodwork: Cut back to a joint or panel line. Undamaged removed materials may be reused.
  - 4. Resilient Tiles: Remove in whole units to natural breaking points or straight joint lines, with no damaged or defective existing tiles remaining where joining new construction.
  - 5. Salvaged Materials: Carefully remove to avoid damage, thoroughly clean and reinstall as indicated, or store as directed.
  - 6. Doors: Remove in such manner as to facilitate filling in of openings or installation of new work, as required by the drawings.
  - 7. Structural Elements: Remove only as shown on the Structural drawings. If not specifically shown, but removal is required, perform such removal or alteration only upon written approval of the Architect. Do not damage or alter any structural element of the existing building.

- E. Patching:
  - 1. Match existing work where possible; if unavailable, use salvage material for patching, and provide totally new material in areas where salvage has been removed. Consult with the Architect concerning locations for salvaging materials.
  - 2. Repairs or continuations of existing work shall be relatively imperceptible in the finished work when viewed under finished lighting conditions from a distance of 6 feet.
  - 3. Patching, Repairing, and Finishing of Existing Work: Perform in compliance with the applicable requirements of the specification section covering the work to be performed and the requirement of this Section.
  
- F. Erect scaffolding as necessary to gain access to the various parts of the work. Provide structurally sound, rigidly braced and properly constructed scaffolding, shoring and bracing as necessary to positively protect the affected elements and building, and to support the activities or workmen and loads. Design and construction of scaffolds and supports shall be in accordance with applicable safety regulations. Material used shall be adequate to support anticipated loads with a properly calculated margin of safety.
  
- G. Noise Producing Equipment: Minimize use of noise producing equipment. Limit excessive noise to periods of vacancy or provide sound control. Arrange schedules in advance with the Architect.

### 3.3 EXISTING FURNITURE AND EQUIPMENT

- A. Owner Salvaged Items: Personal items in areas subject to remodeling will be removed before construction in those areas commences.
  
- B. Furniture Items: Before remodeling commences, remove all furniture and equipment from each space, store items as necessary, and replace these items to the same locations after each remodeling phase is complete.

### 3.4 PAINTING AND FINISHING

- A. Preparation: Prepare patched areas as required for new work. Wash existing painted surfaces with neutral soap or detergent, thoroughly rinse, and sand when dry.
  
- B. Painting and Finishing: Conform to the applicable provisions of the Painting Section. Prepare bare areas and patches in existing painted surfaces with specified primer and intermediate coats, sanded smooth and flush with adjoining surfaces.

### 3.5 DISPOSAL OF DEBRIS

- A. Remove material, debris and rubbish resulting from work of this Section from the building and site as it accumulates. Keep all areas of work in "broom clean" condition as the work progresses.
  
- B. At completion of renovation and remodeling work in each area, provide final cleaning and return space to a condition suitable for use by the Owner.

**END OF SECTION**



## SECTION 01 41 00

### REGULATORY REQUIREMENTS

#### PART 1 - GENERAL

##### 1.1 DEFINITIONS

- A. GENERAL: Basic Contract definitions are included in the General Conditions.
- B. Indicated refers to graphic representations, notes or schedules on the Drawings, or other Paragraphs or Schedules in Specifications, and similar requirements in Contract Documents. Where terms such as "shown", "noted", "scheduled", and "specified" are used, it is to help locate the reference; no limitation on location is intended except as specifically noted.
- C. DIRECTED: Terms such as "directed", "requested", "authorized", "selected", "approved", "required", and "permitted" mean "directed by the Engineer", requested by the Engineer", and similar phrases. However, no implied meaning shall be interpreted to extend the Engineer's responsibility into the Contractor's area of construction supervision.
- D. APPROVE: The term "approved", where used in conjunction with the Engineer's action on the Contractor's submittals, applications, and requests, is limited to the duties and responsibilities of the Engineer as stated in General and Supplementary Conditions. Such approval shall not release the Contractor from responsibility to fulfill Contract requirements unless otherwise provided in the Contract Documents.
- E. REGULATION: The term "Regulations" includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work, whether lawfully imposed by authorities having jurisdiction or not.
- F. FURNISH: The term "furnish" is used to mean "supply and deliver to the Project site, ready for unloading, unpacking, assembly, installation, and similar operations".
- G. INSTALL: The term "install" is used to describe operations at project site including the actual "unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations".
- H. PROVIDE: The term "provide" means "to furnish and install, complete and ready for the intended use".
- I. INSTALLER: An "Installer" is the Contractor or an entity engaged by the Contractor, either as an employee, subcontractor, or sub-subcontractor for performance of a particular construction activity, including installation, erection, application, and similar operations. Installers are required to be experienced in the operations they are engaged to perform.
- J. Project Site is the space available to the Contractor for performance of construction activities, either exclusively or in conjunction with others performing other construction activities as part of the Project. The extent of the Project Site is shown on the Drawings and may or may not be identical with the description of the land upon which the Project is to be built.
- K. TESTING LABORATORIES: A "testing laboratory" is an independent entity engaged to perform specific inspections or tests, either at the Project Site or elsewhere, and to report on and, if required, to interpret results of those inspections or tests.

##### 1.2 SPECIFICATION FORMAT AND CONTENT EXPLANATION

- A. SPECIFICATION FORMAT: These Specifications are organized into Divisions and Sections based on the Construction Specifications Institute's 23-Division format and MASTERFORMAT numbering

system.

- B. **SPECIFICATION CONTENT:** This Specification uses certain conventions in the use of language and the intended meaning of certain terms, words, and phrases when used in particular situations or circumstances. These conventions are explained as follows:
1. **ABBREVIATED LANGUAGE:** Language used in the Specifications and other Contract Documents is the abbreviated type. Implied words and meanings will be appropriately interpreted. Singular words will be interpreted as plural and plural words interpreted as singular where applicable and where the full context of the Contract Documents so indicates.
  2. Imperative and streamlined language is used generally in the Specifications. Requirements expressed in the imperative mood are to be performed by the Contractor. At certain locations in the text, for clarity, subjective language is used to describe responsibilities that must be fulfilled indirectly by the Contractor, or by others when so noted.
- C. **ASSIGNMENT OF SPECIALISTS:** The Specification requires that certain specific construction activities shall be performed by specialists who are recognized experts in the operations to be performed. The specialists must be engaged for those activities, and assignments are requirements over which the Contractor has no choice or option. Nevertheless, the ultimate responsibility for fulfilling Contract requirements remains with the Contractor.
1. This requirement shall not be interpreted to conflict with enforcement of building codes and similar regulations governing the Work. It is also not intended to interfere with local trade union jurisdictional settlements and similar conventions.
  2. **TRADES:** Use of titles such as "carpentry" is not intended to imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter". It also does not imply that requirements specified apply exclusively to tradespersons of the corresponding generic name.

### 1.3 INDUSTRY STANDARDS

- A. **APPLICABILITY OF STANDARDS:** Except where the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents. Such standards are made a part of the Contract Documents by reference. Individual Sections indicate which codes and standards the Contractor must keep available at the Project Site for reference.
- B. **PUBLICATION DATES:** Where the date of issue of a referenced standard is not specified, comply with the standard in effect as of date of Contract Documents.
1. **UPDATE STANDARDS:** At the request of the Engineer, Contractor, or authority having jurisdiction, submit a Change Order proposal where an applicable code or standard has been revised and reissued after the date of the Contract Documents and before performance of Work affected. The Engineer will decide whether to issue a Change Order to proceed with the updated standard.
- C. **CONFLICTING REQUIREMENTS:** Where compliance with two or more standards is specified, and they establish different or conflicting requirements for minimum quantities or quality levels, the most stringent requirement will be enforced, unless the Contract Documents indicate otherwise. Refer requirements that are different, but apparently equal, and uncertainties as to which quality level is more stringent to the Engineer for a decision before proceeding.
1. **MINIMUM QUANTITY OR QUALITY LEVELS:** In every instance the quantity or quality level shown or specified shall be the minimum to be provided or performed. The actual installation may comply exactly, within specified tolerances, with the minimum quantity or quality specified, or it may exceed that minimum within reasonable limits. In complying with these requirements, indicated numeric values are minimum or maximum values, as

noted, or appropriate for the context of the requirements. Refer instances of uncertainty to the Engineer for a decision before proceeding.

D. COPIES OF STANDARDS: Each entity engaged in construction on the Project is required to be familiar with industry standards applicable to that entity's construction activity. Copies of applicable standards are not bound with the Contract Documents.

1. Where copies of standards are needed for performance of a required construction activity, the Contractor shall obtain copies directly from the publication source.

E. ABBREVIATIONS AND NAMES: Trade association names and titles of general standards are frequently abbreviated. The following acronyms or abbreviations as referenced in Contract Documents are defined to mean the associated names. Names and addresses are subject to change and are believed to be, but are not assured to be, accurate and up to date as of the date of Contract Documents.

AA	Aluminum Association 900 19th St., NW, Suite 300 Washington, DC 20006 (200) 862-5100	ALI	Associated Laboratories 641 S. Vermont St. Palatine, IL 60067 (312) 358-7400
AAMA	American Architectural Manufacturer's Association 2700 River Rd. Suite 118 Dds Plaines, IL 60018 (312) 699-7310	ALSC	American Lumber Standards Committee P.O.Box 210 Germantown, MD 20874 (301) 972-1700
ACI	American Concrete Institute P.O. Box 19150 Detroit, MI 48219 (313) 532-2600	ALSC	American national Standards Institute 1430 Broadway New York, NY 10018 (212) 354-3300
ACIL	American Council of Independent Laboratories 1725 K St., NW Washington, DC 20006 (202) 887-5872	APA	American Plywood Asociaiton P.O. Box 11700 Tacoma, WA 98411 (206) 565-6600
AGA	American Gas Assocation 1515 Wilson Blvd. Arlington, VA 22209 (703) 847-8400	API	American Pertroleum Institute 1200 L St., NW Washington, DC 20005 (202) 682-8000
AI	Asphalt Institute Asphalt Institute Building College Park, MD 20740 (310) 277-4258	ARMA	Asphalt Roofing Manufacturers Association 6288 Montrose Rd Rockville, MD 20852 (301) 231-9050
AIA	American Institute of Architects 1735 New York Ave., NW Washington, DC 20006 (202) 626-7300	ASC	Adhesive and Sealant Council 1500 Wilson Blvd., Suite 515 Arlington, VA 22209 (703) 841-1112
A.I.A.	American Insurance Association 85 John St.	ASME	American Society of Mechanical Engineers

	New York, NY 10038 (212) 669-0400		345 East 47th St. New York, NY 10017 (212) 705 7722
AIHA	American Industrial Hygiene Association 475 Wolf Ledges Parkway Akron, OH 44311 (216) 762-7294	ASTM	American Society for Testing and Materials 1916 Race St. Philadelphia, PA 19103 (215) 299-5400
AISC	American Institute of Steel Construction 400 N. Michigan Ave., 8th Floor Chicago, IL 60611 (312) 670-2400	AWS	American Welding Society P.O. Box 351040,550 Jeune Road NW Miami, FL 33135 (305) 443-9353
AITC	American Institute of Timber Construction 333 W. Hampden Ave. Engelwood, CO 80110 (303) 761-3212	ISA	Instrument Society of America P.O. Box 12277, 67 Alexander Drive Research Triangle Park, NC 27709 (919) 549-8411
AWWA	American Water Works Association 6666 W. Quincy Ave. Denver, CO 80235 (303) 794-7711	LPI	Lightning Protection Institute P.O. Box 458 Harvard, IL 60033 (815) 943-7211
BHMA	Builders' Hardware Manufacturers Association 60 E. 42nd St., Room 511 New York, NY 10165 (212) 682-8142	ML/SFA	Metal Lath/Steel Framing Association 600 S. Federal St., Suite 400 Chicago, IL 60605 (312) 922-6222
CDA	Copper Development Association Box 1840, Greenwich Office Park 2 Greenwich, CT 06836 (203) 625-8210	MSS	Manufacturers Standardization Society of the Valve and Fittings Industry 127 Park St., NE Vienna, VA 22180 (703) 281-6613
CRSI	Concrete Reinforcing Steel Institute 933 Plum grove Rd.Schaumburg, IL 60195 (312) 490-1700	NAAMM	National Association of Architect Metal Mfg. 600 S. Federal St., Suite 400 Chicago, IL 60605 (312) 922-6222
EIA	Electronic Industries Association 2001 Eye St., NW Washington, DC 20006 (202) 457-4900	NCMA	National Concrete Masonary Association P.O. Box 781 Herndon, VA 22070 (703) 435-4900
ETL	ETL Testing laboratories, Inc P.O. Box 2040 Route 11, Industrial Park Cortland, NY 13045 (607) 753-6711	NEC	National Electric Code (from NFPA)

FM	Factory Mutual Engineering and Research 1151 Boston Providence Turnpike Norwood, MA 02062 (617) 762-4300	NECA	National Electric Contractors Association 7315 Wisconsin Ave. Bethesda, MD 20814 (301) 657-3110
ICEA	Insulated Cable Engineers Association Inc. P.O. Box P South Yarmouth, MA 02664 (617) 394-4424	NEMA	National Electrical Manufacturers Association 2101 L St., NW, Suite 300 Washington, DC (202) 457-8400
IEC	International Electrotechnical Commission (Available from ANSI) 1430 Broadway New York, NY 10018 (212) 354-3300	NFPA	National Fire Protection Association Battlemarch Park Quincy, MA 02269 (617) 770-3000
IEEE	Institute of Electrical and Electronic Engineers 345 E. 47th St. New York, NY 10017 (203)520-7300	NPCA	National Paint and Coating Association 1500 Rhode Island Ave., NW Washington, DC 20005 (202) 462-6272
IRI	Industrial Risk Insurers 85 Woodland St. Hartford, CT 06102 (203) 520-7300	NSSEA	National School Supply and Equipment Association 2020 Fourteenth St. North, Suite 400 Arlington, VA 22201 (703) 524-8819
PCA	Portland Cement Association 5420 Old Orchard road Skokie, IL 60077 (312) 966-6200	SSPC	Steel Structures Painting Council 4400 Fifth Ave. Pittsburgh, PA 15213 (412) 268-3327
PDI	Plumbing and Drainage Institute (c/o Saul Baker) 1106 W. 77th St., South Dr. Indianapolis, IN 46260 (317) 251-6970	TIMA	Thermal Insulation Manufacturers Association 8341 Sangre de Cristo Road Littleton, CO 80217 (303) 933-9774
RMA	Rubber Manufacturers Association 1400 K St., NW Washington, DC 20005 (202) 682-4800	UL	Underwriters Laboratories 333 Pfingsten Rd. Northbrook, IL 60062 (312) 272-8800
SDI	Steel Deck Institute P.O. Box 9506 Canton, OH 44711 (216) 493-7886	WRI	Wire Reinforcement Institute 8361-A Greensboro Drive McLean, VA 22102 (703) 790-9790
SJI	Steel Joist Institute 1205 48th Street North, Suite A Myrtle beach, SC 29577 (803) 449-0487	WWPA	Woven Wire Products Association 2515 N. Nordica Ave. Chicago, IL 60635 (312) 637 1359

F. FEDERAL GOVERNMENT AGENCIES: Names and titles of federal government standard or Specification producing agencies are frequently abbreviated. The following acronyms or abbreviations referenced in the Contract Documents indicate names of standard or Specification producing agencies of the federal government. Names and address are subject to change but are believed to be, but are not assured to be, accurate and up to date as of the date of the Contract Documents.

<p>CE    Coprs of Engineers (U.S. Department of the Army) Chief of Engineers - Referral Washington, DC 20314 (202) 272-0660</p>	<p>DOT    Department of Transportation 400 Seventh St., SW Washington, DC 20590 (202) 366-4000</p>
<p>CFR    Code of Federal Regulations Available from the Government Printing Office N Capital St. between G and H St. WWashington, DC 20402 (202) 783-3238 (Material is usually first published in the Federal Register)</p>	<p>EPA    Environmental Protection Agency 401 M St., SW Washington, DC 20460 (202) 382-2090</p>
<p>CPSC    Consumer Produt Safety Commission 5401 Westbard Ave. Bethesada, MD 20816 (800) 638-2772</p>	<p>FAA    Federal Aviation Administration (U.S. Department of Transportation) 800 Independence Ave., SW Washington, DC 20590 (202) 366-4000</p>
<p>CS    Commercial Standard(U.S. Department of Commerce)Government Printing OfficeWashington, DC 20402 (202) 377-2000</p>	<p>FCC    Federal Communications Commission 1919 M St., NW Washington, DC 20554 (202) 632-7000</p>
<p>DOC    Department of Commerce 14th St and Constitution Ave., NW Washington, DC 20230 (202) 377-2000</p>	<p>FHA    Federal Housing Administration (U.S. Department of Housing and Urban Development) 451 Seventh St., SW Washington, DC 20201 (202) 755-6422</p>
<p>FS    Federal Specification (from GSA) Specifications Unit (WFSIS) 7th and D St., SW Washington, DC 20406 (202) 472 2205 or 472-2140</p>	<p>OSHA    Occupational Safety and health Administration (U.S. Department of Labor) Government printing Office Washington, DC 20402 (202) 523-609</p>
<p>GSA    General Service Administration F St. and 18th St., NW Washington, DC 20405 (202) 472-1082</p>	<p>PS    Product Standard of NBS (U.S. Department of Commerce) Government Printing Office Washington, DC 20402</p>
<p>MIL    Military Standization Documents (U.S. Department of Defence)</p>	<p>USDA    U.S. Department of Agriculture Independence Ave. between 1</p>

Naval Publications and Forms Center  
5801 Labor Ave.  
Philadelphia, PA 19120

2th and 14th St., SW  
Washington, DC 20250  
(202) 447 8732

NIST National Institute of Standards and  
Technology  
(U.S. Department of Commerce)  
Gaithersburg, MD 20899  
(301) 975-2000

#### 1.4 GOVERNING REGULATIONS/AUTHORITIES

A. The Engineer has contacted authorities having jurisdiction where necessary to obtain information necessary for the preparation of Contract Documents; that information may or may not be of significance to the Contractor. Contact authorities having jurisdiction directly for information and decisions having a bearing on the Work.

1. **COPIES OF CORRESPONDENCE:** During preparation of the Contract Documents, the Engineer maintained a file of correspondence with authorities having jurisdiction. This file is available at the Engineer's office for reference. If requested, the Engineer will provide copies of correspondence at cost of reproduction.

#### 1.5 SUBMITTALS

A. **PERMITS, LICENSES, AND CERTIFICATES:** For the Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, and similar documents, correspondence, and records established in conjunction with compliance with standards and regulations bearing upon performance of the Work.

#### **PART 2 - PRODUCTS (NOT APPLICABLE)**

#### **PART 3 - EXECUTION (NOT APPLICABLE)**

**END OF SECTION**

**SECTION 01 52 00**  
**CONSTRUCTION FACILITIES**

**PART 1 GENERAL**

1.1 DESCRIPTION

- A. Specific administrative and procedural minimum actions are specified in this Section, as extensions of provisions in other Contract Documents. These requirements have been included for special purposes as indicated. Nothing in this Section is intended to limit types and amounts of temporary work required, and no omission from this Section will be recognized as an indication that such temporary activity is not required for successful completion of the Work and compliance with requirements of the Contract Documents. Provisions of this Section are applicable to, but are not limited to the temporary power, temporary water, first aid facilities, fire protection, construction aids, and parking facilities as further expanded in this section.

1.2 JOB CONDITIONS

- A. General: Establish and initiate use of each temporary facility at time first reasonable required for proper performance of the Work. Terminate use and remove facilities at earliest reasonable time, when no longer required or when permanent facilities have, with authorized use, replaced their need.
- B. Conditions of use:
  - 1. Install, operate, maintain and protect temporary facilities in a manner and at locations which will be safe, non-hazardous, sanitary, and protective of persons and property, and free of delirious effects.
  - 2. Contractor shall be responsible for overloading or excess use of or damage resulting from the overloading or excess use of existing utilities.

**PART 2 – PRODUCTS**

2.1 MATERIALS

- A. Materials, not specifically described herein, but required for proper completion of Work of this Section, may be new or used as selected by the Contractor, but shall be of design, type, size, and strength recommended intended purpose.
- B. Items required to protect the tenants, workmen, and public from danger, shall be sufficiently designed to protect them. Where required. Excluded the public from all hazards.

**PART 3 – EXECUTION**

3.1 UTILITIES

- A. Temporary Power: Project site has existing electrical services which may be utilized during performance of the Work, subject to approval of the Owner. Contractor may use existing facilities' power outlets, but shall provide all necessary temporary wiring, lamps, and equipment to complement the existing power service in capacity and with characteristics as required to complete Work.
- B. Temporary Water: Project site has existing water which may be utilized during performance of the Work, subject to approval of the Owner. Contractor may use existing facilities' water, but shall provide all necessary temporary hoses and equipment required to complete Work.



### 3.2 SANITARY FACILITIES

- A. The Contractor may use the Owner's sanitary facilities but must keep clean at all times.

### 3.3 STORAGE FACILITIES

- A. Provide and maintain adequate weather tight lockable storage facilities, raised above the ground, with sides and top enclosed.
- B. Replace materials improperly stored and damaged by weathered conditions.
- C. Remove storage facilities when materials are stored within the structure in a weather tight condition.
- D. Allow for temporary freeze protection as needed.

### 3.4 SIGNS

- A. Signs permitted at the site:
  - 1. Warning signs
  - 2. Direction signs
  - 3. Identification signs at field office
  - 4. Emergency medical service sign.
- B. Contractor shall allow no other signs to be displayed at the project site, unless authorized by the Owner.

### 3.5 BARRIERS

- A. Provide temporary barricades on all portions of the site adjacent to the construction and accessible to the public.

### 3.6 SECURITY

- A. Determine if and when watchmen, fencing or both are necessary for protection of the Work, and provide such services when necessary. Neither provision of watchmen or fencing nor the failure to provide them shall relieve the Contractor of responsibility in event of injury to person or damage to property.

### 3.7 CLEANING

- A. Trash Removal: Clear the building and site of trash resulting from Work at least once a week. When rapid accumulation occurs, make more frequent removals. Remove highly combustible trash such as paper cardboard daily. Dumpsters shall not be allowed to overflow and should be emptied on a regular basis.
- B. Disposition of Debris: Remove debris from site and make legal disposition. Locations for disposal shall be of the Contractor's choice within the above restriction. No debris or material may be buried or burned at the site. Take necessary precautions to prevent accidental burning of materials by avoiding large accumulations of combustible materials.
- C. Final Cleaning: Thoroughly clean the work, including the removal of smudges, marks, stains, fingerprints, soil, Dirt, paint spots, dust, lint, discolorations, and other foreign materials.

### 3.8 TEMPORARY FIRST AID FACILITIES

- A. Provide first aid equipment and supplies, with qualified personnel continuously available to render first aid at the site.
- B. Provide a sign, posted in a conspicuous location, listing the telephone numbers for emergency medical services: Physicians, ambulance services and hospitals.

### 3.9 TEMPORARY FIRE PROTECTION

- A. Provide a fire protection and prevention program for employees and personnel at the site; and provide and maintain fire extinguishing equipment ready for instant use at all areas of the Project and at specific areas of critical fire hazard.
- B. Equipment:
  - 1. Hand extinguishers of the types and sizes recommended by National Board of Fire Underwriters to control fires from particular hazards.
  - 2. Barrels of water with buckets designated for fire-control purposes.
  - 3. Water hoses connected to an adequate water pressure and supply system.
- C. Enforce fire-safety discipline:
  - 1. Store volatile materials in a n isolated, protected location.
  - 2. Avoid accumulations of flammable debris and waste in or about the Project.
  - 3. Prohibit smoking in the vicinity of hazardous conditions.
  - 4. Closely supervise welding and torch-cutting operations in the vicinity of combustible materials and volatile conditions.
  - 5. Supervise locations and operations of portable heating units and fuel.
- D. Maintain fire extinguishing equipment in working condition, with current inspection certificate attached to each extinguisher.

### 3.10 CONSTRUCTION AIDS

- A. Provide construction aids and equipment required to assure safety for personnel and to facilitate the execution of the work; scaffolds, staging, ladders, stairs, ramps, runways, platforms, railings, hoists, cranes, chutes and other equipment.
- B. Maintain all equipment in a first-class, safe condition.

### 3.11 PARKING FACILITIES

- A. Coordinate location of parking for personnel and employees at each facility with school district, located to avoid interference with traffic, work or storage areas, or with materials-handling equipment.

**END OF SECTION**

## SECTION 01 77 00

### CLOSEOUT PROCEDURES

#### PART 1 - GENERAL

##### 1.1 CONTRACT CLOSEOUT PROCEDURES

###### A. SUBSTANTIAL COMPLETION:

1. When Contractor considers the work is substantially complete, he shall submit to Engineer a written notice that the Work, or designated portion thereof, is substantially complete, and a list of items to be completed or corrected.
2. Within a reasonable time after receipt of such notice, Engineer and Engineer, as appropriate, will make an inspection to determine the status of completion.
3. Should Engineer determine that the Work is not substantially complete, Engineer will promptly notify the Contractor in writing, giving the reasons therefore.
4. Contractor shall remedy the deficiencies in the Work and send a second written notice of substantial completion to the Engineer.
5. Engineer, as appropriate, will re-inspect the Work.
6. When Engineer concur that the Work is substantially complete, the Engineer will:
  - a. Prepare a Certificate of Substantial Completion AIA form G704, accompanied by Contractor's list of items to be completed or corrected, as verified and amended by the Engineer.
  - b. Submit the Certificate to Owner and Contractor for their written acceptance of the responsibilities assigned to them in the Certificate.

###### B. FINAL COMPLETION:

1. When Contractor considers the Work is complete, he shall submit written certification that he has:
  - a. Reviewed the Contract Documents.
  - b. Inspected the Work for compliance with Contract Documents.
  - c. Completed the Work in accordance with Contract Documents or describe in detail, work remaining to be completed and when it will be complete and ready for inspection.
  - d. Tested equipment and systems in the presence of the Owner's representative and equipment and systems are operational.
  - e. Performed final clean-up.
  - f. Submitted required test reports.
  - g. Delivered all keys to Owner.
  - h. Delivered all operating tools, replacement items, and "attic stock" materials specified, to Owner.
  - i. Delivered all required certificates and guarantees to Owner including, but not limited to, signed-off permits, final inspections, and framed Certificate of Occupancy (suitable for wall hanging), by local authorities having jurisdiction, evidence of payment and release of liens as required by General Conditions and Certificate of Insurance for Products and Completed Operations.
  - j. Submitted all Record Drawings as specified hereinafter.
2. Engineer, as appropriate, will make an inspection to verify the status of completion with reasonable promptness after receipt of such certification.
3. Should either Engineer consider that the Work is incomplete or defective:
4. Engineer will promptly notify the Contractor in writing, listing the incomplete or defective work.
5. Contractor shall take immediate steps to remedy the stated deficiencies, and send a second written certification to Engineer that the Work is complete.
6. Engineer, as appropriate, will re-inspect the Work.
7. When the Engineer, as appropriate, find that the Work is acceptable under the Contract Documents, the Engineer will request the Contractor to make closeout submittals.
8. Refer to Supplementary Conditions, Article 3.

C. FINAL CLEAN-UP:

1. Prior to final inspection and the Owner's acceptance of the Work, clean all areas of the building and Project Site, performing all operations called for in the various Sections of these Specifications. These operations include, but are not limited to:
  - a. Cleaning of all walls and floors.
  - b. Broom cleaning all exposed concrete floors.
  - c. Cleaning of all glass areas.
  - d. Cleaning all exposed unpainted metals.
  - e. Removing all trash and debris of every nature from the Site and providing legal disposal.
  - f. Cleaning all exposed surfaces including lenses of all lighting fixtures, removing construction dust, paint over-spray and hand prints.
  - g. Removing all surplus materials, tools not in active use, scaffolding, and other materials no longer needed.
  - h. Vacuuming all carpeted floors.
  - i. Cleaning, waxing, buffing of resilient flooring.
2. All cleaning operations shall be performed in strict accordance with manufacturer's written recommendations using products approved by the manufacturer for the materials being cleaned.

