TOWN OF HOPKINTON

DPW ELECTRICAL SERVICE UPGRADE AND FIRE ALARM SYSTEM INSTALLATION

2016

BID INFORMATION, REQUIREMENTS, INSTRUCTIONS AND SPECIFICATIONS

BID INFORMATION

BIDS DUE BY: ***Monday, September 12th, 2016 at 2:00 p.m.***

BID OPENING DATE: ***Monday, September 12th, 2016 at 2:15 p.m.***

BID RECEIPT LOCATION:

Town Clerk's Office
Hopkinton Town Hall
1 Town House Road
Hopkinton, RI 02833

BID OPENING LOCATION:

Town Council Chambers
Hopkinton Town Hall
1 Town House Road
Hopkinton, RI 02833

Sealed Envelopes Must Be Marked As Follows:

"DPW ELECTRICAL SERVICE UPGRADE AND FIRE ALARM SYSTEM INSTALLATION"

The effective date of AWARD shall be on or about October 3rd, 2016.

Single Point of Contact: All requests for information related to this bid package shall be directed to:

Director Timothy Tefft
Department of Public Works
395 Woodville Road
Hopkinton, Rhode Island 02833
(401) 377-7790

Email Address: ttefft@hopkintonri.org

BID REQUIREMENTS

1. Sealed bids will be accepted in the Town Clerk's Office until 2:00 p.m. on Monday, September 12th, 2016.

2. Sealed bids will be opened in the Town Council Chambers at 2:15 p.m. on Monday, September 12th, 2016.

3. Sealed envelopes must be marked ***"DPW ELECTRICAL SERVICE UPGRADE AND FIRE ALARM SYSTEM INSTALLATION"*** and submitted to the Town Clerk's Office.

4. Proposals shall be for an electrical service upgrade and fire alarm system installation at the Department of Public Works, 395 Woodville Road, Hopkinton, Rhode Island 02833.

5. Proposals shall be submitted on the attached bid sheet.

6. **There will be a pre-bid meeting on Thursday, August 25th, 2016, beginning at 10:00 a.m. at the Department of Public Works, 395 Woodville Road, Hopkinton, Rhode Island, for bidders to gather information needed for their respective bids.**

7. **Bid security in the amount of five percent (5%) of the total bid amount must accompany each bid.**

8. A signed copy of the Bid Instructions shall be submitted to the Town Clerk's Office at the time the bid is submitted.

9. Bids are to be submitted on or before the date and time due and signed by a person authorized to represent the bidder.

10. Bidders are required to submit three (3) copies of their bids.

11. Bids that do not meet minimum requirements may or may not be considered. All exceptions must be listed.

12. Contracts may be competitively negotiated when it is determined, in writing, by the Town Manager that the bid prices received by competitive sealed bidding either are unreasonable as to all or part of the requirements or were not independently reached in open competition.

13. The Town of Hopkinton shall award the bid to the responsible bidder whose proposal is determined, in writing, to be the most advantageous to the Town. The award shall be made on the basis of the lowest evaluated or responsive bid price.

14. The Town specifically reserves the right to cancel the contract or any portion thereof providing, in its opinion, the services or materials supplied are not satisfactory or consistent with the terms of this Request for Proposals (RFP).

15. Bidders are required to complete an Experience Sheet, which is included in this bid packet. Any bid submitted without a fully-completed Experience Sheet will be rejected.

16. The successful bidder shall furnish a Certificate of Liability Insurance within fifteen (15) days after the Hopkinton Town Council awards the bid.

17. The successful bidder shall furnish a Performance Bond for the full amount of the award within fifteen (15) days after the Hopkinton Town Council awards the bid.

18. If the successful bidder uses a subcontractor(s) on this project, the successful bidder shall furnish a Labor and Materials Payment Bond for the full amount of the award within fifteen (15) days after the Hopkinton Town Council awards the bid.

19. The successful bidder shall execute Notice of Award and Notice to Proceed forms within fifteen (15) days after the Hopkinton Town Council awards the bid.

20. The successful bidder shall execute a Contractual Agreement within fifteen (15) days after the Hopkinton Town Council awards the bid.

21. The Town of Hopkinton reserves the right to reject any or all bids and to accept the bid that is most acceptable.

22. All work must be completed in a timely, professional manner.

23. Installation shall begin no later than thirty (30) calendar days after the Town Council awards the bid and end no later than sixty (60) calendar days thereafter; however, this time period may be extended, in writing, by mutual agreement.

24. Bidders may be asked to appear before a committee comprised of Town officials to present their proposals and qualifications.

25. The Vendor shall submit two separate bills to the Town-- one for the Electrical System Upgrade and one for the Fire Alarm System Installation.

26. The Town of Hopkinton is exempt from Federal excise taxes and State sales taxes.

27. Contact DPW Director Tim Tefft at (401) 377-7790 with any questions regarding this bidding process.

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STANDARD INSTRUCTIONS TO BIDDERS

THESE ARE STANDARD INSTRUCTIONS FOR BIDS ISSUED BY THE TOWN OF HOPKINTON

1. Receipt and Opening of Bids

Bids will be accepted in the Hopkinton Town Hall until the time indicated on the advertisement for bids, for the commodities, equipment or services designated in the specifications and will then be publicly opened and read.

2. Form of Bids

Bids must be submitted on and in accordance with the forms attached hereto, blank places must be filled in as noted, no change shall be made in the phraseology of the proposal or in the item or items mentioned therein. Bids must contain the name and proper address of the bidding firm, and must be signed by a responsible member of the firm with his/her signature and official title. Proposals that are not complete, or contain any omissions, erasures, alterations, additions or contain irregularities of any kind may be rejected.

3. Submission of Bids

a. Envelopes containing bids must be sealed, submitted to the Town Clerk's Office and marked "**DPW Electrical Service Upgrade and Fire Alarm System Installation**."

b. The Town Clerk will decide when the specified time has arrived to open bids, and no bid received thereafter will be considered.

c. Any bidder may withdraw his/her bid by written request, at any time, prior to the advertised time for bid opening. Telephonic bids, amendments, or withdrawals will not be accepted.

d. Unless otherwise specified, no bid may be withdrawn for a period of ninety (90) days after the date of bid opening.

e. Negligence on the part of the bidder in preparing the bid confers no rights for the withdrawal of the bid after it has been opened.

f. Bids received prior to the time of opening will be securely maintained by the Town Clerk. No responsibility will attach to an officer or person for the premature opening of a bid not properly addressed and identified.

4. Prices

Bidders shall state the proposed price(s) in the manner as designated on the Bid Sheet. In the event that there is a discrepancy between the unit prices and the extended totals, the unit prices shall govern.

5. Rhode Island Sales Tax

The Town is exempt from the payment of R.I. Sales Tax under the 1956 General Laws of Rhode Island, 44-18-30, Paragraph 1, as amended.

6. Federal Excise Taxes

The Town is exempt from the payment of Federal excise taxes. The price bid must be exclusive of taxes and will be so construed.

7. "Or Equal" Bidding

When the name of a manufacturer, a brand name, or manufacturer's catalogue number is issued as the bid standard in describing an item this description is used to indicate quality, performance and other essential characteristics of the article required. If bidding on other than the make, model, brand or sample specified, but equal thereto, bidder must so state by giving the manufacturer's name, catalogue number and any other information necessary to prove that the intended substitution of a commodity is equal in all essential respects to the bid standard. Bidder must prove to the satisfaction of the Town Manager or by person or persons designated by him in his or their sole discretion, that his/her designated substitute is equal to the bid standard: otherwise, his/her bid will be declared "No Bid" in so far as the item in question is concerned.

8. Award and Contract

Unless otherwise specified, the Town reserves the right to make an award by item or items, or by total, as may be in the best interest of the Town. A Notice To Proceed, Notice of Award and a Contractual Agreement executed by both parties within fifteen (15) days after the Town Council awards the bid.

9. Delivery

When applicable, all prices must be on the basis of F.O.B. 1 Town House Road, Hopkinton, Rhode Island. Deliveries must consist only of new merchandise or equipment and shall be made between the hours of 8:30 a.m. and 3:00 p.m., Monday thru Friday.

10. Affirmative Action

Any firm providing services to or doing business with the Town of Hopkinton, R.I. shall adhere to the Town's Affirmative Action Plan for Equal Employment.

11. Towns Right to Reject

The Town reserves the right to reject any and all proposals, to waive any informality in the proposals received and to accept the proposal deemed to be most favorable in the best interests of the Town. The Town reserves the right to terminate the Agreement. Failure of the Contractor to perform any work under this Agreement for a period of ten (10) days following its commencement without the consent of the Town shall constitute a breach of the Agreement and the Town may at its option, by written notice, terminate his/her obligations hereunder and contract for or otherwise effect the completion of the work uncompleted by the Contractor, and may offset against the contract price herein set forth, the cost and expense of completing such work, or in the event the Town has at the time of such breach and termination paid to the Contractor an amount in excess of the fair value of the work then completed, the Contractor shall refund to the Town promptly upon demand, an apportioned amount of the total sum thereto paid by the Town.

12. Insurance/Bonds

The successful bidder shall provide the following insurances/bond:

Certificate of Liability Insurance

- Commercial General Liability Insurance in the amount of one million dollars ($1,000,000).
- Automobile Liability Insurance in the amount of one million dollars ($1,000,000).
- Umbrella Liability Insurance in the amount of five million dollars ($5,000,000).
- Workers Compensation and Employers' Liability Insurance in the amount of one million dollars ($1,000,000).

Performance Bond

- The Contractor shall furnish a Performance Bond in the full amount of the bid submitted as security for faithful performance of the work.

Labor and Materials Payment Bond

- The Contractor shall furnish a Labor and Materials Payment Bond only if any work will be subcontracted to another firm or person.

13. Labor Regulations

The following paragraphs regarding nondiscrimination in employment shall be included and become part of these Specifications:

A. The successful bidder shall not discriminate in employment practices and conform with Executive Order No. 11246.

B. Bidders must, if required, submit a compliance report concerning their employment practices and policies to maintain their eligibility to receive the award.

C. Successful bidders shall submit to the Hopkinton Town Manager a list of all subcontractors who will perform work on the project, and written signed statements from authorized agents of labor pools with which they will or may deal with for employees on the work, together with any information to the effect that such labor pools practices or policies are in conformity with Executive Order No. 11246; that they will affirmatively cooperate in or offer no hindrance to the recruitment, employment, and equal treatment of employment, and equal treatment of employees seeking employment and performing work under this contract; or a certification as to when such agents or labor pools have failed or refused to furnish them, prior to award of the contract. If the successful bidder uses any subcontractors, the bidder shall provide the Town with a Labor and Materials Payment Bond.

14. Wage Rates

In conformity with the provisions of Chapter 13 of Title 37, General Laws, Rhode Island, 1956, as amended, the minimum wages for a days work paid to craftsmen, teamsters and laborers shall be not less than the customary and prevailing rate of wages for a day's work in the locality where the work is undertaken. Such a schedule of wages has been established on a minimum hourly basis and is on file in the office of the State Department of Labor and Training.

15. Remedies

Except as may be otherwise provided, all claims, counterclaims, disputes and other matters in question between the Town and the successful bidder arising out of or relating to this agreement or the breach thereof will be decided in a court of competent jurisdiction within the State of Rhode Island.

16. Indemnity

The successful bidder shall at all times indemnify and save harmless the Town, its servants and agents, from any and all claims and from any suits, litigation, damages, losses or the like arising out of injuries sustained or alleged to have been sustained by any persons or damage to property in connection with the contract work, caused in whole or in part by acts or omissions of the successful bidder, his subcontractors, material persons, or anyone directly or indirectly connected with the contract work.

17. General Guarantee

Neither the final certificate of payment nor any provision in the contract documents nor any partial or entire occupancy of the premises by the Town shall constitute an acceptance of work not done in accordance with the contract documents or relieve the successful bidder of liability with respect to any express warranties or responsibility for faulty workmanship or materials. The successful bidder shall remedy any defects that occur during the upgrade of the electrical service or the installation of the fire alarm system and pay for any damage to other work resulting there from, which shall appear within a period of one (1) year from the date of final acceptance of the work, unless a longer period is specified by the Town and/or by virtue of any specific product guarantees and/or warranties. The Town will give final notice of observed defects with reasonable promptness.

The successful bidder shall guarantee the satisfactory upgrade of the DPW electrical system and fire alarm installation and related accessory parts for any other time period consistent with any specific product guarantees and/or warranties from the date of final acceptance.

18. Claims for Adjustments and Disputes:

If the vendor deems additional compensation is due for work or material not clearly covered in the Contract, the Vendor shall notify the Hopkinton Town Manager, in writing, of its intention to make claim for such additional compensation before beginning or continuing the affected work. Also, the Vendor shall proceed diligently with the performance of the contract, pending the final resolution of any request for relief, payment, claim, appeal or action arising under the contract, and comply with any decisions of the Engineer. If such notification is not given, or the Vendor does not afford the Town Manager proper facilities for keeping strict account of the actual costs, the Vendor thereby waives any claim for additional compensation. Notice by the Vendor, and the fact that the Town Manager has kept account of the actual costs shall not be construed as substantiating the validity of the claim.

19. Methods of Payment

A. Request(s) for Payment(s)

The Vendor shall submit any and all request(s) for payment(s) to the Town of Hopkinton's Finance Office.

B. Payments

1. Upon completion of all work and final approval by Town officials, the Town will pay one hundred percent (100%) of the cost. Payment shall be net thirty (30) days.

2. The Vendor shall submit two separate bills to the Town-- one for the Electrical System Upgrade and one for the Fire Alarm System Installation.

20. Vendor's Delivery Date

The upgrade of DPW's electrical system and installation of the fire alarm system shall begin no later than thirty (30) calendar days after the Town Council awards the bid and be completed no later than sixty (60) calendar days thereafter; however, this time period may be extended, in writing, by mutual agreement.

I hereby certify that I have read and agree with these Bid Instructions.

A signed copy of the Bid Instructions shall be submitted to the Town Clerk's Office at the time the bid is submitted.

