REQUEST FOR PROPOSALS
FOR

RFP #2425-16

TROY SCHOOL DISTRICT TRANSPORTATION CENTER SITE LIGHTING

TROY SCHOOL DISTRICT Attention:
Jennifer Vente
Purchasing Coordinator
1140 Rankin, Troy, Michigan 48083
Telephone: (248) 823-4078
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Email: purchasingoffice@troy.k12.mi.us

I. OVERVIEW

1.1. PURPOSE

The purpose of the Request For Proposals ("RFP") is for Troy School District (the "School District") to obtain proposals from qualified contractors for RFP Number 2425- 16 – Troy School District Transportation Center Site Lighting. (the "Work").

1.2. SELECTION TIMELINE

NOTE: Throughout the remainder of this RFP, a prospective contractor is referred to as the "Contractor."

The School District's anticipated timeline for its selection process is:

Issuance of this RFP	April 16, 2025
There is no Pre-Proposal Meeting	
Deadline for written Requests For Clarifications	4 pm local time, April 24, 2025
DUE DATE FOR PROPOSALS	**1:00 p.m. Local Time, April 30, 2025**
School District's Consideration of the Contract	May 20, 2025
Commencement of Work	July 1, 2025
Completion of Work	August 15, 2025

PLEASE NOTE: The School District reserves the right, in its sole and absolute discretion, to make modifications to the above selection timeline as it determines to be in its best interest.

II. SUBMISSION OF PROPOSALS

2.1. PROPOSAL SUBMISSION DEADLINE AND REQUIREMENTS

The Due Date for receipt of Proposals is:
Wednesday, April 30, 2025 at 1:00 p.m Local Time (the "Due Date")

2.1.1. Sealed proposals should be submitted through Buildingconnect.com with the following link: https://app.buildingconnected.com/public/5cc9d7f637c1a90018cb55dc No physical bids will be accepted in person or via delivery service.

2.1.2. Late Proposals: Each Contractor is responsible for submission of its Proposal. Proposals or Proposal revisions received after the Due Date will not be accepted or considered. The School District is not liable for any delivery or postal delays.

2.1.3. Returned Proposals: All Proposals received after the Due Date will be unopened and made available to the respective Contractor for pick-up, at its sole cost and expense.

2.1.4. Signed Original Proposal: Each Proposal must be signed by an authorized member of the Contractor's firm. This member should be the highest-ranking officer at the local level. NO ORAL, FAX, or E-MAILED Proposals will be accepted. Each Proposal must be submitted on the Proposal Forms attached to this RFP.

2.1.5. **Opening of Proposals:** At the Due Date stated above and with the following virtual link: meet.google.com/ywk-eueo-rcr or phone number (413) 497-4022 PIN 967 244 869#, all submitted Proposals shall be publicly opened and read aloud. Any interested parties may attend. No immediate decision will be rendered.

2.1.6. **E-Mail Clarifications:** The School District intends to communicate with Contractors via e-mail (e.g., RFP clarifications and addenda). Except for the delivery of the Proposal itself, references in this RFP to "written" form of communications include e-mail.

2.1.7. **Additional Requests For Clarification:** Prospective Contractors may request that the School District clarify information contained in this RFP. All such requests must be made in writing via email. The School District will attempt to provide a written response to all written Requests For Clarification within five (5) business days after the receipt of such request. The School District will not respond to any Request For Clarification received after **4 p.m. on April 23, 2025**. Requests For Clarification and inquiries must be made via e-mail. All Requests For Clarification must be directed to Mark Paulus at lecoleplanners@gmail.com. (Subject Line: _____RFP Request For Clarification). No response will be made to any oral questions. All questions and answers will be posted on the School District's website. It is each Contractor's responsibility to check the School District's website prior to the RFP Due Date to ensure that it has received all of the information, including, but not limited to, all Addenda to this RFP.

2.1.8. **Restrictions On Communication:** From the issue date of this RFP until a Contractor is selected and the selection announced, a prospective Contractor shall not communicate about the subject of this RFP or a Contractor's Proposal with the School District, its Board of Education, or any individual member, administrators, faculty, staff, students, employees, or its Construction Manager, if any, except for additional Requests For Clarification in accordance with Paragraph 2.1.7 above, or as otherwise required by applicable law.

2.1.9. **Addenda to the RFP:** If it becomes necessary to revise any part of this RFP, notice of the revision will be e-mailed to all parties that requested a copy of this RFP. All addenda will be issued through the School District's website and all addenda shall become a part of this RFP. Each Contractor must in its Proposal, to avoid any miscommunication, acknowledge all addenda which it has received, but the failure of a Contractor to receive, or acknowledge receipt of, any addendum shall not relieve the Contractor of the responsibility for complying with the terms thereof.

2.1.10. **RFP/Proposal Information Controlling:** The School District intends that all Contractors shall have equal access to information relative to this RFP, and that this RFP contains adequate information. No information communicated, either verbally or in writing, to or from a Contractor shall be effective unless confirmed by written communication contained in an addendum to this RFP, a Request For Clarification or other written response thereto, or in the Proposal.

2.1.11. Finality of Decision: Any decision made by the School District, including the Contractor selection, shall be final.

2.1.12. Reservation of Rights: The School District reserves the right, in its sole and absolute discretion (for this provision and all other provisions contained in this RFP), to accept or reject, in whole or in part, any or all Proposals with or without cause. The School District further reserves the right to waive any irregularity or informality in the RFP process or any Proposal, and the right to award the Contract to other than the Contractor(s) submitting the best financial Proposal (low bidder). The School District reserves the right to request additional information from any or all Contractors. The School District reserves the right to select one or more Contractors to perform the Work on behalf of the School District. In the event the Contractor's Proposal is accepted by the School District and the Contractor asserts exceptions, special considerations or conditions after acceptance, the School District, in its sole and absolute discretion, reserves the right to reject the Proposal and award the Contract to another contractor.

2.1.13. Release of Claims: Each Contractor by submitting its Proposal releases the School District from any and all claims arising out of, and related to, this RFP process and selection of a Contractor.

2.1.14. Contractor Bears Proposal Costs: A recipient of this RFP is responsible for any and all costs and liabilities incurred by it or others acting on its behalf in preparing or submitting a Proposal, or otherwise responding to this RFP, or any negotiations incidental to its Proposal or this RFP.

2.1.15. Irrevocability of Proposals: All Proposals submitted shall not be withdrawn and shall be irrevocable for a minimum period of ninety (90) calendar days following the Due Date for receipt of Proposals set forth above.

2.1.16. Collusive Bidding: The Contractor certifies that its Proposal is made without any previous understanding, agreement, or connection with any person, firm or corporation making a Proposal for the same Work and is in all respects fair, without outside control, collusion, fraud, or otherwise illegal action.

2.2. PROPOSAL REQUIREMENTS AND FORMAT

This outlines the information that must be provided by each Contractor and the required format for its Proposal. Any Proposal not providing the required information, or not conforming to the format specified, may be disqualified on that basis. Please also refer to Sections 2.1, 4.1, and 4.2 of this RFP for additional Proposal requirements. Attached to this RFP is a form of contract under which the Work requested under this RFP shall be provided by the successful Contractor (the "Contract" and referred to throughout the Contract as the "Agreement") (See also Section 3.1 of this RFP). The Contract contains many details relative to the Work requested by the School District, the terms and conditions under which the Work shall be provided by the Contractor and should be reviewed carefully by each Contractor prior to submitting a Proposal.

Any exceptions to the terms and conditions contained in this RFP or the form of Contract attached to this RFP, or any other special considerations or conditions requested or required by the Contractor MUST be specifically enumerated by the Contractor and be submitted as part of its Proposal, together with an explanation as to the reason such terms and conditions of the RFP or form of Contract cannot be met by, or, in the Contractor's opinion, are not applicable to, the Contractor. The Contractor shall be required & expected to meet the specifications and requirements as set forth in this RFP and the form of Contract in their entirety, except to the extent exceptions or special considerations or conditions are expressly set forth in the Contractor's Proposal & those exceptions or special considerations or conditions are expressly accepted by the School District. All Pricing factors must be clearly indicated in the Proposal Forms provided as part of the Contractor's Proposal.

Each Proposal must include, at a minimum, the following:

2.2.1 A detailed list setting forth any exceptions to this RFP and/or the Contract, or other special considerations or conditions of the Contractor, including explanations of such exceptions or the reason such terms and conditions of the RFP or form of Contract cannot be met by, or on the Contractor's opinion are not applicable to, the Contractor.

2.2.2 References – Each Proposal must include detailed evidence that the Contractor is currently providing Work for other K-12 public school districts or educational institutions. The Contractor must provide this information, including contact names, addresses, phone numbers, and type and scope of work provided. This should include school districts of similar size and scope as the School District.

2.2.3 Evidence of the Contractor's ability to provide adequate insurance coverages as required by this RFP and the Contract to protect the interests of the Contractor and the School District.

2.2.4 Demonstrate that the Contractor understands and will comply with all regulatory laws, codes, and requirements of any Local, State, and Federal law that apply to the requirements and obligations under this RFP and the Contract.

2.2.5 A completed Proposal Pricing Form provided as **ATTACHMENT A**.

2.2.6 A completed Familial Disclosure Affidavit provided as **ATTACHMENT B**.

2.2.7 A completed Iran Economics Sanctions Act Affidavit of Compliance provided as **ATTACHMENT C**.

2.3. SPECIFICATIONS

#	Description	Pages
260500	Common Work Results for Electrical	3
260519	Low-Votage Electrical Power Conductors and Cables	4
260526	Grounding and Bonding for Electrical Systems	6
260529	Hangars and Supports for Electrical Systems	4
260533	Raceways and Boxes for Electrical Systems	7
260544	Sleeves and Sleeve Seals for Electrical Raceways and Cabling	3
260553	Identification for Electrical Systems	9
262813	Fuses	2
262816	Enclosed Switches and Circuit Breakers	9

2.4. DRAWINGS

#	Description	Date
E-001	General Electrical Information	04/16/25
ES101	Electrical Site Plan	04/16/25

III. CONTRACTUAL OBLIGATIONS

3.1. FORM OF CONTRACT

3.1.1. Form of Contract: This is a Request For Proposals only. Proposals will be treated as offers to enter into the Contract (as defined above) with the School District. The School District and successful Contractor shall memorialize their contractual relationship and obligations using the form of Contract attached hereto as **ATTACHMENT D**. The Contract contains many details relative to the Work required under this RFP, as well as the terms and conditions under which the Work shall be provided by the successful Contractor. The Contract should be reviewed carefully by each Contractor prior to submitting a Proposal. Any exceptions to the terms and conditions contained in the Contract, or any other special considerations or conditions requested or required by the Contractor relative to this RFP or the form of Contract shall be expressly/specifically enumerated by the Contractor and be submitted as part of its Proposal, together with an explanation as to the reason such terms and conditions cannot be met by, or, in the Contractor's opinion are not applicable to, the Contractor, provided however, that exceptions or special conditions of the Contractor will not be binding upon the School District unless those exceptions or special conditions are expressly accepted by the School District, and incorporated into the final Contract. Following the selection of the successful Contractor by the School District, the Contract will be finalized by the parties. The below sections contain information relative to selected provisions of the Contract and/or the expectations of the School District relative to the provision of the Work.

3.1.1.1. Familial Disclosure Affidavit: All Contractors must provide familial disclosure in compliance with MCL 380.1267 and attach this information to its Proposal. The Proposal must be accompanied by a sworn and notarized statement disclosing any familial relationship that exists between the owner and/or any employee of the Contractor and any member of the School District's Board of Education or the School District's Superintendent. The School District will not accept a Proposal that does not include this sworn and notarized disclosure statement. The Familial Disclosure Affidavit is attached to this RFP as **ATTACHMENT B**.

3.1.1.2. Iran Economic Sanctions Act: In accordance with Michigan Public Act No. 517 of 2012, all Proposals must be accompanied by a sworn and notarized statement certifying that the Contractor is not an Iran Linked Business. The School District will not accept a Proposal that does not include this sworn and notarized statement. The Affidavit of Compliance – Iran Economic Sanctions Act is attached to this RFP as **ATTACHMENT C**.