**PART 2 - PRODUCTS**

2.1 MANUALS, INSTRUCTIONS AND KEYS

- A. OPERATING INSTRUCTIONS AND MAINTENANCE MANUALS: Prior to and as a requisite for Owner's acknowledgment of Substantial Completion, required equipment maintenance manuals and operating instructions shall be submitted to the Engineer for transmittal to Owner.
1. Provide manuals in "hard cover" three-ring binders, indexed, and include plans, elevations, isometrics as necessary, manufacturer's catalogs, and other instructions to clearly indicate operation and function of the systems.
  2. Include manufacturer's standard information and data, edited or modified to identify the equipment actually furnished and installed.
  3. In addition to the above, include the following information:
    - a. Manufacturer's identification including model number and serial number.
    - b. Valve list and directory; wiring and piping diagrams.
    - c. Spare parts list, a list of recommended stock of parts, and location of local parts and service centers.
    - d. Complete wiring diagrams.
    - e. Performance data and rating tables.
    - f. Specific instructions and operation, adjustment, and maintenance.
  4. Organize and assemble each manual with a title sheet directly following the front cover listing the Project title and address, name of Owner, and date of submittal. Immediately after the title sheet include a second page listing the name, address, and phone number of the Engineer, General Contractor, Subcontractors, material suppliers and vendors.
  5. Categorize the contents of the manuals with separation sheets having labeled tabular edges, and sequence information in the same order and relationship as in the Project Manual.
  6. Furnish a letter to Engineer stating that a responsible representative of the Owner (give name and position) has been instructed and informed of working characteristics of mechanical and electrical installations, as required under the Specification Sections, and that necessary verbal instructions and demonstrations shall be given to maintenance forces for component parts of the building.
- B. Upon completion of the Work, the Contractor shall deliver all keys, including master keys and any special keys, and two copies of the keying schedule to the Owner, and shall assist the Owner in reactivation of construction keyed locks used in the Project.

## 2.2 RELEASE OF LIENS

- A. The Contractor shall deliver to the Engineer a blanket release of liens covering all Work performed under this Contract, including that of Subcontractors, Sub-subcontractors, vendors, an other suppliers of materials and labor. Execute the release of liens on Documents similar to AIA Document G706 "Contractor's Affidavit of Payment of Debtors and Claims" and AIA Document G706A "Contractor's Affidavit of Release of Liens".
- B. The forms shall be executed by the authorized officer and notarized. All required attachments shall be included as noted on AIA Document G706 or Document G706A, the Contractor shall furnish bond satisfactory to the Owner for each exception.

## 2.3 GUARANTEES, BONDS AND INSPECTION CERTIFICATES

- A. The Contractor shall have guarantees upon materials and workmanship as required by the General Conditions and special guarantees and bonds required by the Contract Documents executed in the Owner's name.
- B. Prior to making application for final payment, the Contractor shall collect and assemble all required guarantees and bonds and deliver them to the Engineer for review and for transmitting to the Owner.
- C. The Contractor shall collect and assemble all required certificates of inspection, testing, and approval, and deliver them to the Engineer for review and for transmitting to the Owner.

## 2.4 RECORD DOCUMENTS

- A. Prior to and as requisite for Owner's acknowledgment of Substantial Completion, submit Project Record Documents to the Engineer for the permanent Project file as follows:
  - 1. Mark changes on a set of record Vellums reproductions. Submit all Record Drawings, mechanical, plumbing, and electrical installations, and other installations as specified in the Contract Specifications. Provide "as-built" drawings changes prepared by an experienced draftsman and showing all components as actually fabricated and erected.
    - a. Show depths of various elements in relation to Ground Floor elevation.
    - b. Show horizontal and vertical location of underground utilities and other improvements referenced to permanent surface improvements.
    - c. Show location of internal utilities and appurtenances concealed in construction referenced to visible and accessible features of structure.
    - d. Indicate field changes of dimension and detail, changes made by field order of Change Order, and details not on original Contract Drawings.
  - 2. Provide Record Drawings signed and dated by the subcontractors. By signing of drawings, subcontractors shall indicate that they have been checked and that they represent a true and accurate record of the work installed.
  - 3. Provide a cover sheet for each set of Record Documents indicating the Project title and location, the name and address and phone number of Owner, Engineer, Contractor, and all Subcontractors, and the date submitted.
  - 4. Log of all control and survey work as it progresses.

## PART 3 - EXECUTION

### 3.1 TERMINAL INSPECTION

- A. Immediately prior to expiration of the one-year guarantee period, the Contractor shall make an inspection of the Work in the company of the Engineer and the Owner. The Engineer and the Owner shall be given not less than 5 days notice prior to the anticipated date of terminal inspection.
- B. Where any portion of the Work has proven to be defective and requires replacement, repair or adjustment, the Contractor shall immediately provide materials and labor necessary to remedy

such defective Work and shall execute such Work without delay until completed to the satisfaction of the Engineer and the Owner, even though the date of completion of the corrective work may extend beyond the expiration date of the guarantee period.

- C. The Contractor shall not be responsible for correction of Work which has been damaged because of neglect or abuse by the Owner nor the replacement of parts necessitated by normal wear in use.

### 3.2 WARRANTIES

- A. Furnish written Warranties to the Owner including specific items in each product warranty stipulated in the individual sections.
- B. Secure and transmit required Inspection Certificates.
- C. Repair or replace damaged portion of the construction, under Warranty, when damages result from faulty materials or negligent workmanship.
- D. Warrant that modifications or substitutions suggested by the Contractor will give satisfactory results, and that they will be equal or superior to the specified item or method unless shortcomings are specifically listed in the request for modification or substitution.

**END OF SECTION**

**SECTION 22 11 21**  
**NATURAL GAS PIPING SYSTEMS**

**PART 1 - GENERAL**

1.1 GENERAL REQUIREMENTS

- A. The requirements of the General Conditions and Supplementary Conditions apply to all work herein.

1.2 SCOPE

- A. The scope of the work shall include the furnishing and complete installation of the piping system covered by this section, with all appurtenances, ready for the Owner's use. This shall include, but not necessarily be limited to, the following:

1. Pipe and pipe fittings.
2. Adapters, transitions, final flexible connectors.
3. Valves, regulators, and regulator vents.
4. Metering.
5. Testing.

- B. Coordinate in advance with the local gas utility provider and:

1. Ensure an unobstructed and acceptable pathway for the incoming gas service.
2. Ensure compliant gas meter location(s) with all required clearances and maintenance access.
3. Pay for all fees & inspections and secure all necessary permits required for a complete and operating gas service to the project.

1.3 REFERENCES

- A. ANSI Z21.80/CSA 6.22 - Line Pressure Regulators 2019.
- B. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300 2021.
- C. ASME B16.11 - Forged Fittings, Socket-Welding and Threaded 2021.
- D. ASME B31.1 - Power Piping 2022.
- E. ASME BPVC - Boiler and Pressure Vessel Code 2023.
- F. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Qualification Standard for Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing, and Fusing Operators 2021.
- G. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless 2022.
- H. ASTM A105/A105M - Standard Specification for Carbon Steel Forgings for Piping Applications 2021.
- I. ASTM A126 - Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings 2004 (Reapproved 2019).
- J. NFPA 54 - National Fuel Gas Code 2021.

#### 1.4 QUALITY ASSURANCE

- A. Manufacturer: For each product specified, provide components by the same manufacturer throughout.
- B. Valves: Manufacturer's name, size, and pressure rating shall be cast or marked on valve body or handle.
- C. Piping shall be labeled along its entire length indicating size, class, material specification, manufacturer's name and country of origin.
- D. Foreign pipe, fittings or valves are unacceptable.
- E. Welding Materials and Procedures: Conform to ASME BPVC and applicable state labor regulations.
- F. Welders Certification: In accordance with ASME BPVC-IX.
- G. Materials, design, fabrication, and testing-inspection shall conform to the requirements of ASME B31.1.

#### 1.5 SUBMITTALS

- A. Submit product data under provisions of Division One.
- B. Include pipe materials, pipe fittings, valves, regulators, and accessories. Provide manufacturer's catalog information, product certifications, and country of origin. Indicate valve data and ratings.

#### 1.6 PROJECT RECORD DOCUMENTS

- A. Submit under provisions of Division One.
- B. Record actual locations of valves, regulators, and meter(s).

#### 1.7 OPERATION AND MAINTENANCE DATA

- A. Submit under provisions of Division One.
- B. Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.

#### 1.8 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the Products specified in this section with a minimum of 5 years documented experience and must be a domestic manufacturer.
- B. Installer: Company specializing in performing the work of this section with a minimum of 5 years documented experience.

#### 1.9 DELIVERY, STORAGE, AND HANDLING

- A. DELIVERY: Deliver clearly labeled piping and valves to; and store, protect and handle products on site in accordance with the provisions of Division One.
- B. TIMING AND COORDINATION: Arrange for delivery of materials to allow for minimum storage time at the project site. Coordinate with the scheduled time of installation.



- C. ACCEPTANCE: Accept product on site in original factory packaging. Receive valves on site in shipping containers with labeling in place. Inspect for damage. Damaged valves shall not be acceptable.
- D. STORAGE: Store materials in a clean, dry location, protected from weather and damage.
- E. Provide temporary protective coating on steel valves.
- F. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- G. Protect installed piping systems from entry of foreign materials by providing temporary covers, as completing sections of the work, and isolating parts of completed systems. Tape will not be allowed as an acceptable end cover.

#### 1.10 EXTRA MATERIALS

- A. Furnish under provisions of Division One.

#### 1.11 REGULATORY REQUIREMENTS

- A. Perform and provide all work in accordance with plumbing and building codes having jurisdiction.
- B. Ensure compliance with fire marshal, utility provider, and Texas Railroad Commission requirements.
- C. All sleeves passing through return air plenum space shall be of compliant material.

### **PART 2 - PRODUCTS**

#### 2.1 PIPING AND FITTINGS

- A. All gas piping above ground shall be ASTM A53/A53M schedule 40 black steel pipe as manufactured by U.S. Steel Tubular Products, Republic Steel, Youngstown Pipe & Steel, or approved equal domestic manufacturer.
- B. All gas piping larger than 2" shall have welded fittings. Threaded fittings and joints will only be permitted for sizes 2" and smaller. Unions and valves will not be permitted above ceilings or in walls or chases.
- C. All steel pipe fittings shall be as follows:
  1. All dimensions and design for forged steel fittings shall conform to ASME B16.11.
  2. The material for all forged carbon steel fittings shall conform to ASTM A105/A105M.
  3. All welding fittings shall be factory-made and shall be full line size, for each tee, branch, elbow, etc., with reducers after fittings, if required.
  4. All threads shall be taper pipe threads and conform to ASME B1.20.1.
  5. All threaded fittings shall be ASME B16.3 Class 150 malleable iron by Ward Manufacturing or approved equal. Threaded joints shall be made up with graphite and oil or Teflon tape.
  6. All pipe fittings shall be from a domestic manufacturer.
- D. Gas piping installed in unventilated spaces shall be routed in properly vented continuous sleeve where required by the building code.
- E. Gas valves shall be UL listed as follows:
  1. Ball Valves: Nibco T585-70-UL for 1/4" to 1" and T580-70-UL for 1-1/4" to 3".

2. Plug Valves: ASTM A126 cast iron quarter turn plug valve with no less than 175 psi maximum cold working pressure (CWP).
    - a. DeZurik Eccentric plug valve
    - b. Flowserve/Nordstrom short pattern all-iron lubricated plug valve, Super Nordstrom or Nordstrom Bolted Gland type.
- F. Gas pressure regulators:
1. Shall be capable of reducing the incoming gas pressure to the intended outgoing gas pressure at the capacities required by the system gas demand.
  2. Shall be installed in accordance with manufacturer's recommendations, accessible for servicing, and protected against physical damage accordingly.
  3. Shall not be located above ceilings or in similar installations.
  4. Shall be provided with overpressure protection devices (OPD's) where required. Reference NFPA 54, Section 5.8 in particular.
  5. Line pressure regulators shall be listed in accordance with ANSI Z21.80/CSA 6.22.
  6. Shall be as manufactured by Sensus/Rockwell, Emerson/Fisher, Maxitrol, or approved equal.
- G. All gas regulators located inside the building shall be vented to the outdoors with schedule 40 black steel pipe. This includes all regulators provided with mechanical and plumbing equipment and all other regulators provided under this contract.
1. Vent piping shall be the full size of regulatory port opening, or as recommended by the regulator manufacturer.
  2. Each vent shall be run independently of any other regulator vents.
  3. Each vent shall terminate at a height and in a location no less than 10'-0" from any door/window/outside air intake and no less than 3'-0" from a possible source of ignition.
  4. Each vent shall be located and designed to prevent the entry of water, insects, or other foreign materials that could cause blockage. Each vent shall terminate with an elbow oriented downward, fitted with 12x12 mesh stainless steel screen in the outlet.

### **PART 3 - EXECUTION**

#### **3.1 INSTALLATION**

- A. All piping, valves, and appurtenances shall be installed in accordance with the manufacturer's recommendations and printed installation instructions.
- B. All items required for a complete and proper installation are not necessarily indicated on the plans or in the specifications. Provide all items required as per manufacturer's requirements.
- C. Provide lever handle gas valve, drip leg and union at each piece of equipment and where indicated.
- D. Gas piping shall not be routed through or beneath a building slab unless specifically indicated as such on the Drawings. For such installations:
  1. The gas piping shall be sleeved, sealed, and vented to the outdoors in accordance with the requirements of NFPA 54 or the prevailing gas code, or whichever is the more stringent requirement.
  2. All sleeves must be of suitable material for the installed location. This shall include, but is not necessarily limited to, providing sleeves of compliant material and construction where passing through return air plenum spaces.
- E. Provide an accessibly located valved and capped test tee for each distinct system to facilitate regular pressure testing of all gas piping from the outlet of the meter to each inlet valve of each appliance. Reference Texas Administrative Code Title 16, Part 1, Chapter 8, Subchapter C, Rule 8.230 for additional information as necessary.

### 3.2 TESTING OF GAS PIPING SYSTEMS

- A. All gas system testing shall be in compliance with local codes or as required in NFPA 54 National Fuel Gas Code, whichever is the more stringent requirement.
- B. All work shall be performed by a Journeyman Plumber holding current State and local licenses.
- C. All tests shall be accomplished during normal working hours and after having given due notification to building owner, construction manager or designee, of tests to be performed. All tests shall be performed in the presence of and witnessed by the building owners representative or designee.
- D. All gas system piping shall be subjected to a pneumatic test pressure of 60 psig for not less than 2 hours upon completion of all rough-in work and prior to covering. While the systems are subjected to this air pressure test, all joints shall have a soapy water solution applied and shall be observed for leaks. During test period there shall be no perceptible drop in test gage pressure.
- E. A final test shall be performed after all portions of the piping system are completely installed and covered. The entire system shall be tested, with all system outlets plugged or capped, before any equipment or appliances are connected to the piping.
  - 1. Final test shall be with mercury, measured with a manometer or slope gage. Test pressures shall in no case be less than one and one half times the normal operating pressure or as listed below; which ever is the greater:
    - a. 10.5 inches mercury (5 psig) for 4 ounce system
    - b. 21.0 inches mercury (1 psig) for 8 ounce system
  - 2. Tests shall be for a period of not less than 30 minutes and shall prove absolutely tight, showing no perceptible drop, for the entire test period.
- F. Purge air from test piping before connecting equipment or appliances. Purge air to outdoors or to ventilated space of sufficient volume to prevent accumulation of flammable mixtures.

**END OF SECTION**

## SECTION 26 02 00

### BASIC MATERIALS AND METHODS FOR ELECTRICAL

#### PART 1 - GENERAL

##### 1.1 GENERAL REQUIREMENTS

- A. The requirements of the General Conditions and Supplementary Conditions apply to all Work herein.
- B. The Contract Drawings indicate the extent and general arrangement of the systems. If any departure from the Contract Drawings are deemed necessary by the Contractor, details of such departures and the reasons therefore, shall be submitted to the Architect for approval as soon as practicable. No such departures shall be made without the prior written approval of the Architect.

##### 1.2 SCOPE OF WORK

- A. The Work included under this Contract consists of the furnishing and installation of all equipment and material necessary and required to form the complete and functioning systems in all of its various phases, all as shown on the accompanying Drawings and/or described in these Specifications. The contractor shall review all pertinent drawings, including those of other contracts prior to commencement of Work.
- B. This Division requires the furnishing and installing of all items Specified herein, indicated on the Drawings or reasonably inferred as necessary for safe and proper operation; 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, transportation, storage, equipment, utilities, all required permits, licenses and inspections. All work performed under this Section shall be in accordance with the Project Manual, Drawings and Specifications and is subject to the terms and conditions of the Contract.
- C. The approximate locations of Electrical items are indicated on the Drawings. These Drawings are not intended to give complete and accurate details in regard to location of outlets, apparatus, etc. Exact locations are to be determined by actual measurements at the building, and will in all cases be subject to the Review of the Owner or Engineer, who reserves the right to make any reasonable changes in the locations indicated without additional cost to the Owner.
- D. Items specifically mentioned in the Specifications but not shown on the Drawings and/or items shown on Drawings but not specifically mentioned in the Specifications shall be installed by the Contractor under the appropriate section of work as if they were both specified and shown.
- E. All discrepancies within the Contract Documents discrepancies between the Contract Documents and actual job-site conditions shall be reported to the Owner or Engineer so that they will be resolved prior to the bidding, where this cannot be done at least 7 working days prior to bid; the greater or more costly of the discrepancy shall be bid. All labor and materials required to perform the work described shall be included as part of this Contract.
- F. It is the intention of this Section of the Specifications to outline minimum requirements to furnish the Owner with a turn-key and fully operating system in cooperation with other trades.
- G. It is the intent of the above "Scope" to give the Contractor a general outline of the extent of the Work involved; however, it is not intended to include each and every item required for the Work. Anything omitted from the "Scope" but shown on the Drawings, or specified later, or necessary for a complete and functioning electrical system shall be considered a part of the overall "Scope".
- H. The Contractor shall rough-in fixtures and equipment furnished by others from rough-in and placement drawings furnished by others. The Contractor shall make final connection to fixtures

and equipment furnished by others.

- I. Contractor shall participate in the commissioning process; including but not limited to meeting attendance, completion of checklists and participation in functional testing.

### 1.3 RELATED SECTIONS

- A. General Conditions
- B. Supplementary Conditions
- C. Division One

### 1.4 COOPERATION WITH TRADES

- A. Cooperation with trades of adjacent, related, or affected materials or operations shall be considered a part of this work in order to affect timely and accurate placing of work and bring together in proper and correct sequence, the work of such trades.

### 1.5 REFERENCES

- A. National Electrical Code (NEC)
- B. American Society for Testing and Materials (ASTM)
- C. Underwriter's Laboratories, Inc. (UL)
- D. Insulated Cable Engineer's Association (ICEA).
- E. National Electrical Manufacturer's Association (NEMA).
- F. Institute of Electrical and Electronic's Engineers (IEEE).
- G. American National Standards Institute (ANSI).
- H. National Fire Protection Association (NFPA).
- I. International Energy Conservation Code (IECC).

### 1.6 COMPLETE FUNCTIONING OF WORK

- A. All work fairly implied as essential to the complete functioning of the electrical systems shown on the Drawings and Specifications shall be completed as part of the work of this Division unless specifically stated otherwise. It is the intention of the Drawings and Specifications to establish the types of the systems, but not set forth each item essential to the functioning of the system. In case of doubt as to the work intended, or in the event of amplification or clarification thereof, the Contractor shall call upon the Architect for supplementary instructions, Drawings, etc.
- B. Contractor shall review all pertinent Drawings and adjust his work to all conditions shown there on. Discrepancies between Plans, Specifications, and actual field conditions shall be brought to the prompt attention of the Architect.
  1. Approximate location of transformers, feeders, branch circuits, outlets, lighting and power panels, outlets for special systems, etc., are indicated on the Drawings. However, the Drawings, do not give complete and accurate detailed locations of such outlets, conduit runs, etc., and exact locations must be determined by actual field measurement. Such locations will, at all times, be subject to the approval of the Architect.

2. Communicate with the Architect and secure his approval of any outlet (light fixture, receptacle, switch, etc.) location about which there may be the least question. Outlets obviously placed in a location not suitable to the finished room or without specific approval, shall be removed and relocated when so directed by the Architect. Location of light fixtures shall be coordinated with reflected ceiling plans.
- C. Additional coordination with mechanical contractor may be required to allow adequate clearances of mechanical equipment, fixtures and associated appurtenances. Contractor to notify Architect and Engineer of unresolved clearances, conflicts or equipment locations.

#### 1.7 SCHEMATIC NATURE OF CONTRACT DOCUMENTS

- A. The contract documents are schematic in nature in that they are only to establish scope and a minimum level of quality. They are not to be used as actual working construction drawings. The actual working construction drawings shall be the approved shop drawings.

#### 1.8 CONTRACTOR'S QUALIFICATIONS

- A. An approved contractor for the work under this division shall be:
  1. A specialist in this field and have the personnel, experience, training, and skill, and the organization to provide a practical working system.
  2. Able to furnish evidence of having contracted for and installed not less than 3 systems of comparable size and type that have served their Owners satisfactorily for not less than 3 years.
  3. Perform work by persons qualified to produce workmanship of specified quality. Persons performing electrical work shall be required to be licensed. Onsite supervision, journeyman shall have minimum of journeyman license. Helpers, apprentices shall have minimum of apprentice license.

#### 1.9 DATE OF FINAL ACCEPTANCE

- A. The date of final acceptance shall be the date of owner occupancy, or the date all punch list items have been completed or final payment has been received. Refer to Division One for additional requirements.
- B. The date of final acceptance shall be documented in writing and signed by the architect, owner and contractor.

#### 1.10 DEFINITIONS AND SYMBOLS

- A. General Explanation: A substantial amount of construction and Specification language constitutes definitions for terms found in other Contract Documents, including Drawings which must be recognized as diagrammatic and schematic in nature and not completely descriptive of requirements indicated thereon. Certain terms used in Contract Documents are defined generally in this article, unless defined otherwise in Division 1.
- B. Definitions and explanations of this Section are not necessarily either complete or exclusive, but are general for work to the extent not stated more explicitly in another provision of the Contract Documents.
- C. Indicated: The term "Indicated" is a cross-reference to details, notes or schedules on the Drawings, to other paragraphs or schedules in the Specifications and to similar means of recording requirements in Contract Documents. Where such terms as "Shown", "Noted", "Scheduled", "Specified" and "Detailed" are used in lieu of "Indicated", it is for the purpose of helping the reader locate cross-reference material, and no limitation of location is intended except as specifically shown.
- D. Directed: Where not otherwise explained, terms such as "Directed", "Requested", "Accepted", and "Permitted" mean by the Architect or Engineer. However, no such implied meaning will be

interpreted to extend the Architect's or Engineer's responsibility into the Contractor's area of construction supervision.

- E. Reviewed: Where used in conjunction with the Engineer's response to submittals, requests for information, applications, inquiries, reports and claims by the Contractor the meaning of the term "Reviewed" will be held to limitations of Architect's and Engineer's responsibilities and duties as specified in the General and Supplemental Conditions. In no case will "Reviewed" by Engineer be interpreted as a release of the Contractor from responsibility to fulfill the terms and requirements of the Contract Documents.
- F. Furnish: Except as otherwise defined in greater detail, the term "Furnish" is used to mean supply and deliver to the project site, ready for unloading, unpacking, assembly, installation, etc., as applicable in each instance.
- G. Install: Except as otherwise defined in greater detail, the term "Install" is used to describe operations at the project site including unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protection, cleaning and similar operations, as applicable in each instance.
- H. Provide: Except as otherwise defined in greater detail, the term "Provide" is used to mean "Furnish and Install", complete and ready for intended use, as applicable in each instance.
- I. Installer: Entity (person or firm) engaged by the Contractor or its subcontractor or Sub-contractor for performance of a particular unit of work at the project site, including unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protection, cleaning and similar operations, as applicable in each instance. It is a general requirement that such entities (Installers) be expert in the operations they are engaged to perform.
- J. Imperative Language: Used generally in Specifications. Except as otherwise indicated, requirements expressed imperatively are to be performed by the Contractor. For clarity of reading at certain locations, contrasting subjective language is used to describe responsibilities that must be fulfilled indirectly by the Contractor, or when so noted by other identified installers or entities.
- K. Minimum Quality/Quantity: In every instance, the quality level or quantity shown or specified is intended as minimum quality level or quantity of work to be performed or provided. Except as otherwise specifically indicated, the actual work may either comply exactly with that minimum (within specified tolerances), or may exceed that minimum within reasonable tolerance limits. In complying with requirements, indicated or scheduled numeric values are either minimums or maximums as noted or as appropriate for the context of the requirements. Refer instances of uncertainty to Owner or Engineer via a request for information (RFI) for decision before proceeding.
- L. Abbreviations and Symbols: The language of Specifications and other Contract Documents including Drawings is of an abbreviated type in certain instances, and implies words and meanings which will be appropriately interpreted. Actual word abbreviations of a self-explanatory nature have been included in text of Specifications and Drawings. Specific abbreviations and symbols have been established, principally for lengthy technical terminology and primarily in conjunction with coordination of Specification requirements with notations on Drawings and in Schedules. These are frequently defined in Section at first instance of use or on a Legend and Symbol Drawing. Trade and industry association names and titles of generally recognized industry standards are frequently abbreviated. Singular words will be interpreted as plural and plural words will be interpreted as singular where applicable and where full context of Contract Documents so indicate. Except as otherwise indicated, graphic symbols and abbreviations used on Drawings and in Specifications are those recognized in construction industry for indicated purposes. Where not otherwise noted symbols and abbreviations are defined by 1993 ASHRAE Fundamentals Handbook, chapter 34 "Abbreviations and Symbols", ASME and ASPE published standards.

#### 1.11 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to the project properly identified with names, model numbers, types, grades, compliance labels, and other information needed for identification.

- B. Deliver products to the project at such time as the project is ready to receive the equipment, pipe or duct properly protected from incidental damage and weather damage.
- C. Damaged equipment shall be promptly removed from the site and new, undamaged equipment shall be installed in its place promptly with no additional charge to the Owner.

#### 1.12 SUBMITTALS

- A. Coordinate with Division 01 for submittal timetable requirements, unless noted otherwise within thirty (30) days after the Contract is awarded. The Contractor shall submit an electronic copy of a complete set of shop drawings and complete data covering each item of equipment or material. The submittal of each item requiring a submittal must be received by the Architect or Engineer within the above thirty day period. The Architect or Engineer shall not be responsible for any delays or costs incurred due to excessive shop drawing review time for submittals received after the thirty (30) day time limit. The Architect and Engineer will retain a copy of all shop drawings for their files. All literature pertaining to items subject to Shop Drawing submittal shall be submitted at one time. Submittals shall be placed in one electronic file in PDF 8.0 format and bookmarked for individual specification sections. Individual electronic files of submittals for individual specifications shall not be permitted. Each submittal shall include the following items:
  - 1. A cover sheet with the names and addresses of the Project, Architect, MEP Engineer, General Contractor and the Subcontractor making the submittal. The cover sheet shall also contain the section number covering the item or items submitted and the item nomenclature or description.
  - 2. An index page with a listing of all data included in the Submittal.
  - 3. A list of variations page with a listing all variations, including unfurnished or additional required accessories, items or other features, between the submitted equipment and the specified equipment. If there are no variations, then this page shall state "NO VARIATIONS". Where variations affect the work of other Contractors, then the Contractor shall certify on this page that these variations have been fully coordinated with the affected Contractors and that all expenses associated with the variations will be paid by the submitting Contractor. This page will be signed by the submitting Contractor.
  - 4. Equipment information including manufacturer's name and designation, size, performance and capacity data as applicable. All applicable Listings, Labels, Approvals and Standards shall be clearly indicated.
  - 5. Dimensional data and scaled drawings as applicable to show that the submitted equipment will fit the space available with all required Code and maintenance clearances clearly indicated and labeled at a minimum scale of 1/4" = 1'-0", as required to demonstrate that the alternate or substituted product will fit in the space available.
  - 6. Identification of each item of material or equipment matching that indicated on the Drawings.
  - 7. Sufficient pictorial, descriptive and diagrammatic data on each item to show its conformance with the Drawings and Specifications. Any options or special requirements or accessories shall be so indicated. All applicable information shall be clearly indicated with arrows or another approved method.
  - 8. Additional information as required in other Sections of this Division.
  - 9. Certification by the General Contractor and Subcontractor that the material submitted is in accordance with the Drawings and Specifications, signed and dated in long hand. Submittals that do not comply with the above requirements shall be returned to the Contractor and shall be marked "REVISE AND RESUBMIT".
- B. Refer to Division 1 for additional information on shop drawings and submittals.
- C. Equipment and materials submittals and shop drawings will be reviewed for compliance with design concept only. It will be assumed that the submitting Contractor has verified that all items submitted can be installed in the space allotted. Review of shop drawings and submittals shall not be considered as a verification or guarantee of measurements or building conditions.
- D. Where shop drawings and submittals are marked "REVIEWED", the review of the submittal does not indicate that submittals have been checked in detail nor does it in any way relieve the



Contractor from his responsibility to furnish material and perform work as required by the Contract Documents.

