BID OF_____

2017

PROPOSAL, CONTRACT, BOND AND SPECIFICATIONS

FOR

STATE STREET CAPITOL GARAGE RELIGHTING AND ELECTRICAL CONTROLS AND UPGRADE

CONTRACT NO. 7910

PROJECT NO. 140082

MUNIS NO. 16126

IN

MADISON, DANE COUNTY, WISCONSIN

AWARDED BY THE COMMON COUNCIL
MADISON, WISCONSIN ON_____

CITY ENGINEERING DIVISION
1600 EMIL STREET
MADISON, WISCONSIN 53713

https://bidexpress.com/login

STATE STREET CAPITOL GARAGE RELIGHTING AND ELECTRICAL CONTROLS AND UPGRADE
CONTRACT NO. 7910

INDEX

This Proposal, and Agreement have
been prepared by:

CITY ENGINEERING DIVISION
CITY OF MADISON
MADISON, DANE COUNTY, WISCONSIN

David C. Dryer, P.E., City Traffic Engineer and
Parking Utility Manager

DCD: wp

SECTION A: ADVERTISEMENT FOR BIDS AND INSTRUCTIONS TO BIDDERS

REQUEST FOR BID FOR PUBLIC WORKS CONSTRUCTION
CITY OF MADISON, WISCONSIN

A BEST VALUE CONTRACTING MUNICIPALITY

PROJECT NAME:	STATE STREET CAPITOL GARAGE RELIGHTING AND ELECTRICAL CONTROLS AND UPGRADE
CONTRACT NO.:	7910
SBE GOAL	5%
BID BOND	5%
PRE BID MEETING (1:00 P.M.)	3/17/2017
PREQUALIFICATION APPLICATION DUE (1:00 P.M)	3/17/2017
BID SUBMISSION (1:00 P.M.)	3/24/2017
BID OPEN (1:30 P.M.)	3/24/2017
PUBLISHED IN WSJ	3/3/2017 & 3/10/2017 & 3/17/2017

PRE BID MEETING: Representatives of the Affirmative Action Department will be present to discuss the Small Business Enterprise requirements at 1600 Emil Street, Madison Wisconsin.

PREQUALIFICATION APPLICATION: Forms are available on our website, www.cityofmadison.com/business/pw/forms.cfm. If not currently prequalified in the categories listed in Section A, an amendment to your Prequalification will need to be submitted prior to the same due date. Postmark is not applicable.

BIDS TO BE SUBMITTED by hand to 1600 EMIL ST., MADISON, WI 53713 or online at www.bidexpress.com.

THE BID OPENING is at 1600 EMIL ST., MADISON, WI 53713.

STANDARD SPECIFICATIONS

The City of Madison's Standard Specifications for Public Works Construction - 2017 Edition, as supplemented and amended from time to time, forms a part of these contract documents as if attached hereto.

These standard specifications are available on the City of Madison Public Works website, www.cityofmadison.com/Business/PW/specs.cfm.

The Contractor shall review these Specifications prior to preparation of proposals for the work to be done under this contract, with specific attention to Article 102, "BIDDING REQUIREMENTS AND CONDITIONS" and Article 103, "AWARD AND EXECUTION OF THE CONTRACT." For the convenience of the bidder, below are highlights of three subsections of the specifications.

SECTION 102.1: PRE-QUALIFICATION OF BIDDERS

In accordance with Wisconsin State Statutes 66.0901 (2) and (3), all bidders must submit to the Board of Public Works proof of responsibility on forms furnished by the City. The City requires that all bidders be qualified on a biennial basis.

Bidders must present satisfactory evidence that they have been regularly engaged in the type of work specified herein and they are fully prepared with necessary capital, materials, machinery and supervisory personnel to conduct the work to be contracted for to the satisfaction of the City. All bidders must be pre-qualified by the Board of Public Works for the type of construction on which they are bidding prior to the opening of the bid.

In accordance with Section 39.02(9)(a)l. of the General Ordinances, all bidders shall submit in writing to the Affirmative Action Division Manager of the City of Madison, a Certificate of Compliance or an Affirmative Action Plan at the same time or prior to the submission of the proof of responsibility forms.

The bidder shall be disqualified if the bidder fails to or refuses to, prior to opening of the bid, submit a Certificate of compliance, Affirmative Action Plan or Affirmative Action Data Update, as applicable, as defined by Section 39.02 of the General Ordinances (entitled Affirmative Action) and as required by Section 102.11 of the Standard Specifications.

SECTION 102.4 PROPOSAL

No bid will be accepted that does not contain an adequate or reasonable price for each and every item named in the Schedule of Unit Prices.

A lump sum bid for the work in accordance with the plans and specifications is required. The lump sum bid must be the same as the total amounts bid for the various items and it shall be inserted in the space provided.

All papers bound with or attached to the proposal form are considered a part thereof and must not be detached or altered when the proposal is submitted. The plans, specifications and other documents designated in the proposal form will be considered a part of the proposal whether attached or not.

A proposal submitted by an individual shall be signed by the bidder or by a duly authorized agent. A proposal submitted by a partnership shall be signed by a member/partner or by a duly authorized agent thereof. A proposal submitted by a corporation shall be signed by an authorized officer or duly authorized registered agent of such corporation, and the proposal shall show the name of the State under the laws of which such corporation was chartered. The required signatures shall in all cases appear in the space provided thereof on the proposal.

Each proposal shall be placed, together with the proposal guaranty, in a sealed envelope, so marked as to indicate name of project, the contract number or option to which it applies, and the name and address of the Contractor or submitted electronically through Bid Express (www.bidexpress.com). Proposals will be accepted at the location, the time and the date designated in the advertisement. Proposals received after the time and date designated will be returned to the bidder unopened.

SECTION 102.5: BID DEPOSIT (PROPOSAL GUARANTY)

All bids, sealed or electronic, must be accompanied with a Bid Bond equal to at least 5% of the bid or a Certificate of Annual/Biennial Bid Bond or certified check, payable to the City Treasurer. Bid deposit of the successful bidders shall be returned within forty-eight (48) hours following execution of the contract and bond as required.

MINOR DISCREPENCIES

Bidder is responsible for submitting all forms necessary for the City to determine compliance with State and City bidding requirements. Nothwithstanding any language to the contrary contained herein, the City may exercise its discretion to allow bidders to correct or supplement submissions after bid opening, if the minor discrepancy, bid irregularity or omission is insignificant and not one related to price, quality, quantity, time of completion or performance of the contract.

Bidders for this Contract(s) must be Pre-Qualified for at least one of the following type(s) of construction denoted by an ☒

Building Demolition

101 ☐ Asbestos Removal
120 ☐ House Mover
110 ☐ Building Demolition

Street, Utility and Site Construction

201 ☐ Asphalt Paving
205 ☐ Blasting
210 ☐ Boring/Pipe Jacking
215 ☐ Concrete Paving
220 ☐ Con. Sidewalk/Curb & Gutter/Misc. Flat Work
221 ☐ Concrete Bases and Other Concrete Work
222 ☐ Concrete Removal
225 ☐ Dredging
230 ☐ Fencing
235 ☐ Fiber Optic Cable/Conduit Installation
240 ☐ Grading and Earthwork
241 ☐ Horizontal Saw Cutting of Sidewalk
242 ☐ Infrared Seamless Patching
245 ☐ Landscaping, Maintenance
246 ☐ Ecological Restoration
250 ☐ Landscaping, Site and Street
251 ☐ Parking Ramp Maintenance
252 ☐ Pavement Marking
255 ☐ Pavement Sealcoating and Crack Sealing
260 ☐ Petroleum Above/Below Ground Storage Tank Removal/Installation
262 ☐ Playground Installer
265 ☐ Retaining Walls, Precast Modular Units
270 ☐ Retaining Walls, Reinforced Concrete
275 ☐ Sanitary, Storm Sewer and Water Main Construction
276 ☐ Sawcutting
280 ☐ Sewer Lateral Drain Cleaning/Internal TV Insp.
285 ☐ Sewer Lining
290 ☐ Sewer Pipe Bursting
295 ☐ Soil Borings
300 ☐ Soil Nailing
305 ☐ Storm & Sanitary Sewer Laterals & Water Svc.
310 ☐ Street Construction
315 ☐ Street Lighting
318 ☐ Tennis Court Resurfacing
320 ☐ Traffic Signals
325 ☐ Traffic Signing & Marking
332 ☐ Tree pruning/removal
333 ☐ Tree, pesticide treatment of
335 ☐ Trucking
340 ☐ Utility Transmission Lines including Natural Gas, Electrical & Communications
399 ☐ Other_____

Bridge Construction

501 ☐ Bridge Construction and/or Repair

Building Construction

401 ☐ Floor Covering (including carpet, ceramic tile installation, rubber, VCT
402 ☐ Building Automation Systems
403 ☐ Concrete
404 ☐ Doors and Windows
405 ☒ Electrical - Power, Lighting & Communications
410 ☐ Elevator - Lifts
412 ☐ Fire Suppression
413 ☐ Furnishings - Furniture and Window Treatments
415 ☐ General Building Construction, Equal or Less than $250,000
420 ☐ General Building Construction, $250,000 to $1,500,000
425 ☐ General Building Construction, Over $1,500,000
428 ☐ Glass and/or Glazing
429 ☐ Hazardous Material Removal
430 ☐ Heating, Ventilating and Air Conditioning (HVAC)
433 ☐ Insulation - Thermal
435 ☐ Masonry/Tuck pointing
437 ☐ Metals
440 ☐ Painting and Wallcovering
445 ☐ Plumbing
450 ☐ Pump Repair
455 ☐ Pump Systems
460 ☐ Roofing and Moisture Protection
464 ☐ Tower Crane Operator
461 ☐ Solar Photovoltaic/Hot Water Systems
465 ☐ Soil/Groundwater Remediation
466 ☐ Warning Sirens
470 ☐ Water Supply Elevated Tanks
475 ☐ Water Supply Wells
480 ☐ Wood, Plastics & Composites - Structural & Architectural
499 ☐ Other_____
_____

State of Wisconsin Certifications

1 ☐ Class 5 Blaster - Blasting Operations and Activities 2500 feet and closer to inhabited buildings for quarries, open pits and road cuts.
2 ☐ Class 6 Blaster - Blasting Operations and Activities 2500 feet and closer to inhabited buildings for trenches, site excavations, basements, underwater demolition, underground excavations, or structures 15 feet or less in height.
3 ☐ Class 7 Blaster - Blasting Operations and Activities for structures greater than 15 ' in height, bridges, towers, and any of the objects or purposes listed as “Class 5 Blaster or Class 6 Blaster”.
4 ☐ Petroleum Above/Below Ground Storage Tank Removal and Installation (Attach copies of State Certifications.)
5 ☐ Hazardous Material Removal (Contractor to be certified for asbestos and lead abatement per the Wisconsin Department of Health Services, Asbestos and Lead Section (A&LS).) See the following link for application: www.dhs.wisconsin.gov/Asbestos/Cert. State of Wisconsin Performance of Asbestos Abatement Certificate must be attached.
6 ☐ Certification number as a Certified Arborist or Certified Tree Worker as administered by the International Society of Arboriculture
7 ☐ Pesticide application (Certification for Commercial Applicator For Hire with the certification in the category of turf and landscape (3.0) and possess a current license issued by the DATCP)
8 ☐ State of Wisconsin Master Plumbers License.

SECTION B: PROPOSAL

Please refer to the Bid Express Website at https://bidexpress.com look up contract number and go to Section B: Proposal Page

You can access all City of Madison bid solicitations for FREE at www.bidexpress.com

Click on the "Register for Free" button and follow the instructions to register your company and yourself. You will be asked for a payment subscription preference, since you may wish to bid online someday. Simply choose the method to pay on a 'per bid' basis. This requires no payment until / unless you actually bid online. You can also choose the monthly subscription plan at this time. You will, however, be asked to provide payment information. Remember, you can change your preference at anytime. You will then be able to complete your free registration and have full access to the site. Your free access does not require completion of the 'Digital ID' process, so you will have instant access for viewing and downloading. To be prepared in case you ever do wish to bid online, you may wish to establish your digital ID also, since you cannot bid without a Digital ID.

If you have any problems with the free registration process, you can call the bidexpress help team, toll free at 1-888-352-2439 (option 1, option1).

SECTION C: SMALL BUSINESS ENTERPRISE

Instructions to Bidders
City of Madison
SBE Program Information

2 Small Business Enterprise (SBE) Program Information

2.1 Policy and Goal

The City of Madison reaffirms its policy of nondiscrimination in the conduct of City business by maintaining a procurement process which remains open to all who have the potential and ability to sell goods and services to the City. It is the policy of the City of Madison to allow Small Business Enterprises (SBE) maximum feasible opportunity to participate in City of Madison contracting. The bidder acknowledges that its bid has been submitted in accordance with the SBE program and is for the public's protection and welfare.

Please refer to the "ADVERTISEMENT FOR BIDS" for the goal for the utilization of SBEs on this project. SBEs may participate as subcontractors, vendors and/or suppliers, which provide a commercially useful function. The dollar value for SBE suppliers or 'materials only' vendors shall be discounted to 60% for purposes of meeting SBE goals.

A bidder which achieves or exceeds the SBE goal will be in compliance with the SBE requirements of this project. In the event that the bidder is unable to achieve the SBE goal, the bidder must demonstrate that a good faith effort to do so was made. Failure to either achieve the goal or demonstrate a good faith effort to do so will be grounds for the bidder being deemed a non-responsible contractor ineligible for award of this contract.

A bidder may count towards its attainment of the SBE goal only those expenditures to SBEs that perform a commercially useful function. For purposes of evaluating a bidder's responsiveness to the attainment of the SBE goal, the contract participation by an SBE is based on the percentage of the total base bid proposed by the Contractor. The total base bid price is inclusive of all addenda.

Work performed by an SBE firm in a particular transaction can be counted toward the goal only if it involves a commercially useful function. That is, in light of industry practices and other relevant considerations, does the SBE firm have a necessary and useful role in the transaction, of a kind for which there is a market outside the context of the SBE Program, or is the firm's role a superfluous step added in an attempt to obtain credit towards goals? If, in the judgment of the Affirmative Action Division, the SBE firm will not perform a commercially useful function in the transaction, no credit towards goals will be awarded.

The question of whether a firm is performing a commercially useful function is completely separate from the question of whether the firm is an eligible SBE. A firm is eligible if it meets the definitional criteria and ownership and control requirements, as set forth in the City of Madison's SBE Program.

If the City of Madison determines that the SBE firm is performing a commercially useful function, then the City of Madison must then decide what that function is. If the commercially useful function is that of an SBE vendor / supplier that regularly transacts business with the respective product, then the City of Madison will count 60% of the value of the product supplied toward SBE goals.

To be counted, the SBE vendor / supplier must be engaged in selling the product in question to the public. This is important in distinguishing an SBE vendor / supplier, which has a regular trade with a variety of customers, from a firm which performs supplier-like functions on an ad hoc basis or for only one or two contractors with whom it has a special relationship.

A supplier of bulk goods may qualify as an eligible SBE vendor / supplier if it either maintains an inventory or owns or operates distribution equipment. With respect to the distribution equipment; e.g., a fleet of trucks, the term "operates" is intended to cover a situation in which the supplier leases the equipment on a regular basis for its entire business. It is not intended to cover a situation in which the firm simply provides drivers for trucks owned or leased by another party; e.g., a prime contractor, or leases such a party's trucks on an ad hoc basis for a specific job.

If the commercially useful function being performed is not that of a qualified SBE vendor / supplier, but rather that of delivery of products, obtaining bonding or insurance, procurement of personnel, acting as a broker or manufacturer's representative in the procurement of supplies, facilities, or materials, etc., only the fees or commissions will apply towards the goal.

For example, a business that simply transfers title of a product from manufacturer to ultimate purchaser; e. g., a sales representative who re-invoices a steel product from the steel company to the Contractor, or a firm that puts a product into a container for delivery would not be considered a qualified SBE vendor / supplier. The Contractor would not receive credit based on a percentage of the cost of the product for working with such firms.

Concerning the use of services that help the Contractor obtain needed supplies, personnel, materials or equipment to perform a contract: only the fee received by the service provider will be counted toward the goal. For example, use of a SBE sales representative or distributor for a steel company, if performing a commercially useful function at all, would entitle the Contractor receiving the steel to count only the fee paid to the representative or distributor toward the goal. This provision would also govern fees for professional and other services obtained expressly and solely to perform work relating to a specific contract.

Concerning transportation or delivery services: if an SBE trucking company picks up a product from a manufacturer or a qualified vendor / supplier and delivers the product to the Contractor, the commercially useful function it is performing is not that of a supplier, but simply that of a transporter of goods. Unless the trucking company is itself the manufacturer or a qualified vendor / supplier in the product, credit cannot be given based on a percentage of the cost of the product. Rather, credit would be allowed for the cost of the transportation service.

The City is aware that the rule's language does not explicitly mention every kind of business that may contribute work on this project. In administering these programs, the City would, on a case-by-case basis, determine the appropriate counting formula to apply in a particular situation.

2.2 Contract Compliance

Questions concerning the SBE Program shall be directed to the Contract Compliance Officer of the City of Madison Department of Civil Rights, Affirmative Action Division, 210 Martin Luther King, Jr. Blvd., Room 523, Madison, WI 53703; telephone (608) 266-4910.

2.3 Certification of SBE by City of Madison

The Affirmative Action Division maintains a directory of SBEs which are currently certified as such by the City of Madison. Contact the Contract Compliance Officer as indicated in Section 2.2 to receive a copy of the SBE Directory or you may access the SBE Directory online at www.cityofmadison.com/dcr/aaTBDir.cfm.

All contractors, subcontractors, vendors and suppliers seeking SBE status must complete and submit the **Targeted Business Certification Application** to the City of Madison Affirmative Action Division by the time and date established for receipt of bids. A copy of the Targeted Business Certification Application is available by contacting the Contract Compliance Officer at the address and telephone indicated in Section 2.2 or you may access the Targeted Business Certification Application online at www.cityofmadison.com/dcr/aaTBDir.cfm. Submittal of the Targeted Business Certification Application by the time specified does not guarantee that the applicant will be certified as a SBE eligible to be utilized towards meeting the SBE goal for this project.

2.4 Small Business Enterprise Compliance Report

2.4.1 Good Faith Efforts

Bidders shall take all necessary affirmative steps to assure that SBEs are utilized when possible and that the established SBE goal for this project is achieved. A contractor who self performs a portion of the work, and is pre-qualified to perform that category of work, may subcontract that portion of the work, but shall not be required to do so. When a bidder is unable to achieve the established SBE goal, the bidder must demonstrate that a good faith effort to do so was made. Such a good faith effort should include the following:

2.4.1.1 Attendance at the pre-bid meeting.

2.4.1.2 Using the City of Madison's directory of certified SBEs to identify SBEs from which to solicit bids.

2.4.1.3 Assuring that SBEs are solicited whenever they are potential sources.

2.4.1.4 Referring prospective SBEs to the City of Madison Affirmative Action Division for certification.

2.4.1.5 Dividing total project requirements into smaller tasks and/or quantities, where economically feasible, to permit maximum feasible SBE participation.

2.4.1.6 Establishing delivery schedules, where requirements permit, which will encourage participation by SBEs.

2.4.1.7 Providing SBEs with specific information regarding the work to be performed.

2.4.1.8 Contacting SBEs in advance of the deadline to allow such businesses sufficient time to prepare a bid.

2.4.1.9 Utilizing the bid of a qualified and competent SBE when the bid of such a business is deemed reasonable (i.e. 5% above the lowest bidder), although not necessarily low.

2.4.1.10 Contacting SBEs which submit a bid, to inquire about the details of the bid and confirm that the scope of the work was interpreted as intended.

2.4.1.11 Completion of Cover Page (page C-6), Summary Sheet (page C-7) and SBE Contact Reports (pages C-8 and C9) if applicable.

2.4.2 **Reporting SBE Utilization and Good Faith Efforts**

The Small Business Enterprise Compliance Report is to be submitted by the bidder with the bid: This report is due by the specified bid closing time and date. Bids submitted without a completed SBE Compliance Report as outlined below may be deemed non-responsible and the bidder ineligible for award of this contract. Nothwithstanding any language to the contrary contained herein, the City may exercise its discretion to allow bidders to correct or supplement submissions after bid opening, if the minor discrepancy, bid irregularity or omission is insignificant and not one related to price, quality, quantity, time of completion, performance of the contract, or percentage of SBE utilization.

2.4.2.1 If the Bidder meets or exceeds the goal established for SBE utilization, the Small Business Enterprise Compliance Report shall consist of the following:

2.4.2.1.1 **Cover Page,** Page C-6; and
2.4.2.1.2 **Summary Sheet,** C-7.

2.4.2.2 If the bidder does not meet the goal established for SBE utilization, the Small Business Enterprise Compliance Report shall consist of the following:

2.4.2.2.1 **Cover Page,** Page C-6;
2.4.2.2.2 **Summary Sheet,** C-7; and
2.4.2.2.3 **SBE Contact Report,** C-8 and C-9. (A separate Contact Report must be completed for each applicable SBE which is not utilized.)

2.5 Appeal Procedure

A bidder which does not achieve the established goal and is found non-responsible for failure to demonstrate a good faith effort to achieve such goal and subsequently denied eligibility for award of contract may appeal that decision to the Small Business Enterprises Appeals Committee. All appeals shall be made in writing, and shall be delivered to and received by the City Engineer no later than 4:30 PM on the third business day following the bidder's receipt of the written notification of ineligibility by the Affirmative Action Division Manager. Postmark not acceptable. The notice of appeal shall state the basis for the appeal of the decision of the Affirmative Action Division Manager. The Appeal shall take place in accordance with Madison General Ordinance 33.54.

2.6 SBE Requirements After Award of the Contract

The successful bidder shall identify SBE subcontractors, suppliers and vendors on the subcontractor list in accordance with the specifications. The Contractor shall submit a detailed explanation of any variances between the listing of SBE subcontractors, vendors and/or suppliers on the subcontractor list and the Contractor's SBE Compliance Report for SBE participation.

No change in SBE subcontractors, vendors and/or suppliers from those SBEs indicated in the SBE Compliance Report will be allowed without prior approval from the Engineer and the Affirmative Action Division. The contractor shall submit in writing to the City of Madison Affirmative Action Division a request to change any SBE citing specific reasons which necessitate such a change. The Affirmative Action Division will use a general test of reasonableness in approving or rejecting the contractor's request for change. If the request is approved, the Contractor will make every effort to utilize another SBE if available.

The City will monitor the project to ensure that the actual percentage commitment to SBE firms is carried out.

2.7 SBE Definition and Eligibility Guidelines

A Small Business Enterprise is a business concern awarded certification by the City of Madison. For the purposes of this program a Small Business Enterprise is defined as:

A. An independent business operated under a single management. The business may not be a subsidiary of any other business and the stock or ownership may not be held by any individual or any business operating in the same or a similar field. In determining whether an entity qualifies as a SBE, the City shall consider all factors relevant to being an independent business including, but not limited to, the date the business was established, adequacy of its resources for the work in which it proposes to involve itself, the degree to which financial, equipment leasing and other relationships exist with other ineligible firms in the same or similar lines of work. SBE owner(s) shall enjoy the customary incidents of ownership and shall share in the risks and profits commensurate with their enjoyment interests, as demonstrated by an examination of the substance rather than form or arrangements that may be reflected in its ownership documents.

B. A business that has averaged no more than $4.0 million in annual gross receipts over the prior three year period and the principal owner(s) do not have a personal net worth in excess of $1.32 million.

Firm and/or individuals that submit fraudulent documents/testimony may be barred from doing business with the City and/or forfeit existing contracts.

SBE certification is valid for one (1) year unless revoked.

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Small Business Enterprise Compliance Report

This information may be submitted electronically through Bid Express or submitted with bid in sealed envelope.

Cover Sheet

Prime Bidder Information

Company:_____

Address:_____

Telephone Number:_____ Fax Number:_____

Contact Person/Title:_____

Prime Bidder Certification

I, _____, _____ of
Name Title

_____ certify that the information
Company

contained in this SBE Compliance Report is true and correct to the best of my knowledge and belief.

_____ _____
Witness' Signature Bidder's Signature

_____
Date

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Small Business Enterprise Compliance Report

Summary Sheet

SBE Subcontractors Who Are NOT Suppliers

Name(s) of SBEs Utilized	Type of Work	% of Total Bid Amount
		%
		%
		%
		%
		%
		%
		%
		%
		%
		%
		%
		%
		%

Subtotal SBE who are NOT suppliers: _____ %

SBE Subcontractors Who Are Suppliers

Name(s) of SBEs Utilized	Type of Work	% of Total Bid Amount
		%
		%
		%
		%
		%
		%

Subtotal Contractors who are suppliers: _____ % x 0.6 = _____ % (discounted to 60%)

Total Percentage of SBE Utilization: _____%.

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Small Business Enterprise Compliance Report

SBE Contact Report

Submit separate copy of this form for each SBE which you are not able to utilize towards meeting the SBE goal for this project. Attach separate sheets if necessary.

SBE Information

Company: _____

Address: _____

Telephone Number: _____

Contact Person/Title: _____

1. Outline below all efforts to solicit a bid from the above SBE. Include date, means of contact, who from your company made this contact and the result.

   _____

   _____

   _____

2. Describe the information provided to the aforementioned SBE regarding the scope of work for which he/she was to provide a bid.

   _____

   _____

   _____

   Is this the same scope of work on which the subcontractor you intend to utilize based his/her bid?

   ☐ Yes ☐ No

3. Did this SBE submit a bid? ☐ Yes ☐ No

4. Is the General Contractor pre-qualified to self-perform this category of work?

   ☐ Yes ☐ No

5. If you responded “Yes” to Question 3, please check the items below which apply and provide the requested detail. If you responded “No” to Question 3, please skip ahead to item 6 below.

☐ The SBE listed above is unavailable for work on this project for the following reasons. Provide specific detail for this conclusion.

_____

_____

☐ The SBE listed above is unqualified for work on this project. Provide specific details for this conclusion.

_____

_____

☐ The SBE listed above provided a price that was unreasonable (i.e. more than 5% above the lowest bidder). Provide specific detail for this conclusion including the SBE’s price and the price of the subcontractor you intend to utilize.

_____

_____

☐ A contract with the SBE listed above may constitute a breach of the bidder’s collective bargaining agreements. Provide specific detail for this conclusion including, but not limited to, correspondence from the SBE indicating it will not sign a project labor agreement and/or correspondence from the applicable trade union indicating a project labor agreement will not be allowed at the time of project bidding.

_____

_____

☐ Other; please specify reason(s) other than listed above which made it impossible for you to utilize this SBE on this project.

_____

_____

6. Describe any other good faith efforts:

_____

_____

SECTION D: SPECIAL PROVISIONS

STATE STREET CAPITOL GARAGE RELIGHTING AND ELECTRICAL CONTROLS AND UPGRADE
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It is the intent of these Special Provisions to set forth the final contractual intent as to the matter involved and shall prevail over the Standard Specifications and plans whenever in conflict therewith. In order that comparisons between the Special Provisions can be readily made, the numbering system for the Special Provisions is equivalent to that of the Specifications.

Whenever in these Specifications the term "Standard Specifications" appears, it shall be taken to refer to the City of Madison Standard Specifications for Public Works Construction and Supplements thereto.

SECTION 102.12: BEST VALUE CONTRACTING

This Contract shall be considered a Best Value Contract if the Contractor's bid is equal to or greater than $59,000 for a single trade contract; or equal to or greater than $288,000 for a multi-trade contract pursuant to MGO 33.07(7).

GENERAL REQUIREMENTS

TABLE OF CONTENTS

1.01 WORK COVERED BY CONTRACT DOCUMENTS

A. This work covers electrical modifications and upgrades at the State Street Capitol parking garage including but not limited to the replacement of panel boards, wiring, conduits and luminaires throughout. Work will also include the addition of an Emergency Generator CO monitoring and elevator lobby power operated doors.

B. The electrical work to be done is shown on the plans/details and described in these specifications.

C. Ramp construction
   1. State Street Capitol (SSCo):
      a. Mild steel reinforced cast-in-place concrete (levels 1-3).
      b. Post-tensioned cast-in-place concrete (levels 4-6).

1.02 CONTRACTOR'S DUTIES

A. Except as specifically noted, provide and pay for:
   1. Labor, materials, and equipment.
   2. Tools, construction equipment, and machinery.
   3. Water, heat and utilities required for construction not part of the existing ramp system.
   4. Other facilities and services necessary for proper execution and completion of work.

B. Pay legally required sales, consumer and use taxes.

C. Secure and pay for, as necessary for proper execution and completion of work and as applicable at time of receipt for bids:
   1. Permits
   2. Government fees
   3. Licenses

D. Give required notices.

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

F. Contractor is responsible for complying with City Affirmative Action and Best Value Engineering requirements.

G. Promptly submit written notice to Engineer of observed variance of Contract Documents from legal requirements. It is not Contractor's responsibility to make certain that drawings and specifications comply with codes and regulations.

H. Appropriate modifications to Contract Documents will adjust necessary changes.

I. Assume responsibility for work known to be contrary to such requirements, without notice.

J. Enforce strict discipline and good order among employees. Do not employ on work, unfit persons or persons not skilled in assigned task.

1.03 CONTRACTS

A. Construct work under a Lump Sum contract.

1.04 TIME OF COMPLETION AND LIQUIDATED DAMAGES

A. Construction is anticipated to start on or before June 1, 2017 and to be completed by November 30, 2017.

B. The successful Contractor must agree to commence work on a date to be specified in a written Notice to Proceed and to fully complete by dates specified.

C. Liquidated damages for failure to complete construction by given date shall be as stated in the third paragraph of Section 109.9 of the City of Madison Standard Specifications for Public Works Construction – most current year.

D. Completion shall include all construction as outlined in the plans and specifications as well as removal of all materials, debris, barricades, and other construction related items from the site.

E. Final project closeout shall be completed within 30 days of the construction completion date for all work addressed above. Final project closeout shall include, but not be limited to, submittal of warranties, lien waivers, wage rate compliance affidavits, documents of completed work, and proper pay applications

F. Each day shall be defined as a twenty-four (24) hour period beginning at 12:01 AM.

1.05 WORK SEQUENCE

A. The Contractor will be allowed 70 parking stalls out of service for the work. The parking structure will be open during the weekends. Additional parking spaces may be made available upon request and will be reviewed on a case by case basis. The Contractor shall make as many spaces available as possible.

B. Contractor shall keep ramp attendant and cashier informed about the number of parking stalls out of service each day.

C. Contractor shall conduct their work between the hours of 7:00 a.m. and 7:00 p.m. Monday through Friday unless written request for special circumstances is acceptable to the Owner. Contractor shall plan work and make request in writing at least seven days prior to deviation from normal.

D. Prior to the weekend, the Contractor shall clean the site adequately and secure equipment to prevent vandalism, personal injury, or theft.

E. The Contractor will be asked to reduce the number and type of parking spaces out of service for Special Events dates. The city will provide the Contractor with a schedule of dates.

1.06 CONTRACTOR USE OF PUBLIC RIGHTS-OF-WAY

A. The Contractor’s proposed use of the site may require a Street Occupancy Permit.

B. The Contractor shall make application for a Street Occupancy Permit before proceeding with work in any public right-of-way. At the time of application for a Street Occupancy Certificate, the Contractor shall provide a drawing showing construction site fencing, construction entrances, proposed placement of equipment, and traffic routing.

C. A copy of the Street Occupancy Permit shall be at the job site during working hours.

D. Peak hour traffic flow in Madison occurs between the hours of 7:00 and 8:30 a.m. and between 3:30 and 5:30 p.m., Monday through Friday. During these hours work that will interfere with the flow of traffic shall not be permitted on or in the street governed by this permit.

E. All signing or barricading shall be done in conformance with the Federal "Uniform Manual on Traffic Control Devices".

F. For removal or replacement of traffic and parking signs, contact the City of Madison Traffic Engineering Field Operations, 1120 Sayle Street 266-4767, 8:00 a.m. - 4:00 p.m., 24 hours in advance of when you need the sign removed. <u>This service is provided free of charge</u>. If you remove the signs, you will be billed for reinstallation and any damage to the sign installation.

G. NO MATERIALS shall be stored in the street or street right of way.

H. A fence may be required around the occupancy area and the construction site depending on the Contractor's intended use. The occupancy area shall be considered part of the construction site. No stopping, standing or parking signs shall be installed, by the contractor, on the fence surrounding the construction site.