_____
Date

_____
Name

_____
Company Name

_____
Company Street Address

_____
City/Town/State

BID SPECIFICATIONS

This Request for Proposals has been issued by the Town of Hopkinton to solicit bids for **the DPW Electrical Service Upgrade and Fire Alarm System Installation.** Bidders should carefully examine the specifications and fully inform themselves of all language that could in any way affect the equipment or the cost. Should the bidders find discrepancies, omissions in the specifications, or question their interpretation, they should notify the Town Manager's office and obtain clarification, prior to submitting any proposal. Failure to obtain clarification of any issue does not relieve the bidder from any responsibility in the bidding of installation plumbing services, which meets the needs of the Town of Hopkinton. The successful bidder is responsible for submitting a bid which meets the following specifications:

DIVISION 1 - GENERAL REQUIREMENTS

01010 SUMMARY OF THE WORK

01300 SUBMITTALS

01700 CONTRACT CLOSEOUT

DIVISION 16 - ELECTRICAL

260000 GENERAL

260519 CONDUCTORS AND CABLES

260526 GROUNDING AND BONDING

260533 RACEWAY

262416 PANELBOARDS

283111 FIRE ALARM

ATTACHMENT A

SCHEDULE OF DRAWINGS

SUMMARY OF WORK

SECTION 01010

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. The General Conditions, Supplementary Conditions and applicable portions of Division 1 of the specification are a part of this section, which shall consist of all labor, materials, equipment, tools, construction equipment and machinery necessary for the proper execution and completion of the work, and as related to the project or projects.

B. The specification format used herein is in no way intended to restrict this Contractor from expediting his work as he sees fit, nor is there any intention of segregating the units of work as related to specific trades involving jurisdictional labor problems.

1.2 ABBREVIATED WRITTEN SUMMARY:

A. Briefly and without force and effect upon the contract documents, the work of the contract can be summarized as follows:

1.3 CONTRACTOR'S DUTIES:

A. The contractor is responsible for all personnel involved in the work, including those of his direct employ, his sub-contractors and suppliers of materials and equipment and/or labor. The Technical Specifications have been divided for convenience only to cover the scope of work, and where reference to a particular contractor is noted, it is for convenience only. The Owner and Engineer only recognize one Contractor as a party to this contract.

B. Except as specifically noted, provide and pay for:

1. Labor, materials and equipment;
2. Tools, construction equipment and machinery;
3. Other facilities and services necessary for proper execution and completion of Work.

C. Secure and pay for, as necessary for proper execution and completion of Work, and as applicable at time of receipt of bids:

1. Permits;
2. Government Fees;
3. Licenses.

D. Give required notices.

E. Comply with codes, ordinances, rules, regulations, orders and other legal requirements of public authorities which bear on performance of Work.

F. Promptly submit written notice to Engineer of observed variance of Contract Documents from legal requirements.

G. Lay out all work and be responsible for all lines, elevations and measurements of the building, utilities and site work executed under the contract. Verify the figures shown before laying out the work and be responsible for any error resulting from failure to do so.

H. Enforce strict discipline and good order among employees. Do not employ persons not skilled in assigned task.

I. At your option, certain indicated materials and/or procedures are specified herein to be used in lieu of other indicated materials and/or procedures, at no change in contract price. Such options should be analyzed and coordinated during the bidding period, so that the selection of any may immediately be brought to the Engineer's attention, once the contract is awarded (within 30 days thereafter).

1.4 OSHA:

A. These construction documents, and the joint and several phases of construction hereby contemplated are to be governed, at all times, by applicable provisions of the Federal laws(s), including but not limited to, the latest amendments of the following:

1. Williams-Steiger Occupational Safety & Health Act of 1970, Public Law 91-596;
2. Part 1510 - Occupational Safety and Health Standards, Chapter XVII of Title 29, Code of Federal Regulations;
3. Part 1518 - Safety and Health Regulations for Construction, Chapter XIII of Title 29, Code of Federal Regulations.

B. This project, the contractor and his sub-contractors shall, at all times, be governed by Chapter XIII of Title 29, Code of Federal Regulations, Part 1518 - Safety and Health Regulations for Construction, (36 FR 75), as amended to date.

C. Note: Furnish the Owner and Engineer copies of all accident reports.

1.5 PROJECT RECORD DOCUMENTS:

A. Maintain at job site, one copy of:
1. Contract drawings;
2. Specifications;
3. Addenda;

4. Reviewed shop drawings;
5. Record drawings;
6. Change orders;
7. Other modifications to Contract;
8. Field test records;
9. Approved material samples and color schedule.

B. Store documents apart from documents used for construction.

C. File documents in accordance with Project Filing Format of Uniform Construction Index.

D. Maintain documents in clean, dry, legible condition.

E. Do not use record documents for construction purposes.

F. Make documents available at all times for inspection by Engineer and Owner.

G. Marking Devices: Provide red pen or red pencil for all markings.

H. Recording:

1. Keep record documents current.
2. Do not permanently conceal any work until required information has been recorded.
3. Contract Drawings: Legibly mark to record actual construction.

    a. Horizontal and vertical location of underground utilities and appurtenances referenced to permanent surface improvements;
    b. Location of internal utilities and appurtenances concealed in construction referenced to visible and accessible features of structure;
    c. Field changes of dimension and detail;
    d. Changes made by Change Order or Field Order;
    e. Details not on original contract drawings.

4. Specifications and Addenda: Legibly mark up each section to record:

    a. Manufacturer, trade name, catalog number, and supplier of each product and item of equipment actually installed;
    b. Changes made by Change Order or Field Order;
    c. Other matters not originally specified.

5. Shop Drawings: Maintain as record documents; legibly annotate drawings to record changes made after review.

1.6 TRANSPORTATION AND HANDLING:

A. Transport all materials and equipment on legally approved conveyances as required or recommended by the respective manufacturer or supplier.

B. Receive and handle all materials and equipment, at the project site, by conveyances or methods as recommended by the respective manufacturer or supplier.

C. Remove from the site any material or item of equipment damaged during the transportation or handling process, and immediately replace at no additional cost to the Owner.

1.7 STORAGE AND PROTECTION:

A. Store all material and equipment as recommended by the respective manufacturer or supplier, including the following minimum requirements.

B. Upon receipt of such materials and equipment, check, distribute, store and safeguard in a clean, dry and ventilated location.

C. Maintain all storage areas in a clean and orderly condition at all times.

D. Replace any material or item of equipment damaged, due to inadequate storage protection, and immediately replace at no additional cost to the Owner.

1.8 CUTTING AND PATCHING:

A. Execute cutting (including excavating), fitting or patching of work, required to:
   1. Make several parts fit properly.
   2. Uncover work to provide for installation of ill-timed work.
   3. Remove and replace defective work.
   4. Remove and replace work not conforming to requirements of Contract Documents.
   5. Install specified work in existing construction.

B. In addition to contract requirements, upon written instructions of Engineer:
   1. Uncover work to provide for Engineer's observation of covered work, as required by the General Conditions.
   2. Remove samples of installed materials for testing; as required by the General Conditions.
   3. Remove work to provide for alteration of existing work.

C. Do not endanger any work by cutting or altering work or any part of it.

D. Do not cut or alter work of another Contractor without written consent of the Engineer.

E. Prior to cutting which affects structural safety of Project, or work of another contractor, submit written notice to Engineer requesting consent to proceed with cutting.

F. Should conditions or work, or schedule, indicate change of materials or methods, submit written recommendation to Engineer including:
   1. Conditions indicating change;
   2. Recommendations for alternative materials or methods;
   3. Submittals as required for Substitutions.

G. Submit written notice to Engineer designating time work will be uncovered, to provide for observation.

H. Payment for costs caused by ill-timed or defective work, or work not conforming to Contract Documents, including costs for additional services or Engineer will be borne by the Contractor.

I. Contractor Inspection:
   1. Inspect existing conditions or work, including elements subject to movement or damage during:
      a. Cutting and patching;
      b. Excavating and backfilling.
   2. After uncovering work, inspect conditions affecting installation of new products.

J. Preparation: (Prior to cutting)
   1. Provide protection for other portions of Project;
   2. Provide protection from elements.

K. Performance:
   1. Perform all work of fitting, adjustment, cutting and patching, to perfectly match existing adjacent surfaces and the quality as specified throughout these specifications.

L. Painting, Finishing and Restoration:
   1. Final painting/restoration of surfaces will be done under this contract.

1.9 CONTRACTOR USE OF PREMISES:

A. Confine operations at site to areas permitted by:
   1. Law;
   2. Ordinances;
   3. Permits;
   4. Contract Documents.

B. Do not unreasonably encumber site with materials or equipment.

C. Do not load structure with weight that will endanger structure.

D. Assume full responsibility for protection and safekeeping of products stored on premises.

E. Move any stored products which interfere with operations of Owner or other Contractor.

F. Obtain and pay for use of additional storage or work areas needed for operations.

G. Limit use of site for work and storage within the confines of the Project Limit Line.

1.10 OWNER OCCUPANCY:

A. The Owner will be occupying this facility during the work of this contract.

B. All work must be scheduled to allow the least interference with the normal operation of the existing facility. Schedule must be arranged to meet the approval of the Owner. All shutdowns of services (power, fire alarm, telephone, water, etc.) must be approved in writing by the Owner.

C. All "shutdowns" must be done at other than normal working hours without additional compensation. Provide 48 hours' notice for all electrical outages.

D. All building services (power, fire alarm, telephone, lighting, emergency lighting, exit signs, etc.) must remain in operation during full period of construction. Provide temporary wiring (if required) to accomplish this.

SUBMITTALS

SECTION 01300

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. The General Conditions, Supplementary Conditions and applicable portions of Division 1 of the specification are a part of this section, which shall consist of all labor, equipment and materials necessary to complete all submittal work indicated on the drawings, herein specified, or both.

1.2 RELATED REQUIREMENTS SPECIFIED ELSEWHERE:

A. Post Bid Information - See Instructions to Bidders.

B. Certifications and Special Guarantees - See individual specification sections.

C. Submittals with Progress Payments - See General and Supplementary Conditions.

D. Submittals required for Contract Closeout - Section 01700.

1.3 PRIOR TO START OF WORK:

A. Post Bid Information

B. Bonds as required

C. Insurance Certificates and AIA Document G705 (Certificate of Insurance).

D. Copy of Permit

1.4 PROGRESS SCHEDULE:

A. Submit schedule to the Engineer within two weeks after the award of the contract, which shall include time of the start and completion of each section of the work and the anticipated monthly amount of the work in each section. The schedule shall be in bar-graph form and coincide with the Schedule of Values. Cause of failure to meet the time schedule on any section by one week shall be accounted for the Engineer in writing with a copy for the Owner. Submit two copies of this schedule to the Engineer with the monthly requisition for payment. Mark with red pencil to indicate progress to date in each category. he Engineer reserves the right to indicate when and where any work in any portion of this contract shall be undertaken, suspended, or completed.

1.5 SCHEDULE OF VALUES:

A. Within two weeks of the award of the contract, submit a detailed Schedule of Values of the project by technical specification section, and coordinated with the Progress Schedule.

B. Include in the Schedule, a sum for each section of the specification. Do not exclude Division 1. (In fact, incorporate General Conditions and its related items as part of Section 01010.)

C. Each item in the Schedule of Values shall include its proper share of overhead and profit. This schedule, when approved by the Engineer, shall be used only as a basis for the Contractor's Applications for Payment.

1.6 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES:

A. Shop drawings, product data and samples shall be dated and contain: name of project; description or names of equipment, materials and items; and complete identification of locations at which materials or equipment are to be installed.

B. Submission of shop drawings, product data and samples shall be accompanied by transmittal letter, in duplicate, containing project name, Contractor's name, number of drawings and samples, titles and other pertinent data.

C. It is the responsibility of the Contractor to check all dimensions and details on shop drawings, before submission to the Engineer, reject same if necessary and only forward to the Engineer shop drawings which he is reasonably certain fulfill the requirements of the contract documents and the work. The approval of shop drawings by the Engineer shall be general only in character and not mean dimensions on drawings have been checked, and will in no way relieve the Contractor of the responsibility for proper fitting and construction of the work, nor from the necessity of furnishing materials or doing the work required by the drawings and/or specifications, which may not be indicated on the shop drawings when approved. All shop drawings shall be checked by the Contractor, and must bear the Contractor's stamp of approval; drawings submitted without this stamp of approval will not be considered.

D. Submit three (3) prints of each drawing, including fabrication, erection, layout and setting drawings, and such other drawings as required under various sections of the specifications until final approval is obtained. Submit copies of manufacturer's descriptive data including catalog sheets for materials, equipment and fixtures, showing dimensions, performance characteristics and capacities, wiring diagrams and controls, schedules and other pertinent information as required.

E. Contractor is responsible for obtaining and distributing prints of shop drawings as necessary after as well as before final approval.

F. Within 15 calendar days after receipt of the approved shop drawings, catalog cuts, equipment sheets or other material descriptive data, submit to the Engineer a copy of the order confirmation of the respective material(s) , items(s) or equipment. Such confirmation must include: (1) name of supplier; (2) date of order, name, description and quantity of material(s), item(s) or equipment.

G. Maintain a complete file of all shop drawings at the job site until completion of the project.

H. Submit to the Engineer samples of all materials for approval, as requested.

1.7 RECORD DRAWINGS:

A. Prior to the start of construction, the Engineer shall deliver to the Contractor, a complete set of reproducible transparencies for the purpose of maintaining record drawings.

B. Maintain the drawings in a safe, dry location during the entire construction process. The Contractor, together with all his subcontractors, shall indicate clearly and accurately, any and all changes necessitated by field conditions. In addition, accurately maintain dimensions locating all pipes, ducts, etc. built into or under concrete slabs or masonry walls including elevations, inverts, etc.

C. With each monthly requisition, send certification, signed by the Contractor's Superintendent and Owner's Field Representative, that the drawings are being maintained accurately and currently. At the completion of the project, return the drawings to the Engineer, along with certification that the documents are complete in that they represent the true constructed conditions.

CONTRACT CLOSEOUT

SECTION 01700

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. The General Conditions, Supplementary Conditions and applicable portions of Division 1 of the specification are a part of this section, which shall consist of all labor, equipment, and materials necessary to complete all project closeout work indicated on the drawings, herein specified, or both.

B. Items Required for Substantial Completion:
1. Compliance certificates;
2. Warranties and guarantees;
3. Bonds;
4. Certificates and affidavits;
5. Operating and maintenance manuals;
6. Project record documents;
7. Extra materials and samples;
8. Tools and spare parts, as specified;
9. Requirements for insurance "change-over";
10. Complete start-up testing of all equipment and verification;
11. Reports of equipment operational instructions to Owner's personnel;
12. Final cleaning.

