MARYLAND TRANSPORTATION AUTHORITY
Baltimore, Maryland
Invitation for Bids

FORT MCHENRY TUNNEL

Maryland
Transportation
Authority

Contract No. FT 2259-000-002

Replace Generator at Fort McHenry Tunnel Administration Building

Baltimore City

December 2009

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NOTICE TO BIDDERS/OFFERORS
SMALL BUSINESS RESERVE PROCUREMENT

This is a Small Business Reserve Procurement as defined in **COMAR 21.11.01.06**, for which award will be limited to certified small business vendors. Only businesses that meet the statutory requirements set forth in State Finance and Procurement Article, §§14-501 —14-505, Annotated Code of Maryland, and that are registered with the Department of General Services Small Business Reserve Program are eligible for award of a contract.

For the purposes of a Small Business Reserve Procurement, a small business is a for-profit business, other than a broker, that meets the following criteria:

* It is independently owned and operated;

* It is not a subsidiary of another business;

* It is not dominant in its field of operation;

* Its **wholesale** operations did not employ more than 50 persons, and its gross sales did not exceed an average of $4,000,000 in its most recently completed 3 fiscal years;*

* Its **retail** operations did not employ more than 25 persons, and its gross sales did not exceed an average of $3,000,000 in its most recently completed 3 fiscal years;*

* Its **manufacturing operations** did not employ more than 100 persons, and its gross sales did not exceed an average of $2,000,000 in its most recently completed 3 fiscal years;*

* Its **service operations** did not employ more than 100 persons, and its gross sales did not exceed an average of $10,000,000 in its most recently completed 3 fiscal years;*

* Its **construction operations** did not employ more than 50 persons, and its gross sales did not exceed an average of $7,000,000 in its most recently completed 3 fiscal years;* and

* The **architectural and engineering** services of the business did not employ more than 100 persons and the gross sales of the business did not exceed an average of $4,500,00 in its most recently completed 3 fiscal years.

* If a business has not existed for 3 years, the employment and gross sales average or averages shall be the average for each year or part of a year during which the business has been in existence.

Further information on the certification process is available at www.dgs.state.md.us and click on the Small Business Reserve hyperlink.

NOTICE TO BIDDERS

Please review the checklist prior to submitting your bid on this Contract.

- When submitting your completed bid, do not separate the book. Submit the whole book including all addenda.
- Make sure that all addenda letters are attached outside of the front cover of the bid book.
- If the addendum has revised the Schedule of Prices, make sure that you have included the revised pages in your bid. Your price should reflect any and all changes.
- Prices must be written numerically and in words, unless approved substitute forms are used (Refer to GP-2.06). Do not leave any items blank.
- When tabulating your final price, make sure all your calculations are correct.
- The Bid/Proposal Affidavit must be completely filled out and signed by all the parties as indicated.
- If Escrow is being offered in a contract, the contractor must indicate whether or not they wish to utilize an Escrow Account for Retained Funds on the provided form.
- A bid bond must accompany all bids of One Hundred Thousand Dollars ($100,000.00) or more. The bid bond document must be completely filled out and have an original Power of Attorney form attached.
- If the document is too large for the envelope that we have provided, you can place the document in another form of packaging that can be sealed and submitted. If the document is too large for the bid box, you should alert the receptionist.
- Make sure that your company's name, address, the contract number and the bid date appears on the front of the packaging.
- When submitting bid packages via US Mail, Federal Express, DHL, UPS or any other delivery service it is your responsibility to make sure that the bid reaches the bid box before the time deadline. It may be in your best interest to send the package 24 hours in advance of the deadline. Also, when sending packages this way, make sure that the labeling specifies that it is a bid submission.

Notice to Bidders/Offerors

EMaryland Marketplace Fee

In order to take advantage of Maryland State and Local government contracting opportunities, vendors/contractors are encouraged to register with eMaryland Marketplace. The free registration provides a means for businesses to receive e-mail notification of upcoming contracting opportunities in their specified areas of interest and expertise.

For registration requirements, visit:
www.eMarylandMarketplace.com.

NOTICE TO ALL HOLDERS OF THIS CONTRACT DOCUMENT

NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM (NCHRP) REPORT 350 IMPLEMENTATION SCHEDULE FOR DEVICES USED IN THE MAINTENANCE OF TRAFFIC

Except as otherwise specified in this Section, all items for the maintenance of traffic, including those listed under the following categories, shall be crashworthy in conformance with Level 3 or other Level as specified by the Engineer in conformance with the safety crash testing and performance criteria published in the National Cooperative Highway Research Program (NCHRP) Report 350, "Recommended Procedures for the Safety Performance Evaluation of Highway Features." When conformance with NCHRP Report 350 is required, the Contractor shall provide the Engineer with the manufacturers' certifications that the devices comply with the specified criteria.

Unless specifically waived by an attachment to these Contract Provisions, devices must be approved by the Office of Traffic and Safety.

Category 1 Devices

These devices are cones, tubular markers, flexible delineator posts, and drums, all without any accessories or attachments, which are used for channelization and delineation.

Category 2 Devices

These devices are Type I, II, and III barricades; portable sign supports with signs; intrusion alarms; and drums, vertical panels, and cones, all with accessories or attachments.

Category 3 Devices

(a) Truck Mounted Attenuators (TMAs) and Trailer Truck Mounted Attenuators (TTMAs) .

(b) Temporary Barrier.

(1) Concrete Barrier.

(2) Traffic Barrier W Beam and Water Filled Barrier.

(3) Steel/Aluminum Barrier.

(c) Temporary End Treatments.

Category 4 Devices

These devices are area lighting supports, arrow panels, and portable variable message signs that are usually portable or trailer-mounted.

WORK ZONE DEVICES	IMPLEMENTATION SCHEDULE TO CONFORM TO NCHRP REPORT 350 CRITERIA
CATEGORY 1 Cones, tubular markers, flexible delineator posts, and drums (all without any accessories or attachments)	All devices shall conform to NCHRP Report 350 criteria.
CATEGORY 2 Type I, II, and III barricades; portable signs supports with signs; intrusion alarms; and drums, vertical panels, and cones (all with accessories or attachments)	All devices shall conform to NCHRP Report 350 criteria.
CATEGORY 3 (a) Truck Mounted Attenuators (TMAs); Trailer Truck Mounted Attenuators (TTMAs) (b) Temporary Barriers (1) Concrete Barrier (2) Traffic Barrier W Beam and Water Filled Barrier (3) Steel/Aluminum Barrier (c) Temporary End Treatments	All devices shall conform to NCHRP Report 350 criteria.
CATEGORY 4 Portable trailer mounted devices including area lighting supports, arrow panels, and changeable message signs	The Contractor may use devices that do not conform to NCHRP Report 350 criteria, until compliance dates are established. Use of these devices shall comply with the provisions of Part 6 of the MUTCD.

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OCCUPYING WETLANDS

The Contractor is hereby alerted to the importance of preserving wetland areas. The Administration, in conjunction with the various environmental agencies, has developed these Contract Documents so as to minimize or eliminate disturbance and damage to existing wetland areas. In order to accomplish this, the following must be rigidly adhered to:

(a) Prior to performing any work on the project, the areas of wetland will be identified and marked as directed by the Administration. All personnel of the Contractor or sub-contractors shall be alerted to these designated areas.

(b) The Contractor or sub-contractors shall not impact any wetland or waterway, whether it be permanently or temporarily unless otherwise stipulated in the permit application and approved as an authorized action by the appropriate regulatory agency. No fill shall be placed in these areas without a permit.

(c) If a Contractor or sub-contractor has to impact a wetland or waterway that is not covered by an existing wetland permit, they shall immediately notify the Engineer. The Engineer will notify the Environmental Programs Division to determine the extent of any permit modification. At that time the Environmental Programs Division will request a permit modification or submit a permit application.

(d) If the Contractor impacts any wetland or waterway for which they do not have a wetland permit, they shall be responsible for restoring the wetland areas and possibly mitigating the wetland impacts to the full satisfaction of the environmental agencies, which could include monetary compensation.

(e) The cost of restoration and mitigation of the impacted areas shall be at no additional cost to the Administration.

The importance of not abusing the wetland areas cannot be overemphasized. Abuse of wetland areas could jeopardize the operation of the total Contract and could be cause for a shut-down. If a shut-down occurs because of the Contractor's failure to secure the required permits (i.e. the Contractor's method of work includes impacts not approved by previously acquired permits), the Contractor's negligence or operations, all costs and damages to the Contractor and to the State will be at no additional cost to the Administration. Noncompliance with these requirements will not be considered for an extension of Contract time.

NOTICE TO ALL HOLDERS OF THIS CONTRACT DOCUMENT

HIGH VISIBILITY SAFETY APPAREL POLICY

BACKGROUND. Research indicates that high visibility garments have a significant impact on the safety of employees who work on highways and rights-of-way. In addition, high visibility garments may help to prevent injuries and accidents and to make highway workers more visible to the motoring public, which ultimately improves traffic safety.

STATEMENT OF POLICY.

(a) The High Visibility Safety Apparel Policy provides a standardized apparel program.

(b) The program seeks to improve the visibility of all persons who work on Authority highways and rights-of-way.

(c) All apparel shall contain the appropriate class identification label.

(d) Compliance with this policy is retroactive and becomes effective immediately. All affected employees shall receive high visibility apparel awareness training.

APPLICABILITY. This policy applies to all Authority employees and all other persons who work on Authority highways and rights-of-way. All workers shall wear, at a minimum, Class 2 ANSI/ISEA 107/2004 apparel.

(a) For Authority employees, this apparel shall be either fluorescent orange-red or fluorescent yellow-green background material color and be the outermost garment worn.

(b) Retro-reflective material color for Authority employee apparel shall be silver or white and be visible at a minimum distance of 1,000 feet. The retro-reflective safety apparel shall be designed to clearly recognize and differentiate the wearer from the surrounding work environment. The retro-reflective material may be contrasted by fluorescent orange background material not exceeding one and one half inches on either side of the retro-reflective material.

(c) For non-Authority employees, this apparel shall be either fluorescent orange-red or fluorescent yellow-green background material color and be the outermost garment worn.

(d) Retro-reflective material color for non-Authority employee apparel shall either be orange, yellow, white, silver, yellow-green, or a fluorescent version of these colors, and be visible at a minimum distance of 1,000 feet. The retro-reflective safety apparel shall be designed to clearly recognize and differentiate the wearer from the surrounding work environment.

REFERENCES.

(a) ANSI/ISEA 107/2004 standard – American National Safety Institute/International Safety Equipment Association

(b) MUTCD 2003 – Manual for Uniform Traffic Control Devices - Sections 6D.03B and 6E.02

(c) Visibility Research – The VCTR 1989 report concludes that fluorescent colors, when compared with non-fluorescent colors, enhance the daytime conspicuity of worker clothing.

DEFINITIONS.

(a) Apparel – The outermost high-visibility garment worn by employees who work on Authority highways and rights-of-way.

(b) Highways – All roads owned by the Maryland Department of Transportation and maintained by the Authority.

(c) High Visibility – The ability for workers to be distinguishable as human forms to be seen, day and night, at distances that allow equipment operators and motorists to see, recognize, and respond.

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Replace Generator at Fort McHenry Tunnel Administration Building

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NOTICE TO BIDDERS

A "Pre-Bidding Session" for the purpose of answering or obtaining answers to questions of parties interested in constructing the work relative to Right-of-Way, Utilities, Design, and Construction Details will be conducted at 10:00am on January 13, 2010, in the Conference Room, 1st Floor of Francis Scott Key Bridge Engineering Building at 300 Authority Drive in Dundalk, Maryland. While attendance at the Pre-Bid conference is not mandatory, this is the offeror's opportunity to raise questions and/or issues of concern regarding the project.

SP 1-1 PROJECT DESCRIPTION

CONTRACT NO.:	FT 2259-000-002
TITLE:	Replace Generator at Fort McHenry Tunnel Administration Building
FACILITY:	Fort McHenry Tunnel, Administration Building
COUNTY:	Baltimore City
ADVERTISED:	December 22, 2009
PRE-BID MEETING:	**10:00am on January 13, 2010** in the Conference Room at the Maryland Transportation Authority, 300 Authority Drive, 1st Floor, Engineering Building, Baltimore, MD 21222
PROJECT CONTACT:	Project Manager: Mr. Kataw Say at (410) 537-7853 Contract Administration: Ms. Maggie Johnson at (410) 537-7807
BIDS DUE:	**12 Noon, February 4, 2010** in the Bid Box on the 1st floor of the Maryland Transportation Authority, Engineering Building, 300 Authority Drive, Baltimore, Maryland 21222.
CLASSIFICATION:	Class B ($100,001 to $500,000)
CONTRACT TIME:	One Hundred eighty (180) Calendar Days
LIQUIDATED DAMAGES:	Eight Hundred Dollars ($800.00) per Calendar Day
MBE GOALS:	Overall 0 % Women owned businesses 0 % African-American owned businesses 0 %

SMALL BUSINESS RESERVE PROCUREMENT

BID DOCUMENTS:	$50.00 Bid documents can be purchased between 7:30 a.m. and 3:30 p.m., Mondays, Wednesdays, Thursdays and Fridays and between 10:00 a.m. and 4:00 p.m. on Tuesdays at the Ticket Office located at the Francis Scott Key Bridge, Maryland Transportation Authority, Administration Building, 303 Authority Drive, Baltimore, Maryland 21222.

The work to be performed under this contract is located at Fort McHenry Tunnel Administration Building in Baltimore City.

This project is to replace the existing 155KW generator and ATS with a new generator and ATS to support Toll Plaza and other equipments at Fort McHenry Tunnel Administration Building.

Overall Project construction would be expected to take **One Hundred Eighty (180) days** from the Notice to Proceed.

SP 1-2 SPECIFICATIONS

All work on this project shall conform to the Maryland Department of Transportation, State Highway Administration's Specifications entitled, "Standard Specifications for Construction and Materials" dated July 2008, revisions thereof, or additions thereto, and the Special Provisions included in this Invitation for Bids.

SP 1-3 ORIGINAL FACILITY PLANS AND SITE VISITS

The original facility plans are on file at the Engineering/Finance Building of the Francis Scott Key Bridge and will be made available for inspection to prospective bidders. Parties interested in viewing the plans should contact Mr. Kataw Say, at (410) 537-7853. Parties interested in visiting the site should contact Mr. Jeff Robson at (410) 537-1274.

SP 1-4 PROMPT PAYMENT TO SUBCONTRACTORS

The prime Contractor is responsible for making timely payments to all Subcontractors and Suppliers and provide written certification as required in Section 17-106 of the State Finance and Procurement Article of the Annotated Code of Maryland, as amended.

This contract requires the Contractor to make payment to all Subcontractors within ten (10) days of receiving payment from the Authority.

Each month, the construction Project Engineer will review the current pay items with the prime Contractor and all involved Subcontractors to ensure that all work satisfactorily completed within specifications is included in the monthly progress payment. For payment purposes, the same quantity totals used to compute the payment to the prime Contractor will be the basis for payment to the Subcontractor.

If the Subcontractor does not receive payment within the required ten (10) days, the Subcontractor shall notify the Project Engineer in writing of the amount in dispute including the item numbers and payment quantity for each. The Project Engineer will then notify the Chief of Construction of the dispute. The Chief of Construction or his representative will verbally contact the prime Contractor within 48 hours to ascertain whether or not a performance dispute exists which necessitates non-payment to the Subcontractor. If a performance dispute exists, the prime Contractor must demonstrate that there is a valid basis to withhold payment from the Subcontractor. If the prime Contractor withholds payment from a Subcontractor, the prime Contractor shall provide to the Subcontractor written notice of the withholding of payment. The notice shall detail the reasons for withholding payment as well as the amount. A copy of the notice shall be provided to the Surety and the Authority. If no valid dispute exists, the prime Contractor will be directed to make immediate payment to the Subcontractor. The Subcontractor will be responsible for notifying the Chief of Construction if this payment is not made. Upon receipt of notification, the Chief of Construction will schedule a meeting with the Contractor and Subcontractor to verify and discuss the non-payment issue. This meeting will be held at the Authority's offices within two (2) working days of the Authority's contact with the Subcontractor. If it is determined that the prime Contractor has withheld payment to the Subcontractor without cause, further progress payments to the prime Contractor will be withheld until the Subcontractor is paid. In addition, the Authority may order a suspension of work or other administrative actions as it sees fit.

If an action is taken as stated above the Contractor shall notify the Authority's Project Engineer when payment is made. After the Authority's Project Engineer verifies that payment has been made to the Subcontractor the Authority shall release withheld progress payments.

Nothing in this Special Provision shall be construed to prevent the Subcontractor from pursing a claim with the surety under the prime Contractor's payment bond at any time.

SP 1-5 WORK HOURS

Work shall be generally performed inside the existing buildings during normal business working hours of 7:00 a.m. to 4:00 p.m., Monday through Friday, except as authorized by the owner.

The Contractor shall cooperate with any other Contractors that are on site during the term of the project, as stated in GP-5.06 of the Standard Specifications.

SP 1-6 INSURANCE

TC-5.01 INSURANCE

Section TC 5.01 of the Standard Specifications is supplemented as follows:

1. The Contractor shall not commence work under this contract until it has obtained all of the minimum amounts of insurance required by these Special Provisions and the insurance has been approved by the Engineer. The Contractor shall furnish to the Maryland Transportation Authority ("Authority") duly executed certification of all required insurance on forms satisfactory to the Authority. The certificates of insurance shall state that it is in force and cannot be cancelled, release or non-renewed except upon thirty (30) days prior written notice, registered mail to the Authority. All Contractors' insurance policies, with the exception of the Worker's Compensation and Employer's Liability, shall be endorsed to provide as additional insureds the Maryland Transportation Authority and the State of Maryland.

2. The Contractor shall purchase and maintain such insurance as is specified herein which will provide the Authority, its members, employees and agents, as well as the Contractor from claims which may arise out of or as a result of the Contractor's operations under this contract, whether such operations be by the Contractor, by any subcontractor, by anyone directly or indirectly employed by any of them or by anyone whose acts any of them may be liable. This insurance shall be maintained in full force until the Contract has been accepted by the Authority and final payment is made.

3. The Authority requires the following minimum levels of insurance coverage for this contract:

   a) Worker's Compensation and Employer's Liability

   The Contractor shall, at all times, maintain and keep in force such insurance as will protect him from claims under the Worker's Compensation Act of the State of Maryland and maintain and keep Employer's Liability Insurance at a limit of One Hundred Thousand Dollars ($100,000.00). The Contractor shall also maintain United States Long Shore and Harbors Act coverage, if such exposure exists.

   b) Comprehensive General Liability Insurance

   The Contractor shall maintain Comprehensive General Liability Insurance in the amount of at least One Million Dollars ($1,000,000.00) Combined Single Limit for Bodily Injury Liability and Property Damage Liability Insurance per occurrence and in the aggregate. Such insurance shall specifically include the Comprehensive General

Liability Broad Form Endorsement and indicate explosion, collapse, and underground damage coverage.

c) Comprehensive Automobile Liability Insurance

The Contractor shall maintain Comprehensive Automobile Liability Insurance (including all automotive equipment owned, operated, rented, or leased), in the amount of at least Five Hundred Thousand Dollars ($500,000.00) Combined Single Limit for bodily injury and property damage.

d) Additional Insurance

The Contractor shall also procure and keep in effect:

Excess liability (umbrella coverage) in excess of and applicable to the coverage in the Comprehensive General Public Liability and Property Damage Insurance, "X, C, U" and Comprehensive Automobile Insurance in the amount of at least Two Million Dollars ($2,000,000.00) for each occurrence.