I. A clean, safe access route shall be provided to the parking ramp at all locations desired by the City of Madison, Parking Utility.

1.07 CONTRACTOR USE OF PREMISES

A. Confine operations at the site to areas permitted by law, ordinance, permits, and contract documents

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

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

D. Assume full responsibility for protection and safekeeping of products stored on the premises. Construction equipment, tools, etc. shall not be stored in areas of the Owner's continued use.

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

F. There is no storage for materials outside of Contractor's work area.

1.08 DEFINITIONS

A. CONTRACT DOCUMENTS - Contract documents for this project include but are not limited to:

1. Specifications and Drawings for “City of Madison 2016 State Street Capitol Ramp Electrical Modifications and Upgrades”.

2. General Conditions, which are included in the Standard Specifications for Public Works Construction, most current year, of the City of Madison, Department of Public Works. The Standard Specifications described above are available on request from the City Engineer, City Engineering Division, Room 115, City-County Building, Madison, Wisconsin 53709.
3. Architectural and structural drawings for the original construction. Drawings are available for review at the City Department of Transportation office.

B. SLAB - Flat, horizontal or ramped layers of reinforced concrete which spans and is supported by columns, beams or walls.

C. DRAWINGS - Graphical description of the work to be performed, designated.

D. SPECIFICATIONS - Written description of the work to be performed, designated.

1.09 PROJECT MEETINGS

A. Pre-Bid Meeting
1. Refer to Section A: Advertisement for Bids and Instructions to Bidders

B. Pre-Construction Meeting
1. Soon after award of Contract and prior to the start of construction, each Prime Contractor shall attend a pre-construction conference with representatives of the Owner and Engineer.
2. The Contractor shall have at the meeting responsible representatives from subcontractors who are to perform the work.
3. The Contractor shall submit the following information at the Pre-Construction Meeting:
   a. Construction Schedule
   b. List of Sub-Contractors
   c. Procedures for demolition
   d. Change-over dates for new electrical equipment and lighting
4. The Construction Schedule submitted by the Contractor shall describe in detail when each portion of the work is to be accomplished and subcontractors shall participate in the discussion. The Engineer will serve to interpret the Contract Documents should such questions arise. A representative of the Owner may also be present to discuss work to be completed by others in conjunction with this project and the Owner’s partial occupancy and use of the garage during construction.
5. Any other questions that the Contractor or subcontractors have about the work or its scheduling shall be raised at this meeting.
6. Requirements for contract administration and construction operations will be defined for participants.
7. Prepare in reproducible form approved by the Engineer and include:
   a. Breakdown of work activities in categories approved by Engineer, segmented as necessary to allow close monitoring of progress of the work during construction.
   b. Order of work necessary to meet Time for Completion.
   c. Breakdown of the work of all Subcontractors scheduled in cooperation with the Contractor's work.
   d. Signatures of all Contractors.
   e. Space for the additional display of actual performance on the schedule.

8. After necessary revisions and approval by the Engineer, provide two prints of project construction schedule to the Engineer.
9. Time, date and place of the meeting will be determined by the Engineer.

C. Progress Meetings
1. Biweekly project meetings will be held at the project site by the Engineer's representative and Owner's representative for the purpose of coordinating and expediting the Work progress.
2. Attendance at project meetings by all Prime Contractors, or their authorized representative, is mandatory.
3. Date and time of the meetings will be determined at the pre-construction meeting.
4. Contractors shall give verbal reports of progress on the project, discuss the work schedule for the coming period and present all conflicts, discrepancies or other difficulties for resolution.
5. Upon request of the Engineer, update the schedule to reflect changes required by actual conditions and indicate actual work completed. Provide the Engineer with same number of copies as required for original submission.
6. Show changes occurring since previous submission of schedule such as:
   a. Major changes in scope.
   b. Activities modified since previous submission.
   c. Revised projections of progress and completion.
   d. Other identifiable changes.
7. Provide a narrative report as needed to define:
   a. Problem areas, anticipated delays, and the impact on the schedule.
   b. Corrective action recommended, and its effect.
   c. The effect of changes in schedules of other Prime Contractors.
8. Where work is not performed according to the Construction Schedule, a short narrative should be written describing the cause of delay and intended action to remedy the delay.
9. When the work performed is not meeting the construction schedule, the Engineer may request that the contractor increase the labor and equipment being furnished in order to meet the schedule. Should the contractor choose not to follow the engineer's request he shall provide a written submittal explaining how the schedule is to be met without an increase in labor and equipment.

1.10 JOB SITE ADMINISTRATION

A. The Contractor shall have at the site of the work at all times, while work is in progress, a superintendent or foreman having authority both to receive orders from the Engineer and to act for the Contractor.

B. The Engineer will have a representative visit the site during the progress of the work.

C. The Engineer's inspections and project coordination shall take place between regular business hours of 7 a.m. to 5 p.m. The Contractor will take all necessary steps to allow the Engineer to carry out the Engineer’s duties without interference by noise or other construction activities.

1.11 SUBMITTALS

A. General
1. Refer to General Conditions for basic requirements for all submittals.
2. Refer to technical specifications for all submittals required.

B. Submittal Requirements
   1. Project information shall be first sent to the Engineer.
   2. Schedule submittals at least 14 days before the time that reviewed and approved submittals will be needed.
   3. Accompany submittals with transmittal letter containing the date, project title and number, Contractor's name and address, the quantity of items submitted, notifications of any deviations from Contract Documents, the Section of Work and other pertinent data.

C. Schedules
   1. Refer to Project Meetings.

D. Subcontractor and Materials List
   1. The Subcontractor and major suppliers list shall be submitted on or before the first pre-construction meeting.
   2. The Engineer will promptly review list and indicate in writing approval or disapproval of subcontractors and/or materials. Resubmit revised list, upon disapproval of any item, until such time as approval of all items has been obtained from the Engineer.
   3. Use of unspecified or unapproved materials and equipment will not be permitted.

E. Schedule of Values
   1. Before the first Application for Payment, the Contractor shall submit to the Engineer a schedule of values of the various portions of the Work, including quantities if required by the Engineer, aggregating the total Contract Sum, divided so as to facilitate payments to Subcontractors.
   2. Prepare a schedule of values in such form and supported by such substantiating data as the Engineer may require. Each item in the schedule of values shall include its proper share of overhead and profit. This schedule, when approved by the Engineer, shall be used only as a basis for the Contractor's Applications for Payment.

F. Material Safety Data Sheets
   1. Contractor shall submit Material Safety Data Sheets for all products they intend to use on the project.

G. Test Reports and Data
   1. Submit test reports and data where required by technical specifications. Results of testing shall be submitted to the Contractor and the Engineer.

H. Recycling Plan
   1. Contractor shall submit a recycling plan outlining the safe salvage, reuse or recycle of as much waste as possible. See Specifications for additional information.

I. Application for Payment
   1. For each progress payment (no more frequent than once a month) the Contractor shall submit to the Engineer an itemized Application for Payment supported by the following data: materials stored and work in progress. Work not complete at the time of the itemized Application for Payment submittal will not be included in that payment. Contractor shall use AIA Documents G702 and G703 Application and Certificate for Payment or similar, as applicable.

J. Record Drawings

1. The Contractor shall provide and maintain in proper order, in good, clean condition, in field office at the project site, one complete set of prints of all drawings.
2. At time of final acceptance and prior to final payment present these corrected prints to the Owner through the Engineer. Note all data and changes on these record drawings in sufficient detail, clarify and provide information necessary for preparation of "as-built" drawings.

K. Guarantees, Warranties, and Certificates
1. Submit all guarantees, warranties and certificates to the Engineer prior to final payment.

1.12 TEMPORARY UTILITIES

A. The Contractor shall arrange for, obtain and pay for all temporary utilities necessary to complete the work except as stated otherwise in these specifications.

B. ELECTRICAL AND LIGHTING: The Contractor shall provide all temporary electric power and connections necessary for the Contractor's work. The Contractor can use the existing 110/220 volt service in the ramp. The Owner will provide the existing lighting. Supplementary lighting, if necessary, shall be provided by the Contractor.
1. Should there be a need to de-energize the main service or portions of the electrical distribution system, a temporary portable generator or use of the new permanent generator shall be provided by the contractor to maintain power to all ramp lighting, teller booths and office functions. It is the responsibility of the contractor to ensure the power rating of the new generator can support the required temporary loads. Best times to complete the scheduled change-over are Tuesday-Thursday, 2:00 p.m.-4:00 pm.

C. TELEPHONE: The Contractor shall provide temporary telephone service to the job site. This service shall consist of at least a cellular phone for the Contractor's purpose.

D. TOILETS: The Contractor shall provide and maintain suitable, weather tight, sanitary toilet facilities for all workers during construction period. When toilet facilities are no longer required, promptly remove from site, disinfect and clean or treat the area as required.
1. The Contractor shall keep all toilet facilities clean and supplied with toilet tissue at all times. Maintain facilities in accordance with requirements of applicable building codes.

E. PROJECT SIGN: No individual advertising signs, plaques or credits, temporary or permanent, will be permitted on the building or premises, except the name of each contractor on their office or material shed.

F. EXPLOSIVES: Use of explosives, for any purpose, is prohibited.

G. FIRST AID: The Contractor shall provide temporary first-aid facilities on the site.

H. FIRE PROTECTION: The Contractor shall provide temporary fire protection as required by federal, state, and local laws and ordinances.

1.13 TRAFFIC

A. The Contractor shall provide personnel, signs, barricades, lights and warning devices to control the orderly flow of traffic, both inside and outside of the garage where needed, and prevent pedestrians and cars from entering areas of the Contractor's operations. The traffic devices shall meet the requirements of the U.S. Department of Transportation Manual on Uniform Traffic Control Devices.

B. The Owner will continue to use the building during the Electrical modifications and upgrades. The Contractor must schedule and arrange the work so as to maintain access to undisturbed parking areas. Short interruptions in traffic flow may be permitted but must be scheduled and written approval given by the Engineer seven (7) days prior to the planned interruption. During these interruptions, the Contractor shall provide personnel and signage to direct traffic within the structure.

C. The Contractor shall move these signs, barricades, lights and warning devices as necessary as the location of the work within the garage changes and previously worked-in areas are occupied by the Owner.

D. Contractor will provide appropriate signage warning the public of the construction area and directing them to exits.

E. The Contractor shall maintain access to undisturbed parking areas throughout the Electrical modifications and upgrades.

F. All Contractors shall comply with applicable OSHA regulations.

1.14 SPECIAL CONTROLS

A. SPECIAL RESPONSIBILITIES: The Contractor shall be responsible for damages to vehicles in or near the garage, resulting from their operations. The Contractor shall settle claims within 30 days of receipt of claim.

1.15 PARKING

A. Parking of vehicles and equipment required for construction purposes shall be in the Contractor's designated work areas. No parking will be provided for employees of any Contractor on site. Any vehicle in the parking ramp not parked within the construction area, which are required for this project, will be charged for parking.

B. All Contractors and their employees shall cooperate with others in the parking of vehicles to avoid interference with normal construction activities.

C. Do not obstruct existing service drives and parking areas outside the Contractor's work area with equipment, materials and/or vehicles. Keep accessible for Owner's use at all times.

1.16 SECURITY

A. The Contractor shall provide for the security of materials and equipment stored at the site. Material and equipment shall not be stored in areas which the Owner continues to use. The Contractor may store equipment and materials in areas in which the Contractor is working; otherwise they shall be removed from the site.

1.17 CLEANING

A. General
   1. Each Contractor shall keep premises free of accumulation of surplus materials and debris resulting from their operations and the operations of Subcontractors.
      a. Do not throw debris from ramp.
      b. Remove all debris from premises.
      c. No burning of debris on premises allowed.
      d. Do not use Owner's dump containers.
   2. Remove all tools, equipment, scaffolding and temporary facilities immediately when no longer required for execution of the work.

B. Safety Requirements
   1. Store volatile wastes in covered metal containers and remove from premises daily.
   2. Prevent accumulation of wastes which create hazardous conditions.
   3. Provide adequate ventilation during use of volatile or noxious substances.
   4. Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws.
   5. Do not burn or bury waste materials on the project site.
   6. Do not dispose of volatile wastes such as mineral spirits, oil or paint thinner in storm and sanitary drains.

C. Materials
   1. Use only cleaning materials recommended by manufacturer of surface to be cleaned.
   2. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

D. Submittals
   1. Submit plan for disposal of waste.

E. Cleaning During Construction
   1. Execute cleaning to ensure that building, grounds and public properties are maintained free from accumulation of waste materials.
   2. At daily intervals during progress of work, clean site and public properties, and dispose of waste materials. Prior to any removal, the Contractor shall submit their plan for confining, collecting, and disposal of waste material as a result of the Contractor's removal operations.
   3. Provide on-site dump container for collection of waste materials. Contractor shall coordinate with Owner for location of dumpster.
   4. Remove waste materials in a controlled manner with as few handlings as possible. Do not drop or throw materials from heights.
   5. Schedule cleaning operations so that dust and other contaminants resulting from the cleaning process will not fall on wet, newly painted surfaces or adjacent parked cars.

F. Final Cleaning
   1. Immediately prior to final inspection, the Contractor shall clean all surfaces to condition acceptable for immediate occupancy by the Owner and remove all foreign matter from all finished items.
   2. The Contractor shall leave all work clean in all respects, ready for use and occupancy by the Owner without additional work.
   3. Employ experienced workers, or professional cleaners, for final cleaning.

4. In preparation of substantial completion or occupancy, conduct final inspection of sight exposed interior and exterior surfaces, and of concealed spaces.
5. Repair, patch, and touch up marred surfaces to specified finish, to match adjacent surfaces.

1.18 PROJECT CLOSEOUT

A. Completion
   1. All work shall be complete when written notice requesting final inspection is submitted to the Engineer.

B. Guarantees, Bonds, and Affidavits
   1. Required prior to final payment is made. Submit all required written documents including guarantees, bonds, and affidavits.
   2. Guarantees shall extend the full period of the required guarantee period after:
      a. Replacement of work found defective during guarantee period at any time after Completion.
      b. Repair of inoperative items or adjustments to proper working condition of items not operating properly at time of inspection at Completion.
      c. Completion of work not completed at time of Completion.
   3. Items of equipment or material bearing a guarantee of the manufacturer or supplier longer than that described in the City of Madison Standard Specifications for Public Works Construction – most current year, shall not serve to release the manufacturer or supplier from their obligation to repair or replace such items within the limits of their guarantee after expiration of guarantees required by these specifications.

1.19 RECORD DRAWINGS

A. Required prior to final payment is made.

SECTION 08 71 00
DOOR HARDWARE

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Door hardware for swinging doors.

1.03 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction and installation details, material descriptions, dimensions and profiles of individual components, and finishes.

B. Shop Drawings: For electrified door hardware, including:

1. Wiring Diagrams: For power, signal, and control wiring:
2. Details of interface of electrified door hardware and building safety and security systems.
3. Operation Narrative: Describe the operation of doors controlled by electrified door hardware.
4. Door Hardware Schedule: Coordinate door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
5. Submittal Sequence: Submit door hardware schedule concurrently with submissions of Product Data, Shop Drawings and Samples. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate the fabrication of other work that is critical in Project construction schedule.
6. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule." Use same door numbers as used in Contract Documents.
7. Content:
   a. Identification number, location, size, hand, fire rating, and material of each door and frame.
   b. Location of each door hardware set, cross-referenced to floor plans and door schedule.
   c. Complete designations of every item required for each door or opening including name and manufacturer, type, style, function, size, quantity, and finish.
   d. Description of each electrified door hardware function, including location, sequence of operation, and interface with other building control systems.
   e. Fastenings and other pertinent information.
   f. Explanation of abbreviations, symbols, and codes contained in schedule.
   g. Mounting locations for door hardware.
   h. List of related door devices specified in other Sections for each door and frame.
8. Keying Schedule: Detail Owner's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations that are coordinated with the Contract Documents.
9. Samples for Verification:
   a. Each finish required minimum 1 x 2 inch plate.
   b. If requested, full size units of exposed door hardware in specified finish. Tag with full description for coordination with the hardware schedule.
   c. Samples will be returned to Contractor. Units that are acceptable and remain undamaged through submittal process may be incorporated into the Work, within limitations of keying requirements.

10. Qualification Data: For Installer.
11. Warranty: As specified in this Section.
12. Maintenance Data: For each type of door hardware to include in maintenance manuals. Include final hardware schedule and keying schedule.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: Supplier of products indicated and an employer of workers trained and approved by product manufacturers and who is an Architectural Hardware Consultant with appropriate certification from DHI and who is available during the course of the Work to consult with Contractor, Architect, and Owner about door hardware and keying.
   1. Warehouse Facilities: In Project's vicinity.
   2. Scheduling Responsibility: Preparation of door hardware and keying schedules.
   3. Engineering Responsibility: Preparation of data for electrified door hardware, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.

B. Source Limitations: Obtain each type of door hardware from a single manufacturer.
   1. Provide electrified door hardware from same manufacturer as mechanical door hardware, unless otherwise indicated. Manufacturers that perform electrical modifications and that are listed by a testing and inspecting agency acceptable to authorities having jurisdiction are acceptable.

C. Fire-Rated Door Assemblies: Where fire-rated door assemblies are indicated, provide door hardware rated for use in assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C, unless otherwise indicated.

D. Electrified Door Hardware: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.

E. Means of Egress Doors: Latches do not require more than 15 lbf to release the latch. Locks do not require use of a key, tool, or special knowledge for operation.

F. Accessibility Requirements: For door hardware on doors in an accessible route, comply with ICC/ANSI A117.1.

G. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf.
   1. Comply with the following maximum opening-force requirements:
      a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf applied perpendicular to door.
      b. Sliding or Folding Doors: 5 lbf applied parallel to door at latch.
      c. Fire Doors: Minimum opening force allowable by authorities having jurisdiction.
   2. Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than 1/2 inch high.
   3. Adjust door closer sweep periods so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches from the latch, measured to the leading edge of the door.

H. Preinstallation Conference: Review methods and procedures related to electrified door hardware including, but not limited to, the following:
   1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.

B. Tag each item or package separately with identification related to the hardware schedule, and include basic installation instructions, templates, and necessary fasteners with each item or package.

C. Deliver keys and permanent cores to Owner by registered mail or overnight package service.

1.06 COORDINATION

A. Installation Templates: Distribute for doors, frames, and other work specified to be factory prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

B. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.

C. Electrical System Roughing-in: Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and security systems.

D. Existing Openings: Where new hardware components are scheduled for application to existing construction or where modifications to existing door hardware are required, field verify existing conditions and coordinate installation of door hardware to suit opening conditions and to provide for proper operation.

1.07 WARRANTY

A. Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware which fail in materials or workmanship within specified warranty period.

B. Failures include, but are not limited to, the following:
   1. Structural failures including excessive deflection, cracking, or breakage.
   2. Faulty operation of operators and door hardware.
   3. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.

C. Warranty Period: Three years from date of Substantial Completion, except as follows:

1.08 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 PRODUCTS

2.01 SCHEDULED DOOR HARDWARE

A. Provide door hardware for each door as scheduled in Part 3 "Hardware Group Schedule" Article to comply with requirements in this Section.

B. Requirements for design, grade, function, finish, size and other distinctive qualities of each type of door hardware are indicated by product designations of the first manufacturer listed.

C. Except on fire-rated doors, where closers are provided on doors equipped with exit devices, equip the units with keyed dogging device to hold the push bar down and the latch bolt in the open position.

D. Strikes: Manufacturer's standard strike with curved lip extended to protect frame and strike box.

E. Electric Strikes: BHMA A156.31; Grade 1; with faceplate to suit lock and frame.
   1. Manufacturers:
      a. Von Duprin
      b. Folger Adams
      c. Securitron

F. Surface Mounted Overhead Stops: BHMA CO2541
   1. Manufacturers:
      a. Glynn Johnson
      b. Risxon
      c. Sargent

G. Automatic Operators: BHMA A156.19; rack-and-pinion hydraulic type with adjustable sweep and latch speeds controlled by key-operated valves and forged-steel main arm. Comply with manufacturer's written recommendations for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.
   1. Manufacturers:
      a. LCN
      b. Horton
      c. Besam

2.02 FASTENERS

A. Provide door hardware manufactured to comply with published templates prepared for machine, wood, and sheet metal screws. Provide screws that comply with commercially recognized industry standards for application intended, except aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware, unless otherwise indicated.
   1. Wherever proper reinforcement is not present for the added hardware please provide a "Riv-Nut" type of fastener to secure hardware to the door or frame.
   2. Where possible, provide concealed fasteners for door hardware units that are exposed when door is closed, except as otherwise indicated. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.
   3. Fire-Rated Applications:
      a. Wood or Machine Screws: For the following:
      b. Hinges mortised to doors or frames.
      c. Strike plates to frames.
      d. Closers to doors and frames.
      e. Steel Through Bolts: For the following unless door blocking is provided:
      f. Surface hinges to doors.
      g. Closers to doors and frames.
      h. Surface-mounted exit devices.
      i. Fasteners for Wood Doors: Comply with requirements in DHI WDHS.2, "Recommended Fasteners for Wood Doors."
      j. Gasketing Fasteners: Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.

2.03 FINISHES

A. Provide finishes complying with BHMA A156.18.
B. Satin stainless steel 630 (US32D) or stain chrome 626/652 (US26D) except as otherwise indicated.
C. Interior Door closers: Painted or powder-coated aluminum
D. Closers, Sweeps and Hinges for Aluminum Doors: Painted or powder-coated to match doors.

PART 3 EXECUTIONEXAMINATION

A. Examine doors and frames for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance.
B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Steel Doors and Frames: For surface applied door hardware, drill and tap doors and frames according to ANSI/SDI A250.6.

B. Wood Doors: Comply with DHI WDHS.5 "Recommended Hardware Reinforcement Locations for Mineral Core Wood Flush Doors."

3.03 INSTALLATION

A. Mounting Heights: Mount door hardware units at heights to comply with the following unless otherwise indicated or required to comply with governing regulations.
B. Standard Steel Doors and Frames: ANSI/SDI A250.8.
C. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
D. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing. Do not install surface-mounted items until finishes have been completed on substrates involved.
   1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
   2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

3.04 ADJUSTING

A. Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
B. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.

3.05 CLEANING AND PROTECTION

A. Clean adjacent surfaces soiled by door hardware installation.
B. Clean operating items as necessary to restore proper function and finish.
C. Provide final protection and maintain conditions that ensure that door hardware is without damage or deterioration at time of Substantial Completion.

3.06 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain door hardware and door hardware finishes.

DOOR/HARDWARE INDEX

Door #	**HWSet #**
100	01
200	02
300	02
400	02
500	02
600	02
L001	02

B.

HARDWARE GROUP SCHEDULE

Hardware Group No. 01

Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
1	EA	ELECTRIC STRIKE	6300 FSE	630	VON
1	EA	OH STOP	90SE J	630	GLY
1	EA	SURF. AUTO OPERATOR	4642 WMS	689	LCN
1	EA	ACTUATOR KIT JAMB MT	8310-3818TWS	630	LCN
1	EA	ACTUATOR KIT WALL MT	8310-3853TWS	630	LCN
1	EA	RECEIVER	8310-865	BLU	LCN

All other existing hardware to remain. Field verify all hardware and existing conditions prior to bidding or ordering to ensure that all specified hardware will work exactly as desired.

Power for the auto-operator is to be provided by the electrical contractor. Power for the electric strike is to be provided by the on-board power supply located on the auto-operator itself.

Wherever proper reinforcement is not present for the added hardware please provide a "Riv-Nut" type of fastener to secure hardware to the door or frame.

The auto-operator is to be tied to the fire alarm system so the power assist feature will not be available during a fire alarm. The door will still be able to be opened and closed manually.

Hardware Group No. 02

Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
1	EA	ELECTRIC STRIKE	6300 FSE	630	VON
1	EA	SURF. AUTO OPERATOR	4631 WMS	689	LCN
1	EA	ACTUATOR KIT JAMB MT	8310-3818TWS	630	LCN
1	EA	ACTUATOR KIT WALL MT	8310-3853TWS	630	LCN
1	EA	RECEIVER	8310-865	BLU	LCN

All other existing hardware to remain. Field verify all hardware and existing conditions prior to bidding or ordering to ensure that all specified hardware will work exactly as desired.

Power for the auto-operator is to be provided by the electrical contractor. Power for the electric strike is to be provided by the on-board power supply located on the auto-operator itself.

Wherever proper reinforcement is not present for the added hardware please provide a "Riv-Nut" type of fastener to secure hardware to the door or frame.

The auto-operator is to be tied to the fire alarm system so the power assist feature will not be available during a fire alarm. The door will still be able to be opened and closed manually.

SECTION 23 05 23
GENERAL DUTY VALVES FOR HVAC PIPING

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. Base Bid: Unless noted otherwise, Contractor shall provide all labor and materials for a complete system in this specification section.

1.02 SECTION INCLUDES

A. This section includes valve specifications for all HVAC systems except where indicated under Related Work. Included are the following topics:
   1. Natural Gas Systems
      a. Shut-off Valves (Gas)
      b. Gas Pressure Regulators (Gas)

1.03 SUBMITTALS

A. Refer to Section 23 05 00 – Common Work Results for HVAC. In addition to the general content specified under Section 23 05 00 – Common Work Results for HVAC, supply the following submittals:
   1. Natural Gas Systems
      a. Shut-off Valves (Gas)
      b. Gas Pressure Regulators (Gas)

B. Contractors shall submit a schedule of all valves indicating type of service, dimensions, materials of construction, and pressure/temperature ratings for all valves to be used on the project. Temperature ratings specified are for continuous operation

C. Contractors shall submit critical flow capacity data supplied by the manufacturer for all steam pressure reducing valves. The calculation from the manufacturer shall be the largest obtainable by internal trim change of the reducing valve.

1.04 QUALITY ASSURANCE

A. Refer to Division 1 for equals and substitutions.

1.05 DESIGN CRITERIA

A. Where valves are specified for individual mechanical services (i.e. hot water heating, steam, etc.) all valves shall be of the same manufacturer unless prior written approval is obtained from owner.

1.06 OPERATION AND MAINTENANCE DATA

A. All operations and maintenance data shall comply with the submission and content requirements specified in Section 23 05 00 – Common Work Results for HVAC.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. Anvil, Apollo, Armstrong, Bell & Gossett, Cash-Acme, Dresser Consolidated, Conval, Crane, Anderson Greenwood and Crosby, Danfoss-Flomatic, DeZurik, Durco, Fisher, Grinnell, Griswold, Hammond, Hancock, Hoffman, Jamesbury, Keystone, Kunkle, Leslie, Lunkenheimer/Cincinnati, Metraflex, Milwaukee, Mueller, Newco, Nexus, Nibco, Powell, RP&C, Sarco, Spence, Stockham, Taco, Tasco, Thrush-Amtrol, Vogt, Watts.

B. All valves shall be manufactured in the United States.

C. All valves shall be designed for operation with not less than 125 lbs. working pressure and of a type permitting repacking while under pressure. Rising stems shall be used wherever possible. Provide valves to allow control of all major branches. All valves 2 inches and larger installed 7 feet on centerline or higher above the floor shall have chain operators.

2.02 NATURAL GAS SYSTEMS

A. SHUT OFF VALVES:
   1. 2" and smaller: Ball valve, bronze body, threaded ends, chrome-plated bronze or stainless steel ball, full or conventional port, teflon seat, blowout-proof stem, two-piece construction, suitable for 150 psig working pressure, U.L. listed for use as natural gas shut-off.

B. GAS PRESSURE REGULATORS:
   1. 2" and smaller: Cast iron body, aluminum spring and diaphragm, Nitrile diaphragm, threaded ends, 150 psi W.O.G., -20°F to 150°F.

PART 3 – EXECUTION

3.01 GENERAL

A. Properly align piping before installation of valves in an upright position; operators installed below the valves will not be accepted.
B. Install valves in strict accordance with valve manufacturer's installation recommendations. Do not support weight of piping system on valve ends.
C. Install all temperature control valves.
D. Install all valves with the stem in the upright position. Valves may be installed with the stem in the horizontal position only where space limitations do not allow installation in an upright position or where large valves are provided with chain wheel operators. Where valves 2-1/2" and larger are located more than 12'-0" above mechanical room floors, install valve with stem in the horizontal position and provide a chain wheel operator. Valves installed with the stems down, will not be accepted.
E. Install stem extensions when shipped loose from valve.
F. Prior to flushing of piping systems, place all valves in the full-open position.

3.02 SHUT-OFF VALVES

A. Install shut-off valves on both sides of all equipment, on major piping loops, at each branch take-off from mains, at vertical risers, at strainers, and at each automatic valve for isolation or repair. All shut-off valves shall be located to allow proper access for operation for servicing.

3.03 PRESSURE REDUCING VALVES

A. Provide gate valve and strainer at inlet. Provide gate valve at outlet.
B. Use eccentric reducers at inlet and outlet of reducing valves where connections are not the same size as adjacent piping.

3.04 GAS PRESSURE REGULATORS

A. When the gas pressure regulator is equipped with a vent connection, run a connection size vent to the exterior of the building in accordance with codes. Use a larger size vent when required by the manufacturer's installation instructions.

SECTION 23 11 00
FACILITY FUEL PIPING

PART 1 – GENERAL

1.01 SCOPE OF WORK

A. Base Bid: Unless otherwise noted HVAC Contractor to provide fuel piping as specified and indicated on the drawings.

1.02 SECTION INCLUDES

A. This section contains specifications for fuel pipe and fuel pipe fittings for this project. Included are the following topics:
   1. Natural Gas
   2. Vents and Relief Valves
   3. Unions and Flanges
   4. Valves
   5. Piping System Leak Tests

1.03 SUBMITTALS

A. Supply the following submittals:
   1. Natural Gas
   2. Vents and Relief Valves
   3. Unions and Flanges
   4. Valves
   5. Piping System Leak Tests

B. Contractor shall submit schedule indicating the ASTM specification number of the pipe being proposed along with its type and grade and sufficient information to indicate the type and rating of fittings for each service.

C. Type E Or S Steel Pipe: Mill certification papers, also known as material test reports, for the pipe furnished for this project, in English. Heat numbers on these papers to match the heat numbers stenciled on the pipe. Chemical analysis indicated on the mill certification papers to meet or exceed the requirements of the referenced ASTM specification.

1.04 REFERENCE STANDARDS

A.	ANSI B16.3	Malleable Iron Threaded Fittings
B.	API Spec 12P	Fiberglass Reinforced Plastic Tanks; American Petroleum Institute ; 2008.
C.	API Std 650	Welded Steel Tanks for Oil Storage; American Petroleum Institute ; 2009.
D.	API RP 1615	Installation of Underground Petroleum Storage Systems; American Petroleum Institute ; 1996 (Reapproved 2001).
E.	API RP 1632	Cathodic Protection of Underground Petroleum Storage Tanks and Piping Systems; American Petroleum Institute ; 1996 (Reapproved 2002).
F.	API Std 2000	Venting Atmospheric and Low-Pressure Storage Tanks: Nonrefrigerated and Refrigerated; American Petroleum Institute ; 2009.
G.	ASME (BPV)	Boiler and Pressure Vessel Code; The American Society of Mechanical Engineers; 2007.
H.	ASME (BPV IX)	Boiler and Pressure Vessel Code, Section IX - Welding and Brazing Qualifications; The American Society of Mechanical Engineers ; 2010.
I.	ASME B16.3	Malleable Iron Threaded Fittings; The American Society of Mechanical Engineers; 1998 (R2006).
J.	ASME B16.18	Cast Copper Alloy Solder-Joint Pressure Fittings; The American Society of Mechanical Engineers ; 2001 (R2005) (ANSI B16.18).