C. Items Required for Final Completion (Final Acceptance):
   1. Completion of Punch List and Substantial Completion requirements;
   2. Submission of "Contractor's Affidavit of Payment of Debts and Claims (G706);
   3. Submission of "Contractor's Affidavit of Release of Liens" (G706A);
   4. Submission of "Consent of Surety Company to Final Payment (G707);
   5. Submission of a "Closeout Letter."

D. Related Requirements Specified Elsewhere:
   1. Maintenance of Project Record Documents - Section 01010;
   2. Submittals related to payments - See Supplementary Conditions;
   3. Cleaning for specific projects or work - See specification section for that work.

1.2 PROJECT CLOSEOUT PROCEDURE: (Coordinate with General Supplementary Conditions)

A. STEP NO. 1: Substantial Completion.
   1. Contractor prepares list ("Punch List");
   2. Contractor submits items specified;
   3. Engineer verifies Punch List, at which time the "list" will be monetized at the rate of 200% of the estimated value of each item, and that amount retained until completed;
   4. Engineer prepares Certificate of Substantial Completion.

B. STEP NO. 2: Final Completion.

1.3 PROJECT RECORD DOCUMENTS:

A. Documents are as specified in Section 01010.

B. Deliver record documents (including final record drawings) to the Engineer.

C. Operation and Maintenance Data.

D. Instruct the Owner's personnel with regard to equipment, systems and operating specialties which are installed as part of this work.

E. Submit brochures indicating operating instructions and maintenance schedules for all equipment, systems, operating devices and specialties.

F. Submit detail maintenance methods and schedules for all materials and equipment provided in this project.

G. GUARANTEES, BONDS, AFFIDAVITS AND CERTIFICATIONS:

H. In addition to the warranty and guarantee requirements of the General Conditions, provide all other guarantees, bonds, affidavits and certification required throughout these specifications.

1.4 FINAL CLEANING:

A. At completion of work, remove waste materials, rubbish, tools, equipment, machinery and surplus materials, and clean all equipment and areas of work.

B. Use only cleaning materials recommended by manufacturer of surface to be cleaned.

C. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

D. Employ experienced workmen, or professional cleaners, for final cleaning.

E. Repair, patch and touch-up marred surfaces to specified finish, to match adjacent surfaces.

F. Broom clean paved surfaces; rake clean other surfaces of grounds.

1.5 FINAL PUNCH LIST:

A. In conjunction with the final payment procedure of the Supplementary Conditions, a final site observation of the entire project will be conducted, at a mutually agreeable time, by the Owner, Contractor and Engineer.

1.6 CLOSE OUT LETTER:

A. Upon final completion, submit a letter to the Engineer verifying the following:
   1. All work under the contract is now complete.
   2. All work is in accordance with the contract documents.
   3. All work has been accepted by all authorities.
   4. We are prepared to guarantee the work in accordance with the contract documents.

GENERAL

SECTION 260000

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. New electric service;
   2. New fire alarm.

1.2 RELATED DOCUMENTS

A. The General Conditions, Supplementary Conditions, and applicable portions of Division 1 of the specification are part of Division 26, 27 and 28 which shall consist of all labor, equipment, materials and other costs necessary to complete all ELECTRICAL MATERIALS AND METHODS work indicated on the drawings, herein specified or both.

1.3 RELATED WORK SPECIFIED UNDER OTHER SECTIONS: (Read these DIVISIONS carefully. For purposes of bidding, assume that all work of the DIVISION referenced is to be performed under that DIVISION unless specifically indicated therein to be performed under the ELECTRICAL DIVISION.)

A. Cutting and patching - see DIVISION 1

B. Allowances – see DIVISION 1.

C. Alternatives - see DIVISION 1.

1.4 DEFINITIONS

A. Provide: Furnish and install.

B. Wiring: Wire, raceways, boxes and fittings.

1.5 PERMITS AND FEES

A. Obtain all permits for the work of this section

B. Pay all fees, including a FIRE ALARM REVIEW FEE and FINAL INSPECTION FEES.

1.6 SUBMITTALS

A. Product Data: For each product indicated.

B. Shop Drawings: Wiring and connection diagrams.

C. Manufacturers: Where the drawings or specifications list specific brands or catalog numbers, only these products may be used unless the words: "or approved equal" or "but are not limited to" are included.

D. Limitations of approval: The Contractor shall not be relieved of responsibility for deviations from requirements of the Contract Documents by the Engineer's approval of Shop Drawings, Product Data, Samples or similar submittals unless the Contractor has specifically informed the Engineer in writing of such deviation, in a separate cover letter on Contractor's letterhead, at the time of submittal and

the Engineer has given written approval to the specific deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples or similar submittals by the Engineer's approval thereof.

E. Contractor's responsibility: It is the responsibility of the Contractor to check all dimensions and details on shop drawings, before submission to the Engineer, reject same if necessary and only forward to the Engineer shop drawings which he is reasonably certain fulfill the requirements of the contract documents and the work. The approval of shop drawings by the Engineer shall be general only in character and not mean dimensions on drawings have been checked, and will in no way relieve the Contractor of the responsibility for proper fitting and construction of the work, nor from the necessity of furnishing materials or doing the work required by the drawings and/or specifications, which may not be indicated on the shop drawings when approved. All shop drawings shall be checked by the Contractor, and must bear the Contractor's stamp of approval; drawings submitted without this stamp of approval will not be considered.

F. Tests: Test the complete installation to prove it free from shorts, grounds, opens and faulty connections. Make any corrections necessary before acceptance.
   1. Test each function of each system including each device.

G. Record of Addenda and Change Orders: To avoid overlooking addenda and change order modifications, mark all changes on all copies of drawings and specifications, in a manor acceptable to the Engineer. One method of accomplishing this is to make copies and tape them on the back of the preceding page (tape all edges). Also, circle the changed area and note: see addenda #1, etc. If whole pages or sheets change, either remove the superseded document or put a bold "X" through it.

H. Record Drawings: Owner's record drawings shall be updated as the project progresses. Maintain documents in a safe, dry location. Indicate clearly and accurately any changes necessitated by field conditions and dimension all raceways built into or under concrete slabs or buried under ground.

I. Operating Instructions and Manuals: Provide the Owner or his representative with complete operating instructions by qualified personnel of all electrical systems. Provide three (3) bound sets (indexed and bound in three sturdy three-ring binders) of operating and maintenance instructions of all electrical systems employed and all shop drawings.

J. Manuals: Provide one (1) extra bound set of all shop drawings. Bind in a sturdy 3-ring binder.

K. Letter of Confirmation: Include in the above manuals a letter confirming that the following items have been completed. Provide written receipt signed by the Owner or his representative indicating that the first 4 items listed below have been received.

1. Keys have been provided for all locked electrical equipment.
2. Identification is complete and in accordance with these specifications.
3. As-built electrical drawings have been completed and submitted.
4. All tests are complete and in accordance with these specifications.
5. All required shop drawings have been submitted and approved.
6. The entire installation has been accepted by all authorities.

1.7 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Do all wiring and provide all equipment in accordance with the prevailing issue of the National Electrical Code, State Building Code, State Fire Code, OSHA and any additional local rules or requirements.

C. Obtain and pay for all necessary permits, certificates, reviews, etc. Present satisfactory proof of final inspection and approval by all inspection authorities.

D. Where applicable, this installation shall comply with the most recent edition of the following NECA (National Electrical Contractors Association) "National Electrical Installation Standards." Except, if there is a conflict between this specification and these standards, the requirements of this specification shall prevail.
   1. NECA 1 Practices for Good Workmanship in Electrical Contracting
   2. NECA 101 Standard for Installing Steel Conduit (Rigid, EMT)
   3. NECA/AA 104 Recommended Practice for Installing Aluminum Building Wire and Cable
   4. NECA 400 Reco Recommended Practice for Installing and Maintaining Switchboards
   5. NECA/IESNA 500Recommended Practice for Installing Indoor Commercial Lighting Systems
   6. NECA/BICSI 568(B) Telecommunications

1.8 CHANGE ORDERS/PROPOSAL REQUESTS:

A. Refer to DIVISION 1 of these specifications and add the following:

B. During the course of construction, changes in the work may occur. When a significant change is to be made, a Proposal Request will be issued.

C. Provide a complete cost breakdown when responding to each Proposal Request.

D. Each item of work to be priced separately.

E. Each line item to be broken down including quantities and listing separately labor and material.

F. Both credits and extras shall be separately and clearly quantified.

G. Allowances for overhead and profit shall be as listed in the supplementary conditions.

H. If you become aware of a field condition, code requirement, error, or omission that you feel should result in a change to the work, please contact the Engineer for discussion. The Engineer may be able to clarify the situation and avoid unnecessary paperwork.

1.9 INSPECTIONS/SITE OBSERVATIONS

A. The authority having jurisdiction (usually the Municipal Electrical Inspector) shall be notified at periodic intervals that an inspection is requested. Inspections shall be requested at points of progress, meeting the approval of the inspector and as a minimum include the following:
   1. Prior to energizing the electric service;
   2. Prior to installation of panel;
   3. For observation of connections and grounding at the service.

B. Do not cover the work before the Engineer has had a chance to observe it in completed form. The electrical foreman shall request a meeting with the Engineer within 10 days after the start of electrical construction to assure that there is agreement on the scope of work and to answer questions.

C. The electrical foreman shall provide assistance to the Engineer during site observations:
   1. Describe the progress of the electrical work in detail.
   2. Accompany the Engineer on his tour of the site, upon request.
   3. Provide use of project drawings, specifications and shop drawings.

1.10 GUARANTEES/WARRANTIES:

A. Refer to Division 1 of these specifications and add the following:

B. A minimum warrantee time of one year from date of acceptance by the Engineer.

C. The Owner reserves the right to make appropriate modifications or extensions of systems and equipment furnished under this contract during the guarantee/warranty period without "voiding" or modifying the guarantee/warranty of equipment and wiring installed under this contract. If manufacturer voids guarantee, it shall not relieve this contractor of his responsibilities for guarantee/warranty period.

1.11 MISCELLANEOUS

A. Provide all systems complete. Drawings and Specifications form complementary requirements; provide work specified and not shown, and work shown and not specified as though explicitly required by both.

B. Although work is not specifically shown or specified, provide supplementary or miscellaneous items, appurtenances, devices and materials obviously necessary for a sound, secure and complete installation.

C. All wiring and connections to be done with associated circuit de-energized.

PART 2 - PRODUCTS

2.1 MATERIALS - General:

A. All materials and equipment to be new unless specifically stated otherwise.

B. Materials and equipment shall be suitable for their intended use and for the environment in which they are installed. For example, equipment located outside shall be weatherproof and constructed of materials that will not rust. This includes brackets, screws, etc.

C. As it is not practical to enumerate in these specifications (or show on the drawings) all details of fittings and accessory equipment required for proper operation of the various electrical systems herein described, it is understood that they will be supplied without extra compensation. Provide all fittings, terminations, relays, components of panels and equipment, etc., needed for the best performance possible at the present state-of-the-art.

2.2 EQUIPMENT BACKBOARDS

A. Where not otherwise specified, equipment backboards shall be fire rated, exterior grade, AC grade, installed with 'A' side exposed.

PART 3 - EXECUTION

3.1 ELECTRICAL EQUIPMENT INSTALLATION

A. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components so as to allow for safe personnel movement and maintenance access.

B. Materials and Components: Install level, plumb, and parallel and perpendicular to other building systems and components, unless otherwise indicated.

C. Equipment: Install to facilitate service, maintenance, and repair or replacement of components. Connect for ease of disconnecting, with minimum interference with other installations.

D. Right of Way: Give to raceways and piping systems installed at a required slope.

3.2 LAYOUTS

A. The electrical system layouts indicated are generally diagrammatic and locations of outlets and equipment are approximate only. Exact routing of wiring and locations of outlets and equipment shall be governed by structural conditions and obstructions. This is not to be construed to permit redesigning systems. Interconnect as shown.

B. Locate all equipment requiring maintenance and operation so that it will be readily accessible. The right is reserved to make any reasonable change in location of outlets and equipment prior to roughing-in without involving additional expense. This may involve slightly longer wiring runs, longer stems, additional mounting provisions, etc. Allow for this in your bid because additional compensation will not be provided. Items not specifically located on the plans shall (for the purposes of bidding) be assumed to be in the farthest, most difficult location. Exact location to be as directed in the field.

3.3 ELECTRICAL SERVICE:

A. Service to be as indicated on the drawings.

B. Provide secondary spades and aerial building attachment hardware.

3.4 ELECTRICAL SUPPORTING DEVICE APPLICATION

A. Damp Locations and Outdoors: Hot-dip galvanized materials, slotted channel system components.

B. Dry Locations: Steel materials.

3.5 SEQUENCE AND BALANCE:

A. Maintain correct phase sequence of all feeders and circuits by establishing phase identification and maintaining correct relationship throughout the system. Provide line balance within 10% of normal loads.

3.6 FIRESTOPPING

A. Refer to Division 7 of these specifications and add the following:

B. Apply firestopping to cable and raceway sleeves and other penetrations.

C. Penetrations through exterior surfaces shall be made watertight.

3.7 CUTTING AND PATCHING

A. This trade (specification section) is responsible for its respective cutting and patching.

B. Do not endanger any work by cutting or altering work or any part of it.

C. Prior to cutting which affects structural safety of project, or work of another Contractor, submit written notice to the Engineer, requesting consent to proceed with cutting.

3.8 CORE DRILLING:

A. Refer to Division 1 of these specifications and add the following:

B. All holes through masonry surfaces must be "core drilled". This trade (specification section) is responsible for its respective core drilling, if any.

C. Do not endanger any work by drilling or altering work or any part of it.

D. Do not drill or alter work of another Contractor without written consent of the Engineer.

E. Prior to drilling which affects structural safety of project, or work of another Contractor, submit written notice to the Engineer, requesting consent to proceed with cutting.

F. Perform all work of core drilling to perfectly match the quality as specified throughout these specifications.

3.9 ACCESS PANELS:

A. Refer to Division 8 of these specifications and add the following:

B. This trade (specification section) is responsible for determining the number of access panels required for existing and new electrical work (including one under each above ceiling thermodetector) and furnishing them to the mason or drywall contractor for installation.