3.1.1.3. Bid Security: Contractors must submit with its Proposal bid security in the form of a Bid Bond issued by a qualified surety or certified check/money order in an amount of five percent (5%) of the Proposal ("Bid Security"). Failure to include this Bid Security with the Contractor's Proposal will result in the rejection of your Proposal. If a Bid Bond is posted by a Contractor, it shall be from a Treasury Surety licensed to do business in the State of Michigan, and the attorney-in- fact who executes the Bid Bond on behalf of the Contractor shall attach a certified, current copy of its power of attorney. In the event a certified check/money order is submitted, it shall be made payable to "Troy School District." The School District shall not be liable for any interest earned thereon. The Bid Security shall be forfeited as liquidated damages, and not as a penalty, if the Contractor withdraws its Proposal after the Due Date for submission of Proposals or, upon acceptance of its Proposal by the School District, the Contractor fails to execute the form of Contract acceptable to the School District, substantially evidencing and incorporating this RFP and its Proposal and fails to provide the required Performance Bond and/or Payment Bond, if any, and the required insurance certificates, within fifteen (15) days of an award of a Contract to the Contractor. Bid Bonds shall be duly executed by the Contractor, as principal and by a surety that is properly licensed and authorized to do business in the state in which the Work is to be performed. All sureties providing bonds for this Project must be listed in the latest version of the Department of Treasury's Circular 570, entitled "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies", with the bond amount less than or equal to the underwriting limitation, and/or have an A.M. best rating of A- or better. Bid Security shall be returned to all non-successful Contractors within a reasonable time after the award of a Contract and execution of a Contract by the successful Contractor. The bid bond can be included with the proposal as submitted through Buildingconnected.com. If the bid security is a certified check/money order, this must be delivered to the following address: 1140 Rankin Street, Troy, MI 48083 prior to the bid due date and time.

3.1.1.4. Performance Bond: Successful Contractors whose Proposals are $50,000 or more will be required to furnish Performance and Payment Bonds, in a form satisfactory to the School District, in the amount of 100% of its Proposal by a Treasury-listed Surety licensed to do business in the State of Michigan, and the attorney-in-fact who executed the Performance and Payment Bonds on behalf of the Contractor shall attach a certified, current copy of its power of attorney. The cost of the Bonds shall be included in each Proposal.

3.1.1.5. **Governing Law**: The Contract shall be governed by and construed in accordance with the laws of the State of Michigan. The parties hereby agree to the exclusive jurisdiction and venue of courts sitting in Oakland County, Michigan.

3.1.1.6. **General Indemnification**: Contractor shall indemnify, defend and hold harmless the School District, its Board of Education, its Board Members, in their official and individual capacities, its administrators, employees, agents, contractors, successors and assignees, from and against any and all claims, counter claims, suits, debts, demands, actions, judgments, liens, costs, expenses, damages, injuries and liabilities, including actual attorney's fees and actual expert witness fees arising out of or in connection with Contractor's performance of the Contract and/or from Contractor's violation of any of the terms of the Contract, including, but not limited to: (i) the negligent acts or willful misconduct of the Contractor, its officers, directors, employees, successors, assignees, contractors and agents; (ii) any breach of the terms of the Contract by the Contractor, its officers, directors, employees, successors, assignees, contractors and agents; (iii) any violation or breach of any applicable Federal, State or local law, rule, regulation, ordinance, policy and/or licensing and permitting requirements applicable to the Contract; or (iv) any breach of any representation or warranty by the Contractor, its officers, directors, employees, successors, assignees, contractors and agents under the Contract. The Contractor shall notify the School District by certified mail, return receipt requested, immediately upon actual knowledge of any claim, suit, action, or proceeding for which Troy School District may be entitled to indemnification under the Contract. This paragraph shall survive the expiration or earlier termination of the Contract.

3.1.1.7. **Compliance With Laws**: Contractor shall comply with any and all applicable federal, state, and local laws, rules, ordinances, policies, and regulations, including any licensing and permitting requirements, under the Contract. Contractor, including its personnel, employees, contractors, consultants, and agents shall be responsible for knowing the School District's policies concerning appropriate behavior of persons in School District facilities and, on School District properties, including for example, the prohibitions of sexual harassment and smoking, and shall comply with all such policies. Contractor represents and warrants to the School District that it shall at all times be in compliance with any and all applicable federal and state laws, rules, ordinances, policies and regulations, and licensing and permitting requirement applicable to the Contract. Contractor shall indemnify, defend, and hold School District harmless from any liability from its failure to so comply.

3.1.1.8. **Right to Terminate on Breach**: Each party shall have, in addition to all other remedies available to it, the right to terminate the Contract immediately upon written notice to the other party that the other party has committed a material breach of any of its obligations herein and such material party has committed a material breach of any of its obligations herein and such material breach shall not have been cured or corrected within ten (10) days following written notice of the same. Furthermore, if the School District must regularly request that the Contractor cure breaches of the Contract, such circumstances shall be grounds for termination of the Contract for cause, even if each breach on its own would not be material.

i. **Events Upon Termination:** Upon termination of the Contract by ither party for Breach or default of the other party, each party shall be entitled to exercise any other right, remedy or privilege which may be available to it under applicable law or proceed by appropriate court action to enforce the terms of the Contract or to recover damages for the breach of the Contract. Upon termination of the Contract, the Contractor shall immediately provide the School District with any and all drawings and documentation regarding the Work. In the event of termination, title to all supplies, materials, equipment or products purchased by the Contractor for integration into the Work shall pass to the School District, and Contractor shall deliver possession of said supplies, materials, equipment or products to the School District at a location to be designated by the School District.

3.1.1.9. **Pricing**: Prices quoted are to be F.O.B. to Troy School District. All purchases Prices shall be net; including transportation, insurance and delivery charges fully prepaid by the successful Contractor to destinations indicated in the Proposal.

3.1.1.10. **Taxes**: This project is NOT exempt from taxes.

3.1.1.11. **Proposal Withdrawal**: Contractors may withdraw its Proposals any time before the Due Date. Proposals may not be withdrawn for at least 90 days after the Due Date.

3.1.1.12. **Competition**: The name of a model, manufacturer, or brand in this RFP shall not be considered as exclusive of other brands. Brands and models specified in this RFP are preferred. The School District expects all supplies, materials, equipment, or products bid by a Contractor to meet or exceed the Specifications set forth in this RFP. Further, it is the School District's intent that this RFP permit competition. Accordingly, the use of any patent, proprietary name, or manufacturer's name is for demonstrative purposes only and is not intended to curtail competition. Whenever any supplies, material,

equipment, or products requested in this RFP are specified by patent, proprietary name or by the name of the manufacturer, unless stated differently, such specification shall be considered as if followed by the words "or comparable equivalent," whether or not such words appear. The School District in its sole and absolute discretion, shall have the right to determine if the proposed equivalent products/brands submitted by the Contractor meet the Specifications contained in this RFP and possess equivalent and/or better qualities. It is the Contractor's responsibility to notify the School District in writing if any Specifications or suggested comparable equivalent products/brands require clarification by the School District prior to the Due Date for Proposals. Any and all deviations from Specifications must be noted on the Proposal Form.

IV. PROPOSAL

4.1. PROPOSAL FORMS

Each Contractor shall submit its Proposal using the Proposal Pricing Form attached hereto as **ATTACHMENT A**, along with any other information required by this RFP or deem necessary and appropriate by the Contractor for evaluation of its Proposal.

4.2. PROPOSAL CHECKLIST

In addition to the Proposal Pricing Form and any information required under Section 4.1 above, please attach copies of the following documents to your Proposal:

4.2.1. Proposal Pricing Form and detailed list setting forth any exceptions to the RFP and/or Contract, or other special considerations or conditions of the Contractor, including explanations of such exceptions or the reason such terms and conditions of the RFP or form of Contract cannot be met by, or are not applicable to, the Contractor.

4.2.2. List of Contractor's References (K-12 references preferred) with which Contractor has contracted to perform Work or services similar to the Work described herein. The Contractor must provide this information, including contact names, addresses, phone numbers, and type and scope of Work/services provided.

4.2.3. Contractor's Verification of addenda to the RFP, if any.

4.2.4. Evidence of the Contractor's ability to provide adequate insurance coverages as required by this RFP and the Contract to protect the interests of the Contractor and the School District.

4.2.5. A completed Familial Disclosure Affidavit, which is attached hereto as **ATTACHMENT B**.

4.2.6. A completed Iran Sanctions Act Affidavit of Compliance, which is attached hereto as **ATTACHMENT C**.

ATTACHMENT A

PROPOSAL PRICING FORM

CONTRACTOR INFORMATION:

CONTRACTOR'S NAME: _____

CONTACT PERSON: _____

ADDRESS: _____

CITY/STATE: _____

TELEPHONE NUMBER: _____

FAX NUMBER: _____

E-MAIL ADDRESS: _____

A. CONTRACTOR PRICING

BASE BID

Base Bid Amount:	$	_____
Bond Amount:	$	_____
Allowance Amount:	$	20,000.00
Total:	$	_____

B. ACKNOWLEDGEMENT OF ADDENDA TO RFP

The Contractor acknowledges receipt of the following addenda:

Addendum Number _____ dated _____

Addendum Number _____ dated _____

Addendum Number _____ dated _____

The undersigned understands that the School District reserves the right to accept or reject in whole or in part any and all Proposals, to waive informalities and irregularities therein, and to award the Contract to other than the Contractor(s) submitting the best financial Proposal (low bidder) and to award the Contract to one (1) or more Contractors in the School District's sole and absolute discretion.

If award is made to our firm based upon our Proposal, we agree to enter into the attached form of Contract with the School District to furnish the Work in strict accordance with this Request For Proposal, the Contract, and our Proposal.

My signature certifies that the Proposal as submitted complies with all terms and conditions as set forth in this Request For Proposal and the Contract, unless specifically enumerated as an exception as part of our Proposal.

I hereby certify that I am authorized to sign as a Representative for the firm.

CONTRACTOR HEREBY SUBMITS THIS PROPOSAL PRICING FORM IN ACCORDANCE WITH THE TERMS AND CONDITIONS OF THE RFP.

Name of Contractor:_____

_____
(Signature/Principal)

_____
(Name Printed)

Date: _____

ATTACHMENT B

FAMILIAL DISCLOSURE AFFIDAVIT

The undersigned, the owner or authorized officer of _____ (the "Contractor"), pursuant to the familial disclosure requirement provided in the Troy School District's (the "School District") Request For Proposals For RFP Number 2425-16 – Troy School District Transportation Center Site Lighting, hereby represents and warrants that, except as provided below, no familial relationships exist between the owner or any employee of the Contractor, and any member of the Board of Education of the School District or the Superintendent of the School District. A list of the School District's Board of Education Members and its Superintendent may be found at http://www.troy.k12.mi.us

List any Familial Relationships:

CONTRACTOR:

_____

By: _____

Its: _____

STATE OF _____)
)ss.
COUNTY OF _____)

This instrument was acknowledged before me on the _____day of _____, 20__, by _____.

_____

, Notary Public

_____County, _____

My Commission Expires:_____

Acting in the County of :_____

ATTACHMENT C

IRAN ECONOMIC SANCTIONS ACT AFFIDAVIT OF COMPLIANCE
Michigan Public Act No. 517 of 2012

The undersigned, the owner or authorized officer of the below-named contractor ("Contractor"), pursuant to the compliance certification requirement provided in the Troy School District's (the "School District") Request For Proposals For RFP Number 2425-16 Troy School District Transportation Center Site Lighting (the "RFP"), hereby certifies, represents and warrants that the Contractor (including its officers, directors, and employees) is not an "Iran linked business" within the meaning of the Iran Economic Sanctions Act, Michigan Public Act No. 517 of 2012 (the "Act"), and that in the event Contractor is awarded a contract as a result of the aforementioned RFP, the Contractor will not become an "Iran linked business" at any time during the course of performing any Work under the Contract.

The Contractor further acknowledges that any person who is found to have submitted a false certification is responsible for a civil penalty of not more than $250,000.00 or 2 times the amount of the contract or proposed contract for which the false certification was made, whichever is greater, the cost of the School District's investigation, and reasonable attorney fees, in addition to the fine. Moreover, any person who submitted a false certification shall be ineligible to bid on a request for proposal for three (3) years from the date that it is determined that the person has submitted the false certification.

CONTRACTOR:

_____
Name of Contractor

By: _____

Its: _____

Date: _____

STATE OF _____)
)ss.
COUNTY OF _____)

This instrument was acknowledged before me on the _____day of _____, 20__, by _____.