K.	ASME B16.22	Wrought Copper and Copper Alloy Solder Joint Pressure Fittings; The American Society of Mechanical Engineers ; 2001 (R2005).
L.	ASME B16.26	Cast Copper Alloy Fittings for Flared Copper Tubes; The American Society of Mechanical Engineers ; 2006.
M.	ASME B31.1	Power Piping; The American Society of Mechanical Engineers ; 2007 (ANSI/ASME B31.1).
N.	ASME B31.4	Pipeline Transportation Systems for Liquid Hydrocarbons and Other Liquids; The American Society of Mechanical Engineers ; 2006.
O.	ASME B36.10M	Welded and Seamless Wrought Steel Pipe; The American Society of Mechanical Engineers ; 2004.
P.	ASTM A53/A53M	Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless ; 2010.
Q.	ASTM A123/A123M	Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products ; 2009.
R.	ASTM A234/A234M	Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service ; 2011.
S.	ASTM B32	Standard Specification for Solder Metal ; 2008.
T.	ASTM B88	Standard Specification for Seamless Copper Water Tube ; 2009.
U.	ASTM B88M	Standard Specification for Seamless Copper Water Tube (Metric) ; 2005.
V.	ASTM D2310	Standard Classification for Machine-Made "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe ; 2006.
W.	ASTM D2996	Standard Specification for Filament-Wound "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe ; 2001 (Reapproved 2007).
X.	AWS A5.8/A5.8M	Specification for Filler Metals for Brazing and Braze Welding; American Welding Society ; 2004 and errata.
Y.	AWWA C105/A21.5	Polyethylene Encasement for Ductile-Iron Pipe Systems; American Water Works Association ; 2005 (ANSI/AWWA C105/A21.5).
Z.	MSS SP-58	Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. ; 2009.
AA.	MSS SP-80	Bronze Gate, Globe, Angle and Check Valves; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. ; 2008.
BB.	MSS SP-110	Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. ; 1996.
CC.	NACE SP0169	Control of External Corrosion on Underground or Submerged Metallic Piping Systems; NACE International ; 2007.
DD.	NACE RP0285	Corrosion Control of Underground Storage Tank Systems by Cathodic Protection; NACE International ; 2002.
EE.	NFPA 30	Flammable and Combustible Liquids Code; National Fire Protection Association ; 2008.
FF.	NFPA 31	Standard for the Installation of Oil Burning Equipment; National Fire Protection Association ; 2011.
GG.	STI STI-P3	Specification and Manual for External Corrosion Protection of Underground Steel Storage Tanks; Steel Tank Institute ; 2007.
HH.	UL 58	Steel Underground Tanks for Flammable and Combustible Liquids; Underwriters Laboratories Inc. ; Current Edition, Including All Revisions.

II. UL 80 — Standard for Steel Tanks for Oil-Burner Fuels and Other Combustible Liquids; Underwriters Laboratories Inc. ; Current Edition, Including All Revisions.

JJ. UL 142 — Steel Aboveground Tanks for Flammable and Combustible Liquids; Underwriters Laboratories Inc. ; Current Edition, Including All Revisions.

KK. UL 1316 Glass Fiber Reinforced Plastic Underground Storage Tanks for Petroleum

1.05 QUALITY ASSURANCE

A. Order all Type E and Type S steel pipe with heat numbers rolled, stamped, or stenciled to each length or each bundle, depending on the size of the pipe, and in accordance with the appropriate ASTM specification.

B. Any installed material not meeting the specification requirements must be replaced with material that meets these specifications without additional cost to the Owner.

1.06 DESIGN CRITERIA

A. Use only new material, free of defects, rust and scale, and meeting the latest revision of ASTM specifications as listed in this specification.

B. Construct all piping for the highest pressures and temperatures in the respective system in accordance with ANSI B31, but not less than 125 psig unless specifically indicated otherwise.

C. Non-metallic piping will be acceptable only for the services indicated. It will not be acceptable in occupied spaces and ventilation plenum spaces, including plenum ceilings.

D. Where weld fittings or mechanical grooved fittings are used, use only long radius elbows having a centerline radius of 1.5 pipe diameters.

E. Where ASTM A53 grade A pipe is specified, ASTM A53 grade B pipe may be substituted at Contractor's option. Where the grade or type is not specified, Contractor may choose from those commercially available.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Promptly inspect shipments to insure that the material is undamaged and complies with specifications.

B. Cover pipe to eliminate rust and corrosion while allowing sufficient ventilation to avoid condensation. Do not store materials directly on grade. Protect pipe, tube, and fitting ends so they are not damaged. Where end caps are provided or specified, take precautions so the caps remain in place.

C. Offsite storage agreements will not relieve the contractor from using proper storage techniques.

D. Storage and protection methods must allow inspection to verify products.

1.08 WELDER QUALIFICATIONS

A. Before any metallic welding is performed, Contractor to submit his Standard Welding Procedure Specification together with the Procedure Qualification Record as required by Section IX of the ASME Boiler and Pressure Vessel Code and/or the National Certified Pipe Welding Bureau.

B. Before any polyethylene fusion welding is performed, Contractor to submit certification that the welders to be used on this project have successfully demonstrated proper welding procedures in accordance with the Code of Federal Regulations, Title 49, Part 192, Section 192.285.

C. The A/E or owner reserves the right to test the work of any welder employed on the project, at the Contractor's expense. If the work of the welder is found to be unsatisfactory, the welder shall be prevented from doing further welding on the project.

1.09 NATURAL GAS SERVICE

A. Coordinatio of gas service shut down with utility is the responsibility of the contractor.

PART 2 - PRODUCTS

2.01 NATURAL GAS

A. 2" and Smaller: ASTM A53, type E or S, standard weight (schedule 40) black steel pipe with ASTM A197/ANSI B16.3 class 150 black malleable iron threaded fittings or ASTM A234 grade WPB/ANSI B16.9 standard weight, seamless, carbon steel weld fittings.

B. 2-1/2" and Larger: ASTM A53, type E or S, standard weight black steel pipe with ASTM A234 grade WPB/ANSI B16.9 standard weight, seamless, carbon steel weld fittings.

2.02 VENTS AND RELIEF VALVES

A. Use pipe and pipe fittings as specified for the system to which the relief valve or vent is connected.

2.03 UNIONS AND FLANGES

A. 2" and Smaller: ASTM A197/ANSI B16.3 malleable iron unions with brass seats. Use black malleable iron on black steel piping and galvanized malleable iron on galvanized steel piping. Use unions of a pressure class equal to or higher than that specified for the fittings of the respective piping service but not less than 250 psi. Copper tube: 250 psi bronze unions with brazed joints.

B. 2-1/2" and Larger: ASTM A181 or A105, grade 1 hot forged steel flanges of threaded, welding and of a pressure class compatible with that specified for valves, piping specialties and fittings of the respective piping service. Flanges smaller than 2-1/2" may be used as needed for connecting to equipment and piping specialties. Use raised face flanges ANSI B16.5 for mating with other raised face flanges on equipment with flat ring or full face gaskets. Use ANSI B16.1 flat face flanges with full face gaskets for mating with other flat face flanges on equipment. Copper tube: 250 psi slip on bronze flanges; $1/16^{th}$ inch thick preformed neoprene gaskets.

2.04 VALVES

A. Refer to specification section 23 05 23 for General Duty Valves for HVAC.

PART 3 – EXECUTION

3.01 PREPARATION

A. Remove all foreign material from interior and exterior of pipe and fittings.

3.02 ERECTION

A. Install all piping parallel to building walls and ceilings and at heights which do not obstruct any portion of a window, doorway, stairway, or passageway. Where interferences develop in the field, offset or reroute piping as required to clear such interferences. In all cases, consult drawings for exact location of pipe spaces, ceiling heights, door and window openings, or other architectural details before installing piping.

B. Provide anchors, expansion joints, swing joints and/or expansion loops so that piping may expand and contract without damage to itself, equipment, or building.

C. Mitered ells, notched tees, and orange peel reducers are not acceptable. On threaded piping, bushings are not acceptable.

D. "Weldolets" and "Threadolets" may be used for branch takeoffs up to one-half (1/2) the diameter of the main.

E. Do not route piping through transformer vaults or above transformers, panelboards, or switchboards, including the required service space for this equipment, unless the piping is serving this equipment

F. Install all valves, and piping specialties, including items furnished by others, as specified and/or detailed. Make connections to all equipment installed by others where that equipment requires the piping services indicated in this section.

3.03 THREADED PIPE JOINTS

A. Use a Teflon based thread lubricant or Teflon tape when making joints; no hard setting pipe thread cement or caulking will be allowed.

3.04 NATURAL GAS

A. Pitch horizontal piping down 1" in 60 feet in the direction of flow. Install a 4" minimum depth dirt leg at the bottom of each vertical run and at each appliance. When installing mains and branches, cap gas tight each tee or pipe end which will not be immediately extended. All branch connections to the main shall be from the top or side of the main.
B. Do not install gas pipe in a ventilation air plenum.
C. If an above ground vent terminates in an area subject to snow accumulation, terminate the line at least five feet above grade.
D. Install a shut off valve at each appliance. Provide a valved connection at the main for equipment and appliances furnished by others.
E. Piping through a roof shall be run through an approved roof penetration with flashing and counter flashing.
F. Each gas pressure reducing valve vent and relief valve vent shall be run separately to a point outside of the building, terminated with a screened vent cap, and located according to gas utility regulations.
G. Clean all welded piping before all regulators and control valves. Test by placing target cloth over piping and blow with compressed air. Clean piping until target cloth is clean and free of debris.

3.05 VENTS AND RELIEF VALVES

A. Install vent and relief valve discharge lines as indicated on the drawings, as detailed, and as specified for each specific valve or piping specialty item. In no event is a termination to occur less than six feet above a roof line.

3.06 UNIONS AND FLANGES

A. Install a union or flange, as required, at each automatic control valve and at each piping specialty or piece of equipment which may require removal for maintenance, repair, or replacement. Where a valve is located at a piece of equipment, locate the flange or union connection on the equipment side of the valve. Concealed unions or flanges are not acceptable.

3.07 PIPING SYSTEM LEAK TESTS

A. Verify that the piping system being tested is fully connected to all components and that all equipment is properly installed, wired, and ready for operation. If required for the additional pressure load under test, provide temporary restraints at expansion joints or isolate them during the test. Verify that hangers can withstand any additional weight load that may be imposed by the test.
B. Provide all piping, fittings, blind flanges, and equipment to perform the testing.
C. Conduct pressure test with test medium of air or water unless specifically indicated. Minimum test time is indicated in the table below; additional time may be necessary to conduct an examination for leakage. Each test must be witnessed by the Owner's representative. If leaks are found, repair the area with new materials and repeat the test; caulking will not be acceptable.
D. Do not insulate pipe until it has been successfully tested.
E. For hydrostatic tests, use clean water and remove all air from the piping being tested by means of air vents or loosening of flanges/unions. Measure and record test pressure at the high point in the system.

F. For air tests, gradually increase the pressure to not more than one half of the test pressure; then increase the pressure in steps of approximately one-tenth of the test pressure until the required test pressure is reached. Examine all joints and connections with a soap bubble solution or equivalent method. The piping system exclusive of possible localized instances at pump or valve packing shall show no evidence of leaking. After testing is complete, slowly release the pressure in a safe manner.

G. Measure natural gas system test pressure with a water manometer or an equivalent device calibrated in increments not greater than 0.1 inch water column. System will not be approved until it can be demonstrated that there is no measurable loss of test pressure during the test period.

H. Conduct fuel oil system test so as not to impose a pressure of more than 10 psig on the tank. Instead of a pressure test, suction lines may be tested under a vacuum of not less than 20 inches of mercury maintained for at least one hour.

System	Pressure	Medium	Duration
Natural gas	100 psig	Air	24 hr.

~~I.~~ All pressure tests are to be documented on attached form included in this specification.

J. On piping that cannot be tested because of connection to an active line, provide temporary blind flanges and hydrostatically test new section of piping. After completion of test, remove temporary flanges and make final connections to piping. Die penetrate test pass weld or x-ray the piping that was not hydrostatically tested up to the active system.

PIPING SYSTEM TEST REPORT

Date Submitted: _____

Project Name: _____

Location: _____

Project No: _____

Contractor: _____

□ **HVAC** □ **Refrigeration** □ **Controls**

□ **Power Plant** □ **Plumbing** □ **Sprinkler**

Test Medium: □ **Air** □ **Water** □ **Other** _____

Test performed per specification section No. _____

Specified Test Duration _____ **Hours** **Specified Test Pressure** _____ **PSIG**

System Identification: _____

Describe Location: _____

_____

Test Date: _____

Start Test Time: _____ **Initial Pressure:** _____ **PSIG**

Stop Test Time: _____ **Final Pressure:** _____ **PSIG**

Tested By: _____ **Witnessed By:** _____

Title: _____ **Title:** _____

Signed: _____ **Signed:** _____

Date: _____ **Date:** _____

Comments: _____

_____

_____

_____

SECTION 26 05 00
COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. Base Bid: Electrical Contractor provide: It is the intent of these specifications to provide complete and workable electrical systems as shown on the accompanying plans and as specified herein except such parts as are specifically exempted herein. Provide all necessary supervision, coordination, labor, materials, equipment, fixtures, dryage, hoisting, tools, transportation, plant services and facilities, machinery and connections to utilities for the installation of complete and operable electrical systems. If details or special conditions are required in addition to those shown on drawings, provide all material and equipment usually furnished with such systems or required to complete their installation, whether noted in plans and specification or not.

B. Materials and labor shall be new (unless noted otherwise), first class and workmanlike and shall be subject at all times to the A/E's inspections, tests and approval from the commencement until the acceptance of the completed work.

C. The layout shown on the drawings is necessarily diagrammatic but shall be followed as closely as other work will permit. The drawings provide design intent. The Contractor shall verify all dimensions at the site and be responsible for their accuracy.

D. All sizes as given are minimum except as noted.

E. Because of the scale of the Drawings, certain basic items, such as, pipe fittings, duct fittings, access panels, and sleeves, may not be shown. Where such items are required by Code or by other Sections, or where required for proper installation of the Work, such items shall be included, whether shown or not.

F. In the event of any inconsistencies between the specifications, drawings, contract documents, applicable laws, statutes, ordinances, building codes, rules and regulations, the contractor shall provide the better quality or greater quantity of work and comply with or conform its work to the most stringent legal or contractual requirements.

G. Changes from these drawings required to make this work conform to the building construction shall be made only with prior written approval of the Architect/Engineer. All proposed changes shall be shown on shop drawings. All measurements shall be verified by actual observation and all work shall fit in place meeting the approval of the Architect/Engineer.

H. Equipment Specification may not deal individually with minute items required, such as, components, parts, controls, and devices which may be required to produce the equipment performance specified or as required to meet the equipment warranties. Where such items are required to make the system operational, they shall be included by the supplier of the equipment at no additional cost, whether or not specifically called for.

1.02 SECTION INCLUDES

A. The work under this section includes basic electrical requirements, which are applicable to all Division 26 sections. This section includes information common to two or more technical specification sections or items that are of a general nature, not conveniently fitting into other technical sections.

1. Submittals
2. Construction Verification Checklists
3. Functional Performance Tests
4. Reference Standards
5. Quality Assurance
6. Guarantee
7. Operation And Maintenance Instructions

8. Record Documents
9. Continuity Of Existing Services
10. Sealing And Firestopping
11. Off Site Storage
12. Regulatory Requirements
13. Certificates And Inspections
14. Coordination
15. Demolition And Existing Requirements
16. Approved Electrical Testing Laboratories
17. Sleeves And Openings
18. Omissions
19. Definitions
20. Project/Site Conditions
21. Work Sequence And Scheduling
22. Work by Other Trades
23. Salvage Materials
24. Identification
25. Demolition
26. Cutting And Patching
27. Building Access
28. Equipment Access
29. Housekeeping And Clean Up

1.03 RELATED WORK

A. The electrical work included in all other divisions is the responsibility of the contractor performing the Division 26 work unless noted otherwise.

1.04 SUBMITTALS

A. Submit shop drawings for equipment under each section per requirements listed in that section.
B. Submit for all equipment and systems as indicated in the respective specification sections, marking each submittal with that specification section number. Mark general catalog sheets and drawings to indicate specific items being submitted and proper identification of equipment by name and/or number, as indicated in the contract documents. Failure to do this may result in the submittal(s) being returned to the Contractor for correction and resubmission. Do not submit hard copies of web pages. Failing to follow these instructions does not relieve the Contractor from the requirement of meeting the project schedule.
C. On request from the A/E, the successful bidder shall furnish additional drawings, illustrations, catalog data, performance characteristics, etc.
D. Submittals shall be grouped to include complete submittals of related systems, products, and accessories in a single submittal. Mark dimensions and values in units to match those specified. Include wiring diagrams of electrically powered equipment.
E. The submittals must be approved before fabrication is authorized.
F. Provide electronic copies of all submittals for review.

1.05 CONSTRUCTION VERIFICATION CHECKLISTS

A. Contractor is responsible for utilizing the construction verification checklists supplied under these specifications in accordance with the procedures defined for construction verification checklists in Section 26 08 00 – Commissioning of Electrical.

1.06 FUNCTIONAL PERFORMANCE TESTS

A. Contractor is responsible for utilizing the functional performance test procedures supplied under these specifications in accordance with the procedures defined for functional performance test procedures in Section 26 08 00 – Commissioning of Electrical.

1.07 REFERENCE STANDARDS

A. Abbreviations of standards organizations referenced in this and other sections are as follows:
   1. ANSI American National Standards Institute
   2. ASTM American Society for Testing and Materials
   3. EPA Environmental Protection Agency
   4. ETL Electrical Testing Laboratories, Inc.
   5. IEEE Institute of Electrical and Electronics Engineers
   6. IES Illuminating Engineering Society
   7. ISA Instrument Society of America
   8. NBS National Bureau of Standards
   9. NEC National Electric Code
   10. NEMA National Electrical Manufacturers Association
   11. NESC National Electrical Safety Code
   12. NFPA National Fire Protection Association
   13. UL Underwriters Laboratories Inc.

1.08 QUALITY ASSURANCE

A. Substitution of Materials:
   1. If the Contractor wishes to submit an alternate to the named manufacturers for any equipment, he may submit a voluntary alternative minimum 7 days prior to bid, stating the manufacturer's name, model number, written, detailed product data.
   2. Where materials or equipment are specified by name the proposed material or equipment must be identical to the specified material or equipment in all characteristics of quality, function and serviceability, regardless of application in the Project and, in addition, when the Architect deems that aesthetic significance is important, the equal material or equipment must be identical in all characteristics of visual appearance, design, color and texture. Any proposed equal shall be submitted to Architect/Engineer for prior approval, which Architect/Engineer may approve or disapprove in its sole discretion. Work performed or constructed with unapproved equals is at Contractor's risk and any required correction of work incorporating unapproved equals shall be at Contractor's sole cost and expense.
   3. In all instances, Contractor shall assume full responsibility for proof of equality of the statute to the equipment hereinafter specified. All data and information necessary for proof of equality, function and space requirements shall be prepared and accompany the submittal of the substitution to the Architect/Engineer. Approval by the Architect/Engineer of equipment other than the specified does NOT relieve Contractor of this responsibility.

B. All products and materials used are to be new, undamaged, clean and in good condition. Existing products and materials are not to be reused unless specifically indicated.

C. Where equipment or accessories are used which differ in arrangement, configuration, dimensions, ratings, or engineering parameters from those indicated on the contract documents, the contractor is responsible for all costs involved in integrating the equipment or accessories into the system, including, but not limited to, coordination with other trades and any required changes by other trades and for obtaining the intended performance from the system into which these items are placed.

D. All materials, except medium voltage equipment and components, shall be listed by and shall bear the label of an approved electrical testing laboratory. If none of the approved electrical testing laboratories has published standards for a particular item, then other national independent testing standards, if available, applicable, and approved by A/E, shall apply and such items shall bear those labels. Where one of the approved electrical testing laboratories has an applicable system listing and label, the entire system, except for medium voltage equipment and components, shall be so labeled.

1.09 GUARANTEE

A. In entering into a contract covering this work, the contractor accepts the specifications and guarantees that the work will be carried out in accordance with the requirements of this specification or such modifications as may be made under the contract documents.
B. Contractor further guarantees that the workmanship and material will be of the best procurable and that none but experienced workmen familiar with each particular class of work will be employed.
C. Contractor further guarantees to replace and make good at his own expense, including travel time, all defects, which may develop within 1 year after final payment and acceptance by the Architect/Engineer, due to faulty workmanship or material, upon, receipt of written notification from the Owner.

1.10 WORK BY OWNER

A. PCB equipment (other than light fixture ballasts) removal and disposal, if required, will be by the Owner under separate contract.
B. Electrical testing not described in these contract documents will be by the Owner under separate contract.

1.11 OPERATION AND MAINTENANCE INSTRUCTIONS

A. Supply the following additional documentation:
   1. Manufacturer's wiring diagrams for electrically powered equipment.
   2. Copies of all approved submittals along with approval letters.

1.12 RECORD DOCUMENTS

A. Follow the following procedures.
   1. During the progress of the work, Contractor shall maintain a current (daily) record set of the drawings and specifications, indicating thereon all work installed at variance with such Contract Documents including, without limitation, work covered by Addenda, Field Work Orders, Change Orders and Engineers additional instructions, interpretations and clarification. All changes or deviations from the original layout of the work and all critical dimensions of buried or concealed work shall be recorded. It shall be Contractor's responsibility to assure that said record sets are complete, accurate and up-to-date, Engineer shall have the right to inspect and review such record sets.
   2. At the completion of the work, Contractor shall indicated on record sets all record changes and such additional details necessary or appropriate to provide a complete reference document for use by Engineer. If variations and details cannot be shown clearly thereon, the Contractor shall prepare supplemental drawings adequate to impart the information. The foregoing drawings collectively shall constitute the "Record" drawings for the work.
   3. All indication on "Record" drawings shall be executed in a legible manner at Contractor's cost, using methods and legend presentations compatible with the overall scheme of the record drawings with respect to scale, drawing sheet sizes and sequential indexing. All changes shall be marked clearly in red and clouded.
   4. Engineer may review Contractor's "Record" drawings and notify Contractor of observed discrepancies or deviations. Contractor shall promptly correct discrepancies, deviations or illegible markups at Contractor's expense and resubmit revised drawings for Engineer review.
   5. Contractor shall provide final electronic record drawings to the Owner through the Engineer.
   6. Engineer will provide final electronic record drawings to the Owner based on Contractor's markups.

1.13 CONTINUITY OF EXISTING SERVICES

A. Do not interrupt or change existing services without prior written approval from the Owner's Project Representative. When interruption is required, coordinate scheduling of down-time with

the Owner to minimize disruption to his activities. Unless specifically stated, all work involved in interrupting or changing existing services is to be done during normal working hours.

B. Each Contractor shall thoroughly familiarize himself with existing systems which will affect and be affected by relocation of existing equipment and installation of new lines and equipment. They shall plan installation of their work so that interruptions of services to any building or portion thereof will be a minimum and such interruptions shall occur only when system is not required, if possible. If not possible, each Contractor shall insure the operation of services by whatever means possible, such as, installing bypasses, capping of services or providing temporary service. Each interruption shall be for as short a duration as possible.
C. No extra costs will be paid to the Contractor for such outages which must occur outside of regular weekly working hours.
D. This Contractor shall restore any circuit interruption as a result of this work to proper operation as soon as possible. Note that institutional operations are on a seven day week schedule.

1.14 SEALING AND FIRESTOPPING

A. Sealing and firestopping of sleeves/openings between conduits, cable trays, wireways, troughs, cablebus, busduct, etc. and the structural or partition opening shall be the responsibility of the contractor whose work penetrates the opening. The contractor responsible shall hire individuals skilled in such work to do the sealing and firestopping. These individuals hired shall normally and routinely be employed in the sealing and fireproofing occupation.
B. Contractor shall request current life safety drawings from the Architect/Owner.

1.15 OFFSITE STORAGE

A. If payment will be requested for approved offsite stored material, then the Contractor shall complete an "Off-site Storage Agreement" which is available from the Owner. Prior approval by Owner’s personnel for offsite storage will be needed. No material will be accepted for offsite storage unless submittals for the material have been approved.

1.16 REGULATORY REQUIREMENTS

A. All work and materials are to conform in every detail to applicable rules and requirements of the Wisconsin State Electrical Code Volumes 1 and 2, the National Electrical Code (ANSI/NFPA 70), other applicable National Fire Protection Association codes, the National Electrical Safety Code, present manufacturing standards (including NEMA) and the Authority Having Jurisdiction (AHJ).
B. All Division 26 work shall be done under the direction of a currently certified State of Wisconsin Certified Master Electrician.

1.17 CERTIFICATES AND INSPECTIONS

A. Obtain and pay for all required State or local installation inspections except those provided by the Architect/Engineer in accordance with State Code. Deliver originals of these certificates to the Owner. Include copies of the certificates in the Operating and Maintenance Instructions.
B. Coordinate and provide inspections as required by the Authority Having Jurisdiction over the site.
C. This contractor is responsible for coordination of Owner’s electrical inspection. Inspection requirements will be issued at a pre-installation meeting, arranged by this contractor and the Owner’s Electrical Inspector.

1.18 COORDINATION

A. It shall be the responsibility of each Contractor to coordinate and consult with each other to determine space requirements and to determine that adequate space for servicing is provided for all equipment whether furnished by the Contractor or others. The General Contractor shall have final decision on all space priority conflicts among Contractors. All space priority conflicts shall be brought to the attention of the Architect/Engineer and Owner's Representative.

B. Each Contractor shall thoroughly familiarize himself with existing systems which will affect and be affected by relocation of existing equipment and installation of new lines and equipment. They shall plan installation of their work so that interruptions of services to any building or portion thereof will be a minimum, and such interruptions shall occur only when system is not required, if possible. If not possible, each Contractor shall insure the operation of services by whatever means possible, such as, installing bypasses, or providing temporary service or circuits. Each interruption shall be for as short a duration as possible.

C. Cooperation among all Contractors shall be required. Any Work that is installed without cooperating or coordinating with other Contractors and is in conflict shall be removed and reinstalled at that particular Contractor's cost. No cost additions to the Project will be considered due to a Contractor's lack of participation in the cooperation and coordination process. The following list of items of Work shall be the priority of order for all Contractors:
   1. Structure
   2. Gravity-flow systems for sanitary, storm, steam and steam condensate piping
   3. Ductwork and appurtenances
   4. Electrical primary and secondary feeder conduits
   5. Plumbing vent piping
   6. Fire protection (sprinkler system)
   7. HVAC piping
   8. Gas piping, process piping and domestic water
   9. Electrical branch circuit conduit and low voltage conduit
   10. Control air lines or conduit

D. The above list, in descending order, is the precedence assigned the Work items for space priority. Gravity-flow systems have first priority.

E. Exception: Plumbing lines below or behind plumbing fixtures shall have precedence over all other work. Electrical conduit above or below switchgear, panelboards and control panels shall have precedence over all other work. Do not install any fluid conveying piping over electrical or elevator equipment.

F. In the case of interconnection of the work of two or more contractors, verify at the site or on shop drawings all dimensions relating to such work. All errors due to the failure to so verify any such dimensions shall be promptly rectified.
   Any installed work that is not coordinated and interferes with another contractor’s work shall be removed or relocated at the installing contractor’s expense.

1.19 DEMOLITION AND EXISTING REQUIREMENTS

A. Existing active services: water, gas, ventilation, compressed or control air, sanitary waste, sanitary vent, storm electric, and any other building systems when encountered shall be protected against damage. Where existing services are to be abandoned, the services shall be removed back to the point of origin and removed from the site unless otherwise directed by the Owner's Representative.

B. Submit a “Sequence of Work Schedule” in respect to all temporary and permanent utility and service cutovers after final determination. This schedule shall be submitted for approval to the Owner and Architect/Engineer. The submittal shall designate priority order, service or utility affected, date of cutover, and time of day to start and finish.

C. Bidders should inspect the site to become familiar with conditions of the site which will affect the Work. Bidders should verify points of connection with utilities, routing of outside piping to include required clearances from any existing structures, or other obstacles.

D. Extra payment will not be allowed for changes in the Work required because of the successful bidder's failure to make this inspection.

1.20 APPROVED ELECTRICAL TESTING LABORATORIES

A. The following laboratories are approved for providing electrical product safety testing and listing services as required in these specifications:
   1. Underwriters Laboratories Inc.
   2. Electrical Testing Laboratories, Inc.

1.21 SLEEVES AND OPENINGS

A. Openings required in new or existing construction that may be necessary for the installation of new work shall be provided by the respective contractor and all patching and repairing shall be done by workmen competent in the trade required, at the expense of the respective contractor. The respective contractor shall be responsible for arranging the work so that minimum cutting will be required. All rubbish and excess materials involved in such cutting shall be promptly removed from the site and disposed of by the contractor. Cutting through the floor or roof systems or load bearing walls shall be done only with the prior written approval of the Architect/Engineer so as to avoid damaging the structural system.

1.22 OMISSIONS

A. No later than ten (10) days before bid opening, the Contractor shall call the attention of the A/E to any materials or apparatus the Contractor believes to be inadequate and to any necessary items of work omitted.

1.23 DEFINITIONS

A. Wherever the words “the Contractor”, “this Contractor” or “Electrical Contractor”, appear in this section, they refer to the Contractor for Electrical Work.
B. The term “provide” includes such labor, methods, materials, equipment and transportation or other facilities required to complete the Contract and the performance of all duties thereby upon the Contractor.

1.24 PROJECT/SITE CONDITIONS

A. Install Work in locations shown on Drawings, unless prevented by Project conditions.
B. Prepare drawings showing proposed rearrangement of Work to meet Project conditions, including changes to Work specified in other Sections. Obtain permission of A/E before proceeding.
C. Tools, materials and equipment shall be confined to areas designated by the Owner’s project representative.

1.25 WORK SEQUENCE AND SCHEDULING

A. Install work in phases to accommodate Owner's occupancy requirements. During the construction period coordinate schedule and operations with Owner's Construction Representatives.

1.26 WORK BY OTHER TRADES

A. Every attempt has been made to indicate in this trade's specifications and drawings all work required of this Contractor. However, there may be additional specific paragraphs in other trade specifications and addenda, and additional notes on drawings for other trades which pertain to this Trade's work, and thus those additional requirements are hereby made a part of these specifications and drawings.
B. Electrical details on drawings for equipment to be provided by others are based on preliminary design data only. This Contractor shall lay out the electrical work and shall be responsible for its correctness to match equipment actually provided by others.

1.27 SALVAGE MATERIALS

A. No materials removed from this project shall be reused (except as specifically noted below). All materials removed shall become the property of and shall be disposed of by the Contractor.

PART 2 - PRODUCTS

2.01 IDENTIFICATION

A. Refer to Electrical Section 26 05 53 – Identification for Electrical Systems.

2.02 SLEEVES AND OPENINGS

A. General:
   1. Pipe sleeves shall be constructed of standard weight ASTM A53 or ASME B36.10 steel with an anchor plate constructed of A36/A36M steel welded to the pipe. The sleeve shall be sized a minimum of 1" larger than piping insulation diameter. The entire assembly shall be hot-dip galvanized after fabrication.
   2. Duct sleeves and piping sleeves passing through interior walls shall be constructed of 24 gauge galvanized steel minimum thickness.

B. Sleeves Through Below Grade Walls:
   1. Provide steel pipe sleeve, ASTM A53, pressure sealing with membrane clamp ring, gasket, water stop ring, external rings, and nitrile rubber link seals. The assembly shall be hot-dip galvanized after fabrication.
      a. Seals: Modular mechanical type seals, consisting of interlocking nitrile rubber links shaped to continuously fill the annular space between the pipe and the sleeve and electrically isolate the carrier pipe from the steel sleeve.
      b. Sealing Element: Polychloroprene rubber material compounded to resist aging, ozone, sunlight, hydrocarbon gases, water, and chemical action.
      c. Hardware: Type 300 series stainless steel fasteners. Threads rolled to produce smooth uniform threads and unbroken flow lines.
      d. Compression Plates: Fiberglass-reinforced polyester plastic, injection molded for high physical properties, dielectric strength and non-cold flow creep characteristics, having high resistance to acidic and alkaline soils.
   2. For sleeves located 15 feet or more below grade provide cast iron sleeve ASTM A74 with compression seals.

2.03 SEALING AND FIRESTOPPING

A. Fire And/Or Smoke Rated Penetrations:
   1. Manufacturers:
      a. 3M, STI/SpecSeal, Tremco, Hilti
      b. All firestopping systems shall be by the same manufacturer.
   2. Submittals:
      a. Contractor shall submit product data for each firestop system. Submittals shall include product characteristics, performance and limitation criteria, test data, MSDS sheets, installation details and procedures for each method of installation applicable to this project. For non-standard conditions where no UL tested system exists, submit manufacturer's drawings for UL system with known performance for which an engineering judgment can be based upon.
   3. Product:
      a. Firestop systems shall be UL listed or tested by an independent testing laboratory approved by the Owner and the Authority Having Jurisdiction (AHJ).
      b. Use a product that has a rating not less than the rating of the wall or floor being penetrated. Reference architectural drawings for identification of fire and/or smoke rated walls and floors.
      c. Contractor shall use firestop putty, caulk sealant, intumescent wrapstrips, intumescent firestop collars, firestop mortar or a combination of these products to provide a UL listed system for each application required for this project. Provide mineral wool backing where specified in manufacturer's application detail.