3.10 CLEANING, PAINTING AND REFINISHING:

A. Thoroughly clean all new electrical equipment, devices and enclosures upon completion of all work.

B. Refinish any new electrical equipment whose finish is damaged or rusted, as determined by the Engineer.

CONDUCTORS AND CABLES

SECTION 260519

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Building wires and cables rated 600 V and less.
   2. Connectors, splices, and terminations rated 600 V and less.

1.2 SUBMITTALS

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

B. Field quality-control test reports.

1.3 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

A. Copper Conductors, Aluminum conductors are not allowed: Comply with NEMA WC 70.

B. Conductor Insulation: Comply with NEMA WC 70 for Types THW, THHN-THWN and XHHW.

C. Multiconductor Cable: Comply with NEMA WC 70 for metal-clad cable, Type MC.

2.2 CONNECTORS AND SPLICES

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. AFC Cable Systems, Inc.
   2. Hubbell Power Systems, Inc.
   3. O-Z/Gedney; EGS Electrical Group LLC.
   4. 3M; Electrical Products Division.
   5. Tyco Electronics Corp.
   6. Thomas & Betts

C. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

A. Feeders: Copper.

B. Branch Circuits: Copper.

C. At terminations of devices, provide solid conductor in sizes #10 and smaller; stranded wire may be used with fork type crimp connectors or with clamp type termination on the device. Do not wrap stranded wire under screw heads. Do not use back wired devices with spring type connection.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

A. Exposed Feeders: Type THHN-THWN, single conductors in raceway.

B. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspaces: [Type THHN-THWN, single conductors in raceway] [Metal-clad cable, Type MC].

C. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-THWN, single conductors in raceway.

D. Exposed Branch Circuits, Including in Crawlspaces: Type THHN-THWN, single conductors in raceway.

E. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN, single conductors in raceway or Metal-clad cable, Type MC.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

A. Conceal cables in finished walls, ceilings, and floors, unless otherwise indicated.

B. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

C. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

D. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.

E. Identify and color-code conductors and cables according to Division 16 Section "Electrical Identification."

3.4 FIRESTOPPING

A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Division 7 Section "Through-Penetration Firestop Systems."

3.5 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.

B. Tests and Inspections:

1. After installing conductors and cables and before electrical circuitry has been energized, test the electrical system and conductors for compliance with requirements.
2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.

C. Test Reports: Prepare a written report to record the following:

1. Test procedures used;
2. Test results that comply with requirements;
3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

D. Remove and replace malfunctioning units and retest as specified above.

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

SECTION 260526

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes methods and materials for grounding systems and equipment.

1.2 SUBMITTALS

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

B. Field quality-control test reports.

1.3 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with UL 467 for grounding and bonding materials and equipment.

PART 2 - PRODUCTS

2.1 CONDUCTORS

A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.

B. Bare Copper Conductors:

1. Solid Conductors: ASTM B 3.
2. Stranded Conductors: ASTM B 8.
3. Tinned Conductors: ASTM B 33.
4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch (6 mm) in diameter.
5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
6. Bonding Jumper: Copper tape, braided conductors, terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.
7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors, terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.

2.2 CONNECTORS

A. Listed and labeled by a nationally recognized testing laboratory acceptable to authorities having jurisdiction for applications in which used, and for specific types, sizes, and combinations of conductors and other items connected.

B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy, bolted pressure-type, with at least two bolts.

   1. Pipe Connectors: Clamp type, sized for pipe.

C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

2.3 GROUNDING ELECTRODES

A. Ground Rods: Copper-clad; [3/4 inch by10 feet (19 mm by 3 m) in diameter.

PART 3 - EXECUTION

3.1 APPLICATIONS

A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger, unless otherwise indicated.

B. Underground Grounding Conductors: Install bare copper conductor, No. 2/0 AWG minimum. Bury at least 24 inches (600 mm) below grade.

C. Isolated Grounding Conductors: Green-colored insulation with continuous yellow stripe. On feeders with isolated ground, identify grounding conductor where visible to normal inspection, with alternating bands of green and yellow tape, with at least three bands of green and two bands of yellow.

D. Conductor Terminations and Connections:
   1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
   2. Underground Connections: Welded connectors, except at test wells and as otherwise indicated.
   3. Connections to Ground Rods at Test Wells: Bolted connectors.
   4. Connections to Structural Steel: Welded connectors.

3.2 EQUIPMENT GROUNDING

A. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:
   1. Feeders and branch circuits.

3.3 INSTALLATION

A. Grounding Conductors: Route along shortest and straightest paths possible, unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

B. Ground Rods: Drive rods until tops are 2 inches (50 mm) below finished floor or final grade, unless otherwise indicated.

1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating, if any.
2. For grounding electrode system, install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.

C. Handholes: Drive ground rod through drilled hole in bottom of handhole. Handholes are specified in Division 26 Section "Underground Ducts and Raceways for Electrical Systems," and shall be at least 12 inches (300 mm) deep, with cover.

D. Test Wells: Install at least one test well for each service, unless otherwise indicated. Install at the ground rod electrically closest to service entrance. Set top of test well flush with finished grade or floor.

E. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance, except where routed through short lengths of conduit.

1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install so vibration is not transmitted to rigidly mounted equipment.
3. Use exothermic-welded connectors for outdoor locations, but if a disconnect-type connection is required, use a bolted clamp.

F. Grounding and Bonding for Piping:

1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes, using a bolted clamp connector or by bolting a lug-type connector to a pipe flange, using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
3. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.

G. Bonding Interior Metal Ducts: Bond metal air ducts to equipment grounding conductors of associated fans, blowers, electric heaters, and air cleaners. Install bonding jumper to bond across flexible duct connections to achieve continuity.

3.4 FIELD QUALITY CONTROL

A. Perform the following tests and inspections and prepare test reports:

1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
2. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, and at ground test wells.
   a. Measure ground resistance not less than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
   b. Perform tests by fall-of-potential method according to IEEE 81.

B. Report measured ground resistances that exceed the following values:

1. Power Distribution Units or Panelboards Serving Electronic Equipment: 1 ohm.

C. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

RACEWAYS AND BOXES

SECTION 260533

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.

1.2 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 METAL CONDUIT AND TUBING

A. Rigid Steel Conduit: ANSI C80.1.

B. IMC: ANSI C80.6.

C. EMT: ANSI C80.3.

D. Fittings for Conduit (Including all Types and Flexible and Liquidtight), EMT, and Cable: NEMA FB 1; listed for type and size raceway with which used, and for application and environment in which installed.
   1. Fittings for EMT: Steel, set-screw type or compressed type.

2.2 METAL WIREWAYS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Cooper B-Line, Inc.
   2. Hoffman.
   3. Square D; Schneider Electric.

C. Description: Sheet metal sized and shaped as indicated, NEMA 250, Type 3R, unless otherwise indicated.

D. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

E. Wireway Covers: Screw-cover type.

F. Finish: Manufacturer's standard enamel finish.

2.3 BOXES, ENCLOSURES, AND CABINETS

A. Sheet Metal Outlet and Device Boxes: NEMA OS 1.

B. Cast-Metal Outlet and Device Boxes: NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.

C. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.

D. Cast-Metal Access, Pull, and Junction Boxes: NEMA FB 1, cast aluminum with gasketed cover.

E. Hinged-Cover Enclosures: NEMA 250, Type 1, with continuous-hinge cover with flush latch, unless otherwise indicated.

1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
2. Nonmetallic Enclosures: Plastic.

F. Cabinets:

1. NEMA 250, Type 1, galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
2. Hinged door in front cover with flush latch and concealed hinge.
3. Key latch to match panelboards.
4. Metal barriers to separate wiring of different systems and voltage.
5. Accessory feet where required for freestanding equipment.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

A. Outdoors: Apply raceway products as specified below, unless otherwise indicated:
1. Exposed Conduit: Rigid steel conduit, RNC, Type EPC-80-PVC.
2. Concealed Conduit, Aboveground: Rigid steel conduit, EMT
3. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.

B. Comply with the following indoor applications, unless otherwise indicated:
1. Exposed, Not Subject to Physical Damage: EMT.
2. Concealed in Ceilings and Interior Walls and Partitions: EMT.
3. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
4. Damp or Wet Locations: Rigid steel conduit or Schedule 80.
5. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4, in damp or wet locations.

C. Minimum Raceway Size: 1/2-inch trade size.

D. Raceway Fittings: Compatible with raceways and suitable for use and location.
1. Rigid Steel Conduit: Use threaded rigid steel conduit fittings, unless otherwise indicated.

3.2 INSTALLATION

A. Comply with NECA 1 for installation requirements applicable to products specified in Part 2 except where requirements on Drawings or in this Article are stricter.

B. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.as specified in Division 16 Section "Electrical Supports and Seismic Restraints."

C. Complete raceway installation before starting conductor installation.

D. Support raceways per National Electric Code.

E. Install no more than the equivalent of three 90-degree bends in any conduit run except for communications conduits, for which fewer bends are allowed. Conceal conduit and EMT within finished walls, ceilings, and floors, unless otherwise indicated.

F. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors, including conductors smaller than No. 4 AWG.

G. Install raceway sealing fittings at suitable, approved, and accessible locations and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings at the following points:
    1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
    2. Where otherwise required by NFPA 70.

H. Flexible Conduit Connections: Use maximum of 72 inches of flexible conduit for recessed and semirecessed lighting fixtures,]equipment subject to vibration, noise transmission, or movement; and for transformers and motors.
    1. Use LFMC in damp or wet locations subject to severe physical damage.
    2. Use LFMC or LFNC in damp or wet locations not subject to severe physical damage.

3.3 FIRESTOPPING

A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 7 Section "Through-Penetration Firestop Systems."

PANELBOARDS

SECTION 262416

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes distribution panelboards and lighting and appliance branch-circuit panelboards.

1.2 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Panelboards shall withstand the effects of earthquake motions determined according to SEI/ASCE 7.
   1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

1.3 SUBMITTALS

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

B. Shop Drawings: For each panelboard and related equipment.
   1. Include dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings.
   2. Detail enclosure types and details for types other than NEMA 250, Type 1.
   3. Detail bus configuration, current, and voltage ratings.
   4. Short-circuit current rating of panelboards and overcurrent protective devices.
   5. Include evidence of NRTL listing for series rating of installed devices.
   6. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
   7. Include wiring diagrams for power, signal, and control wiring.
   8. Include time-current coordination curves for each type and rating of overcurrent protective device included in panelboards.

C. Seismic Qualification Certificates: Submit certification that panelboards, overcurrent protective devices, accessories, and components will withstand seismic forces defined in Division 16 Section "Vibration and Seismic Controls for Electrical Systems."

D. Field quality-control reports.

E. Panelboard schedules for installation in panelboards.

F. Operation and maintenance data.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NEMA PB 1.

C. Comply with NFPA 70.

1.5 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace transient voltage suppression devices that fail in materials or workmanship within specified warranty period.
   1. Warranty Period: One year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR PANELBOARDS

A. Fabricate and test panelboards according to IEEE 344 to withstand seismic forces defined in Division 16 Section "Vibration and Seismic Controls for Electrical Systems."

B. Enclosures: Surface-mounted cabinets.
   1. Rated for environmental conditions at installed location.
      a. Indoor Dry and Clean Locations: NEMA 250, Type 1
   2. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box.
   3. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover.
   4. Directory Card: Inside panelboard door, mounted in transparent card holder.
   5. Type load type and location.

C. Incoming Mains Location: Top and bottom.

D. Phase, Neutral, and Ground Buses: Tin-plated aluminum

E. Conductor Connectors: Suitable for use with conductor material and sizes.
   1. Material: Hard-drawn copper, 98 percent conductivity.
   2. Main and Neutral Lugs: Compression type.
   3. Ground Lugs and Bus Configured Terminators: Compression type.
   4. Feed-Through Lugs: Compression type, suitable for use with conductor material. Locate at opposite end of bus from incoming lugs or main device.
   5. Subfeed (Double) Lugs: Compression type suitable for use with conductor material. Locate at same end of bus as incoming lugs or main device.

F. Service Equipment Label: NRTL labeled for use as service equipment for panelboards with one or more main service disconnecting and overcurrent protective devices.

G. Future Devices: Mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices.

H. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals.

I. Provide nameplate of panel covers.

J. Provide typed directory identifying all circuits and type of load.

2.2 DISTRIBUTION PANELBOARDS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Eaton Electrical Inc.; Cutler-Hammer
   2. General Electric Company
   3. Siemens
   4. Square D

B. Panelboards: NEMA PB 1, power and feeder distribution type.

C. Doors: Secured with vault-type latch with tumbler lock; keyed alike; hinged door and trim.

D. Branch Overcurrent Protective Devices: Bolt on or Square D I-Line or equal.

2.3 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

A. Subject to compliance with requirements, provide products by one of the following:
   1. Eaton Electrical Inc.; Cutler-Hammer
   2. General Electric Company
   3. Siemens
   4. Square D

B. Molded-Case Circuit Breaker (MCCB): Comply with UL 489, with interrupting capacity to meet available fault currents.
   1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads, and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
   2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
   3. Electronic trip circuit breakers with rms sensing; field-replaceable rating plug or field-replicable electronic trip; and the following field-adjustable settings:
      a. Instantaneous trip.

b. Long- and short-time pickup levels.
c. Long- and short-time time adjustments.
d. Ground-fault pickup level, time delay, and I2t response.

4. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller; let-through ratings less than NEMA FU 1, RK-5.
5. GFCI Circuit Breakers: Single- and two-pole configurations with Class A ground-fault protection (6-mA trip).
6. Ground-Fault Equipment Protection (GFEP) Circuit Breakers: Class B ground-fault protection (30-mA trip).
7. Arc-Fault Circuit Interrupter (AFCI) Circuit Breakers: Comply with UL 1699; 120/240-V, single-pole configuration.
8. Molded-Case Circuit-Breaker (MCCB) Features and Accessories:
   a. Standard frame sizes, trip ratings, and number of poles.
   b. Lugs: Compression or Mechanical style, suitable for number, size, trip ratings, and conductor materials.
   c. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge (HID) lighting circuits.
   d. Ground-Fault Protection: Integrally mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.
   e. Communication Capability: Communication module with functions and features compatible with power monitoring and control system specified in Division 16 Section "Electrical Power Monitoring and Control."
   f. Shunt Trip: 120-V trip coil energized from separate circuit, set to trip at 55 percent of rated voltage.
   g. Handle Padlocking Device: Fixed attachment, for locking circuit-breaker handle in on or off position.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Receive, inspect, handle, store and install panelboards and accessories according to NECA 407.