- E. Shop drawings shall be reviewed and returned to the Contractor with one of the following categories indicated:
1. REVIEWED: Contractor need take no further submittal action, shall include this submittal in the O&M manual and may order the equipment submitted on.
  2. REVIEWED AS NOTED: Contractor shall submit a letter verifying that required exceptions to the submittal have been received and complied with including additional accessories or coordination action as noted, and shall include this submittal and compliance letter in the O&M manual. The contractor may order the equipment submitted on at the time of the returned submittal providing the Contractor complies with the exceptions noted.
  3. NOT APPROVED: Contractor shall resubmit new submittal on material, equipment or method of installation when the alternate or substitute is not approved, the Contractor will automatically be required to furnish the product, material or method named in the Specifications and/or drawings. Contractor shall not order equipment that is not approved. Repetitive requests for substitutions will not be considered.
  4. REVISE AND RESUBMIT: Contractor shall resubmit new submittal on material, equipment or method of installation when the alternate or substitute is marked revise and resubmit, the Contractor will automatically be required to furnish the product, material or method named in the Specifications and/or provide as noted on previous shop drawings. Contractor shall not order equipment marked revise and resubmit. Repetitive requests for substitutions will not be considered.
  5. CONTRACTOR'S CERTIFICATION REQUIRED: Contractor shall resubmit submittal on material, equipment or method of installation. The Contractor's stamp is required stating the submittal meets all conditions of the contract documents. The stamp shall be signed by the General Contractor. The submittal will not be reviewed if the stamp is not placed and signed on all shop drawings.
  6. MANUFACTURER NOT AS SPECIFIED: Contractor shall resubmit new submittal on material, equipment or method of installation when the alternate or substitute is marked manufacturer not as specified, the Contractor will automatically be required to furnish the product, material or method named in the specifications. Contractor shall not order equipment where submittal is marked manufacturer not as specified. Repetitive requests for substitutions will not be considered.
- F. Materials and equipment which are purchased or installed without shop drawing review shall be at the risk of the Contractor and the cost for removal and replacement of such materials and equipment and related work which is judged unsatisfactory by the Owner or Engineer for any reason shall be at the expense of the Contractor. The responsible Contractor shall remove the material and equipment noted above and replace with specified equipment or material at his own expense when directed in writing by the Architect or Engineer.
- G. Shop Drawing Submittals shall be complete and checked prior to submission to the Engineer for review.
- H. Furnish detailed shop drawings, descriptive literature, table of contents listing all items being submitted at the beginning of each submittal package, physical data and a specification critique for each section indicating "compliance" and/or "variations" for the following items:
1. Panelboards
  2. Wiring Gutters
  3. Heavy Duty Disconnect Switches
  4. Conduit and Fittings
  5. Wire
  6. Emergency Generator
  7. Automatic Transfer Switches
- I. Refer to each specification section for additional requirements.

### 1.13 OPERATION AND MAINTENANCE MANUALS

- A. Prepare maintenance manuals in accordance with Division 1 and in addition to the requirements specified in Division 1, include the following information for equipment items:
1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of replacement parts.
  2. Manufacturer's printed operating procedures to include start-up, break-in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.
  3. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.
  4. Servicing instructions and lubrication charts and schedules.

### 1.14 COORDINATION DRAWINGS

- A. Prepare coordination drawings to a scale of 1/4"=1'-0" or larger; detailing major elements, components, and systems of mechanical equipment and materials in relationship with other systems, installations, and building components. Indicate locations where space is limited for installation and access and where sequencing and coordination of installations are of importance to the efficient flow of the Work, including (but not necessarily limited to) the following:
1. Indicate the proposed locations of pipe, duct, equipment, and other materials. Include the following:
    - a. Wall and type locations.
    - b. Clearances for installing and maintaining insulation.
    - c. Locations of light fixtures and sprinkler heads.
    - d. Clearances for servicing and maintaining equipment, including tube removal, filter removal, and space for equipment disassembly required for periodic maintenance.
    - e. Equipment connections and support details.
    - f. Exterior wall and foundation penetrations.
    - g. Routing of storm and sanitary sewer piping.
    - h. Fire-rated wall and floor penetrations.
    - i. Sizes and location of required concrete pads and bases.
    - j. Valve stem movement.
    - k. Structural floor, wall and roof opening sizes and details.
  2. Indicate scheduling, sequencing, movement, and positioning of large equipment into the building during construction.
  3. Prepare floor plans, elevations, and details to indicate penetrations in floors, walls, and ceilings and their relationship to other penetrations and installations.
  4. Prepare reflected ceiling plans to coordinate and integrate installations, air distribution devices, light fixtures, communication systems components, and other ceiling-mounted items.
- B. This Contractor shall be responsible for coordination of all items that will affect the installation of the work of this Division. This coordination shall include, but not be limited to: voltage, ampacity, capacity, electrical and piping connections, space requirements, sequence of construction, building requirements and special conditions.
- C. By submitting shop drawings on the project, this Contractor is indicating that all necessary coordination has been completed and that the systems, products and equipment submitted can be installed in the building and will operate as specified and intended, in full coordination with all other Contractors and Subcontractors.

1.15 RECORD DRAWINGS

- A. Prepare Record Documents in accordance with the requirements of Division 00 and Division 01, in addition to the requirements specified in Division 26.
- B. The Contractor shall maintain a separate set of clearly and legibly marked Record Drawings on the job site to record all changes and modifications, including, but not limited to the following: work details, alterations to meet site conditions, and changes made by "Change Order" notices. Mark the drawings with colored pencil(s). These shall be available for review by the Owner, Architect or Engineer during the entire construction stage.
- C. The Record Drawings shall be updated concurrently as construction progresses, and in no case less frequently than a daily basis. They shall indicate accurate dimensions for all buried or concealed work, precise locations of all concealed pipe or duct, locations of all concealed valves, controls and devices and any deviations from the work shown on the Construction Documents. All dimensions shall include at least two dimensions to permanent structure points.
- D. Engage the services of a Land Surveyor or Professional Engineer registered in the state in which the project is located as specified herein to record the locations and invert elevations of underground installations.
- E. If the Contractor does not keep an accurate set of Record Drawings, the pay request may be altered or delayed at the request of the Architect. Delivery of Record Documents is a condition of final acceptance. Record Drawings shall be furnished in addition to Shop Drawings.
- F. The Contractor shall submit an electronic copy of the record documents in PDF format and one (1) full size set of Record Drawing prints to the Architect or Engineer for review prior to scheduling the final inspection at the completion of the work. The drawings shall have the name(s) and seal(s) of the Engineer(s) removed or blanked out and shall be clearly marked and signed on each sheet as follows:

CERTIFIED RECORD DRAWINGS

DATE:

(NAME OF GENERAL CONTRACTOR)

BY: \_\_\_\_\_

(SIGNATURE)

(NAME OF SUBCONTRACTOR)

BY: \_\_\_\_\_

(SIGNATURE)

1.16 CERTIFICATIONS AND TEST REPORTS

- A. Submit a detailed schedule for completion and testing of each system indicating scheduled dates for completion of system installation and outlining tests to be performed and schedule date for each test. This detailed completion and test schedule shall be submittal at least 90 days before the projected Project completion date.
- B. Test result reporting forms shall be submitted for review no later than the date of the detailed schedule submitted.

- C. Submit 4 copies of all certifications and test reports to the Architect or Engineer for review adequately in advance of completion of the Work to allow for remedial action as required to correct deficiencies discovered in equipment and systems.
- D. Certifications and test reports to be submitted shall include, but not be limited to those items outlined in Section of Division 26.

#### 1.17 MAINTENANCE MANUALS

- A. Coordinate with Division 1 for maintenance manual requirements, unless noted otherwise bind together in "D ring type" binders by National model no. 79-883 or equal, binders shall be large enough to allow 1/4" of spare capacity. Three (3) sets of all approved shop drawing submittals, fabrication drawings, bulletins, maintenance instructions, operating instructions and parts exploded views and lists for each and every piece of equipment furnished under this Specification. All sections shall be typed and indexed into sections and ed for easy reference and shall utilize the individual specification section numbers shown in the Electrical Specifications as an organization guideline. Bulletins containing information about equipment that is not installed on the project shall be properly marked up or stripped and reassembled. All pertinent information required by the Owner for proper operation and maintenance of equipment supplied by Division 26 shall be clearly and legibly set forth in memoranda that shall, likewise, be bound with bulletins.
- B. Prepare maintenance manuals in accordance with Special Project Conditions, in addition to the requirements specified in Division 26, include the following information for equipment items:
  1. Identifying names, name tags designations and locations for all equipment.
  2. Fault Current calculations and Coordination Study.
  3. Reviewed shop drawing submittals with exceptions noted compliance letter.
  4. Fabrication drawings.
  5. Equipment and device bulletins and data sheets clearly highlighted to show equipment installed on the project and including performance curves and data as applicable, i.e., description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and model numbers of replacement parts.
  6. Manufacturer's printed operating procedures to include start-up, break-in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.
  7. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions, servicing instructions and lubrication charts and schedules.
  8. Equipment name plate data.
  9. Wiring diagrams.
  10. Exploded parts views and parts lists for all equipment and devices.
  11. Color coding charts for all painted equipment and conduit.
  12. Location and listing of all spare parts and special keys and tools furnished to the Owner.
  13. Furnish recommended lubrication schedule for all required lubrication points with listing of type and approximate amount of lubricant required.
- C. Refer to Division 1 for additional information on Operating and Maintenance Manuals.
- D. Operating and Maintenance Manuals shall be turned over to the Owner or Engineer a minimum of 14 working days prior to the beginning of the operator training period.

#### 1.18 OPERATOR TRAINING

- A. The Contractor shall furnish the services of factory trained specialists to instruct the Owner's operating personnel. The Owner's operator training shall include 12 hours of onsite training in three 4 hour shifts.

- B. Before proceeding with the instruction of Owner Personnel, prepare a typed outline in triplicate, listing the subjects that will be covered in this instruction, and submit the outline for review by the Owner. At the conclusion of the instruction period obtain the signature of each person being instructed on each copy of the reviewed outline to signify that he has a proper understanding of the operation and maintenance of the systems and resubmit the signed outlines.
- C. Refer to other Division 26 Sections for additional Operator Training requirements.

#### 1.19 SITE VISITATION

- A. Visit the site of the proposed construction in order to fully understand the facilities, difficulties and restriction attending the execution of the work.
- B. Before submitting a bid, it will be necessary for each Contractor whose work is involved to visit the site and ascertain for himself the conditions to be met therein in installing his work and make due provision for same in his bid. It will be assumed that this Contractor in submitting his bid has visited the premises and that his bid covers all work necessary to properly install the equipment shown. Failure on the part of the Contractor to comply with this requirement shall not be considered justification for the omission or faulty installation of any work covered by these Specifications and Drawings.
- C. Understand the existing utilities from which services will be supplied; verify locations of utility services, and determine requirements for connections.
- D. Determine in advance that equipment and materials proposed for installation fit into the confines indicated.

#### 1.20 WARRANTY

- A. The undertaking of the work described in this Division shall be considered equivalent to the issuance, as part of this work, of a specific guarantee extending one year beyond the date of completion of work and acceptance by Owner, against defects in materials and workmanship. Materials, appliances and labor necessary to effect repairs and replacement so as to maintain said work in good functioning order shall be provided as required. Replacements necessitated by normal wear in use or by Owner's abuse are not included under this guarantee.
- B. All normal and extended warranties shall include parts, labor, miscellaneous materials, travel time, incidental expenses, freight/shipping, refrigerant, oils, lubricants, belts, filters and any expenses related to service call required to diagnose warranty problems.

#### 1.21 TRANSFER OF ELECTRONIC FILES

- A. Project documents are not intended or represented to be suitable for reuse by Architect/Owner or others on extensions of this project or on any other project. Any such reuse or modification without written verification or adaptation by Engineer, as appropriate for the specific purpose intended, will be at Architect/Owner's risk and without liability or legal exposure to Engineer or its consultants from all claims, damages, losses and expense, including attorney's fees arising out of or resulting thereof.
- B. Because data stored in electric media format can deteriorate or be modified inadvertently, or otherwise without authorization of the data's creator, the party receiving the electronic files agrees that it will perform acceptance tests or procedures within sixty (60) days of receipt, after which time the receiving party shall be deemed to have accepted the data thus transferred to be acceptable. Any errors detected within the sixty (60) day acceptance period will be corrected by the party delivering the electronic files. Engineer is not responsible for maintaining documents stored in electronic media format after acceptance by the Architect/Owner.
- C. When transferring documents in electronic media format, Engineer makes no representations as to the long-term compatibility, usability or readability of documents resulting from the use of software

application packages, operating systems, or computer hardware differing from those used by Engineer at the beginning of the Project.

- D. Any reuse or modifications will be Contractor's sole risk and without liability or legal exposure to Architect, Engineer or any consultant.
- E. The Texas Board of Architectural Examiners (TBAE) has stated that it is in violation of Texas law for persons other than the Architect of record to revise the Architectural drawings without the Architect's written consent.
  - 1. It is agreed that "MEP" hard copy or computer-generated documents will not be issued to any other party except directly to the Architect/Owner. The contract documents are contractually copyrighted and cannot be used for any other project or purpose except as specifically indicated in AIA B-141 Standard Form of Agreement Between Architect and Owner.
  - 2. If the client, Architect or Owner of the project requires electronic media for "record purposes", then AutoCAD/ Revit documents will be prepared by Engineer on electronic media such as removable memory devices, flash drives or CD's. These documents can also be submitted via file transfer protocols. AutoCAD/ Revit files will be submitted with all title block references intact to permit the end user to only view and plot the drawings. Revisions will not be permitted in this configuration.
  - 3. At the Architect/Owner's request, Engineer will assist the Contractor in the preparation of the submittals and prepare one copy of AutoCAD/ Revit files on electronic media or submit through file transfer protocols. The electronic media will be prepared with all indicia of documents ownership removed. The electronic media will be prepared in a ".rvt" or ".dwg" format to permit the end user to revise the drawings.

## **PART 2 - PRODUCTS**

### **2.1 SUBSTITUTIONS**

- A. The names and manufacturers and model numbers have been used in the Contract documents to establish types of equipment and standards of quality. Where more than one manufacturer is named for a specific item of equipment, only one of the specified manufacturers will be considered for approval. Where only one manufacturer is mentioned with the phrase "or approved equal", Contractor may submit an alternate manufacturer for consideration, provided the following conditions are met:
  - 1. Submit alternate equipment with complete descriptive data in shop drawing form. Provide sample of equipment upon request for review by Architect. Samples will be returned if requested in writing.
  - 2. Alternate equipment must be equal from the standpoint of materials, construction and performance.
  - 3. Alternate submittal must be presented to the Engineer/Architect ten (10) days prior to bid date for approval.
- B. The Architect and Engineer shall be the sole judge of quality and equivalence of equipment, materials and methods.

### **2.2 PRODUCT LISTING**

- A. Products used on this project shall be listed by Underwriters' Laboratories.

### **2.3 ACCESS DOORS**

- A. Wherever access is required in walls or ceilings to concealed junction boxes, pull boxes, equipment, etc., installed under this Division, furnish a hinged access door and frame with flush latch handle to another Division for installation. Doors shall be as follows:
  - 1. Plaster Surfaces: Milcor Style K.

2. Ceramic Tile Surfaces: Milcor Style M.
3. Drywall Surfaces: Milcor Style DW.
4. Install panels only in locations approved by the Architect.

#### 2.4 EQUIPMENT PADS

- A. Provide 4-inch-high concrete pads for indoor floor mounted equipment. Pads shall conform to the shape of the equipment with a minimum of 6 inch beyond the equipment. Top and sides of pads shall be troweled to a smooth finish, equivalent to the floor. External corners shall be bullnosed to a 3/4" radius, unless shown otherwise.
- B. Provide 6-inch-high concrete pads for all exterior mounted equipment. Pads shall conform to the shape of the equipment with a minimum of 6 inch beyond the equipment. Provide a 4-foot monolithic extension to the pad in front of the equipment for service when mounted on a non-finished area (i.e. landscape, gravel, clay, etc.) Top and sides of pads shall be troweled to a smooth finish. External corners shall be bullnosed to a 3/4" radius, unless shown otherwise.
- C. Provide a minimum 6-inch-high, steel reinforced concrete pad for generators. Pads shall be sized 6" larger than the outside perimeter dimensions. Provide a 4-foot monolithic extension to the pad around the equipment for service when mounted on a non-finished area (i.e. landscape, gravel, clay, etc.). Refer to structural details. Top and sides of pads shall be troweled to a smooth finish. External corners shall be bullnosed to a 3/4" radius, unless shown otherwise. The generator shall be bolted to the concrete pad per the manufacturers details.
- D. Provide steel reinforced concrete pad for utility transformers. Pads shall comply with Utility Company Standards.

#### 2.5 ESCUTCHEONS

- A. Provide heavy chrome or nickel plated plates, of approved pattern, on conduit passing through walls, floors and ceilings in finished areas. Where conduit passes through a sleeve, no point of the conduit shall touch the building construction. Caulk around such conduit with sufficient layers of two hour rated firesafing by Thermafiber 4.0 P.C.F. density, U.S.G. fire test 4/11/78 and seal off openings between conduit and sleeves with non-hardening mastic prior to application of escutcheon plate. Escutcheons shall be Gravler Sure-Lock, or approved equal.

#### 2.6 SPACE LIMITATIONS

- A. Equipment shall be chosen which shall properly fit into the physical space provided and shown on the drawings, allowing ample room for access, servicing, removal and replacement of parts, etc. Adequate space shall be allowed for clearances in accordance with Code requirements. Physical dimensions and arrangement of equipment shall be subject to the approval of the Architect.

#### 2.7 PAINTING

- A. All factory assembled equipment for electrical work, except light fixtures, that normally is delivered with a factory applied finish shall be delivered with a hard surface factory applied finish such as baked-on machinery enamel which will not require additional field painting. The finish shall consist of not less than 2 coats of medium gray color paint USA No. 61 Munsell Notation 8-3G, 6. 10/0.54 enamel. This Contractor shall protect this finish from damage due to construction operations until acceptance of the building. He shall be responsible for satisfactorily restoring any such finishes or replacing equipment that becomes stained or damaged.

#### 2.8 ELECTRICAL SYSTEM IDENTIFICATION

- A. Conduit Systems: Provide adequate marking of major conduit which is exposed or concealed in accessible spaces to distinguish each run as either a power or signal/communication conduit. Except as otherwise indicated, use orange banding with black lettering. Provide self-adhesive or snap-on type plastic markers. Indicate voltage for that raceway. Locate markers at ends of conduit runs, on pull boxes, on junction boxes, near switches and other control devices, near items of

equipment served by the conductors, at points where conduit passes through walls or floors, or enters non-accessible construction and at spacings of not more than 50 feet along each run of conduit. Switch-leg conduit and short branches for power connections do not have to be marked, except where conduit is larger than ¾ inch. Branch circuit conduits, junction boxes and pull boxes shall be marked with a permanent marker indicating panel name and branch circuit numbers.

- B. Underground Cable Identification: Bury a continuous, preprinted, bright colored plastic ribbon cable marker with each underground cable (or group of cables), regardless of whether conductors are in conduit, duct bank, or direct buried. Locate each directly over cables, 6 to 8 inches below finished grade.
- C. Identification of Equipment:
1. All major equipment shall have a manufacturer's label identifying the manufacturer's address, equipment model and serial numbers, equipment size, and other pertinent data. Care shall be taken not to obliterate this nameplate in any way. Provide black back plate with white letters and numbers for normal equipment. Provide red back plate with white letters and numbers for optional emergency equipment. Provide yellow back plate with white letters and numbers for Life safety equipment.
  2. A black-white-black laminated plastic engraved identifying nameplate shall be secured by stainless steel screws to each automatic transfer switch, switchboard, distribution panel, motor control center, motor starter panels and panelboards.
    - a. Identifying nameplates shall have ¼ inch high engraved letters and shall contain the following information:
      - 1) Name
      - 2) Voltage
      - 3) Phase
      - 4) "3" or "4" wire, and
      - 5) Where it is fed from.
    - b. An example of a panelboard nameplate is:  
Center Panel – 1HB  
480/277 volt, 3 phase, 4 wire  
Center Fed from DP2
    - c. An example of an automatic transfer switch nameplate is:  
Center ATS #2  
480/277 volt, 3 phase, 4 wire, 4 pole  
Center Fed from MSB and DPE
  3. Each feeder device in a switchboard, distribution panel, and motor control center device shall have a nameplate showing the load served in ½ inch high engraved letters.
  4. A black-white-black laminated plastic engraved identifying nameplate shall be secured by screws to each transformer, safety switch, disconnect switch, individual motor starter, enclosed circuit breaker, wireway, and terminal cabinet.
    - a. Identifying nameplates shall have 1/4 inch high engraved letters and shall indicate the equipment served.
    - b. An example of a disconnect switch is: AHU-1.
  5. Prohibited Markings: Markings which are intended to identify the manufacturer, vendor, or other source from which the material has been obtained are prohibited for installation within public, tenant, or common areas within the project. Also, prohibited are materials or devices which bear evidence that markings or insignias have been removed. Certification, testing (example, Underwriters' Laboratories, Inc.), and approval labels are exceptions to this requirement.
  6. Warning Signs: Provide warning signs where there is hazardous exposure associated with access to or operation of electrical facilities. Provide text of sufficient clarity and lettering of sufficient size to convey adequate information at each location; mount permanently in an appropriate and effective location. Comply with recognized industry standards for color and design.
  7. Operational Tags: Where needed for proper and adequate information on operation and maintenance of electrical system, provide tags of plasticized card stock, either preprinted or hand printed. Tags shall convey the message, example: "DO NOT OPEN THIS SWITCH WHEN BURNER IS OPERATING."



## **PART 3 - EXECUTION**

### **3.1 EXCAVATING AND BACKFILLING**

- A. Trenching and backfilling and other earthwork operations required to install the facilities specified herein shall conform to the applicable requirements of Division 2 (95% of maximum standard density). Where trenching or excavation is required in improved areas, the backfill shall be compacted to a condition equal to that of adjacent undisturbed earth and the surface of the area restored to the condition existing prior to trenching or excavating operations. Provide a minimum of 3" of sand underneath all conduits. The plans indicate information pertaining to surface and sub-surface obstructions; however, this information is not guaranteed. Should obstructions be encountered whether or not shown, the Contractor shall alter routing of new work, reroute existing lines, remove obstructions where permitted, or otherwise perform whatever work is necessary to satisfy the purpose of new work and leave existing surfaces and structures in a satisfactory and serviceable condition. All work shall comply with OSHA Standards.

### **3.2 WORKMANSHIP AND CONCEALMENT**

- A. The work of this Section shall be performed by workman skilled in their trade. Installation shall be consistent in completeness whether concealed or exposed. Each item of electrical work shall be concealed in walls, chases, under floors and above ceilings except:
  - 1. Where shown to be exposed.
  - 2. Where exposure is necessary to the proper function.

### **3.3 SLEEVES, CUTTING AND PATCHING**

- A. This section shall be responsible for placing sleeves for all conduit passing through walls, partitions, sound walls, beams, floors, roof, etc. Sleeves through below-grade walls shall use water-tight fitting manufactured by O-Z/Gedney.
- B. All cutting and patching will be done under another Division, but this Section will be responsible for timely performance of this work and layout of holes and setting sleeves.
- C. All un-used sleeves shall be sealed with 2 hour UL approved fire sealant manufactured by "3M" or approved equal.
- D. Refer to 26 05 33 for additional requirements.

### **3.4 ELECTRICAL GEAR**

- A. Install all electrical equipment in accordance with the National Electrical Code and as shown on the drawings.
- B. Lighting contactors, time clocks, fire alarm equipment, security equipment disconnect switches, etc. mounted in mechanical/electrical rooms shall be mounted at a working height not requiring a ladder, when wall space is available. Installation of these devices at greater elevations shall be approved by the Engineer. Contractor shall provide a coordination sketch of each mechanical/electrical room noting locations and mounting heights of all electrical devices (note bottom and top elevations) shown to be installed. Sketches shall be provided to the Engineer for review and the general contractor for coordination with other trades working in these rooms.
- C. Fire retardant back boards secured to drywall studs may be used for contactors, time clocks, fire alarm equipment, security equipment, and disconnect switches 60 amp or smaller. All other wall mounted devices shall be mounted to unistrut. Unistrut shall be securely mounted to the floor and structural ceiling. Toggle bolts or anchor bolts attached to drywall is not acceptable.

### 3.5 CLEANING

- A. Clean lighting fixtures and equipment.
- B. Touch-up and refinish scratches and marred surfaces on panels, switches, starters, and transformers.

### 3.6 CORROSIVE AREAS

- A. In areas of a corrosive nature, which include but are not limited to the following: pool equipment rooms, cooling towers and areas subject to salt air, etc., provide NEMA 4 X stainless steel or fiberglass reinforced enclosures for contactors, panel boards, controllers, starters, disconnects and materials used as supporting means (i.e. plastibond unistrut, pipe, fittings). The use of spray on coating may be acceptable in some applications.

### 3.7 TESTS AND INSPECTIONS

- A. Tests and inspection requirements shall be coordinated with Division I.
- B. Date for final acceptance test shall be sufficiently in advance of completion date of contract to permit alterations or adjustments necessary to achieve proper functioning of equipment prior to contract completion date.
- C. Conduct re-tests as directed by Architect on portions of work or equipment altered or adjusted as determined to be necessary by final acceptance test. No resultant delay or consumption of time as a result of such necessary re-test beyond contract completion date shall relieve Contractor of his responsibility under contract.
- D. Put circuits and equipment into service under normal conditions, collectively and separately, as may be required to determine satisfactory operation. Demonstrate equipment to operate in accordance with requirements of these specifications. Perform tests in the presence of Architect. Furnish instruments and personnel required for tests.
- E. Final Inspection:
  - 1. At the time designated by the Architect, the entire system shall be inspected by the Architect and Engineer. The contractor or his representative shall be present at this inspection.
  - 2. Panelboards, switches, fixtures, etc., shall be cleaned and in operating condition.
  - 3. Certificates and documents required hereinbefore shall be in order and presented to the Architect prior to inspection.
  - 4. Panel covers, junction box covers, etc., shall be removed for visual inspection of the wire, bus bars, etc.
  - 5. After the inspection, any items which are noted as needing to be changed or corrected in order to comply with these specifications and the drawings shall be accomplished without delay.
- F. The contractor shall provide a thermographic test using an independent testing laboratory using an infrared scanning device. This test shall include but not limited to all switchboards, distribution panelboards, panelboards, automatic transfer switches and other electrical distribution devices. This test shall be conducted to locate high temperature levels. This test shall be conducted between 3 to 8 months after occupancy, but not beyond the one year warranty period. Submit test to the architect and engineer using test reporting forms. All unacceptable conditions shall be corrected prior to the end of the warranty period.

**END OF SECTION**

**SECTION 26 03 00**  
**DEMOLITION WORK**

**PART 1 - GENERAL**

1.1 GENERAL REQUIREMENTS

- A. The drawings do not show all demolition work required. The contractor shall make himself familiar with the required scope of work to accomplish the work required by these documents. All demolition work implied or required shall be included in the scope of this contract.