4. Accident Notification - The Contractor shall send a written report to the Engineer and to the Maryland Transportation Authority within twenty-four (24) hours of any accident or other event arising in any manner from the performance of the Contract which results in or might result in personal injury or property damage.

5. Failure to comply with these Special Provisions may lead to termination for default or convenience.

6. There will be no special payment for the insurance as required by this contract and all costs incidental thereto shall be included in the Lump Sum for "Mobilization", (refer to Section 108), or if the Contract does not include such an item, the insurance costs are to be included in pay items for the Proposal.

SP 1-7 MINORITY BUSINESS ENTERPRISE REGULATIONS GOVERNING CONSTRUCTION CONTRACTS IN EXCESS OF $50,000 EFFECTIVE JULY 1, 2001 For Informational Purposes Only

GP – 7.29 of the General Provisions is supplemented as follows:

MBE participation goal for this contract is as indicated in these Special Provisions.

The Contractor shall:

1. Identify specific work categories appropriate for subcontracting;

2. At least ten (10) days before bid opening, solicit Minority Business Enterprises, through written notice that:

   a) Describe the categories of work; and

   b) Provide information regarding the type of work being solicited and specific instructions on how to submit a bid.

3. Attempt to make personal contact with Minority Business firms;

4. Assist Minority Business Enterprises to fulfill bonding requirements or to obtain a waiver of these requirements; and

5. Upon acceptance of a bid, provide the Maryland Transportation Authority ("Authority") with a list of Minority Businesses with whom the Contractor negotiated, including price quotes from Minority and Non-minority firms.

Third Tier Subcontracting:

Third Tier MBE/DBE Subcontracting will be approved by the Authority only when the Authority is satisfied that there is no way except by Third Tier contracting that an MBE/DBE goal can be achieved. The Contractor's written request must be submitted prior to Contract award and contain specifics as to why a Third Tier contracting agreement is being requested.

Waivers:

If for any reason the bidder/offerer is unable to achieve the specified overall contract goal or subgoals for each certified MBE classification, the bidder/offerer must request, in writing, on Attachment A, (Certified MBE Utilization and Fair Solicitation Affidavit), a waiver at the time of bid.

Strict adherence regarding documentation of the rationale for the waiver request and documentation of "Good Faith Efforts" of the Contractor are required for consideration of any waiver. For additional information on waivers, please see **COMAR 21.11.03.11**

Criminal Fraud Provisions:

All Contractors are reminded that Criminal Fraud Provision and Administrative Sanctions may be imposed for failure to achieve and maintain established MBE/DBE goals.

SP 1-8 PROGRESS SCHEDULE REQUIREMENTS

Refer to Section 110 of the Standard Specifications.

SP 1-9 CORPORATE REGISTRATION

A foreign corporation is any corporation not incorporated under the laws of the State of Maryland. All foreign corporations, prior to performing any services for the Authority, must register with the Maryland State Department of Assessment and Taxation in compliance with Subtitle 2, Title 7, of the Corporations and Associations Article of the Annotated Code of Maryland. Compliance is required of the successful vendor as well as the proposed subcontractors.

To accomplish the required registration, a foreign corporation must request and complete "Qualification Application Forms" which can be obtained from the Department of Assessment and Taxation, State Office Building, Room 803, 301 West Preston Street, Baltimore, Maryland 21201. Forms can be obtained via the Maryland Department of Assessment and Taxation web site at www.dat.state.md.us.

The Contractor will be responsible for documenting compliance with the aforesaid. This documentation will be required prior to the execution of a contract with the successful bidder.

SP 1-10 CONTRACTOR'S EMPLOYEE IDENTIFICATION

The Contractor shall provide to the Authority, a list containing the following for Contractor and all sub-contractors that would be working at the site. This shall include trucking companies who would come to the site on a repetitive basis for supply or removal of materials:

- Name of Company
- Name and title of contact person
- Address of the Company
- Phone number
- Facsimile number
- E-Mail address of contact person (if any)

All Contractor's employees, including employees of subcontractors, on this project, present at the site, shall be in possession of a valid employee identification card provided by the Employer, which shall contain a photograph and identify the employee by name and job title. The employee must produce the said identification if required by the Engineer or the Authority Police.

When working in or around the Authority's buildings, said employees identification shall be displayed at all time.

While working in the Tunnels or on one of the major bridges of the Authority, Contractor's personnel shall have an ID decal displayed on their hardhat. These decals will be provided by the Authority. All of the Contractors' vehicles shall have a parking decal, attached to the rear view mirror. These parking decals will also be provided by the Authority and a distribution list will be maintained. At the time of project completion these decals shall be returned to the Authority. Requests for hardhat and rearview mirror decals shall be made to the Construction Section before the beginning of construction and should include the number required of each type of decal.

All costs associated with identification cards will not be paid for separately and shall be incorporated under other items of payment in the Contract.

SP 1-12 ESTIMATED QUANTITIES

All construction items and quantities in these Special Provisions are provided in the Contract for use when and as directed by the Engineer. The quantities for these items are established for the purpose of obtaining a bid price. The quantities for these items may be increased or decreased without any adjustment to the Contract Unit Price for the item(s) or they may be deleted entirely from the Contract by the Engineer without negotiation. The Contractor will not be allowed to submit a claim against the Authority for any adjustment to the Contract Unit Price should the item(s) be increased, decreased, or eliminated.

GENERAL PROVISIONS
GP SECTION 1
DEFINITIONS AND TERMS

GP-1.03 ORGANIZATIONAL DEFINITIONS

Revise the definitions of Administration to read as follows:

Administration – The word "Administration" shall mean "Maryland Transportation Authority".

Except for Office of Materials and Technology all references to the Maryland State Highway Administration's offices and positions shall mean the Authority's corresponding offices and positions.

GENERAL PROVISIONS
GP SECTION 1
DEFINITIONS AND TERMS

GP-1.05 DEFINITIONS

Add the following definitions:

Highway Standards - The official Book of Standards for Highway and Incidental Structures, edited by the State Highway Administration, with the latest incorporated revisions issued on or before the date of advertisement on the Contract.

GENERAL PROVISIONS
GP SECTION 2
BIDDING REQUIREMENTS AND CONDITIONS

GP-2.04 SITE INVESTIGATION

Revise the paragraph to read as follows:

The Contractor acknowledges that it has investigated and satisfied itself as to the conditions affecting the work, including but not restricted to those bearing upon transportation, disposal, handling, and storage of materials; availability of labor, water, electric power, roads; uncertainties of weather, river stages, tides, or similar physical conditions at the site; and confirmation and conditions of the ground, the character of equipment and facilities needed preliminary to and during prosecution of the work. The Contractor further acknowledges that it has satisfied itself as to the character, quality and quantity of surface and subsurface materials or obstacles to be encountered insofar as the information is reasonably ascertainable from an inspection of the site, including all exploratory INFORMATION IN POSSESSION OF THE STATE, as well as from information presented by the drawings and Specifications made part of this contract. Any failure by the Contractor to acquaint itself with the available information may not relieve it from responsibility for estimating properly the difficulty or cost of successfully performing the work. The State assumes no responsibility for any conclusions or interpretations made by the Contractor on the basis of the information made available by the State.

GENERAL PROVISIONS
GP SECTION 2
BIDDING REQUIREMENTS AND CONDITIONS

GP-2.06 PREPARATION OF THE BID

GP9 **ADD**: After paragraph (a), the following.

The Contractor may elect to submit its bid on forms it has generated in the development of its bid. These may be submitted in lieu of the schedule of prices bid forms furnished by the Administration in the Invitation for Bids. These forms shall emulate the forms currently furnished by the Administration and, as a minimum, contain the following information.

(1) State Contract No.;
(2) State Item Nos.;
(3) State's Proposed Quantities;
(4) Description of Items;
(5) Unit Price;
(6) Total Cost of Each Item; and
(7) Total Bid Amount.

The document shall be 8-1/2 x 11 inches, and oriented in a landscape format. The font size shall be no less than 10 point with horizontal lines dividing each item. Any addendum which revised items or quantities shall be noted on all affected schedule of prices sheets. Any special bid requirements that are noted in the schedule of prices shall also be listed on the form.

Should the Contractor elect to submit bids on the Contractor's own forms, the Contractor shall submit a sample of the form to the Administration at least two (2) weeks prior to the scheduled opening of bids. The use of Contractor generated forms shall be approved, in writing, prior to their use. If the Contractor's forms were previously approved in writing on another Administration project and have not changed, they need not be resubmitted for this project.

Sample forms shall be submitted to:

Ms. Linda McGill, CPPB
Chief of Engineering Procurement
Maryland Transportation Authority
300 Authority Drive
Baltimore, Maryland 21222

GENERAL PROVISIONS
GP SECTION 2
BIDDING REQUIREMENTS AND CONDITIONS

GP-2.23 BID PROTESTS

Section GP 2.23 of the General Provisions is supplemented as follows:

The Board of Public Works does not have the jurisdiction to consider protests relating to this solicitation or an award of this contract under this solicitation.

All protests relating to this solicitation, the selection, and/or award must be filed in writing with the Authority's Procurement Officer, within the time limitations set forth in COMAR 21.10.07 and 21.10.02. Bid protests shall be filed not later than seven (7) days after the basis for protest is known, or should have been known, whichever is earlier. Oral protests will not be considered.

The specific details of the protest procedures shall be followed by aggrieved actual or prospective bidders or offerors are contained in COMAR 21.10.

GENERAL PROVISIONS
GP SECTION 4
SCOPE OF WORK

GP-4.10 WARRANTY OF CONSTRUCTION

GP-4.10 of the Standard Specifications is revised to read as follows:

Delete: The first paragraph in its entirety.

Insert: The following:

The Warranty as defined under paragraphs A through G in GP 4.10 "Warranty of Construction" shall apply to this Maryland Transportation Authority Contract unless specified elsewhere in this Invitation for Bids.

GENERAL PROVISIONS
GP SECTION 5
CONTROL OF WORK

GP-5.12 FAILURE TO MAINTAIN ENTIRE PROJECT

Delete Section GP-5.12 in its entirety

Insert: Revise the paragraph to read as follows:

Failure on the part of the Contractor, at any time, to RESPOND TO the provisions of GP 5.11 above, will result in the procurement officer's immediately notifying the Contractor to comply with the required maintenance provisions. In the event that the Contractor fails to PROCEED WITH CORRECTIONS TO UNSATISFACTORY MAINTENANCE SO AS TO CONFORM TO THE PROVISIONS OF GP 5.11 within four (4) hours of receipt of such notice, the procurement officer MAY NOTIFY THE CONTRACTOR TO SUSPEND ALL OTHER WORK ON THE CONTRACT UNTIL SUCH TIME AS THE UNSATISFACTORY MAINTENANCE IS CORRECTED. In the event that the Contractor fails to RESPOND TO unsatisfactory maintenance within four (4) hours after receipt of such notice, the procurement officer will immediately proceed with adequate forces and equipment to maintain the project, and the entire cost of this maintenance will be deducted from monies due the Contractor ON THE NEXT MONTHLY ESTIMATE.

GENERAL PROVISIONS
GP SECTION 9
PAYMENT

GP-9.05 LATE PAYMENTS

ADD the following:

(e) Payments will be made within thirty (30) days of the date when the Contract amount becomes due and payable or the date of receipt of a proper invoice, whichever is later. The State's failure to remit payment within forty-five (45) days from that date may entitle the Contractor to interest at the rate of 10 percent per annum beginning on the 31st day.

TERMS AND CONDITIONS
TC SECTION 4
CONTROL OF WORK

TC 4.01 – SHOP PLANS AND WORKING DRAWINGS

DELETE SECTION (a) IN ITS ENTIRETY AND REPLACE WITH THE FOLLOWING

ADD:

(a) General. The Plans will be supplemented by working drawings, catalog cuts, schematics, material data, installation plans and manuals, user manuals, and other data necessary to demonstrate to the Engineer adequate control of the work, proper installation and handling, conformance to the specifications, and that the proposed materials and equipment is suitable for the intended use. All authorized alterations affecting the requirements and information given on the working drawings shall be in writing to the Engineer. Any deviations from the Specifications, Special Provisions, or Plans shall be clearly highlighted and explained. When reference is made to the working drawings, the interpretation shall be the working drawings as affected by all authorized alterations then in effect. When reference is made to the working drawings, the interpretation shall be that working drawings include working drawings, catalog cuts, schematics, material data, installation plans and manuals, user manuals, and other data necessary to demonstrate to the Engineer adequate control of the work, proper installation and handling, conformance to the specifications, and that the proposed material or equipment is suitable for the intended use.

Working drawings will show details of all structures, lines, grades, typical cross section of roadway, general cross sections, location and designation of all units and elements. Cabinet drawings shall be to-scale showing the location of all equipment proposed to be mounted within the cabinet. One-line diagrams and schematics shall be provided for equipment cabinets showing the interconnection of all devices located therein. Equipment layouts shall include rack-level elevation views as well as floor plans for all equipment racks. All working drawings, regardless if submitted as specified or submitted as equal substitutes, shall be furnished with complete, specific, detailed information from the manufacturer or supplier for the material or equipment the Contractor proposes to furnish, in which the requirements of the Specifications and Special Provisions shall be clearly shown to be met.

When any article is specified by trade name of manufacturer with or without the clause "or equal," it is intended to establish the quality of the article. If the Contractor proposes to use material or equipment of another manufacturer as an "or equal" to the material or

equipment specified, all working drawings shall conform to the following requirements, conditions, and procedures:

1. Substitution of equipment or materials other than those specified will be considered, providing, in the opinion of the Engineer, such equipment or material is equal to, or better than specified. The decision of the Engineer with respect to approval or disapproval of any material or equipment proposed to be substituted as an "or equal" is final. The Contractor shall have no claim of any sort by reason of such decision.

2. If the Contractor proposes to substitute materials or equipment as "or equal" to those specified, it shall be his responsibility to furnish, in addition to the information discussed above, a point by point comparison of the material or equipment specified under the Contract and that proposed to be substituted. The burden of responsibility in furnishing this information is with the Contractor.

3. If the substitute material or equipment requires any re-design or affects other aspects of the project, the Contractor shall be responsible to provide such re-design including details and to adjust elements as necessary to achieve the re-design at no additional cost to the Administration. Cost saving re-designs will be considered under the value engineering specifications.

If incomplete or irrelevant data is submitted as evidence of compliance with Specifications, Special Provisions, or Plans, the data will be returned and the request for approval of working drawings will be denied.

The Contractor shall provide, at no additional cost to the Administration, all required working drawings and shall have them adequately checked, after which they shall be submitted to the Engineer for review. The Engineer may reject working drawings and return them for revisions, in which case the Contractor shall submit revised working drawings as required. No items involving working drawings shall be incorporated into the work until working drawings have been accepted by the Engineer, however, acceptance shall not relieve the Contractor of any responsibility in connection with the working drawings.

The working drawings shall be prepared on sheets no smaller than 8.5" x 11" and no larger than 22" x 36". The sheet size and scale of the drawings shall be appropriate for the work depicted.

All working drawings shall be submitted by the Contractor, no working drawings submitted directly by subcontractors, fabricators, suppliers, etc. shall be accepted. Acceptance of a material source or equipment source by the Engineer or Administration

shall NOT constitute approval of the material or equipment nor approval of the materials or equipment as a substitute or an "equal" product.

ADD:

(b) The working drawings shall be submitted electronically as files (FAXES are NOT acceptable). Electronic submission may be made via email for small submissions. Email is the preferred submission method. The email submissions shall be made to the email addresses provided by the Administration upon notice to proceed of the project and shall include **ksay@mdta.state.md.us**. Where electronic submittals are larger than email can support (currently about 8MB), the submission may be made using one or more of the following alternatives:

1. Posted on a contractor supported FTP server, or other via another service that may be accessed by the administration as long as an email notice is made with the 'cover' sheet.

2. Copied onto a CD, DVD, or other supported data media and submitted to the Administration via standard mail. At least five (5) copies of the media shall be provided for in-house distribution. The address to mail such media transfers is:

Maryland Transportation Authority
Engineering Division
300 Authority Drive
Baltimore, MD 21222
ATTN: Kataw Say

ADD:

(c) Electronic Submittal Format. All electronic submittals shall be in a format readable by the Administration. The submittals shall be in Adobe portable document format (PDF) compatible with version 6.0 of Adobe Acrobat.

Each submittal shall be a single file. Multi-file submittals shall not be accepted.

The first page of each submittal shall be a cover page. The cover page must be in the 8.5 x 11" sheet format. The cover page must include:

1. Contract number.

2. Contract title.

3. Submittal Number. For each project (Contract), a sequential number starting with number 1 shall be used. Where a submittal is rejected, or otherwise requires

resubmittal or replacement, the Submittal number shall be appended with an "R" followed by the revision number.

4. The Contractor's name, mailing address, contact phone number, contact email address.

5. The relevant line items in the contract that the submittal is associated with.

6. A brief description of the materials or data represented in the submittal package.

7. The date of the submittal.

8. The manufacturer's name, web site address, mailing address, and contact phone number, if applicable.

9. The vendor's or reseller's name, web site address, mailing address, and contact phone number if applicable.

10. The cover page must contain a 6" x 3" blank space where engineering stamps may be placed (electronically) without covering data in the page.

The electronic file must not be secured. The review process for electronic submittals will place electronic stamps and may include electronic comments in the electronic submittals by the Contractor. Any security or compatibility problems that prevent the use of the electronic stamps or electronic commenting will render the submittal unacceptable. The returned file may be secured to prevent accidental changes.

ADD:

(d) File Naming Conventions and rules. It is necessary and required that file naming conventions and rules be followed to lend to organization and reduce confusion regarding the electronic submissions. Submittals that do not follow the file naming conventions described herein will be rejected without review. Strict adherence to the file naming rules is required. The file names for electronic submissions shall follow these rules:

1. The first six characters must be the first five characters of the contract number. For example, for contract FT2259-000-006, the first six characters of the file name must be FT2259.

2. The seventh character must be a dash.

3. The eight through ninth characters shall be the text "SUB," which is short for submittal. Which is used to indicate that the file is a submittal from a Contractor.