_____
, Notary Public

_____County, _____

My Commission Expires:_____

Acting in the County of _____

ATTACHMENT D

CONTRACT

CONTRACT

I. This Contract ("Contract") is made on _____, 20__ ("Effective Date"), between **TROY SCHOOL DISTRICT**, a Michigan public school district ("School District"), whose address is 4400 Livernois Road, Troy, Michigan 48098 and _____, a _____("Contractor"), whose address is _____. The School District and Contractor may each be referred to herein as a "Party" and collectively as the "Parties."

RECITALS

A. The School District issued a Request For Proposal For _____dated _____, as amended by [INSERT ADDENDA BY NAME AND DATE HERE] (collectively the "RFP"), the purpose of which was to solicit proposals from qualified contractors to furnish to the School District all of the materials and labor required to _____identified in the RFP in accordance with the terms and conditions contained in the RFP and the Specifications attached thereto (the "Work").

B. In response to the RFP, the Contractor submitted to the School District a Proposal dated _____, to perform the Work contemplated by the RFP.

C. The Parties have, in accordance with the provisions of the RFP, conducted negotiations concerning the Contractor's Proposal to the RFP. The Contractor's Proposal together with written clarifications of the Parties, if any, are attached hereto, incorporated by reference, and marked as **Exhibit A** (collectively referred to as the "Proposal").

D. Pursuant to the terms of the RFP, the Contractor is required to enter into a written contract in accordance with the School District's written acceptance of its Proposal.

E. The Parties agree that certain terms, conditions, and provisions of the RFP and the Proposal must be further clarified and that certain additional terms and conditions need to be expressly set forth by way of this Contract.

NOW THEREFORE, in consideration of the foregoing and the mutual covenants set forth herein, the Parties agree as follows:

1. RESTATEMENT CONSTITUTES THE CONTRACT

(a) Incorporation By Reference. The object of this Contract is to formalize in one document the complete agreement between the Parties, and to do so by specifically incorporating by reference into this Contract the RFP, the Proposal, and other related documents, and by including certain additional necessary or appropriate Contract terms, particularly where the Contract terms agreed to by the Parties during the RFP negotiation process do not correspond with the RFP and/or the Proposal.

(b) Order of Precedence. The Contract Documents, which are all incorporated herein by reference, include the following:

This Contract, including all Attachments hereto;
The RFP, including the Specifications attached thereto; and
Contractor's Proposal.

To the extent that the terms and conditions of the Contract Documents are in conflict, the terms and conditions shall be interpreted in the above-referenced order from 1 to 3. However, the Parties also agree that where there is not a conflict between any of the terms and conditions contained in the above-referenced Contract Documents, all of the Contract Documents shall be binding upon both Parties, except to the extent the exceptions contained in the Contractor's Proposal are not expressly accepted by the School District in writing and incorporated into this Contract.

2. TERM AND TERMINATION

(a) This Agreement shall commence as of the Effective Date and all Work hereunder shall be completed no later than _____and shall be in compliance with the Project Schedule attached hereto as **Exhibit B**.

(b) Each Party shall have, in addition to all other remedies available to it, the right to terminate this Contract upon written notice to the other Party that the other Party has committed a material breach of any of its obligations herein and such material breach shall not have been cured or corrected within ten (10) days following written notice of the same. Furthermore, in addition to the rights of the School District under this Paragraph if the School District must regularly request that the Contractor to cure breaches of this Contract, such circumstances shall be grounds for termination of this Contract for cause, even if each breach on its own would not be material. Upon termination of this Contract by the School District for breach or default of the Contractor pursuant to this Paragraph, the School District shall be entitled to exercise any other right, remedy, or privilege which may be available to it under applicable law or proceed by appropriate court action to enforce the terms of the Contract or to recover damages for the breach of this Contract. If this Contract is terminated in accordance with any of the provisions contained herein, all rights of the Contractor under this Contract shall cease. Regardless of the basis for termination, the School District shall neither be liable to, nor obligated to pay, the Contractor for any incidental or consequential damages or lost profits, or costs incurred for Work not actually performed.

(c) Notwithstanding anything contained herein to the contrary, the School District may terminate this Contract at any time and for any reason or no reason at all upon written notice to the Contractor.

3. WARRANTY

The Contractor warrants and represents that its Work, will be in accordance with all applicable federal, state, and local laws and regulations for a minimum of two (2) years from completion of the Work.

4. INSURANCE

The Contractor shall maintain, at its expense, during the term of this Contract the following insurance:

(a) Worker's Compensation Insurance with statutory limits and Employer's Liability Insurance with a minimum limit of $1,000,000 each occurrence.

(b) Comprehensive General Liability Insurance with a minimum combined single limit of $1,000,000 per occurrence and $3,000,000 in the aggregate, in the same amount made for bodily injury and property damage. The policy is to include products and completed operations, cross liability, broad form property damage, independent bidders, and contractual liability coverage. The policy shall be endorsed to provide thirty (30) days written notice to the School District of any material change of coverage, cancellation, or non-renewal of coverage.

(c) If Subcontractors are likely to be used, the Comprehensive General Liability policy shall include coverage for independent contractors.

(d) Automobile Liability insurance covering all owned, hired, and non-owned vehicles with personal protection insurance and property insurance to comply with the provisions of the Michigan no-fault Insurance Law, including residual liability insurance with a minimum combined single limit of $1,000,000 each occurrence of bodily injury and property damage.

(e) All insurance policies shall be issued by companies licensed to do business in the State of Michigan. The companies issuing the policies must be domestic (on-shore) companies and have an A-rating by AM Best.

(f) The Contractor shall be responsible for payment of all deductibles contained in any insurance policy required in this Contract.

(g) Other requirements: Evidence of your insurance coverages, required herein, is to be provided to the School District and must indicate:

1. A Best's rating for each of your insurance carrier at A-VII or better,
2. "Troy School District" is endorsed as an additional insured on the General Liability policies.
3. All consultants must be listed as additional insured.

5. CONTRACTOR'S COMPENSATION

Based upon the School District's RFP and the Contractor's Proposal, the School District shall pay the Contractor for its Work as follows:

_____

_____

6. MISCELLANEOUS

(a) Notices. All notices hereunder shall be in writing and shall be effective when sent by facsimile or electronic mail (provided, however, that any notice which could materially affect the rights of either Party shall also be sent by courier as provided herein) or a nationally known courier service such as DHL or Federal Express, addressed to the addresses written below, or to such other address as either Party may have last designated in writing in the manner herein provided. Such notice shall be deemed given when received, but in any event no later than four (4) days after sent by the internationally known courier. All notices shall be sent to the following address:

If to the Contractor:

_____

_____

_____

Attention: _____

Copy To: _____

_____

_____

_____

If to the School District: Troy School District
4400 Livernois Road
Troy, Michigan 48098

(b) Assignment. This Contract and any other interest herein may not be assigned or transferred, in whole or in part, by either Party without the prior written consent of the other Party, which consent shall not be unreasonably withheld, and any assignment or transfer without such consent shall be null and void. This Contract shall be binding upon the successors, and subject to the above, assigns of either Party.

(c) Severability. If any provision of this Contract is held invalid or unenforceable, the remainder of this Contract shall nevertheless remain in full force and effect. If any provision is held invalid or unenforceable with respect to particular circumstances, it shall nevertheless remain in full force and effect in all other circumstances.

(d) Independent Contractor; No Joint Venture. It is expressly agreed that Contractor is acting hereunder as an independent contractor and under no circumstances shall any of the employees of either Party be deemed the employees of the other for any purpose. This Contract shall not be construed as authority for either Party to act for the other Party in any agency or other capacity or to make commitments of any kind for the account of, or on behalf of, the other Party, except to the extent, and for the purposes, expressly provided for and set forth herein, and no partnership or joint venture is created hereby.

(e) Modifications. No provision of this Contract or any Exhibit hereto may be modified without the prior written consent of both Parties.

(f) Captions. The captions used in this Contract are for convenience only and shall not affect in any way the meaning or interpretation of the provisions of this Contract.

(g) Governing Law. This Contract shall be construed in accordance with, and its performance governed by, the laws of the State of Michigan. The Parties hereby agree to the exclusive jurisdiction and venue of courts sitting in Oakland County, Michigan.

(h) Taxes. Contractor is responsible for sales taxes and any other applicable taxes related to the Work provided under this Contract.

(i) Entire Agreement. This Contract and all Exhibits and documents incorporated herein by reference constitute the entire agreement between the Parties, and supersedes all previous agreements, whether written or oral.

IN WITNESS WHEREOF, the undersigned have caused this Contract to be duly executed on the dates indicated below.

CONTRACTOR:	**SCHOOL DISTRICT:**
By: _____	By: _____
Its: _____	Its: _____
Date: _____	Date: _____

EXHIBIT A

WRITTEN CLARIFICATIONS

EXHIBIT B

PROJECT SCHEDULE

SPECIFICATIONS

TROY SCHOOL DISTRICT

TRANSPORTATION SITE LIGHTING

TROY, MICHIGAN

DSD PROJECT NO. 25-0301
BIDS
APRIL 16, 2025

DIVISION 26 – ELECTRICAL

END OF SECTION 000110

SECTION 260500 - COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

A. This section includes the following:

1. Electrical equipment coordination and installation.
2. Sleeves for raceways and cables.
3. Sleeve seals.
4. Common electrical installation requirements.

PART 2 - PRODUCTS

2.01 SLEEVES FOR RACEWAYS AND CABLES

A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.

2.02 SLEEVE SEALS

A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Advance Products & Systems, Inc.
   b. Calpico, Inc.
   c. Metraflex Co.
   d. Pipeline Seal and Insulator, Inc.
2. Sealing Elements: EPDM interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.
3. Pressure Plates: Stainless steel. Include two for each sealing element.
4. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.03 GROUT

A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, non-staining, mixed with water to consistency suitable for application and a 30-minute working time.

PART 3 - EXECUTION

3.01 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION

A. Comply with NECA 1.

B. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.

C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.

D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.

E. Right of Way: Give to piping systems installed at a required slope.

3.02 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Electrical penetrations occur when raceways, cables, wireways, cable trays, or busways penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.

B. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.

C. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.

D. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.

E. Cut sleeves to length for mounting flush with both surfaces of walls.

F. Extend sleeves installed in floors 2 inches above finished floor level.

G. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and raceway or cable, unless indicated otherwise.

H. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Division 07 Section "Joint Sealants."

I. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway and cable penetrations. Install sleeves and seal raceway and cable penetration sleeves with firestop materials. Comply with requirements in Division 07 Section "Penetration Firestopping."

J. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.

3.03 SLEEVE-SEAL INSTALLATION

A. Use type and number of sealing elements recommended by manufacturers for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install them in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.04 FIRESTOPPING

A. Apply firestopping to penetrations of fire-rated floor and wall assemblies for electrical installations to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 07 Section "Penetration Firestopping."

END OF SECTION 260500

SECTION 260519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Copper building wire rated 600 V or less.
2. Connectors, splices, and terminations rated 600 V and less.

B. Related Requirements:

1. Section 260513 "Medium-Voltage Cables" for single-conductor and multiconductor cables, cable splices, and terminations for electrical distribution systems with 601 to 35,000 V.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Product Schedule: Indicate type, use, location, and termination locations.

1.3 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

PART 2 - PRODUCTS

2.1 COPPER BUILDING WIRE

A. Description: Flexible, insulated and uninsulated, drawn copper current-carrying conductor with an overall insulation layer or jacket, or both, rated 600 V or less.

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

1. Alpha Wire Company.
2. Cerro Wire LLC.
3. General Cable Technologies Corporation.
4. Okonite Company (The).
5. Southwire Company.

C. Standards:

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
2. RoHS compliant.

3. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."

D. Conductors: Copper, complying with ASTM B 3 for bare annealed copper and with ASTM B 8 for stranded conductors.

E. Conductor Insulation:

1. Type THHN and Type THWN-2: Comply with UL 83.
2. Type XHHW-2: Comply with UL 44.

2.2 CONNECTORS AND SPLICES

A. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated; listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.