B. Non-Rated Penetrations:

1. Conduit Penetrations Through Below Grade Walls:
    a. In exterior wall openings below grade, use a modular mechanical type seal consisting of interlocking synthetic rubber links shaped to continuously fill the annular space between the uninsulated conduit and the cored opening or a water-stop type wall sleeve.
2. Conduit and Cable Tray Penetrations:
    a. At conduit and cable tray penetrations of non-rated interior partitions, floors and exterior walls above grade, use urethane caulk in annular space between conduit and sleeve, or the core drilled opening.

PART 3 – EXECUTION

3.01 DEMOLITION

A. Perform all demolition as indicated on the drawings to accomplish new work. Where demolition work is to be performed adjacent to existing work that remains in an occupied area, construct temporary dust partition to minimize the amount of contamination of the occupied space. Where pipe is removed and not reconnected with new work, cap ends of existing services as if they were new work. Coordinate work with the Owner to minimize disruption to the existing building occupants.

B. All devices, fixtures, equipment, wiring and associated conduit, insulation and similar items demolished, abandoned, or deactivated are to be removed from the site by the Contractor except as specifically noted otherwise. All designated equipment is to be turned over to the owner for their use at a place and time so designated. Maintain the condition of material and/or equipment that is indicated to be reused equal to that existing before work began.

C. All contractors requiring the personnel/ material hoist and or temporary construction elevator (i.e. new elevators, temporarily protected) at times other than outlined in the temporary facilities specifications will make arrangements directly with the general contractor. The general contractor is responsible for all coordination and scheduling of the use of any hoisting equipment so the flow of the project is smoothly maintained and all workers have access to the work areas to perform their work and deliver material to the areas needed according to the project schedule.

D. If any contractor’s work requires the removal and replacement of any finished materials including but not limited to such materials as ceiling tiles, wall finishes, cabinets, doors, flooring, windows, etc. after those items are installed, each contractor will be responsible, at no additional cost to the owner, to replace any damaged, soiled or lost materials with new materials to match the existing materials and those materials damaged.

3.02 CUTTING AND PATCHING

A. Each Contractor shall coordinate the placing of openings in the new structure as required for the installation of each Contractor’s work.

B. Each Contractor shall furnish to the General Contractor the accurate locations and sizes for required openings in the new work, but this shall not relieve each Contractor of the responsibility of checking to assure that properly sized openings are provided. When additional patching is required due to the Contractor's failure to inspect this work, then the Contractor shall make arrangements for the patching required to properly close the openings to include patch painting, and the Contractor shall pay any additional cost incurred in this respect.

C. If cutting and patching of the new structure is made necessary due to the Contractor's failure to install piping, ducts, sleeves, or equipment on schedule, or due to the Contractor's failure to furnish on schedule the information required for the leaving of openings, then it shall be the Contractor's responsibility to make arrangements and obtain approval from the General Contractor and Architect/Engineer for this cutting and patching, and the Contractor shall pay any additional cost incurred in this respect. The Contractor shall also reimburse the Owner for any additional costs incurred to the Architect/Engineer for additional services caused by the Contractor in this respect.

D. The Contractor shall provide cutting and patching and patch painting in the existing structure as required for the installation of his Work and shall furnish lintels and supports as required for openings. Cutting of structural support members will not be permitted without prior approval of the Architect/Engineer. Extent of cutting shall be minimized; use core drills, power saws, or other machines which will provide neat, minimum openings. Patching shall match adjacent materials and surfaces and shall be performed by craftsmen skilled in the respective craft required.

3.03 BUILDING ACCESS

A. Arrange for the necessary openings in the building to allow for admittance of all apparatus. When the building access was not previously arranged and must be provided by this contractor, restore any opening to its original condition after the apparatus has been brought into the building.

3.04 EQUIPMENT ACCESS

A. Install all piping, conduit, ductwork, and accessories to permit access to equipment for maintenance. Coordinate the exact location of wall and ceiling access panels and doors with the General Contractor, making sure that access is available for all equipment and specialties. Where access is required in plaster or drywall walls or ceilings, furnish the access doors to the General Contractor and reimburse the General Contractor for installation of those access doors.
B. The approximate location of all equipment and devices is shown on the drawings. The Architect/Engineer reserves the right to change the location of all equipment or devices 6 feet in any direction at no additional cost provided such changes are requested before final installation.
C. Install all equipment with ample space allowed for removal and repair. Provide ready accessibility to removable parts of equipment and to all wiring without moving equipment which is installed or which is already in place.
D. In mechanical and electrical equipment spaces, expose ceiling outlets and conduit with due consideration to ventilating ducts and mechanical piping. Where numerous ducts occur, install conduits and outlets after the ventilating ducts. Puncturing of ductwork or hanging equipment such as light fixtures, ceiling hangers and conduits from ductwork is prohibited unless specifically noted otherwise.
E. Electrical equipment shall be installed to maintain minimum clearances per Article 110 of NEC and ANSI C2 (National Electrical Safety Code).
F. No piping carrying fluids shall be installed directly over electrical equipment.
G. Equipment shall be installed in accordance with manufacturer’s recommendation. Where conflicts occur between Contract Document and these recommendations, a ruling shall be requested of the Architect for decision before proceeding with such work.

3.05 COORDINATION

A. The Contractor shall cooperate with other trades in locating work in a proper manner. Should it be necessary to raise or lower or move longitudinally any part of the electrical work to better fit the general installation, such work shall be done at no extra cost to the Owner, provided such decision is reached prior to actual installation. The Contractor shall check location of electrical outlets with respect to other installations before installing.
B. The Contractor shall verify that all devices are compatible for the surfaces on which they will be used. This includes, but is not limited to light fixtures, panelboards, devices, etc. and recessed or semi-recessed heating units installed in/on architectural surfaces. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls and other structural components as they are constructed.
C. Coordinate all work with other contractors prior to installation. Any installed work that is not coordinated and that interferes with other contractor's work shall be removed or relocated at the installing contractor's expense.
D. Coordinate arrangements, mounting and support of electrical equipment:

1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
2. To provide for ease of disconnecting the equipment with minimum interference to other installations.
3. To allow right of way for piping and conduit installed at required slope.
4. So connecting raceways, cables, wireways, cable trays and busways will be clear of obstructions and of the working and access space of other equipment.

E. Cooperate with the testing consultant in ensuring Section 26 05 04 compliance. Verify system completion to the testing consultant. Demonstrate the starting, interlocking and control features of each system so the testing contractor can perform its work.

3.06 SLEEVES AND OPENINGS

A. General:
1. Sleeves are not required for piping and ducts passing through interior non-rated drywall, plaster, or wood partitions and interior poured concrete walls that have been saw cut or core drilled.
2. Pack annular space between sleeves and pipe or ducts with fiberglass insulation and seal.
3. Piping sleeves that pass through fire rated floors, walls, or ceilings shall be provided with a UL listed fire stop material meeting UL 1479 to seal the opening between the pipe and the pipe sleeve to maintain the fire rating.
4. Provide escutcheon plates on piping to cover sleeve and insulation in finished areas.

B. Sleeves Through Floors/Ceilings:
1. Sleeves shall be installed to extend 1 inch above finished floor with a watertight sealant between floor and sleeve in all mechanical rooms and wet rooms listed below.
2. If a sleeve is not provided, provide 1-1/2 inch angle ring with urethane caulk between the angle and the floor and seal at the corners to form a watertight seal.
3. Wet Locations:
   a. Mechanical Rooms
   b. Parking Ramps
   c. Sanitary/Storm pumping stations

3.07 SEALING AND FIRESTOPPING

A. The Contractor shall refer to building life safety drawings for all smoke and fire rates in addition to the mechanical drawings. Any discrepancies shall be brought to the attention of the Architect/Engineer before final addendum.

B. Fire and/or Smoke Penetrations:
1. Install approved product in accordance with the manufacturer's instructions where a pipe (i.e. cable tray, bus, cable bus, conduit, wireway, trough, etc.) penetrates a fire rated surface.
2. Where firestop mortar is used to infill large fire-rated floor openings that could be required to support weight, provide permanent structural forming. Firestop mortar alone is not adequate to support any substantial weight.

C. Non-Rated Surfaces:
1. When the opening is through a non-fire rated wall, floor, ceiling or roof the opening must be sealed using an approved type of material.
2. Install escutcheons or floor/ceiling plates where conduit, penetrates non-fire rated surfaces in occupied spaces. Occupied spaces for this paragraph include only those rooms with finished ceilings and the penetration occurs below the ceiling.
3. In exterior wall openings below grade, assemble rubber links of mechanical seal to the proper size for the conduit and tighten in place, in accordance with the manufacturer's instructions. Install so that the bolts used to tighten the seal are accessible from the interior of the building or vault.

4. At interior partitions, conduit penetrations are required to be sealed for all clean rooms, laboratories, and most hospital spaces, computer rooms, dormitory rooms, tele/data/com rooms and similar spaces where the room pressure or odor transmission must be controlled. Apply sealant to both sides of the penetration in such a manner that the annular space between the conduit sleeve and the conduit is completely filled.

3.08 HOUSEKEEPING AND CLEAN UP

A. The Contractor shall clean up and remove from the premises, on a daily basis, all debris and rubbish resulting from its work and shall repair all damage to new and existing equipment resulting from its work. When job is complete, this Contractor shall remove all tools, excess material and equipment, etc., from the site.

SECTION 26 05 02
ELECTRICAL DEMOLITION FOR REMODELING

PART 1 – GENERAL

1.01 SCOPE OF WORK
A. Base Bid: The work under this section includes selective and/or total demolition of all existing electrical equipment, devices, conduit, wiring, back boxes and supporting associated devices for the electrical systems.

1.02 SECTION INCLUDES
A. Materials and Equipment

1.03 RELATED WORK
A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, apply to this Section.

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT
A. Materials and equipment for patching and extending work as specified in the individual Sections.

PART 3 - EXECUTION

3.01 EXAMINATION
A. Verify field measurements and circuiting arrangements as shown on Drawings.
B. Verify that abandoned wiring and equipment serve only abandoned facilities.
C. Verify whether or not PCB ballasts exist in light fixtures which will be disposed of. If PCB light fixture ballasts exist, then follow requirements in PCB BALLAST HANDLING AND DISPOSAL below.
D. Demolition Drawings are based on casual field observation and/or existing record documents. Report discrepancies to the Owner, Architect/Engineer and Owner's Field Representative before disturbing existing installation.
E. Beginning of demolition means installer accepts existing conditions.

3.02 PREPARATION
A. Disconnect electrical systems in walls, floors, and ceilings scheduled for removal.
B. Coordinate utility service outages with the Owner, Owner's Field Representative, Architect, and Engineer. Also, if applicable, coordinate utility service outages with the local Utility Company.
C. Provide temporary wiring and connections to maintain existing systems in service during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations. In particular, all security and safety systems must be maintained in operation at all times as required by the Owner. This includes security and safety lighting.

3.03 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK
A. Demolish and extend existing electrical work to meet all requirements of these specifications.
B. If certain raceways and boxes are abandoned but not scheduled for removal, those items must be shown on the "As Built Drawings".
C. Remove, relocate, and extend existing installations to accommodate new construction.
D. Remove abandoned wiring to source of supply.

E. Remove exposed abandoned conduit.
F. Cut conduit flush with walls and floors, and patch surfaces.
G. Disconnect and remove abandoned panelboards and distribution equipment.
H. Disconnect and remove abandoned luminaires. Remove brackets, stems, hangers, and other accessories.
I. Repair adjacent existing construction and finishes damaged during demolition and extension work to match adjacent existing surfaces.
J. Maintain access to existing electrical installations which remain active. Modify installation or provide access panel as appropriate.
K. Extend existing installations using materials and methods compatible with existing electrical installations, or as specified. This includes the extension of the circuit from the last active device to the next device in the system to be activated.

3.04 PCB BALLAST HANDLING AND DISPOSAL

A. Generally, all high power factor fluorescent light ballasts manufactured before 1978 and some HID ballasts contain PCB compounds in their capacitors. The Contractor shall inspect all ballasts in all light fixtures and take the actions described below.
B. All ballasts labeled as "NON-PCBs" or "NO PCBs" shall become the responsibility of the Contractor. If the PCB content is not stated on the ballast label, the ballast shall be handled as a PCB ballast.
C. All PCB ballasts shall be removed from the light fixtures and shall have the wires clipped off. However, before removal, all PCB ballasts shall be carefully inspected for leaks. If a ballast appears to be leaking(evidenced by potting compound leaking out or by an oily film on the ballast surface) the ballast must be handled per EPA and DNR PCB regulations. Basically, this means the ballast is to be carefully removed from the fixture and placed in an approved drum. See paragraph below for the drum specifications. The person removing the ballast from the fixture shall wear protective gloves, eye protection, and protective clothing as necessary.
D. If the fixture has also been contaminated, it must be cleaned to less than 10 micrograms/100 square centimeters contamination before disposal. This cleaning must be done by an approved PCB contractor and is not considered a part of this contract. Contact Owner for contractor approval before commencing with the cleanup.
E. The ballasts shall then be placed in US DOT approved type 17C or type 17H drums (barrels) furnished by Veolia Environmental Services. The quantity and size of the drums will be determined by the contractor at the time of construction, - 30 and 55 gallon drums are typically available.
F. These barrels shall be placed in storage with the cover that came with the barrels, in a location within a building, as designated by the Building Manager or Owner's project representative. The barrels are not to be placed outside where they are exposed to weather.
G. THESE BALLASTS ARE NOT TO BE REMOVED FROM THE WORK SITE BY THE CONTRACTOR. To do so, would be a violation of DNR and DOT hazardous waste regulations and may result in a fine to the Contractor.
H. The Contractor shall label and mark the PCB storage drums with EPA approved PCB labels and the storage area with signs, marks and lines to meet the regulations of Wisconsin Code NR 157.
I. The Contractor shall also provide approved PCB absorbent materials to be stored immediately adjacent to the drum storage area. Do not place loose absorbent material in the drums.
J. The Contractor shall provide to the Owner's Project representative, in written form, a total count of these ballasts (or their total weight by barrel) and where they are stored.
K. See Lamp and Ballast Handling and Disposal instructions below.

3.05 LAMP AND BALLAST HANDLING AND DISPOSAL

A. All lamps (fluorescent, incandescent, and HID) contain mercury and/or lead (in the base) as well as other heavy metals and compounds which are regulated by the EPA and DNR during the

disposal process. As a result, regulations have been issued covering the handling and disposal of all lamps. Therefore, lamps which have been removed from service for disposal shall be handled as follows by the Contractor.

B. The Contractor shall very carefully remove all lamps (fluorescent, incandescent, and HID) from light fixtures before removal of the fixture from its mounted position. This is to reduce the likelihood that the lamp(s) will be broken. If the Contractor breaks more than 1% of the total lamps removed for the project, the Contractor will be charged the cost difference between disposal of broken lamps and disposal of unbroken lamps for all lamps broken in excess of 1% of the total lamps removed in the project.
C. The contractor shall contact Veolia Environmental Services (1-800-358-9095 or 262-243-8917) to coordinate the storage and pickup of disposed lamps and ballasts. The contractor shall obtain containers from Veolia Environmental Services, for the storage of lamps and ballasts. Removed lamps and ballasts shall be placed in containers by the contractor, marked with the number and type of lamp and ballast, and placed in storage at a location on the Owner's property. The contractor shall label the area as "Hazardous Material Storage – Mercury". The contractor shall make arrangements for pickup of the lamps and ballasts with Veolia Environmental Services, shall provide a count of all stored lamps and ballasts, and shall fill out any required forms.
D. When making disposal arrangements with Veolia Environmental Services, the contractor shall notify them of the Owner's project name and number, and the Owner's project manager, for invoicing purposes. Invoicing from Veolia Environmental Services shall be sent to the Owner's project manager for direct charge payment from that project (lamp and ballast disposal costs to be paid by Owner).
E. The contractor shall coordinate the lamp and ballast disposal with the Owner's field representative.

3.06 CLEANING AND REPAIR

A. Clean and repair existing materials and equipment which remain or are to be reused.
B. Panelboards: Clean exposed surfaces and check tightness of electrical connections. Replace damaged circuit breakers and provide closure plates for vacant positions. Provide typed circuit directory showing revised circuiting arrangement.
C. Luminaires: Remove existing luminaires for cleaning. Use mild detergent to clean all exterior and interior surfaces; rinse with clean water and wipe dry. Replace lamps, ballasts (if required) and broken electrical parts.

3.07 INSTALLATION

A. Install relocated materials and equipment under the provisions of other sections.

SECTION 26 05 04
CLEANING, INSPECTION, AND TESTING OF ELECTRICAL EQUIPMENT

PART 1 – GENERAL

1.01 SCOPE OF WORK

A. Base Bid: The work under this section includes the required cleaning, repair, adjustment, calibration, maintenance and testing of electrical equipment, as specified herein. This applies only to new electrical and existing electrical equipment being furnished, modified, worked on or serviced by this contractor for this project. Additional testing may be required and specified in other Division 26 sections and shall also be provided.

1.02 SECTION INCLUDES

A. General Inspection and Cleaning of All Electrical Equipment
B. Battery Systems
C. Cables
D. Panelboards
E. Light Fixtures
F. Occupancy Sensors

1.03 RELATED WORK

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

PART 2 – PRODUCTS

2.01 NOT USED.

PART 3 – EXECUTION

3.01 GENERAL INSPECTION AND CLEANING OF ALL ELECTRICAL EQUIPMENT

A. Inspect for physical damage and abnormal mechanical and electrical conditions.
B. Any item found to be out of tolerance, or in any other way defective as a result of the required testing, shall be reported to the A/E. Procedure for repair and/or replacement will be outlined. After appropriate corrective action is completed the item shall be re-tested.
C. Compare equipment nameplate information with the latest single line diagram and report any discrepancies.
D. Verify proper auxiliary device operation and indicators.
E. Check tightness of accessible bolted electrical joints. Use torque wrench method.
F. Make a close examination of equipment and remove any shipping brackets, insulation, packing, etc. that may not have been removed during original installation.
G. Make a close examination of equipment and remove any dirt or other forms of debris that may have collected in existing equipment or in new equipment during installation.
H. Clean All Equipment:
    1. Vacuum inside of panelboards, switchboards, switchgear, transformer core and coils, horizontal and vertical busducts, motor control centers (MCC)'s, fire alarm panels, comm/data, security panel, etc.
    2. Loosen attached particles and vacuum them away.
    3. Wipe all insulators with a clean, dry, lint free rag.
    4. Clean insulator grooves.

5. Re-vacuum inside surfaces as directed by the Owner's Construction Representative or Inspector

I. Inspect equipment anchorage.
J. Inspect equipment and bus alignment.
K. Check all overload elements for operation and control.
L. Lubricate nonelectrical equipment per manufacturer's recommendations.

3.02 GROUNDING SYSTEMS

A. Inspect the ground system for adequate termination at all devices.

3.03 BATTERY SYSTEMS

A. Inspect for physical damage and evidence of corrosion. Clean units.
B. Measure system charging voltage and each individual cell voltage.
C. Measure the electrolyte specific gravity and level.
D. Verify and compare measured values with manufacturer's specifications.

3.04 CABLES

A. Visual and Mechanical Inspections:
   1. Inspect exposed sections for physical damage.
   2. Verify cable is supplied and connected in accordance with single line diagram.
   3. Inspect for shield grounding, cable support and termination.
   4. Inspect for visual jacket and insulation condition.
   5. Visible cable bends shall be checked against ICEA or manufacturer's minimum allowable bending radii -- 12 times the diameter for tape shielded cables.
   6. Inspect for proper fireproofing in common cable areas.
   7. There shall be NO tests performed on existing cable without specific direction from the Consulting Engineer.

3.05 PANELBOARDS

A. Torque all the connections per the manufacturers spec. Verify phase wires, color coding, separate neutral and mechanical bonding. Verify circuit breaker operation. Verify the directory.

3.06 LIGHT FIXTURES

A. Check the bonding and proper lamping. Confirm operation of the fixture with the proper switch or sensor.

3.07 OCCUPANCY SENSORS

A. Confirm operation of the sensor per the manufacturers spec.

SECTION 26 05 19
LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLE

PART 1 – GENERAL

1.01 SCOPE OF WORK
A. Base Bid: The work under this section includes furnishing and installing required wiring and cabling systems including pulling, terminating and splicing.

1.02 SECTION INCLUDES
A. General
B. Manufacturers
C. Building Wire
D. Wiring Connectors

1.03 RELATED WORK
A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, apply to this Section.
B. Section 26 05 00 – Common Work Results for Electrical
C. Section 26 05 26 – Grounding and Bonding for Electrical Systems
D. Section 26 05 33 – Raceway and Boxes for Electrical Systems.
E. Section 26 05 53 – Identification for Electrical Systems.

1.04 SUBMITTALS
A. Submit product data: Provide for each cable assembly type.
B. Submit factory test reports: Indicate procedures and values obtained.
C. Submit shop drawings for modular wiring system including layout of distribution devices, branch circuit conduit and cables, circuiting arrangement, and outlet devices.
D. Submit manufacturer's installation instructions. Indicate application conditions and limitations of use stipulated by product testing agency specified under Regulatory Requirements.

1.05 REFERENCE STANDARDS
A. NFPA 70 - National Electrical Code
B. IPCEA S-61-402/NEMA WC-5 Thermoplastic Insulated Wire and Cable
C. IPCEA S-66-524/NEMA WC-7 Cross-linked Thermosetting Polyethylene-Insulated Wire and Cable
D. UL 83
E. ASTM

1.06 PROJECT CONDITIONS
A. Verify that field measurements are as shown on Drawings.
B. Conductor sizes are based on copper.
C. Wire and cable routing shown on Drawings is approximate unless dimensioned. Route wire and cable as required to meet project conditions.
D. Where wire and cable routing is not shown, and destination only is indicated, determine exact routing and lengths required.

PART 2 – PRODUCTS

2.01 GENERAL

A. All wire shall be new, delivered to the site in unbroken cartons and shall be less than one year old out of manufacturer's stock.

All conductors shall be copper.

B. All cable and wire shall have 600 volts insulation, have a conductivity of 98 percent, and shall be annealed coated copper per ASTM B33 or B189.

C. Wire sizes No. 12 AWG and smaller shall be solid wire, and wire No. 10 AWG and larger shall be stranded, Class B, ASTM B8.

D. Stranded conductors may only be terminated with UL OR ETL Listed type terminations or methods: e.g. stranded conductors may not be wrapped around a terminal screw but must be terminated with a crimp type device or must be terminated in an approved back wired method.

E. Minimum wire sizes shall be as follows:
   1. Power wiring- #12 AWG
   2. Control Wiring- #18 AWG

F. All conductors shall be continuous without splices except at locations approved for the purpose.

2.02 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the work include, but are not limited to, the following:
   1. Alcan Products Corporation; Alcan Cable Division
   2. American Insulated Wire Corp.; a Leviton Company
   3. General Cable Corporation
   4. Senator Wire & Cable Company
   5. Southwire Company
   6. Houston Wire & Cable
   7. AFC Cable Systems, Inc.
   8. Hubbell Power Systems, Inc.
   9. O-Z/Gedney; EGS Electrical Group, LLC
   10. 3M; Electrical Products Division
   11. Tyco Electronics Corp.

2.03 BUILDING WIRE

A. Description: Single conductor insulated wire.

B. Insulation: Type THHN/THWN, XHHW-2 insulation for feeders and branch circuits.
   1. Type XHHW-2 insulation for feeders with aluminum conductors.
      a. Insulation shall not contain halogenated flame retardants, including but not limited to polybrominated diphenyl ethers.
      b. Insulating jacket shall be 100% lead free.

2.04 WIRING CONNECTORS

A. Split Bolt Connectors: Not acceptable.

B. Solderless Pressure Connectors: High copper alloy terminal. May be used only for cable termination to equipment pads or terminals. Not approved for splicing.

C. Spring Wire Connectors: Solderless spring type pressure connector with insulating covers for copper wire splices and taps. Use for conductor sizes 10 AWG and smaller.

D. All wire connectors used in underground or exterior pull boxes shall be gel filled twist connectors or a connector designed for damp and wet locations.

E. Mechanical Connectors: Bolted type tin-plated; high conductivity copper alloy; spacer between conductors; beveled cable entrances.

F. Compression (crimp) Connectors: Long barrel; seamless, tin-plated electrolytic copper tubing; internally beveled barrel ends. Connector shall be clearly marked with the wire size and type and proper number and location of crimps.

PART 3 – EXECUTION

3.01 GENERAL WIRING METHODS

A. All wire and cable shall be installed in conduit.
B. Do not use wire smaller than 12 AWG for power and lighting circuits.
C. All conductors shall be sized to prevent excessive voltage drop at rated circuit ampacity. As a minimum use 10 AWG conductor for 20 ampere, 120 volt branch circuit home runs longer than 100 feet (30 m), and for 20 ampere, 277 volt branch circuit home runs longer than 200 feet (61 m).
D. Make conductor lengths for parallel conductors equal.
E. Splice only in junction or outlet boxes.
F. No conductor less than 10 AWG shall be installed in exterior underground conduit.
G. Identify ALL low voltage, 600v and lower, wire per section 26 05 53.
H. Neatly train and lace wiring inside boxes, equipment, and panelboards.

3.02 WIRING INSTALLATION IN RACEWAYS

A. Pull all conductors into a raceway at the same time. Use Listed wire pulling lubricant for pulling 4 AWG and larger wires and for other conditions when necessary.
B. Install wire in raceway after interior of building has been physically protected from the weather and all mechanical work likely to injure conductors has been completed.
C. Completely and thoroughly swab raceway system before installing conductors.
D. Place all conductors of a given circuit (this includes phase wires, neutral (if any), and ground conductor) in the same raceway. If parallel phase and/or neutral wires are used, then place an equal number of phase and neutral conductors in same raceway or cable.

3.03 WIRING CONNECTIONS AND TERMINATIONS

A. Splice only in accessible junction boxes.
B. Wire splices and taps shall be made firm, and adequate to carry the full current rating of the respective wire without soldering and without perceptible temperature rise.
C. All splices shall be so made that they have an electrical resistance not in excess of two feet (600 mm) of the conductor.
D. Use solderless spring type pressure connectors with insulating covers for wire splices and taps, 10 AWG and smaller.
E. Use mechanical or compression connectors for wire splices and taps, 8 AWG and larger. Tape uninsulated conductors and connectors with electrical tape to 150 percent of the insulation value of conductor.
F. Thoroughly clean wires before installing lugs and connectors.
G. At all splices and terminations, leave tails long enough to cut splice out and completely re-splice.

3.04 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Section 26 05 04.
B. Additional testing as follows shall be performed if aluminum conductors are used:
C. Equipment terminated with aluminum conductors shall be tested with a thermal imager and recorded.
D. Conductors shall be closely checked for loose or poor connections, and for signs of overheating or corrosion.
E. Test procedures shall meet NETA guidelines.
F. Test results and report shall be provided to the engineer.
G. Contractor shall correct all deficiencies reported in the test report.

3.05 WIRE COLOR

A. General:

1. For wire sizes 10 AWG and smaller - Wire shall be colored as indicated below.
2. For wire sizes 8 AWG and larger – Use colored wire, or identify wire with colored tape at all terminals, splices and boxes. Colors to be as indicated below.
3. In existing facilities, use existing color scheme.
4. All switch legs shall be the same color as their associated circuit. Traveler conductors run between 3 and 4 way switches shall be colored pink or purple.

B. Neutral Conductors: White for 120/208V Where there are two or more neutrals in one conduit, each shall be individually identified with a different stripe color matching that of the associated phase conductor..

C. Branch Circuit Conductors: Three or four wire home runs shall have each phase uniquely color coded.

D. Feeder Circuit Conductors: Each phase shall be uniquely color coded.

E. Ground Conductors: Green for 6 AWG and smaller. For 4 AWG and larger, identify with green colored wire, or with green tape at both ends and at all access points, such as panelboards, motor starters, disconnects and junction boxes.

3.06 BRANCH CIRCUITS

A. The use of single-phase, multi-wire branch circuits with a common neutral are not permitted. All branch circuits shall be furnished and installed with an individual accompanying neutral, sized the same as the phase conductors.

3.07 EMERGENCY CIRCUITS

A. All emergency system wiring (NEC 700) shall be installed in separate raceways after their associated distribution equipment. The wiring shall be separate from each other and from all normal system wiring.

SECTION 26 05 23
CONTROL-VOLTAGE ELECTRICAL POWER CABLES

PART 1 – GENERAL

1.01 SCOPE OF WORK
A. Base Bid: The work under this section includes furnishing and installing required remote control and signal cabling.

1.02 SECTION INCLUDES
A. General
B. Manufacturers
C. Remote Control and Signal Cable
D. Wiring Connectors

1.03 RELATED WORK
A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, apply to this Section
B. Section 26 05 00 – Common Work Results for Electrical
C. Section 26 05 33 – Raceway and Boxes for Electrical Systems
D. Section 26 05 53 – Identification for Electrical Systems

1.04 SUBMITTALS
A. Submit product data: Provide for each cable assembly type.
B. Submit manufacturer's installation instructions. Indicate application conditions and limitations of use stipulated by product testing agency specified under Regulatory Requirements.

1.05 REFERENCE STANDARDS
A. NFPA 70 - National Electrical Code

1.06 PROJECT CONDITIONS
A. Verify that field measurements are as shown on Drawings.
B. Conductor sizes are based on copper.
C. Wire and cable routing shown on Drawings is approximate unless dimensioned. Route wire and cable as required to meet Project Conditions.
D. Where wire and cable routing is not shown, and destination only is indicated, determine exact routing and lengths required.

PART 2 – PRODUCTS

2.01 GENERAL
A. All wire shall be new, delivered to the site in unbroken cartons and shall be less than one year old out of manufacturer's stock.
B. All conductors shall be copper.
C. Insulation shall have a 600 volt rating.
D. All conductors must be suitable for the application intended. Conductors #12 and smaller may be solid or stranded with the following requirements or exceptions:
E. All conductors terminated with crimp type devices must be stranded.
F. Stranded conductors may only be terminated with UL OR ETL Listed type terminations or methods: e.g. stranded conductors may not be wrapped around a terminal screw but must be terminated with a crimp type device or must be terminated in an approved back wired method.

2.02 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the work include, but are not limited to, the following:
   1. Alcan Products Corporation; Alcan Cable Division
   2. American Insulated Wire Corp.; a Leviton Company
   3. General Cable Corporation
   4. Senator Wire & Cable Company
   5. Southwire Company
   6. Houston Wire & Cable
   7. Insert Manufacturer's Name

2.03 REMOTE CONTROL AND SIGNAL CABLE

A. All other systems cabling shall meet the requirements of NEC Article 725 and the following:
B. Control Cable for Class 1 Remote Control and Signal Circuits: 600 volt insulation, individual conductors twisted together, and covered with an overall PVC jacket. Cable shall be Listed, temperature rated, and plenum or non-plenum rated for the application as required in the National Electrical Code.
C. Control Cable for Class 2 or Class 3 Remote Control and Signal Circuits shall be constructed, Listed, temperature rated, and plenum or non-plenum rated for the application as required in the NEC Article 725.

2.04 WIRING CONNECTORS

A. Split Bolt Connectors: Not acceptable.
B. Spring Wire Connectors: Solderless spring type pressure connector with insulating covers for copper wire splices and taps. Use for conductor sizes 10 AWG and smaller.
C. All wire connectors used in underground or exterior pull boxes shall be gel filled twist connectors or a connector designed for damp and wet locations.

PART 3 – EXECUTION

3.01 GENERAL WIRING METHODS

A. Low voltage control and signal cables shall be installed in conduit.
B. Control cables for controlling lighting equipment connected to emergency power shall be routed in raceway.
C. Do not use wire smaller than 14 AWG for control wiring greater than 60 volts, or 18 AWG for voltages less than 60 volts, all sizes subject to NEC 725 requirements.
D. Splice only in junction boxes.
E. Identify wire per section 26 05 53.
F. Neatly train and lace wiring inside boxes, and equipment.

3.02 WIRING INSTALLATION IN RACEWAYS

A. Pull all conductors into a raceway at the same time. Use Listed wire pulling lubricant for pulling conditions when necessary.
B. Install wire in raceway after interior of building has been physically protected from the weather and all mechanical work likely to injure conductors has been completed.
C. Completely and thoroughly swab raceway system before installing conductors.