4. The eleventh character must be a dash.

5. The twelve through thirteenth characters must be the submittal number, e.g., 001.

6. In the event of a re-submittal, the 15th character will be an R followed by the re-submittal number.

7. The remaining filename characters may be any short descriptive characters that may be useful to identify the nature of the submittal (fewer than 40 additional characters).

8. Examples of filenames:

   i. FT2259-SUB-001-Conduit.pdf

   ii. FT2259-SUB-001R2-Conduit.pdf

   iii. FT2259-SUB-015-Fiber Optic Cable.pdf

9. After the submittal has been reviewed, the text 'SUB' will be replaced by the text 'TRN' by the administration and the electronic file with electronic stamps and possibly containing electronic comments will be returned to the contractor via email, CD, DVD, or similar electronic file transfer.

ADD:

(e) Upon completion of the project, all electronic files that have been transmitted to the Contractor (TRN's) shall be transferred to CD's, DVD's or other media by the Contractor and provided to the Administration along with as-built data. Data provided shall include any original files in original format, used to generate the PDF submittals, these may include CADD, Visio, Word, Excel, MathCad, Access/DataBase, HTML, JPG/Pictures, Power point, or any other format that may have been used as the originating document. Provide three (3) copies of all media.

TERMS AND CONDITIONS
TC SECTION 4
CONTROL OF WORK

TC-4.02 FAILURE TO ADEQUATELY MAINTAIN PROJECT.

16 **ADD**: To the existing paragraph.

Additionally, an appropriate deduction will be made from the Contractor's next progress estimate for each day or portion thereof that Maintenance of Traffic deficiencies exist, and will continue until the deficiencies are satisfactorily corrected and accepted by the Engineer. Any portion of a day will be assessed a full day deduction. The deduction will be equal to a prorata share of the lump sum price bid for Maintenance of Traffic or an amount prorated from the Engineer's estimate, whichever is more. The amount prorated will be the per diem amount established by using the working days (based upon calendar dates when required) divided into the total value of the bid item or the Engineer's estimate of that item, whichever is more.

The above noted deduction will be assessed on the next progress estimate if:

> The Contractor does not take action to correct the deficiencies and properly assume the responsibilities of maintaining the project (as determined by the Engineer) within four (4) hours of receiving a notice to comply with the required maintenance provisions.

The deduction will be equal to the daily prorated share of the lump sum price bid for Maintenance of Traffic or One Thousand Dollars ($1,000.00) per day, whichever is more for each day or portion thereof that the deficiencies exist, and will continue until the deficiencies and proper assumption of the required maintenance provisions are satisfactorily corrected and accepted by the Engineer. The amount of monies deducted will be a permanent deduction and are not recoverable. Upon satisfactory correction of the deficiencies, payment of the Maintenance of Traffic lump sum item will resume.

TERMS AND CONDITIONS
TC SECTION 5
LEGAL RELATIONS AND PROGRESS

TC-5.01 INSURANCE.

17 **DELETE:** The first three paragraphs under TC-5.01 in their entireties.

INSERT: The following.

The requirement of GP-7.14 (Liability Insurance) to submit Certificate of Insurance prior to starting work is modified for Administration Contracts to require the certificate of insurance to be submitted prior to the execution of the Contract.

The Contractor shall maintain in full force and effect third party legal liability insurance necessary to cover claims arising from the Contractor's operations under this agreement which cause damage to the person or property of third parties. The insurance shall be under a standard commercial general liability ("CGL") form endorsed as necessary to comply with the above requirements; or other liability insurance form deemed acceptable by the State. The State of Maryland shall be listed as an additional named insured on the policy. The limit of liability shall be no less than One Million Dollars ($1,000,000.00) per occurrence/ Two Million Dollars ($2,000,000.00) general aggregate. The insurance shall be kept in full force and effect until all work has been satisfactorily completed and accepted. The policies shall be endorsed to provide thirty (30) days notice of cancellation or non-renewal to:

Director of Construction
Maryland Transportation Authority
300 Authority Drive
Baltimore, Maryland 21222

TERMS AND CONDITIONS
TC SECTION 7
PAYMENT

29 **DELETE:** TC-7.02 PAYMENT ALLOWANCES FOR STORED MATERIALS in its entirety.

INSERT: The following.

TC-7.02 PAYMENT ALLOWANCES FOR STORED MATERIALS.

When the Contractor requests payment allowance for materials, the following terms and conditions shall apply:

(a) For superstructure members delivered on the project site, an allowance of 100 percent of the material cost plus freight charges as invoiced may be made provided the cost does not exceed 90 percent of the Contract price of the applicable Contract item. The allowance will be based upon validated invoices or bills for material including freight charges, and a copy thereof shall be made a part of the documented records for the project.

(b) For reinforcement steel, piling, pipe, traffic barrier, signs and sign assemblies, and other nonperishable material in storage on the project, but excluding aggregates, cement, seed, plants, fertilizer or other perishable items, an allowance of 100 percent of the invoiced cost of the material plus freight charges to the Contractor may be made provided the cost does not exceed 90 percent of the Contract price of the applicable Contract item. Such material shall be delivered and stock-piled at the project site, and have been tested by the Administration and found to have conformed to the Specifications or have been accepted under an approved certification program prior to the allowance.

(c) No allowance will be made for fuels, form lumber, falsework, temporary structures or other materials of any kind which will not become an integral part of the finished construction.

No payment for stored material will be made if it is anticipated that the material will be incorporated into the work within thirty (30) days of the written request.

Only end product manufactured material or fully fabricated products that are awaiting installation or incorporation into the finished work are eligible for prepayment. Components, elements, or ingredients of a finished product are not eligible for prepayment.

(d) Material for which an allowance is requested shall be stored in an approved manner in areas within the State of Maryland where damage is not likely to occur. If any of the stored materials are lost or become damaged in any manner, the Contractor shall be responsible for repairing or replacing the damaged materials. The value of the lost or damaged material will be deducted from the Contractor's subsequent estimates until replacement has been accomplished. The request for allowances for any materials stored on private property within the State of Maryland shall be accompanied by a release from the owner and/or tenant of such property agreeing to permit the removal of the materials from the property without cost to the State of Maryland.

The material shall be clearly marked with the Administration's Contract number on individual units. If the material is normally shipped to the project in bundles or other forms of packaging, the Administration's Contract number shall be clearly marked or affixed to the package. When the material is not stored at the actual project site, the material shall be physically separated by fencing or equivalent barrier from other materials stored at the same site. The material shall be accessible to the Administration at all times.

When it is considered impractical to store materials on the actual project, the Engineer may approve storage areas in the vicinity of the actual project which will be considered at the project site.

When storage of the materials within the State of Maryland is not practical, approval shall be obtained from the District Engineer for storage elsewhere. Storage of materials outside the State of Maryland will be subject to the conditions set forth in this provision and limited to materials exceeding Twenty-Five Thousand Dollars ($25,000.00), which are designed and fabricated exclusively for use on a specific project.

(e) Material for which payment has been made, either wholly or partially, shall not be removed from the approved location until such time that it is to be incorporated into the work unless authorized by the Engineer.

(f) The Contractor shall submit a written request for payment to the District Engineer at least two (2) weeks prior to the estimate cutoff date established by the District Engineer. The following items shall accompany the written request for payment:

(1) Consent of surety specifying the material type and the item(s) in which the material is to be used.

(2) Validated invoices with the signature of an officer of the company supplying the material showing actual cost.

(3) A notarized statement from the Contractor attesting that the invoices as submitted do not include charges or fees for placing, handling, erecting or any other charges or markups other than the actual material cost, sales tax(es), if applicable, and freight charges.

(4) Bills of lading showing delivery of the material. The request for allowances for any materials stored on property outside the State of Maryland shall be accompanied by a release from the owner or tenant of such property agreeing to permit verification by the Inspector that the material is stored at the approved location, and to permit the removal of the materials from the property without cost to the State of Maryland.

(5) Inspection test reports, certifications and/or a written statement from the Inspector attesting to the inspection and approval of the material.

Upon receipt of the above by the District Engineer and verification by the Inspector that the material is stored at the approved location, the District Engineer will authorize payment.

(6) A statement explaining why the material can not be stored on the project, if the Contractor is requesting to store material at a location other than the project site. The statement shall include the methods of storage, separation, and identification to be used by the Contractor. The Contractor shall provide a method of inventory control and withdrawal satisfactory to the Administration which shall be used by the Contractor to monitor materials not stored on the project.

(7) A breakdown of the Contract line item bid unit price showing the relationship of the cost of the stored material to the costs of all other materials, labor, and components of the work included in the Contract line item unit price bid by the Contractor.

Upon receipt of the above by the District Engineer and verification by the Inspector that the material is stored at the approved location, the District Engineer will authorize payment.

The Contractor shall pay the material provider the amount shown on the invoice within ten (10) calendar days of receipt of payment from the Administration. Evidence of payment shall be provided to the Administration. Failure to make invoice payments as specified will be cause to deduct the monies from future estimates and/or deny future stored materials payment requests.

Copies of all pertinent data shall be made by the Contractor and distributed to the Inspector for retention as part of the documented records for the project.

TC-7.03 FORCE ACCOUNT WORK.

(e) Subcontracting.

35 **ADD:** The following to the end of the paragraph.

"or five hundred dollars ($500) which ever sum is greater."

DELETE: TC-7.05 PROGRESS PAYMENTS Subsection (a) (3) Variable Retainage

INSERT: The following.

(3) **VARIABLE RETAINAGE.** The Contract will be subject to a variable retainage based upon the Authority's performance evaluations of the Contractor.

Those qualifying may have retainage reduced upon request of the Contractor with consent of surety. This request must be processed through the Construction Manager. If at any time during the performance of the project, the evaluation of the Contractor changes, retainage reduction may be reconsidered.

Contractors with "A" evaluations for the last two years may be reduced from 5 percent to 2.0 percent upon request after 15 percent project completion. Project completion percentage will be based upon actual work completed (excluding monies paid for stored materials). An interim evaluation of the current project must be completed and must be an "A". Contractors with "A" evaluations for the last two years may petition to have all retainage at that point released upon completion of a significant milestone. Retainage will continue at 2.0 percent until the next milestone of completion of the Contract.

Contractors with "B" evaluations or any combination of "A" and "B" evaluations for the last two years may be reduced from 5 percent to 2.5 percent at 50 percent project completion and remain at that level until released upon final payment. Project completion percentage will be based upon actual work completed (excluding monies paid for stored materials). An interim evaluation of the current project shall be completed and shall be an "A" or "B".

Contractors with "C" evaluations or any combination of "C" and "D" evaluations for the last two years will begin and remain at 5 percent for the life of the project. An interim evaluation of the current project shall be completed and shall be a "C" or better rating.

Contractors with a "D" evaluation for the last two years will begin at 5 percent. Project performance will be evaluated monthly. Should the contractor performance remain at the "D" level, to protect the State's interest 10 percent of the progress payment will be withheld until performance improves to a "C".

New Bidders. Contractors who have not been previously rated by the Authority may be eligible for a reduction in retainage. To be eligible, their past performance on highway and bridge work shall be documented by the government agency with whom they had a contract and their performance shall be documented on Authority forms.

All other Contractors who do not fit into the above criteria would require a 5 percent retainage throughout the life of the Contract.

TC SECTION 7
PAYMENT

TC-7.06 FINAL ACCEPTANCE AND FINAL PAYMENT.

128 **DELETE:** (b) in its entirety.

INSERT: The following.

(b) The Contractor shall then have a period of 30 days, dating from the date upon which he received the aforementioned tabulation from the Administration, in which:

(1) To decide whether or not he will accept final payment upon such a basis, and

(2) To notify the Administration, in writing, of his decision. The Contractor may request an additional period up to 30 days in which to notify the Administration of his decision. In the event the Contractor notifies the Administration that he protests final payment on such a basis, that notification shall outline the reasons for said protest.

SECTION 108 — MOBILIZATION

108.01 DESCRIPTION. This work shall consist of the construction preparatory operations, including the movement of personnel and equipment to the project site and for the establishment of the Contractor's offices, buildings, and other facilities necessary to begin work.

108.02 MATERIALS. Not applicable.

108.03 CONSTRUCTION. All work performed in providing the facilities and services shall be done in a safe and workmanlike manner.

108.04 MEASUREMENT AND PAYMENT. Mobilization will not be measured but will be paid for at the Contract lump sum price. The cost of all required insurance and bonds will be incidental to the Mobilization item.

Payment of 50 percent of the Mobilization item will be made in the first monthly estimate after the Contractor has established the necessary facilities. The remaining 50 percent will be prorated and paid in equal amounts on each of the next five monthly estimates. The payment will be full compensation for all material, labor, equipment, tools, and incidentals necessary to complete the work.

Payment of the Mobilization item will not be made more than once, regardless of the fact that the Contractor may have, for any reason, shut the work down on the project, moved their equipment away from the project and then back again.

If an item for mobilization is not provided, the cost of mobilization including the required insurance and bonds will be incidental to the other items specified in the Contract Documents.

The pay item(s) for this section include(s):

1001	Mobilization	-- per lump sum

820 GENERAL ELECTRICAL WORK AND TESTING

See Section 820 of the SHA's *Standard Specifications for Construction and Materials* in conjunction with the changes shown in this Section.

820.01 DESCRIPTION

ADD: The following.

(a) This work includes contacting, coordinating and cooperating with BG&E (or other local utility company) for the changes and additions to the electrical service.

(b) The Plans show only diagrammatic locations of cables, conduits, and other underground utilities. They are approximate and do not show every detail. The Contractor shall provide working drawings, shop drawings, and catalog cuts, etc., which show final details of the installation.

820.01.01 Codes, Standards, Inspection, and Documentation

(a) All work shall be performed in accordance with the codes and standards listed below. In addition, materials and construction methods shall meet the minimum requirements and recommendations of the listed codes, standards, and organizations. Unless otherwise stated, the latest edition, revision, or supplement, as of the date of advertisement, of the specified codes shall be used.

- ANSI - American National Standards Institute
- ASTM - American Society for Testing and Materials
- IEEE - Institute of Electrical and Electronic Engineers
- NEC - National Electrical Code (NFPA70)
- NECA - National Electrical Contractors Association (NECA 1-2006)
- NEMA - National Electrical Manufacturers Association
- NESC - National Electrical Safety Code
- NFPA - National Fire Protection Association
- UL - Underwriters' Laboratories
- TIA - Telecommunications Industry Association

(b) All materials supplied by the contractor shall be new and UL listed, where such listing is possible. Submit catalog cuts for all materials in accordance with Shop Plans & Working Drawings in SPECIAL PROVISIONS (TC4.01).

(c) The MDTA Chief Electrical Inspector or his appointed representative will inspect the entire installation. The Contractor shall contact the Electrical Inspector at least 48 hours before needed inspections. All trenches shall be inspected before backfilling. All equipment, conduits, etc. shall be inspected at rough in and prior to concealment. All work shall be inspected prior to power-up. Contact the Chief Electrical Inspector, Douglas Evans, at 410-977-2687 or devans3@mdta.state.md.us to arrange necessary inspections.

(d) All rough-in work shall be documented via a digital camera prior to concealment. Camera shall be color, minimum of 5 mega pixels, and images shall be clear and readable to the naked eye. All color photos shall be time stamped with the date of the picture. Filename or other label shall identify project number and general location of the picture. All pictures shall be submitted on a CD or DVD at the conclusion of the project, however, electronic copies shall be made available at any time by request to the project engineer, inspector, and/or electrical inspector.

(e) Special attention is directed to the fact that the Standard Specifications For Construction and Materials dated July 2008 and published by the Maryland Department of Transportation, State Highway Administration, also governs this work, and is referenced frequently herein as the "Specifications."

(f) All work shall be performed in accordance with NECA 1-2006 (Standard for Good Workmanship in Electrical Construction) or latest revision.

(g) Unless clearly specified otherwise, all voltages indicated are AC (alternating current), shall be at 60 Hz, and stated as RMS values.

820.01.02 Quality Assurance and Quality Control

The contractor shall inspect all materials furnished or installed under this contract and shall bring any damage, failure, or other problem to the attention of the project inspector prior to incorporation into the work. The contractor shall provide his own quality assurance and quality control for the work performed in the contract. The inspectors operating on behalf of the state are not a replacement for contractor's management and the contractor's own quality assurance and quality control.

Prior to final inspections/punch list development the contractor shall conduct his own inspections. The use of inspection checklists and quality control documents is required as evidence that inspections have been completed.

820.03 CONSTRUCTION

820.03.01 GENERAL

ADD: The following.

For the purpose of this specification, "direct supervision" shall mean that the qualified Master Electrician shall be at the job site at all times electrical work is performed. The Master Electrician shall be the single point of contact for inspection and quality control issues related to electrical work and shall be able to effectively manage the electrical work force.

The contractor must provide qualified labor to perform installation. Where licenses or certifications are available or required by local jurisdictions, state jurisdictions, or federal jurisdictions for certain skilled trades, such as electrical, mechanical, plumbing, welding, etc. The skilled trade workers shall have current versions of the appropriate license or certification prior to working the associated specialty and shall provide copies to the Project Engineer or Inspectors upon request.

Installation, splicing, terminating, and testing of fiber optic cable shall be performed by a trained and qualified fiber optic cable technician. Copies of certifications and experience shall be submitted to the Engineer prior to starting work.

ADD: The following just prior to paragraph 820.04.

820.03.04 Testing Fiber Optic Cables

Circuit tests shall be performed to verify that each fiber is connected to the proper circuit, and that it is continuous with no breaks, or damaged sections, in the fiber. All strands shall meet current EIA/TIA-568 specifications. Dark fibers and excessive attenuation due to breaks, bends, bad splices, defective connectors and bad installation practices shall not be accepted and shall be corrected. For fiber optic testing standards, see EIA-455-171 (FOTP-171), EIA 526-14.

(a) All cables shall have ST connectors installed prior to testing. All testing, for purposes of acceptance of the system, shall be conducted on fully installed and assembled fiber optic cables.

(b) Upon completion of testing, replace or repair any failed cable(s) with a new fiber or cable, and test the new cable to demonstrate acceptability.

(c) Insertion loss testing shall be performed.

(d) These tests shall be measured in dB.

(e) These tests shall use 850 nm and 1300 nm light sources for multimode fiber and 1300 and 1550 nm for single mode fiber.

(f) Test shall be documented for all wavelengths as noted above.

(g) Test results shall be documented on paper and stored on a computer diskette and shall be turned over to the electrical inspector after testing is complete. Attachment 820-A to this Section shows a sample fiber optic test report.

(h) An optical time domain reflectometer (OTDR) approved by the Engineer shall be used to conduct testing. The OTDR shall be calibrated to sheath (jacket) length, not optical length, by adjusting the unit's index of refraction. Properly trained technicians shall conduct tests.

(i) All OTDR traces shall maximize both the vertical and horizontal scales to the greatest extent possible and still fit the entire trace on the screen.