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

1. 3M Electrical Products.
2. Hubbell Power Systems, Inc.
3. Ideal Industries, Inc.
4. ILSCO.
5. O-Z/Gedney; a brand of Emerson Industrial Automation.
6. TE Connectivity Ltd.
7. Thomas & Betts Corporation; A Member of the ABB Group.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

A. Feeders: Copper; stranded.

B. Branch Circuits: Copper, stranded.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

A. Service Entrance: Type XHHW-2, single conductors in raceway.

B. Exposed Feeders: Type THHN/THWN-2, single conductors in raceway.

C. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspaces: Type THHN/THWN-2, single conductors in raceway.

D. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type XHHW-2, single conductors in raceway.

E. Exposed Branch Circuits, Including in Crawlspaces: Type THHN/THWN-2, single conductors in raceway.

F. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN/THWN-2, single conductors in raceway.

G. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type XHHW-2, single conductors in raceway.

H. Branch Circuits in Damp or Wet Locations, Type XHHW-2, single conductors in raceway.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

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

B. Complete raceway installation between conductor and cable termination points according to Section 260533 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.

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

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

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

F. Support cables according to Section 260529 "Hangers and Supports for Electrical Systems."

3.4 CONNECTIONS

A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.

B. Make splices, terminations, and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

C. Wiring at Outlets: Install conductor at each outlet, with at least 12 inches of slack.

3.5 IDENTIFICATION

A. Identify and color-code conductors and cables according to Section 260553 "Identification for Electrical Systems."

B. Identify each spare conductor at each end with identity number and location of other end of conductor, and identify as spare conductor.

3.6 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.7 FIRESTOPPING

A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Section 078413 "Penetration Firestopping."

END OF SECTION 260519

SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes grounding and bonding systems and equipment, plus the following special applications:

1. Underground distribution grounding.
2. Foundation steel electrodes.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Plans showing dimensioned as-built locations of grounding features specified in "Field Quality Control" Article.

B. Qualification Data: For testing agency and testing agency's field supervisor.

C. Field quality-control reports.

1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1. Plans showing as-built, dimensioned locations of grounding features specified in "Field Quality Control" Article, including the following:

a. Ground rods.
b. Ground rings.
c. Grounding arrangements and connections for separately derived systems.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: Certified by NETA.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

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

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

2.2 MANUFACTURERS

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

1. Burndy; Part of Hubbell Electrical Systems.
2. ERICO International Corporation.
3. Galvan Industries, Inc.; Electrical Products Division, LLC.
4. ILSCO.
5. O-Z/Gedney; a brand of Emerson Industrial Automation.
6. Thomas & Betts Corporation; A Member of the ABB Group.

2.3 CONDUCTORS

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

B. Bare Copper Conductors:

1. Stranded Conductors: ASTM B 8.
2. Tinned Conductors: ASTM B 33.
3. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
4. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.
5. Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.

C. Grounding Bus: Predrilled rectangular bars of annealed copper, 1/4 by 4 inches in cross section, with 9/32-inch holes spaced 1-1/8 inches apart. Stand-off insulators for mounting shall comply with UL 891 for use in switchboards, 600 V and shall be Lexan or PVC, impulse tested at 5000 V.

2.4 CONNECTORS

A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.

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

C. Bus-Bar Connectors: Compression type, copper or copper alloy, with two wire terminals.

D. Beam Clamps: Mechanical type, terminal, ground wire access from four directions, with dual, tin-plated or silicon bronze bolts.

E. Cable-to-Cable Connectors: Compression type, copper or copper alloy.

F. Cable Tray Ground Clamp: Mechanical type, zinc-plated malleable iron.

G. Conduit Hubs: Mechanical type, terminal with threaded hub.

H. Ground Rod Clamps: Mechanical type, copper or copper alloy, terminal with hex head bolt.

I. Lay-in Lug Connector: Mechanical type, copper rated for direct burial terminal with set screw.

J. Straps: Solid copper, cast-bronze clamp. Rated for 600 A.

K. U-Bolt Clamps: Mechanical type, copper or copper alloy, terminal listed for direct burial.

L. Water Pipe Clamps:

1. Mechanical type, two pieces with stainless-steel bolts.

a. Material: Copper or Cast Bronze.
b. Listed for direct burial.

2.5 GROUNDING ELECTRODES

A. Ground Rods: Copper-clad steel; 3/4 inch by 10 feet.

B. Ground Plates: 1/4 inch (6 mm) thick, hot-dip galvanized.

PART 3 - EXECUTION

3.1 APPLICATIONS

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

B. Underground Grounding Conductors: Install bare tinned-copper conductor, No.4/0 AWG minimum.

C. Bury at least 24 inches below grade.

D. Grounding Bus: Install in electrical equipment rooms, in rooms housing service equipment, and elsewhere as indicated.

1. Install bus horizontally, on insulated spacers 2 inches minimum from wall, 6 inches above finished floor unless otherwise indicated.
2. Where indicated on both sides of doorways, route bus up to top of door frame, across top of doorway, and down; connect to horizontal bus.

E. Conductor Terminations and Connections:

1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
3. Connections to Structural Steel: Welded connectors.

3.2 GROUNDING AT THE SERVICE

A. Equipment grounding conductors and grounding electrode conductors shall be connected to the ground bus. Install a main bonding jumper between the neutral and ground buses.

3.3 GROUNDING UNDERGROUND DISTRIBUTION SYSTEM COMPONENTS

A. Comply with IEEE C2 grounding requirements.

B. Grounding Manholes and Handholes: Install a driven ground rod through manhole or handhole floor, close to wall, and set rod depth so 4 inches (100 mm) will extend above finished floor. If necessary, install ground rod before manhole is placed and provide No. 1/0 AWG bare, tinned-copper conductor from ground rod into manhole through a waterproof sleeve in manhole wall. Protect ground rods passing through concrete floor with a double wrapping of pressure- sensitive insulating tape or heat-shrunk insulating sleeve from 2 inches above to 6 inches below concrete. Seal floor opening with waterproof, nonshrink grout.

C. Grounding Connections to Manhole Components: Bond exposed-metal parts such as inserts, cable racks, pulling irons, ladders, and cable shields within each manhole or handhole, to ground rod or grounding conductor. Make connections with No. 4 AWG minimum, stranded, hard-drawn copper bonding conductor. Train conductors level or plumb around corners and fasten to manhole walls. Connect to cable armor and cable shields according to written instructions by manufacturer of splicing and termination kits.

D. Pad-Mounted Transformers and Switches: Install two ground rods and ground ring around the pad. Ground pad-mounted equipment and noncurrent-carrying metal items associated with substations by connecting them to underground cable and grounding electrodes. Install tinned-copper conductor not less than No. 4/0 AWG for ground ring and for taps to equipment grounding terminals. Bury ground ring not less than 6 inches from the foundation.

3.4 EQUIPMENT GROUNDING

A. Install insulated equipment grounding conductors with all feeders and branch circuits.

B. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:

1. Feeders and branch circuits.
2. Lighting circuits.
3. Receptacle circuits.
4. Single-phase motor and appliance branch circuits.
5. Three-phase motor and appliance branch circuits.

3.5 INSTALLATION

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

B. Ground Bonding Common with Lightning Protection System: Comply with NFPA 780 and UL 96 when interconnecting with lightning protection system. Bond electrical power system ground directly to lightning protection system grounding conductor at closest point to electrical service

grounding electrode. Use bonding conductor sized same as system grounding electrode conductor, and install in conduit.

C. Ground Rods: Drive rods until tops are 2 inches below finished floor or final grade unless otherwise indicated.

1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.

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

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

E. Grounding and Bonding for Piping:

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

3.6 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency (NECA member contractor, with NETA accreditation, and technician completing the tests with a minimum level 3 NETA certification) and to perform tests and inspections.

B. Tests and Inspections:

1. After installing grounding system, before permanent electrical circuits have been energized, test for compliance with requirements.
2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
3. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, and at individual ground rods. Make tests at ground rods before any conductors are connected.

a. Measure ground resistance no fewer than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.

b. Perform tests by fall-of-potential method according to IEEE 81.

4. Prepare dimensioned Drawings locating each test well, ground rod and ground-rod assembly, and other grounding electrodes. Identify each by letter in alphabetical order, and key to the record of tests and observations. Include the number of rods driven and their depth at each location and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.

C. Grounding system will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

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

1. Power and Lighting Equipment or System with Capacity of 500 kVA and Less: 5 ohms.
2. Power and Lighting Equipment or System with Capacity of 500 to 1000 kVA: 3 ohms.
3. Power and Lighting Equipment or System with Capacity More Than 1000 kVA: 3 ohms.
4. Substations and Pad-Mounted Equipment: 3 ohms.
5. Manhole Grounds: 10 ohms.

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

END OF SECTION 260526

SECTION 260529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Hangers and supports for electrical equipment and systems.
2. Construction requirements for concrete bases.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For fabrication and installation details for electrical hangers and support systems.

C. Delegated-Design Submittal: For hangers and supports for electrical systems.

1. Include design calculations and details of trapeze hangers.

2. Die cast and spring steel components are not acceptable.

1.3 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plan(s) and other details, drawn to scale, and coordinated with each other, using input from installers of the items involved:

B. Welding certificates.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design hanger and support system.

2.2 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. Steel Slotted Support Systems: Comply with MFMA-4 factory-fabricated components for field assembly.

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

a. Allied Tube & Conduit; a part of Atkore International.

b. B-line, an Eaton business.
c. ERICO International Corporation.
d. Thomas & Betts Corporation; A Member of the ABB Group.
e. Unistrut; Part of Atkore International.

2. Material: Stainless Steel, Grade 316.
3. Channel Width: 1-5/8 inches.
4. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
5. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
6. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
7. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
8. Channel Dimensions: Selected for applicable load criteria.

B. Conduit and Cable Support Devices: Steel and malleable-iron hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

C. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for nonarmored 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 made of malleable iron.

D. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M steel plates, shapes, and bars; black and galvanized.

E. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:

1. Mechanical-Expansion Anchors: Insert-wedge-type, stainless steel, for use in hardened Portland cement concrete, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.

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

1) B-line, an Eaton business.
2) Empire Tool and Manufacturing Co., Inc.
3) Hilti, Inc.
4) ITW Ramset/Red Head; Illinois Tool Works, Inc.
5) MKT Fastening, LLC.

2. Concrete Inserts: Steel or malleable-iron, slotted support system units are similar to MSS Type 18 units and comply with MFMA-4 or MSS SP-58.

3. Clamps for Attachment to Steel Structural Elements: MSS SP-58 units are suitable for attached structural element.
4. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
5. Hanger Rods: Threaded steel.

2.3 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

A. Description: Welded or bolted structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.

B. Materials: Comply with requirements in Section 055000 "Metal Fabrications" for steel shapes and plates.

PART 3 - EXECUTION

3.1 APPLICATION

A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems unless requirements in this Section are stricter.

B. Comply with requirements for raceways and boxes specified in Section 260533 "Raceways and Boxes for Electrical Systems."

C. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMTs, IMCs, and RMCs as scheduled in NECA 1, where its Table 1 lists maximum spacings that are less than those stated in NFPA 70. Minimum rod size shall be 1/4 inch in diameter.

D. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted or other support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.

1. Secure raceways and cables to these supports with single-bolt conduit clamps.

E. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1- 1/2-inch and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports.

3.2 SUPPORT INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this article.

B. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.

C. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements.

D. Drill holes for expansion anchors in concrete at locations and to depths that avoid the need for reinforcing bars.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

A. Comply with installation requirements in Section 055000 "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.

3.4 PAINTING

A. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 260529

SECTION 260533 - RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Metal conduits, tubing, and fittings.
2. Nonmetal conduits, tubing, and fittings.
3. Metal wireways and auxiliary gutters.
4. Boxes, enclosures, and cabinets.

1.2 ACTION SUBMITTALS

A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.

B. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, and attachment details.

1.3 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Conduit routing plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of items involved:

1. Structural members in paths of conduit groups with common supports.
2. HVAC and plumbing items and architectural features in paths of conduit groups with common supports.

PART 2 - PRODUCTS

2.1 METAL CONDUITS, TUBING, AND FITTINGS

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

1. Allied Tube & Conduit; a part of Atkore International.
2. O-Z/Gedney; a brand of Emerson Industrial Automation.
3. Republic Conduit.
4. Southwire Company.
5. Thomas & Betts Corporation; A Member of the ABB Group.
6. Western Tube and Conduit Corporation.
7. Wheatland Tube Company.