3.03 WIRING CONNECTIONS AND TERMINATIONS

A. Splice only in accessible junction boxes.
B. All splices shall be so made that they have an electrical resistance not in excess of two feet (600 mm) of the conductor.

C. Use solderless spring type pressure connectors with insulating covers for wire splices and taps, 10 AWG and smaller.
D. Thoroughly clean wires before installing lugs and connectors.
E. At all splices and terminations, leave tails long enough to cut splice out and completely re-splice.

3.04 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Section 26 05 04.

SECTION 26 05 26
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.01 SCOPE OF WORK
A. Base Bid: The work under this section includes grounding electrodes, connectors, equipment grounding conductors, bus and bonding.

1.02 SECTION INCLUDES
A. Manufacturers
B. Wire

1.03 RELATED WORK
A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, apply to this Section.
B. Section 26 05 00 – Common Work Results for Electrical

1.04 REFERENCE STANDARDS
A. NFPA 70 - National Electrical Code.
B. ANSI/IEEE 142 (Latest edition) - Recommended Practice for Grounding of Industrial and Commercial Power Systems.

1.05 PROJECT RECORD DOCUMENTS
A. Accurately record actual locations of grounding electrodes.

1.06 REGULATORY REQUIREMENTS
A. Conform to requirements of NFPA 70.
B. Furnish products listed and classified by Underwriters Laboratories, Inc. or testing firm acceptable to authority having jurisdiction as suitable for purpose specified and shown.
C. Comply with UL 467 for grounding and bonding materials and equipment.

PART 2 - PRODUCTS

2.01 WIRE
A. Material: Stranded copper (aluminum not permitted).
B. Grounding Electrode Conductor: Size as shown on drawings, specifications or as required by NFPA 70, whichever is larger.
C. Feeder and Branch Circuit Equipment Ground: Size as shown on drawings, specifications or as required by NFPA 70, whichever is larger. .

PART 3 - EXECUTION

3.01 EXAMINATION
A. Verify that final backfill and compaction has been completed before driving rod electrodes.

3.02 GENERAL
A. Install Products in accordance with manufacturer's instructions.
B. Ground connection surfaces shall be cleaned and all connections shall be made so that it is impossible to move them.
C. All grounding electrode conductors shall be installed in PVC conduit, in exposed locations.

3.03 LESS THAN 600 VOLT SYSTEM GROUNDING

A. Equipment Grounding Conductor: Provide separate, insulated equipment grounding conductor within each raceway. Terminate each end on suitable lug, bus, enclosure or bushing. Provide a ground wire from each device to the respective enclosure.

3.04 FIELD QUALITY CONTROL

A. Inspect grounding and bonding system conductors and connections for tightness and proper installation.

SECTION 26 05 29
HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 SCOPE OF WORK
A. Base Bid: The work under this section includes conduit and equipment supports, straps, clamps, steel channel, etc., and all required fastening hardware for supporting electrical work.

1.02 SECTION INCLUDES
A. Support, Anchorage And Attachment Components
B. Manufacturers

1.03 RELATED WORK
A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, apply to this Section
B. Section 26 05 00 – Common Work Results for Electrical
C. Section 26 05 19 – Low-Voltage Electrical Power Conductors and Cables
D. Section 26 05 23 – Control Voltage Electrical Power Cables
E. Section 26 05 26 – Grounding and Bonding for Electrical Systems
F. Section 26 05 33 – Raceway and Boxes for Electrical Systems
G. Section 26 09 23 – Lighting Controls
H. Section 26 51 13 -Interior Lighting Fixtures, Lamps and Ballasts

1.04 SUBMITTALS
A. Product Data: Provide data for support channel and equipment supports.

1.05 QUALITY ASSURANCE
A. Support systems shall be adequate for weight of equipment and conduit, including wiring, which they carry.
B. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code – Steel".

1.06 PERFORMANCE REQUIREMENTS
A. Delegated Design: Design supports for multiple raceways, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
B. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.
C. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

1.07 COORDINATION
A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement and formwork requirements are specified in Division 03.
B. Coordinate installation of roof curbs, equipment supports and roof penetrations as specified in Division 07 Section "Roof Accessories".

PART 2 - PRODUCTS

2.01 SUPPORT, ANCHORAGE AND ATTACHMENT COMPONENTS

A. Support Channel: Steel, Galvanized, Enameled or other corrosion resistant.
B. Hardware: Corrosion resistant.
C. Minimum sized threaded rod for supports shall be 3/8" for trapezes and single conduits 1-1/4" and larger, and ¼" for single conduits 1" and smaller.
D. Conduit clamps, straps, supports, etc., shall be steel or malleable iron. One-hole straps shall be heavy duty type. All straps shall have steel or malleable backing plates when rigid steel conduit is installed on the interior or exterior surface of any exterior building wall.
E. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be malleable iron.
F. Mechanical-Expansion Anchors: Insert-wedge-type, (zinc-coated) (stainless) steel, for use in hardened Portland cement concrete with tension, shear and pullout capacities appropriate for supported loads and building materials in which used.

2.02 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the work include, but are not limited to, the following:
   1. Allied Tube & Conduit
   2. Cooper B-Line, Inc.; a Division of Cooper Industries
   3. ERICO International Corporation
   4. GS Metals Corp.
   5. Thomas & Betts Corporation
   6. Unistrut; Tyco International, Ltd.
   7. Wesanco, Inc.
   8. Fabco Plastics Wholesale Limited
   9. Seasafe, Inc.
   10. Empire Tool & Manufacturing Co.
   11. Hilti, Inc.
   12. ITW Ramset/Red Head; a Division of Illinois Tool Works, Inc.
   13. MKT Fastening, LLC
   14. Simpson Strong-Tie Co., Inc.; Masterset Fastening Systems Unit

PART 3 - EXECUTION

3.01 INSTALLATION

A. Fasten hanger rods, conduit clamps, outlet, junction and pull boxes to building structure using pre-cast insert system, preset inserts, beam clamps, expansion anchors, or spring steel clips (interior metal stud walls only).
B. Use toggle bolts or hollow wall fasteners in hollow masonry, plaster, or gypsum board partitions and walls; expansion anchors or preset inserts in solid masonry walls; self-drilling anchors or expansion anchors on concrete surfaces; sheet metal screws in sheet metal studs and wood screws in wood construction. If nail-in anchors are used, they must be removable type anchors.
C. Power-actuated fasteners and plastic wall anchors are not permitted.
D. File and de-bur cut ends of support channel and spray paint with cold galvanized paint to prevent rusting.
E. Do not fasten supports to piping, ductwork, mechanical equipment, cable tray or conduit. Do not fasten to suspended ceiling grid system.
F. Do not drill structural steel members unless approved by Engineer.
G. Fabricate supports from galvanized structural steel or steel channel, rigidly welded or bolted to present a neat appearance. Use hexagon head bolts with spring lock washers under all nuts.

H. In wet locations, mechanical rooms and electrical rooms install free-standing electrical equipment on 3.5 inch (89 mm) concrete pads.
I. Install surface-mounted cabinets and panelboards with minimum of four anchors. Provide steel channel supports to stand cabinet one inch (25 mm) off wall (7/8" Uni-strut or ¾" painted, fire-retardant plywood is acceptable).
J. Bridge studs top and bottom with channels to support flush-mounted cabinets and panelboards in stud walls.
K. Furnish and install all supports as required to fasten all electrical components required for the project, including free standing supports required for those items remotely mounted from the building structure, catwalks, walkways etc.

3.02 INSTALLATION OF FABRICATED METAL SUPPORTS

A. Comply with installation requirements in Division 05 Section "Metal Fabrications" for site-fabricated metal supports.
B. Cut, fit and place miscellaneous metal supports accurately in location, alignment and elevation to support and anchor electrical materials and equipment.
C. Field Welding: Comply with AWS D1.1/D1.1M.

3.03 PAINTING

A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field painted surfaces.
   1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils (0.05 mm).
B. Touchup: Comply with requirements in Division 09 (painting sections) (Section "High Performance Coating") for cleaning and touchup painting of field welds, bolted connections and abraded areas of shop paint on miscellaneous metal.
C. Galvanized Surfaces: Clean welds, bolted connections and abraded areas and apply galvanizing repair paint to comply with ASTM A 780.

SECTION 26 05 33
RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.01 SCOPE OF WORK

A. Base Bid:
   1. The work under this section includes conduits, fittings, boxes, surface raceways, multi-outlet assemblies, auxiliary gutters, and wall duct for electrical systems including wall and ceiling outlet boxes, floor boxes, and junction boxes.

1.02 SECTION INCLUDES

A. General
B. Manufacturers
C. Rigid Metal Conduit and Fittings
D. PVC Coated Rigid Metal Conduit
E. Intermediate Metal Conduit (IMC) and Fittings
F. Electrical Metallic Tubing (EMT) and Fittings
G. Liquidtight Flexible Metal Conduit and Fittings
H. Rigid Nonmetallic Conduit and Fittings
I. Conduit Supports
J. Auxiliary Gutters (Wireways)
K. Pull and Junction Boxes
L. Hinged Cover Enclosures

1.03 RELATED WORK

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, apply to this Section
B. Section 26 05 00 – Common Work Results for Electrical
C. Section 26 05 26 – Grounding and Bonding for Electrical Systems
D. Section 26 05 29 – Hangers and Supports for Electrical Systems

1.04 SUBMITTALS

A. Boxes - provide product data showing configurations, finishes, dimensions, and manufacturer's instructions.
B. Product data for conduit, wireways, fittings, hinged-cover enclosures or cabinets.

1.05 QUALITY ASSURANCE

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

PART 2 – PRODUCTS

2.01 GENERAL

A. All steel fittings and conduit bodies shall be galvanized.
B. No cast metal, or split-gland type fittings permitted.
C. Mogul-type condulets larger than 2 inch (50 mm) not permitted except as approved or detailed.
D. All condulet covers must be fastened to the condulet body with screws and be of the same manufacture.
E. Wireways, gutters and c-condulets shall not be used in lieu of pull boxes and condulets.

F. All boxes shall be of sufficient size to provide free space for all conductors enclosed in the box and shall comply with NEC requirements.

2.02 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. AFC Cable Systems, Inc.
2. Alflex Inc.
3. Allied Tube & Conduit; a Tyco International Ltd. Co
4. Anamet Electrical, Inc.; Anaconda Metal Hose
5. Armorcast Products Company
6. Arnco Corporation
7. CANTEX inc
8. Carson Industries LLC
9. CDR Systems Corporation
10. CertainTeed Corp.; Pipe & Plastics Group
11. Christy Concrete Products
12. Condux International, Inc
13. Cooper Crouse-Hinds; Div. of Cooper Industries, Inc.
14. EGS/Appleton Electric
15. ElecSYS, Inc
16. Electri-Flex Co.
17. Erickson Electrical Equipment Company
18. Hoffman
19. Hubbell Incorporated; Killark Electric Manufacturing Co. Division
20. Hubbell Incorporated; Quazite
21. Lamson & Sessions: Carlon Electrical Products
22. Manhattan/CDT/Cole-Flex
23. Maverick Tube Corporation
24. NewBasis
25. Nordic Fiberglass, Inc.
26. O-Z Gedney; a unit of General Signal
27. RACO; a Hubbell Company
28. Robroy Industries, Inc.; Enclosure Division
29. Scott Fetzer Co.; Adalet Division
30. Spring City Electrical Manufacturing Company
31. Synertech Moulded Products, Inc.; a division of Oldcastle Precast
32. Thomas & Betts Corporation
33. Walker Systems, Inc.; Wiremold Company (The)
34. Wheatland Tube Company
35. Woodhead, Daniel Company; Woodhead Industries, Inc. Subsidiary

2.03 RIGID METAL CONDUIT AND FITTINGS

A. Conduit: Heavy wall, galvanized steel, schedule 40, threaded. ANSI C80.1

B. Fittings and Conduit Bodies: Use all steel threaded fittings and conduit bodies.

2.04 PVC COATED RIGID METAL CONDUIT

A. PVC Externally Coated Conduit: Rigid heavy wall, schedule 40, steel conduit with external 40 mil (0.1 mm) PVC coating. Conduit must be hot dipped galvanized inside and out including threads. The PVC coating bond to the galvanized steel conduit shall be stronger than the tensile strength of the coating itself.

B. Fittings and Conduit Bodies: Threaded type, material to match conduit. PVC coated fittings and couplings shall have specially formed sleeves to tightly seal to conduit PVC coating. The sleeves shall extend beyond the fitting or coupling a distance equal to the pipe outside steel diameter or two inches (50 mm) whichever is greater.

2.05 INTERMEDIATE METAL CONDUIT (IMC) AND FITTINGS

A. Conduit: Galvanized steel, threaded. ANSI C80.6
B. Fittings and Conduit Bodies: Use all steel threaded fittings and conduit bodies.

2.06 ELECTRICAL METALLIC TUBING (EMT) AND FITTINGS

A. Conduit: Steel, galvanized tubing. ANSI C80.3
B. Fittings: All steel, set screw, concrete tight. No push-on or indenter types permitted.
C. Conduit Bodies: All steel threaded conduit bodies.

2.07 LIQUIDTIGHT FLEXIBLE METAL CONDUIT AND FITTINGS

A. Conduit: flexible, steel, galvanized, spiral strip with an outer Liquidtight, nonmetallic, sunlight-resistant jacket.
B. Fittings and Conduit Bodies: ANSI/NEMA FB 1, compression type. There shall be a metallic cover/insert on the end of the conduit inside the connector housing to seal the cut conduit end.

2.08 RIGID NONMETALLIC CONDUIT AND FITTINGS

A. Conduit: Schedule 40 PVC minimum, Listed, sunlight resistant, rated for 900 C conductors. NEMA TC2
B. Fittings and Conduit Bodies: NEMA TC 2, Listed.

2.09 CONDUIT SUPPORTS

A. See section 26 05 29.

2.10 AUXILIARY GUTTERS (WIREWAYS)

A. Description: General purpose type wireway without knockouts.
B. Size: As indicated on Drawings; length as indicated on Drawings.
C. Cover: Hinged cover
D. Finish: Rust inhibiting primer coat with gray enamel finish.

2.11 PULL AND JUNCTION BOXES

A. Pull boxes and junction boxes shall be minimum 4 inch square (100 mm) by 2 1/8th inches (54 mm) deep for use with 1 inch (25 mm) conduit and smaller. On conduit systems using 1 1/4 inch (31.75 mm) conduit or larger, pull and junction boxes shall be sized per NEC but not less than 4 11/16 inch square (117 mm).
B. Sheet Metal Boxes: code gauge galvanized steel, screw covers, flanged and spot welded joints and corners.
C. Sheet Metal Boxes Larger Than 12 Inches (300 mm) in any dimension shall have a hinged cover or a chain installed between box and cover.
D. Cast Metal Boxes for Outdoor and Wet Location Installations: Type 4 and Type 6, flat-flanged, surface-mounted junction box, UL listed as rain tight. Galvanized cast iron or aluminum box and cover with ground flange, neoprene gasket, and stainless steel cover screws.
E. Box extensions and adjacent boxes within 48” of each other are not allowed for the purpose of creating more wire capacity.
F. Junction boxes 6" x 6" or larger size shall be without stamped knock-outs.
G. Wireways shall not be used in lieu of junction boxes.

2.12 HINGED COVER ENCLOSURES

A. NEMA 250, Type 1, with continuous hinge cover with flush latch, unless otherwise indicated.

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

2.13 CABINETS

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

PART 3 – EXECUTION

3.01 CONDUIT SIZING, ARRANGEMENT AND SUPPORT

A. See CONDUIT INSTALLATION SCHEDULE below for other limitations for types of conduit.
B. Size power conductor raceways for conductor type installed. Conduit size shall be 1/2 inch (13 mm) minimum except all homerun conduits shall be ¾", or as specified elsewhere. Caution: Per the NEC, the allowable conductor ampacity is reduced when more than three current-carrying conductors are installed in a raceway. Contractor must take the NEC ampacity adjustment factors into account when sizing the raceway and wiring system.
C. Size conduit for all other wiring, including but not limited to data, control, security, fire alarm, telecommunications, signal, video, etc. shall be sized per number of conductors pulled and their cross-section. 40% fill shall be maximum for all new conduit fills.
D. Arrange conduit to maintain headroom and present a neat appearance.
E. Route exposed conduit and conduit above accessible ceilings parallel and perpendicular to walls and adjacent piping.
F. Maintain minimum 6 inch (150 mm) clearance between conduit and piping. Maintain 12 inch (300 mm) clearance between conduit and heat sources such as flues, steam pipes, and heating appliances.
G. Arrange conduit supports to prevent distortion of alignment by wire pulling operations. Fasten conduit using galvanized pipe straps, conduit racks (lay-in adjustable hangers), clevis hangers, or bolted split stamped galvanized hangers.
H. Group conduit in parallel runs where practical and use conduit rack (lay-in adjustable hangers) constructed of steel channel with conduit straps or clamps. Provide space for 25 percent additional conduit.
I. Do not fasten conduit with wire or perforated pipe straps. Before conductors are pulled, remove all wire used for temporary conduit support during construction.
J. Support and fasten metal conduit at a maximum of 8 feet (2.4 m) on center.
K. Supports shall be independent of the installations of other trades, e.g. ceiling support wires, HVAC pipes, other conduits, etc., unless so approved or detailed.
L. In general, all conduit shall be concealed except where noted on the drawings or approved by the Architect/Engineer. Contractor shall verify with Architect/Engineer all surface conduit installations except in mechanical rooms.
M. Changes in direction shall be made with symmetrical bends, cast steel boxes, stamped metal boxes or cast steel conduit bodies.
N. For all conduits, no continuous conduit run shall exceed 100 feet (30 meters) without a junction box.
O. All conduits installed in exposed areas shall be installed with a box offset before entering box.

3.02 CONDUIT INSTALLATION

A. Cut conduit square; de-burr cut ends.
B. Conduit shall not be fastened to the corrugated metal roof deck.

C. Bring conduit to the shoulder of fittings and couplings and fasten securely.
D. Use conduit hubs for fastening conduit to cast boxes. Use sealing locknuts or conduit hubs for fastening conduit to sheet metal boxes in damp or wet locations.
E. All conduit terminations (except for terminations into conduit bodies) shall use conduit hubs, or connectors with one locknut, or shall use double locknuts (one each side of box wall) and insulated bushing. Provide bushings for the ends of all conduit not terminated in box walls. Refer to Section 26 05 26 – Grounding and Bonding for Electrical Systems for grounding bushing requirements.
F. Install no more than the equivalent of three 90 degree bends between boxes.
G. Use hydraulic one-shot conduit bender or factory elbows for bends in conduit larger than 2 inch (50 mm) size unless sweep elbows are required.
H. Conduit shall be bent according to manufacturer's recommendations. Torches or open flame shall not be used to aid in bending of PVC conduit.
I. Use suitable conduit caps or other approved seals to protect installed conduit against entrance of dirt and moisture.
J. Provide 1/8 inch (3 mm) nylon pull string in empty conduit, except sleeves and nipples.
K. Install expansion-deflection joints where conduit crosses building expansion joints. Note: expansion-deflection joints are not required where conduit crosses building control joints if the control joint does not act as an expansion joint. Install expansion fitting in PVC conduit runs as recommended by the manufacturer.
L. Avoid moisture traps where possible. Where moisture traps are unavoidable, provide junction boxes with drain fittings at conduit low points.
M. Where conduit passes between areas of differing temperatures such as into or out of cool rooms, freezers, unheated and heated spaces, buildings, etc., provide Listed conduit seals to prevent the passage of moisture and water vapor through the conduit.
N. Ground and bond conduit under provisions of Section 26 05 26.
O. PVC conduit shall transition to galvanized rigid metal conduit before it enters a concrete pole base, foundation, wall (where exposed) or up through a concrete floor.
P. Identify conduit under provisions of Section 26 05 53.
Q. PVC conduit shall be cleaned with solvent, and dried before application of glue. The temperature rating of glue/cement shall match weather condition. Apply full even coat of cement/glue to entire area that will be inserted into fitting. The entire installation shall meet manufacturer's recommendations.

3.03 CONDUIT INSTALLATION SCHEDULE

A. Conduit other than that specified below for specific applications shall not be used.
B. Exposed Outdoor Locations: Rigid steel conduit.
C. Wet Interior Locations (Within parking, stairs and similar exposed spaces): Rigid steel conduit., Schedule 40 PVC conduit, PVC coated rigid steel conduit.
D. Concealed Dry Interior Locations (Within interior conditions spaces similar to basement and office) : Rigid steel conduit. Intermediate metal conduit. Electrical metallic tubing.
E. Equipment connections: Flexible PVC coated metal conduit (all locations). Minimum length shall be one foot (300 mm), maximum length shall be three feet (900 mm). Conduit must be installed perpendicular to direction of equipment vibration to allow conduit to freely flex.
F. Light fixtures: Direct box or conduit connection for surface mounted. Liquid tight flexible metal conduit from a J-box to light fixtures. Conduit size shall be 3/8" (10 mm) minimum diameter and six foot (1.8 M) maximum length. Conduit length shall allow movement of fixture for maintenance purposes.

3.04 AUXILIARY GUTTERS (WIREWAYS) INSTALLATION

A. Bolt auxiliary gutter to wall using two-piece hangers or steel channels fastened to the wall or in self-supporting structure.

B. Gasket each joint in oil-tight gutter.
C. Mount rain-tight gutter in horizontal position only.
D. Maintain grounding continuity between raceway components to provide a continuous grounding path under provisions of Section 26 05 26.

3.05 COORDINATION OF BOX LOCATIONS

A. Provide electrical boxes as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections, and code compliance.
B. Electrical box locations shown on Contract Drawings are approximate unless dimensioned. Verify location of floor boxes and outlets in offices and work areas prior to rough-in.
C. No outlet, junction, or pull boxes shall be located where it will be obstructed by other equipment, piping, lockers, benches, counters, etc.
D. It shall be the Contractor's responsibility to study drawings pertaining to other trades, to discuss location of outlets with workmen installing other piping and equipment and to fit all electrical outlets to job conditions.
E. In case of any question or argument over the location of an outlet, the Contractor shall refer the matter to the Architect/Engineer and install outlet as instructed by the Architect/Engineer.
F. The proper location of each outlet is considered a part of this contract and no additional compensation will be paid to the Contractor for moving outlets which were improperly located.
G. Locate and install boxes to allow access to them. Where installation is inaccessible, coordinate locations and provide 18 inch (450 mm) by 24 inch (600 mm) access doors.
H. Locate and install to maintain headroom and to present a neat appearance.
I. Install boxes to preserve fire resistance rating of partitions and other elements, using approved materials and methods.

3.06 PULL AND JUNCTION BOX INSTALLATION

A. Locate pull boxes and junction boxes above accessible ceilings, in unfinished areas or furnish and install Owner approved access panels in non-accessible ceilings where boxes are installed. All boxes are to be readily-accessible.
B. Support pull and junction boxes independent of conduit.

3.07 EXPANSION JOINT FITTINGS FOR RNC

A. Install in each run of above ground conduit that is routed across an existing structural expansion joint.
B. Install in each run of aboveground conduit that is located where environmental temperature change may exceed 30° F (17° C) and that has straight run length that exceeds 25 feet (7.6 m).
C. Install expansion joint fittings for each of the following locations and provide type and quantity of fittings that accommodate temperature change listed for location:
    1. Outdoor Locations not Exposed to Direct Sunlight: 125° F (70° C), , temperature change.
    2. Outdoor Locations Exposed to Direct Sunlight: 155° F (86° C), , temperature change.
    3. Indoor Spaces: Connected with the outdoors without physical separation: 125° F (70° C), , temperature change.
D. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F (0.06 mm per meter of length of straight run per deg C) of temperature change.
E. Install each expansion joint fitting with position, mounting and piston setting selected according to manufacturer’s written instructions for conditions at specific location at the time of installation.

SECTION 26 05 53
IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.01 SCOPE OF WORK

A. Base Bid: The work under this section includes the products and execution requirements relating to labeling of conduit, power, lighting, general wiring, signal, fire alarm, and telecommunications wire and cabling. Further, this section includes labeling of all terminations and related sub-systems, including but not limited to nameplates, stenciling, wire and cable marker labeling of all backbone fiber optic (inter-building, tie & riser) cables, terminating equipment and labeling of inner duct (fiber optic).

1.02 SECTION INCLUDES

A. Manufacturers
B. Identification Materials
C. Power Raceway Identification Materials
D. Power and Control Cable Identification Materials
E. Conductor Identification Materials
F. Warning Labels and Signs
G. Cable Ties
H. Miscellaneous Identification Products

1.03 RELATED WORK

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, apply to this Section
B. Section 26 05 00 – Common Work Results for Electrical
C. Section 26 05 19 – Low-Voltage Electrical Power Conductors and Cables
D. Section 26 05 33 - Raceway and Boxes for Electrical Systems
E. Section 26 24 16 – Panelboards

1.04 SUBMITTALS

A. Include product data for each electrical identification product indicated.
B. Include schedule for nameplates and stenciling.
C. Prior to installation, the Contractor shall provide samples of all label types planned for the project. These samples shall include examples of the lettering to be used. Samples shall be mounted on 8 1/2" x 11" sheets annotated, explaining their purposed use.

1.05 QUALITY ASSURANCE

A. Comply with ANSI A13.1.
B. Comply with NFPA 70.
C. Comply with 29 CFS 1910.144 and 29 CFR 1910.145.
D. Comply with ANSI Z535.4 for safety signs and labels.
E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers shall comply with UL 969.

1.06 COORDINATION

A. Coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual; and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.

B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
C. Coordinate installation of identifying devices with location of access panels and doors.
D. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. Pipe/conduit identification
      a. Pipe maker by Briman Industries, Inc.
      b. Seton
      c. Brady
      d. Emedco
      e. Graphic Products
      f. Panduit
      g. Thomas & Betts
   2. Condutor & Warning Identification
      a. 3M
      b. Panduit
      c. Thomas & Betts
      d. Brady

2.02 IDENTIFICATION MATERIALS

A. General:
   1. Labels: All labels shall be permanent, and machine generated. NO HANDWRITTEN OR NON-PERMANENT LABELS ARE ALLOWED. Exception: back side of device plates and junction boxes may use handwritten, legible labeling on box covers, unless specifically prohibited by other specification sections.
   2. Cable label size shall be appropriate for the conductor or cable size(s), outlet faceplate layout and patch panel design. All labels shall be self-laminating, white/transparent vinyl and be wrapped around the cable or sheath. Labels for power conductors (600V and lower) shall be cloth-type. Flag type labels are not allowed. The labels shall be of adequate size to accommodate the circumference of the cable being labeled and properly self-laminate over the full extent of the printed area of the label.
   3. Nameplates: Engraved three-layer laminated plastic, black letters on a white background. Emergency system (level 1 and level 2) shall use white letters on red background.
   4. Tape (phase identification only): Scotch #35 tape in appropriate colors for system voltage and phase.
   5. Adhesive type labels not permitted except for phase and wire identification. Machine generated adhesive labels shall be permitted for device plates, 4-11/16” and smaller junction boxes, Fire alarm and control devices.

2.03 POWER RACEWAY IDENTIFICATION MATERIALS

A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway size.
B. Colors for Raceways Carrying Circuits at 600 V or Less:
   1. Black letters on an orange field.
C. Self-Adhesive Vinyl Labels for Raceways Carrying Circuits at 600 V or Less: Preprinted, flexible label laminated with a clear, weather- and chemical-resistance coating and matching wraparound adhesive tape for securing ends of legend label.

D. Snap-Around Labels for Raceways Carrying Circuits at 600 V or Less: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.
E. Snap-Around, Color Coding Bands for Raceways Carrying Circuits at 600 V or Less: Slit, pretensioned, flexible, solid-colored acrylic sleeve, 2 inches (50 mm) long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.
F. Tape and Stencil for Raceways Carrying Circuits More than 600 V: 4-inch (100 mm) wide black stripes on 10-inch (250 mm) centers diagonally over orange background that extends full length of raceway or duct and is 12 inches (300 mm) wide. Stop stripes at legends.
G. Metal Tags: Brass or aluminum, 2 by 2 by 0.05 inch (50 by 50 by 1.3 mm), with stamped legend, punched for use with self-locking cable tie fastener.

2.04 POWER AND CONTROL CABLE IDENTIFICATION MATERIALS

A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.
B. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.
C. Snap-Around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.
D. Snap-Around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeve, 2 inches (50 mm) long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.
E. Color coding shall be as noted in Section 26 05 19.

2.05 CONDUCTOR IDENTIFICATION MATERIALS

A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils (0.08 mm) thick by 1 to 2 inches (25 to 50 mm) wide.
B. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.
C. Snap-Around Labels: Slit, pretensioned, flexible, solid-colored acrylic sleeve, with diameter sized to suit diameter of raceway or cable it identified and to stay in place by gripping action.
D. Snap-Around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeve, 2 inches (50 mm) long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.
E. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.
F. Color coding shall be as noted in Section 26 05 19.

2.06 WARNING LABELS AND SIGNS

A. Comply with NFPA 70 and 28 CFR 1910.145.
B. Self-Adhesive Warning Labels: Factory-printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated.
C. Baked-Enamel Warning Signs:
    1. Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application.
    2. ¼ inch (6.4 mm) grommets in corners for mounting.
    3. Nominal size, 7 by 10 inches (180 by 250 mm).
D. Warning label and sign shall include, but are not limited to, the following legends:

1. Multiple Power Source Warning: "DANGER ELECTRICAL SHOCK HAZARD – EQUIPMENT HAS MULTIPLE POWER SOURCES."
2. Workspace Clearance Warning: "WARNING – OSHA REGULATION – AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES (915 MM)."

2.07 CABLE TIES

A. General –Purpose Cable Ties: Fungus insert, self-extinguishing, one-piece, self-locking, Type 6/6 nylon.
   1. Minimum Width: 3/16 inch (5 mm).
   2. Tensile Strength at 73° F (23° C), According to ASTM D638: 12,000 psi (82.7 MPa).
   3. Temperature Range: Minus 50 to plus 185° F. (Minus 50 to plus 85° C).
   4. Color: Black except where used for color-coding.

B. UV-Stabilized Cable Ties: Fungus inert, designed for continuous exposure to exterior sunlight, self-extinguishing, one-piece, self-locking, Type 6/6 nylon.
   1. Minimum Width: 3/16 inch (5 mm).
   2. Tensile Strength at 73° F (23° C), According to ASTM D638: 12,000 psi (82.7 MPa).
   3. Temperature Range: Minus 40 to plus 185° F (Minus 40 to plus 85° C).
   4. Color: Black.

C. Plenum-Rated Cable Ties: Self-extinguishing, UV stabilized, one-piece, self-locking.
   1. Minimum Width: 3/16 inch (5 mm).
   2. Tensile Strength at 73° F(23 ° C), According to ASTM D638: 7,000 psi (48.2 MPa)
   3. UL 94 Flame Rating: 94V-0.
   4. Temperature Range: Minus 50 to plus 284° F (Minus 46 to plus 140° C).
   5. Color: Black.

2.08 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Paint: Comply with requirements in Division 09 painting sections for paint materials and application requirements. Select paint system applicable for surface material and location (exterior or interior).

B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 – EXECUTION

3.01 GENERAL

A. Identification legend, colors of labels and color of raceway shall match facility standards. When no standards established the following systems shall be used.

B. Where mixed voltages are used in one building (e.g. 4160 volt, 480 volt, 208 volt) each switch, switchboard, junction box, equipment, etc., on each system must be labeled for voltage in addition to other requirements listed herein.

C. All branch circuit and power panels must be identified with the same identification legend used in circuit directory in main distribution center.

D. Clean all surfaces before attaching labels with the label manufacturer's recommended cleaning agent.

E. Install all labels firmly as recommended by the label manufacturer.

F. Labels shall be installed plumb and neatly on all equipment.

G. Install nameplates parallel to equipment lines.

H. Secure nameplates to equipment fronts using screws, rivets or manufacturer approved adhesive or cement.

I. Embossed tape will not be permitted for any application.

3.02 INSTALLATION

A. Verify identity of each item before installing identification products.
B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.
C. Apply identification devices to surfaces that require finish after completing of finish work.
D. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.
E. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
F. System Identification Color-Coding Bands for Raceways and Cables: Each color-coding band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and floors at 50-foot (15-m) maximum intervals in straight runs, and at 25-foot (7.6-m) maximum intervals in congested areas.
G. Aluminum Wraparound Marker Labels and Metal Tags: Secure tight to surface of conductor or cable at a location with high visibility and accessibility.
H. Cable Ties: For attaching tags. Use general-purpose type, except as listed below:
    1. Outdoors: UV-stabilized nylon.
    2. In Spaces Handling Environmental Air: Plenum rated.
I. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at 6 to 8 inches (150 to 200 mm) below finished grade. Use multiple tapes where width of multiple lines installed in a common trench [or concrete envelope] exceeds 16 inches (400 mm) overall.
J. Painted Identification: Comply with requirements in Division 09 painting Sections for surface preparation and paint application.