**PART 2 - PRODUCTS - NOT USED**

**PART 3 - EXECUTION**

3.1 DEMOLITION WORK

- A. The contractor shall be responsible for loss or damage to the existing facilities caused by him and his workmen, and shall be responsible for repairing such loss or damage. The contractor shall send proper notices, make necessary arrangements, and perform other services required for the care, protection and in-service maintenance of all electrical services for the new and existing facilities. The contractor shall erect temporary barricades, with necessary safety devices, as required to protect personnel from injury, removing all such temporary protection upon completion of the work.
- B. The contractor shall provide temporary or new services to all existing facilities as required to maintain their proper operation when normal services are disrupted as a result of the work being accomplished under this project.
- C. Where existing construction is removed to provide working and extension access to existing utilities, contractor shall remove doors, piping, conduit, outlet boxes, wiring, light fixtures, air conditioning ductwork and equipment, etc., to provide this access and shall reinstall same upon completion of work in the areas affected.
- D. Where partitions, walls, floors, or ceilings of existing construction are being removed, all contractors shall remove and reinstall in locations approved by the Architect all devices required for the operation of the various systems installed in the existing construction.
- E. Outages of services as required by the new installation will be permitted but only at a time approved by the Owner. The contractor shall allow the Owner 2 weeks in order to schedule required outages. The time allowed for outages will not be during normal working hours unless otherwise approved by the Owner. All costs of outages, including overtime charges, shall be included in the contract amount.
- F. The contractor shall modify, remove, and/or relocate all materials and items so indicated on the drawings or required by the installation of new facilities. All removals and/or dismantling shall be conducted in a manner as to produce maximum salvage. Salvage materials shall remain the property of the Owner, and shall be delivered to such destination as directed by the Owner. Materials and/or items scheduled for relocation and which are damaged during dismantling or reassembly operations shall be repaired and restored to good operative condition. The contractor may, at his discretion and upon the approval of the Owner, substitute new materials and/or items of like design and quality in lieu of materials and/or items to be relocated.
- G. All items which are to be relocated shall be carefully removed in reverse to original assembly or placement and protected until relocated. The contractor shall clean and repair and provide all new materials, fittings, and appurtenances required to complete the relocations and to restore to good operative order. All relocations shall be performed by workmen skilled in the work and in accordance with standard practice of the trades involved.

- H. When items scheduled for relocation are found to be in damaged condition before work has been started on dismantling, the contractor shall call the attention of the Owner to such items and receive further instructions before removal. Items damaged in repositioning operations are the contractor's responsibility and shall be repaired or replaced by the contractor as approved by the Owner, at no additional cost to the Owner.
- I. Service lines and wiring to items to be removed, salvaged, or relocated shall be removed to points indicated on the drawings, specified, or acceptable to the Owner. Service lines and wiring not scheduled for reuse shall be removed to the points at which reuse is to be continued or service is to remain. Such services shall be sealed, capped, or otherwise tied-off or disconnected in a safe manner acceptable to the Owner. All disconnections or connections into the existing facilities shall be done in such a manner as to result in minimum interruption of services to adjacent occupied areas. Services to existing areas or facilities which must remain in operation during the construction period shall not be interrupted without prior specific approval of the Owner as hereinbefore specified.
- J. During the construction and remodeling, portions of the project shall remain in service. Construction equipment, materials, tools, extension cords, etc., shall be arranged so as to present minimum hazard or interruption to the occupants of the building.
- K. Certain work during the demolition phase of construction may require overtime or nighttime shifts or temporary evacuation of the occupants. Coordinate and schedule all proposed down time with the Owner's Representative at least 72 hours in advance.
- L. Make every effort to minimize damage to the existing building and the Owner's property. Repair, patch, or replace as required any damage which might occur as a result of work at the site. Care shall be taken to minimize interference with the Owner's activities during construction. Cooperate with the Owner and other trades in scheduling and performance of the work.
- M. Include in the contract price all rerouting of existing conduits, wiring, outlet boxes, fixtures, etc., and the reconnecting of existing fixtures as necessitated by field conditions to allow the installation of the new systems. Furnish all temporary conduit, wiring, boxes, etc., as required to maintain lighting and power service for the existing areas with a minimum of interruption. Remove wire and conduit back to nearest accessible active junction box and extend to existing homeruns as required.
- N. All existing lighting fixtures, switches, outlets, speakers, materials, equipment and appurtenances not included in the remodel or alteration areas are to remain in place and shall remain in service.
- O. Electrical equipment, outlets, speakers, circuits to mechanical and building systems equipment, etc., which are to remain but which are served by conduit and/or circuiting that is disturbed by the remodeling work, shall be reconnected in such a manner as to leave it in proper operating condition.
- P. Existing branch circuit wiring which is to be removed, shall be pulled from the raceways and the empty conduit shall be removed to a point of permanent concealment.
- Q. Existing lighting fixtures shown to be removed and indicated to be reused, shall be cleaned, repaired, relamped and provided with such new accessories as may be needed for the proper installation in their new locations.
- R. New circuiting indicated to be connected to existing panels shall be connected to "spares" and/or "released" breakers as applicable, or new breakers provided where space is available. Contractor shall verify the existing panel load and feeder capacity prior to adding any additional loads.
- S. Within the remodeled or alteration areas where existing ceilings are being removed and new ceiling are installed, all existing lighting fixtures, other ceiling mounted devices and their appurtenances shall be removed and reinstalled into the new ceiling, unless otherwise shown or specified.

- T. Within the remodeled or alteration areas where existing walls are being removed, all existing lighting fixtures, switches, receptacles, other materials and equipment and their appurtenances shall be removed, where required by the remodel work either shown or specified.
- U. Refer to Architectural "Demolition" and "Alteration" plans for actual location of walls, ceilings, etc. being removed and/or remodeled.

**END OF SECTION**

**SECTION 26 05 19**

**WIRE, CABLE AND RELATED MATERIALS**

**PART 1 - GENERAL**

1.1 SCOPE

- A. Provide 600 volt building wire, cable and connectors and 300 volt wire, cable and connectors.
- B. WORK INCLUDED: Include the following Work in addition to items normally part of this Section.
  - 1. Connection of equipment shown.
- C. WORK SPECIFIED ELSEWHERE:
  - 1. Heating, ventilating, and air conditioning equipment.
  - 2. Structured cabling system.
  - 3. Coaxial cables

1.2 REFERENCE STANDARDS

- A. UL 83 - Thermoplastic-Insulated Wires and Cables
- B. ASTM B3 - Standard Specification for Soft or Annealed Copper Wire
- C. NFPA 70 - National Electrical Code
- D. All wire cable and connectors shall be UL approved.
- E. NEMA
- F. NEMA Bulletin 119

1.3 ACCEPTABLE MANUFACTURERS

- A. 600 VOLT WIRE AND CABLE
  - 1. Southwire
  - 2. Encore
  - 3. Cerro
- B. 300 VOLT WIRE AND CABLE
  - 1. Westpenn
  - 2. Beldon
  - 3. Alpha
  - 4. Tappan - Southwire
- C. FLEXIBLE CABLE SYSTEMS
  - 1. AFC Modular Cable Systems
  - 2. Kaf-Tech
- D. CONNECTORS
  - 1. IlSCO

2. Cooper
3. AMP - TYCO
4. Burndy
5. Ideal
6. 3M
7. O.Z. Gedney
8. Thomas & Betts
9. Buchanan

#### 1.4 SUBMITTALS

- A. Shop drawings shall include, but not limited to:
  1. Cutsheets of wire, cable and connectors to indicate the performance, fabrication procedures, product variations, and accessories.

#### 1.5 REQUIREMENTS OF REGULATORY AGENCIES WORK IN ACCORDANCE WITH:

- A. National Electrical Code.
- B. Local, municipal, or state codes that have jurisdiction.

### **PART 2 - PRODUCTS**

#### 2.1 WIRING

- A. All wire shall be new and continuous without weld, splice, or joints throughout its length. It must be uniform in cross-section, free from flaws, scales and other imperfections.
- B. WIRE MATERIAL: Conductors shall be soft drawn, annealed copper. Aluminum wiring is not acceptable unless otherwise noted on drawings.
- C. TYPES:
  1. Provide type "THHN/THWN-2" insulation for all buried feeders and service entrance conductors.
  2. Provide type "THHN/THWN-2" insulation for all branch circuits and above grade feeders.
  3. All wire No. 8 and larger shall be stranded. All wire No. 10 and smaller shall be stranded or solid.
  4. Provide type "XHHW" or other 90 degrees insulation wiring for branch circuit wiring installed through continuous rows of fixture bodies.
  5. All 300-volt cable including but not limited to telephone, fire alarm, data, CATV and security shall be UL listed for use in return air plenums.
  6. All dimming conductors shall be 300 volt, 75 C plenum rated. Dimming conductors shall be solid. Stranded conductors are not acceptable.
- D. CONDUCTOR SIZES
  1. Feeder conductors shall be sized for a maximum of 2% drop in rated voltage at scheduled load.
  2. Branch circuit conductors shall be sized for a maximum 3% drop in the rated voltage to the longest outlet on the circuit.
  3. Minimum wire shall be 12 AWG, unless otherwise shown on Drawings or required by Code.
  4. Minimum wire size for 0-10v dimming controls shall be 18 AWG for conductors not exceeding 300 feet circuit length (one-way) and 16 AWG for those exceeding 300 feet (one-way).
- E. COLOR CODING: No. 6 or larger shall use tape for color coding. No. 8 and smaller wire shall be color coded in accordance with the governing authority requirements or as follows:

120/208 Volt

Neutral: White  
Phase A: Black  
Phase B: Red  
Phase C: Blue  
Ground: Green

277/480 Volt

Neutral: Gray  
Phase A: Brown  
Phase B: Purple  
Phase C: Yellow  
Ground: Green

0-10 Volt dimming conductors

Purple (source)  
Pink (common)

2.2 GROUNDING

- A. Permanently connect all conduit work, motors, starters, and other electrical equipment to grounding system in accordance with NFPA 70.

**PART 3 - EXECUTION**

3.1 WIRE

- A. Do not pull wire into conduit until Work of an injurious nature is completed. Where two or more circuits run to a single outlet box, each circuit shall be properly tagged. Wyreze or approved equal may be used as a lubricant where necessary.
- B. Splices shall be fully made up in outlet boxes with compression crimp-on type splice connectors.
- C. Joints and splices will not be permitted in service entrance or in feeders. Joints in branch circuits will be permitted where branch circuits divide, and then shall consist of one through-circuit to which the branch shall be spliced. Joints shall not be left for the fixture hanger to make. Connect joints and splices with Buchanan Series "2000" solderless connectors complete with insulating caps or properly sized twist on wire nuts. "Wago" push-in connectors are not acceptable.
- D. All stranded conductors shall be furnished with lugs or connectors.
- E. Connectors furnished with circuit breakers or switches shall be suitable for copper wire termination.
- F. "Sta-Cons" shall be used to terminate stranded conductors on all switches and receptacles.
- G. All stranded #10 and small conductors shall be terminated with an approved solderless terminal if the device or light fixture does not have provisions for clamp type securing of the conductor.
- H. The jacket for all travelers used on 3-way and 4-way switches shall be pink.
- I. Route conductors for 480Y/277 systems in a separate raceway. Do not combine with 208Y/120 volt or 120/240 volt systems.
- J. Emergency circuits shall not be routed with normal conductors.

3.2 BALANCING SYSTEM

- A. The load on each distribution and lighting panel shall be balanced to within 10% by proper arrangement of branch circuits on the different phase legs. Provide written documentation showing results. Submit with O & M manuals.



### 3.3 LOW VOLTAGE WIRING

- A. Low voltage wiring, including dimming conductors, shall be plenum rated. All wiring in mechanical rooms, electrical rooms, drywall ceiling, inaccessible areas, underground, plaster ceiling, inside concealed walls areas exposed to occupant view, and other areas subject to physical damage shall be run in conduit.
- B. Low voltage wiring shall be routed in separate raceways from power wiring systems.
- C. Sleeves shall be placed in the forms of concrete, masonry and fire rated walls, floor slabs and beams, for the passage of wiring. Sleeves should be set in place a sufficient time ahead of the concrete work so as not to delay the work. Sleeves shall be rigid galvanized steel.
- D. Provide Caddy J-hooks supported independently from other system to support cable at 4-foot on center or closer if required by manufacturer.
- E. Provide a junction box to make up all joints and splices.
- F. Provide dimming conductors for all lighting circuits located in spaces with dimmer switches and theatrical lighting as indicated on the drawings and as specified.

### 3.4 CABLE SUPPORTS

- A. Provide cable supports in all vertical raceways in accordance with Article 300-19 of NFPA 70.

### 3.5 DEFECTS

- A. Defects shall include, but are not to limited to, the following:
  - 1. Tripping circuit breakers under normal operation.
  - 2. Improperly connected equipment.
  - 3. Damaged, torn, or skinned insulation.

**END OF SECTION**

## SECTION 26 05 26

### GROUNDING

#### PART 1 - GENERAL

##### 1.1 GENERAL REQUIREMENTS

- A. The requirements of the General Conditions and Supplementary Conditions apply to all work herein.

##### 1.2 SCOPE

- A. **WORK COMBINED WITH OTHER SECTIONS:** Combine the work specified herein with the following Sections to form a single responsibility for the Work:
  - 1. Electrical.
  - 2. Basic materials and methods.
- B. Provide electrical service, equipment and wiring device grounding as shown, scheduled and as specified.
- C. The types of grounding include, but not limited to, the grounding bonding of all equipment devices, building steel piping, and as required by the National Electrical Code, Local Inspection Department and Power Company.

##### 1.3 STANDARDS

- A. National Electrical Code (NFPA-70)
- B. Local municipal and State codes that have jurisdiction.
- C. NECA

##### 1.4 ACCEPTABLE MANUFACTURES

- A. Provide grounding products manufactured by Copperweld and Cadweld.

##### 1.5 SUBMITTALS

- A. Shop drawings shall include, but not limited to the following:
  - 1. Cut sheets of ground rods, clamps and connectors.
  - 2. Grounding system diagram.

#### PART 2 - PRODUCTS

##### 2.1 GENERAL

- A. Provide all materials required to construct a complete grounded electrical system.
- B. **GROUND RODS:** Ground rods shall be 3/4" inch diameter by 10 feet long construction with copper jacket and a steel core.
- C. **CLAMPS:** Ground clamps shall be copper except for steel or iron pipes in which the clamps shall be galvanized iron.

- D. CONDUCTORS: Conductors shall be connected by means of an approved pressure connector or clamp.

### **PART 3 - EXECUTION**

#### **3.1 INSTALLATION**

- A. GENERAL: Install grounding system as shown and specified to ensure a properly grounded system.
- B. BUILDING STEEL AND PIPING SYSTEM: Install a bonding jumper between building steel and metallic piping systems to bond them to the electrical grounding system.
- C. NEUTRAL: The neutral shall be grounded only at the service entrance and other separately derived systems. The neutral shall be kept separate from the grounding system and shall not be used as a ground.
- D. GROUNDING SEPARATELY DERIVED ALTERNATING CURRENT SYSTEM
  - 1. TRANSFORMERS: The center point (neutral) of each wye connected transformer shall be bonded to the case and the grounding electrode conductor shall be connected to the grounded conductor (neutral).
  - 2. STANDBY EMERGENCY GENERATOR: The generator neutral shall be bonded to the generator when a 4-pole switched neutral automatic transfer switch is specified.
- E. GROUNDING CONDUCTOR: A grounding conductor and metallic conduit system shall bond all equipment served by the electrical system. Provide a flexible bonding jumper for isolated metallic piping and ductwork and around expansion fittings and joints.
- F. CONDUIT GROUNDING BUSHING: Conduit terminating in equipment that has a ground bus such as switchboards, panelboards, etc., shall have grounding bushings installed. Ground each conduit by means of a grounding bushing and to the ground bus in the equipment.
- G. MOTORS: The frame of all motors shall be grounded.
- H. SPECIAL GROUNDING: Provide a #6 AWG copper grounding conductor for each telephone board, television system, etc. Terminate the grounding conductor on ground bus and to the building electrical grounding system. Refer to 800-40(d) and 820-40(d) of the NEC.
- I. REMOTE PANELBOARDS: Provide a grounding electrode conductor all remote panels as required by the NEC and shown on drawings.
- J. LIGHTING FIXTURES: Flexible fixture whips containing a green grounding conductor shall be used to connect light fixtures. Flexible fixture whips shall not exceed ten feet.
- K. RECEPTACLES: All receptacles shall be grounded using the branch circuit grounding conductor. Receptacles shall use an approved grounding yoke.

#### **3.2 TESTING**

- A. Perform a ground resistance test using a biddle analog or digital portable earth/ground resistance tester. The system resistance shall not exceed 5 Ohms. Provide additional electrodes as required (refer to 250-84 and 250-56 of the most current edition NEC). Test shall not be conducted following wet weather. Provide personal instruments to conduct these tests and submit certified test for review. Test shall be verified by Engineer.

**END OF SECTION**

## SECTION 26 05 33

### RACEWAYS

#### PART 1 - GENERAL

##### 1.1 SCOPE

- A. Provide electrical raceways and fittings as shown, scheduled and specified.
- B. The types of raceways and fittings required are as follows:
  - 1. Rigid hot-dipped galvanized steel conduit (GRC) (RMC)
  - 2. Intermediate hot-dipped galvanized steel conduit (IMC)
  - 3. Electrical metallic tubing (EMT)
  - 4. PVC (Sch. 40 & 80)
  - 5. Flexible metal conduit (FMC)
  - 6. Liquid-tight flexible metal conduit (LFMC)
  - 7. PVC coated rigid galvanized steel conduit (GRCC)

##### 1.2 REFERENCE STANDARDS

- A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC) 2020.
- B. ANSI C80.3 - American National Standard for Electrical Metallic Tubing -- Steel (EMT-S) 2020.
- C. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- D. UL 6 - Electrical Rigid Metal Conduit-Steel Current Edition, Including All Revisions.
- E. UL 360 - Liquid-Tight Flexible Metal Conduit Current Edition, Including All Revisions.
- F. UL 651 - Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings Current Edition, Including All Revisions.
- G. UL 797 - Electrical Metallic Tubing-Steel Current Edition, Including All Revisions.
- H. UL 1242 - Electrical Intermediate Metal Conduit-Steel Current Edition, Including All Revisions.
- I. NEMA FB-1
- J. NEMA TC3

##### 1.3 ACCEPTABLE MANUFACTURERS

- A. Raceways
  - 1. Allied
  - 2. Republic
  - 3. Prime Conduit (Carlon)
  - 4. Wheatland Tube
  - 5. Cantex
  - 6. Western Tube
  - 7. Robroy Industries
- B. Fittings

1. Appleton
2. Crouse Hinds
3. Steel City
4. O.Z. Gedney
5. Carlon
6. Raco, Inc.
7. Bridgeport

C. Boxes

1. RACO
2. Thomas and Betts
3. EATON
4. Crouse-Hinds
5. Appleton

D. Surface

1. Hubbell
2. Wiremold

1.4 SUBMITTALS

A. Product data shall include but not be limited to:

1. Cutsheets for raceways, fitting, solvents, primers, etc.

1.5 REQUIREMENTS OF REGULATORY AGENCIES WORK IN ACCORDANCE WITH

A. NFPA 70

B. Local, municipal, or state codes that have jurisdiction.

**PART 2 - PRODUCTS**

2.1 CONDUIT AND FITTINGS

A. Rigid Galvanized Steel Conduit (GRC/RMC)

1. Construction, Materials, Codes, Standards:
  - a. Article 344 - NFPA 70.
  - b. Hot-dip galvanized rigid steel conduit, galvanized after fabrication. Products shall comply with UL 6 and ANSI C80.1. All threads shall be galvanized after cutting. A uniform zinc coating shall be applied to the inner and outer walls.
  - c. Fittings shall be threaded and shipped with thread protectors. Set Screw are not acceptable. Die Cast Fittings are not acceptable.
2. Permitted for use in the following locations:
  - a. Outdoor or Exterior (Exposed)
  - b. Indoors, Conditioned Spaces
  - c. Unconditioned Spaces
  - d. Underslab (Void Form Slab): where not in contact with earth – only permitted where indicated on plan.
  - e. Underslab (Suspended Slab): Permitted – only where indicated on plan.
3. Prohibited Locations: Underground, Corrosive environments, Underslab (Slab on Grade), Foundation penetrations.
4. Specific Uses: Exposed Exterior installations, where within or attached to masonry or concrete, where subject to damage.

B. Intermediate Metal Conduit (IMC)

1. Construction, Materials, Codes, Standards:
  - a. Article 342 - NFPA 70.
  - b. Conduit shall be similar to rigid steel conduit except thinner wall.
  - c. Fittings shall be threaded hot-dipped galvanized and shipped with thread protectors. Set Screw or Die Cast Fittings are not acceptable
  - d. Products shall comply with UL 1242.
2. Permitted for use in the following locations:
  - a. Outdoor or Exterior (Exposed)
  - b. Indoors, Conditioned Spaces
  - c. Unconditioned Spaces
  - d. Underslab (Void Form Slab): not in contact with earth only as indicated on plan.
  - e. Underslab (Suspended Slab): only where indicated on plan.
3. Prohibited Locations: Corrosive Environment, Underground, Underslab (Slab on Grade), Foundation Penetrations
4. Specific Uses: Exposed exterior locations, Rooftops exposed to sunlight

C. Electrical Metallic Tubing (EMT)

1. Construction, Materials, Codes, Standards:
  - a. Article 358 - NFPA 70.
  - b. EMT shall be made of hot-dip galvanized strip steel. The interior shall be coated with a corrosion-resistant lubricant for ease of wiring pulling.
  - c. Shall utilize steel insulated throat, set-screw connectors and steel set-screw couplings in all indoor conditioned spaces.
  - d. Shall utilize steel insulated throat, threadless, watertight compression type connectors and steel threadless watertight compression type coupling in all non-conditioned spaces and in grout filled CMU walls.
  - e. Products shall comply with UL 797 and ANSI C80.3.
2. Permitted for use in the following locations:
  - a. Indoors, Conditioned Spaces
  - b. Unconditioned Spaces
3. Prohibited Locations: Corrosive Environment, Underground, Underslab (all types), Wet or Damp Locations, Exteriors, Within Concrete, foundation penetrations.
4. Specific Uses: Primary use conduit for indoor spaces, where conditioned. Unconditioned locations shall require use of insulated throat water tight fittings.

D. Rigid Nonmetallic Conduit (PVC Schedule 40 & 80)

1. Construction, Materials, Codes, Standards:
  - a. Article 352 and 300.6 - NFPA 70.
  - b. Conduit shall be schedule 40 or 80 polyvinyl chloride (PVC), UV stabilized, rated for 90°C conductors.
  - c. Fittings shall be solvent weld socket type.
  - d. Products shall comply with UL 651.
2. Permitted for use in the following locations:
  - a. Underground (Earth, outside foundation perimeter)
  - b. Underslab (Slab on Grade): only where indicated on plan.
  - c. Under Driveways, roadways, or vehicular crossings, and where required by Utility Company: PVC Schedule 80
    - 1) PVC Schedule 40 allowed where concrete encased.
3. Prohibited Locations: return air Plenums, interstitial spaces, Outdoor or Exterior (Exposed), Unconditioned spaces, corrosive environments, underslab (suspended or void form), foundation penetrations.
4. Specific Uses: For use underground or underslab (Slab on grade). Underground use is approved for all locations where transiting a project site, not underneath any foundation. For locations under the footprint of building/foundation, use only authorized where indicated on drawings.

E. Flexible Metal Conduit (FMC/Greenfield)

1. Construction, Materials, Codes, Standards:

- a. Article 348 - NFPA 70.
- b. Spirally wound continuously interlocked zinc coated strip steel.
- c. Fittings shall be one screw for smaller than 1-1/2-inch, two screw for 1-1/2-inch and larger, double clamp steel or malleable iron, either cadmium plated or hot-dip galvanized.
- d. Products shall comply with UL 360.
- 2. Permitted for use in the following locations:
  - a. Indoors, Conditioned Spaces.
- 3. Prohibited Locations: outdoors/Exterior, unconditioned spaces, Corrosive, Wet, Concrete, underslab(all types), underground, foundation penetrations.
- 4. Specific Uses and Applications: For use in connection to rotating equipment within conditioned spaces, including plenums. Also permitted for use with empty raceways in walls for use with Low Voltage, AV, telecom cabling.

F. Liquid-Tight Flexible Steel Conduit (LFMC/Seal Tite)

- 1. Construction, Materials, Codes, Standards
  - a. Article 350 - NFPA 70.
  - b. Spirally wound continuously interlocked zinc coated strip steel with a UV stabilized polyvinyl chloride (PVC) outer jacket bonded to the conduit.
  - c. Fittings shall be compression type, malleable iron, with insulated throat, either cadmium plated or hot-dip galvanized. Plastic is not acceptable.
- 2. Permitted for use in the following locations:
  - a. Outdoor or Exterior (Exposed)
  - b. Indoors, Conditioned Spaces
  - c. Unconditioned Spaces
- 3. Prohibited Locations: Concrete, corrosive, underground, underslab (all types), foundation penetrations.
- 4. Specific Uses and Applications: Primary use is connection to rotating equipment at unconditioned spaces. Transformer Primaries and Secondaries (excluding service transformer).

G. PVC Coated Rigid Galvanized Steel Conduit (GRCC/Plastibond)

- 1. Construction, Materials, Codes, Standards:
  - a. Article 344 and 300.6 - NFPA 70.
  - b. Conduit shall be same as rigid metal conduit with a factory-applied 40-mil-thick covering of polyvinyl chloride (PVC) bonded to the metal, coated inside and outside.
- 2. Permitted for use in the following locations:
  - a. Outdoor or Exterior (Exposed): except for stub-ups and penetrations.
  - b. Corrosive Environment: required throughout
    - 1) Where corrosive environments exist, such as pools, pool pump room, corrosive chemical storage, GRCC shall be provided throughout, up to the point of sealed penetration into a non-corrosive environment.
  - c. Underground (Earth, outside foundation perimeter): Required at bends of 15° or greater, Penetrations through concrete, Stub-ups through foundation or grade at concrete.
  - d. Foundation Penetrations
- 3. Prohibited Locations: extended runs exposed to sunlight, Plenums, Underslab except for penetrations (all foundation types).
- 4. Specific Uses: For use at Cooling Towers, Pools, Pool Decks, Pool pump rooms, chemical storage, corrosive environments.

2.2 PULL BOXES

- A. Exterior in-ground pull boxes shall be concrete or polymer as manufactured by Brooks, Dalworth, Hubbell Quazite, or approved equivalent. Covers shall include identification of systems contained.
- B. Where located in Roadways, Parking Lots, or Traffic zones, Pullboxes shall be rated to accept a minimum 25,000 lb. load.

- C. All Pullboxes shall be sized based on NEC wire-bending requirements at each individual location.
- D. Covers shall include identification of systems contained, such as:
  - 1. Electrical
  - 2. Telecom
  - 3. Communications
  - 4. Others, as required.
- E. Pull boxes in pole bases shall be as manufactured by Carlon.
- F. Pullboxes shall be provided in all raceway systems upon exceeding the following conditions:
  - 1. The equivalent of 270° in conduit bends, or after (3) 90° bends.
  - 2. Any 400ft of linear conduit or duct bank continuous segments.
  - 3. Where required to make transitions to prevent the damaging of conductor insulation.

### 2.3 WIREWAYS

- A. Wireways shall be made of not less than 16-gauge sheet steel for 4 inch and 6 inch square sizes and 14 gauge steel for 8 inch and 12 inch square sizes. Couplings end plates, and knockouts shall be furnished as required. Each section of wireways shall be rigidly supported.
- B. The finish shall be ANSI-49 gray epoxy paint applied by a cathodic electrode position paint process over a corrosion resistant phosphate preparation for NEMA 1 wireways. Provide galvanized steel for NEMA 3R wireways. NEMA 3R wireways and auxiliary gutters are for horizontal mounting only.

### 2.4 BUSHINGS

- A. Provide nylon bushing on end of all low voltage cabling system conduits (sleeves, rough-ins, etc.).
- B. Provide Grounding Bushing as required in 26 05 26 - Grounding.

## PART 3 - EXECUTION

### 3.1 PROVIDE CONDUIT AS FOLLOWS:

- A. GENERAL: The Drawings are diagrammatic and are intended to show the general location of outlets, devices, fixtures, and arrangement and control of circuits. The Contractor shall determine exact locations by actual measurement of the building or by reference to the Architectural Drawings.
- B. Raceways shall not be routed below or within slab-on-grade, foundations, or below grade of suspended slab structures, unless specifically noted or indicated otherwise on plan.
- C. EMT in sizes up to 4 inches when concealed or not exposed to damage and located indoors only. (EMT is not acceptable in wet and damp location.)
- D. MINIMUM SIZE: 3/4 inch.
- E. Flexible conduit of any type shall not be used except for connections to rotating or vibrating equipment, or where use for low voltage raceways. All conduit shall be provided as a rigid type conduit for homeruns, runs between termination boxes, outlets, etc.
- F. Fixture whips: Refer to 265119 for additional information.
- G. Of such size, and so installed that conductors may be drawn in without injury or excessive strain.