(j) A cable segment shall be deemed a failure if the total loss exceeds the calculated loss for that length of cable as indicated in Attachment 820-A. A cable segment shall fail if any individual splice loss is greater than 0.3dB, or if any mated connector pair loss is greater than 1.0dB, or if there is any point loss (over less than 1' of cable) of more than 1.0dB.

(k) After the circuit test, a functional test shall be performed. This test shall consist of allowing the system to operate as normal for 30 consecutive days. Any failures shall be repaired by the Contractor at his own expense, and the test restarted.

820.03.05 All switches and breakers shall be operational and the operation of the devices they control verified. That is, the Contractor shall test switches and breakers in the presence of the MDTA electrical inspector to prove and assure that the device (or devices) specified is (are) controlled and no other device (or devices) is (are) controlled. All panel schedules shall be accurate and reflect the final installation.

820.03.06 All GFI protected outlets shall be tested with a suitable tester in the presence of the MDTA electrical inspector. The tester shall be a device that plugs into the outlet and indicates proper wiring of the outlet. A switch on the tester shall be utilized to introduce a ground fault that must trip the GFI device.

820.03.07 All Uninterruptible Power Supplies shall be tested by removal of power sources. Verify proper transfer to battery and backup time consistent with the manufacturers load vs time data for the particular model of UPS. Restore normal power and verify that batteries are charged and normal operation commences.

820.03.08 All PVC conduit fittings, except threaded fittings, shall be schedule 80 and glued and water tight. All GRSC fittings shall be tight fit.

820.03.09 All photo electric controls shall be tested by applying a temporary shade to simulate photometric changes intended to activate the controls. Such testing shall be performed by the contractor in the presence of the MDTA electrical inspector.

820.03.10 All three phase panels, loads, motors, generators, UPS's, and ATS's shall be checked for proper phase rotation and consistent phase termination between termination points. Ie: Phase A is the same Phase at all Phase A termination points and the phase rotation is the same at all points. Such testing shall be performed by the contractor and witnessed by the electrical inspector.

820.03.11 Flexible metal conduit (Greenfield) and liquid tight flexible metal conduit (seal tight), and liquid tight flexible non-metallic conduit may be used as follows. Flexible fabric innerduct and innerduct used for low-voltage and fiber optic systems is not covered by this requirement.

(a) Lengths not exceeding 3' shall be used to connect transformers over 5KVA and motors.

(b) Lengths not exceeding 6' may be used for the final connection of light fixtures used in ceilings.

(c) Lengths not exceeding 6" may be used for the final connection devices that may be subject to minor vibration or minor movement perhaps from temperature expansion and contraction.

(d) Other lengths as clearly specified on the plans or as approved by the Engineer.

820.03.12 Conduit/Cable labeling. Interior cable and raceways shall be permanently labeled at a minimum of every 50 feet, **every 25 feet when view is obstructed, and within 5' of any wall or floor/ceiling penetration** at all junction boxes, terminations, **and within 12" of electrical panel.** Label color shall be Safety Orange with Black Letters and shall follow ANSI (ASME) A13.1 for location and size.

820.03.13 Unless specifically shown otherwise on the plans, wiring derived from different system voltages shall be installed in separate conduits. Wiring of different voltages derived from the same system (i.e. Control wiring) may be permitted to be installed in the same conduit or junction box provided that all requirements of the NEC are maintained.

820.03.14 No wiring other than the primary voltage indicated shall be installed in electrical panels and Safety/Disconnect Switches. Exception may be granted for wiring that terminates on a device within the panelboard or safety/disconnect switch that is integral to the operation of that device. Enclosures for switches or overcurrent devices shall not be used as junction boxes, auxiliary gutters, or raceways for conductors feeding through or tapping off to other switches or overcurrent devices.

820.03.15 Branch Circuits: Any circuits supplying more than 50% non-linear loads shall have a dedicated neutral conductor

820.03.16 Conduit or tubing 1" and larger shall be provided with a suitable insulating bushing.

820.03.17 Panel Board Labeling. All circuits installed or modified by the contractor in any way shall be properly labeled in the associated panel board panel schedule. This work shall include verifying that the existing load on the affected circuit(s) is also correctly identified. The label shall identify the type of load(s) served (e.g.: receptacles, lighting, appliances, motors, pumps, etc..) and the location (e.g.: room 103, sump pit#1, etc...). Where changes are minor (e.g. Two circuits or less being changed), the existing panel schedule may be modified as approved by the Electrical Inspector. Larger changes shall require a new panel schedule typed, neat in appearance. The new schedule may copy the identifying labels of the old schedule provided that the contractor has not made any changes to those circuits. To clarify, replacing a panel board, moving circuits within a panel board, or similar changes shall be considered modifying the circuit and shall require testing to verify the connections of all such circuits and coordinating the panel schedule with the existing conditions.

820.03.18 Fire Stopping. All penetrations into fire walls or core holes between floors and walls must be properly fire-stopped in accordance NEC requirements for fire stopping. Penetrations into the surface of any firewall or presumed firewall should be only slightly larger than the conduit, cable or cables that will need to pass through it. This will make fire stopping easier and allow the wall to maintain a better over all structural integrity.

820.03.19 Construction Stakeout and Coordination

(a) The Contractor shall coordinate this work with the work of other trades to avoid conflicts. Electrical cables and equipment damaged by the execution of work of other trades shall be completely removed and replaced with new.

(b) The Contractor shall keep an up-to-date set of as-built red lined drawings on the job site. Submit as-built drawings upon completion of the work. The Contractor shall note the exact location of trenches at 100-foot intervals on the as-built drawings by station,

and offset from the roadway. The Contractor shall show only the work that is part of the final project on as-built drawings.

820.03.20 Boxes and Cabinets. Unless specified otherwise, junction boxes, pull boxes, disconnect switches, cabinets, and other boxes installed outdoors and above ground shall be NEMA4X rated; except cabinets and boxes requiring ventilation which shall be NEMA3X rated.

820.03.21 Rodent stopping. All conduits that connect to exterior mounted cabinets shall be stuffed with copper mesh at the cabinet end point to deter rodent egress through the conduit. The copper mesh shall be installed after all wires and cables have been installed. The mesh shall be removable and the mesh and installation and removal technique shall not damage wires or cables.

820.03.22 Conduit Fill. All conduit, new or existing, shall not exceed conduit fill requirements as specified in ANSI/NECA/BICSI-568-2006. Discrepancies shall be brought to the attention of the engineer prior to incorporation into the work.

ATTACHMENT 820-A

SAMPLE FIBER OPTIC CABLE TEST REPORT

(To be filled out after installation is complete)

Job Name: **Job ID:**	**Fiber Cable:**
Location (A):	**Location (B):**

ANSI/EIA/TIA 568A: Cable Loss Factor (CLF); 1km=3280.83 feet

3.75 db/km **(0.00114 db/ft)** @ 850 nm for 62.5/125 μm MM

0.50 db/km **(0.00045 db/ft)** @ 1300 nm for 62.5/125 μm MM

0.50 db/km **(0.00015 db/ft)** @ 1310 nm and 1550 nm for OSP SM

1.0 db/km **(0.00030 db/ft)** @ 1310 nm and 1550 nm for ISP SM

0.5 Connector Loss (CL) = 0.75 db per pair of connectors

Splice Loss (SL) = 0.3 db each

To calculate ACCEPTABLE LOSS (db): Multiply cable length x (CLF) + (CL) + (SL) = DB margin:___

Cable Length	Strand No.	A to B	B to A	Fiber ID
Feet	1			Blue
850 NM MM	2			Orange
dB	3			Green
	4			Brown
	5			Slate
	6			White
	7			Red
	8			Black
	9			Yellow
	10			Violet
	11			Rose
	12			Aqua

Cable Length	Strand No	A to B	B to A	Fiber ID
Feet	1			Blue
1300 NM MM	2			Orange
dB	3			Green
	4			Brown
	5			Slate
	6			White
	7			Red
	8			Black
	9			Yellow
	10			Violet
	11			Rose
	12			Aqua

Cable Length	Strand No	A to B	B to A	Fiber ID
Feet	1			Blue
1550 NM MM	2			Orange
dB	3			Green
	4			Brown
	5			Slate
	6			White
	7			Red
	8			Black
	9			Yellow
	10			Violet
	11			Rose
	12			Aqua

Technician: _____ **Date:** _____

CATEGORY 800
UTILITIES

SECTION 831 – MISS UTILITY

831.01 DESCRIPTION.

This work shall consist of contacting Miss Utility as required by Law and providing evidence of Miss Utility Marking of the construction area.

This work shall include written notification to the Maryland Transportation Authority at least seventy-two (72) hours in advance of excavation for each site.

831.03 CONSTRUCTION.

The Contractor shall contact Miss Utility and assure that all construction areas are marked where excavation or other work affecting or possibly affecting underground utilities will take place. The Contractor shall maintain the markings. The Contractor shall pay any Miss Utility fees. The Contractor shall submit copies of Miss Utility tickets to the Engineer as evidence of this work.

The Contractor shall provide a written notification of intent to excavate or disturb the earth in an area to the Maryland Transportation Authority at least seventy-two (72) hours in advance of such activity. The Maryland Transportation Authority is not a subscriber to utility marking services. This notification shall permit the Authority to mark any Authority owned utilities within the excavation or disturbance area. The written notification shall be provided to the Authority's Project Manager and a copy provided to the Administrator at the affected facility as indicated below:

Name	Phone	Fax
Dave Roehmer, BHT	410-537-1310	410-537-1304
Dave Roehmer, FMT	410-537-1310	410-537-1304
Charles Raycob, FSK	410-537-7513	410-537-7503
Gary Jackson, HWN	410-537-6807	301-259-0411
George Fish, JFK, TJH	410-537-1101	410-537-1105
Ken Cimino, WPL	410-295-8156	410-295-8151

The Contractor shall maintain markings of utilities until excavation and disturbance work is complete. Existing marked utilities shall not be damaged or disturbed without permission of the owner of the utility.

831.04 MEASUREMENT AND PAYMENT.

This work will not be measured or paid separately, but shall be considered incidental to other work on the project.

SECTION 01095 - REFERENCE STANDARDS AND DEFINITIONS

PART 1 - GENERAL

1.1 RELATED SECTIONS

A. General Provisions, Terms and Conditions, Special Provisions, Technical Specification Divisions 2 through 16, other Division 1 Specifications Sections and Drawings apply to this Section.

1.2 DEFINITIONS

A. General: Basic Contract definitions are included in the Standard Provisions.

B. Indicated: The term indicated refers to graphic representations, notes, or schedules on the Drawings, or other paragraphs or Schedules in the Specifications, and similar requirements in the Contract Documents. Terms such as shown, noted, scheduled, and specified are used to help the reader locate the reference. Location is not limited.

C. Regulations: The term regulations includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work.

D. Furnish: The term furnish means supply and deliver to the Project Site, ready for unloading, unpacking, assembly, installation, and similar operations.

E. Install: The term install describes operations at the Project Site including the actual unloading, unpacking, assembly, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

F. Provide: The term provide means to furnish and install, complete and ready for the intended use.

G. Installer: An installer is the Contractor or another entity engaged by the Contractor, either as an employee, subcontractor, or contractor of lower tier, to perform a particular construction activity, including installation, erection, application, and similar operations. Installers are required to be experienced in the operations they are engaged to perform.

1. The term experienced, when used with the term Installer, means having a minimum of five (5) previous projects similar in size and scope to this Project, being familiar with the special requirements indicated, and having complied with requirements of the authority having jurisdiction.
2. Trades: Using terms such as carpentry does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as carpenter. It also does not imply that requirements specified apply exclusively to tradespersons of the corresponding generic name.
3. Assigning Specialists: Certain Sections of the Specifications require that specific construction activities shall be performed by specialists who are recognized experts in those operations. The specialists must be engaged for those activities, and their assignments are requirements over which the Contractor has no option. However, the ultimate responsibility for fulfilling Contract requirements remains with the Contractor.

    a. This requirement shall not be interpreted to conflict with enforcing building codes and similar regulations governing the Work. It is also not intended to interfere with local trade union jurisdictional settlements and similar conventions.

H. Project Site is the space available to the Contractor for performing construction activities, either exclusively or in conjunction with others performing other work as part of the Project. The extent of the Project Site is shown on the Drawings and may or may not be identical with the description of the land on which the Project is to be built.

I. Testing Agencies: A testing agency is an independent entity engaged to perform specific inspections or tests, either at the Project Site or elsewhere, and to report on and, if required, to interpret results of those inspections or tests.

1.3 SPECIFICATION FORMAT AND CONTENT EXPLANATION

A. Specification Format: These Specifications are organized into Divisions and Sections based on the Construction Specifications Institute's 16-Division format and MASTERFORMAT numbering system.

B. Specification Content: This Specification uses certain conventions regarding the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations or circumstances. These conventions are explained as follows:

1. Abbreviated Language: Language used in Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be interpolated as the sense requires. Singular words will be interpreted as plural and plural words interpreted as singular where applicable as the context of the Contract Documents indicates.
2. Imperative and streamlined language is used generally in the Specifications. Requirements expressed in the imperative mood are to be performed by the Contractor. At certain locations in the Text, subjective language is used for clarity to describe responsibilities that must be fulfilled indirectly by the Contractor, or by others when so noted.

    a. The words "shall be" are implied wherever a colon (:) is used within a sentence or phrase.

3. Method of measurement and basis of payment as stated in these technical specifications shall govern over references to measurement and basis of payment in SHA Standard Specifications for Construction and Materials.

1.4 INDUSTRY STANDARDS

A. Applicability of Standards: Except where the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

B. Publication Dates: Comply with the standards in effect as of the date of the Contract Documents.

C. Conflicting Requirements: Where compliance with 2 or more standards is specified and where the standards may establish different or conflicting requirements for minimum quantities or quality levels, refer requirements that are different but apparently equal and uncertainties to the Engineer for a decision before proceeding.

1. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of the requirements. Refer uncertainties to the Engineer for a decision before proceeding.

D. Copies of Standards: Each entity engaged in construction on the Project is required to be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

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

1.5 RELATED DOCUMENTS

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01095

SECTION 01100

SUMMARY

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Contract description.

B. Contractor's use of site and premises.

C. Work sequence.

D. Authority occupancy.

E. Specification Conventions.

1.2 CONTRACT DESCRIPTION

A. Work of the Project includes replace generator at Fort McHenry Tunnel Administration building.

B. Perform Work of Contract under stipulated sum contract with the Authority in accordance with Conditions of Contract.

1.3 CONTRACTOR'S USE OF PREMISES

A. Limit use of premises to allow:
   1. Work by Others.
   2. Access to Site.
   3. Emergency Building Exits during Construction.
   4. Construction Operations: Limited to Authority designated areas.
   5. Time Restrictions for Performing Interior Work.
   6. Utility Outages and Shutdown.

1.4 WORK SEQUENCE

A. Construct Work in during construction period, coordinate construction schedule and operations with the Authority and Project Manager.

1.5 AUTHORITY OCCUPANCY

A. The Authority intends to occupy the entire portion of the Project by time of substantial completion.

1.6 SPECIFICATION CONVENTIONS

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

PART 2 **PRODUCTS** (Not Used.)

PART 3 **EXECUTION** (Not Used.)

END OF SECTION

SECTION 01300

ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Coordination and project conditions.

B. Preconstruction meeting.

C. Site mobilization meeting.

D. Progress meetings.

E. Pre-installation meetings.

F. Cutting and patching.

G. Special procedures.

1.2 COORDINATION AND PROJECT CONDITIONS

A. Coordinate scheduling, submittals, and Work of various sections of Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.

B. Verify utility requirements and characteristics of operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, operating equipment.

C. Coordinate space requirements, supports, and installation of mechanical and electrical Work indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

D. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within construction. Coordinate locations of fixtures and outlets with finish elements.

E. Coordinate completion and clean-up of Work of separate sections in preparation for Substantial Completion and for portions of Work designated for Authority's occupancy.

F. After Authority occupancy of premises, coordinate access to site for correction of defective Work and Work not in accordance with Contract Documents, to minimize disruption of Authority's activities.

1.3 PROGRESS MEETINGS

A. Make arrangements for meetings, prepare agenda with copies for participants, and preside at meetings.

B. Attendance Required: Job superintendent, major subcontractors and suppliers, Authority, Architect/Engineer, as appropriate to agenda topics for each meeting.

C. Agenda:
1. Review minutes of previous meetings.
2. Review of Work progress.
3. Field observations, problems, and decisions.
4. Identification of problems impeding planned progress.
5. Review of submittals schedule and status of submittals.
6. Review of off-site fabrication and delivery schedules.
7. Maintenance of progress schedule.
8. Corrective measures to regain projected schedules.
9. Planned progress during succeeding work period.
10. Coordination of projected progress.
11. Maintenance of quality and work standards.
12. Effect of proposed changes on progress schedule and coordination.
13. Other business relating to Work.

D. Record minutes and distribute copies within two days after meeting to participants, with copies to Architect/Engineer, Authority, and those affected by decisions made.

1.4 PRE-INSTALLATION MEETINGS

A. When required in individual specification sections, convene pre-installation meetings at Project site prior to commencing work of specific section.

B. Require attendance of parties directly affecting, or affected by, Work of specific section.

C. Notify Architect/Engineer four days in advance of meeting date.

D. Prepare agenda and preside at meeting:
1. Review conditions of installation, preparation and installation procedures.
2. Review coordination with related work.

E. Record minutes and distribute copies within two days after meeting to participants, with copies to Architect/Engineer, Authority, and those affected by decisions made.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.1 CUTTING AND PATCHING

A. Employ skilled and experienced installer to perform cutting and patching.

B. Submit written request in advance of cutting or altering elements affecting:
1. Structural integrity of element.
2. Integrity of weather-exposed or moisture-resistant elements.
3. Efficiency, maintenance, or safety of element.
4. Visual qualities of sight exposed elements.
5. Work of Authority or separate contractor.

C. Execute cutting, fitting, and patching, to complete Work, and to:
1. Fit the several parts together, to integrate with other Work.
2. Uncover Work to install or correct ill-timed Work.
3. Remove and replace defective and non-conforming Work.
4. Remove samples of installed Work for testing.

5. Provide openings in elements of Work for penetrations of mechanical and electrical Work.

D. Execute work by methods to avoid damage to other Work, and to provide proper surfaces to receive patching and finishing.

E. Cut masonry and concrete materials using masonry saw or core drill.

F. Restore Work with new products in accordance with requirements of Contract Documents.

G. Fit Work tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

H. Maintain integrity of wall, ceiling, or floor construction; completely seal voids.

I. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire resistant material in accordance with Section 07840, to full thickness of penetrated element.

J. Refinish surfaces to match adjacent finishes. For continuous surfaces, refinish to nearest intersection; for assembly, refinish entire unit.

K. Identify hazardous substances or conditions exposed during the Work to Architect/Engineer for decision or remedy.

3.2 SPECIAL PROCEDURES

A. Materials: As specified in product sections; match existing with new products and salvaged products for patching and extending work.