B. Comply with mounting and anchoring requirements specified in Division 16 Section "Vibration and Seismic Controls for Electrical Systems."

C. Mount panelboard cabinet plumb and rigid without distortion of box. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.

D. Install overcurrent protective devices and controllers not already factory installed.
   1. Set field-adjustable, circuit-breaker trip ranges.

E. Install filler plates in unused spaces.

F. Stub four 1-inch empty conduits from panelboard into accessible ceiling space or space designated to be ceiling space in the future.

G. Arrange conductors in gutters into groups and bundle with tie wraps.

H. Comply with NECA 1.

3.2 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs complying with Division 16 Section "Electrical Identification."

B. Create a directory to indicate installed circuit loads and incorporating Owner's final room designations. Obtain approval before installing. Use a computer or typewriter to create directory; handwritten directories are not acceptable.

C. Panelboard Nameplates: Label each panelboard with a nameplate complying with requirements for identification specified in Division 16 Section "Electrical Identification."

D. Device Nameplates: Label each branch circuit device in distribution panelboards with a nameplate complying with requirements for identification specified in Division 16 Section "Electrical Identification."

3.3 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Acceptance Testing Preparation:
   1. Test each panelboard bus, component, connecting supply, feeder, and control circuit for shorts and grounds.

C. Tests and Inspections:
   1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
   2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

D. Panelboards will be considered defective if they do not pass tests and inspections.

E. Report any unsatisfactory results to engineer.

FIRE ALARM SYSTEM

SECTION 283111

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Fire-alarm control unit;
   2. Manual fire-alarm boxes;
   3. System smoke detectors;
   4. Heat detectors;
   5. Notification appliances;
   6. Addressable interface device.

1.3 SYSTEM DESCRIPTION

A. Non-coded, UL Listed intelligent analog addressable fire alarm system with multiplexed signal transmission.

B. The complete system shall be as manufactured by Edwards (EST.) and distributed by an authorized factory trained distributor of EST equipment. The equipment supplier shall have EST certified technicians.

C. Equal equipment of Notifier or FCI may be submitted for approval.

D. The System supplied under this specification utilize independently addressed, input/output modules, power supply(s) as described in this specification. The system contain fire alarm control panel, remote annunciator(s) and NAC power supply(s).

1.4 SUBMITTALS

A. The Contractor shall purchase no equipment for the system specified herein until the engineer has approved the project submittals in their entirety and has returned them to the contractor. It is the responsibility of the contractor to meet the entire intent and functional performance detailed in these specifications. Approved submittals shall only allow the contractor to proceed with the installation and shall not be construed to mean that the contractor has satisfied the requirements of these specifications.

B. Each submittal shall include a cover letter providing a list of each variation that the submittal may have from the requirements of the Contract Documents. In addition

the Contractor shall provide specific notation on each Shop Drawing, sample, catalog cut, data sheet, installation manual, etc. submitted for review and approval, of each such variation.

1. Submittals shall be approved by authorities having jurisdiction prior to submitting them to the Architect.
2. Shop Drawings shall be prepared by persons with the following qualifications:
   a. Trained and certified by manufacturer in fire-alarm system design.

C. Product Data: Product Data sheets with the printed logo or trademark of the manufacturer of all equipment. Indicated in the documentation shall be the type, size, rating, style, and catalog number for all items proposed to meet the system performance detailed in this specification. The proposed equipment shall be subject to the approval of the Owner.

D. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
   1. Comply with recommendations in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter in NFPA72.
   2. Include voltage drop calculations for notification appliance circuits.
   3. Include battery-size calculations.
   4. Include performance parameters and installation details for each detector, verifying that each detector is listed for complete range of air velocity, temperature, and humidity possible when air-handling system is operating.

E. Operation and Maintenance Data: For fire-alarm systems and components to be included in emergency, operation, and maintenance manuals. In addition to items specified in Division 1 Section "Operation and Maintenance Data, include the following:
   1. Comply with the "Records" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA72.
   2. Provide "Record of Completion Documents" according to NFPA72 article "Permanent Records" in the "Records" Section of the "Inspection, Testing and Maintenance" Chapter.
   3. Record copy of site-specific software database file, hardcopy print-out and CD, with password for delivery to the owner.
   4. Provide "Maintenance, Inspection and Testing Records" according to NFPA72 article of the same name and include the following:
      a. Frequency of testing of installed components;
      b. Frequency of inspection of installed components;
      c. Requirements and recommendations related to results of maintenance.
   5. Manufacturer's required maintenance related to system warranty requirements.
   6. Abbreviated operating instructions for mounting at fire-alarm control unit.
   7. Copy of NFPA72.

F. Software and Firmware Operational Documentation:
   1. Software operating and upgrade manuals;
   2. Program Software Backup: On magnetic media or compact disk, complete with data files;
   3. Device address list;

4. Printout of software application;
5. CD of site-specific software database file with password, and electronic product data sheets. Provide hard copy print-out of the software program. Provide a complete system comparison report for each change implemented during the warranty period;
6. Provide a list of global system settings;
7. Provide a list of the contents of each system cabinet and their settings;
8. Provide a list of all addressable devices with their addresses and settings.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Personnel shall be trained and certified by manufacturer for installation of units required for this Project.

B. Source Limitations for Fire-Alarm System and Components: Obtain fire-alarm system from single source from single manufacturer. Components shall be compatible with, and operate as, an extension of existing system.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA70, by a qualified testing agency, and marked for intended location and application.

1.6 WARRANTY and SOFTWARE SERVICE AGREEMENT

A. The contractor shall warranty all materials, installation and workmanship for one (1) year from date of acceptance, unless otherwise specified. A copy of the manufacturers' warranty shall be provided with closeout documentation and included with the operation and installation manuals.

B. The System Supplier shall maintain a service organization with adequate spare parts stocked within 50 miles of the installation.

C. Detector Sensitivity Testing: During the warranty period, each year the contractor is to perform detector sensitivity testing and provide report to the Owner. Unless, the system is UL Listed to perform automatic sensitivity testing without any manual intervention and should detector fall outside of sensitivity window, the system will automatically indicate a device trouble. A copy of UL letter is to be provided as proof of system operation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: The materials, appliances, equipment and devices shall be tested and listed by a nationally recognized approvals agency for use as part of a protected premises protective signaling fire alarm system. The authorized representative of the manufacturer of the major equipment, such as control panels, shall be responsible for the satisfactory installation of the complete system.
B. The Contractor shall provide, from the acceptable manufacturer's current product lines, equipment and components, which comply, with the requirements of these Specifications.

Equipment or components, which do not provide the performance and features, required by these specifications are not acceptable, regardless of manufacturer.

C. Strict conformance to this specification is required to ensure that the installed and programmed system will function as designed, and will accommodate the future requirements and operations of the building Owner. All specified operational features must be met without exception.

D. All control panel assemblies and connected (new) field appliances shall be provided by the same System Supplier, and shall be designed and tested to ensure that the system operates as specified. All equipment and components shall be installed in strict compliance with the manufacturer's recommendations.

E. Upon completion of the project the Owner shall be provided with a hard copy printout of the system software database and an electronic version of the system program and database with all required passwords.

F. That equipment proposed to be supplied will be considered only if it meets all sections of the performance specification. Any deviations of system performance outlined in this specification will only be considered when the following requirements have been met:
   1. A complete description of proposed alternate system performance methods with three (3) copies of working drawings thereof for approval by the Owner, not less than ten (10) calendar days prior to the scheduled date for submission of bids.
   2. The supplier of alternate equipment shall furnish evidence that the proposed alternate system performance is equal to or superior than the system operation stated in the specification. Such evidence shall be submitted to the Owner, not less than ten (10) calendar days prior to the scheduled date for submission of bids.
   3. The supplier shall submit a point-by-point statement of compliance for all sections in this specification. The statement of compliance shall consist of a list of all paragraphs within these sections. Where the proposed system complies fully with the paragraph as written, placing the word "comply" opposite the paragraph number shall indicate such. Where the proposed system does not comply with the paragraph as written, and the supplier feels the proposed system will accomplish the intent of the paragraph, a full description of the function as well as a full narrative description of how its proposal will meet its intent shall be provided. Any submission that does not include a point-by-point statement of compliance as described herein shall be disqualified. Where a full description is not provided, it shall be assumed that the proposed system does not comply.
   4. The supplier of alternate equipment shall submit a list from the alternate manufacture on the manufactures letterhead indicating the names and addresses of all authorized suppliers in the area.
   5. The acceptability of any alternate proposed system shall be the sole decision of the Owner or his authorized representative.

G. Approved Products: All panels and peripheral devices shall be of the standard product of single manufacturer and shall display the manufacturer's name of each component. The

catalog numbers specified under this section are those of Edwards and shall constitute the type, product quality, material and desired operating features.

2.2 SYSTEMS OPERATIONAL DESCRIPTION

A. Fire-alarm signal initiation shall be by one or more of the following devices:
   1. Manual stations;
   2. Heat detectors;
   3. Flame detectors;
   4. Smoke detectors;
   5. Automatic sprinkler system water flow;
   6. Heat detectors in elevator shaft and pit;
   7. Fire standpipe system.

B. Fire-alarm signal shall initiate the following actions:
   1. Activate the audible and visual notification appliances;
   2. Identify alarm at fire-alarm control unit and remote annunciators;
   3. Transmit an alarm signal to the remote alarm receiving station;
   4. Unlock electric door locks in designated egress paths;
   5. Release fire and smoke doors held open by magnetic door holders;
   6. Switch heating, ventilating, and air-conditioning equipment controls to fire-alarm mode;
   7. Activate emergency shutoffs for gas and fuel supplies;
   8. Record events in the system memory.

C. Supervisory signal initiation shall be by one or more of the following devices and actions:
   1. Valve supervisory switch;
   2. Low-air-pressure switch of a dry-pipe sprinkler system;
   3. Elevator shunt-trip supervision;
   4. Duct smoke detectors (shutdown local fan).

D. System trouble signal initiation shall be by one or more of the following devices and actions:
   1. Open circuits, shorts, and grounds in designated circuits;
   2. Opening, tampering with, or removing alarm-initiating and supervisory signal-initiating devices;
   3. Loss of primary power at fire-alarm control unit;
   4. Ground or a single break in fire-alarm control unit internal circuits;
   5. Abnormal ac voltage at fire-alarm control unit;
   6. Break in standby battery circuitry;
   7. Failure of battery charging;
   8. Abnormal position of any switch at fire-alarm control unit or annunciator;
   9. Fire-pump power failure, including a dead-phase or phase-reversal condition;
   10. Low-air-pressure switch operation on a dry-pipe or pre-action sprinkler system.

E. System Trouble and Supervisory Signal Actions: Annunciate at fire-alarm control unit and remote annunciators.

2.3 FIRE-ALARM CONTROL UNIT

A. The control panel shall contain a microprocessor with 10/100 ethernet media access controller (MAC). The system shall be designed specifically for fire detection, and notification applications. The control panel shall be listed and approved for the application standard(s) as listed under the General section. Panel shall be GE Security - EST iO500.

B. The control panel shall include all required hardware, software and system programming to provide a complete and operational system. The control panel shall assure that life safety takes precedence among all panel activities.

C. The control panel shall include the following capacities:
   1. Support one loop of 250 analog/addressable points, expandable up to two loops for a total of 500 points;
   2. Support up to 8 fully supervised remote annunciators;
   3. Support digital dialer with Contact ID format;
   4. Support up to 1000 chronological events.

D. The control panel shall include the following features:
   1. Ability to download or upload site applications and system diagnostics remotely through an Ethernet connection, or DACT;
   2. Provide electronic addressing of analog/addressable devices. Rotary and dip switch addressing shall not be considered equal;
   3. Provide an operator interface display that shall include functions required to annunciate, command and control system functions;
   4. Provide an internal audible signal with different programmable patters to distinguish between alarm, supervisory, trouble and monitor conditions;
   5. Provide system reports that provide detailed description of the status of system parameters for corrective action or for preventative maintenance programs. Reports shall be displayed by the operator interface or capable of being printed on a printer.;
   6. Provide an authorized operator with the ability to operate or modify system functions like system time, date, passwords, restart the system and clear control panel event history file;
   7. Provide an authorized operator to perform test functions within the installed system.

E. The control panel shall provide the following intelligent and intuitive diagnostic software tools.
   1. Fast Ground Check - Allow quick wiring diagnostics for ground faults every 4 seconds to troubleshoot ground faults much quicker and determine if they have been fixed or not.
   2. Recalibrate Device - The control panel recalibrates any devices that have been cleaned. The Recalibrate Device feature will immediately reset the environmental compensation and dirtiness levels for faster verification of cleaned devices.
   3. Test Fire - The control panel sends a test command to a detector or input module to activate. This allows for proper operation and programming testing of the device.

4. Flash Device LED - It shall be possible to activate any device LED from the control panel menu to help troubleshooting or locate a specific device on a loop.
5. Walk Test - Walk test will allow the operator to test individual zones or devices without placing an alarm event on the system. It shall be possible to perform a walk test in a silent or audible test mode. Silent test mode shall display the test results on the LCD display. Audible test confirmation shall sound a coded signal on the systems NAC circuits. It shall be possible to activate Walk Test by zone or device to ensure the balance of the system remains in service to protect the premises.It shall be possible to view and print a walk test report showing the activation and restoration of all walk test events.
6. Device Maintenance - It shall be possible to view and print a report of all detectors dirtiness levels to optimize cleaning schedules. The report shall filter for all devices, devices that are 20% dirty or devices that are 80% dirty. The report shall show the device, how dirty it is by percentage and its sensitivity setting. Detectors shall automatically send an alert message to the LCD Users Interface and illuminate the service detector LED when they reach 80% dirty and latch a trouble when they reach 100% dirty to ensure maintenance action is performed.

F. Main Operators Display Operations:
   1. Provide a discreet system control switch provided for reset, alarm silence, panel silence, remote disconnect, drill switch, and up/down/right/left switches.
   2. Backlit LCD display shall be 80 character display. Each point shall have a 40 character custom message.
   3. Service Detector LED: Provide indication when a detector needs servicing
   4. Programmable Switches: Provide minimum of 2 programmable switches with corresponding LED . The switches shall be programmed for disable/enable or activate restore functions as follows;
      a. Disable NAC
      b. Disable Elevator Recall
      c. Disable Fan Shutdown

G. Instructions: Computer printout or typewritten instruction card mounted behind a plastic or glass cover in a stainless-steel or aluminum frame. Include interpretation and describe appropriate response for displays and signals. Briefly describe the functional operation of the system under normal, alarm, and trouble conditions.