- H. Where entering panels, pull boxes, junction boxes, or outlet boxes, shall be secured in place with lock nuts inside and outside, and insulated bushings inside.
- I. Have Red seal type VCC or approved equal cable supports in risers, as required by N.E.C.
- J. Have ends reamed after cutting and application of die.
- K. Keep conduit corked and dry during construction and swab out before conductors are pulled.
- L. Have bends and offsets made with approved tools. Bends or offsets in which the pipe is crushed or deformed shall not be installed.
- M. Have O.Z. Gedney or approved equal expansion fittings where crossing building expansion joints.
- N. Fixtures in finished areas having suspended acoustical ceilings shall be connected to outlet boxes of lighting grid by flexible metal conduit; length not to exceed ten feet (six feet if using 3/8" manufactured fixture "whips").
- O. Outlet boxes in partitions shall never be set back-to-back. They shall be offset to prevent undue noise transmission from room to room.
- P. Each entire conduit system shall be installed complete before any conductors are drawn in. Every run of conduit shall be finished before covering up to guard against obstructions and omissions.
- Q. Sleeves shall be placed in the forms of concrete, masonry and fire rated walls, floor slabs and beams, for the passage of conduits. Sleeves should be set in place a sufficient time ahead of the concrete work so as not to delay the work. Sleeves shall be rigid galvanized steel with a minimum thickness of 1.07MM and set to extend 4" above slab.
- R. All pipe penetrations through walls and concrete floors shall be fire rated by applying USG Thermafiber in the space between the concrete and the pipe. The fire rating shall be additionally sealed by using 3M brand model CP 25 or 303 fire barrier caulk and putty. All fire rating material shall be installed in accordance with manufacturer's printed instructions.
- S. All conduit shall be cleaned and swabbed to remove all foreign matter and moisture prior to pulling wire and cable. All boxes in which conduits terminate shall be cleaned of all concrete mortar and other foreign matter.
- T. Provide #30 nylon pulling line in all conduits in which permanent wiring is not installed.
- U. All conduit shall be securely fastened and supported using hot galvanized malleable iron one-hole pipe straps, clamps, hanger or other means approved by the engineer. Supports shall be as required per NEC. Tie wire shall not be used as support or securing means. Support conduit independently of ceiling hanger wire. Use all thread rods to support outlet boxes, junction boxes and conduit.
- V. Contact the Architect and Engineer for an installation review before covering any below grade or above grade conduit.
- W. All new outlets shall be flush mounted. In remodeled areas where wall construction prohibits flush mounting, provide Hubbell 2400 series, unless noted otherwise. Verify exact location and routing with architect before installation.
- X. Contractor shall not penetrate waterproof barriers without using proper fitting to maintain barriers. This shall include exterior walls and slabs. Coordinate with Architect for proper methods.

### 3.2 CONDUIT ROUTING

- A. Conduit shall be concealed and by using the shortest practicable route between outlets, including where located on CMU walls.
- B. Conduit may be exposed in electrical and mechanical rooms, and central plants, or other industrial type facilities such as warehouses or production plants.
- C. Install risers, drops, offsets to avoid ductwork and structural components. Ductwork and structural systems shall take precedence to conduit.
- D. Any exposed and visible conduit shall be parallel and perpendicular based on the lines of the building (such as ceiling lines, wall blocking lines, or architectural feature lines) using structural systems to conceal conduit visibility at all opportunities.
- E. Concealed conduit shall be run in as direct manner as possible, using long bends. All bend radii shall be 12x conduit diameter. Condulets in lieu of elbows where ease of installation and appearance warrant their use – confirmation with architect is required for this use.
- F. Conduit shall be continuous, with no more than (4) quarter bends between terminals, cabinets, boxes, or pullboxes is acceptable. Contractor is expected to provide wireway or boxes at appropriate intervals, in accordance with NFPA 70 for wire bending space. All conduit shall be electrically continuous throughout, including across boxes and cabinets. Terminals of all conduit shall be provided with double lock nuts and bushing, or terminated on conduit hubs. Use of Running Threads prohibited.

### 3.3 CONDUIT CORROSION PROTECTION

- A. Branch circuit conduits installed in concrete slabs on fill or grade shall be positioned in a manner to ensure complete concrete cover. In no case shall such conduits be exposed below or above the slab surfaces, or penetrate the waterproof membrane.
- B. At locations where metallic conduits pass through slabs on grade or transitions below grade, PVC coated rigid galvanized conduit shall be used.
- C. Conduit installed in the air gap between the water-resistant barrier and finish brick shall not exceed 2-ft. in length.

### 3.4 EXPANSION JOINTS

- A. Install approved expansion fitting in all conduit runs in excess of 150 feet or when crossing building expansion joints.

### 3.5 OUTLET AND JUNCTION BOXES

- A. Provide an approved galvanized outlet box with adequate volume for number of conductors installed.
- B. Provide standard galvanized switch boxes of the required number of gangs. Switch boxes where conduit is exposed shall be handy boxes or approved equal.
- C. Outlet boxes for receptacles shall be similar to Universal 52151 with suitable raised cover. Receptacle boxes where conduit is exposed shall be handy boxes or approved equal.
- D. Weatherproof boxes shall be FS or FD. Provide these boxes in all non-conditioned areas, exterior areas and natatoriums.
- E. Outdoor boxes shall be NEMA 3R, with conduit connections made by Myers Hubs.

- F. See notes and details on Drawings for special box requirements.
- G. Provide junction boxes required to facilitate installation of the various conduit systems. Provide support boxes required for risers, each complete with approved cable supports as described elsewhere in this Division.
- H. Outlet boxes for drywall shall be standard galvanized 4" square boxes with the appropriate device cover. Secure all outlet boxes with a backing brace connected to two adjacent studs. Mounting brackets with a single ear to rest against the backing sheet rock are not acceptable.
- I. Provide floor outlet fittings for telephone to match fittings for duplex floor receptacles.
- J. Provide 3-1/2" deep gangable masonry boxes in all masonry wall (CMU). Steel City GW-135-G or approved equal.
- K. Provide shallow 4"x4" boxes in all demountable partitions.
- L. Metallic boxes located in fire rated walls or partitions shall be separated by a minimum horizontal distance of 24 in. This minimum separation distance between metallic boxes may be reduced when " Wall Opening Protective Materials" (CLIV) are installed according to the requirements of their Classification. Metallic boxes shall not be installed on opposite side of walls or partitions of staggered stud construction unless "Wall Opening Protective Materials" are installed with the metallic boxes in accordance with Classification requirements for the protective materials.
- M. Junction, pull boxes, condulets, gutters, disconnects, contactors, etc., above 2-foot x 2-foot grid ceilings shall be mounted within 18-inches of ceiling grid. Above 2-foot x 4 – foot grid ceiling they shall be mounted within 30-inches of ceiling grid. All junction box, pull box, gutter openings shall be side or bottom accessible.
- N. Junction boxes are prohibited above drywall or plaster ceilings except for lighting; and those must be mounted directly over light fixture opening. Route power, PA, fire alarm conduits to nearest lay-in ceiling.

### 3.6 THRU-WALL SEALS

- A. Provide O.Z. Gedney "Thru-wall" seals for all conduits passing through concrete structure below grade, above grade, and floor penetrations below grade. These prevent moisture from entering the building.
- B. Straight sleeves are not acceptable.

### 3.7 PULL BOXES

- A. Interior Pull boxes shall be provided for conduit systems as required and shall be constructed of galvanized steel of not less than gauge and size specified by National Electrical Code. Size pull boxes per Article 314.28 - NFPA 70.
- B. Where two or more feeders pass through a common pull box, they shall be tagged to indicate clearly their electrical characteristics, circuit number, and panel designation.
- C. Exterior in-ground pull boxes shall have open bottoms with sand and rock beds below box for drainage of water. Provide closed bottom boxes where specified. Closed bottom boxes shall be provided with sumps for portable pump to allow for extracting water. Refer to details on the drawings.
- D. Pull boxes mounted in pole bases shall be coordinated with the pour of the pole base and shall be flush with finished footing.

### 3.8 WIREWAYS

- A. Wireways shall be installed as indicated or required and locations shall be coordinated with architect.
- B. Wiring in wireways shall be neatly bundled, tied and suitably tagged.

### 3.9 UNDERGROUND DUCTBANK SYSTEM

#### A. DUCT SYSTEM

- 1. The duct system shall consist of Schedule 40 PVC or type 1-EB PVC conduits encased in red concrete as detailed on the drawings. Use rigid conduit for stub-ups and the last ten feet at the end of each ductbank. Duct lines shall be laid to a minimum grade of 4 inches per 100 feet and shall be free from either horizontal or vertical waves. Duct lines shall be straight unless otherwise noted on the drawings. Duct lines shall be installed so that the top of concrete in encased duct lines is not less than 24 inches below finished grade or finished paving at any point. Changes in direction or runs exceeding a total of 10 degrees, either vertical or horizontal, shall be accomplished by long sweep bends having a minimum radius of curvature of 5 feet. The long sweep bends may be made up of one or more curved or straight sections and/or combinations thereof using five degree angle couplings. Conduit shall be thoroughly cleaned before using or laying. During construction and after the duct line is completed, the ends of the conduit shall be plugged to prevent water washing mud into the conduits. Particular care shall be taken to keep the conduits clean of concrete, dirt, and any other substance during the course of construction.
  - 2. Each single conduit of the duct bank shall be completely encased in steel reinforced concrete as indicated. The thickness of concrete encasement indicated is the minimum thickness, and may be increased to fit the actual shape of trench.
  - 3. Concrete for duct bank envelopes shall be standard 2000 psi concrete mix as described in Division 03, and be colored deep red for permanent marking of underground electrical work. The concrete red pigment shall be pure inorganic natural metallic base pigment, approved by the Engineer before use. Organic pigments will not be permitted. The approved pigments shall be mixed four pounds per yard of cement.
    - a. Envelopes may be poured directly against sides of trenches if the "cut" is clean, even and free of loose material. All loose dirt and extraneous material shall be removed from the trenches before and during the pouring of concrete to ensure sound envelopes. Concrete shall be carefully spaded during pouring to eliminate all voids under and between the conduit and honeycombing of the exterior surfaces. Power driven tampers or agitators shall not be used, unless specifically designed for the application, in order to ensure that the water-tightness of the conduits is not destroyed.
    - b. Generally, each run of envelopes shall be poured in one continuous operation. Where more than one pour is necessary, each pour shall terminate in a vertical plane. Partial pours shall not terminate in horizontal or angular planes.
- B. For normal underground installation see Section 26 02 00, paragraph 3.1 for Excavating and Backfilling.

**END OF SECTION**

## SECTION 26 32 13.11

### NATURAL GAS ENGINE-DRIVEN STANDBY GENERATING SYSTEM (100 KW)

#### PART 1 - GENERAL

##### 1.1 GENERAL REQUIREMENTS

- A. The requirements of the General Conditions and Supplementary Conditions apply to all work herein.
- B. SCOPE
  - 1. Provide a standby electric generating system manufactured by Cummins C100N6 series or approved equal electric set rated for continuous standby service at 100 kW, 125 kVA at 0.8 power factor, 3-phase, 480Y/277 volts, 60 cycle. The system shall be a package of new and current equipment consisting of:
    - a. A natural gas engine driven electric plant in a (weather-protective housing) to provide emergency electric power.
    - b. Automatic transfer switch(es) to provide automatic starting and stopping of the plant and switching of the emergency load.
    - c. Mounted accessories as specified.
    - d. Control wiring.
    - e. Provide oversized alternator as specified.
    - f. Load bank.
    - g. Manual transfer switch and docking station.

##### 1.2 PERMITS, TEST INSPECTIONS

- A. This system shall be completely built, tested and shipped by a manufacturer who has been regularly engaged in the production of such equipment for the past ten years and who has parts and service facilities locally available so that there is one source of supply and responsibility. The performance of the electric plant shall be certified by an independent testing laboratory as to the plant's full power rating and voltage and frequency regulation. The complete system shall bear a seal showing that it is prototype test supported.

##### 1.3 REQUIREMENTS

- A. Level 1 applications are legally required emergency systems.
- B. The electric generating system must meet all requirements of NFPA 110 (latest edition) including design specifications, prototype tests, one-step full-load pickup, and installation acceptance. Engine-generator system to provide source of power for Level 1 applications.

##### 1.4 STANDARDS

- A. Equipment shall meet the latest versions of the following codes:
  - 1. NFPA 30
  - 2. NFPA 37
  - 3. NFPA 70
  - 4. NFPA 99
  - 5. NFPA 101
  - 6. NFPA 110
  - 7. IEEE C62.41.1
  - 8. IEEE 446
  - 9. NEMA MG 1, ICS
  - 10. ANSI
  - 11. UL 1008

12. UL 2200
13. MIL-STD 461 C - Part 9, IEC 801.2, IEC 801.3, IEC 801.5, IEC 1000-4-2,3,6 - RFI and EMI Performance.

#### 1.5 SUBMITTALS

- A. Provide a specification compliance document noting any deviations to the specification. Document shall be a copy of the specification noting Comply, Deviate, or Exception to each section with detailed explanation for each deviation and exception.
- B. Shop drawings shall include but not be limited to:
  1. Catalog cut sheets with all equipment, accessories and devices including all ratings.
  2. Interconnection wiring diagrams.
  3. Complete bill of materials.
  4. Certified performance tests
  5. Sizing report using manufacture software confirming the engine an alternator complies with the size required to supply the connected load. Submit alternate generator if the proposed unit will not comply. The generator shall not exceed 85% of rated load.
- C. Operation and Maintenance Data
  1. Submit under provisions of Division One.
  2. Furnish three copies of the manuals and books listed below in substantial three-ring binders for each unit:
    - a. Operating Instructions: Describe and illustrate all switchgear controls and indicators and engine and general controls. Include instructions for operating transfer switch equipment under normal and emergency conditions when engine generator is running.
    - b. Parts Books: Illustrate and list all assemblies, subassemblies and components, except standard fastening hardware (nuts, bolts, washers, etc.).
    - c. Preventative Maintenance Instructions: Describe the daily, weekly, monthly, biannual and annual maintenance requirements and include a complete lubrication chart.
    - d. Routine Test Procedures: Describe procedures for engine, radiator, all electronic and electrical circuits, and the generator.
    - e. Troubleshooting Chart: Describe and list all troubles, probable causes, and suggested remedies.
    - f. Recommended Spare Parts List: List all consumables anticipated to be required during routine maintenance and testing. List special tools, maintenance materials and replacement parts.
    - g. Wiring Diagrams and Schematics: Show function of all electrical components.

#### 1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of Division One.
- B. Accept units on site on skids. Inspect for damage.
- C. Protect equipment from dirt and moisture by securely wrapping in heavy plastic.

#### 1.7 ACCEPTABLE MANUFACTURERS

- A. Provide products complying with these specifications and produced by the following:
  1. Generator Manufacturer
    - a. Cummins
    - b. Kohler
    - c. Caterpillar
    - d. Generac

2. Automatic Transfer Switches
  - a. ASCO
  - b. Cummins Power Generation
  - c. Caterpillar
  - d. Kohler
  - e. Russ Electric

## 1.8 ACCEPTABLE SUPPLIERS

- A. All equipment provided shall be supplied by an authorized distributor of the manufacturer who has been continuously engaged in the distribution of industrial grade power system products for a minimum of 15 years. The supplier shall provide initial start-up services, conduct field acceptance testing, and warranty service. The supplier shall be authorized to perform warranty service on all products provided.
- B. The supplier shall maintain a minimum of 6 factory trained and qualified field technicians within 50 mile of the job site, a proper supply of spare parts for the supplied equipment, a shop with overhaul capabilities; and be able to provide 24 hour, 7 days per week, 365 days per year field service capability.

## PART 2 - PRODUCTS

### 2.1 ENGINE

- A. The engine shall be radiator cooled, natural gas fueled, 4 cycle, 6 cylinder. It shall have a total piston displacement of not less than 359 cubic inches and develop not less than 162.7 brake horsepower at its operating speed. A radiator air discharge duct flange shall be provided for a connecting duct to allow all heated air and gases to be discharged out of the building, or enclosure, through one opening. The radiator cooling system shall be rated at 104 degrees F ambient against an external restriction of 0.5 inch water column. Engine cooling air requirements shall not exceed 8,000 CFM.
- B. The engine shall be of 1-piece cast alloy iron construction with cast alloy iron heads. Valves shall be overhead and free to rotate. Valves shall be hard chrome-cobalt alloy faced with replaceable valve seat inserts of solid chrome-cobalt alloy. The crankshaft shall be forged steel. Main bearings provided between all cylinders. The connecting rods shall be forged steel with connecting rod bearings. Provide full-flow, replaceable oil filter with bypass. Oil pressure gauge shall be included.
- C. The engine shall be equipped with adjustable isochronous electronic governor with speed regulation 5.0 percent, no load to full load main output circuit breaker, fuel carburetor system with automatic fuel shut-off and a reusable air element air cleaner and natural gas fuel train.
- D. Provide a 12 volt electrical system and electric starter.
- E. 120 VAC thermostatically controlled water jacket heater system (1500 watts) shall be provided. Contractor shall install normal power to the heater.
- F. Provide the following safety shutdown fault devices:
  1. Low oil pressure
  2. Over-speed
  3. Over-crank
  4. High temperature (with low water level)
- G. Provide the following alarms:
  1. Low engine temperature (indicating jacket heater malfunction)
  2. Marginally high engine temperature
  3. Marginally low oil pressure
  4. Flashing light for control switch in "Stop" position.

- H. Generator main circuit breaker shall be UL listed, set-mounted, factory connected, molded case type with electronic trip unit. Submittals shall demonstrate that the circuit breaker provides proper protection for the alternator by a comparison of the trip characteristic of the breaker with the thermal damage characteristic of the alternator. Field circuit breakers shall not be acceptable for generator overcurrent protection. (Lugs on breaker shall match "ATS" lugs). Provide ground fault alarm for breakers rated 1000 amps and larger to comply with Article 700.6 (D) of the National Electrical Code
- I. Provide output breaker for load bank.

## 2.2 ALTERNATOR

- A. Rating 125 kW, 157 kVA, at 0.8 power factor, 105 degrees Celsius, 480Y/277 volts, 60 Hz at 1800 rpm.
- B. The alternator shall be a single bearing revolving field type, 2/3 pitch, 4-pole and shall be completely brushless. No commutator or commutator brushes shall be allowed. The main alternator and exciter shall be vacuum impregnated. The alternator shall be directly connected to the engine through a rigid coupling to insure permanent alignment. Voltage regulation shall be within plus or minus 1% of rated voltage, from no load to full load. Voltage recovery to rated voltage after acceptance of 100% of rated load in one step shall occur within 10 seconds. Provide a permanent magnet generator (PMG) excitation system. Motor starting capability shall be a minimum of 423 kVA. Rating for non-linear loads shall not be less than 50 kW at 0.8 power factor. The generator set shall be capable of sustaining a minimum of 90% of rated no load voltage with the specified kVA load at near zero power factor applied to the generator set. The instantaneous voltage dip shall be less than 10% of rated voltage when full load and rated power factor are applied to the alternator. Stable or study-state operation is defined as operation with terminal voltage remaining constant within plus or minus 1% of rated voltage. Temperature rise shall be within rating as defined by NEMA MG1-22.40. Radio interference reduction shall exceed requirements for general civilian or commercial applications with TIF less than 50 and wave form deviation less than 0.06 line to line.
- C. Provide a 120 volt anti-condensation heater (minimum of 100 watts) to prevent condensation during non-operating periods. Heater shall be thermostatically controlled and rated for continuous use for the frame. Provide normal power to the heater.
- D. Overload Rating: Capable of withstanding a three phase load of 300% rated current for 10 seconds, 150% of rated current for 60 seconds and 105% rated current for 60 minutes with field set for normal rated load excitation, and capable of withstanding an overspeed of 125%.
- E. Performance Criteria:
  - 1. Wave form Deviation: Less than 5%.
  - 2. Crest Factor: 1.41 +/- 0.07.
  - 3. Form Factor: 1.11 +/- 0.05.
  - 4. Total Harmonic Distortion: 5%.
  - 5. Single Harmonic Distortion: 3%.
  - 6. Telephone Interference Factor: 50% maximum.
  - 7. Dynamic Balance: Less than 1 mil displacement peak to peak.
- F. Enclosure: NEMA MG1, open drip-proof.
- G. Neutral Ground: As shown on drawings.

## 2.3 CONTROLS AND INSTRUMENTS

- A. Provide comprehensive monitoring and control system integral to the Generator Set control to guard the electrical integrity of the alternator and power system. Provide single and 3-phase fault current regulation, so that downstream protective devices have the maximum current available to



quickly clear fault conditions, without subjecting the alternator to potentially catastrophic failure conditions. Include provisions to either prevent over voltage due to single phase faults, or to shut down the generator set if line to neutral voltage on any phase exceeds 115% for more than 0.5 second. Acceptable methods are a 100% rated, 600 volt circuit breaker mounted in the generator enclosure. Provide Square D size as indicated on drawings with handheld programmer or inherent protection provided by microprocessor-based AmpSentry protection. Submittals shall demonstrate that the protective device provides proper protection for the alternator by a comparison of the trip characteristic of the breaker with the thermal damage characteristic of the alternator. Field circuit breakers shall not be acceptable for generator overcurrent protection.

B. A Generator Control Panel mounted on top of the alternator shall contain the following:

1. Run-stop-remote switch
2. Charge rate ammeter
3. Oil Pressure Digital Readout
4. Coolant Temperature Digital Readout
5. Remote start-stop terminals
6. Running time meter
7. Full A.C. Digital Display (A.C. ammeter, A.C. voltage, phase selector switch, frequency meter, and voltage adjustment.) All parameters shall have a readout of not less than 2.5% accuracy.
8. Red alarm lights shall be provided for each fault and alarm condition.
9. Two sets of spare terminals shall be provided for customer selected faults.
10. An Emergency Shutdown contact shall be provided through which customer's push button or other momentary-closing switch contacts shall shutdown the generator set engine.
11. A fault reset switch contacts shall shutdown the generator set engine.
12. A fault reset switch shall be provided to clear fault indications and allow restarting of the engine after shutdown faults.
13. The control design shall be such that the fault indication shall remain until reset. The fault indicator memory shall not be dependent on the presence of either AC or DC voltage and shall retain the fault status memory even through complete removal and replacement of the starting batteries.
14. A battery warning that includes load testing the battery on each crank shall be provided.
15. The fault reset function shall operate only when the RUN-STOP-REMOTE switch is in the STOP position.
16. All devices for interconnection and compatibility with digital accuracy and response shall be provided. Digital panels shall comply with electromagnetic interference requirements of Minimum Standard 461C - Part 9, and IEC Standard 801.2, 801.3 and 801.4. indication of voltage level
17. Include a full wave rectified automatic digital voltage regulation system matched and prototype tested by the engine manufacturer with the governing system provided. It shall be immune from misoperation due to load-induced voltage waveform distortion and provide a pulse width modulated output to the alternator exciter. The voltage regulation system shall be equipped with three-phase RMS sensing and shall control buildup of AC generator voltage to provide a linear rise and limit overshoot. The system shall include a torque-matching characteristic, which shall reduce output voltage in proportion to frequency below an adjustable frequency threshold. Torque matching characteristic shall be adjustable for roll-off frequency and rate; and be capable of being curve-matched to the engine torque curve with adjustments in the field.
18. The automatic voltage regulator shall be temperature compensated, solid-state design and include overvoltage and overexcitation protection functions. The voltage regulator shall be equipped with three phase RMS sensing. The regulator shall control buildup of AC generator voltage to provide a linear rise and limit overshoot. Overvoltage protection shall sense the AC generator output voltage and (in the event of regulator failure or loss of reference), shut down regulator output on a sustained overvoltage of one (1) second duration. Overexcitation protection shall sense regulator output and shutdown regulator output if overloads exceed ten (10) seconds in duration. Both overvoltage and overexcitation protection shutdowns shall be latched, requiring the AC generator to be stopped for reset.
19. The regulator shall include an under frequency rolloff torque-matching characteristics, which shall reduce output voltage in proportion to frequency below a threshold of 58-59 Hz. The torque-matching characteristics shall include differential rate of frequency change

- compensation to use maximum available engine torque and provide optimal transient load response. Regulators which use a fixed volts per hertz characteristic are not acceptable.
20. An electronic governor system shall provide automatic isochronous frequency regulation. The governing system dynamic capabilities shall be controlled as a function of engine coolant temperature to provide fast, stable operation at varying engine operating temperature conditions.
  21. All analog and digital metering shall be true-RMS indicating, and shall not be disrupted by non-linear load generated waveform distortion.
  22. Digital metering set shall indicate generator RMS voltage and current, frequency, output current, output kW, kW-hours, and power factor. Generator output voltage shall be available in line-to-line neutral voltages and shall display all three phase voltages (line to neutral or line-to-line) simultaneously.
  23. An under frequency sensing and protection system shall be provided which causes a shutdown of the generator set if true RMS frequency falls below 90% of rated frequency for more than 10 seconds.
  24. The control system provided shall withstand the surge voltage produced by a 70A DC battery charging alternator operating at full load when the battery bank is disconnected. The test shall be successfully completed without tripping protective circuit breakers or blowing fuse protective devices.
  25. All switches, lamps and meters shall be oil-tight and dust-tight and the enclosure door shall be gasketed.
  26. All switches shall be provided with fully illuminated back-lit labels and all metering shall be individually lighted to allow for easy reading of functions in a completely dark room.
  27. The field connections shall be made on permanently labeled terminal blocks, which are designed and tested by the manufacturer of the generator set to be suitable for use without wire termination lugs. Provisions shall be made for future addition of DIN-rail mounted components.
  28. Control panel and interconnection enclosures shall be UL 508 listed as a unit assembly.
  29. Communications:
    - a. Alarm Relay Mode: Provide Form C alarm contacts that can be individually linked to alarm or status outputs from the generator set to external devices.
  30. Interface to Site Monitoring System: Provide necessary electronic components and wiring to interface with and communicate the analog and digital status information to an owner provided site monitoring system. Include in this contract all work required for translation of proprietary protocol required to achieve this interface, and all licensing or other fees associated with this interface. Provide ethernet connection for integrating into modbus protocol.

## 2.4 ELECTRIC PLANT MOUNTING

- A. The plant shall be provided with shock or anti-vibration mounts with the plant. Provide Korfund LKD spring-type isolators or type EU pads. Vibration isolation may be integrally a part of the generator set to the skid package. The plant's integral base shall have forklift sockets. Battery rack shall be integral part of plant base.

## 2.5 ACCESSORIES

- A. All accessories needed for the proper operation of each plant shall be furnished. These shall include, but not limited to, the following:
  1. Critical rated side inlet silencers with installation attachments for mounting within the set housing, flexible exhaust connection.
  2. Belt driven battery charging alternator.
  3. Lead acid starting batteries
  4. Battery cables.
  5. Fully automatic 120 volt, 10 amp battery charger. Cummins model number A048G602 or approved equal.
  6. Natural Gas Fuel Train consisting of:
    - a. Dry fuel strainer
    - b. 12 VDC fuel solenoid valve
    - c. Pounds-to-ounces primary gas pressure reducing regulator

- d. UL Listed braided metallic flexible fuel line
- 7. An oil drain valve with hose extension shall be provided for draining oil at the side of the plant.
- 8. Detailed operation and maintenance manuals with parts list.

## 2.6 REMOTE ALARM ANNUNCIATOR

- A. Cummins No.0300-5929 shall be provided for flush mounting at inside location remote from the generator set located by the fire alarm control remote annunciator panel in the front administration office area.

## 2.7 AUTOMATIC TRANSFER SWITCH

### A. Scope

- 1. Provide open transition automatic transfer switches (ATS) with the number of poles, amperage, voltage and withstand current ratings as shown on the plans. Each automatic transfer switch shall consist of an inherently double throw power transfer switch unit and a control module interconnected to provide complete automatic operation.