B. Employ skilled and experienced installer to perform alteration work.

C. Cut, move, or remove items as necessary for access to alterations and renovation Work. Replace and restore at completion.

D. Remove unsuitable material not marked for salvage, including rotted wood, corroded metals, and deteriorated masonry and concrete. Replace materials as specified for finished Work.

E. Remove debris and abandoned items from area and from concealed spaces.

F. Prepare surface and remove surface finishes to permit installation of new work and finishes.

G. Close openings in exterior surfaces to protect existing work from weather and extremes of temperature and humidity.

H. Remove, cut, and patch Work in manner to minimize damage and to permit restoring products and finishes to original or specified condition.

I. Refinish existing visible surfaces to remain in renovated rooms and spaces, to renewed condition for each material, with neat transition to adjacent finishes.

J. Where new Work abuts or aligns with existing, provide smooth and even transition. Patch Work to match existing adjacent Work in texture and appearance.

K. When finished surfaces are cut so that smooth transition with new Work is not possible, terminate existing surface along straight line at natural line of division and submit recommendation to Architect/Engineer for review.

L. Patch or replace portions of existing surfaces, which are damaged, lifted, discolored, or showing other imperfections.

M. Finish surfaces as specified in individual product sections.

END OF SECTION 01300

SECTION 01700

EXECUTION REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Closeout procedures.

B. Final cleaning.

C. Starting of systems.

D. Demonstration and instructions.

E. Testing, adjusting and balancing.

F. Protecting installed construction.

G. Project record documents.

H. Operation and maintenance data.

I. Manual for materials and finishes.

J. Manual for equipment and systems.

K. Spare parts and maintenance products.

L. Product warranties and product bonds.

M. Maintenance service.

1.2 CLOSEOUT PROCEDURES

A. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for project manager review.

B. Provide submittals to project manager and Authority required by authorities having jurisdiction.

C. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due.

D. Authority will occupy all portions of building as specified in Section 01100.

1.3 FINAL CLEANING

A. Execute final cleaning prior to final project assessment.

B. Clean equipment and fixtures to sanitary condition with cleaning materials appropriate to surface and material being cleaned.

C. Replace filters of operating equipment.

D. Remove waste and surplus materials, rubbish, and construction facilities from site.

1.4 STARTING OF SYSTEMS

A. Coordinate schedule for start-up of various equipment and systems.

B. Notify project manager and Authority seven days prior to start-up of each item.

C. Verify each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions, which may cause damage.

D. Verify tests, meter readings, and specified electrical characteristics agree with those required by equipment or system manufacturer.

E. Verify wiring and support components for equipment are complete and tested.

F. Execute start-up under supervision of applicable manufacturer's representative Contractors' personnel in accordance with manufacturers' instructions.

G. When specified in individual specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.

H. Submit a written report that equipment or system has been properly installed and is functioning correctly.

1.5 DEMONSTRATION AND INSTRUCTIONS

A. Demonstrate operation and maintenance of products to Authority's personnel two weeks prior to date of Substantial Completion final inspection.

B. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Authority's personnel in detail to explain all aspects of operation and maintenance.

C. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at scheduled agreed time, at equipment location.

D. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.

E. Required instruction time for each item of equipment and system is specified in individual sections.

1.6 TESTING, ADJUSTING AND BALANCING

A. Authority will appoint, and employ, for services of an independent firm to perform testing, adjusting, and balancing. Contractor shall pay for services from an agreed cash allowance.

B. Independent firm will perform services as specified elsewhere in these specifications.

C. Reports will be submitted by independent firm to Architect/Engineer indicating observations and results of tests and indicating compliance or non-compliance with requirements of Contract Documents.

1.7 PROTECTING INSTALLED CONSTRUCTION

A. Protect installed Work and provide special protection where specified in individual specification sections.

B. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.

C. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.

D. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.

1.8 PROJECT RECORD DOCUMENTS

A. Maintain on site one set of the following record documents; record actual revisions to the Work:
   1. Drawings.
   2. Specifications.
   3. Addenda.
   4. Change Orders and other modifications to the Contract.
   5. Reviewed Shop Drawings, Product Data, and Samples.
   6. Manufacturer's instruction for assembly, installation, and adjusting.

B. Ensure entries are complete and accurate, enabling future reference by Authority.

C. Store record documents separate from documents used for construction.

D. Record information concurrent with construction progress, not less than weekly.

E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
   1. Manufacturer's name and product model and number.
   2. Product substitutions or alternates utilized.
   3. Changes made by Addenda and modifications.

F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
   1. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
   2. Field changes of dimension and detail.
   3. Details not on original Contract drawings.

G. Submit documents to project manager with claim for final Application for Payment.

1.9 OPERATION AND MAINTENANCE DATA

A. Submit data bound in 8-1/2 x 11 inch (A4) text pages, three D side ring capacity expansion binders with durable plastic covers.

B. Prepare binder cover with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS", title of project, and subject matter of binder when multiple binders are required.

C. Internally subdivide binder contents with permanent page dividers, logically organized as described below; with tab titling clearly printed under reinforced laminated plastic tabs.

D. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

E. Contents: Prepare Table of Contents for each volume, with each product or system description identified, typed on white paper, in three parts as follows:
   1. Part 1: Directory, listing names, addresses, and telephone numbers of Architect/Engineer, Contractor, Subcontractors, and major equipment suppliers.
   2. Part 2: Operation and maintenance instructions, arranged by system process flow and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
      a. Significant design criteria.
      b. List of equipment.
      c. Parts list for each component.
      d. Operating instructions.
      e. Maintenance instructions for equipment and systems.
      f. Maintenance instructions for special finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
   3. Part 3: Project documents and certificates, including the following:
      a. Shop drawings and product data.
      b. Air and water balance reports.
      c. Certificates.
      d. Originals of warranties and bonds.

1.10 MANUAL FOR MATERIALS AND FINISHES

A. For equipment, or component parts of equipment put into service during construction and operated by Authority, submit documents within ten days after acceptance.

B. Submit one copy of completed volumes 15 days prior to final inspection. Draft copy be reviewed and returned after final inspection, with Architect/Engineer comments. Revise content of document sets as required prior to final submission.

C. Submit two sets of revised final volumes in final form within 10 days after final inspection.

D. Building Products, Applied Materials, and Finishes: Include product data, with catalog number, size, composition, and color and texture designations. Include information for re-ordering custom manufactured products.

E. Instructions for Care and Maintenance: Include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

F. Moisture Protection and Weather Exposed Products: Include product data listing applicable reference standards, chemical composition, and details of installation. Include recommendations for inspections, maintenance, and repair.

G. Additional Requirements: As specified in individual product specification sections.

H. Include listing in Table of Contents for design data, with tabbed fly sheet and space for insertion of data.

1.11 MANUAL FOR EQUIPMENT AND SYSTEMS

A. For equipment, or component parts of equipment put into service during construction and operated by Authority, submit documents within ten days after acceptance.

B. Submit one copy of completed volumes 15 days prior to final inspection. Draft copy be reviewed and returned after final inspection, with project manager comments. Revise content of document sets as required prior to final submission.

C. Submit two sets of revised final volumes in final form within 10 days after final inspection.

D. Each Item of Equipment and Each System: Include description of unit or system, and component parts.

E. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications; typed or by label machine.

F. Include wiring diagrams as installed.

G. Include manufacturer's printed operation and maintenance instructions.

H. Include sequence of operation by controls manufacturer.

I. Include original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

J. Include control diagrams by controls manufacturer as installed.

K. Include Contractor's coordination drawings.

L. Include charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.

M. Include list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.

N. Include test and balancing reports as specified.

O. Include listing in Table of Contents for design data, with tabbed dividers and space for insertion of data.

1.12 SPARE PARTS AND MAINTENANCE PRODUCTS

A. Furnish spare parts, maintenance, and extra products in quantities specified in individual specification sections.

B. Deliver to Project site and place in location as directed by Authority; obtain receipt prior to final payment.

1.13 PRODUCT WARRANTIES AND PRODUCT BONDS

A. Obtain warranties and bonds executed in duplicate by responsible subcontractors, suppliers, and manufacturers, within ten days after completion of applicable item of work.

B. Execute and assemble transferable warranty documents and bonds from subcontractors, suppliers, and manufacturers.

C. Co-execute submittals when required.

D. Include Table of Contents and assemble in three D side ring binder with durable plastic cover.

E. Submit prior to final Application for Payment.

F. Time Of Submittals:
   1. For equipment or component parts of equipment put into service during construction with Authority's permission, submit documents within ten days after acceptance.
   2. Make other submittals within ten days after Date of Substantial Completion, prior to final Application for Payment.
   3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within ten days after acceptance, listing date of acceptance as beginning of warranty or bond period.

1.14 MAINTENANCE SERVICE

A. Furnish service and maintenance of components indicated in specification sections from date of Substantial Completion during warranty period.

B. Examine system components at frequency consistent with reliable operation. Clean, adjust, and lubricate as required.

C. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by manufacturer of original component.

D. Do not assign or transfer maintenance service to agent or Subcontractor without prior written consent of the Authority.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION 01700

SECTION 260000 – BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.1 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM D 709	(2001; R 2007) Laminated Thermosetting Materials

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE C2	(2007; Errata 2007; INT 2008) National Electrical Safety Code
IEEE C57.12.28	(2005) Standard for Pad-Mounted Equipment - Enclosure Integrity
IEEE C57.12.29	(2005) Pad-Mounted Equipment - Enclosure Integrity for Coastal Environments
IEEE Std 100	(2000) The Authoritative Dictionary of IEEE Standards Terms

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA 250	(2003) Enclosures for Electrical Equipment (1000 Volts Maximum)

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2007; AMD 1 2008) National Electrical Code - 2008 Edition

1.2 RELATED REQUIREMENTS

A. This section applies to sections of Division 26, ELECTRICAL, of this project specification unless specified otherwise in the individual sections. This section has been incorporated into, and thus, does not apply to, and is not referenced in the following sections.

Section 26 05 19.00.10	Insulated Wires and Cables
Section 26 32 13	Standby Emergency Generator
Section 26 28 21.00 40	Automatic Transfer Switches

Section 26 24 16.00 40 Panelboards

1.3 DEFINITIONS

A. Unless otherwise specified or indicated, electrical and electronics terms used in these specifications, and on the drawings, shall be as defined in IEEE Std 100.

B. The technical sections referred to herein are those specification sections that describe products, installation procedures, and equipment operations and that refer to this section for detailed description of submittal types.

C. The technical paragraphs referred to herein are those paragraphs in PART 2 - PRODUCTS and PART 3 - EXECUTION of the technical sections that describe products, systems, installation procedures, equipment, and test methods.

1.4 ELECTRICAL CHARACTERISTICS

A. Electrical characteristics for this project shall be 480/277V three phase, four wire, 60 Hz. Final connections to the ATS switches from the Generator and the MDP shall be made by the Contractor as directed by the Contracting Officer.

1.5 ADDITIONAL SUBMITTALS INFORMATION

A. Submittals required in other sections that refer to this section must conform to the following additional requirements as applicable.

1. Shop Drawings: Include wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to ensure a coordinated installation. Wiring diagrams shall identify circuit terminals and indicate the internal wiring for each item of equipment and the interconnection between each item of equipment. Drawings shall indicate adequate clearance for operation, maintenance, and replacement of operating equipment devices.

2. Product Data: Submittal shall include performance and characteristic curves.

1.6 QUALITY ASSURANCE

A. Regulatory Requirements: In each of the publications referred to herein, consider the advisory provisions to be mandatory, as though the word, "shall" had been substituted for "should" wherever it appears. Interpret references in these publications to the "authority having jurisdiction," or words of similar meaning, to mean the Contracting Officer. Equipment, materials,

installation, and workmanship shall be in accordance with the mandatory and advisory provisions of NFPA 70 unless more stringent requirements are specified or indicated.

B. Standard Products: Provide materials and equipment that are products of manufacturers regularly engaged in the production of such products which are of equal material, design and workmanship. Products shall have been in satisfactory commercial or industrial use for 2 years prior to bid opening. The 2-year period shall include applications of equipment and materials under similar circumstances and of similar size. The product shall have been on sale on the commercial market through advertisements, manufacturers' catalogs, or brochures during the 2-year period. Where two or more items of the same class of equipment are required, these items shall be products of a single manufacturer; however, the component parts of the item need not be the products of the same manufacturer unless stated in the technical section.

1. Alternative Qualifications: Products having less than a 2-year field service record will be acceptable if a certified record of satisfactory field operation for not less than 6000 hours, exclusive of the manufacturers' factory or laboratory tests, is furnished.

2. Material and Equipment Manufacturing Date: Products manufactured more than 3 years prior to date of delivery to site shall not be used, unless specified otherwise.

1.7 WARRANTY

A. The equipment items shall be supported by service organizations which are reasonably convenient to the equipment installation in order to render satisfactory service to the equipment on a regular and emergency basis during the warranty period of the contract.

1.8 POSTED OPERATING INSTRUCTIONS

A. Provide for each system and principal item of equipment as specified in the technical sections for use by operation and maintenance personnel. The operating instructions shall include the following:

1. Wiring diagrams, control diagrams, and control sequence for each principal system and item of equipment.

2. Start up, proper adjustment, operating, lubrication, and shutdown procedures.

3. Safety precautions.

4. The procedure in the event of equipment failure.

5. Other items of instruction as recommended by the manufacturer of each system or item of equipment.

B. Print or engrave operating instructions and frame under glass or in approved laminated plastic. Post instructions where directed. For operating instructions exposed to the weather, provide weather-resistant materials or weatherproof enclosures. Operating instructions shall not fade when exposed to sunlight and shall be secured to prevent easy removal or peeling.

1.9 MANUFACTURER'S NAMEPLATE

A. Each item of equipment shall have a nameplate bearing the manufacturer's name, address, model number, and serial number securely affixed in a conspicuous place; the nameplate of the distributing agent will not be acceptable.

1.10 FIELD FABRICATED NAMEPLATES

A. ASTM D 709. Provide laminated plastic nameplates for each equipment enclosure, relay, switch, and device; as specified in the technical sections or as indicated on the drawings. Each nameplate inscription shall identify the function and, when applicable, the position. Nameplates shall be melamine plastic, 0.125 inch thick, white with black center core. Surface shall be matte finish. Corners shall be square. Accurately align lettering and engrave into the core. Minimum size of nameplates shall be one by 2.5 inches. Lettering shall be a minimum of 0.25 inch high normal block style.

1.11 ELECTRICAL REQUIREMENTES

A. Electrical installations shall conform to IEEE C2, NFPA 70, and requirements specified herein.

1.12 INSTRUCTION TO AUTHORITY'S PERSONNEL

A. Where specified in the technical sections, furnish the services of competent instructors to give full instruction to designated personnel in the adjustment, operation, and maintenance of the specified systems and equipment, including pertinent safety requirements as required. Instructors shall be thoroughly familiar with all parts of the installation and shall be trained in operating theory as well as practical operation and maintenance work. Instruction shall be given during the first regular work week after the equipment or system has been accepted and turned over to the Government for regular operation. The number of man-days (8 hours per day) of instruction furnished shall be as specified in the individual section.

PART 2 - PRODUCTS

2.1 FACTORY APPLIED FINISH

A. Electrical equipment shall have factory-applied painting systems which shall, as a minimum, meet the requirements of NEMA 250 corrosion-resistance test.

PART 3 - EXECUTION

3.1 FIELD APPLIED PAINTING

A. Paint of electrical equipment to match finish of adjacent surfaces or to meet the indicated or specified safety criteria.

3.2 FIELD FABRICATED NAMEPLATE MOUNTING

A. Provide number, location, and letter designation of nameplates as indicated. Fasten nameplates to the device with a minimum of two sheet-metal screws or two rivets.

END OF SECTION 260000

SECTION 260519 – INSULATED WIRE AND CABLE

PART 1 - GENERAL

1.1 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE Std 383 (2003) Standard for Qualifying Class 1E Electric Cables and, Field Splices for Nuclear Power Generating Stations 2004

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA 250 (2003) Enclosures for Electrical Equipment (1000 Volts Maximum)

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NEMA WC 70 (1999; Errata 2001) Standard for Non-Shielded Power Cable 2000 V or Less for the Distribution of Electrical Energy

1.2 MATERIALS

A. Wire, copper solid, 600V, #12 Type XLPE in raceway
B. Wire, copper solid, 600V, #10 Type XLPE in raceway
C. Wire, copper stranded, 600V, #6 Type XLPE in raceway
D. Wire, copper stranded, 600V, #2/0 Type XLPE in raceway
E. Wire, copper stranded, 600V, #4/0 Type XLPE in raceway
F. Wire, copper stranded, 600V, 500 kcmil Type XLPE in raceway
G. Wire, copper solid, 600V, #10 Ground Type XLPE in raceway
H. Wire, copper stranded, 600V, #3 Ground Type XLPE in raceway
I. Wire, copper stranded, 600V, #4 Ground Type XLPE in raceway
J. Wire, copper stranded, 600V, #6 Ground Type XLPE in raceway
K. Wire, copper stranded, 600V, #1/0 Ground Type XLPE in raceway
L. Cat 5E cable furnish and install

1.3 SUBMITTALS

A. Authority approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval, for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following:

1. Product Data

a. Installation Instructions
1) Cable manufacturing data.
2) Generator; G
3) Automatic Transfer Switch; G
4) Panelboard; G

2. Test Reports

a. Tests, Inspections, and Verifications; G
1) Six certified copies of test reports.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Furnish cables on reels or coils. Each cable and the outside of each reel or coil, shall be plainly marked or tagged to indicate the cable length, voltage rating, conductor size, and manufacturer's lot number and reel number. Each coil or reel of cable shall contain only one continuous cable without splices.

1.5 PROJECT/SITE CONDITIONS

A. The electrical work will be performed in the Generator/Mechanical Rooms. Ensure that wires are not in the vicinity of space heaters or close to fuel lines.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:

1. South Wire Co
2. Huston Wire and Cable Company

3. Okonite Co
4. Draka
5. Belden

2.2 MATERIALS

A. Wire Table: Furnish wire and cable in accordance with the requirements of the wire table below, conforming to the detailed requirements specified herein.

WIRE TABLE						
Item No.	Size, AWG or kcmil	No. of Conds.	Rated Circuit Voltage	Stranding	Comments	Quantity (Lin. Ft.)
1	250kmils	1	600	27		
2	4/0AWG	1	600	27		
3	2/0AWG	1	600	27		
4	#10AWG	1	600			
5	#12AWG	1	600			
6	#1/0AWG	1	600		Ground	
7	#3AWG	1	600	9	Ground	
8	#4AWG	1	600	9	Ground	
9	#6AWG	1	600	9	Ground	
10	#10AWG	1	600		Ground	
Class ___ stranding may be substituted for ___ where indicated by "*".						