H. Circuits Requirements:
   1. Signaling Line Circuits for Intelligent Analog Addressable Loop:
      a. Class A (style 6)
      b. Any combination of 64 detectors or modules.
   2. Notification Appliance Circuits:
      1. Class A (style Z)
      2. Maximum circuit loading to 2.5 amps for notification appliance circuits
3. Activation of alarm notification appliances, elevator recall and other functions shall occur within 3 seconds after the activation of an initiating device.

I. Door Controls: Door hold-open devices that are controlled by smoke detectors at doors in smoke barrier walls shall be connected to fire-alarm system.

J. Smoke-Detector Sensitivity Adjustment: Controls shall select specific addressable smoke detectors for adjustment, display their current status and sensitivity settings, and change to alternate settings. Allow controls to be used to program repetitive, time-scheduled, and automated changes in sensitivity of specific detector groups. Record sensitivity adjustments and sensitivity-adjustment schedule changes in system memory, and print out the final adjusted values on system printer.

K. Primary Power: 24-V dc obtained from 120-V ac service and a power-supply module. Initiating devices, notification appliances, signaling lines, trouble signals, shall be powered by nominal 24-V dc source.
   1. Alarm current draw of entire fire-alarm system shall not exceed 80 percent of the power-supply module rating.

L. Secondary Power: Shall provide 60 hours supervisory and 5 minutes of alarm with batteries, automatic battery charger, and automatic transfer switch.

M. NAC Power Supply: The NAC power supply shall be independent unit that will provide power to visual strobe notification appliances. It shall be possible to configure the NAC's to follow the main panel's NAC or activate from intelligent synchronized modules. The booster NAC's must be configurable to operate independently at any one of the following rates: continuous synchronized, or 3-3-3 temporal. Fault conditions on the power supply shall not impede alarm activation of host NAC circuits or other power supplies. The NAC power supply must be able to provide concurrent power for notification devices, and auxiliary devices such as door holders. . All the NAC Power Supplies shall be synchronized. The power supply shall support up to 24 amp hour batteries.
   1. Power supply shall be minimum of 6 amps and UL 864 Listed.
   2. Two independent 3amp Class A NAC circuits. Each being configurable as auxiliary power.
   3. All circuits shall be synchronized.
   4. Shall be Edwards-EST, model BPS6A.

2.4 MANUAL FIRE-ALARM BOXES

A. General Requirements for Manual Fire-Alarm Boxes: Comply with UL38. Boxes shall be finished in red with molded, raised-letter operating instructions in contrasting color; shall show visible indication of operation; and shall be mounted on recessed outlet box. If indicated as surface mounted, provide manufacturer's surface back box.
   1. Double-action mechanism requiring two actions to initiate an alarm, pull-lever type; with integral addressable module arranged to communicate manual-station status (normal, alarm, or trouble) to fire-alarm control unit.
   2. The manual pull station will have an intelligent module integral of the unit.
   3. Station Reset: key operated switch shall match the control panel key.
   4. Manual pull stations that initiated an alarm condition by opening the unit are not acceptable.

5. Provide GE-EST, model SIGA-278.
6. When surface mounting provide surface back box Edwards-EST, model 276B-RSB.

B. Indoor Protective Shield: Factory-fabricated clear plastic enclosure. Hinged at the top to permit lifting for access to initiate alarm. Lifting the cover actuates an integral battery powered audible horn intended to discourage false-alarm operation. (when noted on the drawings).

C. Weatherproof manual pull station shall be provided of red metal construction with special weatherproof gasket metal red box.
1. Double-action operation.
2. Station Reset: key operated switch shall match the control panel key.
3. The intelligent monitor module will be located within the building and not with the station.
4. Provide Edwards-EST, model MPSR2.

2.5 INTELLIGENT ANALOG SYSTEM SMOKE DETECTORS

A. General Requirements for Intelligent Analog Detectors
1. Integral Microprocessor: All decisions are made at the detector determining if the device is in the alarm or trouble condition.
2. Non-Volatile Memory: Permanently stores serial number, and type of device. Automatically updates historic information including hours of operation, last maintenance date, number of alarms and troubles, time of last alarm and analog signal patterns for each sensing element just before last alarm.
3. Electronic Addressing: Permanently stores programmable system address. It shall be possible to address each intelligent module without the use of DIP or rotary switches. Devices using switches for addressing shall not be acceptable.
4. Automatic Device Mapping: Each detector transmits wiring information regarding its location with respect to other devices on the circuit, creating an As-Built wiring diagram. This will also provide enhanced supervision of the device physical location and the device message shall reside with the location and not the device address. Devices installed in the wrong location will always report the correct message of the physical location.
5. Sensitivity Range: Each analog addressable smoke detector's sensitivity shall be capable of being programmed individually as: most sensitive, more sensitive, normal, less sensitive or least sensitive. It shall be possible to automatically change the sensitivity of individual analog/addressable detectors for the day and night periods. It shall be possible to program control panel activity to each level.
6. Pre-Alarm: Detector stores 8 pre-alarm sensitivity values to alert local personnel prior to the sensor reaching a full evacuation sensitivity. Sensitivity values can be set in 5-10% increments.
7. Environmental Compensation: The detector's sensing element reference point shall automatically adjust, compensating for background environmental conditions such as dust, temperature, and pressure. Periodically, the sensing element real-time analog value shall be compared against its reference value. The detector shall provide a maintenance alert signal when the detector reaches 80% compensation has been used.

The detector shall provide a dirty fault signal and illuminate Service Detector LED on control panel.

8. Twin Status LEDs: Flashing Green LED shows normal; flashing RED shows alarm state; steady RED and steady GREEN show alarm state in stand-alone mode, visible from any direction.
9. UL Sensitivity Testing: The detector shall utilize a supervised microprocessor that is capable of monitoring the sensitivity of the detector. If the detector sensitivity shifts outside of the UL limits, a trouble signal is sent to the panel.
10. Device Replacement: The system shall allow for changing of detector types for service replacement purposes without the need to reprogram the system. The replacement detector type shall automatically continue to operate with the same programmed sensitivity levels and functions as the detector it replaced. System shall display an off-normal condition until the proper detector type has been installed or change in the application program profile has been made.

B. Intelligent Photoelectric Detector
   1. Provide intelligent analog addressable photoelectric smoke detectors at the locations shown on the drawings.
   2. Provide Edwards-EST, model SIGA2-PS.

C. Intelligent 135 Degree Fixed Temperature / Rate of Rise Heat Detector
   1. Provide intelligent combination fixed temperature/rate-of-rise heat detectors at the locations shown on the drawings. The heat detector shall have a low mass thermistor heat sensor and operate at a fixed temperature and at a temperature rate-of-rise. It shall continually monitor the temperature of the air in its surroundings to minimize thermal lag to the time required to process an alarm. The integral microprocessor shall determine if an alarm condition exists and initiate an alarm based on the analysis of the data. Systems using central intelligence for alarm decisions shall not be acceptable. The intelligent heat detector shall have a nominal fixed temperature alarm point rating of 135oF (57oC) and a rate-of-rise alarm point of 15oF (9oC) per minute. The heat detector shall be rated for ceiling installation at a minimum of 70 ft (21.3m) centers and be suitable for wall mount applications.
   2. Provide Edwards-EST, model SIGA2-HRS.

D. Fixed Temperature Heat Detector
   1. Provide intelligent fixed temperature heat detectors at the locations shown on the drawings. The heat detector shall have a low mass thermistor heat sensor and operate at a fixed temperature. It shall continually monitor the temperature of the air in its surroundings to minimize thermal lag to the time required to process an alarm. The integral microprocessor shall determine if an alarm condition exists and initiate an alarm based on the analysis of the data. Systems using central intelligence for alarm decisions shall not be acceptable. The heat detector shall have a nominal alarm point rating of 135oF (57oC). The heat detector shall be rated for ceiling installation at a minimum of 70 ft (21.3m) centers and be suitable for wall mount applications.
   2. Provide Edwards-EST, model SIGA-HFS.

E. Detector Base Types
   1. Provide standard detector mounting bases suitable for mounting on 1-gang, or 4inch octagon box and 4 inch square box. The base shall, contain no electronics and support all series detector types. Bases with electronics or dip-switches are not acceptable.
      a. Provide Edwards-EST, model SIGA-SB or SB4.
   2. Provide relay detector mounting bases suitable for mounting on 1-gang, or 4" octagon box and 4" square box. The relay base shall support all Signature Series detector types and have the following minimum requirements:
      a. The relay shall be a bi-stable type and selectable for normally open or normally closed operation.
      b. The position of the contact shall be supervised.
      c. The relay shall automatically de-energize when a detector is removed.
      d. The operation of the relay base shall be controlled by its respective detector processor or under program control as required by the application. Detector relays not capable of operational programming independent of the detector shall not be considered equal. Form "C" Relay contacts shall have a minimum rating of 1 amp @ 30 Vdc and be listed for "pilot duty".
      e. Removal of the respective detector shall not affect communications with other detectors.
      f. Provide Edwards-EST, model SIGA-RB or RB4.

   3. Provide audible detector mounting bases suitable for mounting on 4" x 4" octagonal concrete ring (mud box) and 4" square x 2-1/8" (54 mm) deep box.
      a. The base shall support all Signature Series detector types and be capable of single or group operation. The audible base shall emit a temporal alarm tone and be selectable for low or high output.
      b. The operation of the audible base shall be controlled by its respective detector processor or under program control as required by the application. Detector audible base not capable of operational programming independent of the detector shall not be considered equal.
      c. The audible bases shall be UL268 and UL464 Listed, and provide a reverberant room sound output per UL464 of 81 dBA at 10ft (3m). and an average anechoic sound output of 90 dBA at 10 ft.(3m).
      d. Provide Edwards-EST, model SIGA-AB4G.

F. Intelligent Duct Smoke Detector - Photoelectric
   1. Provide intelligent photoelectric duct smoke detector at the locations shown on the drawings.
      a. One form C auxiliary alarm relay rated at 2amps @ 30Vdc.
      b. The operating range shall be 100ft/min to 4,000ft/min air velocity and temperature range of –20 to 158F.
      c. Sample tube can be installed with or without the cover place and be rotated in 45-degree increments to ensure proper alignment with duct airflow.
      d. Local magnet-activated test switch.
      e. Provide Edwards-EST, model SIGA-SD
   2. Provide remote test station with Alarm LED and Key Switch.
      a. Provide Edwards -EST, model SD-TRK.

3. Relay Fan Shutdown: Rated to interrupt fan motor control circuit. Furnish and install separate device for each motor start. Connect to motor start as required for fan shutdown during alarm condition.
   a. Provide Edwards -EST, model SIGA-CR.

2.6 INTELLIGENT MODULES

A. It shall be possible to address each intelligent module without the use of DIP or rotary switches. Devices using switches for addressing shall not be acceptable. The personality of multifunction modules shall be programmable at site to suit conditions and may be changed at any time using a personality code downloaded from the Analog Loop Controller.
   1. Integral Microprocessor: All decisions are made at the module determining if the device is alarm or trouble condition. Each module provides its own ground fault detection.
   2. Non-Volatile Memory: Permanently stores serial number, and type of device. Automatically updates historic information including hours of operation, number of alarms and troubles, time of last alarm.
   3. Automatic Device Mapping: Each detector transmits wiring information regarding its location with respect to other devices on the circuit, creating an As-Built wiring diagram. This will also provide enhanced supervision of the device physical location. The device message shall reside with the location and not the device address. Devices installed in the wrong location will always report the correct message of the physical location.
   4. Twin Status LEDs: The modules shall have a minimum of 2 diagnostic LEDs mounted behind a finished cover plate. A green LED shall flash to confirm communication with the loop controller. A red LED shall flash to display alarm status.
   5. Input and output circuit wiring shall be supervised for open and ground faults.
   6. Two styles of modules shall be available, those designed for gang box mounting, and where multiple modules are required in a single location, plug in modules shall be provided with a Universal Input/Output motherboard.

B. Intelligent Input Module. The Input Module shall provide one Class A input circuit capable of a minimum of 4 personalities, each with a distinct operation. The module shall be suitable for mounting on North American 1 ½" (38mm) deep 4" square boxe with 2-gang covers. The single input module shall support the following circuit types:
   - Normally-Open Alarm Latching (Manual Stations, Heat Detectors, etc.)
   - Normally-Open Active Non-Latching (Monitor, Fans, Dampers, Doors, etc.)
   - Normally-Open Active Latching (Supervisory, Tamper Switches)

   1. Provide Edwards -EST model SIGA-UM.

C. Intelligent Relay Module. Provide addressable control relay circuit modules shall provide one (1) form C dry relay contacts rated at 24Vdc @ 2 amps (pilot duty) to control external appliances or equipment. The position of the relay contact shall be confirmed by the system firmware. The module shall be suitable for mounting on North American 2 ½" (64mm) deep 1-gang boxes and 1 ½" (38mm) deep 4" square boxes with 1-gang covers.

1. Provide Edwards -EST, model SIGA-CR or SIGA-MCR.

D. Intelligent Isolation Module. Provide intelligent circuit isolator module shall provide short circuit protection. This module shall be install on a standard 4" square electrical box and shall be installed every 25 devices. In no case shall the length of an area be disabled by a wire to wire short circuit fault exceed two hundred feet (200') in any one direction. When a common SLC serves more than one floor of a building, fault isolation modules shall be installed to prevent a wire to wire short circuit fault on one floor from disabling the SLC on any other floor.
   1. Provide Edwards-EST, model SIGA-IM or SIGA-IB.

2.7 NOTIFICATION APPLIANCES

A. All appliances shall be of the same manufacturer as the Fire Alarm Control Panel specified to insure absolute compatibility between the appliances and the control panels, and to insure that the application of the appliances are done in accordance with the single manufacturers' instructions.

B. Any appliances, which do not meet the above requirements, and are submitted, for use must show written proof of they're compatibility for the purpose intended. Such proof shall be in the form of documentation from all manufacturers which clearly states that their equipment (as submitted) are 100% compatible with each other for the purposes intended. All appliances shall be UL listed Fire Protective Service and shall be UL 1971.