### B. Codes and Standards

- 1. UL 1008 - Transfer Switch Equipment
- 2. NFPA 70 - National Electrical Code
- 3. NFPA 99 - Health Care Facilities Code
- 4. NFPA 110 - Standard for Emergency and Standby Power Systems

### C. Acceptable Manufacturers

- 1. Cummins Power Generation
- 2. ASCO
- 3. Caterpillar
- 4. Kohler
- 5. Russ Electric

### D. Mechanically Held Transfer Switch

- 1. The transfer switch unit shall be electrically operated and mechanically held. The switch shall be mechanically interlocked to ensure only one of two possible positions, normal or emergency.
- 2. All main contacts shall be silver composition. Switches rated 600 amperes and above shall have segmented, blow-on construction and be protected by separate arcing contacts.
- 3. Inspection of all contacts shall be possible from the front of the switch without disassembly of operating linkages and without disconnection of power conductors. A manual operating handle shall be provided for maintenance purposes.
- 4. Designs utilizing components of molded-case circuit breakers, contactors, or parts thereof are not acceptable.

### E. Microprocessor Control Panel

- 1. The control panel shall direct the operation of the transfer switch. The panel's sensing and logic shall be controlled by a built-in microprocessor.
- 2. Operator Panel. Each transfer switch shall be provided with a control panel to allow the operator to view the status and control operation of the transfer switch. The operator panel shall be a sealed membrane panel rated NEMA 3R/IP53 or better (regardless of enclosure rating) that is permanently labeled for switch and control functions. The operator panel shall communicate with the engine generator, including display of all engine and alternator data, and other transfer switch data in the power system. The operator panel shall allow starting and stopping of the generator set via the transfer switch operator panel

in both test and emergency modes.

F. Enclosure

1. The ATS shall be furnished in a NEMA type 1 enclosure, for indoor use and NEMA4 for exterior use.

G. Voltage and Frequency Sensing

1. The voltage of each phase of the normal source shall be monitored, with pickup adjustable from 85% to 100% of nominal, and dropout adjustable from 75% to 98% of pickup setting.
2. Single-phase voltage sensing of the emergency source shall be provided, with pickup voltage adjustable from 85% to 100% of nominal and independent frequency sensing with pickup adjustable from 90% to 100% of nominal.

H. Time Delays

1. A time delay shall be provided to override momentary normal source outages and delay all transfer and engine starting signals. Adjustable from 0 to 6 seconds.
2. A time delay shall be provided on transfer to emergency, adjustable from 0 to 5 minutes for controlled timing of transfer of loads to emergency.
3. A time delay shall be provided on retransfer to normal, adjustable from 0 to 30 minutes. Time delay shall be automatically bypassed if emergency source fails and normal source is acceptable.
4. A time delay shall be provided on shutdown of engine generator for cool down, adjustable from 0 to 60 minutes.

I. Additional Features

1. A set of DPDT gold-flashed contacts rated 10 amps, 32 VDC shall be provided for a low-voltage engine start signal.
2. A momentary-type test switch shall be provided to simulate a normal source failure.
3. One set of auxiliary contacts rated 10 amps, 250 VAC shall be provided.
4. Position indicating lights shall be provided.
5. An in-phase monitor or delayed transition shall be provided for motor load applications.
6. Provide a field-programmable control which shall periodically start and run the generator with or without transferring the load for a preset time period, then re-transfer and shut down the generator after a preset cool-down period.

J. Withstand and Closing Ratings

1. The ATS shall be UL listed in accordance with UL 1008 and be labeled in accordance with that standard's 3 cycle, long-time ratings. ATS's that are tested and labeled with specific breaker ratings only are acceptable. If current limiting fuses are utilized, provide current limiting fuses and disconnect switch mounted in or on Automatic Transfer Switch.

- K. The ATS manufacturer shall maintain a national service organization of company-employed personnel located throughout the contiguous United States. The service center's personnel must be factory trained and must be on call 24 hours a day, 365 days a year.

## 2.8 OUTDOOR WEATHER-PROTECTIVE HOUSING

- A. Generator set housing shall be provided factory-assembled to generator set base and radiator cowling. Housing shall provide ample airflow for generator set operation at rated load in the ambient conditions previously specified. The housing shall have hinged side-access doors and rear control door. All doors shall be lockable. All sheet metal shall be primed for corrosion protection and finish painted with the manufacturer's standard color using a two-step electro-coating paint process, or equal, meeting the performance requirements specified below. All surfaces of all metal parts shall be primed and painted. The painting process shall result in a coating that meets the following requirements:

1. Primer thickness, 0.5 - 2.0 mils. Top coat thickness, 0.8 - 1.2 mils.
  2. Gloss, per ASTM D523, 80% plus or minus 5%. Gloss retention after one year shall exceed 50%.
  3. Crosshatch adhesion, per ASTM D3359, 4B-5B.
  4. Impact resistance, per ASTM D2794, 120-160 inch-pounds.
  5. Salt spray, per ASTM B117, 1000+ hours.
  6. Humidity, per ASTM D2247, 1000+ hours.
  7. Water soak, per ASTM D2247, 1000+ hours.
- B. Painting of hoses, clamps, wiring harnesses, and other non-metallic service parts shall not be acceptable. Fasteners used shall be corrosion resistant and designed to minimize marring of the painted surface when removed for normal installation or service work.
- C. A 120 VAC heater with thermostat shall be provided within the generator set control panel to eliminate condensation. Contractor shall provide 120 volt, 20 amp circuit.

## 2.9 OUTDOOR SOUND ATTENUATED WEATHER-PROTECTIVE HOUSING

- A. The generator set shall be provided with a factory-installed housing to allow the generator set to operate at full rated load in the ambient conditions previously specified. The enclosure shall reduce the sound level of the generator set while operating at full rated load to an maximum of 71 dBA, which shall be an eight-position average of any location 7 meters from the geometric center point of the generator set in a free field environment. Housing configuration and materials used may be of a suitable design which meets application needs, except that acoustical materials used shall be oil and water resistant. No foam materials shall be used unless they can be demonstrated to have the same durability and life as fiberglass. The acoustical housing shall match the standard footprint of the standard housing-ready generator set base. The enclosure shall include hinged doors for access to both sides of the engine and alternator, and the control equipment. Key-locking and pad lockable door latches shall be provided for all doors. Door hinges shall be stainless steel. The enclosure shall be provided with an exhaust silencer which is mounted inside of the enclosure and allows the generator set package to meet specified sound level requirements. Silencer and exhaust shall include a rain cap and rain shield. All sheet metal shall be primed for corrosion protection and finish painted with the manufacturer's standard color using a two-step electro coating paint process, or equal, meeting the performance requirements specified below. All surfaces of all metal parts shall be primed and painted. The painting process shall result in a coating which meets the following requirements:
1. Primer thickness, 0.5-2.0 mils. Top coat thickness, 0.8-1.2 mils.
  2. Gloss, per ASTM D523, 80% plus or minus 5%. Gloss retention after one year shall exceed 50%.
  3. Crosshatch adhesion, per ASTM D3359, 4B-5B.
  4. Impact resistance, per ASTM D2794, 120-160 inch-pounds.
  5. Salt spray, per ASTM B117, 1000+ hours.
  6. Humidity, per ASTM D2247, 1000+ hours.
  7. Water soak, ASTM D2247, 1000+ hours.
- B. Painting of hoses, clamps, wiring harnesses, and other non-metallic service parts shall not be acceptable. Fasteners used shall be corrosion-resistant and designed to minimize marring of the painted surface when removed for normal installation or service work.
- C. A 120 VAC heater with thermostat shall be provided within the generator set control panel to eliminate condensation. Contractor shall provide 120 volt, 20 amp circuit.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install generator and housing on a minimum 6 inch high reinforced concrete housekeeping pad. Provide blockouts as required. Bolt the generator to the pad. The pad shall be designed by a structural engineer. Provide working clearances and operational air flow clearances as required by

the manufacturer.

- B. Install the load bank on a minimum 6 inch high reinforced concrete housekeeping pad. Provide blockouts as required. Bolt the load bank to the pad. The pad shall be designed by a structural engineer. Provide working clearances as required by the manufacturer.
- C. Provide all power wiring, control wiring, additional contacts and relays required for a complete installation. All conduit shall be in a two-hour enclosure. Underground conduits shall be concrete encased. The wall mounted dual rate battery shall be taken offline during the starting of the generator. The generator belt driven alternator shall charge the batteries when the generator is running.
- D. Provide conduit and wire routed from the auxiliary contacts in the automatic transfer switch to the elevator controller. The purpose of this wiring is to signal the elevator controller when it is connected to emergency power.
- E. Install generator set and transfer switches in accordance with manufacturer's instructions.
- F. The generator shall be installed as a separately derived system. Contractor shall connect the generator neutral to a grounding electrode. Provide a bonding jumper from the ground bar to neutral.
- G. Provide engraved plastic nameplates under the provisions of Section 26 02 00.

### 3.2 WARRANTY

- A. The complete standby electric power system, including engine-generator set equipped with set exerciser, and running time meter, shall be warranted for a period of five years from the date of initial start-up. Multiple warranties for individual components (engine, alternator, controls, etc.) will not be acceptable. Satisfactory warranty documents must be provided. This warranty shall be as detailed in available written documents. In the judgement of the specifying authority, the manufacturer supplying the warranty for the complete system must have necessary financial strength and technical expertise with all components supplied to provide adequate warranty support. All items of the engine, generator, and controls that are warranted in the first year shall be covered for the full five year term of the warranty. Warranty coverage shall include parts, labor, and travel for the full term of the warranty.
- B. Extensions of warranty term up to 10 years from start-up and inclusion of comprehensive terms shall be available for one year after start-up.
- C. Provide one year service contract that includes monthly visits to observe and record condition and verify "exercise" programming is operational.

### 3.3 TESTS

- A. Factory production model tests: Before shipment of the equipment, the generator set shall be tested under rated load and power factor for performance and proper functioning of control and interfacing circuits. Testing at unity power factor only (resistance banks only) is not acceptable, since kW output is affected by the higher generator efficiency at unity power factor, and the kVAR for motor starting and regulation loads is not correlatable between unity and rated power factor. Other tests shall include:
  - 1. Single step load pickup per NFPA 110.
  - 2. Transient response and steady state governing.
  - 3. Safety Shutdowns.
  - 4. Prototype tests in accordance with NFPA 110 level 1 have been done on a complete and functional set. Component level type tests will not substitute for this requirement.
- B. The engineer shall be notified in advance of these test and shall have the option of witnessing these tests. Certified copies of test results shall be forwarded to the engineer for review.

C. Field Test After Installation:

1. The complete installation shall be initially started and checked out for operational compliance by factory-trained representative(s) of the engine-generator set and transfer switch manufacturer. The engine lubrication oil and antifreeze, as recommended by the manufacturer for operation under environmental conditions specified, shall be provided by the engine-generator set supplier.
2. Upon completion of initial start-up and system checkout, the supplier of the generator set shall perform a field test, with the engineer notified in advance, to demonstrate load carrying capability, stability, voltage, and frequency. The engineer shall be present during the field test.
3. The generator shall be run for four hours continuously with all available facilities emergency load connected to its output; in addition, the generator set supplier must provide a portable load bank to supplement any existing load to enable full load testing. Load shall not exceed 50% of generator-set rating for first 1/2 hour during first initial run for proper engine break-in. Records shall be maintained throughout this period to record water temperature, oil pressure, ambient air temperature, voltage, current, frequency, kilowatts, and power factor. The above data shall be recorded at 15 minute intervals throughout the test. There shall be a 10 minute unloaded run at the conclusion of the test to allow engine to cool before shutdown. Three copies of the field test data shall be furnished to the engineer. The contractor shall make all necessary hook-ups to accomplish field tests and shall furnish all fuel necessary for field test and start-up.

3.4 OPERATIONS PERSONNEL TRAINING

- A. Provide a training session for the owner's operations personnel. Training session shall be performed by a qualified person who is knowledgeable in the subject/equipment. Submit a training agenda two (2) weeks prior to the proposed training session for review and approval. Training session shall include at the minimum:
1. Purpose of equipment.
  2. Principle of how the equipment works.
  3. Important parts and assemblies.
  4. How the equipment achieves its purpose and necessary operating conditions.
  5. Most likely failure modes, causes and corrections.
  6. On site demonstration.

**END OF SECTION**

**GALENA PARK I.S.D.  
SNS GENERATORS TICE, NSMS AND HAVARD  
GPISD #900-2023**

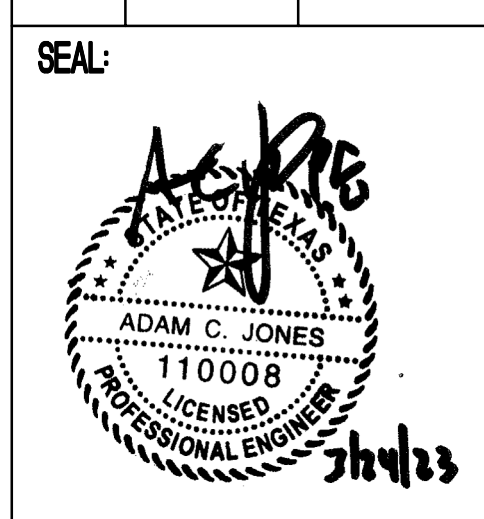


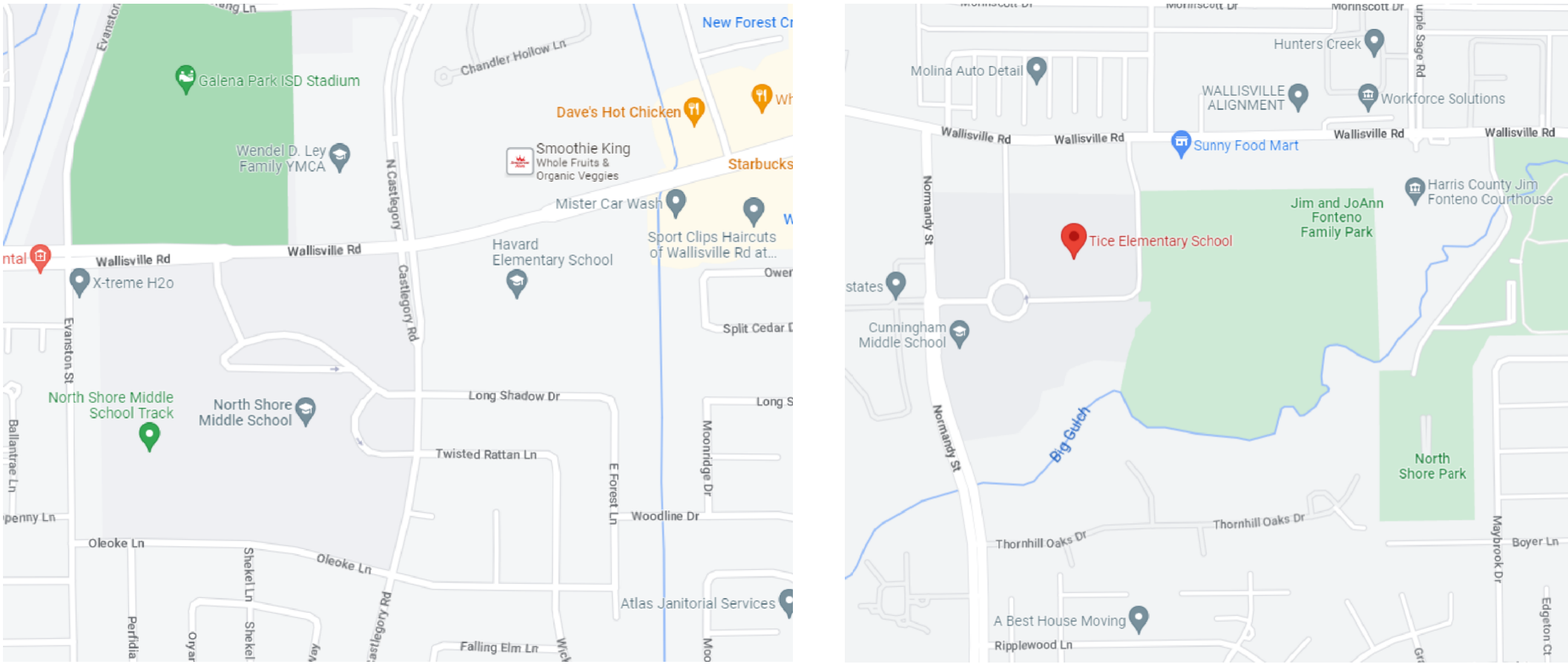
**BOARD OF TRUSTEES**

Adrian Stephens	Board President
Noe Esparza	Vice-President
Norma Hernandez	Secretary
Wanda Heath Johnson	Trustee
Ramon Garza	Trustee
Herbert Alexander Sanchez	Trustee
Linda Clark Sherrard	Trustee
Dr. John C. Moore	Superintendent of Schools



REVISION	No.	DATE	DISCUSSION



PROJECT TEAM	LOCATION	SHEET LIST TABLE																								
<p>DBR Inc. 9990 Richmond Ave. South Bldg. Suite 300 Houston, Texas 77042 713-914-0888</p> <p>MEP Engineer Adam Jones, P.E. <a href="mailto:ajones@dbrinc.com">ajones@dbrinc.com</a></p> <p>Galena Park I.S.D. 14705 Woodforest Blvd. Houston, TX 77015</p>	 <p style="text-align: center; font-size: 24pt; font-weight: bold; margin-top: 20px;">ADDRESS</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 30%;">HAVARD ES:</td> <td>15150 WALLISVILLE RD HOUSTON, TX 77049</td> </tr> <tr> <td>TICE ES:</td> <td>14120 WALLISVILLE RD HOUSTON, TX 77049</td> </tr> <tr> <td>NORTH SHORE MS:</td> <td>120 CASTLEGORY HOUSTON, TX 77015</td> </tr> </table>	HAVARD ES:	15150 WALLISVILLE RD HOUSTON, TX 77049	TICE ES:	14120 WALLISVILLE RD HOUSTON, TX 77049	NORTH SHORE MS:	120 CASTLEGORY HOUSTON, TX 77015	<table style="width: 100%; border: none;"> <tr><td>C0.01</td><td>COVER SHEET</td></tr> <tr><td>E0.01</td><td>ELECTRICAL SYMBOL LEGEND</td></tr> <tr><td>PE2.01</td><td>OVERALL PLUMBING AND ELECTRICAL PLAN - HAVARD ES</td></tr> <tr><td>PE2.02</td><td>ENLARGED PLUMBING AND ELECTRICAL PLANS - HAVARD ES</td></tr> <tr><td>PE2.03</td><td>OVERALL PLUMBING AND ELECTRICAL PLAN - NORTH SHORE MS</td></tr> <tr><td>PE2.04</td><td>ENLARGED PLUMBING AND ELECTRICAL PLANS - NORTH SHORE MS</td></tr> <tr><td>PE2.05</td><td>OVERALL PLUMBING AND ELECTRICAL PLAN - TICE ES</td></tr> <tr><td>PE2.06</td><td>ENLARGED PLUMBING AND ELECTRICAL PLANS - TICE ES</td></tr> <tr><td>E4.01</td><td>ELECTRICAL ONE LINE DIAGRAMS</td></tr> </table>	C0.01	COVER SHEET	E0.01	ELECTRICAL SYMBOL LEGEND	PE2.01	OVERALL PLUMBING AND ELECTRICAL PLAN - HAVARD ES	PE2.02	ENLARGED PLUMBING AND ELECTRICAL PLANS - HAVARD ES	PE2.03	OVERALL PLUMBING AND ELECTRICAL PLAN - NORTH SHORE MS	PE2.04	ENLARGED PLUMBING AND ELECTRICAL PLANS - NORTH SHORE MS	PE2.05	OVERALL PLUMBING AND ELECTRICAL PLAN - TICE ES	PE2.06	ENLARGED PLUMBING AND ELECTRICAL PLANS - TICE ES	E4.01	ELECTRICAL ONE LINE DIAGRAMS
HAVARD ES:	15150 WALLISVILLE RD HOUSTON, TX 77049																									
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PE2.06	ENLARGED PLUMBING AND ELECTRICAL PLANS - TICE ES																									
E4.01	ELECTRICAL ONE LINE DIAGRAMS																									

GALENA PARK ISD  
SNS GENERATORS TICE, NSMS AND HAVARD  
#900-2023

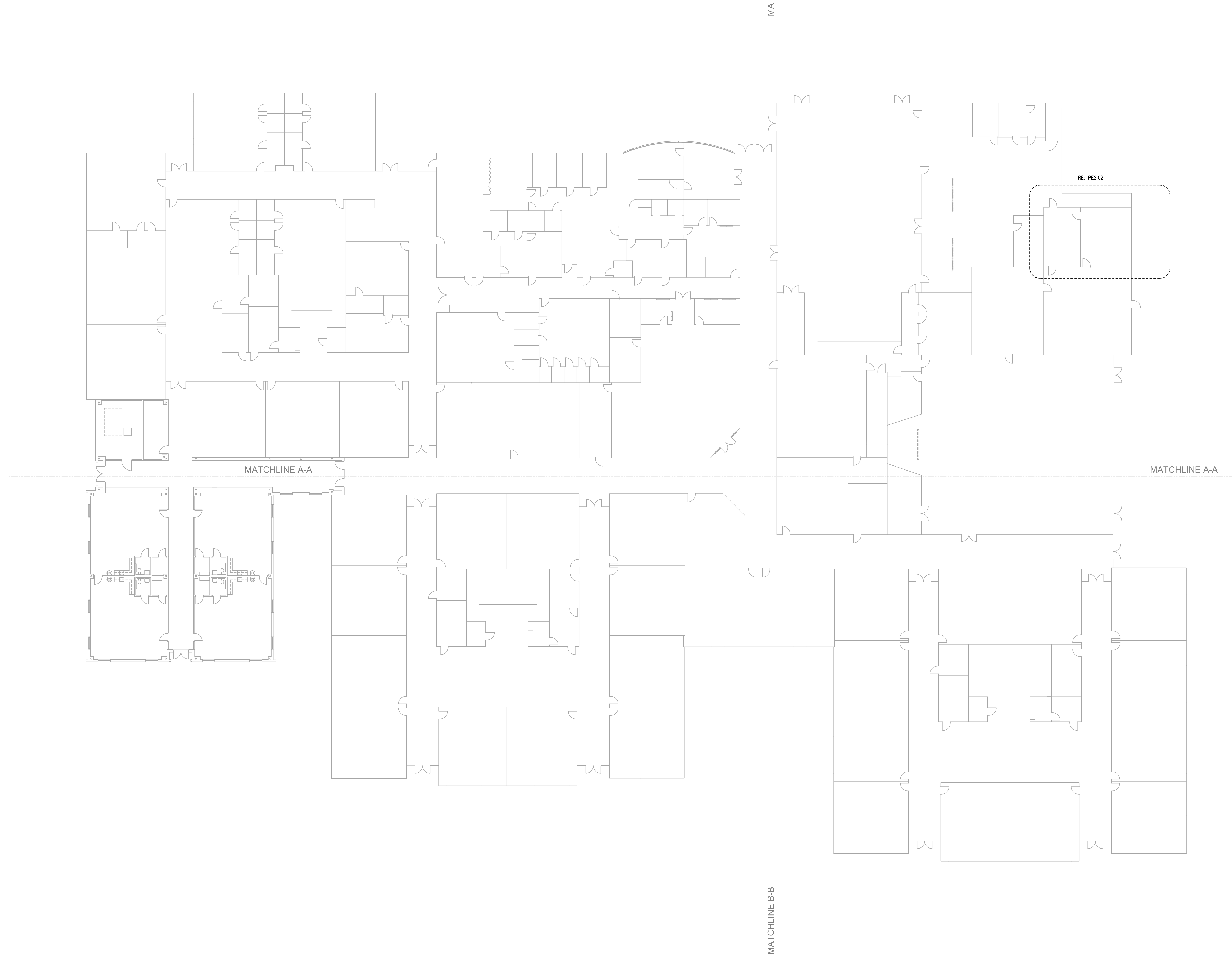
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DRAWN BY:	DBR
CHECKED BY:	DBR
PROJECT NUMBER:	230083.000
SHEET TITLE:	COVER SHEET
SHEET NUMBER:	C0.01

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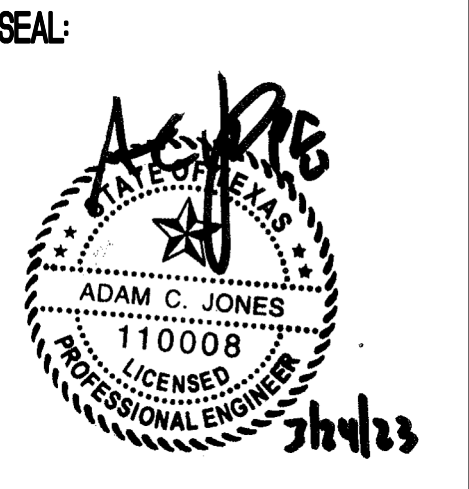
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**1** OVERALL PLUMBING AND ELECTRICAL PLAN - HAVARD ES  
PE2.01 SCALE: 1/16" = 1'-0"



REVISION	No.	DATE	DISCRIPTION



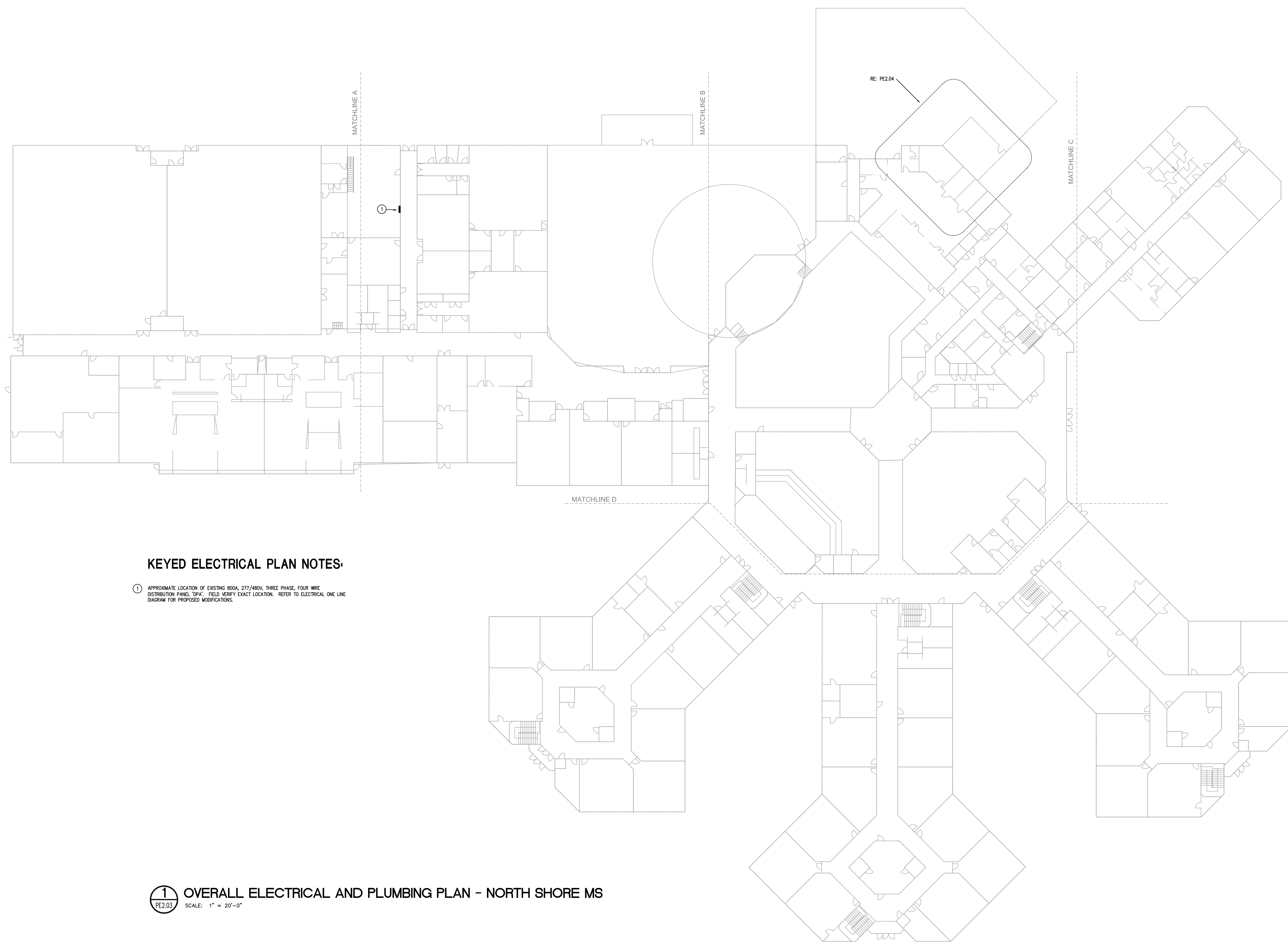
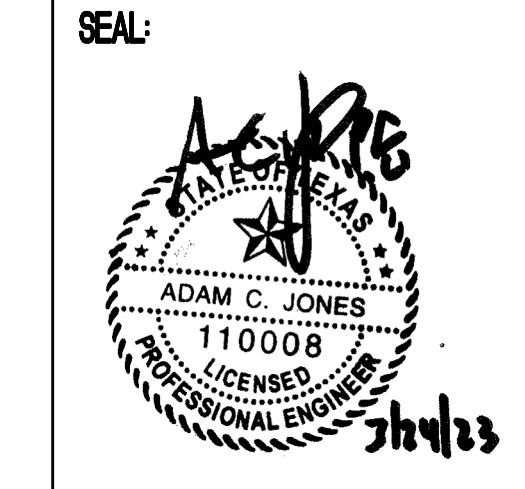
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#900-2023

DATE:	03/24/2023
DRAWN BY:	DBR
CHECKED BY:	DBR
PROJECT NUMBER:	230083.000
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SHEET NUMBER:	PE2.01

PE2.01



REVISION	No.	DATE	DISCRIPTION



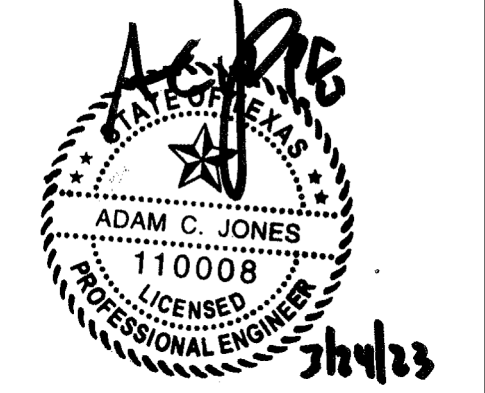
**KEYED ELECTRICAL PLAN NOTES:**

- ① APPROXIMATE LOCATION OF EXISTING 800A, 277/480V, THREE PHASE, FOUR WIRE DISTRIBUTION PANEL, 'DPA'. FIELD VERIFY EXACT LOCATION. REFER TO ELECTRICAL ONE LINE DIAGRAM FOR PROPOSED MODIFICATIONS.