3.03 IDENTIFICATION SCHEDULE

A. Accessible Raceway, 600 V or Less, for Feeder, and Branch Circuits More than 30 A, and 120 V to ground: Install with self-adhesive vinyl tape applied in bands. Install labels at 30-foot (10-m) intervals.
B. Accessible Raceways and Cables within Buildings: Identify the covers of each junction and pullbox of the following systems with self-adhesive vinyl labels with the wiring system legend and system voltage. System legends shall be as follows:
    1. Emergency Power.
    2. Power.
C. Conductors to be Extended in the Future: Attach marker tape to conductors and list source.
D. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.
    1. Identify conductors, cables and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
    2. Use system of marker tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.
    3. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual.
E. Workspace Indication: Install floor marking tape to show working clearances in the direction of access to live parts. Workspace shall be as required by NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.
F. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive warning labels Baked-enamel warning signs.
    1. Comply with 29 CFR 1910.145.
    2. Identify system voltage with black letters on an orange background.
    3. Apply to exterior of door, cover, or other access.

4. For equipment with multiple power or control sources, apply to door or cover of equipment including, but not limited to, the following:
    a. Controls with external control power connections.

G. Operating Instruction Signs: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.

3.04 JUNCTION AND PULLBOX IDENTIFICATION

A. The following junction and pullboxes shall be identified utilizing spray painted covers:

System	Color(s)
Secondary Power – 208Y/120V, 240/120V	White
Emergency Power – 208Y/120V	White/Red

B. Provide circuit numbers, and source panel designations for power wiring. Other system shall be identified as shown on details or approved shop drawings. Temperature control shall identify the source.

3.05 POWER AND CONTROL WIRE IDENTIFICATION

A. Provide wire markers on each conductor in panelboard gutters, pull boxes, outlet and junction boxes, and at load connection. Identify with branch circuit or feeder number for power and lighting circuits, and with control wire number as indicated on schematic and interconnection diagrams or equipment manufacturer's shop drawings for control wiring.

B. All wiring shall be labeled within 2 to 4 inches of terminations. Each end of a wire or cable shall be labeled as soon as it is terminated including wiring used for temporary purposes.

3.06 NAMEPLATE ENGRAVING

A. Provide nameplates of minimum letter height as scheduled below.

B. A specific schedule may be included on the Contract Drawings, or specific schedules may be included in equipment Sections to which they apply; Panelboards, for example.

C. Panelboards, Switchboards and Motor Control Centers: 1 inch (25 mm); identify equipment designation. 1/2 inch (13 mm); identify voltage rating, source and room location of the source.

D. Equipment Enclosures: 1 inch (25 mm); identify equipment designation.

E. Circuit Breakers, Switches, and Motor Starters in Panelboards or Switchboards or Motor Control Centers: 1/2 inch (13 mm); identify circuit and load served, including location.

F. Individual Circuit Breakers, Disconnect Switches, Enclosed Switches, and Motor Starters: ½ inch (13 mm); identify source and load served.

G. Transformers: 1 inch (25 mm); identify equipment designation. 1/2 inch (13 mm); identify primary and secondary voltages, primary source, and secondary load and location.

H. Junction boxes: 1 inch (25 mm); identify system source(s) and load(s) served. Junction boxes may be neatly identified using a permanent marker.

SECTION 26 08 00
COMMISSIONING OF ELECTRICAL

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. This section includes commissioning for construction verifications and functional performance testing.

1.02 RELATED DOCUMENTS

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

1.03 SUMMARY

A. This Section includes requirements for commissioning the Electrical and Lighting Control systems.

1.04 DEFINITIONS

A. Electrical Systems: This term shall refer to Electrical Power Systems as well as Electrical Low-Voltage Systems scheduled for commissioning as applicable.

B. Lighting Control Systems: This term shall refer to Occupancy Sensors, Lighting Control Relay Panels, Dimming Systems, and Daylight Harvesting Systems as applicable.

1.05 CONTRACTOR'S RESPONSIBILITIES

A. Provide and install electrical equipment, furnish necessary tools to complete installation per the design documents.

B. Complete pre-functional checklists on electrical equipment and systems.

C. Conduct startup of electrical equipment and systems.

D. Perform commissioning performance tests on the electrical equipment and systems as directed by the A/E.

E. Coordinate equipment installations and connections with contractors of other disciplines, and with other electrical and mechanical systems being installed.

F. Direct functional performance testing.

G. Provide adequate documentation and reports pertinent to commissioning testing.

1.06 A/E RESPONSIBILITIES

A. Provide project-specific pre-functional checklists and commissioning performance test forms for electrical and lighting control systems scheduled for commissioning.

PART 2- PRODUCTS (Not Used)

PART 3- EXECUTION

3.01 TESTING PREPARATION

A. Prerequisites for Testing:
   1. Commissioning of Electrical Equipment requires use of proper test equipment. Special tools and instruments for recording measurements of equipment performance may be required. Electrical testing equipment should be of sufficient quality and accuracy to measure system's performance with tolerance levels specified in the manufacturer's specifications and design documents.

a) Calibration – All test equipment used in the project must be calibrated within one year, prior to the beginning of the testing procedure.
b) Data Logging (As Applicable) – Data logging instruments and software shall be used to measure the electrical systems performance over a specified time period, to ensure they are functioning in accordance with the design intent and specifications.

B. Verification and Pre-Functional Checklists:
1. The objective of verification and pre-functional checklists is to ensure that the specified equipment, subsystem, or system is installed correctly, and is ready for functional performance tests.
2. These checklists are based on design intent documentation, equipment submittals and quality construction procedures. The checklists should at a minimum ensure:
a. All related equipment has been installed correctly and pre-functional checklists have been submitted and approved prior to functional testing.
b. Required Architectural/Engineering (A/E) punch list items, for designated equipment, have been corrected as applicable.
c. Functional test procedures have been reviewed and approved by the installing contractor.
d. Sufficient clearance around equipment is provided for servicing and maintenance.
e. Other operational, safety, alarm checks, and startup have been completed successfully.

3.02 FUNCTIONAL TESTING PROCEDURES

A. Contractor may begin testing procedures after pre-functional checklists for systems, subsystems, and equipment, have been approved.
B. Upon satisfactory completion of all verified tests, the building electrical equipment and systems must be returned to the condition required by the contract documents as a complete and operational system. Deficiencies should be corrected by the installing contractor and the equipment, subsystems, or systems re-tested.
C. Perform tests using design conditions whenever possible.
1 Simulate conditions by imposing an artificial load when it is not practical to test under design conditions and when approval for simulated conditions is received from A/E. Before simulating conditions, calibrate testing instruments. Set and document simulated conditions and methods of simulation. After tests, return settings to normal operating conditions.
2 Alter set points when simulating conditions is not practical and when approval is received from A/E.

D. Detailed Testing Procedures: A/E, with Electrical Contractor, shall prepare detailed testing plans, procedures, and checklists for Electrical systems, subsystems, and equipment.
E. Deferred Testing:
1. If tests cannot be completed because of a deficiency outside the scope of the Electrical system, the deficiency shall be documented and reported to Owner. Deficiencies shall be resolved and corrected by appropriate parties and test rescheduled.
F. Testing Reports:
1 Reports shall include measured data, data sheets, and a comprehensive summary describing the operation of systems at the time of testing.
2 Prepare a preliminary test report. Deficiencies will be evaluated to determine corrective action. Deficiencies shall be corrected and test repeated.

G. If it is determined that the system is not constructed according to the Contract Documents, Owner shall decide whether modifications required to bring the performance of the system to the Design Intent shall be implemented or if tests will be accepted as submitted. If corrective work is performed, Owner will decide if tests shall be repeated and a revised report submitted.

3.03 ELECTRICAL FUNCTIONAL TESTING

A. Electrical Functional Testing shall be conducted as outlined in other Division 26 specifications and as outlined below.
   1. Low Voltage Power Cable (below 600V)
      a. As specified in other Division 26 specifications.
   2. Electrical Feeders and Branch Circuits (600V or below)
      a. Test each circuit for continuity to insure correct cable connection. (As directed)
      b. Examine grounding installation to ensure that the equipment grounding conductor, grounding electrode conductor, and bonding ground jumpers are properly installed and firmly connected.
      c. Using a calibrated torque wrench, perform torque test for every conductor that is part of the tested circuit and terminated in an overcurrent device or bolted type connection. Torque all connections per manufacturer's recommendations and record the results on a tabular form.
      d. Verify conductor color coding with applicable specifications and the National Electrical Code.
   3. Panelboards
      a. Record phase-phase voltages and neutral-ground voltage (must be less than 6V).
      b. Record current readings on each phase including neutral current.
      c. Check all panel boards for proper load balance between phase conductors and adjust the loads as necessary to bring unbalanced phases within 20% of average load.
      d. Ensure that circuit directories are typed and up-to-date.
      e. Check torque and tighten all accessible connections to manufacturer's specifications.
   4. Receptacles and Devices
      a. Test receptacles for open ground, reverse polarity, open hot, open neutral, hot and ground reversed, and neutral and hot open. Note receptacles that do not pass these tests and retest after correction has been made.
      b. Test GFCI receptacles or each GFCI circuit breaker to ensure that the ground-fault circuit interrupter will not operate when subjected to a ground fault current of less than 4 milliamperes, and will operate when subjected to a ground-fault current exceeding 6 milliamperes. Perform testing with an instrument specifically designed and manufactured for testing ground-fault circuit interrupters. Pushing the receptacle or circuit breaker "TEST" button operation is not acceptable as a substitute for this test. GFCI receptacles or circuit breakers that do not shut off power at 5 milliamperes within 1/40th of a second shall be replaced.
   5. Lighting Controls
      a. Occupancy Sensors: Do Performance Tests on occupancy sensors to ensure that lights are turning on and off automatically. Adjust time delay and sensitivity settings as needed. Record any blind spots or issues with sensors not performing.
      b. Lighting Control Panel / Controllable Breaker Panel: Verify that time clock has been programmed with correct lighting zones – on/off control. Simulate times to witness lights turning on and off. Check override switch operation. Record any issues observed during testing.
   6. Emergency Generator and Transfer Switch
      a. Do Performance Tests as outlined in Functional Performance Document attached to this specification section.

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FPT-26 32 00 – Engine-Driven Generator Sets

Equipment Identification/Tag: _____
Location: _____

Test Duration

Date: _____ Start Time: _____ End Time _____

Estimated Duration: _____
Cx Provider(s): _____
_____
_____
_____

Applicable Equipment: _____
_____

Objectives

This test is performed to investigate the functionality of the generator to provide emergency power to the facility in concert with automatic transfer switches upon loss of normal power.

Instrumentation

Instrument	Accuracy	Measurement
N/A	N/A	N/A

Sampling Set

All units and all sequences.

Procedure

1. Power Transfer
    a. Open the main utility feed breaker.
    b. Verify the generator starts and comes up to speed.
    c. Record the time delay between loss of power and generator start up.
    d. Verify the ATS transfers loads to the generator.
    e. Verify the generator annunciator panel provides indication that the generator is running.
    f. Close the main utility feed breaker (only complete this step after all emergency mode tests have been completed).
    g. Verify ATS transfers power back to utility feed.
    h. Verify generator annunciator panel indicates transfer to utility power.
    i. Verify generator shuts down after given cool down period.
    j. Record time from power transfer to generator shut down.
2. Emergency Load Tests
    a. Lighting
        i. Verify facility is being supplied by emergency power system only.
        ii. Using the final as-built documentation and the Lighting table under the results section, systematically verify the fixtures noted to be supplied by emergency power are energized.
    b. Receptacle Loads
        i. Verify facility is being supplied by emergency power system only.

ii. Using the final as-built documentation and the Receptacle Loads table under the results section, systematically verify the receptacles noted to be supplied by emergency power are powered via a receptacle test plug.

c. Process and Equipment Loads
   i. Verify facility is being supplied by emergency power system only.
   ii. Using the BAS system and the Process/Equipment Loads table under the results section, systematically verify the connected equipment is operational by manually overriding each unit through the BAS system.

Results - Power Transfer

Generator starts in response to loss of utility power?	Y / N
Time Delay Between Loss of Power and Generator Start-up:	
ATS properly transfers power to generator without any issues or hitches in transfer?	Y / N
Generator enunciator panel clearly indicates generator and emergency mode power operation?	Y / N
ATS transfers power back to utility feed in response to restoration of utility feed?	Y / N
Generator enunciator panel clearly indicates transfer of power back to utility feed?	Y / N
Generator successfully shuts down after cool down period?	Y / N
Time From Transfer to Utility Feed to Generator Shut Down:	

Emergency Load Tests

Lighting

Room #	Circuit #	Fixture ID	# of Fixtures	Accepted?	Notes
				Y / N	
				Y / N	
				Y / N	

Receptacle Loads

Room #	Circuit #	# of Recpt.	Accepted?	Notes
			Y / N	
			Y / N	
			Y / N	

Process/Equipment Loads

Unit Tag	Circuit #	Accepted?	Notes
		Y / N	
		Y / N	
		Y / N	

Conclusion

Acceptable Criterion: Generator and ATS transfer power without issue and in accordance with specified time delays for power transfer and cool down, all attached loads to emergency power comply with as-built documentation and are operational.

Comments:

Observations:

Final Status: ❑ Accepted ❑ Not Accepted

Relevant Trend Data

N/A

Witnesses

Name	**Signature**

SECTION 26 09 23
LIGHTING CONTROLS

PART 1 GENERAL

1.01 SCOPE OF WORK
A. Base Bid: This section specifies the furnishing, installation and connection of the lighting controls.

1.02 SECTION INCLUDES
A. Outdoor Photoelectric Switches
B. Emergency Shunt Relay

1.03 RELATED WORK
A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, apply to this Section
B. Section 26 05 00 – Common Work Results for Electrical
C. Section 26 05 19 – Low Voltage Electrical Power Conductors and Cables
D. Section 26 05 26 – Grounding and Bonding for Electrical Systems
E. Section 24 26 16 – Electrically Operated Circuit Breaker Panelboards

1.04 SUBMITTALS
A. In accordance with Section 26 05 00, submit the following:
B. Product Data: For each type of lighting control, submit the following information.
   1. Manufacturer's catalog data.
   2. Wiring schematic and connection diagram.
   3. Installation details.
C. Manuals:
   1. Submit, simultaneously with the shop drawings companion copies of complete maintenance and operating manuals including technical data sheets, and information for ordering replacement parts.
   2. Two weeks prior to the final inspection, submit four copies of the final updated maintenance and operating manuals, including any changes, to the Resident Engineer.
D. Certifications:
   1. Two weeks prior to final inspection, submit four copies of the following certifications to the A/E:
      a. Certification by the Contractor that the equipment has been properly installed, adjusted, and tested.

1.05 FUNCTIONAL TESTS
A. Refer to Section 26 05 00 – Common Work Results for Electrical, Functional Tests.

1.06 QUALITY ASSURANCE
A. Refer to Paragraph, QUALIFICATIONS, in Section 26 05 00.

1.07 REFERENCE STANDARDS
A. Publications listed below (including amendments, addenda, revisions, supplements, and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by designation only.
B. Green Seal (GS): GC-12 Occupancy Sensors
C. Illuminating Engineering Society of North America (IESNA):

1. IESNA LM-48 Guide for Calibration of Photoelectric Control Devices

D. National Electrical Manufacturer's Association (NEMA)
   1. C136.10 American National Standard for Roadway Lighting Equipment-Locking-Type Photocontrol Devices and Mating Receptacles - Physical and Electrical Interchangeability and Testing
   2. ICS-1 Standard for Industrial Control and Systems General Requirements
   3. ICS-2. Standard for Industrial Control and Systems: Controllers, Contractors, and Overload Relays Rated Not More than 2000 Volts AC or 750 Volts DC: Part 8 - Disconnect Devices for Use in Industrial Control Equipment
   4. ICS-6 Standard for Industrial Controls and Systems Enclosures

E. Underwriters Laboratories, Inc. (UL):
   1. 20 Standard for General-Use Snap Switches
   2. 773 Standard for Plug-In Locking Type Photocontrols for Use with Area Lighting
   3. 773A Nonindustrial Photoelectric Switches for Lighting Control
   4. 98 Enclosed and Dead-Front Switches
   5. 917 Clock Operated Switches

1.08 COORDINATION

A. Coordinate layout and installation of ceiling-mounted devices with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, smoke detectors, fire-suppression system and partition assemblies.

PART 2 PRODUCTS

2.01 OUTDOOR PHOTOELECTRIC (PHOTOCELL) SWITCH AND CONTROLLER MANUFACTURERS

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

2.02 OUTDOOR PHOTOELECTRIC (PHOTOCELL) SWITCHES

A. Three wire analog.
   1. Outdoor Style
   2. 24VDC Powered, 0-10VDC Output Signal.
   3. Light-Level Monitoring Range: 0 to 750 fc, with adjustable turn-on and turn-off levels.
   4. Mounting: ½" threaded fitting.

2.03 OUTDOOR PHOTOELECTRIC (PHOTOCELL) SWITCH CONTROLLER

A. Maintained single pole, double throw form C relay output for control input into Electrically Operated Circuti Breaker Panelboard switch inputs.
   1. 24VDC Powered
   2. Form C SPDT Relay 10A Resistive
   3. Photoelectric switch compatible 3 wire input
   4. Input Time Delay – 30 seconds
   5. Dead Band Adjustment – 5-95%

2.04 EMERGENCY SHUNT RELAY MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the work include, but are not limited to, the following.
   1. Wattstopper
   2. Functional Devices Inc
   3. Square D

4. Bodine

2.05 EMERGENCY SHUNT RELAY

A. Description: Normally closed, electrically held relay, arranged for wiring in parallel with manual or automatic switching contacts; complying with UL 924.
   1. Coil Rating: 120 V.

2.06 CONDUCTORS AND CABLES

A. Power Wiring to Supply Side of Remote-Control Power Sources: Not smaller than No. 12 AWG. Comply with requirements in Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."
B. Classes 2 and 3 Control Cable: Multi-conductor cable with stranded-copper conductors not smaller than No. 18 AWG/Comply with requirements in Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."
C. Class 1 Control Cable: Multi-conductor cable with stranded-copper conductors not smaller than No. 14 AWG. Comply with requirements in Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

PART 3 EXECUTION

3.01 INSTALLATION

A. Installation shall be in accordance with the NEC, manufacturer's instructions and as shown on the drawings or specified.
B. Calibrate outdoor photoelectric switch and controller to switch off designated lighting zones when sufficient natural light is present. Include start-up, programming, calibration and set point adjustments within bid. Include within bid, all required hardware, software, simulators, etc… to adequately program and calibrate sensor.
C. Final outdoor photoelectric switch positioning shall be determined by field mock-ups. The electrical contractor shall include within their bid 3 temporary sensor installations and relocations to determine ideal mounting location. The same sensor is permitted to be used for all 3 mock up locations.

3.02 ACCEPTANCE CHECKS AND TESTS

A. Perform in accordance with the manufacturer's recommendations.
B. Upon completion of installation, conduct an operating test to show that equipment operates in accordance with requirements of this section.

3.03 FOLLOW-UP VERIFICATION

A. Upon completion of acceptance checks and tests, the Contractor shall show by demonstration in service that the lighting control devices are in good operating condition and properly performing the intended function. Additional calibration, as required, will be performed at the electrical contractor's expense to achieve design intent.

SECTION 26 24 16
PANELBOARDS

PART 1 – GENERAL

1.01 SCOPE OF WORK
A. Base Bid: The work under this section includes main, distribution and branch circuit panelboards.

1.02 SECTION INCLUDES
A. Branch Circuit Panelboards

1.03 RELATED WORK
A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, apply to this Section.

1.04 SUBMITTALS
A. Include outline and support point dimensions, voltage, main bus ampacity, integrated short circuit ampere rating, and circuit breaker arrangement and sizes.

1.05 OPERATION AND MAINTENANCE DATA
A. All operations and maintenance data shall comply with the submission and content requirements specified under section GENERAL REQUIREMENTS.

1.06 COORDINATION
A. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, encumbrances to workspace clearance requirements, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.
B. Coordinate sizes and location of concrete bases with actual equipment provided. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.
C. Existing electrical service interruption shall comply with Section 26 05 02 Electrical Demolition for Remodeling.
D. Electrically Operated Circuit Breaker Panelboards and Branch Circuit Panelboards manufacturer shall be the same manufacturer.

1.07 SPARE PARTS
A. Keys: Furnish 2 keys for each panelboard to Owner.

PART 2 – PRODUCTS

2.01 BRANCH CIRCUIT PANELBOARDS
A. Lighting and Appliance Branch Circuit Panelboards: Circuit breaker type.
B. Enclosure: Type 1. Minimum cabinet size: 5-3/4 inches (144 mm) deep; 20 inches (508 mm) wide with 5" minimum gutter space top and bottom. Constructed of galvanized code gauge steel. Panel enclosure (back box) shall be of non-stamped type (without KO's) to avoid concentric break out problem.
C. Provide surface cabinet front with concealed trim clamps, concealed hinge and flush cylinder lock all keyed alike. Front cover shall be hinged to allow access to wiring gutters without removal of

panel trim. Hinged trim shall be held in place with screw fasteners. Finish in manufacturer's standard gray enamel.

D. Provide metal directory holders with clear plastic covers.
E. Provide panelboards with copper bus (phase buses, bus fingers, etc.), ratings as scheduled on Drawings. Provide ground bars in all panelboards. Neutral and ground bars can be dual rated ALCU9. All spaces shall have bus fully extended and drilled for the future installation of breakers.
F. Minimum System (i.e. individual component) Short Circuit Rating: As shown on the Drawings.
G. Molded Case Circuit Breakers:
    1. Bolt-on type thermal magnetic trip circuit breakers.
    2. Provide UL Class A ground fault interrupter circuit breakers where shown on Drawings.
    3. Provide circuit breakers UL listed as Type HACR for air conditioning equipment branch circuits.
    4. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250A and larger.
H. Do not use tandem circuit breakers.
I. Circuit breakers shall be bolt-on type with common trip handle for all poles. No handle ties of any sort will be permitted.
J. All of the panelboards provided under this section shall be by the same manufacturer.

PART 3 – EXECUTION

3.01 INSTALLATION

A. See section 26 05 29 for support requirements.
B. Install panelboards plumb with wall finishes.
C. Height: 6 ft. (2 m) to top or 6 ft. to center of breaker handle.
D. Install a crimp type stud termination to stranded conductor when terminating on circuit breakers without a captive assembly rated for terminating stranded conductors.
E. Provide filler plates for unused spaces in panelboards.
F. See section 26 05 53 for identification requirements. Provide typed circuit directory for each branch circuit panelboard. Revise directory to reflect circuiting changes required to balance phase loads.
G. Stub three (3) empty ¾" conduits to accessible location above ceiling or below floor out of each recessed panelboard. Cap these conduits to prevent material from entering them.

3.02 FIELD QUALITY CONTROL

A. If aluminum conductors size #1/0 and larger (per Section 26 05 19) are to be used as panelboard feeders, it is the responsibility of the contractor to provide panelboards with adequate wire bending space to accommodate the aluminum conductors and terminators to meet allowable code requirements. The Contractor shall circuit the panelboards as shown on the drawings. Measure steady state load currents at each panelboard feeder. Should the difference at any panelboard between phases exceed 10 percent, rearrange circuits in the panelboard to balance the phase loads within 10 percent.
B. Visual and Mechanical Inspection: Inspect for physical damage, proper alignment, anchorage, and grounding. Check proper installation and tightness of connections.

3.03 ADJUSTING

A. Adjust all operating mechanisms for free mechanical movement.

3.04 TRAINING

A. See Section 26 05 00 for general training requirements.

B. In addition to the training provided in Section 26 05 00, provide an additional 1 hour of training for each type of panelboard provided on the project.

SECTION 26 24 18
ELECTRONICALLY OPERATED CIRCUIT-BREAKER PANELBOARDS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

a. Drawings and general provisions of the Contract, including General and Supplementary Conditions, apply to this Section..

1.02 SUMMARY

a. Section Includes: Panelboards using electronically controlled, electrically operated circuit breakers.

1.03 DEFINITIONS

a. BAS: Building automation system.
b. IP: Internet protocol.
c. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control, signaling power-limited circuits.
d. Monitoring: Acquisition, processing, communication, and display of equipment status data, metered electrical parameter values, power quality evaluation data, event and alarm signals, tabulated reports, and event logs.
e. PC: Personal computer; sometimes plural as "PCs."
f. RS-485: A serial network protocol, similar to RS-232, complying with TIA-485-A.

1.04 ACTION SUBMITTALS

a. Product Data: For each type of product.

1) Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for control modules, power distribution components, manual switches and plates, and conductors and cables.
2) Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

b. Shop Drawings: For each electronically operated, circuit-breaker panelboard and related equipment.

1) Include dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings.
2) Detail enclosure types and details for types other than NEMA 250, Type 1.
3) Detail bus configuration, current, and voltage ratings.
4) Short-circuit current rating of panelboards and overcurrent protective devices.
5) Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
6) Include diagrams for power, signal, and control wiring.
7) Block Diagram: Show interconnections between components specified in this Section and devices furnished with power distribution system components. Indicate data communication paths and identify networks, data buses, data gateways, concentrators, and other devices to be used. Describe characteristics of network and other data communication lines.

1.05 INFORMATIONAL SUBMITTALS

a. Coordination Drawings: Submit evidence that electronic controls are compatible with connected monitoring and control devices and systems specified in other Sections.

1) Show interconnecting signal and control wiring and interfacing devices that prove compatibility of inputs and outputs.
2) For networked controls, list network protocols and provide statements from manufacturers that input and output devices comply with interoperability requirements of the network protocol.

b. Qualification Data: For testing agency.
c. Field quality-control reports.
d. Software licenses and upgrades required by and installed for operation and programming of digital and analog devices.
e. Sample Warranty: For manufacturer's special warranty.

1.06 CLOSEOUT SUBMITTALS

a. Operation and Maintenance Data: For electronic controls to include in emergency, operation, and maintenance manuals.
b. Software and Firmware Operational Documentation:

1) Software operating and upgrade manuals.
2) Program Software Backup: On magnetic media or compact disk, complete with data files.
3) Device address list.
4) Printout of software application and graphic screens.

1.07 MAINTENANCE MATERIAL SUBMITTALS

a. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1.08 QUALITY ASSURANCE

a. Testing Agency Qualifications: Member company of NETA or an NRTL.

1) Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

1.09 DELIVERY, STORAGE, AND HANDLING

a. Handle and prepare panelboards for installation according to **NECA 407** and NE**MA PB 1.1**.

1.10 WARRANTY

a. Special Warranty: Manufacturer agrees to repair or replace transient voltage suppression devices that fail in materials or workmanship within specified warranty period.

1) Warranty Period: **Five** years from date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

a. Source Limitations: Obtain electrically operated circuit breakers and power distribution components from single manufacturer. Manufacturer listed shall be included within base bid.

1) Square D, a brand of Schneider Electric; PowerLink G3-3000 Level Control Panelboards.

b. Voluntary Alternate Manufacturers: At contractors discretion, an add or deduct alternate price may supplement their base bid to include an alternate manufacturer. All bidders shall include the Square D product listed above within their primary, base bid. Subject to compliance with requirements, manufacturers offering products that may be incorporated into the work include the following:

1) Eaton Corporation, Cutler-Hammer Business Unit; Pow-R-Command Control Panelboards.
2) Siemens Energy & Automation, Inc.; i-3 Control Technology.

2.02 SYSTEM DESCRIPTION

a. Input signal from field-mounted or on-board signal source shall open or close one or more electrically operated circuit breakers in the electronically operated, circuit-breaker panelboards. Any combination of inputs shall be programmable to any combination outputs.
b. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
c. Comply with 47 CFR, Subpart A and Subpart B, for Class A digital devices.

2.03 PERFORMANCE REQUIREMENTS

a. Expansion Requirements: Capacity for future expansion of number of control functions by 25 percent of current capacity; to include equipment ratings, housing capacities, spare spaces for circuit breakers, terminals, number of conductors in control cables, and control software.

2.04 PANELBOARDS

a. Electronically operated, circuit-breaker panelboards may contain remotely operated circuit breakers and standard branch circuit breakers
b. Assemblies: Comply with UL 67 and NEMA PB 1.
c. Enclosures: Comply with UL 50 and NEMA 250.
d. Future Devices: Mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices.
e. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals.

2.05 CIRCUIT BREAKERS

a. Remotely operated branch circuit breakers shall provide branch circuit overcurrent protection.
b. Labeled with SWD and HID Ratings: Comply with UL 489 for 20-A, single-pole branch devices
c. Switching Endurance Rating: Not less than 200,000 full-load open/close/open remote operations.
d. Remotely Operated Circuit Breakers: Manual override switch or handle position shall enable or disable the remote operation of the device and allow breaker handle to manually control the breaker's on-off status.

2.06 INTEGRATED LIGHTING CONTROL SYSTEM

a. The lighting control system shall consist of microprocessor-based control electronics with remotely operated circuit breakers mounted to a UL67 listed lighting panelboard interior and enclosed in a UL50 listed panelboard enclosure. The circuit breakers shall provide overcurrent protection, and have an AIR rating or series connected rating that meets or exceeds the fault current of the system to which the panelboard is being applied.
b. Each master control panel shall meet or exceed the following capabilities:
1) Capable of remotely controlling 168 branch circuits in a master/slave configuration.

2) Provide true status feedback by monitoring branch circuit breaker status based on actual system voltage at load side terminal.
3) Accept remote commands via network connection.

c. All lighting control components shall be installed in a conventional panelboard 20 inches wide. Suitable barriers shall be installed to separate Class 2 wiring from power conductors.

2.07 MAIN CONTROLLERS

a. Description: Controllers shall contain the power supply and electronic control for operating and monitoring remotely operated branch circuit breakers.

1) Comply with UL 916 (CSA C22.2, No. 205); with a microprocessor-based, solid-state, 365-day timing and control unit.
2) Power Supply: Powered from the panelboard, sized to provide control power for the operation of the remotely operated circuit breakers, controller, bus system, low-voltage inputs, and field-installed sensors.
3) Integral keypad and digital-display front panel for local setup, including the following:

a) Log and display remotely operated breaker on-time.
b) Provision to accept downloadable firmware so that the latest features may be added in the future without replacing the module.

4) Nonvolatile memory shall retain all setup configurations. After a power failure, the controller shall automatically reboot and return to normal system operation.

5) Alarm and E-mail Notification: Automatically initiate alarms based on preconfigured conditions listed below and routing alarm alerts as set at the control panel.

a) General Alarms: Power loss, non-responding breakers, loss and restoration of sub-net communications, loss and restoration of serial port communications, loss and restoration of BAS commands.
b) Specific Alarms: Input status, zone status, breaker status on-time (0 to 99999 hours).
c) E-mail Notification: Automatically route e-mail messages to five individual e-mail addresses. Within the body text of the e-mail, include a link that will automatically redirect the user to the associated panels' status Web page.

b. Timing Unit:

1) 365-day calendar, astronomical clock, and automatic adjustments for daylight savings and leap year.
2) Clock configurable for 12-hour (A.M./P.M.) or 24-hour format.
3) 16 independent schedules, each having 24 time periods.
4) Schedule periods settable to the minute.
5) Day of week, day of month, day of year with one-time or repeating capability.
6) 32 special date periods.

c. With 8 inputs, each configurable to the following parameters:

1) Normally open, normally closed, two-wire maintained toggle, two-wire momentary toggle, two-wire momentary on, two-wire momentary off, or three-wire momentary operation.
2) On and off-delay timers for local override operation, adjustable from five minutes to 12 hours. Local override shall be by field-installed, two-wire momentary toggle switch.

2.08 SLAVE PANEL CONTROLLERS

a. Slave panels shall contain the necessary busses and network hardware to allow connection of the sub-net wiring between panels, with programming at the main panel controller. Programmable timing unit, Web server, alarm and e-mail notification, and Ethernet connection to the control network is not required provided all of these functions are available for the slave panel from the main panel controller.

b. Sub-net wiring connections shall allow connection of wiring to a terminal that can be removed from the panel without interrupting communications to other panels.

c. Slave panels shall contain a nameplate label attached to the deadfront trim indicating the panel designation, panel network address, and panel designation of the associated master panel.