C. Notification Appliances – Visual
   1. Provide wall or ceiling mounted strobes with in-out screw terminals shall be provided for wiring. Strobes shall provide a smooth light distribution pattern field selectable candela 15 cd, 30 cd, 75 cd, and 110 cd flash output rating. The strobe (15, 30, 75, 110) candela rating shall be view from the side window to verify the setting. All strobes shall be synchronization to within 10 milliseconds for an indefinite period shall not require the use of separately installed remote synch modules. The strobes shall mount to one-gang electrical box.
   2. The device shall have plastic protective cover for during installation.
   3. The actual candela setting on the visual shall be marked on the appliance.
   4. Provide Edwards -EST, model Genesis Series devices.

D. Notification Appliance - Horn
   1. Provide low profile wall mount horns at the locations shown on the drawings. The horn shall provide an 95 dBA sound output at 10 ft. when measured in reverberation room per UL-464. The horn shall have a selectable steady or synchronized temporal output. In and out screw terminals shall be provided for wiring. The horn shall mount in a 1-gang box.
   2. The device shall have plastic protective cover during installation.
   3. Provide Edwards -EST model Genesis Series device.

E. Notification Appliance – Horn/Strobe

1. Provide low profile wall mount horn/strobes at the locations shown on the drawings. The horn/strobe shall provide an audible output of 95 dBA at 10 ft. when measured in reverberation room per UL-464. Strobes shall provide synchronized flash outputs. The strobe output shall be determined as required by its specific location and application from a family of 15cd, 30cd, 60cd, 75cd & 110cd devices. The horn shall have a selectable steady or synchronized temporal output. In and out screw terminals shall be provided for wiring. Low profile horn/strobes shall mount to one-gang box.
2. The device shall have plastic protective cover during installation.
3. Provide Edwards -EST model Genesis Series device.

F. Notification Appliance – Harsh Environment Temporal Horn/Strobes>
   1. Provide red electronic horn/strobes at the locations shown on the drawings. Horns shall be temporal output. At the high output setting, the horn shall provide a 85 dBA continuous sound output or a 95 dBA temporal sound output, when measured in reverberation room per UL-464. Strobes shall provide 15 cd, 75 cd, 110 cd synchronized flash outputs without the use of separate "synchronizing" modules. The strobe shall have lens markings oriented for wall or ceiling mounting.
   2. In - Out screw terminals shall be provided for wiring. Horns shall mount to a North American 4" electrical boxes (2-1/8" deep) or to a 2-gang (2-3/4" deep) electric box. Weatherproof wall boxes shall be provided for outdoor applications.
   3. Provide Edwards -EST model 757 series.

2.8 MUNICIPAL MASTER BOX

A. Provide a local energy municipally connected town approved masterbox.

2.9 WIRE AND CABLE

A. Signaling Line Circuits – Annunciator Data: Twisted pair, not less than No. 16Awg or as recommended by the manufacturer.

B. Signaling Line Circuits – Intelligent Loop: Non-twisted pair, not less than No. 16Awg or as recommended by the manufacturer.
   1. Circuit Integrity Cable: Provide as required to meet NFPA or Local Code requirements.
   2. CI Cable shall meet National Electrical Code, power limited fire alarm service.
   3. Existing wiring may be reused as long as it is in good shape, free of electrical noise, and meets the requirements of National Electrical Code and local AHJ.

C. Notification Appliance Circuits –
   1. Horn and Visual. 12AWG THHN or FPLP or as recommended by the manufacturer.

PART 3 - EXECUTION

3.1 EQUIPMENT INSTALLATION

A. Comply with NFPA72, local fire department and all state fire alarm code requirements for installation of fire-alarm equipment.

B. Equipment Mounting: Install fire-alarm control unit on finished floor with tops of cabinets not more than 72 inches above the finished floor.

C. Smoke- or Heat-Detector Spacing:
   1. Comply with NFPA72, "Smoke-Sensing Fire Detectors" Section in the "Initiating Devices" Chapter, for smoke-detector spacing.
   2. Comply with NFPA72, "Heat-Sensing Fire Detectors" Section in the "Initiating Devices" Chapter, for heat-detector spacing.
   3. Smooth ceiling spacing shall not exceed 30 feet.
   4. Spacing of detectors for irregular areas, for irregular ceiling construction, and for high ceiling areas shall be determined according to NFPA 72.
   5. HVAC: Locate smoke detectors not closer than 3 feet from air-supply diffuser or return-air opening.
   6. Lighting Fixtures: Locate detectors not closer than 12 inches from any part of a lighting fixture.

D. Duct Smoke Detectors: Comply with NFPA72 and NFPA90A. Install sampling tubes so they extend the full width of duct.

E. Notification Appliance Devices: Install bottom of strobe 80 inches above finished floor.

F. Fire-Alarm Control Unit: Surface mounted, with tops of cabinets not more than 72 inches above the finished floor.

3.2 CONNECTIONS

A. For fire-protection systems related to doors in fire-rated walls and partitions and to doors in smoke partitions, comply with requirements in Division 8 Section "Door Hardware." Connect hardware and devices to fire-alarm system.
   1. Verify that hardware and devices are NRTL listed for use with fire-alarm system in this Section before making connections.

B. Make addressable connections with a supervised interface device to the following devices and systems. Install the interface device less than 3 feet from the device controlled. Make an addressable confirmation connection when such feedback is available at the device or system being controlled.
   1. Smoke dampers in air ducts of designated air-conditioning duct systems.
   2. Alarm-initiating connection to elevator recall system and components.
   3. Alarm-initiating connection to activate emergency lighting control.
   4. Alarm-initiating connection to activate emergency shutoffs for gas and fuel supplies.

5. Supervisory connections at valve supervisory switches.
6. Supervisory connections at low-air-pressure switch of each dry-pipe sprinkler system.
7. Supervisory connections at elevator shunt trip breaker.
8. Supervisory connections at fire-pump power failure including a dead-phase or phase-reversal condition.
9. Supervisory connections at fire-pump engine control panel.

3.3 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Division 16 Section "Electrical Identification."

3.4 GROUNDING

A. Ground fire-alarm control unit and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to fire-alarm control unit.

3.5 FIELD QUALITY CONTROL

A. Field tests shall be witnessed by Architect, Engineer and authorities having jurisdiction.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.

C. Perform tests and inspections.
   1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

D. Tests and Inspections:
   1. Visual Inspection: Conduct visual inspection prior to testing.
      a. Inspection shall be based on completed Record Drawings and system documentation that is required by NFPA72 in its "Completion Documents, Preparation" Table in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter.
      b. Comply with "Visual Inspection Frequencies" Table in the "Inspection" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA72; retain the "Initial/Reacceptance" column and list only the installed components.
   2. System Testing: Comply with "Test Methods" Table in the "Testing" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA72.
   3. Test audible appliances for the public operating mode according to manufacturer's written instructions. Perform the test using a portable sound-level meter complying with Type 2 requirements in ANSI S1.4.
   4. Test audible appliances for the private operating mode according to manufacturer's written instructions.

5. Test visible appliances for the public operating mode according to manufacturer's written instructions.
6. Factory-authorized service representative shall prepare the "Fire Alarm System Record of Completion" in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter in NFPA72 and the "Inspection and Testing Form" in the "Records" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA72.

E. Reacceptance Testing: Perform reacceptance testing to verify the proper operation of added or replaced devices and appliances.

F. Fire-alarm system will be considered defective if it does not pass tests and inspections.

G. Prepare test and inspection reports.

H. Maintenance Test and Inspection: Include, as part of this Contract, the four quarterly tests following the final acceptance test. Provide quarterly testing in conformance with the "Massachusetts Building Code," latest edition Annual Test and Inspection: During the warranty period, each year test fire-alarm system complying with visual and testing inspection requirements in NFPA72. Use forms developed for initial tests and inspections.

3.6 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain fire-alarm system.

Schedule of Drawings (plans) for the DPW electrical service upgrade and fire alarm system can be obtained from the Hopkinton Town Clerks office Monday through Friday from 9:00 a.m. to 4:00 pm.

BID SHEET

DPW Electrical Service Upgrade and Fire Alarm System Installation

(Bid as one - Billed separately)

Bid Price for DPW Electrical System Upgrade and Fire Alarm System Installation: $ _____

Any Additional Fees: $ _____

TOTAL BID PRICE: $ _____

PROPOSAL BY: _____
(Company Name)

_____
(Street Address)

_____
(City/Town) (State) (Zip)

_____
Name

_____
Title

_____
Date

NOTICE OF AWARD

TO: _____ DATE: _____

_____

_____

DPW Electrical Service Upgrade and Fire Alarm System Installation

The Town has considered the bid submitted by you, dated _____, for the above-referenced purchase in response to its Request for Proposals (RFP).

You are hereby notified that your bid has been accepted in the amount(s) shown on the Bid Sheet.

Dated this _____day of _____, 2016

TOWN OF HOPKINTON, RHODE ISLAND

BY: _____
William A. McGarry

TITLE: _____
Town Manager

ACCEPTANCE OF NOTICE

Receipt of the above NOTICE OF AWARD is hereby acknowledged on this _____ day of _____, 2016.

BY: _____

TITLE: _____

COMPANY NAME: _____

NOTICE TO PROCEED

TO: _____ DATE: _____

_____

_____

DPW Electrical Service Upgrade and Fire Alarm System Installation

You are hereby notified to commence work on or after _____.

Work shall begin no later than thirty (30) calendar days after the Town Council awards the bid and be completed no later than sixty (60) calendar days thereafter; however, this time period may be extended, in writing, by mutual agreement.

TOWN OF HOPKINTON, RHODE ISLAND

BY: _____
William A. McGarry

TITLE: _____
Town Manager

ACCEPTANCE OF NOTICE

Receipt of the above NOTICE TO PROCEED is hereby acknowledged on this _____ day of _____, 2016.

BY: _____

TITLE: _____

COMPANY NAME: _____

PERFORMANCE BOND

KNOWN ALL MEN BY THESE PRESENTS, that _____
(Name of Contractor)

of _____
(Address of Contractor)

as Principal hereinafter called Principal, and _____
(Name of Surety)

of _____
(Address of Surety)

a Corporation, organized and existing under the laws of the State of _____,

as Surety, hereinafter called Surety, are help and firmly bound unto the Town of Hopkinton as Obligee, hereinafter called the Onligee, in the full penal sum of _____ dollars ($_____) in lawful money of the United States for the payment whereof Principal and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH THAT WHEREAS said Principal has entered into a certain written Contract with said Obligee, dated the _____day of_____, 2016 for the DPW Electrical Service Upgrade and Fire Alarm Installation, which contract, together with all Contract Documents now made of which may hereafter be made in extension, modification or alteration thereof, are hereby referred to, incorporated in and made a part of this Bond as though herein fully set forth.

NOW, THEREFORE, if the said Principal shall well and truly keep, perform, and execute all the terms, conditions and stipulations of said Contract according to its provisions on his/her or its part to be kept and performed and shall indemnify and reimburse the Obligee for any loss that it may suffer through failure of the Principal to faithfully observe and perform each and every obligation and duty imposed upon the Principal by the said Contract, at the time and in the manner therein specified, then this obligation shall be null and void, otherwise it shall remain and be in full force and effect.

PROVIDED, HOWEVER, that any alterations which may be may in the terms of said Contract or in the Work done for to be done under it, or the giving by the Obligee of any extension of tie for the performance of said Contract or any other forbearance on the part of either the Obligee or the Principal one to the other, shall not in any way release the Principal and/or the Surety, or either of them, their representatives, heirs, executors, administrators, successors or assigns form liability hereunder, notice to the Surety or Sureties of any such alteration, extension or forbearance being hereby specifically and absolutely waived.

AND PROVEIDED FURTHER THAT NO ACTION, suit, or proceeding shall be had or maintained against the Surety on this instrument unless the same be brought or instituted and process served upon the Suety within one (1) year from the expiration of the guaranty period provided in the Standard Instructions To Bidders, whether the Work be completed by the Principal, or Obligee.

IN WITNESS WHEREOF, the said Principal and Surety have SIGNED AND SEALED this instrument this _____day of _____, 20____.

ATTEST:

_____
Principal

_____
(Principal) Secretary

By_____

(SEAL)

_____
Witness as to Principal

ATTEST:

_____
Surety

_____
(Surety) Secretary

(SEAL)

By_____
Attorney-in-fact

_____
Witness as to Surety

CONTRACTUAL AGREEMENT

THIS CONTRACTUAL AGREEMENT, made and executed this _____ day of _____, 2016 by and between the Town of Hopkinton, a municipality located within the State of Rhode Island, by its Town Council duly constituted, and without personal liability for the individuals signatory hereto, herein termed the TOWN, and _____ doing business as a corporation, hereinafter termed the VENDOR.

WITNESSETH: That the parties to this Contract have agreed, and by these presents do hereby agree, the TOWN, for itself, and the VENDOR for himself/herself and his/her heirs, executors, administrators, successors, and assigns, as follows:

That the VENDOR has informed himself/herself fully in regard to all conditions pertaining to the place where the work is to be done and other circumstances affecting the work;

That the VENDOR has obtained all the information he/she needs to enable him/her to estimate fully and fairly the costs of the work herein contemplated.

That the VENDOR shall furnish all plant, labor, materials, supplies, tools, equipment, and other facilities and things necessary to commence work within the time interval stated in the bid proposal, provided he/she shall have been notified by the Town to do so, and complete everything required of him/her under the Contract no later than the time stated in the bid proposal.

That the VENDOR agrees to accept all of the terms and conditions incorporated into this Invitation to Bid, Bid Information and Requirements, Standard Instructions, Special Instructions, Site Plan Set, and all other related information and requirements identified in the Bidding Documents.

That the TOWN shall pay and the VENDOR shall receive, as full compensation for fulfilling everything required of the VENDOR under the Contract, the unit prices and lump sums recorded in the Bid Form.

That the VENDOR shall give to the TOWN, as liquidated damages, for each day lost by the VENDOR in the completion of the Work of the Contract after the time herein stipulated, the sum of five hundred dollars ($500.00), per day.

Signed, sealed and delivered in **duplicate** on _____ of _____, 2016.

TOWN:

Town of Hopkinton, Rhode Island

By:_____

Title: _____

Date: _____

VENDOR:

Name:_____

Address:_____

_____

By:_____

Title:_____

Date: _____

EXPERIENCE OF CONTRACTOR

The following experience sheet must be completed by each bidder. Any bid submitted without a fully-completed Experience Sheet will be rejected. Contractors may attach supplemental experience sheets at their option.