B. Rated Circuit Voltages: All wire and cable shall have minimum rated circuit voltages in accordance with NEMA WC 70.

C. Conductors

1. Material for Conductors: Conductors shall conform to all the applicable requirements of NEMA WC 70, as applicable, and shall be annealed copper. Copper conductors may be bare, or tin- or lead-alloy-coated, if required by the type of insulation used.

2. Size: Minimum wire size shall be No. 12 AWG for power and lighting circuits; No. 10 AWG for current transformer secondary circuits; No. 14 AWG for potential transformer, relaying, and control circuits; No. 16 AWG for annunciator circuits; and No. 19 AWG for alarm circuits. Stranding: Conductor stranding classes cited herein shall be as defined in NEMA WC 70, as applicable. Lighting conductors No. 10 AWG and smaller shall be solid or have Class B stranding. Any conductors used between stationary and moving devices, such as hinged doors or panels, shall have Class H or K stranding. All other conductors shall have Class B or C stranding, except that conductors shown on the drawings, or in the schedule, as No. 12 AWG may be 19 strands of No. 25 AWG, and conductors shown as No. 10 AWG may be 19 strands of No. 22 AWG.

D. Insulation

a. Insulation Material: Provide insulation which is a cross-linked thermosetting polyethylene (XLPE) type, meeting the requirements of NEMA WC 70, as applicable, or an ethylene-propylene rubber (EPR) type meeting the requirements of NEMA WC 70.

2. Insulation Thickness: The insulation thickness for each conductor shall be based on its rated circuit voltage.

a. Power Cables/Single-Conductor Control Cables, 2,000 Volts and Below - The insulation thickness for single-conductor cables rated 2,000 volts and below shall be as required by NEMA WC 70, as applicable. Some thicknesses of NEMA WC 70 will be permitted only for single-conductor cross-linked thermosetting polyethylene insulated cables without a jacket. NEMA WC 70 ethylene-propylene rubber-insulated conductors shall have a jacket.

b. Multiple-Conductor Control Cables - The insulation thickness of multiple-conductor cables used for control and related purposes shall be as required by NEMA WC 70, as applicable.

E. Jackets: All cables shall have jackets meeting the requirements of NEMA WC 70, as applicable, and as specified herein. Individual conductors of multiple-conductor cables shall be required to have jackets only if they are necessary for the conductor to meet other specifications herein. Jackets of single-conductor cables and of individual conductors of multiple-conductor cables, except for shielded cables, shall be in direct contact and adhere or be vulcanized to the conductor insulation. Multiple-conductor cables and shielded single-conductor cables shall be provided with a common overall jacket, which shall be tightly and concentrically formed around the core. Repaired jacket defects found and corrected during manufacturing are permitted if the cable, including jacket, afterward fully meets these specifications and the requirements of the applicable standards.

1. Jacket Material: The jacket shall be one of the materials listed below. Polyvinyl chloride compounds will not be permitted. Variations from the materials required below will be permitted only if approved for each specific use, upon submittal of sufficient data to prove that they exceed all specified requirements for the particular application.

a. General Use
   1) Heavy-duty black neoprene (NEMA WC 70).
   2) Heavy-duty chlorosulfonated polyethylene (NEMA WC 70).
   3) Heavy-duty cross-linked (thermoset) chlorinated polyethylene (NEMA WC 70).

b. Accessible Use Only, 2,000 Volts or Less - Cables installed where they are entirely accessible, such as cable trays and raceways with removable covers, or where they

pass through less than 3 meters 10 feet of exposed conduit only, shall have jackets of one of the materials specified in above paragraph GENERAL USE, or the jackets may be of one of the following:

1) General-purpose neoprene (NEMA WC 70).
2) Black polyethylene (NEMA WC 70).
3) Thermoplastic chlorinated polyethylene (NEMA WC 70).

2. Jacket Thickness: The minimum thickness of the jackets at any point shall be not less than 80 percent of the respective nominal thicknesses specified below.

   a. Multiple-Conductor Cables - Thickness of the jackets of the individual conductors of multiple-conductor cables shall be as required by NEMA WC 70, and shall be in addition to the conductor insulation thickness required by Column B of Table 3-1 of the applicable NEMA publication for the insulation used. Thickness of the outer jackets or sheaths of the assembled multiple-conductor cables shall be as required by NEMA WC 70.

3. Single-Conductor Cables - Single-conductor cables, if nonshielded, shall have a jacket thickness as specified in NEMA WC 70. If shielded, the jacket thickness.

2.3 CABLE IDENTIFICATION

A. Color-Coding: Insulation of individual conductors of multiple-conductor cables shall be color-coded in accordance with NEMA WC 70, except that colored braids will not be permitted. Only one color-code method shall be used for each cable construction type. Control cable color-coding shall be in accordance with NEMA WC 70. Power cable color-coding shall be black for Phase A, red for Phase B, blue for Phase C, white for grounded neutral, and green for an insulated grounding conductor, if included.

B. Cabling: Individual conductors of multiple-conductor cables shall be assembled with flame-and moisture-resistant fillers, binders, and a lay conforming to NEMA WC 70, except that flat twin cables will not be permitted. Fillers shall be used in the interstices of multiple-conductor round cables with a common covering where necessary to give the completed cable a substantially circular cross section. Fillers shall be non-hygroscopic material, compatible with the cable insulation, jacket, and other components of the cable. The rubber-filled or other approved type of binding tape shall consist of a material that is compatible with the other components of the cable and shall be lapped at least 10 percent of its width.

C. Dimensional Tolerance: The outside diameters of single-conductor cables and of multiple-conductor cables shall not vary more than 5 percent and 10 percent, respectively, from the manufacturer's published catalog data.

PART 3 - EXECUTION

3.1 INSTALLATION INSTRUCTIONS

A. The following information shall be provided by the cable manufacturer for each size, conductor quantity, and type of cable furnished:

1. Minimum bending radius, in inches - For multiple-conductor cables, this information shall be provided for both the individual conductors and the multiple-conductor cable.

2. Pulling tension and sidewall pressure limits, in newtons pounds.

3. Instructions for stripping semiconducting insulation shields, if furnished, with minimum effort without damaging the insulation.

4. Upon request, compatibility of cable materials and construction with specific materials and hardware manufactured by others shall be stated. Also, if requested, recommendations shall be provided for various cable operations, including installing, splicing, terminating, etc.

3.2 TESTS, INSPECTIONS, AND VERIFICATIONS

A. Cable Data: Manufacture of the wire and cable shall not be started until all materials to be used in the fabrication of the finished wire or cable have been approved by the Contracting Officer. Cable data shall be submitted for approval including dimensioned sketches showing cable construction, and sufficient additional data to show that these specifications will be satisfied.

B. Inspection and Tests: Inspection and tests of wire and cable furnished under these specifications shall be made by and at the plant of the manufacturer, and shall be witnessed by the Contracting Officer or his authorized representative, unless waived in writing. The MdTA may perform further tests before or after installation. Testing in general shall comply with NEMA WC 70. Specific tests required for particular materials, components, and completed cables shall be as specified in the sections of the above standards applicable to those materials, components, and cable types. Tests shall also be performed in accordance with the additional requirements specified below.

1. High Voltage Test Source: Cables to be used exclusively on ac circuits shall be tested with ac test voltages. If both ac and dc will be present, on either the same or separate conductors of the cable, ac test voltages shall be used.

2. Flame Tests: All multiple-conductor and single-conductor cable assemblies shall pass IEEE Std 383 flame tests, paragraph 2.5, using the ribbon gas burner. Single-conductor cables and individual conductors of multiple-conductor cables shall pass the flame test of

NEMA WC 70. If such tests, however, have previously been made on identical cables, these tests need not be repeated. Instead, certified reports of the original qualifying tests shall be submitted. In this case the reports furnished under paragraph REPORTS, shall verify that all of each cable's materials, construction, and dimensions are the same as those in the qualifying tests.

3. Independent Tests: The Authority may at any time make visual inspections, continuity or resistance checks, insulation resistance readings, power factor tests, or dc high-potential tests at field test values. A cable's failure to pass these tests and inspections, or failure to produce readings consistent with acceptable values for the application, will be grounds for rejection of the cable.

4. Reports: Furnish results of tests made. No wire or cable shall be shipped until authorized. Lot number and reel or coil number of wire and cable tested shall be indicated on the test reports.

3.3 MEASUREMENT AND PAYMENT

A. Wire and cable will be measured and paid for at the Contract unit price per linear foot for the type and sizes specified in the Contract Documents. All pay items shall include all materials, labor, and equipment necessary to furnish and install, test, mark and label a complete, operational, and acceptable system as specified herein and as shown on the plans. Payment of items shall include all testing and guarantee required by the specifications and special provisions. The Authority will make payment for the following items only upon completion of the installation and acceptance by the Authority.

In addition, the following services/work shall be incidental to the listed pay item(s):

- The contractor's quality assurance and quality control responsibilities
- Construction stake out and coordination
- Testing as specified in the Special Provisions and Specifications

The pay item(s) for this section includes:

8008 Linear foot of Wire, copper solid, 600V, #12 Type XLPE

8009 Linear foot of Wire, copper solid, 600V, #10 Type XLPE

8010 Linear foot of Wire, copper stranded, 600V, #6 Type XLPE

8011 Linear foot of Wire, copper stranded, 600V, #2/0 Type XLPE

8012 Linear foot of Wire, copper stranded, 600V, #4/0 Type XLPE

8013 Linear foot of Wire, copper stranded, 600V, 500 KCMIL Type XLPE

8014 Linear foot of Wire, copper solid, 600V, #10 Ground Type XLPE

8015 Linear foot of Wire, copper stranded, 600V, #3 Ground Type XLPE

8016 Linear foot of Wire, copper stranded, 600V, #4 Ground Type XLPE

8017 Linear foot of Wire, copper stranded, 600V, #6 Ground Type XLPE

8018 Linear foot of Wire, copper stranded, 600V, #1/0 Ground Type XLPE

8019 Linear foot of Cat 5E cable furnish and install

END OF SECTION 260519

SECTION 262416 – PANELBOARDS

PART 1 - GENERAL

1.1 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

ELECTRONIC INDUSTRIES ALLIANCE (EIA)

EIA 416	(1974; R 1981) Standard for Filters, for Radio Interference
EIA 46	(1987) Test Procedure for Resistance to Soldering (Vapor Phase Technique) for Surface Mount Devices

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA 250	(2003) Enclosures for Electrical Equipment (1000 Volts Maximum)
NEMA AB 1	(2002) Molded-Case Circuit Breakers, Molded Case Switches, and Circuit-Breaker Enclosures
NEMA PB 1	(2006; Errata 2008) Standard for Panelboards

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2007; AMD 1 2008) National Electrical Code - 2008 Edition

U.S. DEPARTMENT OF DEFENSE (DOD)

MIL-HDBK 232	(Rev A) Red/Black Engineering Installation Guidelines

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FED-STD-595	(Rev B; Am 1) Colors Used in Government Procurement

UNDERWRITERS LABORATORIES (UL)

UL 67	(1993; Rev thru Jul 2008) Standard for Panelboards

1.2 MATERIALS

A. 400a, 277/480V Panelboard

1.3 GENERAL REQUIREMENTS

A. Section 26 00 00.00 20 BASIC ELECTRICAL MATERIALS AND METHODS applies to work specified in this section.

B. Submit Detail Drawings for the panelboards consisting of fabrication and assembly drawings for all parts of the work in sufficient detail to enable the Government to check conformity with the requirements of the contract documents. Include within drawings details of bus layout.

C. Ensure Outline Drawings for panelboards indicate overall physical features, dimensions, ratings, service requirements, and weights of equipment.

D. Statements signed by responsible officials of a manufacturer of a product, system, or material attesting that the product, system or material meet specified requirements. Statements must be dated after the award of this contract, name the project, and list the specific requirements which it is intended to address.

1.4 SUBMITTALS

A. Authority approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval and for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Authority. Submit the following:

1. Shop Drawings

   a. Submit Detail Drawings and Outline Drawings for panelboards in accordance with paragraph entitled, "General Requirements," of this section.

2. Product Data

   a. Submit manufacturer's catalog data for the following items:
      1) Panelboards; G
      2) Directory Card and Holder
      3) Filtered Panelboard

3. Samples

   a. Ensure that keys are properly tagged and delivered to the Contracting Officer.

4. Test Reports

a. Submit test reports for the following tests in accordance with the paragraph entitled, "Site Testing," of this section. Do not energize panelboards until the recorded test data has been submitted to and approved by the Contracting Officer.

b. Continuity Tests

c. Insulations Tests

5. Certificates

a. Submit Statements in accordance with paragraph entitled, "General Requirements," of this section.

6. Manufacturer's Instructions

a. Submit Manufacturer's instructions for Panelboards including special provisions required to install equipment components and system packages. Special notices shall detail impedances, hazards and safety precautions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Square D
2. Cutler-Hammer.
3. General Electric.

2.2 PANELBOARDS

A. Totally enclose power-distribution panelboards in a steel cabinet, dead-front circuit breaker type with copper buses, surface mounted as indicated. Ensure panelboards conform to NEMA PB 1 and NEMA AB 1. Branch circuit panels shall have buses fabricated for bolt-on type circuit breakers.

B. An outer door or cover, secured with captive screws, shall be provided on surface-mounted panelboards to provide gutter space access. Provide a center door for circuit breaker/switch access only.

C. Voltage and current rating, number of phases, and number of wires shall be as indicated. Provide four-wire distribution panelboards with an isolated full-capacity neutral bus and spaces as indicated. Ensure panelboards are rated 277/480-volt, three-phase, 60-hertz current.

D. Provide panelboards with a separate grounding bus bonded to the enclosure. Grounding bus shall be a solid bus bar of rectangular cross section equipped with binding screws for the connection of equipment grounding conductors.

E. Each panelboard, as a complete unit, shall have a short-circuit current rating equal to or greater than the integrated equipment rating shown on the panelboard schedule or as indicated.

F. Ensure panelboards and main lugs or main breaker have current ratings as shown on the panelboard schedule.

G. Bus bar connections to the branch circuit breakers shall be the "distributed phase" or "phase sequence" type. Three-wire panelboard busing shall be such that when any two adjacent single-pole breakers are connected to opposite phases, two-pole breakers can be installed in any location. Three-phase, four-wire busing shall be such that when any three adjacent single-pole breakers are individually connected to each of the three different phases, two- or three-pole breakers can be installed at any location. Current-carrying parts of the bus assembly shall be plated. Mains ratings shall be as shown.

H. Mechanical lugs furnished with panelboards shall be cast copper or copper alloys of sizes suitable for the conductors indicated to be connected thereto.

I. Boxes shall have the manufacturer's standard knockouts and shall be galvanized code-gage sheet steel. Fronts shall be of code-gage sheet steel furnished with captive screws for securing the fronts to the boxes.

J. Panelboard enclosures shall be NEMA, Type 1. Provide enclosures with corrosion-resistant steel pin-tumbler cylinder locks. Key locks alike and provide two keys for each enclosure.

K. Finish panelboards with baked enamel. Finish color is to be No. 61 gray conforming to FED-STD-595.

2.3 CIRCUIT BREAKERS

A. Circuit breakers shall be the molded-case type. Frame and trip ratings shall be as indicated.

B. Interrupting rating of circuit breakers shall be as indicated. If not shown, the interrupting rating for circuit breakers in 277/480volt panelboards shall be not less than 25,000 amperes rms symmetrical.

C. Circuit breakers shall be bolt-on type. Plug-in type is not acceptable.

D. Ensure connections to the bus are bolt-on type.

E. When multiple wires per phase are specified, furnish the circuit breakers with connectors made to accommodate multiple wires.

F. Ensure circuit breaker spaces called out on the drawings are complete with mounting hardware to permit ready installation of the circuit breakers.

2.4 DIRECTORY CARD AND HOLDER

A. Mount a directory card on the inside of hinged fronts and doors 0.030-inch thick minimum plastic in a metal frame, with spaces for circuit numbers, outlets controlled, and room numbers.

2.5 FACTORY TESTING

A. Test complete panelboards in accordance with UL 67.

2.6 PRECAUTIONARY LABEL

A. To ensure persons are aware of immediate or potential hazard in the application, installation, use, or maintenance of panelboards, each panelboard shall be conspicuously marked on the trim or dead front shield with the text or equivalent 480/277V symbol. If the panel is supplied with a door, ensure the label is visible when the door is in the open position.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install panelboards as indicated and in accordance with the manufacturer's instructions. Fully align and mount panels so that the height of the top operating handle does not exceed 72-inches above the finished floor.

B. Directory information shall be typewritten in capital letters to indicate loads served by each circuit and shall be mounted in holders behind protective covering.

3.2 SITE TESTING

A. Each panelboard enclosure key shall be shown to operate the enclosure locks in the presence of the Contracting Officer.

B. Panelboards shall be given continuity and insulation tests after the installation has been completed and before the panelboard is energized.

C. Provide test equipment, labor, and personnel as required to perform the tests as specified. Conduct Continuity tests using a dc device with buzzer.

D. Conduct insulation tests on 480-volt panelboards using a 1,000-volt insulation-resistance test set. Record readings every minute until three equal and consecutive readings have been obtained. Resistance between phase conductors and between phase conductors and ground shall be not less than 50 megohms.

E. Conduct insulation tests on panelboards rated 300 volts or less using a 500-volt minimum insulation-resistance test set. Record readings after 1 minute and until the reading is constant for 15 seconds. Resistance between phase conductors and between phase conductors and ground shall be not less than 25 megohms.

F. Record test data and include the location and identification of panelboards and megohm readings versus time.

3.3 MEASUREMENT AND PAYMENT

A. Panelboard will not be measured but will be paid for at the Contract lump sum price. Payment shall be full compensation for all materials, panelboard, breakers, labor, equipment and all other incidentals necessary to complete this work. This work includes furnish and install panelboard, circuit breaker, mark, label a complete and making all final connections as specified herein and as shown on the plans. Payment of items shall include all testing and guarantee required by the specifications and special provisions. The Authority will make payment for the following items only upon completion of the installation and acceptance by the Authority.

The pay item(s) for this section includes:

8020 Lump sum of 400A, 277/480V Panelboard

END OF SECTION 262416

SECTION 262821 – AUTOMATIC TRANSFER SWITCHES

PART 1 - GENERAL

1.1 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA 250	(2003) Enclosures for Electrical Equipment (1000 Volts Maximum)
NEMA ICS 1	(2000; R 2005; R 2008) Standard for Industrial Control and Systems General Requirements

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2007; AMD 1 2008) National Electrical Code - 2008 Edition

UNDERWRITERS LABORATORIES (UL)

UL 1008	(1996; Rev thru Dec 2007) Standard for Transfer Switch Equipment
UL 508	(1999; Rev thru Sep 2008) Standard for Industrial Control Equipment

1.2 MATERIALS

1. Generator set, diesel, 3phase 4wire, 277/480V, 250 KW, including battery charger, muffler and automatic transfer switch (ATS), exclude conduits, wiring and concrete

1.3 SUBMITTALS

A. Authority approval is required for ATS submittals. Submit the following:

1. Shop Drawings

a. Submit connection diagrams showing the relations and connections of the following items by showing the general physical layout of all controls, the interconnection of one system (or portion of system) with another, and internal tubing, wiring, and other devices.
   1) Contacts
   2) Indicating Lights
   3) Terminal Board

b. Submit fabrication drawings for the following items consisting of fabrication and assembly details to be performed in the factory.
   1) Contacts
   2) Indicating Lights
   3) Terminal Board
   4) Enclosures
   5) Accessories

c. Submit installation drawings for automatic transfer equipment in accordance with the paragraph entitled, "Installation," of this section.