B. Listing and Labeling: Metal conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. GRC: Comply with ANSI C80.1 and UL 6.

D. IMC: Comply with ANSI C80.6 and UL 1242.

E. EMT: Comply with ANSI C80.3 and UL 797.

F. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.

1. Fittings for EMT:

a. Material: Steel.
b. Type: Compression.

2. Expansion Fittings: PVC or steel to match conduit type, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.

G. Joint Compound for IMC or GRC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.2 NONMETALLIC CONDUITS, TUBING, AND FITTINGS

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

1. Anamet Electrical, Inc.
2. CANTEX INC.
3. CertainTeed Corporation.
4. Condux International, Inc.
5. RACO; Hubbell.
6. Thomas & Betts Corporation; A Member of the ABB Group.

B. Listing and Labeling: Nonmetallic conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. ENT: Comply with NEMA TC 13 and UL 1653.

D. RNC: Type EPC-40-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.

E. Fittings for ENT and RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.

F. Solvents and Adhesives: As recommended by conduit manufacturer.

2.3 METAL WIREWAYS AND AUXILIARY GUTTERS

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

1. B-line, an Eaton business.
2. Hoffman; a brand of Pentair Equipment Protection.
3. Square D.

B. Description: Sheet metal, complying with UL 870 and NEMA 250, Type 3R or Type 12 unless otherwise indicated, and sized according to NFPA 70.

1. Metal wireways installed outdoors shall not be permitted.

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

2.4 BOXES, ENCLOSURES, AND CABINETS

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

1. Adalet.
2. Crouse-Hinds, an Eaton business.
3. EGS/Appleton Electric.
4. Erickson Electrical Equipment Company.
5. Hoffman; a brand of Pentair Equipment Protection.
6. Hubbell Incorporated.
7. Milbank Manufacturing Co.
8. O-Z/Gedney; a brand of Emerson Industrial Automation.
9. RACO; Hubbell.
10. Spring City Electrical Manufacturing Company.
11. Thomas & Betts Corporation; A Member of the ABB Group.

B. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.

C. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.

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

E. Box extensions used to accommodate new building finishes shall be of same material as recessed box.

F. Device Box Dimensions: 4 inches square by 2-1/8 inches deep.

G. Gangable boxes are prohibited.

H. Bell type boxes are prohibited. Type FS and FD device boxes shall be used.

I. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 3R or Type 12 with continuous-hinge cover with flush latch unless otherwise indicated.

1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
2. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.

J. Cabinets:

1. NEMA 250, Type 12 galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
2. Hinged door in front cover with flush latch and concealed hinge.
3. Key latch to match panelboards.

4. Metal barriers to separate wiring of different systems and voltage.
5. Accessory feet where required for freestanding equipment.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

A. Outdoors: Apply raceway products as specified below unless otherwise indicated:

1. Exposed Conduit: GRC.
2. Concealed Conduit, Aboveground: GRC.
3. Underground Conduit: RNC, Type EPC-40-PVC, concrete encased.
4. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.

B. Indoors: Apply raceway products as specified below unless otherwise indicated.

1. Exposed, Not Subject to Physical Damage: EMT.
2. Exposed, Not Subject to Severe Physical Damage: EMT.
3. Exposed and Subject to Severe Physical Damage: GRC. Raceway locations include the following:

    a. Loading dock.
    b. Electrical equipment rooms.
    c. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
    d. Mechanical rooms.

4. Concealed in Ceilings and Interior Walls and Partitions: EMT.
5. Damp or Wet Locations: GRC.
6. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4 stainless steel in and damp or wet locations.
7. Feeders: GRC.

C. Minimum Raceway Size: 3/4-inch trade size.

D. Raceway Fittings: Compatible with raceways and suitable for use and location.

1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
2. EMT: Use compression, steel fittings. Comply with NEMA FB 2.10.
3. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.

E. Do not install aluminum conduits.

F. Install surface raceways only where indicated on Drawings.

G. Do not install nonmetallic conduit where ambient temperature exceeds 120 deg F.

3.2 INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum conduits.

Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.

B. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.

C. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for hangers and supports.

D. Arrange stub-ups so curved portions of bends are not visible above finished slab.

E. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches of changes in direction.

F. Conceal conduit and EMT within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.

G. Support conduit within 12 inches of enclosures to which attached.

H. Raceways Embedded in Slabs:

1. Run conduit larger than 1-inch trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support. Secure raceways to reinforcement at maximum 8-foot intervals.
2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
3. Arrange raceways to keep a minimum of 2 inches of concrete cover in all directions.
4. Do not embed threadless fittings in concrete unless specifically approved by Architect for each specific location.
5. Change from RNC, Type EPC-40-PVC to GRC before rising above floor.

I. Stub-ups to Above Recessed Ceilings:

1. Use EMT, IMC, or RMC for raceways.
2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.

J. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.

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

L. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch trade size and insulated throat metal bushings on 1-1/2-inch trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.

M. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.

N. Install raceway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces.

O. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:

1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
2. Where an underground service raceway enters a building or structure.
3. Where otherwise required by NFPA 70.

P. Expansion-Joint Fittings:

1. Install in each run of aboveground RMC that is located where environmental temperature change may exceed 30 deg F and that has straight-run length that exceeds 25 feet.
2. Install type and quantity of fittings that accommodate temperature change listed for each of the following locations:

    a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F temperature change.
    b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F temperature change.
    c. Indoor Spaces Connected with Outdoors without Physical Separation: 125 deg F temperature change.
    d. Attics: 135 deg F temperature change.

3. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per degree F of temperature change for PVC conduits.
4. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
5. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.

Q. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.

R. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall. Prepare block surfaces to provide a flat surface for a raintight connection between the box and cover plate or the supported equipment and box.

S. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.

T. Locate boxes so that cover or plate will not span different building finishes.

U. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.

V. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

3.3 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.4 FIRESTOPPING

A. Install firestopping at penetrations of fire-rated floor and wall assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

3.5 PROTECTION

A. Protect coatings, finishes, and cabinets from damage and deterioration.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.

END OF SECTION 260533

SECTION 260544 - SLEEVES AND SLEEVE SEALS FOR ELECTRICAL RACEWAYS AND CABLING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Sleeves for raceway and cable penetration of non-fire-rated construction walls and floors.
2. Sleeve-seal systems.
3. Sleeve-seal fittings.
4. Grout.
5. Silicone sealants.

B. Related Requirements:

1. Section 078413 "Penetration Firestopping" for penetration firestopping installed in fire-resistance-rated walls, horizontal assemblies, and smoke barriers, with and without penetrating items.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 SLEEVES

A. Wall Sleeves:

1. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.

B. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies: Galvanized-steel sheet; 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint, with tabs for screw-fastening the sleeve to the board.

C. Sleeves for Rectangular Openings:

1. Material: Galvanized sheet steel.
2. Minimum Metal Thickness:

a. For sleeve cross-section rectangle perimeter less than 50 inches and with no side larger than 16 inches, thickness shall be 0.052 inch.
b. For sleeve cross-section rectangle perimeter 50 inches or more and one or more sides larger than 16 inches, thickness shall be 0.138 inch.

2.2 SLEEVE-SEAL SYSTEMS

A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.

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

   a. Advance Products & Systems, Inc.
   b. CALPICO, Inc.
   c. Metraflex Company (The).
   d. Pipeline Seal and Insulator, Inc.
   e. Proco Products, Inc.

2. Sealing Elements: Nitrile (Buna N) rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
3. Pressure Plates: Stainless steel.
4. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements.

2.3 GROUT

A. Description: Nonshrink; recommended for interior and exterior sealing openings in non-fire-rated walls or floors.

B. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

C. Design Mix: 5000-psi, 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

2.4 SILICONE SEALANTS

A. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below.

1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces that are not fire rated.

B. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION FOR NON-FIRE-RATED ELECTRICAL PENETRATIONS

A. Comply with NECA 1.

B. Comply with NEMA VE 2 for cable tray and cable penetrations.

C. Sleeves for Conduits Penetrating Above-Grade Non-Fire-Rated Concrete and Masonry-Unit Floors and Walls:

1. Interior Penetrations of Non-Fire-Rated Walls and Floors:

a. Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Section 079200 "Joint Sealants."
b. Seal space outside of sleeves with mortar or grout. Pack sealing material solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect material while curing.

2. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
3. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and raceway or cable unless sleeve seal is to be installed.
4. Install sleeves for wall penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of walls. Cut sleeves to length for mounting flush with both surfaces of walls. Deburr after cutting.

D. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies:

1. Use circular metal sleeves unless penetration arrangement requires rectangular sleeved opening.
2. Seal space outside of sleeves with approved joint compound for gypsum board assemblies.

E. Aboveground, Exterior-Wall Penetrations: Seal penetrations using cast-iron pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.

F. Underground, Exterior-Wall and Floor Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch annular clear space between raceway or cable and sleeve for installing sleeve-seal system.

3.2 SLEEVE-SEAL-SYSTEM INSTALLATION

A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at raceway entries into building.

B. Install type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

END OF SECTION 260544

SECTION 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Color and legend requirements for raceways, conductors, and warning labels and signs.
2. Labels.
3. Bands and tubes.
4. Tapes and stencils.
5. Tags.
6. Signs.
7. Cable ties.
8. Paint for identification.
9. Fasteners for labels and signs.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each type of label and sign to illustrate composition, size, colors, lettering style, mounting provisions, and graphic features of identification products.

C. Delegated-Design Submittal: For arc-flash hazard study.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Comply with ASME A13.1.

B. Comply with NFPA 70.

C. Comply with 29 CFR 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.

F. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 COLOR AND LEGEND REQUIREMENTS

A. Raceways and Cables Carrying Circuits at 600 V or Less:

1. White letters on a black field.
2. Legend: Indicate voltage and service type.

2.3 LABELS

A. Vinyl Wraparound Labels: Preprinted, flexible labels laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing label ends.

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

a. Brady Corporation.
b. Champion America.
c. Marking Services, Inc.
d. Seton Identification Products.

B. Snap-around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeves, with diameters sized to suit diameter and that stay in place by gripping action.

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

a. Brady Corporation.
b. Champion America.
c. Marking Services, Inc.
d. Seton Identification Products.

C. Self-Adhesive Wraparound Labels: Preprinted, 3-mil-thick, vinyl flexible label with acrylic pressure-sensitive adhesive.

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

a. Brady Corporation.
b. Champion America.
c. Marking Services, Inc.
d. Seton Identification Products.

2. Self-Lamination: Clear; UV-, weather- and chemical-resistant; self-laminating, protective shield over the legend. Labels sized such that the clear shield overlaps the entire printed legend.
3. Marker for Labels: Permanent, waterproof, black ink marker recommended by tag manufacturer.

4. Marker for Labels: Machine-printed, permanent, waterproof, black ink recommended by printer manufacturer.

D. Self-Adhesive Labels: Vinyl, thermal, transfer-printed, 3-mil-thick, multicolor, weather- and UV-resistant, pressure-sensitive adhesive labels, configured for intended use and location.

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

a. Brady Corporation.
b. Champion America.
c. Marking Services, Inc.
d. Seton Identification Products.

2. Minimum Nominal Size:

a. 3-1/2 by 5 inchesfor equipment.

2.4 BANDS AND TUBES

A. Snap-around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeves, 2 inches long, with diameters sized to suit diameter and that stay in place by gripping action.

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

a. Brady Corporation.
b. HellermannTyton.
c. Marking Services, Inc.
d. Panduit Corp.

B. Heat-Shrink Preprinted Tubes: Flame-retardant polyolefin tubes with machine-printed identification labels, sized to suit diameters of and shrunk to fit firmly around item being identified. Full shrink recovery occurs at a maximum of 200 deg F. Comply with UL 224.

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

a. Brady Corporation.
b. HellermannTyton.
c. Marking Services, Inc.
d. Panduit Corp.

2.5 TAPES AND STENCILS

A. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.

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

a. Carlton Industries, LP.
b. Champion America.
c. Ideal Industries, Inc.
d. Marking Services, Inc.

B. Self-Adhesive Vinyl Tape: Colored, heavy duty, waterproof, fade resistant; not less than 3 mils thick by 1 to 2 inches wide; compounded for outdoor use.