**① OVERALL ELECTRICAL AND PLUMBING PLAN - NORTH SHORE MS**  
 PE2.03 SCALE: 1" = 20'-0"

**GALENA PARK ISD**  
**SNS GENERATORS TICE, NSMS AND HAVARD**  
**#900-2023**

<b>DATE:</b> 03/24/2023
<b>DRAWN BY:</b> ASDFASDF
<b>CHECKED BY:</b> DBR
<b>PROJECT NUMBER:</b> 230083.000
<b>SHEET TITLE:</b> OVERALL PLUMBING AND ELECTRICAL PLAN - NORTH SHORE MS
<b>SHEET NUMBER:</b>  <b>PE2.03</b>

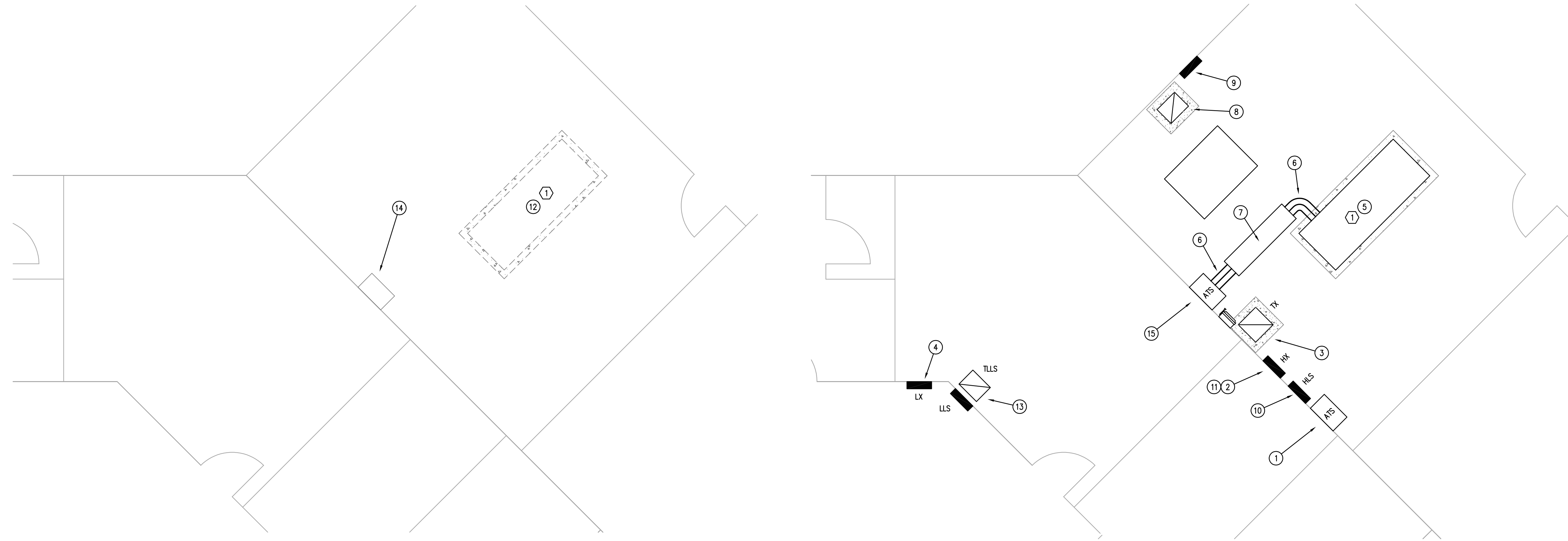


**KEYED ELECTRICAL PLAN NOTES:**

- NEW NEAR AUTOMATIC TRANSFER SWITCH 'ATS-LS' FOR LIFE SAFETY PANEL 'HLS'. REFER TO ELECTRICAL ONE LINE DIAGRAMS FOR ADDITIONAL INFORMATION.
- EXISTING PANEL 'HX'. REFER TO ELECTRICAL ONE LINE DIAGRAMS FOR ADDITIONAL INFORMATION.
- EXISTING TRANSFORMER 'TX'. REFER TO ELECTRICAL ONE LINE DIAGRAMS FOR ADDITIONAL INFORMATION.
- EXISTING PANEL 'LX'. REFER TO ELECTRICAL ONE LINE DIAGRAMS FOR ADDITIONAL INFORMATION.
- NEW 100KW NATURAL GAS GENERATOR TO REPLACE EXISTING.
- EXISTING SURFACE MOUNTED CONDUITS TO REMAIN FOR REUSE. REFER TO ELECTRICAL ONE LINE DIAGRAM.
- EXISTING DIAMOND PLATE WIRING TROUGH TO REMAIN FOR REUSE. REFER TO ELECTRICAL ONE LINE DIAGRAM.
- EXISTING TRANSFORMER 'LY' TO REMAIN.
- EXISTING PANEL 'LY' TO REMAIN.
- NEW NEAR PANEL 'HLS'. REFER TO ELECTRICAL ONE LINE DIAGRAM AND PANEL SCHEDULE.
- EXISTING PANEL 'HX' TO BECOME 277/480V, THREE PHASE, FOUR WIRE STAND-BY PANEL.
- EXISTING 85KW NATURAL GAS GENERATOR TO BE REMOVED. RETURN TO OWNER FOR DISPOSITION.
- NEW TRANSFORMER 'TLLS' SUSPENDED ABOVE ACCESSIBLE CEILING.
- EXISTING THREE POLE AUTOMATIC TRANSFER SWITCH TO BE REMOVED. RETURN TO OWNER FOR DISPOSITION.
- NEW NEAR AUTOMATIC TRANSFER SWITCH ATS-SB FOR EXISTING PANEL 'HX'

**KEYED PLUMBING PLAN NOTES:**

- CONTRACTOR TO DISCONNECT EXISTING 2" GAS LINE TO EXISTING EMERGENCY NATURAL GAS GENERATOR AND RE-CONNECT TO NEW EMERGENCY NATURAL GAS GENERATOR. CONTRACTOR TO PROVIDE GAS PRESSURE REGULATOR, PLUG VALVE, UNION, STRAINER AND DIRT LEG AT NEW EMERGENCY NATURAL GAS GENERATOR. CONTRACTOR TO VERIFY EXACT SIZE OF EXISTING GAS LINE ROUTED TO EXISTING EMERGENCY NATURAL GAS GENERATOR AND ROUTE NEW 2" GAS LINE (5 PSI) TO NEW EMERGENCY NATURAL GAS GENERATOR IF EXISTING GAS LINE IS LESS THAN 2".



**1 ENLARGED PARTIAL PLUMBING AND ELECTRICAL PLAN - DEMOLITION**  
 SCALE: 1/4" = 1'-0"

**2 ENLARGED PARTIAL PLUMBING AND ELECTRICAL PLAN - NEW WORK**  
 SCALE: 1/4" = 1'-0"

Panelboard HLS		10,000 AIC Rating												
277/480 Volt, 3-Phase, 4-Wire		X Existing												
1 Section		X New												
3R - Nema Rating		MLO												
Notes	Load (VA)	Description	Type	Wre	CB	CKT #	PH	CKT #	CB	Wre	Type	Description	Load (VA)	Notes
1	2000	EXISTING CIRCUIT	L	12	20/1	1	A	2	20/1			SPARE		
1	2000	EXISTING CIRCUIT	L	12	20/1	3	B	4	20/1			SPARE		
1	2000	EXISTING CIRCUIT	L	12	20/1	5	C	6	20/1			SPARE		
		SPACE				7	A	8				SPACE		
		SPACE				9	B	10				SPACE		
		SPACE				11	C	12				SPACE		
		SPACE				13	A	14				SPACE		
		SPACE				15	B	16				SPACE		
		SPACE				17	C	18				SPACE		
		SPACE				19	A	20				SPACE		
		SPACE				21	B	22				SPACE		
		SPACE				23	C	24				SPACE		
	6,000	Subtotal										Subtotal	0	
N.E.C.	Load Type	Conn.	Fct.	Diversity	N.E.C.	(L) Lighting		Conn.	Fct.	Diversity				
220.44	(R) Recept.	0	0	0	210.20(a)	(L) Lighting		6,000	125%	7,500				
220.56	(K) Kitchen	0	100%	0	620.14	(E) Ext. Ltg.		0	125%	0				
220.60	(C) Cooling	0	0%	0	620.14	(E) Elevators		0	100%	0				
220.60	(H) Heating	0	0%	0	220.50	(WH) Water Ht.		0	100%	0				
220.60	(F) Fans	0	100%	0		(MT) Ltg. Mot.		0	125%	0				
220.60	(M) Misc.	0	100%	0		(SP) Sub Panel		0	100%	0				
	Total Connected Load	6,000 VA =	7.2	AMPS	Location of Panel:		NORTH SHORE							
	Total Load (Diversified)	7,500 VA =	9.0	AMPS	Location of Panel:		MIDDLE SCHOOL							

1. EXISTING LIFE SAFETY LOAD TRANSFERRED FROM EXISTING PANEL 'HX'.

Panelboard LLS		10,000 AIC Rating												
120/208 Volt, 3-Phase, 4-Wire		X Existing												
1 Section		X New												
1 - Nema Rating		MLO												
Notes	Load (VA)	Description	Type	Wre	CB	CKT #	PH	CKT #	CB	Wre	Type	Description	Load (VA)	Notes
1	500	FIRE SYSTEM	M	EX	20/1	1	A	2	20/1			SPARE		
		SPACE				3	B	4	20/1			SPACE		
		SPACE				5	C	6	20/1			SPACE		
		SPACE				7	A	8				SPACE		
		SPACE				9	B	10				SPACE		
		SPACE				11	C	12				SPACE		
	500	Subtotal										Subtotal	0	
N.E.C.	Load Type	Conn.	Fct.	Diversity	N.E.C.	(L) Lighting		Conn.	Fct.	Diversity				
220.44	(R) Recept.	0	0	0	210.20(a)	(L) Lighting		0	125%	0				
220.56	(K) Kitchen	0	100%	0	620.14	(E) Ext. Ltg.		0	125%	0				
220.60	(C) Cooling	0	0%	0	620.14	(E) Elevators		0	100%	0				
220.60	(H) Heating	0	0%	0	220.50	(WH) Water Ht.		0	100%	0				
220.60	(F) Fans	0	100%	0		(MT) Ltg. Mot.		0	125%	0				
220.60	(M) Misc.	500	100%	500		(SP) Sub Panel		0	100%	0				
	Total Connected Load	500 VA =	1.4	AMPS	Location of Panel:		NORTH SHORE							
	Total Load (Diversified)	500 VA =	1.4	AMPS	Location of Panel:		MIDDLE SCHOOL							

1. EXISTING LIFE SAFETY LOAD TRANSFERRED FROM EXISTING PANEL 'LX'.

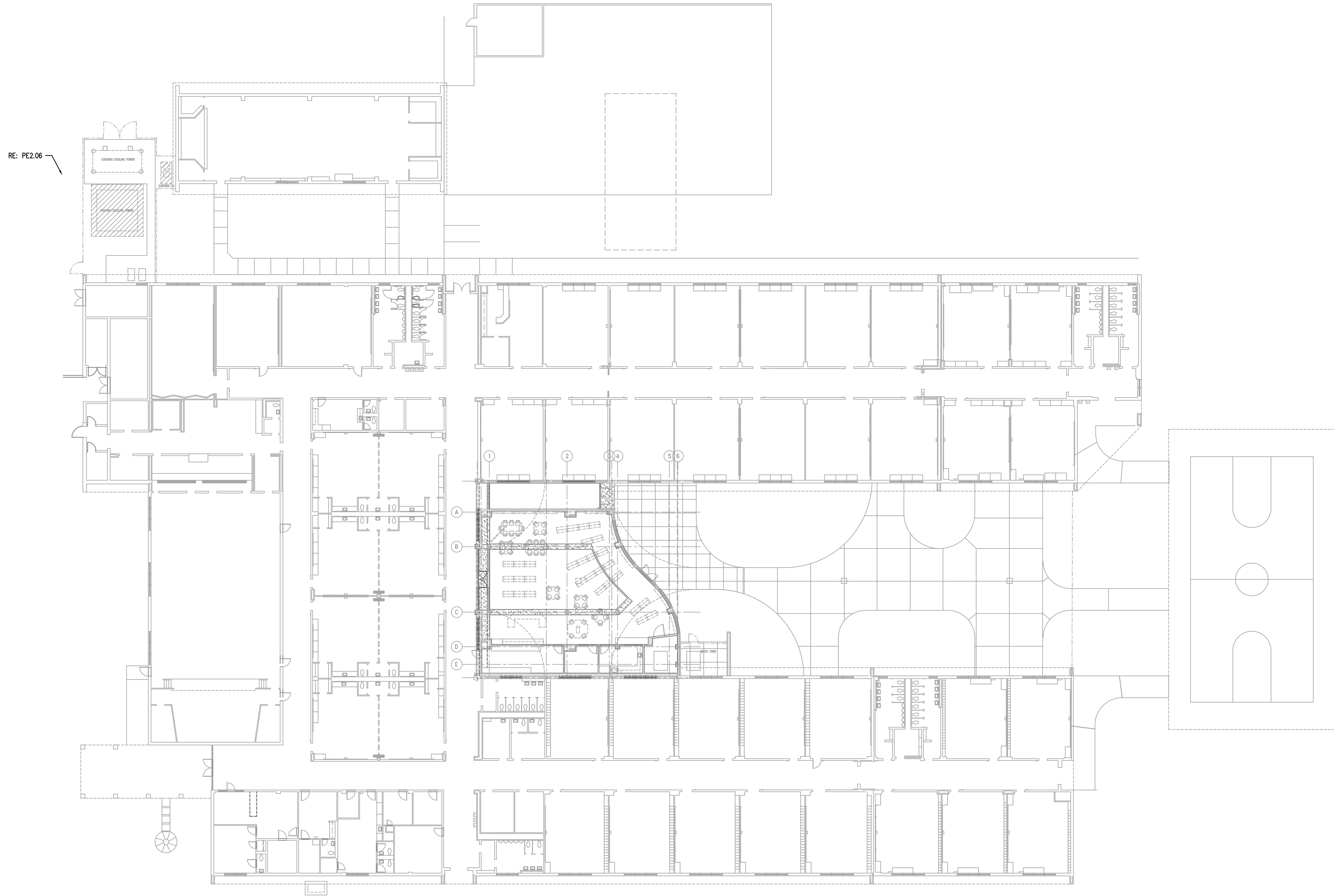
Panelboard HX		EXISTING AIC Rating												
277/480 Volt, 3-Phase, 4-Wire		X Existing												
1 Section		New												
1 - Nema Rating		MLO												
Notes	Load (VA)	Description	Type	Wre	CB	CKT #	PH	CKT #	CB	Wre	Type	Description	Load (VA)	Notes
1	2000	LIGHTING	L	EX	20/1	1	A	2	7/03	EX	SP	XFMR TX	7066	2
1	2000	LIGHTING	L	EX	20/1	3	B	4	-	EX	SP	-	7066	
1	2000	LIGHTING	L	EX	20/1	5	C	6	-	EX	SP	-	7066	
		SPACE				7	A	8	20/1			SPACE		3
		SPACE				9	B	10	20/1			SPACE		3
		SPACE				11	C	12	20/1			SPACE		3
		SPACE				13	A	14	20/1			SPACE		3
		SPACE				15	B	16	20/1			SPACE		3
		SPACE				17	C	18				SPACE		
		EXISTING CIRCUIT	SP	EX	30/3	19	A	20				SPACE		
		-	SP	EX	-	21	B	22				SPACE		
		-	SP	EX	-	23	C	24				SPACE		
		SPACE				25	A	26				SPACE		
		SPACE				27	B	28				SPACE		
		SPACE				29	C	30				SPACE		
		SPACE				31	A	32				SPACE		
		SPACE				33	B	34				SPACE		
		SPACE				35	C	36				SPACE		
		SPACE				37	A	38				SPACE		
		SPACE				39	B	40				SPACE		
		SPACE				41	C	42				SPACE		
	6,000	Subtotal										Subtotal	21,198	
N.E.C.	Load Type	Conn.	Fct.	Diversity	N.E.C.	(L) Lighting		Conn.	Fct.	Diversity				
220.44	(R) Recept.	0	0	0	210.20(a)	(L) Lighting		6,000	125%	7,500				
220.56	(K) Kitchen	0	100%	0	620.14	(E) Ext. Ltg.		0	125%	0				
220.60	(C) Cooling	0	0%	0	620.14	(E) Elevators		0	100%	0				
220.60	(H) Heating	0	0%	0	220.50	(WH) Water Ht.		0	100%	0				
220.60	(F) Fans	0	100%	0		(MT) Ltg. Mot.		0	125%	0				
220.60	(M) Misc.	0	100%	0		(SP) Sub Panel		21,198	100%	21,198				
	Total Connected Load	27,198 VA =	32.7	AMPS	Location of Panel:		NORTH SHORE							
	Total Load (Diversified)	28,698 VA =	34.5	AMPS	Location of Panel:		MIDDLE SCHOOL							

- RELOCATE THIS EXISTING CIRCUIT TO NEW 277/480V, THREE PHASE, FOUR WIRE LIFE SAFETY PANEL 'HLS'. EXISTING BREAKER TO BECOME SPARE.
- EXISTING CIRCUIT BREAKER TO REMAIN.
- EXISTING 20A/1P SPARE CIRCUIT BREAKER CURRENTLY IN THE 'OFF' POSITION.

Panelboard LY		EXISTING AIC Rating												
120/208 Volt, 3-Phase, 4-Wire		X Existing												
1 Section		New												
3R - Nema Rating		MLO												
Notes	Load (VA)	Description	Type	Wre	CB	CKT #	PH	CKT #	CB	Wre	Type	Description	Load (VA)	Notes
1		EXISTING CIRCUIT	M	EX	30/3	1	A	2	20/1	EX	SP	EXISTING CIRCUIT		1
		-				3	B	4				SPACE		
		-				5	C	6				SPACE		
		SPACE				7	A	8				SPACE		
		SPACE				9	B	10				SPACE		
		SPACE				11	C	12				SPACE		
		SPACE				13	A	14				SPACE		
		SPACE				15	B	16				SPACE		
		SSS				17	C	18				SPACE		
	0	Subtotal										Subtotal	0	
N.E.C.	Load Type	Conn.	Fct.	Diversity	N.E.C.	(L) Lighting		Conn.	Fct.	Diversity				
220.44	(R) Recept.	0	0	0	210.20(a)	(L) Lighting		0	125%	0				
220.56	(K) Kitchen	0	100%	0	620.14	(E) Ext. Ltg.		0	125%	0				
220.60	(C) Cooling	0	0%	0	620.14	(E) Elevators		0	100%	0				
220.60	(H) Heating	0	0%	0	220.50	(WH) Water Ht.		0	100%	0				
220.60	(F) Fans	0	100%	0		(MT) Ltg. Mot.		0	125%	0				
220.60	(M) Misc.	0	100%	0		(SP) Sub Panel		0	100%	0				
	Total Connected Load	0 VA =	0.0	AMPS	Location of Panel:		NORTH SHORE							
	Total Load (Diversified)	0 VA =	0.0	AMPS	Location of Panel:		MIDDLE SCHOOL							

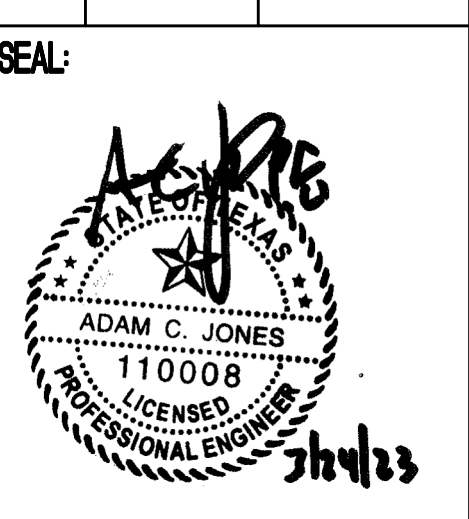
1. EXISTING CIRCUIT TO REMAIN.

Distribution Panelboard LX		EXISTING AIC Rating												
120/208 Volt, 3-Phase, 4-Wire		X Existing												
1 Section		New												
1 - Nema Rating		MLO												
Notes	Load (VA)	Description	Type	Wre	CB	CKT #	PH	CKT #	CB	Wre	Type	Description	Load (VA)	Notes
1	833	REFRIG. RACK	K	EX	15/3	1	A	2	20/1	EX	K	PASS THRU COOLER	900	1
1	833	-	K	EX	-	3	B	4	20/1	EX	K	PASS THRU COOLER	900	1
1	833	-	K	EX	-	5	C	6	20/1	EX	K	COOLER	900	1
1	500	COOLER COIL	K	EX	20/1	7	A	8	20/1	EX	K	COOLER	900	1
1	500	FREEZER COOL	K	EX	20/1	9	B	10	20/1	EX	K	COOLER	900	1
1	500	LTG/DOOR HTR												



**1** OVERALL ELECTRICAL AND PLUMBING PLAN - TICE ES  
PE2.05 SCALE: 1" = 20'-0"

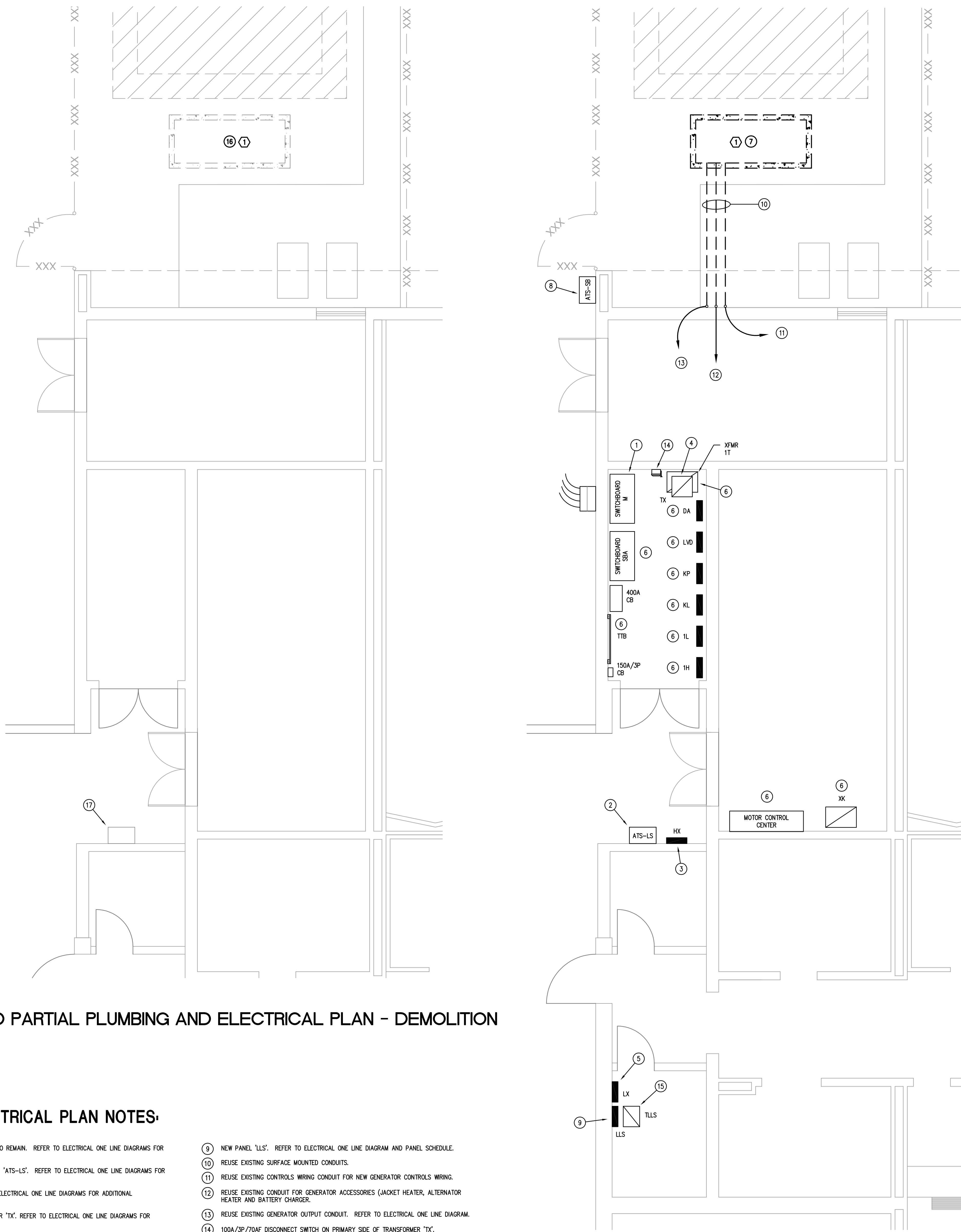
REVISION	No.	DATE	DISCRIPTION



GALENA PARK ISD  
SNS GENERATORS TICE, NSMS AND HAVARD  
#900-2023

DATE:	03/24/2023
DRAWN BY:	DBR
CHECKED BY:	DBR
PROJECT NUMBER:	230083.000
SHEET TITLE:	OVERALL PLUMBING AND ELECTRICAL PLAN - TICE ES
SHEET NUMBER:	PE2.05

PE2.05



**1 ENLARGED PARTIAL PLUMBING AND ELECTRICAL PLAN - DEMOLITION**  
1/4"=1'-0"

**KEYED ELECTRICAL PLAN NOTES:**

- 1 EXISTING MAIN SWITCHBOARD 'M' TO REMAIN. REFER TO ELECTRICAL ONE LINE DIAGRAMS FOR ADDITIONAL INFORMATION.
- 2 NEW AUTOMATIC TRANSFER SWITCH 'ATS-LS'. REFER TO ELECTRICAL ONE LINE DIAGRAMS FOR ADDITIONAL INFORMATION.
- 3 EXISTING PANEL 'HX'. REFER TO ELECTRICAL ONE LINE DIAGRAMS FOR ADDITIONAL INFORMATION.
- 4 EXISTING SUSPENDED TRANSFORMER 'TX'. REFER TO ELECTRICAL ONE LINE DIAGRAMS FOR ADDITIONAL INFORMATION.
- 5 EXISTING PANEL 'LX'. REFER TO ELECTRICAL ONE LINE DIAGRAMS FOR ADDITIONAL INFORMATION.
- 6 EXISTING ELECTRICAL EQUIPMENT TO REMAIN UNLESS NOTED OTHERWISE.
- 7 NEW 100kW NATURAL GAS GENERATOR TO REPLACE EXISTING.
- 8 NEW TRANSFER SWITCH 'ATS-SB'. REFER TO ELECTRICAL ONE LINE DIAGRAM.
- 9 NEW PANEL 'LLS'. REFER TO ELECTRICAL ONE LINE DIAGRAM AND PANEL SCHEDULE.
- 10 REUSE EXISTING SURFACE MOUNTED CONDUITS.
- 11 REUSE EXISTING CONDUIT WIRING CONDUIT FOR NEW GENERATOR CONTROLS WIRING.
- 12 REUSE EXISTING CONDUIT FOR GENERATOR ACCESSORIES (JACKET HEATER, ALTERNATOR HEATER AND BATTERY CHARGER).
- 13 REUSE EXISTING GENERATOR OUTPUT CONDUIT. REFER TO ELECTRICAL ONE LINE DIAGRAM.
- 14 100A/3P/70AF DISCONNECT SWITCH ON PRIMARY SIDE OF TRANSFORMER 'TX'.
- 15 NEW TRANSFORMER 'TLLS' SUSPENDED ABOVE ACCESSIBLE CEILING.
- 16 EXISTING 85kW NATURAL GAS GENERATOR TO BE REMOVED. RETURN TO OWNER FOR DISPOSITION.
- 17 EXISTING THREE POLE AUTOMATIC TRANSFER SWITCH TO BE REMOVED. RETURN TO OWNER FOR DISPOSITION.