2.09 CONTROL NETWORK

a. Panel Controllers: Networked with other electronically operated, circuit-breaker panel controllers in a peer-to-peer configuration using Ethernet 10Base-T or100Base-T network.

b. Provide sub-net wiring between master and slave panels as indicated on the drawings. Sub-net wiring shall permit slave panels to receive power and control data from the master panelboard. No more than eight (8) bus rails shall be connected to the sub-net.

c. Sub-net communications shall follow Class 1 wiring practices. Communications conductors shall be Belden 27326 or equal having the same voltage rating as the branch circuit conductors. Wiring distances shall not exceed the manufacturer's recommendations.

d. For RS485 based networks, all wiring between master panels shall use 2-wire twisted pair shielded conductors (Belden 9841 or equal). Provide all necessary hardware for connecting the RS485 network to the RS232 port of the workstation.

2.10 MANUAL SWITCHES AND PLATES

a. Keypads: Programmable, designed to control functions associated with the equipment of this Section. The units shall be able to control any system output device.

b. Push-Button Switches: Modular, momentary-contact, low-voltage type.

c. Manual, Maintained Contact, Full- or Low-Voltage Switch:

d. Legend: Engraved or permanently silk-screened on wall plate where indicated. Use designations indicated on Drawings.

2.11 CONDUCTORS AND CABLES

a. Power Wiring to Supply Side of Class 2 Power Source: Not smaller than No. 12 AWG. Comply with Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

b. Class 2 and Class 3 Control Cables: Multiconductor cable with copper conductors not smaller than No. 18 AWG. Comply with Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

c. Class 1 Control Cables: Multiconductor cable with copper conductors not smaller than No. 14 AWG. Comply with Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

d. Digital and Multiplexed Signal Cables: Unshielded, twisted-pair cable with copper conductors, complying with TIA/EIA-568-B.2, Category 6 for horizontal copper cable. Comply with requirements in Section 271500 "Communications Horizontal Cabling."

PART 3 EXECUTION

3.01 EXAMINATION

a. Receive, inspect, handle, and store panelboards according to NECA 407 and NEMA PB 1.1.

b. Examine panelboards before installation. Reject panelboards that are damaged or rusted or have been subjected to water saturation.

c. Examine elements and surfaces to receive panelboards for compliance with installation tolerances and other conditions affecting performance of the Work.

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

3.02 WIRING INSTALLATION

a. Comply with NECA 1.

b. Wiring Method: Install cables in raceways except within consoles, cabinets, desks, and counters. Conceal raceway and cables except in unfinished spaces.

1) Comply with requirements for raceways and boxes specified in Section 26 05 33 "Raceways and Boxes for Electrical Systems."

c. Wiring Method: Conceal conductors and cables in accessible ceilings, walls, and floors where possible.

d. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Install lacing bars and distribution spools.

3.03 PANELBOARD INSTALLATION

a. Comply with NECA 1.

b. Install panelboards and accessories according to NECA 407 and NEMA PB 1.1.

c. Mounting Height: 6 ft. (2 m) to top or 6 ft. to center of breaker handle.

d. .Mount panelboard cabinet plumb and rigid without distortion of box.

e. Install filler plates in unused spaces.

3.04 IDENTIFICATION

a. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

b. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs complying with Section 260553 "Identification for Electrical Systems."

c. Create a directory to indicate loads served by each circuit; incorporate Owner's final room designations. Obtain approval before installing. Use a computer or typewriter to create directory; handwritten directories are unacceptable.

d. Panelboard Nameplates: Label each panelboard with a nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.05 FIELD QUALITY CONTROL

a. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

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

c. Perform the following tests and inspections with the assistance of a factory-authorized service representative:

1) Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.

2) Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

3) Perform the following infrared scan tests and inspections and prepare reports:

a) Initial Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each panelboard. Remove front panels so joints and connections are accessible to portable scanner.

b) Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each panelboard 11 months after date of Substantial Completion.

c) Instruments and Equipment:

1) Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.

d. Acceptance Testing Preparation:

1) Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
2) Test continuity of each circuit.

e. Panelboard will be considered defective if it does not pass tests and inspections.
f. Prepare test and inspection reports, including a certified report that identifies panelboards included and describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations made after remedial action.

3.06 STARTUP SERVICE

a. Engage a factory-authorized service representative to perform startup service.

1) Complete installation and startup checks according to manufacturer's written instructions.
2) Confirm correct communication wiring, initiate communications between panels, and program the control system according to approved time-of-day schedules and input override assignments.

3.07 ADJUSTING

a. Photocell Adjustments: When requested within 12 months from date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

3.08 SOFTWARE SERVICE AGREEMENT

a. Technical Support: Beginning at Substantial Completion, service agreement shall include software support for two years.
b. Upgrade Service: At Substantial Completion, update software to latest version. Install and program software upgrades that become available within **two** years from date of Substantial Completion. Upgrading software shall include operating system and new or revised licenses for using software.

1) Upgrade Notice: At least **30** days to allow Owner to schedule and access the system and to upgrade computer equipment if necessary.

3.09 DEMONSTRATION

a. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain control modules.

SECTION 26 29 00
LOW-VOLTAGE CONTROLLERS

PART 1 – GENERAL

1.01 SCOPE OF WORK
A. Base Bid: The work under this section includes combination magnetic motor starters.

1.02 SECTION INCLUDES
A. Controller Overcurrent Protection and Disconnecting Means

1.03 RELATED WORK
A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section.
B. Section 26 08 00 – Commissioning of Electrical
C. Section 26 05 29 – Hangers and Supports for Electrical Systems
D. Section 26 27 28 – Disconnect Switches

1.04 SUBMITTALS
A. Provide product data on motor starters and combination motor starters, relays, pilot devices, and switching and overcurrent protective devices.

1.05 REFERENCE STANDARDS
A. ANSI/NEMA ICS 6 - Enclosures for Industrial Controls and Systems.
B. NEMA AB 1 - Molded Case Circuit Breakers.
C. NEMA ICS 2 - Industrial Control Devices, Controllers, and Assemblies.
D. NEMA KS 1 - Enclosed Switches.

1.06 OPERATION AND MAINTENANCE DATA
A. All operations and maintenance data shall comply with the submission and content requirements specified under section GENERAL REQUIREMENTS.

1.07 DELIVERY, STORAGE AND HANDLING
A. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
B. Handle in accordance with manufacturer's written instructions.

1.08 COORDINATION WITH OTHER TRADES
A. Motors: In general, all electric motors required for this installation are existing with manual control. Automatic control is being added by this project.
B. Wiring Connections:
   1. Provide all necessary labor and material to completely connect all indicated motors and controls.
   2. All conduits and wiring required for control work from the holding coil circuit of the starter, including the furnishing and installation of control devices such as auxiliary contacts, control relays, time delay relays, pilot lights, selector switches, alternators, etc., shall be provided and installed by Division 26 unless otherwise indicated.
C. Power Branch Circuits:
   1. Match existing wire and conduit sizes.

1.09 PROJECT COORDINATION

A. Coordinate layout and installation of switches, circuit breakers, and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.
B. Motor starter manufacturer shall be the same manufacturer as distribution panelboards, branch circuit panelboards, and disconnect switches.

1.10 SPARE PARTS

A. Keys: Furnish two (2) each to Owner.
B. Provide one (1) spare of each type of LED, push to test indicator lamp.– PRODUCTS

1.11 MAGNETIC MOTOR STARTERS

A. Magnetic Motor Starters: NEMA ICS 2; AC general-purpose Class A magnetic controller for induction motors rated in horsepower; NEMA size 0 minimum.
B. Full Voltage Starting: Non-reversing type.
C. Coil Operating Voltage: 120 volts, 60 Hz.
D. Overload Protection: solid state overload relay.
E. Enclosure: NEMA Type: 1.
F. Provide manufacturer's equipment ground kit in all starter enclosures.
G. Auxiliary Contacts: NEMA ICS 2; two field convertible contacts in addition to seal-in contact.
H. Selector Switches: NEMA ICS 2; HAND/OFF/AUTO, in front cover.
I. Indicating Lights: NEMA ICS 2; LED Push-to-test type. RUN: red in front cover.
J. Control Power Transformers: Each magnetic starter shall have a fused primary and a fused 120Vsecondary control transformer, sized for the load, 100 VA minimum. Additionally, the X2 terminal of the control transformer shall be grounded.
K. Combination Motor Starters: Combine motor starters with motor circuit protector disconnect in common enclosure.

1.12 CONTROLLER OVERCURRENT PROTECTION AND DISCONNECTING MEANS

A. Motor Circuit Protector: NEMA AB 1; circuit breakers with integral instantaneous magnetic trip in each pole.

PART 2 – EXECUTION

2.01 INSTALLATION

A. Wall-Mounted Controllers: Install enclosed controllers on walls with tops at uniform height unless otherwise indicated, and by bolting units to wall or mounting on lightweight structural-steel channels bolted to wall. For controllers not at walls, provide freestanding racks complying with Division 26 Section "Hangers and Supports for Electrical Systems."
B. Install motor control equipment in accordance with manufacturer's instructions.
C. Adjust overload relays in motor starters to match installed motor characteristics.
D. Install fuses in control circuits if not factory installed.
E. Motor Data: Provide neatly typed label inside each motor starter enclosure door identifying motor served, nameplate horsepower, full load amperes, code letter, service factor, and voltage/phase rating.

2.02 IDENTIFICATION

A. Identify enclosed controllers, components, and control wiring. Comply with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."
   1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
   2. Label each enclosure with engraved nameplate.
   3. Label each en closure-mounted control and pilot device.

SECTION 26 32 00
PACKAGED GENERATOR ASSEMBLIES

PART 1 – GENERAL

1.01 SCOPE OF WORK
A. Base Bid: The work under this section includes providing a complete factory assembled packaged engine generator system with controls and startup testing.
B. This section includes packaged engine-generator sets for emergency power supply consisting of (natural) gas engine, unit mounted cooling system and outdoor sound attenuated system.

1.02 SECTION INCLUDES
A. System Ratings
B. Engine and Engine Equipment
C. Generator
D. Accessories

1.03 RELATED WORK
A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section.
B. Section 26 08 00 – Commissioning of Electrical
C. Section 26 36 00 - Transfer Switches

1.04 SUBMITTALS
A. Submit shop drawings showing plan and elevation views with overall and interconnection point dimensions, fuel consumption rate curves at various loads, ventilation and combustion air requirements, and electrical ratings and diagrams including schematic and interconnection diagrams.
B. Submit manufacturer's installation instructions.

1.05 REFERENCE STANDARDS
A. NFPA 70 – National Electrical Code.
B. NFPA110 – Emergency and Standby Power Systems.
C. ANSI/NEMA MG 1 - Motors and Generators.
D. UL2200 – Stationary Engine Generator Assemblies.

1.06 QUALITY ASSURANCE
A. Manufacturer: Company specializing in packaged engine generator systems with minimum ten years documented experience. Packaged generator assembly shall meet UL 2200 requirements.
B. Supplier: Authorized distributor of engine generator manufacturer with service facilities within 100 miles of project site.

1.07 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.
B. Warranty Period: One (1) year from date of Substantial Completion.

1.08 OPERATION AND MAINTENANCE DATA
A. All operations and maintenance data shall comply with the submission and content requirements specified under section GENERAL REQUIREMENTS.

1.09 PERMITS

A. The Contractor shall be responsible for obtaining all necessary permits for the complete installation of the generator fuel system and related equipment.

1.10 COORDINATION

A. Coordinate size and location of concrete bases for package engine generators. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.

1.11 MAINTENANCE SERVICE

A. Initial Maintenance Service: Beginning at Substantial Completion, provide [12] <insert number] months' full maintenance by skilled employees of manufacturer's designate service organization. Include quarterly exercising to check for proper starting, load transfer, and running under load. Include routine preventative 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 MATERIAL

A. Provide two additional sets of each fuel, oil, and air filter elements required for the engine generator system and one additional set of all required belts.

PART 2 – PRODUCTS

2.01 SYSTEM RATINGS

A. Generator Set Rating: 60 kW/75 kVA, .8pf, 208y/120 VAC, 3 phase, 4 wire, 12 wire re-connectable, 60 Hz at 1,800 rpm. Standby power rated.
B. Basis of Design Unit – Kohler 60RCL Light Commercial Unit with PIM and LCM accessories. Alternate units are permitted which meet the dimensional and performance characteristics of the referenced Kohler unit.
C. The generator set manufacturer shall verify the engine as capable of driving the generator with all accessories in place and operating at the nameplate rating after de-rating for the range of temperature expected in service and the altitude of the installation.
D. The engine-generator set shall be capable of picking up 100% of nameplate kW, less applicable derating factors, in one step with the engine-generator set at operating temperature.
E. Voltage regulation shall be ±1.0% of rated voltage for any constant load between no load and rated load. Random voltage variation with any steady state load from no load to full load shall not exceed ±1.0% of rated voltage.
F. Frequency regulation shall be ±0.5% from steady state no load to steady state rated load.
G. Harmonic distortion shall not exceed 5% total harmonic distortion at full linear load and no single harmonic shall exceed 3% of rated voltage.
H. Telephone Influence Factor: TIF shall be less than 50.
I. Start time shall comply with NFPA 110, Type 10, Systems Requirements.

2.02 ENGINE AND ENGINE EQUIPMENT

A. Engine Type: Water-cooled, naturally aspirated four cycle, internal combustion engine.
B. Fuel Type: Natural Gas.
C. Engine Fuel System:
    1. Natural Gas:
        a. Carburetor.
        b. Secondary Gas Regulators.
        c. Fuel-Shutoff Solenoid Valves.
        d. Flexible Fuel Connector.

D. Engine Speed: 1,800 rpm.
E. Governor: Isochronous electronic type to maintain engine speed within 0.5 percent, steady state, and 1 percent, no load to full load, with recovery to steady state within 2 seconds following sudden load changes.
F. Safety Devices: Engine shutdown on high water temperature, low oil pressure, overspeed, and engine overcrank. Limits as selected by manufacturer.
G. Include remote starting control circuit, with RUN-OFF-AUTO selector switch on engine generator control panel.
H. Engine Accessories: Include intake air filter, fuel filter, automatic electric fuel shutoff, gear-driven water pump, positive displacement mechanical full pressure lubrication oil pump, full flow lubrication oil filters with replaceable elements, dipstick oil level indicator, and oil drain valve with hose extension. Include engine mounted battery charging alternator with solid state voltage regulator. Include fuel pressure gauge, water temperature gauge, and lube oil pressure gauge on engine-generator control panel.
I. Engine Jacket Heater: Thermal circulation type water heater with integral thermostatic control, sized to maintain engine jacket water at 90 degrees F (32 degrees C). Heater voltage shall be 120 VAC.
J. Mounting: Provide unit with suitable elastomeric pad vibration isolators and mount on structural steel base to maintain alignment of mounted components. Provide lifting attachments.
K. Cooling System: Unit mounted, closed loop, liquid cooled radiator using glycol coolant, with engine mounted blower type fan and coolant pump with thermostat temperature control sized to maintain safe engine temperature in ambient temperature of 110 degrees F (43 degrees C). Fan shall be driven by multiple belts from engine shaft. Radiator shall be provided with a duct adapter flange permitting the attachment of air discharge duct directing the discharge of radiator air through the wall. The equipment supplier shall provide 50% ethylene glycol antifreeze solution to fill engine cooling system. Coolant hoses shall be flexible assembly with inside surface of ultraviolet and abrasion-resistant fabric with rating of 50-psig (345-kPa) maximum working pressure with coolant at 180° F (82° C), and noncollapsible under vacuum.
L. Exhaust System:
    1. Provide critical grade silencer, with muffler companion flanges and flexible stainless steel exhaust fitting, suitable for horizontal orientation, sized in accordance with engine manufacturer's instructions. Silencer shall be sized as recommended by the engine manufacturer and selected with a minimum sound attenuation of 25 dB at 500 Hz. Additionally, the exhaust sound level, measured at a distance of 10 feet, 90 degrees from the exhaust discharge, shall be 85 dBA or less. Contractor shall mount muffler so its weight is not supported by the engine.
    2. Flexible exhaust connections shall be provided as required for connection between engine exhaust manifold and exhaust line, in compliance with applicable codes and regulations.
    3. Provide an exhaust condensation trap with manual drain valve to trap and drain off exhaust condensation and to prevent condensation from entering the engine. Provide drain line to drip pan.
    4. Provide a suitable rain cap at the stack outlet. Provide all necessary flanges and special fittings for proper installation.
M. Batteries: Heavy duty, lead-acid storage batteries. Provide a DC volt system with number of batteries and battery capacity as sized by the manufacturer adequate for (4) 30 second cranking periods (total of 2 minutes) along with all additional loads being run on the DC system.

2.03 GENERATOR

A. Insulation: ANSI/NEMA MG 1, Class H.
B. The generator shall be single bearing, self-aligning 4-pole, brushless, synchronous type, revolving field with amortisseur windings, and with direct driven centrifugal blower for proper cooling and minimum noise. No brushes will be allowed. Generator shall be directly connected to engine

fly wheel housing and driven through a flexible coupling to ensure permanent alignment. Generator design shall prevent potentially damaging shaft currents.

C. The generator shall be 3-phase, broad-range, re-connectable and shall have 12 leads brought out to allow connection by user to obtain any of the available voltages for the unit.
D. The regulator design shall include torque-matching characteristics to allow the engine to use its fullest power producing capacity (without exceeding it or over compensating) at speeds lower than rated, to optimize motor starting capability and provide the fastest possible recovery from transient speed dips. Regulators which use fixed volts per hertz characteristic are not acceptable.
E. Provide an exciter field automatic circuit breaker, mounted on the control panel, of the manual reset only type (cannot be used as a manual disconnect) for protection of exciter field and regulator.
F. The generator, exciter, and voltage regulator shall be designed and manufactured by the engine generator set manufacturer. The exciter shall be 3-phase, full wave, rectified with heavy duty silicone diodes mounted on the common rotor shaft and sized for maximum motor starting loads. Systems utilizing 3-wire, solid state control elements rotating in the rotor, will not be acceptable. The generator design shall be of the self-protecting type as demonstrated by the prototype short circuit test.
G. Provide a mainline molded case circuit breaker per one line diagram, on generator output with integral thermal and instantaneous magnetic trip in each pole; number and rating as indicated. Include battery-voltage operated shunt trip, connection to open circuit breaker on engine failure.

2.04 ACCESSORIES

A. Provide the following accessories with the engine generator set.
B. Enclosure: Weather protective housing with the following features:
   1. Galvanized steel body
   2. Lifting points on base frame
   3. Stainless steel flush fitting latches and hinges
   4. Zinc plated or stainless steel fasteners
   5. Sheet steel components pre-treated with zinc phosphate prior to polyester powder coating
   6. Lockable wide door on each side installed to allow 180 degree opening rotation
   7. Radiator fill access door with lockable cover
   8. Lube oil and coolant drains piped to the exterior of the enclosure skid base
   9. Battery can only be reached through lockable doors
   10. Sound attenuation housing to limit noise level not to exceed 70dB at 7 meters
C. Battery Heater: Thermostatically controlled battery blanket heater, 120VAC.
D. Battery Tray: Plastic coated metal tray treated for electrolyte resistance, constructed to contain spillage of electrolyte.
E. Battery Charger: A 10-ampere voltage regulated battery charger shall be provided for the engine-generator set. Charger shall be equipped with float, taper and equalize charge settings. Charger shall include overload protection, voltage surge suppressor, DC voltmeter and fused AC input. Operational monitors shall provide visual output along with individual form C contacts rated at 4 amps, 120 VAC, 30 VDC for remote indication of:
   1. Loss of AC power-red light (no relay contact).
   2. Low battery voltage-red light.
   3. High battery voltage-red light (no relay contact).
   4. Charger fail-red light.
F. Engine-Generator Digital Control Panel: Top of control panel shall not be more than six (6) feet above finished floor (this may require remote mounting). NFPA - 110 and NFPA - 99, Type 1 generator mounted control panel enclosure with engine and generator controls and indicators. Include the following features:
   1. Power source with circuit protection: 12or 24 VDC.
   2. Operating temperature range: –40degree C to +70 degree C.

3. Humidity range: 5% to 95% non-condensing.
4. Remote annunciator panel.
5. Alarm horn.
6. Indicators: not on auto, program, systems, warning.
7. Alphanumeric digital display.
8. A flashing red light to indicate the generator set is not in automatic start mode.
9. Engine run/off/auto selector switch.
10. Emergency stop "mushroom" switch.
11. Engine running time meter.
12. Oil pressure gauge.
13. Water temperature gauge.
14. Battery voltmeter.
15. Auxiliary Relay: 3PDT, operates when engine runs, with contact terminals prewired to terminal strip.
16. Remote Alarm Contacts: Pre-wire form C contacts to terminal strip for remote alarm functions required by ANSI/NFPA 110.
17. Indicator lamps to include: overcrank, low oil pressure, high engine temperature, overspeed, not-in-auto, system ready, low battery volts, battery charger fault, low fuel, pre-alarm high engine temp, pre-alarm low oil pressure, low water temp, auxiliary alarm, auxiliary pre-alarm.

G. The NEMA 1 enclosed control panel shall be mounted on the generator set with vibration isolators. The control shall include surge suppression for protection of solid state components. A front control panel illumination lamp with On/Off switch shall be provided. The engine-generator set starting batteries shall power the monitor.

H. Remote Emergency Stop Station: With STI -1230CR "GENERATOR EMEG. STOP" surface mounted, polycarbonate cover with horn and relay or equal.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Verify that required utilities are available in proper location and ready for use.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.
B. Generator set shall be anchored to the floor or concrete pad.
C. Natural Gas piping, gate valve, unions and connectors.
D. All required fuel regulators and pressure reducing equipment.

3.03 FIELD QUALITY CONTROL

A. Provide full load testing utilizing a portable test bank for four hours continuous, minimum. During the first two hours, step increase the load from 0% to 100% in at least six equal steps. At the end of two hours, continue running test at 100% load. Record the following in 20 minute intervals throughout the four hour test: kilowatts, amperes, voltage, coolant temperature, room temperature, generator frequency (Hz), oil pressure, fuel consumption.

B. After the generator has cooled down from the four hour test, shut it down and then simulate a power failure including operation of the transfer switch, automatic cycle, and automatic shutdown and return to normal.

3.04 TRAINING

A. See Section 26 05 00 for general training requirements.

B. In addition to the training provided in Section 26 05 00, provide an additional 8 hours of training for each type of generator assembly provided on the project.

3.05 CONSTRUCTION VERIFICATION CHECKLISTS

A. Contractor is responsible for utilizing the construction verification checklists supplied under these specifications in accordance with the procedures defined for construction verification checklists.

3.06 FUNCTIONAL TESTS

A. Contractor is responsible for utilizing the functional test procedures supplied under this specification in accordance with the procedures defined for functional test procedures.

SECTION 26 36 00
TRANSFER SWITCHES

PART 1 – GENERAL

1.01 SCOPE OF WORK

A. Base Bid: The work under this section includes transfer switches (less than 600V) for standby generator systems.

1.02 SECTION INCLUDES

A. Automatic Transfer Switch
B. Approval
C. Manufacturer

1.03 RELATED WORK

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specifications Sections, apply to this section.
B. Section 26 08 00 – Commissioning of Electrical
C. Section 26 24 16 – Panelboards
D. Section 26 32 00 – Packaged Generator Assemblies

1.04 SUBMITTALS

A. The following information shall be submitted to the user and Engineer:
   1. Front view and plan view of the assembly
   2. Schematic diagram
   3. Conduit space locations within the assembly
   4. Assembly ratings including:
      a. Withstand and closing rating
      b. Voltage
      c. Continuous current rating
      d. Short-Time rating if applicable
      e. Short-circuit rating if ordered with integral protection
   5. Cable terminal sizes
   6. Product data sheets
B. The following information shall be submitted for record purposes:
   1. Final as-built drawings and information for items listed above.
   2. Wiring diagrams
   3. Certified production test reports
   4. Installation information

1.05 REFERENCE STANDARDS

A. The combination automatic closed transition transfer switches shall be designed, tested, and assembled in strict accordance with all applicable standards of ANSI, U.L., IEEE and NEMA as follows:
   1. UL 1008 – Transfer Switches
   2. UL991 – Tests for Safety-Related Controls Employing Solid-State Devices
   3. NFPA 70 – National Electrical Code
   4. NFPA 99 – Essential Electrical Systems of Health Care Facilities
   5. NFPA 110 – Emergency and Standby Power Systems.
   6. NEMA ICS 1 – AC Transfer Switch Equipment
B. IEEE 446 – Recommended Practice for Emergency and Standby Power Systems.

1.06 QUALITY ASSURANCE

A. Manufacturer: Company specializing in automatic transfer equipment with five years documented experience.

1.07 OPERATION AND MAINTENANCE DATA

A. Submit operation and maintenance manual under provisions of Division 1. The manuals shall contain at least the following:
   1. Instructions for operating equipment under test and emergency conditions.
   2. Identification of operating limits which may result in hazardous or unsafe conditions.
   3. Document ratings of equipment and each major component.
   4. Routine preventive maintenance and lubrication schedule.
   5. List of special tools, maintenance materials, and replacement parts.
   6. Technical data sheets
   7. Wiring diagrams

PART 2 – PRODUCTS

2.01 AUTOMATIC TRANSFER SWITCH

A. The automatic open transition transfer switch (AOTTS) shall be furnished as scheduled. Voltage and continuous current ratings and number of poles shall be as scheduled.
B. The AOTTS shall be mounted in a freestanding NEMA 1 enclosure, unless otherwise indicated. Enclosures shall be fabricated from 12-gauge steel. The enclosure shall be sized to exceed minimum wire bending space required by UL 1008.
C. The transfer switch shall be equipped with an internal welded steel pocket, housing an operations and maintenance manual.
D. The AOTTS shall be top or bottom accessible.
E. The main contacts shall be capable of being replaced without removing the main power cables.
F. The main contacts shall be visible for inspection without any major disassembly of the transfer switch.
G. All bolted bus connections shall have Belleville compression type washers.
H. When a solid neutral is required, a fully rated bus bar with required AL-CU neutral lugs shall be provided.
I. Control components and wiring shall be front accessible. All control wires shall be multi-conductor 18 gauge 600-volt SIS switchboard type point to point harness. All control wire terminations shall be identified with tubular sleeve-type markers.
J. The switch shall be equipped with compression lugs.
K. The complete combination automatic closed transition transfer bypass/isolation switch assembly shall be factory tested to ensure proper operation and compliance with the specification requirements. A copy of the factory test report shall be available upon request.
L. OPEN TRANSITION TRANSFER SWITCH
   1. The transfer switch shall be double throw, incapable of pauses or intermediate position stops during normal functioning.
   2. Manual Switch Operation: Under load, with door closed and with either or both sources energized. Transfer time is same as for electrical operation. Control circuit automatically disconnects from electrical operator during manual operation.
   3. The main contacts shall be mechanically locked in both the normal and emergency positions without the use of hooks, latches, magnets, or springs, and shall be silver-tungsten alloy. Separate arcing contacts with magnetic blowouts shall be provided on all transfer switches. Interlocked, molded case circuit breakers or contactors are not acceptable.
M. TRANSFER SWITCH CONTROLS
   1. The transfer switch shall be equipped with a microprocessor based control system, to provide all the operational functions of the close transition transfer switch. The controller shall have

two asynchronous serial ports. The controller shall have a real time clock with NiCad battery backup.

2. The CPU shall be equipped with self-diagnostics which perform periodic checks of the memory I/O and communication circuits, with a watchdog/power fail circuit
3. The controller shall use Modbus, an industry standard open architecture communication protocol for high-speed serial communications via multi-drop connection to other controllers and to a master terminal with up to 4000 ft. of cable, or further, with the addition of a communication repeater. The serial communication port shall be RS422/485 compatible.
4. The serial communication port shall allow interface to either the manufacturer's or owner furnished remote supervisory control.
5. The controller shall have password protection required to limit access to qualified and authorized personnel.
6. The controller shall include a 20 character, LCD display, with a keypad, which allows access to the system.
7. The controller shall also be capable of monitoring, logging and trending power data and shall include the following:
    a. The controller shall be accurate to 1% measured. Voltage and current for all phases shall be sampled simultaneously to assure high accuracy in conditions of low power factor or large waveform distortions (harmonics).
    b. The controller shall be capable of operating at nominal frequencies of 45 to 66 Hz.
    c. The controller shall accept inputs from industry standard current transformers (5A secondary). Direct phase voltage connections, 600 VAC and under, shall be possible without the use of PT's.
    d. The controller shall be capable of being applied in single or 3-phase, three and four wire circuits.
    e. All setup parameters required by the controller for power monitoring shall be stored in non-volatile memory and retained in the event of a control power interruption.
    f. The following metered readings shall be communicated by the Controller, via local display and serial communication.
        1) Current, per phase RMS and neutral
        2) Current Unbalance %
        3) Voltage, phase-to-phase and phase-to-neutral
        4) Voltage Unbalance %
        5) Real power (KW), per phase and 3-phase total
        6) Apparent power (KVA), per phase and 3-phase total
        7) Reactive power (KVAR), per phase and 3-phase total
        8) Power factor, 3-phase total & per phase
        9) Frequency
        10) Accumulated Energy, (KWH, KVAH, and KVARH)
    g. Displaying each of the metered quantities shall be accomplished through the use of menu scroll buttons.
    h. Setup for systems requirements shall be allowed through the local access display.
    i. Reset of the following electrical parameters shall also be allowed from the local access display - Real Energy (KWH), Apparent Energy (KVAH), Reactive Energy (KVARH).
    j. All reset and setup functions shall have a means for protection against unauthorized/accidental changes.
    k. The Controller shall be capable of storing records in memory for access either locally or remotely for up to 100 events. The reports shall include date, time and a description of the event and shall be maintained in a nonvolatile memory.
    l. The controller shall be capable of storing the following records in memory for access either locally or remotely:

1) Number of hours transfer switch is in the emergency position (total since record reset).
2) Number of hours emergency power is available (total since record reset).
3) Total transfer in either direction (total since record reset).
4) Date, time, and description of the last four source failures.
5) Date of the last exercise period.
6) Date of record reset.

N. SEQUENCE OF OPEN TRANSITION OPERATION

1. When the voltage on any phase of the normal source drops below 80% or increases to 120%, or frequency drops below 90%, or increase to 110%, or 20% voltage differential between phases occurs, after a programmable time delay period of 0-9999 seconds factory set at 3 seconds to allow for momentary dips, the engine starting contacts shall close to start the generating plant.
2. The transfer switch shall transfer to emergency when the generating plant has reached specified voltage and frequency on all phases.
3. After restoration of normal power on all phases to a preset value of at least 90% to 110% of rated voltage, and at least 95% to 105% of rated frequency, and voltage differential is below 20%, an adjustable time delay period of 0-9999 seconds (factory set at 300 seconds) shall delay retransfer to allow stabilization of normal power. If the emergency power source should fail during this time delay period, the switch shall automatically return to the normal source.
4. After retransfer to normal, the engine generator shall be allowed to operate at no load for a programmable period of 0-9999 seconds, factory set at 300 seconds.

O. TRANSFER SWITCH ACCESSORIES

1. Programmable three phase sensing of the normal source set to pickup at 90% and dropout at 80% of rated voltage and overvoltage to pickup at 120% and dropout out at 110% of rated voltage. Programmable frequency pickup at 95% and dropout at 90% and over frequency to pickup at 110% and dropout at 105% of rated frequency. Programmable voltage differential between phases, set at 20%, and phase sequence monitoring.
2. Programmable three phase sensing of the emergency source set to pickup at 90% and dropout at 80% of rated voltage and overvoltage to pickup at 120% and dropout out at 110% of rated voltage programmable frequency pickup at 95% and dropout at 90% and over frequency to pickup at 110% and dropout at 105% of rated frequency. Programmable voltage differential between phases set at 20%, and phase sequence monitoring.
3. Time delay for override of momentary normal source power outages (delays engine start signal and transfer switch operation). Programmable 0-9999 seconds. Factory set at 3 seconds, if not otherwise specified.
4. Time delay on transfer to emergency for engine generator stabilization. Programmable 0-9999 seconds, factory set at 3 seconds.
5. Time delay to control contact transition time during open transition transfer to either source. Programmable 0-9999 seconds, factory set at 3 seconds.
6. Time delay on retransfer to normal, programmable 0-9999 seconds, factory set at 300 seconds if not otherwise specified, with overrun to provide programmable 0-9999 second time delay, factory set at 300 seconds, unloaded engine operation after retransfer to normal.
7. A maintained type load test switch shall be included to simulate a normal power failure, toggle switch operated.
8. Contact, rated 10 Amps 30 volts DC, to close on failure of normal source to initiate engine starting.
9. Contact, rated 10 Amps 30 volts DC, to open on failure of normal source for customer functions.
10. Light emitting diodes shall be mounted on the microprocessor panel to indicate: switch is in normal position, switch is in emergency position and controller is running.