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

a. Carlton Industries, LP.
b. Champion America.
c. Ideal Industries, Inc.
d. Marking Services, Inc.

C. Tape and Stencil: 4-inch-wide black stripes on 10-inch centers placed diagonally over orange background and is 12 inches wide. Stop stripes at legends.

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

a. Carlton Industries, LP.
b. Champion America.
c. Ideal Industries, Inc.
d. Marking Services, Inc.

D. Floor Marking Tape: 2-inch-wide, 5-mil pressure-sensitive vinyl tape, with black and white stripes and clear vinyl overlay.

2.6 SIGNS

A. Metal-Backed Butyrate Signs:

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

a. Brady Corporation.
b. Champion America.
c. emedco.
d. Marking Services, Inc.

2. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs, with 0.0396-inch galvanized-steel backing, punched and drilled for fasteners, and with colors, legend, and size required for application.

3. 1/4-inch grommets in corners for mounting.
4. Nominal Size: 10 by 14 inches.

B. Laminated Acrylic or Melamine Plastic Signs:

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

    a. Brady Corporation.
    b. Carlton Industries, LP.
    c. emedco.
    d. Marking Services, Inc.

2. Engraved legend.

3. Thickness:

    a. For signs up to 20 sq. in., minimum 1/16 inch.
    b. For signs larger than 20 sq. in., 1/8 inch thick.
    c. Engraved legend with black letters on white face.
    d. Punched or drilled for mechanical fasteners with 1/4-inch grommets in corners for mounting.
    e. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

2.7 CABLE TIES

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

1. HellermannTyton.
2. Ideal Industries, Inc.
3. Marking Services, Inc.
4. Panduit Corp.

B. General-Purpose Cable Ties: Fungus inert, self-extinguishing, one piece, self-locking, and Type 6/6 nylon.

1. Minimum Width: 3/16 inch.
2. Tensile Strength at 73 Deg F according to ASTM D 638: 12,000 psi.
3. Temperature Range: Minus 40 to plus 185 deg F.
4. Color: Black, except where used for color-coding.

C. UV-Stabilized Cable Ties: Fungus inert, designed for continuous exposure to exterior sunlight, self-extinguishing, one piece, self-locking, and Type 6/6 nylon.

1. Minimum Width: 3/16 inch.
2. Tensile Strength at 73 Deg F according to ASTM D 638: 12,000 psi.
3. Temperature Range: Minus 40 to plus 185 deg F.
4. Color: Black.

D. Plenum-Rated Cable Ties: Self-extinguishing, UV stabilized, one piece, and self-locking.

1. Minimum Width: 3/16 inch.
2. Tensile Strength at 73 Deg F according to ASTM D 638: 7000 psi.
3. UL 94 Flame Rating: 94V-0.
4. Temperature Range: Minus 50 to plus 284 deg F.
5. Color: Black.

2.8 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Retain 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

3.1 INSTALLATION

A. Verify and coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and operation and maintenance manual. Use consistent designations throughout Project.

B. Install identifying devices before installing acoustic ceilings and similar concealment.

C. Verify the identity of each item before installing identification products.

D. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and operation and maintenance manual.

E. Apply identification devices to surfaces that require finish after completing finish work.

F. Install signs with approved legend to facilitate proper identification, operation, and maintenance of electrical systems and connected items.

G. Self-Adhesive Identification Products: Before applying electrical identification products, clean substrates of substances that could impair bond, using materials and methods recommended by manufacturers of identification product.

H. System Identification for Raceways and Cables under 600 V: Identification shall completely encircle cable or conduit. Place identification of two-color markings in contact, side by side.

1. Secure tight to surface of conductor, cable, or raceway.

I. System Identification for Raceways and Cables over 600 V: Identification shall completely encircle cable or conduit. Place adjacent identification of two-color markings in contact, side by side.

1. Secure tight to surface of conductor, cable, or raceway.

J. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.

K. Elevated Components: Increase sizes of labels, signs, and letters to those appropriate for viewing from the floor.

L. Accessible Fittings for Raceways: Identify the covers of each junction and pull box of the following systems with the wiring system legend and system voltage. System legends shall be as follows:

1. "EMERGENCY POWER."
2. "POWER."
3. "UPS."
4. "FIRE ALARM".

M. Vinyl Wraparound Labels:

1. Secure tight to surface at a location with high visibility and accessibility.
2. Attach labels that are not self-adhesive type with clear vinyl tape, with adhesive appropriate to the location and substrate.

N. Snap-around Labels: Secure tight to surface at a location with high visibility and accessibility.

O. Self-Adhesive Wraparound Labels: Secure tight to surface of raceway or cable at a location with high visibility and accessibility.

P. Self-Adhesive Labels:

1. On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and operation and maintenance manual.
2. Unless otherwise indicated, provide a single line of text with 1/2-inch-high letters on 1- 1/2-inch-high label; where two lines of text are required, use labels 2 inches high.

Q. Snap-around Color-Coding Bands: Secure tight to surface at a location with high visibility and accessibility.

R. Heat-Shrink, Preprinted Tubes: Secure tight to surface at a location with high visibility and accessibility.

S. Marker Tapes: Secure tight to surface at a location with high visibility and accessibility.

T. Self-Adhesive Vinyl Tape: Secure tight to surface at a location with high visibility and accessibility.

1. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding.

U. Tape and Stencil: Comply with requirements in painting Sections for surface preparation and paint application.

V. Floor Marking Tape: Apply stripes to finished surfaces following manufacturer's written instructions.

W. Baked-Enamel Signs:

1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
2. Unless otherwise indicated, provide a single line of text with 1/2-inch-high letters on minimum 1-1/2-inch-high sign; where two lines of text are required, use signs minimum 2 inches high.

X. Metal-Backed Butyrate Signs:

1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
2. Unless otherwise indicated, provide a single line of text with 1/2-inch-high letters on minimum 1-1/2-inch-high sign; where two lines of text are required, use signs minimum 2 inches high.

Y. Laminated Acrylic or Melamine Plastic Signs:

1. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
2. Unless otherwise indicated, provide a single line of text with 1/2-inch-high letters on minimum 1-1/2-inch-high sign; where two lines of text are required, use signs minimum 2 inches high.

Z. Cable Ties: General purpose, for attaching tags, except as listed below:

1. Outdoors: UV-stabilized nylon.
2. In Spaces Handling Environmental Air: Plenum rated.

3.2 IDENTIFICATION SCHEDULE

A. Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment. Install access doors or panels to provide view of identifying devices.

B. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, pull points, and locations of high visibility. Identify by system and circuit designation.

C. Accessible Raceways and Metal-Clad Cables, 600 V or Less, for Service, Feeder, and Branch Circuits, More Than 30 A and 120 V to Ground: Identify with self-adhesive vinyl tape applied in bands.

1. Locate identification at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.

D. Accessible Fittings for Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive labels containing the wiring system legend and system voltage. System legends shall be as follows:

1. "EMERGENCY POWER."
2. "POWER."
3. "UPS."
4. “FIRE ALARM”.

E. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use self-adhesive vinyl tape to identify the phase.

1. Locate identification at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.

F. Equipment Identification Labels:

1. Indoor Equipment: Laminated acrylic or melamine plastic sign.

END OF SECTION 260553

SECTION 262813 - FUSES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Cartridge fuses rated 600 V ac and less for use in the following:

   a. Control circuits.
   b. Panelboards.
   c. Switchboards.
   d. Enclosed controllers.
   e. Enclosed switches.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Bussmann, an Eaton business.
2. Edison; a brand of Bussmann by Eaton.
3. Littelfuse, Inc.
4. Mersen USA.

2.2 CARTRIDGE FUSES

A. Characteristics: NEMA FU 1, current-limiting, nonrenewable cartridge fuses with voltage ratings consistent with circuit voltages.

1. Type RK-1: 250 and 600-V, zero- to 600-A rating, 200 kAIC.
2. Type RK-5: 250 and 600-V, zero- to 600-A rating, 200 kAIC.
3. Type CC: 600-V, zero- to 30-A rating, 200 kAIC, fast acting.
4. Type L: 600-V, 601- to 6000-A rating, 200 kAIC.

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 NEMA FU 1 for cartridge fuses.

D. Comply with NFPA 70.

E. Coordinate fuse ratings with utilization equipment nameplate limitations of maximum fuse size and with system short-circuit current levels.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install fuses in fusible devices. Arrange fuses so rating information is readable without removing fuse.

B. Install spare-fuse cabinet(s) in location shown on the Drawings or as indicated in the field by Owner.

3.2 IDENTIFICATION

A. Install labels complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems" and indicating fuse replacement information inside of door of each fused switch and adjacent to each fuse block, socket, and holder.

END OF SECTION 262813

SECTION 262816 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Fusible switches.
2. Nonfusible switches.
3. Molded-case circuit breakers (MCCBs).
4. Enclosures.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include nameplate ratings, dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.

1. Include time-current coordination curves (average melt) for each type and rating of overcurrent protective device; include selectable ranges for each type of overcurrent protective device. Provide in PDF electronic format.

B. Shop Drawings: For enclosed switches and circuit breakers.

1. Include plans, elevations, sections, details, and attachments to other work.
2. Include wiring diagrams for power, signal, and control wiring.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified testing agency.

B. Field quality-control reports.

1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: Accredited by NETA.

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

1.6 WARRANTY

A. Manufacturer's Warranty: Manufacturer and Installer agree to repair or replace components that fail in materials or workmanship within specified warranty period.

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

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Source Limitations: Obtain enclosed switches and circuit breakers, overcurrent protective devices, components, and accessories, within same product category, from single manufacturer.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.

C. Comply with NFPA 70.

2.2 FUSIBLE SWITCHES

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Square D; by Schneider Electric.
2. GE by ABB
3. Siemens
4. Eaton Cutler Hammer

B. Type HD, Heavy Duty:

1. Single throw.
2. Three pole.
3. 240 and 600-V ac.
4. 1200 A and smaller.
5. UL 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate specified fuses.
6. Lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

C. Accessories:

1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
3. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
4. Service-Rated Switches: Labeled for use as service equipment.
5. Lugs: Compression type lug kit for 400A and larger disconnect switches.

2.3 NONFUSIBLE SWITCHES

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Square D; by Schneider Electric.
2. Type HD, Heavy D GE by ABB
3. Siemens
4. Eaton Cutler Hammer

B. Type HD, Heavy Duty, Three Pole, Single Throw, 240 and 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

C. Accessories:

1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
3. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
4. Service-Rated Switches: Labeled for use as service equipment.
5. Lugs: Compression type lug kit for 400A and larger disconnect switches.

2.4 MOLDED-CASE CIRCUIT BREAKERS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Square D; by Schneider Electric.
2. GE by ABB
3. Siemens
4. Eaton Cutler Hammer

B. Circuit breakers shall be constructed using glass-reinforced insulating material. Current carrying components shall be completely isolated from the handle and the accessory mounting area.

C. Circuit breakers shall have a toggle operating mechanism with common tripping of all poles, which provides quick-make, quick-break contact action. The circuit-breaker handle shall be over center, be trip free, and reside in a tripped position between on and off to provide local trip indication. Circuit-breaker escutcheon shall be clearly marked on and off in addition to providing international I/O markings. Equip circuit breaker with a push-to-trip button, located on the face of the circuit breaker to mechanically operate the circuit-breaker tripping mechanism for maintenance and testing purposes.

D. The maximum ampere rating and UL, IEC, or other certification standards with applicable voltage systems and corresponding interrupting ratings shall be clearly marked on face of circuit breaker. Circuit breakers shall be 100 percent rated

E. MCCBs shall be equipped with a device for locking in the isolated position.

F. Lugs shall be suitable for 194 deg F rated wire, sized according to the 167 deg F temperature rating in NFPA 70. Lugs for 400A and larger capacities shall be compression type.

G. Standards: Comply with UL 489 and NEMA AB 3, with interrupting capacity to comply with available fault currents.

H. Electronic Trip Circuit Breakers: Field-replaceable rating plug, rms sensing, with the following field-adjustable settings:

1. Long- and short-time pickup levels.
2. Long- and short-time time adjustments.
3. Ground-fault pickup level, time delay, and I-squared t response.

I. Features and Accessories:

1. Standard frame sizes, trip ratings, and number of poles.
2. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge lighting circuits.
3. Auxiliary Contacts: One SPDT switch with "a" and "b" contacts; "a" contacts mimic circuit-breaker contacts, "b" contacts operate in reverse of circuit-breaker contacts.