What four (4) similar projects has your company completed within the last five (5) years?

Type of Work	Contract Amount	Year Completed	Name & Address of Owner
1.			
2.			
3.			
4.			

The Town of Hopkinton, RI is currently seeking sealed bids for:

DPW ELECTRICAL SERVICE UPGRADE AND FIRE ALARM SYSTEM INSTALLATION

A complete document package containing bid information, instructions, requirements, and specifications may be obtained at the Town Clerk's Office, 1 Town House Road, Hopkinton, RI 02833 from 8:30 a.m. until 4:30 p.m., M-F, and is available on the Town's website www.hopkintonri.org.

A pre-bid meeting will be held on Thursday, August 25th, 2016, beginning at 10:00 a.m. at the Department of Public Works, 395 Woodville Road, Hopkinton, Rhode Island.

Sealed bids will be accepted at the Clerk's Office until Monday, September 12th, 2016, at 2:00 p.m. and opened at 2:15 p.m.

For further information, contact Tim Tefft, DPW Director, during normal business hours at (401) 377-7790, or via email at ttefft@hopkintonri.org.

NEW ELECTRICAL SERVICE AND FIRE ALARM SYSTEM

FOR THE

TOWN OF HOPKINTON DPW
395 WOODVILLE RD, HOPKINTON, RI 02804

ENGINEER:

CREATIVE ENVIRONMENT CORP.

195 Frances Avenue

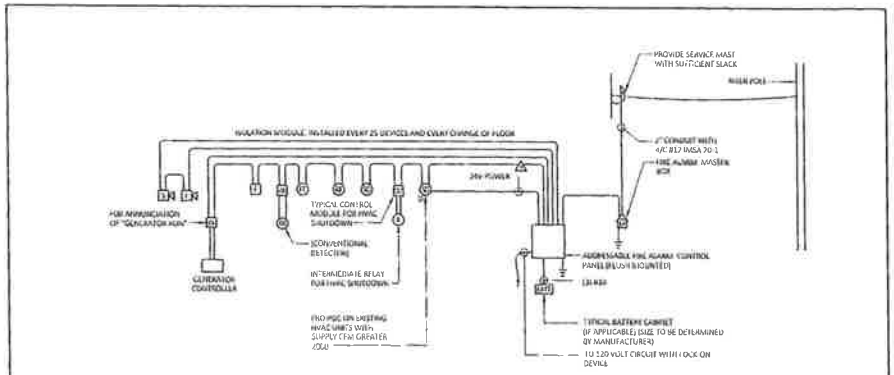
Building 2

Cranston, RI 02910

Tel.: (401)-438-7733

SCHEDULE OF DRAWINGS	
E-100	ELECTRICAL NOTES AND LEGENDS
E-101	ELECTRICAL FLOOR PLANS AND SCHEMATICS

JULY 2016



FIRE ALARM SYSTEM GENERAL NOTES:

1. ALL WIRING SHALL BE PER MANUFACTURER'S SPECIFICATIONS
2. THIS SCHEMATIC IS TYPICAL. WIRE TO ALL DEVICES ON ALL ZONES AND CIRCUITS. SEE PLAN VIEWS FOR TYPES AND QUANTITIES OF DEVICES
3. ALL FIRE ALARM WIRING SHALL BE RUN CONTINUOUS FROM DEVICE TO DEVICE (SEE RIIFC).
4. OUTGOING AND RETURN CONDUCTORS MUST BE RUN IN SEPARATE RACEWAYS PROVIDE MINIMUM SEPARATION OF 1 FOOT WHERE THE CABLE IS RUN VERTICALLY AND A 4 FEET SEPARATION WHERE THE CABLE IS RUN HORIZONTALLY. (SEE RIIFC AND NFPA)
5. PROVIDE ANY ADDITIONAL REMOTE POWER SUPPLIES AS NECESSARY. PROVIDE ADDITIONAL SMOKE DETECTORS AS NECESSARY PER NFPA
6. PROVIDE HARDWARE AND PROGRAMMING SUCH THAT DURING ALARM, ALL HVAC UNITS WITH CFM >2000 WILL BE SHUTDOWN
7. PROVIDE INTERMEDIATE RELAYS AS NEEDED
8. SYNCHRONIZE ALL STROBE LIGHTS
9. VERIFY WIRING TYPE FOR PROPER OPERATION
10. VERIFY ADDITIONAL WIRING (e.g. 24V POWER FOR MODULES) WITH SPECIFIED MANUFACTURER
11. NOTIFY OWNER, FIRE DEPARTMENT, AND POLICE DEPARTMENT PRIOR TO EXECUTING ANY WORK ON THE FIRE ALARM SYSTEM.
12. PROVIDE NEW FIRE ALARM POWER SUPPLIES, DEVICES, WIRING, ETC. AS REQUIRED TO SERVE NEW FIRE ALARM NOTIFICATION DEVICES SHOWN ON THE DRAWINGS
13. PROVIDE ISOLATION MODULES AS REQUIRED IN ACCORDANCE WITH THE RHODE ISLAND FIRE SAFETY CODE. PROVIDE A MINIMUM OF ONE PER FLOOR. PROVIDE AN ISOLATION MODULE FOR EVERY 25 INITIATING DEVICES
14. PROVIDE 25% SPARE CAPACITY ON INITIATING AND NOTIFICATIONS LOOPS
15. RECALCULATE BATTERY LOAD AND PROVIDE AS NEEDED

① FIRE ALARM SYSTEM SCHEMATIC
SCALE: N.T.S.

GENERAL NEW WORK NOTES

1. PROVIDE ALL REQUIRED PULL BOXES AND JUNCTION BOXES
2. COLOR CODE ALL WIRING
3. PROVIDE CONDUIT SLEEVES AS REQUIRED. THROUGH FIRE RATED SEPARATIONS, FIRE SEAL AFTER WIRING IS COMPLETE
4. CONCEAL ALL WIRING WHERE POSSIBLE. REVISE EXISTING WIRING WITH ENGINEER
5. PROVIDE ALL GROUNDING INCLUDING GREEN EQUIPMENT GROUND IN ALL RACEWAYS. GROUND BUILDING SERVICE ACCORDING TO NEC AND ALSO TO STREET SIDE OF WATER METER AND TO APPROVED GROUND ROD
6. WIRING SHALL NOT BE LAID ON, OR ATTACHED TO THE SUSPENDED CEILING OR ITS SUPPORT WIRES. ALL CABLES SHALL BE RUN PARALLEL OR PERPENDICULAR TO WALLS. DO NOT RUN CABLES DIAGONALLY THROUGH ANY SPACE
7. PROVIDE GROUNDING AND BONDING BUSHINGS FOR SERVICE RACEWAYS PER NEC SIZE THE BONDING JUMPER PER NEC
8. CONTRACTOR SHALL VISIT THE SITE AND FAMILIARIZE HIMSELF WITH THE EXISTING CONDITIONS. NO CLAIM FOR EXTRA COMPENSATION SHALL BE ENTERTAINED FOR WORK WHICH A PRELIMINARY EXAMINATION WOULD HAVE REVEALED. THE SUBMISSION OF A BID WILL BE CONSIDERED AS ACKNOWLEDGEMENT ON THE PART OF THE BIDDER OF HIS VISITATION TO THE SITE.
9. OBTAIN ALL NECESSARY PERMITS AND CERTIFICATES. PRESENT SATISFACTORY PROOF OF FINAL INSPECTION AND APPROVAL BY AUTHORITIES HAVING JURISDICTION

SITE LEGEND

	UTILITY POLE
AE	AERIAL SECONDARY ELECTRIC SERVICE

POWER DISTRIBUTION LEGEND

	208Y/120 VOLT PANELBOARD, SURFACE MOUNTED, REFER TO SCHEDULE OF PANELBOARDS.
ATS	AUTOMATIC TRANSFER SWITCH
M	METER SOCKET AND UTILITY COMPANY ELECTRIC METER, OR AS NOTED

FIRE ALARM LEGEND

SD	FIRE ALARM SMOKE DETECTOR.
HD	FIRE ALARM HEAT DETECTOR, COMBINATION RATE OF RISE AND ONE HUNDRED THIRTY FIVE DEGREES (135°) F FIXED TEMPERATURE
F	FIRE ALARM HORN/STROBE COMBINATION. CANDELA RATING SHALL BE 15 UNLESS OTHERWISE NOTED
S	FIRE ALARM STROBE ONLY. CANDELA RATING SHALL BE 15, UNLESS OTHERWISE NOTED
P	FIRE ALARM PULL STATION
FACP	FIRE ALARM CONTROL PANEL
FM	FIRE ALARM SYSTEM MASTERBOX
FN	FIRE ALARM MONITOR MODULE
FT	FIRE ALARM HEAT DETECTOR, AUTOMATIC FIXED TEMPERATURE WITH A RATING OF ONE HUNDRED EIGHTY FIVE DEGREES (135°) F
DD	FIRE ALARM DUCT MOUNTED SMOKE DETECTOR, INSTALLED BY MECHANICAL CONTRACTOR, WIRED AND FURNISHED BY ELECTRICAL CONTRACTOR.
K	KEY ACCESS BOX
HD	FIRE ALARM HEAT DETECTOR, COMBINATION RATE-OF-RISE AND ONE HUNDRED THIRTY FIVE DEGREES (135°) F FIXED TEMPERATURE, MOUNTED ABOVE ACCESSIBLE CEILING.

CREATIVE ENVIRONMENT CORP.
ARCHITECTURE · PLUMBING · FIRE PROTECTION
[illegible]

NEW ELECTRICAL SERVICE AND FIRE ALARM SYSTEM
TOWN OF HOPKINTON DPW
995 WOODVILLE ROAD, HOPKINTON, RI 02804

Prepared by:
SILVER COSTA
No. 7813
REGISTERED PROFESSIONAL ENGINEER ELECTRICAL

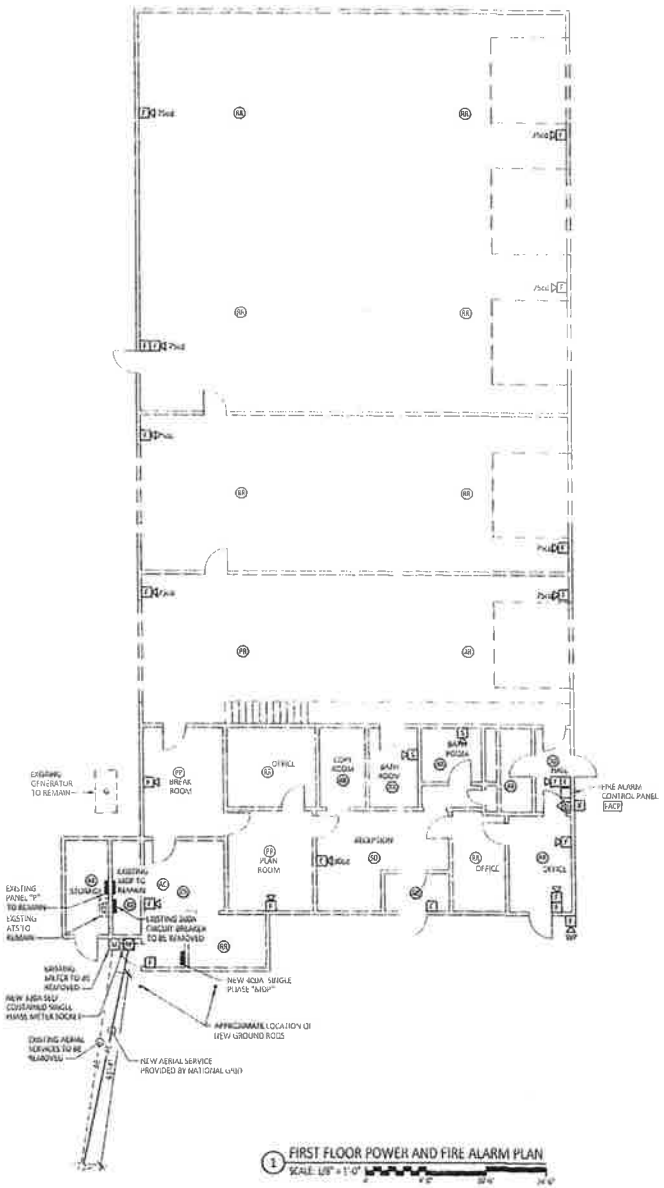
Status:
ISSUED FOR CONSTRUCTION

Date
Revision/Issue
[illegible]

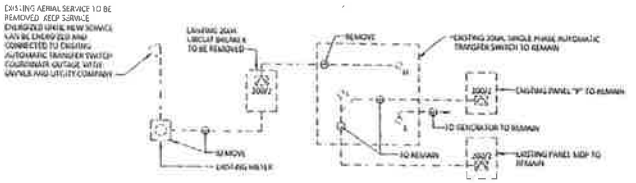
Sheet Title:
ELECTRICAL NOTES AND LEGENDS

Project No: [illegible]
Drawn By: [illegible]
Checked By: [illegible]
Scale: AS NOTED
Date: 09/09/2021

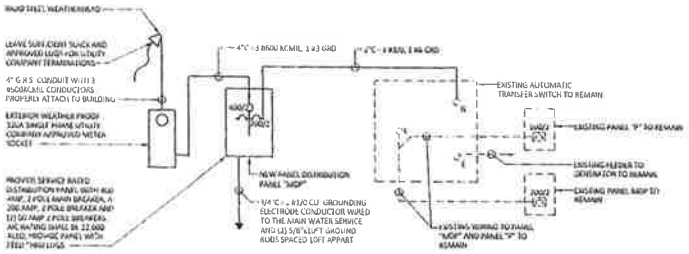
Drawing No:
E-100
Sheet 1 of 1



1 FIRST FLOOR POWER AND FIRE ALARM PLAN
SCALE: 1/8" = 1'-0"



3 EXISTING DISTRIBUTION SCHEMATIC
NOT TO SCALE



4 NEW SERVICE DISTRIBUTION SCHEMATIC
NOT TO SCALE

2 LOFT FIRE ALARM PLAN
SCALE: 1/8" = 1'-0"

NEW ELECTRICAL SERVICE AND FIRE ALARM SYSTEM
TOWN OF HOPKINTON DPW
395 WOODVILLE ROAD, HOPKINTON, RI 02804

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Sheet 2 of 2