11. Light emitting diodes shall be provided to indicate: Normal Source power available and Emergency Source power available, Transfer Switch in Manual Mode and Fail to Transfer.
12. A Push-button to reset fail to transfer.
13. Four auxiliary contacts rated 10 Amp, 120 volts AC (for switches 100 to 800 amps) 15 amp, 120 volts AC (for switches 1000 to 4000 amps), shall be mounted on the main shaft, two closed on normal, the other closed on emergency. All contacts will be wired to a terminal strip for ease of customer connections.
14. Automatic synchronizing check function to prevent transfer from normal to emergency or retransfer from emergency to normal until both sources are within acceptable limits of synchronism.
15. A three phase digital LCD voltage readout, with 1% accuracy shall display all three separate phase to phase voltages simultaneously, for both the normal and emergency source.
16. A digital LCD frequency readout with 1% accuracy shall display frequency for both normal and emergency source.
17. A LCD readout shall display normal source and emergency source availability.
18. Include (2) time delay contacts that open simultaneously just (milliseconds) prior to transfer in either direction. These contacts close after a time delay upon transfer. Programmable 0-9999 seconds after transfer.
19. A plant exerciser shall be provided with (10) 7-day events, programmable for any day of the week and (24) calendar events, programmable for any month/day, to automatically exercise generating plant programmable in one-minute increments. Also include selection of either "no load" (switch will not transfer) or "load" (switch will transfer) exercise period. Keypad initiated.
20. A block transfer function shall be included, energized from a 24VDC signal from the generator control switchgear, to allow transfer to emergency.
21. A load-shed function shall be included, energized from a 24VDC signal from the generator control switchgear, to disconnect the load from the emergency source when an overload condition occurs.
22. A peak shave function shall be included, energized from a 24VDC signal from the generator control switchgear. This function will start the emergency generator and transfer the ATS to the emergency source reducing the utility supply to the building. After the peak shave signal is removed, the transfer switch will retransfer to the normal supply, bypassing the retransfer time delay.
23. Phase rotation relay that will sense the rotation on both the normal source and the emergency source. If the rotation does not match the programmed value, the source will be considered an “off” source.
24. Dry contacts each to indicate the following statuses; bypassed to normal source, bypassed to emergency source, ATS is isolated, normal source available, emergency source available.

2.02 APPROVAL

A. As a condition of approval, the manufacturer of the AOTTS shall verify that their switches are listed by Underwriters Laboratories, Inc., Standard UL-1008 with 3 cycle short circuit closing and withstand as follows:

RMS Symmetrical Amperes 480 VAC

Current Limiting Amperes	Closing and Withstand	Fuse Rating
100 – 400	42,000	200,000
600 – 800	65,000	200,000
1000 – 1200	85,000	200,000
1600 – 4000	100,000	200,000

B. During the 3 cycle closing and withstand tests, there shall be no contact welding or damage. The 3 cycle tests shall be performed without the use of current limiting fuses. The test shall verify that contact separation has not occurred, and there is contact continuity across all phases. Test procedures shall be in accordance with UL-1008, and testing shall be certified by Underwriters' Laboratories, Inc.
C. When conducting temperature rise tests to UL-1008, the manufacture shall include post-endurance temperature rise tests to verify the ability of the combination transfer bypass/isolation switch to carry full rated current after completing the overload and endurance tests.
D. The microprocessor controller shall meet the following requirements:
   1. Storage conditions - 25 degrees C to 85 degrees C
   2. Operation conditions - 20 degrees C to 70 degrees C ambient
   3. Humidity 0 to 99% relative humidity, noncondensing
   4. Capable of withstanding infinite power interruptions
   5. Surge withstand per ANSI/IEEE C-37.90A-1978
E. Manufacturer shall provide copies of test reports upon request.

2.03 MANUFACTURER

A. The AOTTS manufacturer shall employ a nationwide factory-direct, field service organization, available on a 24-hour a day, 365 days a year, call basis.
B. The manufacture shall include an 800-telephone number, for field service contact, affixed to each enclosure.
C. The manufacturer shall maintain records of each combination transfer bypass/isolation switch, by serial number, for a minimum 20 years.

2.04 SCHEDULES

A. As scheduled.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.
B. Starting contacts for all transfer switches shall be wired in parallel to the generator starting circuit so that any transfer switch that senses a loss of normal power will start the generator.

3.02 FIELD ADJUSTMENTS

A. The contractor shall field adjust all timing and voltage settings of the transfer switch as necessary for proper operation of the switch, related loads and sources.

3.03 TRAINING

A. See Section 26 05 00 for general training requirements.

SECTION 26 51 13
INTERIOR LIGHTING FIXTURES, LAMPS, AND BALLASTS

PART 1 – GENERAL

1.01 SCOPE OF WORK
A. Base Bid: The work under this section includes interior luminaires and accessories, exit signs, lamps, and ballasts.

1.02 SECTION INCLUDES
A. Interior Luminaires and Accessories
B. LED Luminaires
C. Exit Signs

1.03 RELATED WORK
A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specifications Sections, apply to this section.
B. Section 26 09 23 – Lighting Controls

1.04 SUBMITTALS
A. Include outline drawings, lamp and ballast data, support points, weights, accessory information and performance and photometric data for each luminaire type.
B. For each luminaire type, submit luminaire information in the following example table format, and submit catalog cuts with highlighted catalog numbers and required accessories.

LUMINAIRE		BALLAST	LAMP	ANSI INPUT WATTS
Type	Manufacturer and Catalog No.	Manufacturer, Quantity per Fixture, and Catalog No.	Manufacturer, Quantity per Fixture, and Catalog No.	

1.05 QUALITY ASSURANCE
A. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by manufacturers' laboratories that are accredited under the National Volunteer Laboratory Accreditation Program for Energy Efficiency Lighting Products
B. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by an independent agency, with the experience and capability to conduct the testing indicated, that is an NRTL as defined by OSHA in 29 CFR 1910.7.
C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
D. Comply with NFPA 70.

1.06 WARRANTY
A. Warranty Period: One year(s) from date of Substantial Completion.

1.07 OPERATION AND MAINTENANCE DATA
A. All operations and maintenance data shall comply with the submission and content requirements specified under section GENERAL REQUIREMENTS.

1.08 COORDINATION

A. Coordinate layout and installation of lighting fixtures and suspension system with other construction that penetrates ceilings or is supported by them, including HVAC equipment, fire-suppression system, and partition assemblies.

1.09 EXTRA MATERIAL

A. Provide three (3) percent of each fixture type, but not less than one (1) fixture of each type.

PART 2 – PRODUCTS

2.01 INTERIOR LUMINAIRES AND ACCESSORIES

A. See the Lighting Fixture Schedule on the drawings, for type of fixtures and catalog numbers. Catalog numbers are shown on the drawings for quality and performance requirements only. Fixtures manufactured by others are equally acceptable provided they meet or exceed the performance of the indicated fixtures, and meet the intent of the design.
B. Provide with quick-connect disconnecting means, similar to Thomas & Betts Sta-Kon.
C. Sheet metal components shall be steel unless otherwise noted, formed and supported to prevent warping or sagging. Metal shall be free of burrs, sharp corners, and edges.
D. Doors, Frames and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components form falling accidentally during relamping and when secured in operating position.

2.02 LED LUMINAIRES

A. The manufacturer offering this item shall have been in business for a minimum of 5 years and shall have successfully produced at least 1000 (one thousand) identical or similar models to that being tendered.
B. Luminaire shall be certified by a Nationally Recognized Testing Laboratory (UL, ETL, or IEC).
C. Luminaire shall be mercury-free, lead-free, and RoHS compliant.
D. Luminaire shall comply with FCC 47 CFR part 15 non-consumer RFI/EMI standards.
E. Luminaire shall maintain 70% lumen output (L70) for a minimum of 50,000 hours.
F. Light output of the LED system shall be measured using the absolute photometry method following IES LM-79 and IES LM-80 requirements and guidelines.
G. Driver shall have a rated life of 50,000 hours, minimum.
H. Lumen output shall not depreciate more than 20% after 10,000 hours of use.
I. The manufacturer of the Luminaire shall utilize high-brightness LEDs with proven quality. LED drivers to be compatible with LEDs. Driver and LEDs shall be furnished from a single manufacturer to ensure compatibility.
J. Luminaire Color Rendering Index (CRI) shall be a minimum of 70.
K. LED fixture shall be thermally designed as to not exceed the maximum junction temperature of the LED for the ambient temperature of the location the fixture is to be installed. Rated case temperature shall be suitable for operation in the ambient temperatures typically found for the intended installation. Exterior luminaires to operate in ambient temperatures of -20°F to 122°F (-29°C to 50°C).
L. LED driver shall have a minimum power factor (pf) of 0.9 and a maximum crest factor (cf) of 1.5 at full input power and across specified voltage range.
M. Luminaire shall operate normally for input voltage fluctuations of plus or minus 10 percent and shall have a maximum Total Harmonic Distortion (THD) of 20% at full input power and across specified voltage range.
N. Electrical components of the LED lighting fixture (LED light engine/board array and driver(s)) shall be of modular construction so that each component is individually replaceable in the field for maintenance and repair purposes. Wiring connecting these components shall utilize polarized quick-disconnects.

O. All connections to luminaires shall be reverse polarity protected and provide high voltage protection in the event connections are reversed or shorted during the installation process.
P. Fuse Protections: All luminaires shall have built-in fuse protection. All power supply outputs shall be either fuse protected or be Polymeric Positive Temperature Coefficient (PTC)-protected as per Class 2 UL listing. All luminaires shall be provided with knockouts for conduit connections.
Q. The LED lighting fixture shall carry a limited 5-year warranty minimum for LED light engine(s)/board array, and driver(s).

2.03 EXIT SIGNS

A. Description: Comply with UL 924; for sign colors, visibility, luminance, and lettering size, comply with authorities having jurisdiction.
   1. Self-Powered Exit Signs (Battery Type): Integral automatic charger in a self-contained power pack suitable for low ambient temperature conditions.
      a. Battery: Sealed, maintenance-free, nickel-cadmium type.
      b. Charger: Fully automatic, solid-state type with sealed transfer relay.
      c. Operation: Relay automatically energizes lamp from battery when circuit voltage drops to 80 percent of nominal voltage or below. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.
      d. Test Push Button: Push-to—test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
      e. LED Indicator Light: Indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
      f. Remote Test: Switch in hand-held remote device aimed in direction of tested unit initiates coded infrared signal. Signal reception by factory-installed infrared receiver in tested unit triggers simulation of loss of its normal power supply, providing visual confirmation of either proper or failed emergency response.
      g. Integral Self-Test: Factory-installed electronic device automatically initiates code-required test of unit emergency operation at required intervals. Test failure is annunciated by an integral audible alarm and flashing red LED.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer’s instructions.
B. Install suspended luminaires and exit signs using pendants supported from swivel hangers. Heavy duty jack chain supports may be used where indicated on the fixture schedule. Provide pendant or chain length required to suspend luminaire at indicated height.
C. Support luminaires larger than 2 x 4 foot (600 x 1 200 mm) size independent of ceiling framing.
D. Locate ceiling luminaires as indicated on reflected ceiling plan.
E. Install surface mounted luminaires and exit signs plumb and adjust to align with building lines and with each other. Secure to prohibit movement.
F. The Contractor shall install fixture supports as required. Fixture installations with fixtures supported only by insecure boxes will be rejected. It shall be the Contractor's responsibility to support all lighting fixtures adequately, providing extra steel work for the support of fixtures if required. Any components necessary for mounting fixtures shall be provided by the Contractor. No plastic, composition or wood type anchors shall be used.
G. Install wall mounted luminaires and exit signs at height as scheduled.
H. Install accessories furnished with each luminaire.
I. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within luminaire.

J. Bond fixtures and metal accessories to branch circuit equipment grounding conductor.

3.02 ADJUSTING AND CLEANING

A. Align luminaires and clean lenses and diffusers at completion of Work. Clean paint splatters, dirt, and debris from installed luminaires.
B. Aim and adjust luminaires as indicated on Drawings or as directed by the A/E.
C. Touch up luminaire finish at completion of work.

3.03 INTERFACE WITH OTHER PRODUCTS

A. Interface with air handling accessories furnished and installed under Division 23.

3.04 FIELD QUALITY CONTROL

A. Operate each luminaire after installation and connection. Inspect for proper connection and operation.

3.05 TRAINING

A. See Section 26 05 00 for general training requirements.
B. In addition to the training provided in Section 26 05 00, provide an additional 1 hour of training for each type of lighting fixture provided on the project.

SECTION E: BIDDERS ACKNOWLEDGEMENT

STATE STREET CAPITOL GARAGE RELIGHTING AND ELECTRICAL CONTROLS AND UPGRADE
CONTRACT NO. 7910

Bidder must state a Unit Price and Total Bid for each item. The Total Bid for each item must be the product of quantity, by Unit Price. The Grand Total must be the sum of the Total Bids for the various items. In case of multiplication errors or addition errors, the Grand Total with corrected multiplication and/or addition shall determine the Grand Total bid for each contract. The Unit Price and Total Bid must be entered numerically in the spaces provided. All words and numbers shall be written in ink.

1. The undersigned having familiarized himself/herself with the Contract documents, including Advertisement for Bids, Instructions to Bidders, Form of Proposal, City of Madison Standard Specifications for Public Works Construction - 2017 Edition thereto, Form of Agreement, Form of Bond, and Addenda issued and attached to the plans and specifications on file in the office of the City Engineer, hereby proposes to provide and furnish all the labor, materials, tools, and expendable equipment necessary to perform and complete in a workmanlike manner the specified construction on this project for the City of Madison; all in accordance with the plans and specifications as prepared by the City Engineer, including Addenda to the Contract Nos. _____ through _____ issued thereto, at the prices for said work as contained in this proposal. (Electronic bids submittals shall acknowledge addendum under Section E and shall not acknowledge here)
2. If awarded the Contract, we will initiate action within seven (7) days after notification or in accordance with the date specified in the contract to begin work and will proceed with diligence to bring the project to full completion within the number of work days allowed in the Contract or by the calendar date stated in the Contract.
3. The undersigned Bidder or Contractor certifies that he/she is not a party to any contract, combination in form of trust or otherwise, or conspiracy in restraint of trade or commerce or any other violation of the anti-trust laws of the State of Wisconsin or of the United States, with respect to this bid or contract or otherwise.
4. I hereby certify that I have met the Bid Bond Requirements as specified in Section 102.5. *(IF BID BOND IS USED, IT SHALL BE SUBMITTED ON THE FORMS PROVIDED BY THE CITY. FAILURE TO DO SO MAY RESULT IN REJECTION OF THE BID).*
5. I hereby certify that all statements herein are made on behalf of _____ (name of corporation, partnership, or person submitting bid) a corporation organized and existing under the laws of the State of _____ a partnership consisting of _____; an individual trading as _____; of the City of _____ State of _____; that I have examined and carefully prepared this Proposal, from the plans and specifications and have checked the same in detail before submitting this Proposal; that I have fully authority to make such statements and submit this Proposal in (its, their) behalf; and that the said statements are true and correct.

_____
SIGNATURE

_____
TITLE, IF ANY

Sworn and subscribed to before me this
_____ day of _____, 20_____.

_____
(Notary Public or other officer authorized to administer oaths)
My Commission Expires _____
Bidders shall not add any conditions or qualifying statements to this Proposal.

SECTION F: BEST VALUE CONTRACTING

STATE STREET CAPITOL GARAGE RELIGHTING AND ELECTRICAL CONTROLS AND UPGRADE
CONTRACT NO. 7910

Best Value Contracting

1. The Contractor shall indicate the non-apprenticeable trades used on this contract.

_____

_____

2. Madison General Ordinance (M.G.O.), 33.07(7), does provide for some exemptions from the active apprentice requirement. Apprenticeable trades are those trades considered apprenticeable by the State of Wisconsin. Please check applicable box if you are seeking an exemption.

☐ Contractor has a total skilled workforce of four or less individuals in all apprenticeable trades combined.

☐ No available trade training program; The Contractor has been rejected by the only available trade training program, or there is no trade training program within 90 miles.

☐ Contractor is not using an apprentice due to having a journey worker on layoff status, provided the journey worker was employed by the contractor in the past six months.

☐ First-time Contractor on City of Madison Public Works contract requests a onetime exemption but intends to comply on all future contracts and is taking steps typical of a "good faith" effort.

☐ Contractor has been in business less than one year.

☐ Contractor doesn't have enough journeyman trade workers to qualify for a trade training program in that respective trade.

☐ An exemption is granted in accordance with a time period of a "Documented Depression" as defined by the State of Wisconsin.

3. The Contractor shall indicate on the following section which apprenticeable trades are to be used on this contract. Compliance with active apprenticeship, to the extent required by M.G.O. 33.07(7), shall be satisfied by documentation from an applicable trade training body; an apprenticeship contract with the Wisconsin Department of Workforce Development or a similar agency in another state; or the U.S Department of Labor. This documentation is required prior to the Contractor beginning work on the project site.

☐ The Contractor has reviewed the list and shall not use any apprenticeable trades on this project.

LIST APPRENTICABLE TRADES (check all that apply to your work to be performed on this contract)

- ☐ BRICKLAYER
- ☐ CARPENTER
- ☐ CEMENT MASON / CONCRETE FINISHER
- ☐ CEMENT MASON (HEAVY HIGHWAY)
- ☐ CONSTRUCTION CRAFT LABORER
- ☐ DATA COMMUNICATION INSTALLER
- ☐ ELECTRICIAN
- ☐ ENVIRONMENTAL SYSTEMS TECHNICIAN / HVAC SERVICE TECH/HVAC INSTALL / SERVICE
- ☐ GLAZIER
- ☐ HEAVY EQUIPMENT OPERATOR / OPERATING ENGINEER
- ☐ INSULATION WORKER (HEAT & FROST)
- ☐ IRON WORKER
- ☐ IRON WORKER (ASSEMBLER, METAL BLDGS)
- ☐ PAINTER & DECORATOR
- ☐ PLASTERER
- ☐ PLUMBER
- ☐ RESIDENTIAL ELECTRICIAN
- ☐ ROOFER & WATER PROOFER
- ☐ SHEET METAL WORKER
- ☐ SPRINKLER FITTER
- ☐ STEAMFITTER
- ☐ STEAMFITTER (REFRIGERATION)
- ☐ STEAMFITTER (SERVICE)
- ☐ TAPER & FINISHER
- ☐ TELECOMMUNICATIONS (VOICE, DATA & VIDEO) INSTALLER-TECHNICIAN
- ☐ TILE SETTER

SECTION G: BID BOND

KNOW ALL MEN BY THESE PRESENT, THAT Principal and Surety, as identified below, are held and firmly bound unto the City of Madison, (hereinafter referred to as the "Obligee"), in the sum of five per cent (5%) of the amount of the total bid or bids of the Principal herein accepted by the Obligee, for the payment of which the Principal and the Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

The conditions of this obligation are such that, whereas the Principal has submitted, to the City of Madison a certain bid, including the related alternate, and substitute bids attached hereto and hereby made a part hereof, to enter into a contract in writing for the construction of:

STATE STREET CAPITOL GARAGE RELIGHTING AND ELECTRICAL CONTROLS AND UPGRADE
CONTRACT NO. 7910

1. If said bid is rejected by the Obligee, then this obligation shall be void.

2. If said bid is accepted by the Obligee and the Principal shall execute and deliver a contract in the form specified by the Obligee (properly completed in accordance with said bid) and shall furnish a bond for his/her faithful performance of said contract, and for the payment of all persons performing labor or furnishing materials in connection therewith, and shall in all other respects perform the agreement created by the acceptance of said bid, then this obligation shall be void.

   If said bid is accepted by the Obligee and the Principal shall fail to execute and deliver the contract and the performance and payment bond noted in 2. above executed by this Surety, or other Surety approved by the City of Madison, all within the time specified or any extension thereof, the Principal and Surety agree jointly and severally to forfeit to the Obligee as liquidated damages the sum mentioned above, it being understood that the liability of the Surety for any and all claims hereunder shall in no event exceed the sum of this obligation as stated, and it is further understood that the Principal and Surety reserve the right to recover from the Obligee that portion of the forfeited sum which exceed the actual liquidated damages incurred by the Obligee.

   The Surety, for value received, hereby stipulates and agrees that the obligations of said Surety and its bond shall be in no way impaired or affected by an extension of the time within which the Obligee may accept such bid, and said Surety does hereby waive notice of any such extension.

IN WITNESS WHEREOF, the Principal and the Surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, on the day and year set forth below.

Seal PRINCIPAL

Name of Principal

By Date

Name and Title

Seal SURETY

Name of Surety

By Date

Name and Title

This certifies that I have been duly licensed as an agent for the above company in Wisconsin under National Provider No. _____ for the year _____, and appointed as attorney in fact with authority to execute this bid bond and the payment and performance bond referred to above, which power of attorney has not been revoked.

Date Agent Signature

Address

City, State and Zip Code

Telephone Number

NOTE TO SURETY & PRINCIPAL

The bid submitted which this bond guarantees shall be rejected if the following instrument is not attached to this bond:

Power of Attorney showing that the agent of Surety is currently authorized to execute bonds on behalf of the Surety, and in the amounts referenced above.

Certificate of Biennial Bid Bond

TIME PERIOD - VALID (FROM/TO)
NAME OF SURETY
NAME OF CONTRACTOR
CERTIFICATE HOLDER City of Madison, Wisconsin

This is to certify that a biennial bid bond issued by the above-named Surety is currently on file with the City of Madison.

This certificate is issued as a matter of information and conveys no rights upon the certificate holder and does not amend, extend or alter the coverage of the biennial bid bond.

Cancellation: Should the above policy be cancelled before the expiration date, the issuing Surety will give thirty (30) days written notice to the certificate holder indicated above.

Signature of Authorized Contractor Representative

Date

SECTION H: AGREEMENT

THIS AGREEMENT made this _____ day of _____ in the year Two Thousand and Seventeen between _____ hereinafter called the Contractor, and the City of Madison, Wisconsin, hereinafter called the City.

WHEREAS, the Common Council of the said City of Madison under the provisions of a resolution adopted _____, and by virtue of authority vested in the said Council, has awarded to the Contractor the work of performing certain construction.

NOW, THEREFORE, the Contractor and the City, for the consideration hereinafter named, agree as follows:

1. **Scope of Work.** The Contractor shall, perform the construction, execution and completion of the following listed complete work or improvement in full compliance with the Plans, Specifications, Standard Specifications, Supplemental Specifications, Special Provisions and contract; perform all items of work covered or stipulated in the proposal; perform all altered or extra work; and shall furnish, unless otherwise provided in the contract, all materials, implements, machinery, equipment, tools, supplies, transportation, and labor necessary to the prosecution and completion of the work or improvements:

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2. **Completion Date/Contract Time.** Construction work must begin within seven (7) calendar days after the date appearing on mailed written notice to do so shall have been sent to the Contractor and shall be carried on at a rate so as to secure full completion SEE SPECIAL PROVISIONS, the rate of progress and the time of completion being essential conditions of this Agreement.

3. **Contract Price.** The City shall pay to the Contractor at the times, in the manner and on the conditions set forth in said specifications, the sum of _____($_____) Dollars being the amount bid by such Contractor and which was awarded to him/her as provided by law.

4. **Affirmative Action.** In the performance of the services under this Agreement the Contractor agrees not to discriminate against any employee or applicant because of race, religion, marital status, age, color, sex, disability, national origin or ancestry, income level or source of income, arrest record or conviction record, less than honorable discharge, physical appearance, sexual orientation, gender identity, political beliefs, or student status. The Contractor further agrees not to discriminate against any subcontractor or person who offers to subcontract on this contract because of race, religion, color, age, disability, sex, sexual orientation, gender identity or national origin.

   The Contractor agrees that within thirty (30) days after the effective date of this agreement, the Contractor will provide to the City Affirmative Action Division certain workforce utilization statistics, using a form to be furnished by the City.

   If the contract is still in effect, or if the City enters into a new agreement with the Contractor, within one year after the date on which the form was required to be provided, the Contractor will provide updated workforce information using a second form, also to be furnished by the City. The second form will be submitted to the City Affirmative Action Division no later than one year after the date on which the first form was required to be provided.

   The Contractor further agrees that, for at least twelve (12) months after the effective date of this contract, it will notify the City Affirmative Action Division of each of its job openings at facilities in Dane County for which applicants not already employees of the Contractor are to be considered.

The notice will include a job description, classification, qualifications and application procedures and deadlines. The Contractor agrees to interview and consider candidates referred by the Affirmative Action Division if the candidate meets the minimum qualification standards established by the Contractor, and if the referral is timely. A referral is timely if it is received by the Contractor on or before the date started in the notice.

Articles of Agreement
Article I

The Contractor shall take affirmative action in accordance with the provisions of this contract to insure that applicants are employed, and that employees are treated during employment without regard to race, religion, color, age, marital status, disability, sex, sexual orientation, gender identity or national original and that the employer shall provide harassment free work environment for the realization of the potential of each employee. Such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer, recruitment or recruitment advertising, layoff or termination, rates of pay or other forms of compensation and selection for training including apprenticeship insofar as it is within the control of the Contractor. The Contractor agrees to post in conspicuous places available to employees and applicants notices to be provided by the City setting out the provisions of the nondiscrimination clauses in this contract.

Article II

The Contractor shall in all solicitations or advertisements for employees placed by or on behalf of the Contractors state that all qualified or qualifiable applicants will be employed without regard to race, religion, color, age, marital status, disability, sex, sexual orientation, gender identity or national origin.

Article III

The Contractor shall send to each labor union or representative of workers with which it has a collective bargaining agreement or other contract or understanding a notice to be provided by the City advising the labor union or worker's representative of the Contractor's equal employment opportunity and affirmative action commitments. Such notices shall be posted in conspicuous places available to employees and applicants for employment.

Article V

The Contractor agrees that it will comply with all provisions of the Affirmative Action Ordinance of the City of Madison, including the contract compliance requirements. The Contractor agrees to submit the model affirmative action plan for public works contractors in a form approved by the Affirmative Action Division Manager.

Article VI

The Contractor will maintain records as required by Section 39.02(9)(f) of the Madison General Ordinances and will provide the City Affirmative Action Division with access to such records and to persons who have relevant and necessary information, as provided in Section 39.02(9)(f). The City agrees to keep all such records confidential, except to the extent that public inspection is required by law.

Article VII

In the event of the Contractor's or subcontractor's failure to comply with the Equal Employment Opportunity and Affirmative Action Provisions of this contract or Section 39.03 and 39.02 of the Madison General Ordinances, it is agreed that the City at its option may do any or all of the following:

1. Cancel, terminate or suspend this Contract in whole or in part.

2. Declare the Contractor ineligible for further City contracts until the Affirmative Action requirements are met.

3. Recover on behalf of the City from the prime Contractor 0.5 percent of the contract award price for each week that such party fails or refuses to comply, in the nature of liquidated damages, but not to exceed a total of five percent (5%) of the contract price, or five thousand dollars ($5,000), whichever is less. Under public works contracts, if a subcontractor is in noncompliance, the City may recover liquidated damages from the prime Contractor in the manner described above. The preceding sentence shall not be construed to prohibit a prime Contractor from recovering the amount of such damage from the non-complying subcontractor.

Article VIII

The Contractor shall include the above provisions of this contract in every subcontract so that such provisions will be binding upon each subcontractor. The Contractor shall take such action with respect to any subcontractor as necessary to enforce such provisions, including sanctions provided for noncompliance.

Article IX

The Contractor shall allow the maximum feasible opportunity to small business enterprises to compete for any subcontracts entered into pursuant to this contract. (In federally funded contracts the terms “DBE, MBE and WBE” shall be substituted for the term “small business” in this Article.)

5. Substance Abuse Prevention Program Required. Prior to commencing work on the Contract, the Contractor, and any Subcontractor, shall have in place a written program for the prevention of substance abuse among its employees as required under Wis. Stat. Sec. 103.503.

6. **Contractor Hiring Practices.**

Ban the Box - Arrest and Criminal Background Checks. (Sec. 39.08, MGO)

This provision applies to all prime contractors on contracts entered into on or after January 1, 2016, and all subcontractors who are required to meet prequalification requirements under MGO 33.07(7)(I), MGO as of the first time they seek or renew pre-qualification status on or after January 1, 2016. The City will monitor compliance of subcontractors through the pre-qualification process.

a. **Definitions.** For purposes of this section, “Arrest and Conviction Record” includes, but is not limited to, information indicating that a person has been questioned, apprehended, taken into custody or detention, held for investigation, arrested, charged with, indicted or tried for any felony, misdemeanor or other offense pursuant to any law enforcement or military authority.

“Conviction record” includes, but is not limited to, information indicating that a person has been convicted of a felony, misdemeanor or other offense, placed on probation, fined, imprisoned or paroled pursuant to any law enforcement or military authority.

“Background Check” means the process of checking an applicant’s arrest and conviction record, through any means.

b. **Requirements.** For the duration of this Contract, the Contractor shall:

1. Remove from all job application forms any questions, check boxes, or other inquiries regarding an applicant's arrest and conviction record, as defined herein.

2. Refrain from asking an applicant in any manner about their arrest or conviction record until after conditional offer of employment is made to the applicant in question.

3. Refrain from conducting a formal or informal background check or making any other inquiry using any privately or publicly available means of obtaining the arrest or conviction record of an applicant until after a conditional offer of employment is made to the applicant in question.

4. Make information about this ordinance available to applicants and existing employees, and post notices in prominent locations at the workplace with information about the ordinance and complaint procedure using language provided by the City.

5. Comply with all other provisions of Sec. 39.08, MGO.

c. Exemptions: This section shall not apply when:

1. Hiring for a position where certain convictions or violations are a bar to employment in that position under applicable law, or

2. Hiring a position for which information about criminal or arrest record, or a background check is required by law to be performed at a time or in a manner that would otherwise be prohibited by this ordinance, including a licensed trade or profession where the licensing authority explicitly authorizes or requires the inquiry in question.

To be exempt, Contractor has the burden of demonstrating that there is an applicable law or regulation that requires the hiring practice in question, if so, the contractor is exempt from all of the requirements of this ordinance for the position(s) in question.

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IN WITNESS WHEREOF, the Contractor has hereunto set his/her hand and seal and the City has caused these presents to be sealed with its corporate seal and to be subscribed by its Mayor and City Clerk the day and year first above written.

Countersigned:

Company Name

Witness Date

President Date

Witness Date

Secretary Date

CITY OF MADISON, WISCONSIN

Provisions have been made to pay the liability that will accrue under this contract.

Approved as to form:

Finance Director

City Attorney

Signed this _____ day of _____, 20_____

Witness

Mayor Date

Witness

City Clerk Date

SECTION I: PAYMENT AND PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS, that we _____
as principal, and
_____
Company of _____as surety, are held and firmly bound unto the City of Madison, Wisconsin, in the sum of _____($_____) Dollars, lawful money of the United States, for the payment of which sum to the City of Madison, we hereby bind ourselves and our respective executors and administrators firmly by these presents.

The condition of this Bond is such that if the above bounden shall on his/her part fully and faithfully perform all of the terms of the Contract entered into between him/herself and the City of Madison for the construction of:

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in Madison, Wisconsin, and shall pay all claims for labor performed and material furnished in the prosecution of said work, and save the City harmless from all claims for damages because of negligence in the prosecution of said work, and shall save harmless the said City from all claims for compensation (under Chapter 102, Wisconsin Statutes) of employees and employees of subcontractor, then this Bond is to be void, otherwise of full force, virtue and effect.

Signed and sealed this _____day of _____

Countersigned:

_____
Company Name (Principal)

_____ _____
Witness President Seal

_____
Secretary

Approved as to form:

_____
Surety Seal
☐ Salary Employee ☐ Commission

_____ By _____
City Attorney Attorney-in-Fact

This certifies that I have been duly licensed as an agent for the above company in Wisconsin under National Producer Number _____ for the year _____, and appointed as attorney-in-fact with authority to execute this payment and performance bond which power of attorney has not been revoked.

_____ _____
Date Agent Signature