2. Product Data

   a. Submit Equipment and Performance Data for automatic transfer equipment in accordance with paragraph entitled, "General Requirements," of this section.

   b. Submit manufacturer's catalog data for the following items:
      1) Contacts
      2) Indicating Lights
      3) Terminal Board
      4) Enclosures
      5) Accessories

3. Test Reports

   a. Submit test reports for Operation Tests on the automatic transfer switch in accordance with the paragraph entitled, "Field Testing," of this section.

4. Certificates

   a. Submit Listing of Product Installations for automatic transfer switches in accordance with paragraph entitled, "Installation," of this section.

5. Manufacturer's Instructions

a. Manufacturer's instructions shall include special provisions required to install equipment components and system packages for Automatic Transfer Switch. Special notices shall detail impedances, hazards and safety precautions.

1.4 GENERAL REQUIREMENTS

A. Section 26 00 00. 00 20 BASIC ELECTRICAL MATERIALS AND METHODS applies to work specified in this section.

B. Submit Equipment and Performance Data for automatic transfer equipment including life, test, system functional flows, safety features, and mechanical automated details.

1.5 QUALIFICATION TESTING

A. Provide certified independent laboratory test data for the furnished unit or an identical unit. Tests shall meet the general use requirements of UL 508, Table 22.1. Complete automatic transfer switch shall be subjected to a test as outlined in NEMA ICS 1, paragraph 109.5. One cycle of operation tests under the UL 508 test requirements shall consist of a transfer of load from the normal source to the emergency source and retransfer to the normal source. After the required number of test cycles, the temperature rise of the contacts shall not exceed 65 degrees C. 149 degrees F. Test the switch operating time and sense relay pickup and dropout times.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. General Electric Zenith.
2. Kohler Co.
3. Onan Corp – Electrical Division.

2.2 APPLICATION

A. Automatic transfer switch shall be capable of transferring the load from the normal power source to emergency power source, and from an emergency source to the normal power source.

Locate switch where indicated. Switch shall be electrically solenoid-operated, mechanically held, double-throw, rated for continuous duty, capable of transferring in 100 milliseconds or less, and conforming to the applicable requirements of UL 1008 and NFPA 70, Article 700, except as herein modified.

B. Automatic transfer switch shall be three-pole type for three-phase application. Provide a solid neutral conductor connection for neutral transfer from normal source to emergency source.

C. Automatic transfer switch shall be capable of being placed in either the normal or the emergency position..

2.3 CONTACTS

A. Main contacts shall be wiping-action silver alloy that, when rated for operation at 50 amperes or greater, shall be protected against arcing. Auxiliary contacts and control transfer relay contacts shall have a minimum continuous current rating of not less than 10-amperes inductive at 120 volts ac. Provide the following auxiliary contacts:

1. Generator-control contacts, normally open, that close on undervoltage or loss of normal power as specified, remaining closed until transfer back to normal power.

2. Emergency-position contacts, normally open when the switch is in the normal position, that close when the switch is in the emergency position.

3. Normal position contacts, normally closed when the switch is in the normal position, that open when the switch is in the emergency position.

B. Auxiliary contacts shall be two-pole one set closed when switch is in Source 1 position and another set closed when switch is in source 1 position.

C. Engine start contacts.

2.4 INDICATING LIGHTS

A. Furnish Automatic transfer switch with two indicating lamps. One shall light to indicate that the switch is operating on normal power, and the other shall light to indicate that the switch is operating on emergency power. Fuse each indicating circuit.

2.5 TERMINAL BOARD

A. Control devices, indicating lights, auxiliary contacts, and internal control devices or auxiliary switches, shall be internally wired to a common output terminal board. Wire the internal functions to facilitate remote connections or monitoring.

2.6 OPERATION

A. Normal source voltage across phase lines shall be monitored by sensing devices. If the normal source voltage in any phase drops to 90 percent or less for a timed period, the automatic transfer switch shall start the emergency source and transfer the load to the emergency source when voltage and frequency reach rated values or, if the emergency source is on, verify voltage and frequency of the alternate source and transfer the load to the alternate source. This time period shall be field adjustable from 1 to 30 seconds. Provide a voltage and frequency sensor relay to monitor rated values on the emergency side to prohibit transfer until the emergency source voltage and frequency reach at least 95 percent of the required rating. Provide phase failure protection, with 65 to 70 percent drop and 92 to 95 percent voltage pickup ratings.

B. Furnish the automatic transfer switch with a time-delay feature, field adjustable from 2 to 30 minutes, that operates to delay automatic transfer back to normal power until the normal source voltage and frequency reach at least 95 percent of the rated voltage. However, if the emergency power fails, and the normal source is again available at 90 percent of the rated voltage, the time-delay circuitry shall be bypassed, and the load immediately transferred back to the normal source. Capability shall also be provided for manual transfer in either direction. Sensing relays shall operate without contact chatter or false response during voltage variations between dropout and pickup.

2.7 SELF-TEST CAPABILITY

A. Automatic transfer switch shall be provided with a control-circuit self-test feature that shall be capable of verifying the proper operation of the switch control circuit without moving the main contactor or causing discontinuity of service to the load. Self-test circuit shall have the following characteristics:

1. A key-operated switch that disconnects the main actuator and connects in its place, an indicator light. Design the key-operated switch to prevent removal of the key while the switch is in the self-test mode.

2. A power-failure simulator switch that removes voltage from the voltage-sensing devices so that emergency power activates the test light.

2.8 ENCLOSURES

A. Automatic transfer switch.enclosures shall be solid, unventilated, code-gage 1.9 millimeter, 14-gage, minimum sheet metal, NEMA 250, Type 1, with manufacturer's standard finish.

2.9 ACCESSORIES

A. Automatic transfer switch shall incorporate an engine-generator exerciser timer to permit weekly programming cycle of engine-generator set test runs under load.

B. Automatic transfer switch shall incorporate a network interface card.

C. Three phase voltage imbalance user configured ON or OFF.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install automatic transfer switch as indicated, and in accordance with the manufacturer's installation instructions. Wall-mounted enclosures shall be fully aligned and installed at the indicated mounting height using a minimum of six M10 3/8-inch bolts. Use of sheet metal screws or small machine screws is not permitted.

B. Submit Listing of Product Installations for automatic transfer switches showing the manufacturer has successfully manufactured automatic transfer switches of the size specified for a minimum period of 10 years. List shall include purchaser, address of installation, service organization, and date of installation.

3.2 FIELD TESTING

A. Automatic transfer switch shall be demonstrated to operate in accordance with the specification requirements in conjunction with the normal and emergency power sources.

3.3 MEASUREMENT AND PAYMENT

A. Automatic Transfer Switch will not be measured or paid separately, but shall be considered incidental to the Contract lump sum bid price for the "Generator set, diesel, 3phase 4wire, 277/480V, 250K, including battery charger, muffler and automatic transfer switch (ATS)" item.

END OF SECTION 262821

SECTION 263213 - ENGINE GENERATORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes packaged engine-generator sets for emergency power supply with the following features:

1. Diesel engine.
2. Subbase tank.
3. Control and monitoring.
4. Performance requirements for sensitive loads.

1.3 MATERIALS

1. Temporary generator installation, rental, cable and connection to ATS 2
2. Concrete pad removal/construction
3. Metal Duct work for the shroud , fabricated rectangular, galvanized steel #16gauge , 200lb to500lb includes fitting, joints, supports and allowance for a flexible connection, excludes insulation
4. Generator set, diesel, 3phase 4wire, 277/480V, 250 KW, including battery charger, muffler and automatic transfer switch (ATS), exclude conduits, and wiring.
5. Electric Metallic Tubing (EMT), ¾" diameter to 15ft high, including 2 terminations, 2 elbows and 11 beam clamps per 100 LF
6. Electric Metallic Tubing (EMT), 1" diameter to 15ft high, including 2 terminations, 2 elbows and 11 beam clamps per 100 LF
7. Electric Metallic Tubing (EMT), 2" diameter to 15ft high, including 2 terminations, 2 elbows and 11 beam clamps per 100 LF
8. Electric Metallic Tubing (EMT), 3 " diameter to 15ft high, including 2 terminations, 2 elbows and 11 beam clamps per 100 LF

9. Fuel oil specialties, fuel pump, duplex set with lead/lag controller 1/2HP. 155GPH
10. Pipe, black ½"
11. Fuel pump controls installation and integration in Boiler room controls
12. Penetration thru ceiling and installation of timble

1.4 DEFINITIONS

A. Operational Bandwidth: The total variation from the lowest to highest value of a parameter over the range of conditions indicated, expressed as a percentage of the nominal value of the parameter.

1.5 SUBMITTALS

A. Product Data: For each type of packaged engine generator indicated include rated capacities, operating characteristics, and furnished specialties and accessories. In addition, include the following:

1. Thermal damage curve for generator.
2. Time-current characteristic curves for generator protective device.

B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

1. Dimensioned outline plan and elevation drawings of engine-generator set and other components specified.
2. Design Calculations: Signed and sealed by a qualified professional engineer. Calculate requirements for selecting vibration isolators and seismic restraints and for designing vibration isolation bases.
3. Vibration Isolation Base Details: Signed and sealed by a qualified professional engineer. Detail fabrication, including anchorages and attachments to structure and to supported equipment. Include base weights.
4. Wiring Diagrams: Power, signal, and control wiring.

C. Qualification Data: For manufacturer.

D. Field quality-control test reports.

E. Operation and Maintenance Data: For packaged engine generators to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:

1. List of tools and replacement items recommended to be stored at Project for ready access. Include part and drawing numbers, current unit prices, and source of supply.

F. Warranty: Special warranty specified in this Section.

G. Manufacturer's installation instructions.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

1. Maintenance Proximity: Not more than four hours' normal travel time from Installer's place of business to Project site.

B. Manufacturer Qualifications: A qualified manufacturer. Maintain, within 100 miles of Project site, a service center capable of providing training, parts, and emergency maintenance repairs.

C. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a member company of the International Electrical Testing Association or is a nationally recognized testing laboratory (NRTL), and that is acceptable to authorities having jurisdiction.

1. Testing Agency's Field Supervisor: Person currently certified by the International Electrical Testing Association or the National Institute for Certification in Engineering Technologies to supervise on-site testing specified in Part 3.

D. Source Limitations: Obtain packaged generator sets and auxiliary components through one source from a single manufacturer.

E. 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.

F. Comply with ASME B15.1.

G. Comply with NFPA 37.

H. Comply with NFPA 70.

I. Comply with NFPA 110 requirements for Level **1** emergency power supply system.

J. Comply with UL 2200.

K. Engine Exhaust Emissions: Comply with applicable state and local government requirements.

L. Noise Emission: Comply with applicable state and local government requirements for maximum noise level at adjacent property boundaries due to sound emitted by generator set including engine, engine exhaust, engine cooling-air intake and discharge, and other components of installation.

1.7 PROJECT CONDITIONS

A. Interruption of Existing Electrical Service: Do not interrupt electrical service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electrical service according to requirements indicated:

1. Notify owner no fewer than two days in advance of proposed interruption of electrical service.
2. Do not proceed with interruption of electrical service without Owner's written permission.

B. Environmental Conditions: Engine-generator system shall withstand the following environmental conditions without mechanical or electrical damage or degradation of performance capability:

1. Ambient Temperature: minus 15 to plus 40 deg c.
2. Relative Humidity: 0 to 95 percent.
3. Altitude: Sea level to 500feet.

1.8 COORDINATION

A. Coordinate size and location of concrete bases for package engine generators. Cast anchor-bolt inserts into bases. Concrete, and reinforcement, requirements as shown on the plans.

1.9 DELIVERY, STORAGE, AND HANDLING

A. See Section – 109/110 for scheduling requirements. Delivery, installation and testing dates for generator must be shown in the schedule.

B. Contractor shall contact Maryland Transportation Authority (MdTA) with the date for delivery of generator set to the city of Baltimore, Fort McHenry Tunnel, Administration Building at 3990 Leland Ave. Contact: Mr. Kataw Say (Project Engineer) at (410)537-7853 and Mr. Jeff Robson (MdTA Special Trade Supervisor) at (410)537-1274.

C. Deliver engine generator set and system components to their final location in protective wrappings, containers, and other protection that will exclude dirt and moisture and prevent damage from construction operations. Remove protection only after equipment is safe from hazards.

1.10 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of packaged engine generators and associated auxiliary components that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 10 years from date of Substantial Completion.

1.11 MAINTENANCE SERVICE

A. Initial Maintenance Service: Beginning at Substantial Completion, provide 12 months' full maintenance by skilled employees of manufacturer's designated service organization. Include quarterly exercising to check for proper starting, load transfer, and running under load. Include routine preventive maintenance as recommended by manufacturer and adjusting as required for proper operation. Provide parts and supplies same as those used in the manufacture and installation of original equipment.

1.12 EXTRA MATERIALS

A. Furnish extra materials describe below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Fuses; one for every ten of each type and rating not less than one of each.
2. Filters: One set each of lubricating oil, fuel, and combustion-air filters.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

C. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:

1. Kohler Co.; Generator Division
2. Generac Power Systems, Inc.
3. Caterpillar; Engine Div.
4. Magnetek, Inc.
5. Onan/Cummins Power Generation; Industrial Business Group.
6. Spectrum Detroit Diesel.

2.2 ENGINE-GENERATOR SET

A. Factory-assembled and -tested, engine-generator set.

B. Mounting Frame: Maintain alignment of mounted components without depending on concrete foundation; and have lifting attachments.

1. Rigging Diagram: Inscribed on metal plate permanently attached to mounting frame to indicate location and lifting capacity of each lifting attachment and generator-set center of gravity.

C. Capacities and Characteristics:

1. Power Output Ratings: Nominal ratings as indicated.
2. Output Connections: Three-phase, four wires.
3. Nameplates: For each major system component to identify manufacturer's name and address, and model and serial number of component.

D. Generator-Set Performance for Sensitive Loads:

1. Oversizing generator compared with the rated power output of the engine is permissible to meet specified performance.

    a. Nameplate Data for Oversized Generator: Show ratings required by the Contract Documents rather than ratings that would normally be applied to generator size installed.

2. Steady-State Voltage Operational Bandwidth: 1 percent of rated output voltage from no load to full load.
3. Transient Voltage Performance: Not more than 10 percent variation for 50 percent step-load increase or decrease. Voltage shall recover and remain within the steady-state operating band within 0.5 second.
4. Steady-State Frequency Operational Bandwidth: Plus or minus 0.25 percent of rated frequency from no load to full load.
5. Steady-State Frequency Stability: When system is operating at any constant load within the rated load, there shall be no random speed variations outside the steady-state operational band and no hunting or surging of speed.
6. Transient Frequency Performance: Less than 2-Hz variation for 50 percent step-load increase or decrease. Frequency shall recover and remain within the steady-state operating band within three seconds.
7. Output Waveform: At no load, harmonic content measured line to neutral shall not exceed 2 percent total with no slot ripple. Telephone influence factor, determined according to NEMA MG 1, shall not exceed 50 percent.
8. Sustained Short-Circuit Current: For a 3-phase, bolted short circuit at system output terminals, system shall supply a minimum of 300 percent of rated full-load current for not less than 10 seconds and then clear the fault automatically, without damage to winding insulation or other generator system components.
9. Excitation System: Performance shall be unaffected by voltage distortion caused by nonlinear load.

    a. Provide permanent magnet excitation for power source to voltage regulator.

10. Start Time: Comply with NFPA 110, Type 10, system requirements.

2.3 ENGINE

A. Fuel: Fuel oil, Grade DF-2.

B. Rated Engine Speed: 1800 rpm.

C. Maximum Piston Speed for Four-Cycle Engines: 2250 fpm (11.4 m/s).

D. Lubrication System: The following items are mounted on engine or skid:

1. Filter and Strainer: Rated to remove 90 percent of particles 5 micrometers and smaller while passing full flow.
2. Thermostatic Control Valve: Control flow in system to maintain optimum oil temperature. Unit shall be capable of full flow and is designed to be fail-safe.
3. Crankcase Drain: Arranged for complete gravity drainage to an easily removable container with no disassembly and without use of pumps, siphons, special tools, or appliances.

E. Engine Fuel System:

1. Main Fuel Pump: Mounted on engine. Pump ensures adequate primary fuel flow under starting and load conditions.
2. Relief-Bypass Valve: Automatically regulates pressure in fuel line and returns excess fuel to source.

F. Governor: Adjustable isochronous, with speed sensing.

G. Cooling System: Closed loop, liquid cooled, with radiator factory mounted on engine-generator-set mounting frame and integral engine-driven coolant pump.

1. Coolant: Solution of 50 percent ethylene-glycol-based antifreeze and 50 percent water, with anticorrosion additives as recommended by engine manufacturer.
2. Size of Radiator: Adequate to contain expansion of total system coolant from cold start to 110 percent load condition.
3. Temperature Control: Self-contained, thermostatic-control valve modulates coolant flow automatically to maintain optimum constant coolant temperature as recommended by engine manufacturer.
4. Coolant Hose: Flexible assembly with inside surface of nonporous rubber and outer covering of aging-, ultraviolet-, and abrasion-resistant fabric.

    a. Rating: 50-psig (345-kPa) maximum working pressure with coolant at 180 deg F (82 deg C), and no collapsible under vacuum.
    b. End Fittings: Flanges or steel pipe nipples with clamps to suit piping and equipment connections.

H. Muffler/Silencer: Critical type, sized as recommended by engine manufacturer and selected with exhaust piping system to not exceed engine manufacturer's engine backpressure requirements. Due to the room height and width limitation consider a pancake style silencer to ensure 24inch clearance from any combustible materials.

1. Minimum sound attenuation of 25 dB at 500 Hz.

2. Sound level measured at a distance of 10 feet (3 m) from exhaust discharge after installation is complete shall be 85 dBA or less.