2.5 ENCLOSURES

A. Enclosed Switches and Circuit Breakers: UL 489, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.

B. Enclosure Finish: The enclosure shall be finished with gray baked enamel paint, electrodeposited on cleaned, phosphatized galvannealed steel (NEMA 250 Types 3R, 12).

C. Conduit Entry: NEMA 250 Types 4, 4X, and 12 enclosures shall contain no knockouts. NEMA 250 Types 7 and 9 enclosures shall be provided with threaded conduit openings in both endwalls.

D. Operating Mechanism: The circuit-breaker operating handle shall be externally operable with the operating mechanism being an integral part of the box, not the cover. The cover interlock mechanism shall have an externally operated override. The override shall not permanently disable the interlock mechanism, which shall return to the locked position once the override is released. The tool used to override the cover interlock mechanism shall not be required to enter the enclosure in order to override the interlock.

E. Enclosures designated as NEMA 250 Type 4, 4X stainless steel, 12, or 12K shall have a dual cover interlock mechanism to prevent unintentional opening of the enclosure cover when the circuit breaker is ON and to prevent turning the circuit breaker ON when the enclosure cover is open.

F. NEMA 250 Type 7/9 enclosures shall be furnished with a breather and drain kit to allow their use in outdoor and wet location applications.

PART 3 - EXECUTION

3.1 ENCLOSURE ENVIRONMENTAL RATING APPLICATIONS

A. Enclosed Switches and Circuit Breakers: Provide enclosures at installed locations with the following environmental ratings.

1. Indoor, Dry and Clean Locations: NEMA 250, Type 1.
2. Outdoor Locations: NEMA 250, Type 12.
3. Other Wet or Damp, Indoor Locations: NEMA 250, Type 12.
4. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: NEMA 250, Type 12.

3.2 INSTALLATION

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

1. Notify Owner no fewer than thirty days in advance of proposed interruption of electric service.
2. Indicate method of providing temporary electric service.
3. Do not proceed with interruption of electric service without Owner's written permission.
4. Comply with NFPA 70E.

B. 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.

C. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.

D. Temporary Lifting Provisions: Remove temporary lifting of eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.

E. Install fuses in fusible devices.

F. Comply with NFPA 70 and NECA 1.

G. Set field-adjustable circuit-breaker trip ranges as specified in the Overcurrent Protective Device Coordination Study.

3.3 IDENTIFICATION

A. Comply with requirements in Section 260553 "Identification for Electrical Systems."

1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
2. Label each enclosure with engraved metal or laminated-plastic nameplate.

3.4 FIELD QUALITY CONTROL

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

B. Perform tests and inspections with the assistance of a factory-authorized service representative.

C. Tests and Inspections for Switches:

1. Visual and Mechanical Inspection:

a. Inspect physical and mechanical condition.
b. Inspect anchorage, alignment, grounding, and clearances.
c. Verify that the unit is clean.
d. Verify blade alignment, blade penetration, travel stops, and mechanical operation.
e. Verify that fuse sizes and types match the Specifications and Drawings.
f. Verify that each fuse has adequate mechanical support and contact integrity.
g. Inspect bolted electrical connections for high resistance using one of the two following methods:

1) Use a low-resistance ohmmeter.

a) Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from those of similar bolted connections by more than 50 percent of the lowest value.

2) Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method in accordance with manufacturer's published data or NETA ATS Table 100.12.

a) Bolt-torque levels shall be in accordance with manufacturer's published data. In the absence of manufacturer's published data, use NETA ATS Table 100.12.

h. Verify that operation and sequencing of interlocking systems is as described in the Specifications and shown on the Drawings.
i. Verify correct phase barrier installation.
j. Verify lubrication of moving current-carrying parts and moving and sliding surfaces.

2. Electrical Tests:

a. Perform resistance measurements through bolted connections with a low- resistance ohmmeter. Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from adjacent poles or similar switches by more than 50 percent of the lowest value.
b. Measure contact resistance across each switchblade fuseholder. Drop values shall not exceed the high level of the manufacturer's published data. If manufacturer's published data are not available, investigate values that deviate from adjacent poles or similar switches by more than 50 percent of the lowest value.
c. Perform insulation-resistance tests for one minute on each pole, phase-to-phase and phase-to-ground with switch closed, and across each open pole. Apply voltage in accordance with manufacturer's published data. In the absence of manufacturer's published data, use Table 100.1 from the NETA ATS. Investigate values of insulation resistance less than those published in Table 100.1 or as recommended in manufacturer's published data.

d. Measure fuse resistance. Investigate fuse-resistance values that deviate from each other by more than 15 percent.

D. Tests and Inspections for Molded Case Circuit Breakers:

1. Visual and Mechanical Inspection:

a. Verify that equipment nameplate data are as described in the Specifications and shown on the Drawings.
b. Inspect physical and mechanical condition.
c. Inspect anchorage, alignment, grounding, and clearances.
d. Verify that the unit is clean.
e. Operate the circuit breaker to ensure smooth operation.
f. Inspect bolted electrical connections for high resistance using one of the two following methods:

1) Use a low-resistance ohmmeter.

a) Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from those of similar bolted connections by more than 50 percent of the lowest value.

2) Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method in accordance with manufacturer's published data or NETA ATS Table 100.12.

a) Bolt-torque levels shall be in accordance with manufacturer's published data. In the absence of manufacturer's published data, use NETA ATS Table 100.12.

g. Inspect operating mechanism, contacts, and chutes in unsealed units.
h. Perform adjustments for final protective device settings in accordance with the coordination study.

2. Electrical Tests:

a. Perform resistance measurements through bolted connections with a low- resistance ohmmeter. Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from adjacent poles or similar switches by more than 50 percent of the lowest value.
b. Perform insulation-resistance tests for one minute on each pole, phase-to-phase and phase-to-ground with circuit breaker closed, and across each open pole. Apply voltage in accordance with manufacturer's published data. In the absence of manufacturer's published data, use Table 100.1 from the NETA ATS. Investigate values of insulation resistance less than those published in Table 100.1 or as recommended in manufacturer's published data.
c. Perform a contact/pole resistance test. Drop values shall not exceed the high level of the manufacturer's published data. If manufacturer's published data are not available, investigate values that deviate from adjacent poles or similar switches by more than 50 percent of the lowest value.
d. Perform insulation resistance tests on all control wiring with respect to ground. Applied potential shall be 500-V dc for 300-V rated cable and 1000-V dc for 600-V rated cable. Test duration shall be one minute. For units with solid state

components, follow manufacturer's recommendation. Insulation resistance values shall be no less than two megohms.

e. Determine the following by primary current injection:

1) Long-time pickup and delay. Pickup values shall be as specified. Trip characteristics shall not exceed manufacturer's published time-current characteristic tolerance band, including adjustment factors.
2) Short-time pickup and delay. Short-time pickup values shall be as specified. Trip characteristics shall not exceed manufacturer's published time-current characteristic tolerance band, including adjustment factors.
3) Ground-fault pickup and time delay. Ground-fault pickup values shall be as specified. Trip characteristics shall not exceed manufacturer's published time-current characteristic tolerance band, including adjustment factors.
4) Instantaneous pickup. Instantaneous pickup values shall be as specified and within manufacturer's published tolerances.

f. Verify correct operation of auxiliary features such as trip and pickup indicators; zone interlocking; electrical close and trip operation; trip-free, anti-pump function; and trip unit battery condition. Reset all trip logs and indicators. Investigate units that do not function as designed.
g. Verify operation of charging mechanism. Investigate units that do not function as designed.

3. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
4. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.

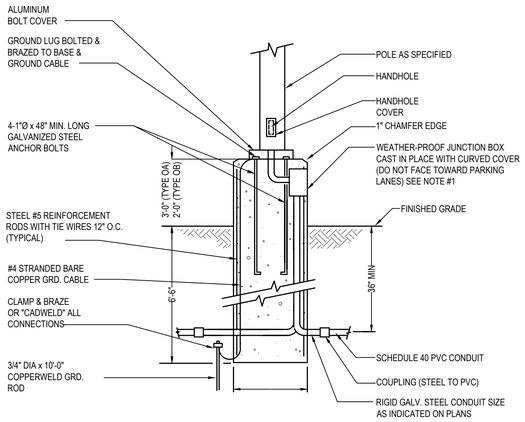
E. Enclosed switches and circuit breakers will be considered defective if they do not pass tests and inspections.

F. Prepare test and inspection reports.

1. Test procedures used.
2. Include identification of each enclosed switch and circuit breaker tested and describe test results.
3. List deficiencies detected, remedial action taken, and observations after remedial action.

END OF SECTION 262816

XREF: 25-0301-TB
XREF: 25-0301-ES1



TYPE OA & OB POLE BASE DETAIL WITH JUNCTION BOX

NO SCALE

NOTE:
1. USE JUNCTION BOX ONLY WHERE 3 OR MORE CONDUITS ENTER POLE BASE.

TYPE "OC"-LIGHT FIXTURE DETAIL

NOT TO SCALE

LIGHTING FIXTURE SCHEDULE

TYPE	DESCRIPTION	MOUNTING	WATTS
OA	LED SINGLE LUMINAIRE AREA LIGHT WITH FLEXIBLE ARM, DIE CAST ALUMINUM HOUSING, CORROSION RESISTANT POLYESTER POWER COAT BRONZE FINISH, IES TYPE III DISTRIBUTION, 120-277V., 4000K, 23328 LUMENS, SURGE PROTECTION. SQUARE STRAIGHT STEEL 20'-0" POLE, 3'-0" BASE (23'-0" OMH). PROVIDE HOUSE SIDE SHIELD FOR FIXTURES AS NOTED ON PLAN. MAYLITE #AE200U MC WCS B 2 ENERGY LIGHT #QS20S4SQ125	POLE	150
OB	LED POST TOP SPINER MOUNT STYLE SITE LIGHTING FIXTURE WITH DIE CAST ALUMINUM HOUSING, CORROSION RESISTANT POWER COAT PAINT FINISH, BRONZE, 120-277V. INPUT, IES TYPE V DISTRIBUTION, 4000K, 6988 LUMENS, 10'-0" ROUND STEEL POLE, 2'-0" CONCRETE BASE (14'-0" OMH). MAYLITE #PSM53 U T5 40 B ENERGY LIGHT #10SO4RS125	POLE	53.3
OC	LED 42½" BOLLARD STYLE SITE LIGHTING FIXTURE WITH EXTRUDED ALUMINUM HOUSING, BRONZE FINISH, 120-277V. INPUT, BRONZE FINISH, 400K, 1450 LUMENS, 80 CRI. MAYLITE #BL-CL RD 17 U 40 B	BASE	17

ELECTRICAL SYMBOL - SITE

ITEM	DESCRIPTION
	UNDERGROUND DUCT BANK WITH FILL AS INDICATED
HH	HANDHOLE - ELECTRIC
HH	HANDHOLE - TELEPHONE
MH	MANHOLE
	SITE LIGHT - BOLLARD
	SITE LIGHT - BOLLARD
	SITE LIGHT - POST TOP MOUNTED
	SITE LIGHT - POST TOP MOUNTED
	SINGLE HEAD SITE LIGHT
	SINGLE HEAD SITE LIGHT
	TWIN HEAD SITE LIGHT
	TWIN HEAD SITE LIGHT
— — E_P — —	UNDERGROUND ELECTRIC SERVICE - PRIMARY
— — E_S — —	UNDERGROUND ELECTRIC SERVICE - SECONDARY
— — T — —	UNDERGROUND TELEPHONE SERVICE
— — SL — —	UNDERGROUND SITE LIGHTING SERVICE
OMH	OVERALL MOUNTING HEIGHT

ELECTRICAL SHEET INDEX

OVERVIEW OF ELECTRICAL SCOPE

THIS OVERVIEW OF SCOPE IS INCLUDED TO GIVE THE CONTRACTOR A GENERAL OVERVIEW OF THE PROJECT REQUIREMENTS. THE OVERVIEW IS NOT ALL INCLUSIVE AND IS NOT INTENDED TO, AND SHOULD NOT BE USED TO, ESTABLISH CONTRACT LIMITS OR PRICING INCLUSIONS. THE CONTRACT DOCUMENTS SHALL BE USED TO ESTABLISH CONSTRUCTION CONTRACT SCOPE.