**2 ENLARGED PARTIAL PLUMBING AND ELECTRICAL PLAN - NEW WORK**  
1/4"=1'-0"

**Panelboard LLS**

10,000 AIC Rating  
Existing X New

120/208 Volt, 3-Phase, 4-Wire 1- Nema Rating		X MCB MLO	60 AMP MCB AMP BUS (Copper)	X Single Double Feed - Thru	Mounting X Surface Flush											
Notes	Load (VA)	Description	Type	Wire	CB	CKT #	PH	CKT #	CB	Wire	Type	Description	Load (VA)	Notes		
1	500	FIRE SYSTEM	M	EX	20/1	1	A	2				SPACE				
		SPACE				3	B	4				SPACE				
		SPACE				5	C	6				SPACE				
		SPACE				7	A	8				SPACE				
		SPACE				9	B	10				SPACE				
		SPACE				11	C	12				SPACE				
	500	Subtotal										Subtotal	0			
N.E.C.	Load Type	Conn.	Fct.	Diversity	N.E.C.			Conn.			Fct.	Diversity				
220.44	(R) Recept.	0	100%	0	210.20(a)			(L) Lighting			0	125%	0			
220.56	(K) Kitchen	0	0%	0	620.14			(E) Elevators			0	100%	0			
220.60	(C) Cooling	0	0%	0	220.50			(W) Water Ht.			0	125%	0			
220.60	(H) Heating	0	100%	0				(MT) Lrg. Mot.			0	100%	0			
220.60	(F) Fans	0	100%	0				(SP) Sub Panel			0	100%	0			
	(M) Misc.	500	100%	500												
Total Connected Load					500 VA =	1.4	AMPS	Location of Panel:					TICE ELEMENTARY			
Total Load (Diversified)					500 VA =	1.4	AMPS						SCHOOL			

1. THIS CIRCUIT TRANSFERRED FROM EXISTING PANEL 'LX'.

**Distribution Panelboard HX**

EXISTING AIC Rating  
X Existing New

277/480 Volt, 3-Phase, 4-Wire 1- Nema Rating		MCB MLO	225 AMP MCB AMP BUS (Copper)	X Single Double Feed - Thru	Mounting X Surface Flush											
Notes	Load (VA)	Description	Type	Wire	CB	CKT #	PH	CKT #	CB	Wire	Type	Description	Load (VA)	Notes		
2	4933	XFMR TX	SP	EX	1	A	2	20/1	EX	L	LIGHTING		2000	1		
	4933	-	SP	EX	3	B	4	20/1				SPARE				
		SPACE			5	C	6	20/1				SPACE				
		SPACE			20/1	7	A	8	20/1			SPACE				
		SPACE			20/1	9	B	10	20/1			SPACE				
		SPACE			20/1	11	C	12	20/1			SPACE				
		SPACE			20/1	13	A	14	20/1			SPACE				
		SPACE			20/1	15	B	16	20/1			SPACE				
		SPACE			20/1	17	C	18	20/1			SPACE				
		SPACE			20/1	19	A	20	20/1			SPACE				
		SPACE			20/1	21	B	22	20/1			SPACE				
		SPACE			20/1	23	C	24	20/1			SPACE				
		SPACE			20/1	25	A	26	20/1			SPACE				
		SPACE			20/1	27	B	28	20/1			SPACE				
		SPACE			20/1	29	C	30	20/1			SPACE				
		SPACE			20/1	31	A	32	20/1			SPACE				
		SPACE			20/1	33	B	34	20/1			SPACE				
		SPACE			20/1	35	C	36	20/1			SPACE				
		SPACE			20/1	37	A	38	20/1			SPACE				
		SPACE			20/1	39	B	40	20/1			SPACE				
		SPACE			20/1	41	C	42	20/1			SPACE				
	14,799	Subtotal										Subtotal	2,000			
N.E.C.	Load Type	Conn.	Fct.	Diversity	N.E.C.			Conn.			Fct.	Diversity				
220.44	(R) Recept.	0	100%	0	210.20(a)			(L) Lighting			2,000	125%	2,500			
220.56	(K) Kitchen	0	0%	0	620.14			(E) Elevators			0	100%	0			
220.60	(C) Cooling	0	0%	0	220.50			(W) Water Ht.			0	100%	0			
220.60	(H) Heating	0	100%	0				(MT) Lrg. Mot.			0	125%	0			
220.60	(F) Fans	0	100%	0				(SP) Sub Panel			14,799	100%	14,799			
	(M) Misc.	0	100%	0												
Total Connected Load					16,799 VA =	20.2	AMPS	Location of Panel:					TICE ELEMENTARY			
Total Load (Diversified)					17,299 VA =	20.8	AMPS						SCHOOL			

- 1. EXISTING CIRCUIT TO REMAIN.
- 2. THIS CIRCUIT REMOVED FROM PANEL 'HX'. REFER TO ELECTRICAL ONE LINE FOR RE-FEED OF EXISTING TRANSFORMER 'X'. CIRCUIT BREAKER TO BECOME SPARE.

**Distribution Panelboard LX**

EXISTING AIC Rating  
X Existing New

120/208 Volt, 3-Phase, 4-Wire 1- Nema Rating		X MCB MLO	150 AMP MCB AMP BUS (Copper)	X Single Double Feed - Thru	Mounting X Surface Flush											
Notes	Load (VA)	Description	Type	Wire	CB	CKT #	PH	CKT #	CB	Wire	Type	Description	Load (VA)	Notes		
1	1666	REFRIG RACK	K	EX	30/3	1	A	2	20/1	EX	K	PASS THRU COOLER	900	1		
1	1666	-	K	EX	-	3	B	4	20/1	EX	K	PASS THRU COOLER	900	1		
		SPACE			5	C	6	20/1				SPACE				
		COOLER COIL	K	EX	20/1	7	A	8	20/1			SPACE				
		FREEZER COIL	K	EX	20/1	9	B	10	20/1			SPACE				
		LIGHTING HTR	K	EX	20/1	11	C	12	20/1			SPACE				
		LIGHTING HTR	K	EX	20/1	13	A	14	20/1			SPACE				
		PRESS. RELIEF PT.	K	EX	20/1	15	B	16	20/1			SPACE				
		ANSUL SYSTEM	K	EX	20/1	17	C	18	20/1			SPACE				
		COMPUTERS	M	EX	20/1	19	A	20	20/1			SPACE				
		CASH REGISTERS	M	EX	20/1	21	B	22	20/1			SPACE				
		SPACE			20/1	23	C	24	20/1			SPACE				
		SPACE			20/1	25	A	26	20/1			SPACE				
		SPACE			20/1	27	B	28	20/1			SPACE				
		SPACE			20/1	29	C	30	20/1			SPACE				
		SPACE			20/1	31	A	32	20/1			SPACE				
		SPACE			20/1	33	B	34	20/1			SPACE				
		ALTERNATOR HTR	EX	20/1	35	C	36	20/1				SPACE				
		BATT CHARGER	EX	20/1	37	A	38	20/1				SPACE				
		JACKET HEATER	EX	20/2	39	B	40	20/1				SPACE				
		SPACE			41	C	42	20/1				SPACE				
	13,998	Subtotal										Subtotal	1,800			
N.E.C.	Load Type	Conn.	Fct.	Diversity	N.E.C.			Conn.			Fct.	Diversity				
220.44	(R) Recept.	0	100%	0	210.20(a)			(L) Lighting			0	125%	0			
220.56	(K) Kitchen	9,798	65%	6,369	620.14			(E) Elevators			0	125%	0			
220.60	(C) Cooling	0	0%	0	220.50			(W) Water Ht.			0	100%	0			
220.60	(H) Heating	0	0%	0				(MT) Lrg. Mot.			0	100%	0			
220.60	(F) Fans	0	100%	0				(SP) Sub Panel			0	100%	0			
	(M) Misc.	2,000	100%	2,000												
Total Connected Load					11,798 VA =	32.8	AMPS	Location of Panel:					TICE ELEMENTARY			
Total Load (Diversified)					8,369 VA =	23.2	AMPS						SCHOOL			

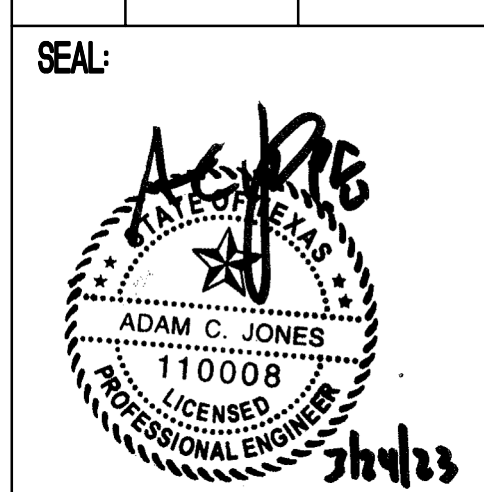
- 1. EXISTING CIRCUIT TO REMAIN.
- 2. TRANSFER THIS CIRCUIT TO NEW PANEL 'LSS'. MARK BREAKER AS SPARE.

**KEYED PLUMBING PLAN NOTES:**

- 1. CONTRACTOR TO DISCONNECT EXISTING 2" GAS LINE TO EXISTING EMERGENCY NATURAL GAS GENERATOR AND RE-CONNECT TO NEW EMERGENCY NATURAL GAS GENERATOR. CONTRACTOR TO PROVIDE GAS PRESSURE REGULATOR, PLUG VALVE, UNION, STRAINER AND DIRT LEG AT NEW EMERGENCY NATURAL GAS GENERATOR. CONTRACTOR TO VERIFY EXACT SIZE OF EXISTING GAS LINE ROUTED TO EXISTING EMERGENCY NATURAL GAS GENERATOR AND ROUTE NEW 2" GAS LINE (5 PS) TO NEW EMERGENCY NATURAL GAS GENERATOR IF EXISTING GAS LINE IS LESS THAN 2".



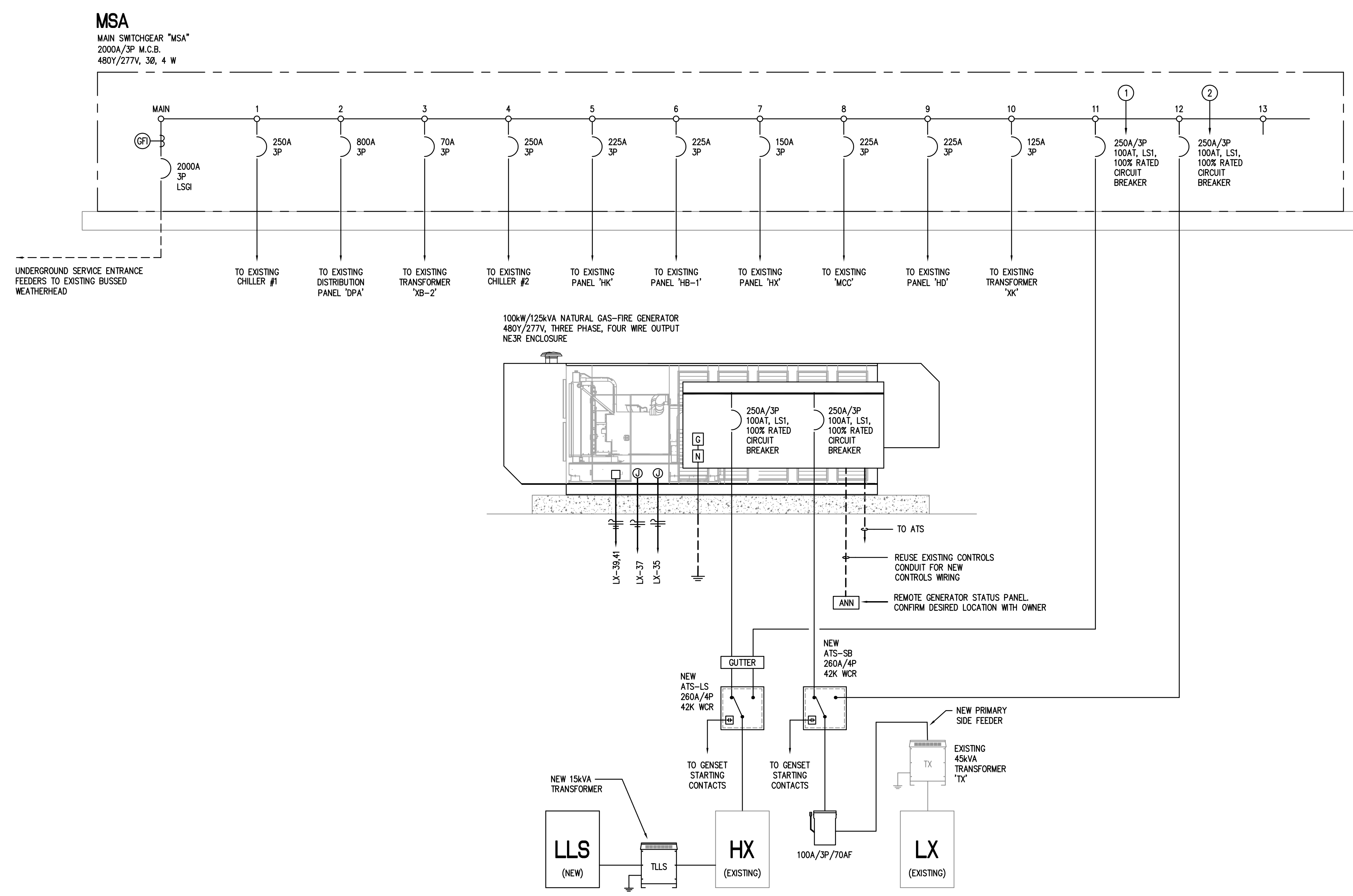
REVISION:  
No. / DATE / DISCUSSION



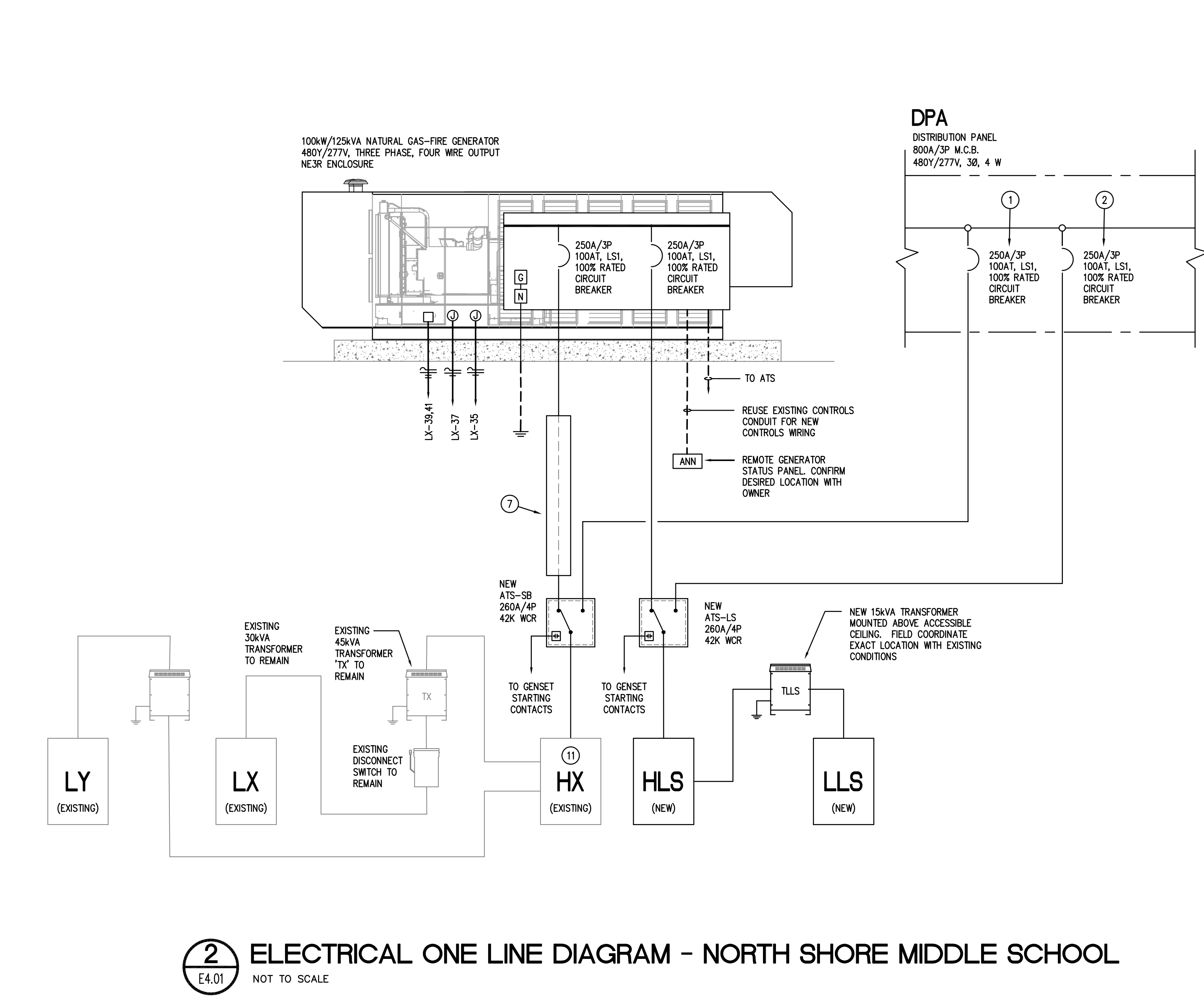
**GALENA PARK ISD**  
**SNS GENERATORS TICE, NSMS AND HAVARD**  
**#900-2023**

DATE:  
03/24/2023  
 DRAWN BY:  
DBR  
 CHECKED BY:  
DBR  
 PROJECT NUMBER:  
230083.000  
 SHEET TITLE:  
ENLARGED  
PLUMBING AND  
ELECTRICAL  
PLANS - TICE  
ES  
 SHEET NUMBER:

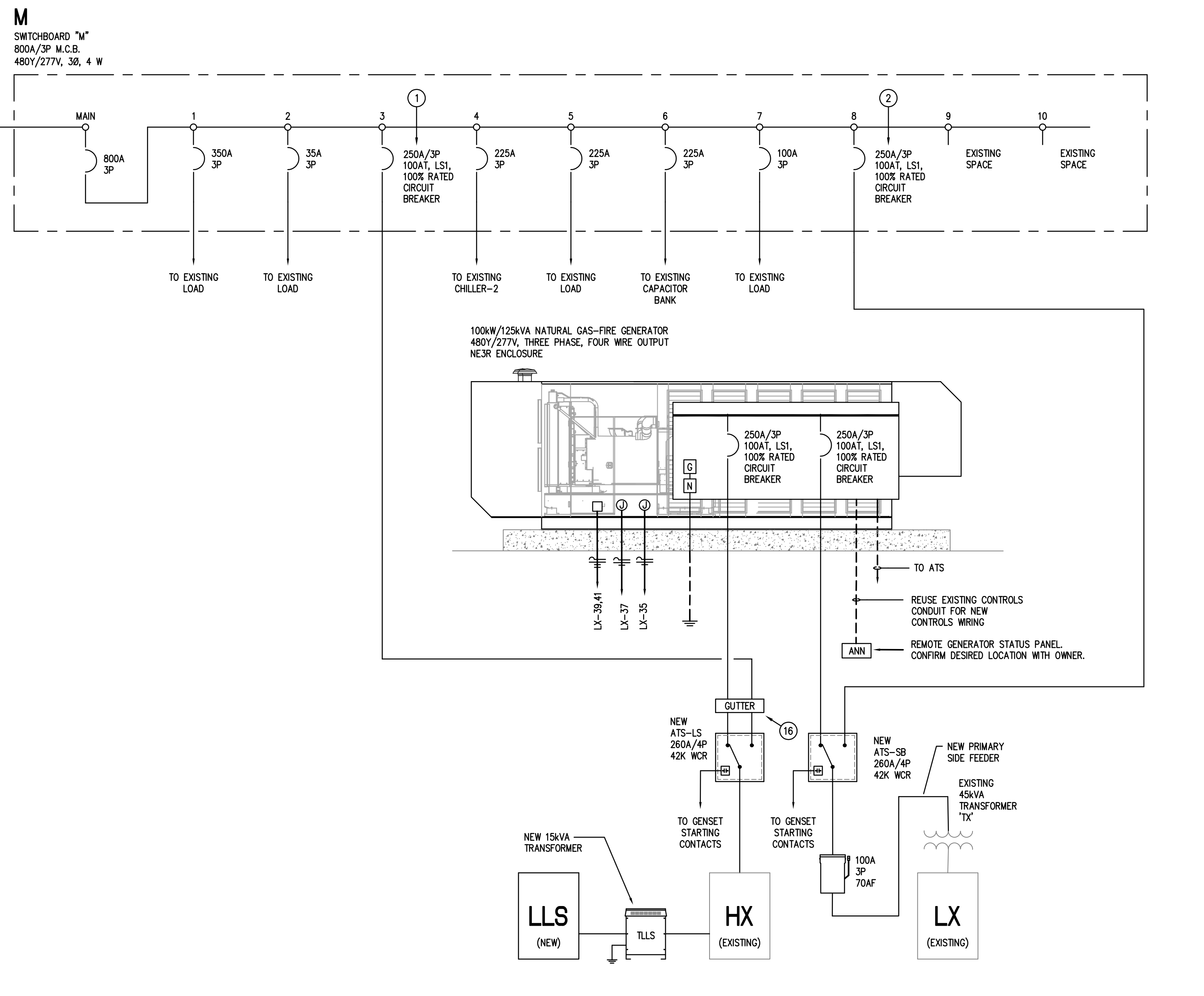
PE2.06



**1 ELECTRICAL ONE LINE DIAGRAM - HAVARD ELEMENTARY SCHOOL**  
 E4.01 NOT TO SCALE



**2 ELECTRICAL ONE LINE DIAGRAM - NORTH SHORE MIDDLE SCHOOL**  
 E4.01 NOT TO SCALE



**3 ELECTRICAL ONE LINE DIAGRAM - TICE ELEMENTARY SCHOOL**  
 E4.01 NOT TO SCALE

FEEDER SCHEDULE COPPER ONLY			
RATING	SETS	CONDUCTOR SIZE	CONDUIT
30A	1	4#10, 1#10 G.	3/4"
40A	1	4#8, 1#10 G.	1"
50A	1	4#8, 1#10 G.	1"
60A	1	4#8, 1#10 G.	1"
70A	1	4#4, 1#8 G.	1 1/4"
80A	1	4#4, 1#8 G.	1 1/4"
90A	1	4#3, 1#8 G.	1 1/4"
100A	1	4#3, 1#8 G.	1 1/4"
125A	1	4#1, 1#6 G.	1 1/2"
150A	1	4#2/0, 1#6 G.	1 1/2"
175A	1	4#2/0, 1#6 G.	2"
200A	1	4#3/0, 1#6 G.	2"
225A	1	4#4/0, 1#4 G.	2 1/2"
250A	1	4#250, 1#4 G.	2 1/2"
300A	1	4#350, 1#4 G.	3"
350A	1	4#500, 1#3 G.	3 1/2"
400A	1	4#600, 1#3 G.	4"
450A	2	4#4/0, 1#2 G.	2 1/2"
500A	2	4#250, 1#2 G.	2 1/2"
600A	2	4#350, 1#1 G.	3"
700A	2	4#500, 1#1/0 G.	4"
800A	2	4#600, 1#1/0 G.	4"
1000A	3	4#500, 1#2/0 G.	4"
1200A	4	4#350, 1#3/0 G.	3"
1600A	4	4#600, 1#4/0 G.	4"
2000A	5	4#500, 1#4/0 G.	4"
2500A	6	4#500, 1#250 G.	4"
3000A	7	4#500, 1#350 G.	4"
3500A	8	4#500, 1#400 G.	4"
4000A	9	4#500, 1#500 G.	4"
4500A	10	4#500, 1#500 G.	4"
5000A	11	4#500, 1#500 G.	4"
5000A	12	4#600, 1#750 G.	4"
5000A	14	4#500, 1#750 G.	4"

TRANSFORMER FEEDER SCHEDULE - HARMONIC MITIGATING - 3 PHASE							
PRIMARY VOLTAGE				SECONDARY VOLTAGE			
480V, THREE PHASE				120/208V, THREE PHASE, FOUR WIRE			
KVA	FEEDER	CONDUIT	BREAKER	FEEDER	CONDUIT	BREAKER	G.E.C. SIZE
15	3#10, 1#10G.	3/4"	25A/3P	3#6, 1#4N, 1#6G.	1"	60A/3P	#8
30	3#8, 1#10G.	1"	45A/3	3#3, 1#1/0N, 1#6G.	1 1/4"	100A/3P	#8
45	3#4, 1#6G.	1"	70A/3P	3#1/0, 1#4/0N, 1#6G.	2"	150A/3P	#6
75	3#1, 1#6G.	1 1/4"	125A/3P	3#250, 2#3/0N, 1#2G.	3"	250A/3P	#2
112.5	3#2/0, 1#6G.	1 1/2"	175A/3P	3#600, 2#300N, 1 #1/0G.	4"	400A/3P	#1/0
150	3#4/0, 1#4G.	2"	225A/3P	(2) SETS OF 3#250, 2#3/0N, 1#1/0G.	3"	500A/3P	#1/0
225	3#500, 1#3G.	3"	350A/3P	(2) SETS OF 3#600, 2#300N, 1#3/0G.	4"	800A/3P	#3/0
300	(2) SETS OF 3#4/0, 1#2G.	2 1/2"	450A/3P	(3) SETS OF 3#500, 2#250N, 1#3/0G.	3 1/2"	1000A/3P	#3/0
500	(2) SETS OF 3#500, 1#1/0G.	3"	800A/3P	(5) SETS OF 3#500, 2#300N, 1#350G.	3 1/2"	1800A/3P	#3/0

NOTE:  
 ALL CONDUCTORS SHALL BE COPPER

TRANSFORMER SCHEDULE						
MARK	KVA	PRI. VOLTAGE	SECONDARY VOLTAGE	MOUNTING	ENCLOSURE	REMARKS
TLS	15	480V, 3P	120V/208V, 3P, 4 W	SEE PLAN	NE1	POI TYPE "DV" HARMONIC MITIGATING TRANSFORMER. TYPICAL OF THREE

- KEYED ELECTRICAL PLAN NOTES:**
- REPLACE EXISTING CIRCUIT BREAKER WITH NEW CIRCUIT BREAKER AS SHOWN.
  - ADD NEW CIRCUIT BREAKER AS SHOWN.

1. ELECTRICAL CONTRACTOR SHALL PROVIDE THE NUMBER OF LUGS AND PROPER LUG SIZES TO ACCEPT CONDUCTOR SIZES SHOWN.  
 2. GROUND NOT REQUIRED AT SERVICE LATERAL.