I. Air-Intake Filter: Replace existing with new to match.

J. Starting System: 24-V electric, with negative ground.

1. Cranking Motor: Heavy-duty unit that automatically engages and releases from engine flywheel without binding.
2. Cranking Cycle: As required by NFPA 110 for system level specified.
3. Battery: Adequate capacity within ambient temperature range specified in Part 1 "Project Conditions" Article to provide specified cranking cycle at least **twice** without recharging.
4. Battery Cable: Size as recommended by engine manufacturer for cable length indicated. Include required interconnecting conductors and connection accessories.
5. Battery Compartment: Factory fabricated of metal with acid-resistant finish and thermal insulation. Thermostatically controlled heater shall be arranged to maintain battery above 10 deg C regardless of external ambient temperature within range specified in Part 1 "Project Conditions" Article. Include accessories required to support and fasten batteries in place.
6. Battery-Charging Alternator: Factory mounted on engine with solid-state voltage regulation and 35-A minimum continuous rating.
7. Battery Charger: Current-limiting, automatic-equalizing and float-charging type. Unit shall comply with UL 1236 and include the following features:

    a. Operation: Equalizing-charging rate of 10 A shall be initiated automatically after battery has lost charge until an adjustable equalizing voltage is achieved at battery terminals. Unit shall then be automatically switched to a lower float-charging mode and shall continue to operate in that mode until battery is discharged again.
    b. Automatic Temperature Compensation: Adjust float and equalize voltages for variations in ambient temperature from minus 40 deg C to plus 60 deg C to prevent overcharging at high temperatures and undercharging at low temperatures.
    c. Automatic Voltage Regulation: Maintain constant output voltage regardless of input voltage variations up to plus or minus 10 percent.
    d. Ammeter and Voltmeter: Flush mounted in door. Meters shall indicate charging rates.
    e. Safety Functions: Sense abnormally low battery voltage and close contacts providing low battery voltage indication on control and monitoring panel. Sense high battery voltage and loss of ac input or dc output of battery

charger. Either condition shall close contacts that provide a battery-charger malfunction indication at system control and monitoring panel.

f. Enclosure and Mounting: NEMA 250, Type 1, wall-mounted cabinet.

2.4 FUEL OIL STORAGE

A. The existing main fuel tank is located outside the building in the ramp embankment about 100ft away and has a capacity of 8,000gallons. This tank provides fuel oil for the boilers and the emergency generator.

B. Base-Mounted Fuel Oil Tank: Factory installed and piped, complying with UL 142 fuel oil tank. The based mounted tank shall have double wall to meet spill containment requirements. Features include the following:

1. Tank level indicator and emergency relief vents.
2. Capacity: Fuel for minimum five hours' continuous operation at 100 percent rated power output.
3. Vandal-resistant fill cap.
4. Containment Provisions: Comply with requirements of authorities having jurisdiction. The inner primary tank is sealed inside the outer secondary tank . If a spill occurs the outer tank contains the inner tank fuel.

2.5 CONTROL AND MONITORING

A. Automatic Starting System Sequence of Operation: When mode-selector switch on the control and monitoring panel is in the automatic position, remote-control contacts in one or more separate automatic transfer switches initiate starting and stopping of generator set. When mode-selector switch is switched to the on position, generator set starts. The off position of same switch initiates generator-set shutdown. When generator set is running, specified system or equipment failures or derangements automatically shut down generator set and initiate alarms. Operation of a remote emergency-stop switch also shuts down generator set.

B. Configuration: Operating and safety indications, protective devices, basic system controls, and engine gages shall be grouped in a common control and monitoring panel mounted on the generator set. Mounting method shall isolate the control panel from generator-set vibration.

1. Wall-Mounting Cabinet Construction: Rigid, self-supporting steel unit complying with NEMA ICS 6. Power bus shall be copper. Bus, bus supports, control wiring, and temperature rise shall comply with UL 891.

2. Current and Potential Transformers: Instrument accuracy class.

C. Indicating and Protective Devices and Controls: As required by NFPA 110 for Level 1 system, and the following:

1. AC voltmeter.
2. AC ammeter.
3. AC frequency meter.
4. DC voltmeter (alternator battery charging).
5. Engine-coolant temperature gage.
6. Engine lubricating-oil pressure gage.
7. Running-time meter.
8. Ammeter-voltmeter, phase-selector switch(es).
9. Generator-voltage adjusting rheostat.
10. Generator overload.

D. Indicating and Protective Devices and Controls:

1. AC voltmeter.
2. AC ammeter.
3. AC frequency meter.
4. DC voltmeter (alternator battery charging).
5. Engine-coolant temperature gage.
6. Engine lubricating-oil pressure gage.
7. Running-time meter.
8. Ammeter-voltmeter, phase-selector switch(es).
9. Generator-voltage adjusting rheostat.
10. Start-stop switch.
11. Overspeed shutdown device.
12. Coolant high-temperature shutdown device.
13. Coolant low-level shutdown device.
14. Oil low-pressure shutdown device.
15. Generator overload.

E. Supporting Items: Include sensors, transducers, terminals, relays, and other devices and include wiring required to support specified items. Locate sensors and other supporting items on engine or generator, unless otherwise indicated.

F. Connection to Data Link: A separate terminal block, factory wired to Form C dry contacts, for each alarm and status indication is reserved for connections for data-link transmission of indications to remote data terminals. Provide network compatible interface.

G. Common Remote Audible Alarm: Comply with NFPA 110 requirements for Level 1 systems. Include necessary contacts and terminals in control and monitoring panel.

1. Overcrank shutdown.
2. Coolant low-temperature alarm.
3. Control switch not in auto position.
4. Battery-charger malfunction alarm.
5. Battery low-voltage alarm.

H. Remote Emergency-Stop Switch: Flush; wall mounted, unless otherwise indicated; and labeled. Push button shall be protected from accidental operation.

I. Remote Annunciator to monitor the; overspeed, high temperature, low oil and overcrank.

2.6 GENERATOR OVERCURRENT AND FAULT PROTECTION

A. Generator Circuit Breaker: Molded-case, electronic-trip type; 100 percent rated; complying with UL 489.

1. Tripping Characteristics: Adjustable long-time and short-time delay and instantaneous.
2. Trip Settings: Selected to coordinate with generator thermal damage curve.
3. Shunt Trip: Connected to trip breaker when generator set is shut down by other protective devices.
4. Mounting: Adjacent to or integrated with control and monitoring panel with left facing orientation to allow for front clearances at both monitoring, control and circuit breakers.

B. Generator Protector: Microprocessor-based unit shall continuously monitor current level in each phase of generator output, integrate generator heating effect over time, and predict when thermal damage of alternator will occur. When signaled by generator protector or other generator-set protective devices, a shunt-trip device in the generator disconnect switch shall open the switch to disconnect the generator from load circuits. Protector shall perform the following functions:

1. Initiates a generator overload alarm when generator has operated at an overload equivalent to 110 percent of full-rated load for 60 seconds. Indication for this alarm is integrated with other generator-set malfunction alarms.
2. Under single or three-phase fault conditions, regulates generator to 300 percent of rated full-load current for up to 10 seconds.

3. As overcurrent heating effect on the generator approaches the thermal damage point of the unit, protector switches the excitation system off, opens the generator disconnect device, and shuts down the generator set.
4. Senses clearing of a fault by other overcurrent devices and controls recovery of rated voltage to avoid overshoot.

2.7 GENERATOR, EXCITER, AND VOLTAGE REGULATOR

A. Comply with NEMA MG 1.

B. Drive: Generator shaft shall be directly connected to engine shaft. Exciter shall be rotated integrally with generator rotor.

C. Electrical Insulation: Class H or Class F.

D. Stator-Winding Leads: Brought out to terminal box to permit future reconnection for other voltages if required.

E. Construction shall prevent mechanical, electrical, and thermal damage due to vibration, over speed up to 125 percent of rating, and heat during operation at 110 percent of rated capacity.

F. Enclosure: Drip proof.

G. Instrument Transformers: Mounted within generator enclosure.

H. Voltage Regulator: Solid-state type, separate from exciter, providing performance as specified.

1. Adjusting rheostat on control and monitoring panel shall provide plus or minus 5 percent adjustment of output-voltage operating band.

2.8 VIBRATION ISOLATION DEVICES

A. Restrained Spring Isolators: Freestanding, steel, open-spring isolators with seismic restraint.

1. Housing: Steel with resilient vertical-limit stops to prevent spring extension due to wind loads or if weight is removed; factory-drilled baseplate bonded to 1/4-inch- (6-mm-) thick, elastomeric isolator pad attached to baseplate underside; and adjustable equipment mounting and leveling bolt that acts as blocking during installation.

2. Outside Spring Diameter: Not less than 80 percent of compressed height of the spring at rated load.
3. Minimum Additional Travel: 50 percent of required deflection at rated load.
4. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.

2.9 FINISHES

A. Indoor Enclosures and Components: Manufacturer's standard finish over corrosion-resistant pretreatment and compatible primer.

2.10 SOURCE QUALITY CONTROL

A. Prototype Testing: Factory test engine-generator set using same engine model, constructed of identical or equivalent components and equipped with identical or equivalent accessories.

1. Tests: Comply with NFPA 110, Level 1 Energy Converters and with IEEE 115.

B. Project-Specific Equipment Tests: Before shipment, factory test engine-generator set and other system components and accessories manufactured specifically for this Project. Perform tests at rated load and power factor. Include the following tests:

1. Test components and accessories furnished with installed unit that are not identical to those on tested prototype to demonstrate compatibility and reliability.
2. Full load run.
3. Maximum power.
4. Voltage regulation.
5. Transient and steady-state governing.
6. Single-step load pickup.
7. Safety shutdown.
8. Provide 14 days' advance notice of tests and opportunity for observation of tests by Owner's representative.
9. Report factory test results within 10 days of completion of test.

2.11 DUPLEX FUEL-OIL TRANSFER PUMP SETS

A. Basis-of-Design Product: Subject to compliance with requirements, provide product comparable with one of the following:

1. Alyan Pump Company.
2. Hydronic Modules Corporation.
3. Preferred Utilities Manufacturing Corporation.
4. Smith-Koch, Inc.
5. Webster Fuel Pumps & Valves; a division of Capital City Tool, Inc.

B. Description: Comply with HI M109.

1. Listed and labeled for fuel-oil service by an NRTL acceptable to authorities having jurisdiction.
2. Type: Positive-displacement, rotary type.
3. Impeller: Steel gear with crescent.
4. Housing: Cast-iron foot mounted.
5. Bearings: Bronze, self-lubricating.
6. Shaft: Polished steel.
7. Seals: Mechanical.
8. Base: Steel.
9. Pressure Relief: Built in.
10. Discharge Check Valve: Built in.

C. Drive: Gear reducer, Direct close coupled.

D. Controls:

1. Run pumps to maintain minimum manifold pressure with outdoor-air temperature less than 60 deg F.
2. Run pumps on seven-day schedule.
3. Stage pumps on pressure at a common supply manifold.
4. Alternate pumps to equalize run time.
5. Alarm motor failure.
6. Manual reset dry-run protection. Stop pumps if fuel level falls below pump suction.
7. Deenergize and alarm pump locked rotor condition.
8. Alarm open circuit, high and low voltage.
9. Indicating lights for power on, run, and off normal conditions.
10. Interface with automatic control system to control and indicate the following:

    a. Start/stop pump set when required by schedule, fuel-fired appliance operation, day tank level control, or weather conditions.
    b. Operating status.
    c. Alarm off-normal status.

E. Motor: Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors.

1. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven loads will not require motor to operate in service factor range above 1.0.
2. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections per NEC.

F. Piping Furnished with Pumps: Steel with ferrous fittings and threaded or welded joints.

G. Strainers Furnished with Pumps: Duplex, basket type with corrosion-resistant-metal-screen baskets.

H. Capacities and Characteristics:

1. Capacity (Each Pump): 155GPH.
2. Motor Speed: 1725rpm.
3. Motor Horsepower 2/2HP.
4. Electrical Characteristics (Pump Set):

a. Volts: 480VAC.
b. Phase: Three.
c. Hertz: 60.

2.12 CONCRETE PAD

A. Portland cement concrete

1. Compressive strength (minimum, 28 days): 5000psi

B. Aggregate: Broken stone or gravel conforming to ASTM C33, Size No. 57

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas, equipment bases, and conditions, with Installer present, for compliance with requirements for installation and other conditions affecting packaged engine-generator performance.

B. Examine roughing-in of piping systems and electrical connections. Verify actual locations of connections before packaged engine-generator installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with packaged engine-generator manufacturers' written installation and alignment instructions and with NFPA 110.

B. Provide temporary generator as shown to ensure that no interruption of emergency service occurs during generator installation.

C. Remove existing generator and the all associated appurtenances as shown on the plans including the concrete pad.

D. Provide new concrete pad.

E. Install packaged engine generator to provide access, without removing connections or accessories, for periodic maintenance.

F. Install packaged engine generator with restrained spring isolators having a minimum deflection of 1 inch on 4-inch high concrete base. Secure sets to anchor bolts installed in concrete bases.

G. Install Schedule 40, black steel piping with welded joints and connect to engine muffler. Install thimble at ceiling. Piping shall be same diameter as muffler outlet. Flexible connectors and steel piping materials and installation requirements shall be as shown on plans.

H. Electrical Wiring: Install electrical devices furnished by equipment manufacturers but not specified to be factory mounted.

I. Transfer Pumps:

1. Install pumps with access space for periodic maintenance including removal of motors, impellers, and accessories.
2. Set pumps on and anchor to concrete base.

J. Shroud:

1. Remove existing shroud connecting the generator with plenum. Install new actuator and ensure that the intake/exhaust dampers work properly.

2. Install new shroud to make connection between the generator radiator and the plenum. Make provision for a flexible connection at radiator end.

K. Concrete Pad removal/installation:

1. Remove existing concrete pad and an additional 2 inch of the room slab.

2. Roughen concrete surface

3. Clean surface from any loose debris.

4. Provide reinforcement bars as shown in the plans.

5. Pour concrete with strength not less then 5000psi

6. Cure as per American Concrete Institute (ACI) requirements

3.3 CONNECTIONS

A. Piping installation requirements areas shown on drawings. Drawings indicate general arrangement of piping and specialties.

B. Connect fuel pipe to engine with flexible connector.

C. Connect fuel piping to engines with a gate valve and union and flexible connector.

1. Piping, valves, and specialties for fuel systems are as shown on plans.

D. Ground equipment according to wiring diagram shown in the plans.

E. Connect wiring according to Division 26 Section "Insulated Wire and Cables."

3.4 IDENTIFICATION

A. Identify system components according to Division 26 Section "Basic Electrical Materials and Methods".

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections and prepare test reports.

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

C. Perform tests and inspections and prepare test reports.

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. Perform tests recommended by manufacturer and each electrical test and visual and mechanical inspection for "AC Generators and for Emergency Systems" specified in NETA Acceptance Testing Specification. Certify compliance with test parameters.
2. NFPA 110 Acceptance Tests: Perform tests required by NFPA 110 that are additional to those specified here including, but not limited to, single-step full-load pickup test.
3. Battery Tests: Equalize charging of battery cells according to manufacturer's written instructions. Record individual cell voltages.

    a. Measure charging voltage and voltages between available battery terminals for full-charging and float-charging conditions. Check electrolyte level and specific gravity under both conditions.
    b. Test for contact integrity of all connectors. Perform an integrity load test and a capacity load test for the battery.
    c. Verify acceptance of charge for each element of the battery after discharge.
    d. Verify that measurements are within manufacturer's specifications.

4. Battery-Charger Tests: Verify specified rates of charge for both equalizing and float-charging conditions.
5. System Integrity Tests: Methodically verify proper installation, connection, and integrity of each element of engine-generator system before and during system operation. Check for air, exhaust, and fluid leaks.
6. Exhaust Emissions Test: Comply with applicable government test criteria.

7. Voltage and Frequency Transient Stability Tests: Use recording oscilloscope to measure voltage and frequency transients for 50 and 100 percent step-load increases and decreases, and verify that performance is as specified.
8. Harmonic-Content Tests: Measure harmonic content of output voltage under 25 percent and at 100 percent of rated linear load. Verify that harmonic content is within specified limits.

E. Coordinate tests with tests for transfer switches and run them concurrently.

F. Test instruments shall have been calibrated within the last 12 months, traceable to standards of NIST, and adequate for making positive observation of test results. Make calibration records available for examination on request.

G. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.

H. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.

I. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

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

K. Retest: Correct deficiencies identified by tests and observations and retest until specified requirements are met.

L. Report results of tests and inspections in writing. Record adjustable relay settings and measured insulation resistances, time delays, and other values and observations. Attach a label or tag to each tested component indicating satisfactory completion of tests.

M. Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each power wiring termination and each bus connection. Remove all access panels so terminations and connections are accessible to portable scanner.

1. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan 11 months after date of Substantial Completion.
2. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
3. Record of Infrared Scanning: Prepare a certified report that identifies terminations and connections checked and that describes scanning results.

Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.6 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain packaged engine generators.

3.7 TRAINING

A. The equipment supplier shall provide training for the facility operating personnel covering operation and maintenance of all equipment provided.

B. The training program shall be not less than 8 hours in duration and the class size shall be limited to 5 persons per model startup.

C. Training date shall be coordinated with facility owner with at least seven (7) day advance notice.

3.8 MEASUREMENT AND PAYMENT

A. All pay items shall include all materials, generator, wire, conduit, concrete pad, EMT, remove and disposal, fuel pump, labor, and equipment necessary to furnish and install, test, mark and label a complete, operational, and acceptable system as specified herein and as shown on the plans. Payment of items shall include all testing and guarantee required by the specifications and special provisions.

The pay item(s) for this Section includes:

8001 Lump sum of Temporary Generator

Contractor shall be paid a lump sum for temporary generator. This price shall include installation, rental, cables, all temporary connections and maintaining the generator in service, including refueling as necessary. The price shall also include removal of generator and restoring area to match existing conditions.

8002 Lump sum of Demolition/removal, generator set 155kW including accessories

8003 Lump sum of Demolition/removal of concrete pad

8004 Lump sum of Demolition/removal of ATS, Disc., conduits, wiring

8005 Lump sum of Concrete pad construction

8006 Pound of Metal duct work, fabricated rectangular, galvanized steel, 200 to 500lb includes fitting, joints, supports and allowance for a flexible connection, excludes insulation

8007 Lump sum of Generator set, diesel, 3phase 4wire, 277/480V, 250KW, including battery charger, muffler and automatic transfer switch (ATS)

8021 Linear foot of Electric metallic tubing (EMT), ¾" Inch Diameter

8022 Linear foot of Electric metallic tubing (EMT), 1" Inch Diameter

8023 Linear foot of Electric metallic tubing (EMT), 2" Inches Diameter

8024 Linear foot of Electric metallic tubing (EMT), 3" Inches Diameter

8025 Lump sum of Fuel oil specialties, fuel pump, duplex set with lead/lag controller 1/2HP 155GPH

8026 Linear foot of Galvanized Rigid Steel Pipe, black, ½" Inches Diameter

8027 Lump sum of Fuel Pump controls installation and integration in Boiler room controls

8028 Lump sum of Penetration thru ceiling and installation of timber

8029 Lump sum of Miscellaneous work, repair to wall, paint touch up and cleaning

8030 Lump sum of Remove and replace corrugated roof over the Intake shaft

END OF SECTION 263213