THIS OVERVIEW OF SCOPE INCLUDES, BUT IS NOT LIMITED TO THE FOLLOWING:

ELECTRICAL:
1. PROVIDE AND INSTALL SITE LIGHTING (BOLLARDS, AREA LIGHTS AND POST TOPS) COMPLETE AS INDICATED.
2. PROVIDE ALLOWANCE FOR RACEWAY SYSTEM FOR FUTURE BUS CHARGERS.
3. REMOVE AND REPLACE CEILING TILES TO ACCOMMODATE INSTALLATION OF SITE LIGHTING CONDUITS AS INDICATED.
4. PROVIDE PROVISIONS TO ADD NEW SITE LIGHTING TO EXISTING SITE LIGHTING CONTROLS.
5. PROVIDE WALL CORES AND SEALANT TO ACCOMMODATE NEW CONDUIT RUNS AS INDICATED.

PROJECT REQUIREMENTS

PROVIDE ALL NECESSARY PERMITS. ALL WORK SHALL BE INSTALLED TO COMPLY WITH THE OWNER'S STANDARDS, STATE AND LOCAL CODES INCLUDING, BUT NOT LIMITED TO, THE FOLLOWING CODES AND THEIR RELATED REFERENCES.

2023 NATIONAL ELECTRICAL CODE AS AMENDED BY THE MICHIGAN CONSTRUCTION CODE PART 8, ELECTRICAL CODE RULES.

NFPA 101 LIFE SAFETY CODE 2012 (AS REFERENCED)

2021 MICHIGAN ENERGY CODE

2021 INTERNATIONAL FIRE CODE (AS REFERENCED)

2015 MICHIGAN REHABILITATION CODE FOR EXISTING BUILDINGS

2021 MICHIGAN MECHANICAL CODE

2018 MICHIGAN PLUMBING CODE

2021 INTERNATIONAL FUEL GAS CODE

2013 NFPA 110 AND NFPA 111

MANUFACTURER AND MODEL NUMBER LISTED REPRESENTS THE BASIS OF DESIGN FOR THIS PROJECT. THE ELECTRICAL CONTRACTOR SHALL BEAR ALL ADDITIONAL COST ASSOCIATED WITH USING EQUIPMENT BY OTHER APPROVED MANUFACTURERS INCLUDING ADDITIONAL COSTS BY OTHER TRADES.

ALL EQUIPMENT INSTALLED SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS. WHERE FIELD OR PROJECT CONDITIONS DO NOT ALLOW ALL MANUFACTURER'S RECOMMENDATIONS TO BE MET, THE INSTALLING CONTRACTOR SHALL SUBMIT IN WRITING TO THE ENGINEER THE PROPOSED DEVIATION, IN A SKETCH FORM, ACCOMPANIED BY THE MANUFACTURER'S CONCURRENCE.

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ARCHITECTURE & ENGINEERING

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248.569.1430 Fax: 248.569.0096
Website: www.dsdonline.com

A/E SEAL

TROY SCHOOL DISTRICT
TRANSPORTATION
SITE LIGHTING
TROY, MI 48083

DATE	ISSUED FOR:
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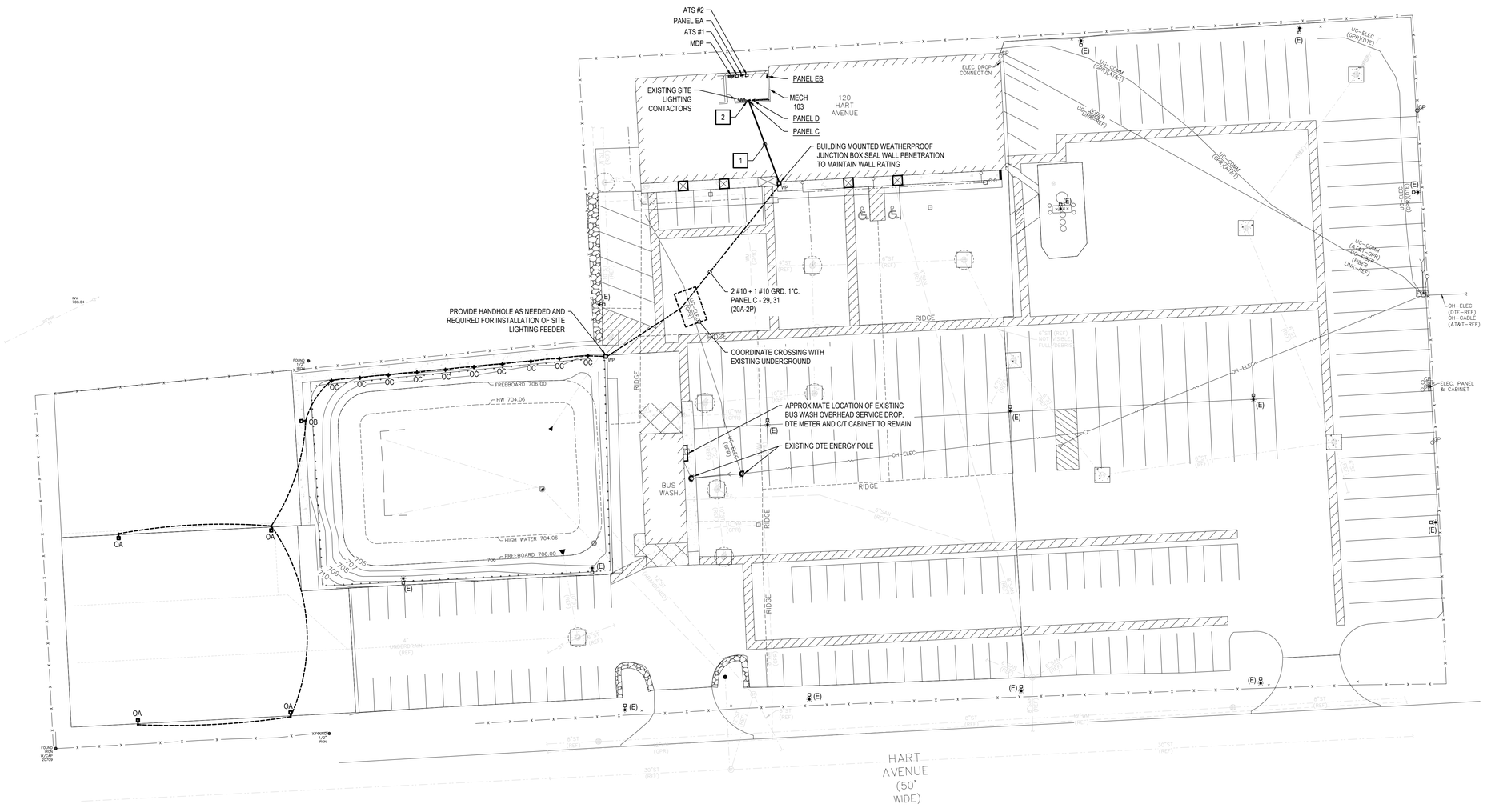
Designer:	B. DORNER
Modeler:	E. SPEARS
PM:	B. DORNER
PIC:	B. REED
ACADFILE:	25-0301-E-001.DWG
Project No.	25-0301

Sheet Title
GENERAL ELECTRICAL INFORMATION

Sheet Number
E-001

XREF: 25-0301-TB
XREF: 25-0301-ASP
XREF: 25-0301-ESP



NORTH

ELECTRICAL SITE PLAN

SCALE: 1" = 30'

0 15 30 60 Feet

SHEET NOTES:

1. COORDINATE ALL ELECTRICAL WORK REQUIRED WITH CIVIL DRAWINGS, DETAILS, DIAGRAMS AND EXISTING CONDITION.
2. THE ELECTRICAL CONTRACTOR SHALL VISIT THE JOB SITE BEFORE SUBMITTING BIDS TO BECOME FAMILIARIZED WITH ACTUAL JOB CONDITIONS AND AREA OF WORK INCLUDING LOCATIONS OF PANELBOARDS SERVING THE PROPOSED ELECTRICAL WORK.
3. ALL UTILITY SHUT DOWNS ARE TO BE COORDINATED WITH THE OWNER'S REPRESENTATIVE A MINIMUM OF THREE WEEKS PRIOR.
4. THE ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR THE REMOVAL AND RE-INSTALLATION OF LAY-IN CEILING TILES TO FACILITATE THE INSTALLATION OF NEW CONDUITS, JUNCTION BOXES, HANGERS AND SUPPORTS.
5. ALL ELECTRICAL ITEMS SHOWN ARE NEW UNLESS OTHERWISE NOTED.
6. ALL ELECTRICAL MATERIALS SHALL BE NEW AND BEAR THE "UL" LABEL OR LISTING.
7. CIRCUIT NUMBERS SHOWN (FROM EXISTING PANELS) ARE FOR REFERENCE ONLY AND MAY NOT REFLECT THE ACTUAL POSITION OF "SPARE" CIRCUIT BREAKERS IN EXISTING PANELS. "SPARE" CIRCUIT BREAKERS ARE THOSE THAT ARE BREAKERS NOT BEING USED.
8. ALL ELECTRICAL ITEMS SHOWN SHALL BE PROVIDED AND INSTALLED ETC. (AS INDICATED) BY THE ELECTRICAL CONTRACTOR UNLESS OTHERWISE NOTED.
9. BRANCH CIRCUIT WIRING SHALL BE "THHN/THWN", UNLESS NOTED ON PLANS. ALL FEEDERS AND SECONDARY SERVICE CONDUCTORS SHALL BE COPPER WITH 600V INSULATION. FEEDERS AND SECONDARY SERVICE CONDUCTORS SHALL BE TYPE "XHHW", INSTALLED IN CONDUIT UNLESS NOTED OTHERWISE.
10. INSTALL ALL CONDUITS WITHIN FINISHED AREAS OF THE BUILDING "CONCEALED", UNLESS SPECIFIC APPROVAL IS RECEIVED FROM THE OWNER OR ARCHITECT TO INSTALL CONDUITS EXPOSED. ALL CUTTING, CORING, PAINTING AND PATCHING OF BUILDING CONSTRUCTION (TO ACCOMMODATE INSTALLATION OF NEW ELECTRICAL ITEMS) SHALL BE DONE BY THE CONTRACTOR, PATCHING SHALL MATCH BUILDING CONSTRUCTION.
11. FUSES SHALL BE "UL"LISTED, DUAL ELEMENT, CLASS RK1 FOR DISCONNECT SWITCH SIZES OF 400 AND 600 AMP, CLASS RK5 FOR DISCONNECT SWITCH SIZE 200 AMP OR LESS AND FOR 800 AMP DISCONNECT SWITCHES, FUSES SHALL BE CLASS L.
12. SEAL ALL CEILING, WALL, AND FLOOR PENETRATIONS WITH APPROVED MATERIAL TO MAINTAIN ALL REQUIRED RATINGS.
13. COORDINATE ALL WALL CORE LOCATIONS WITH STRUCTURAL MEMBERS.
14. ALL LIGHTING CONTROLS SHALL COMPLY WITH THE 2015 MICHIGAN ENERGY CODE. (ASHRAE 90.1, 2013).
15. UPDATE ALL PANEL DIRECTORIES UPON COMPLETION OF WORK.
16. THE USE OF MC CABLE SHALL BE LIMITED TO LIGHTING FIXTURE CONNECTIONS. HOME RUNS SHALL BE IN CONDUIT.
17. ALL BRANCH BREAKERS SERVING LED LIGHTING SHALL BE HID TYPE.

NEW WORK KEYED NOTES:

(SEE PLAN FOR APPLICABLE NOTES)

1. REMOVE AND REPLACE LAY-IN CEILING TILES TO FACILITATE THE INSTALLATION OF NEW SITE LIGHTING CIRCUIT.
2. REMOVE TWO (2) 20A-1P BRANCH BREAKERS (PANEL C 29 & 31) AND REPLACE WITH NEW 20A-2P TO SERVE NEW PARKING LOT AND WALK WAY LIGHTS. CONNECT NEW BREAKER TO EXISTING SITE LIGHTING CONTROLS.

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TROY SCHOOL DISTRICT

TRANSPORTATION SITE LIGHTING

TROY, MI 48083

DATE	ISSUED FOR:
4/16/25	BIDS

Designer:	B. DORNER
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