INDIANOLA MUNICIPAL UTILITIES

Electric • Communications • Water

IMU BOARD OF TRUSTEES OF THE ELECTRIC, WATER AND COMMUNICATIONS UTILITIES

December 26, 2025
2:00 PM
IMU Boardroom
Agenda

1. **Call to Order**
2. **Roll Call**
3. **Public Comment**
4. **Electric Utility Action Items**
   - A. Resolution Setting Public Hearing and Letting for East Iowa Switcher Replacement Project
5. **Communications Utility Action Items**
   - A. Resolution Authorizing Modification of Calix Service Cloud Agreement
6. **Other Business**
7. **Adjourn**

RESOLUTION NO 2025-

RESOLUTION SETTING PUBLIC HEARING AND LETTING:
EAST IOWA CIRCUIT SWITCHER REPLACEMENT PROJECT - INSTILLATION

Whereas, the Electric Department has requested; and
Whereas, the Board of Trustees deems it advisable and necessary to work on East Iowa Circuit Switcher Replacement Project- Instillation; and
Whereas, the Board of Trustees has caused to be prepared plans, specifications and form of contract together with an estimate of costs; and
Whereas the plans, specifications and form of contract and estimate of cost may be adopted in a contract for the making of the public improvements, and it is necessary pursuant to Chapter 384, Code of Iowa, as amended, to hold a public hearing and to advertise for bids.
NOW, THEREFORE BE IT RESOLVED BY THE INDIANOLA MUNICIPAL UTILITIES BOARD OF TRUSTEES

Section 1: That this Board will meet on February 9, 2026 at 5:30 p.m. in the IMU Customer Service Center, Indianola, Iowa, at which time they will hold a public hearing on the plans and specifications for the aforementioned project. At the hearing, any interested person may appear and file objections to the proposed plans, specifications, form of contract, or estimated cost of the project.
Section 2: That this Board will meet on February 9, 2026, at 5:30 p.m., in IMU Customer Service Center, Indianola, Iowa, and subsequent to the public hearing on said documents, it will consider all bids filed pursuant to the plans, specifications, form of contract, and cost for the aforementioned project.
Section 3: That the amount of the bid security to accompany each bid shall be in an amount which shall conform to the provisions of the notice to bidders as part of said specifications.
Section 4: Sealed proposals will be received at Indianola Municipal Utilities Customer Service Building, at 210 West 2nd Avenue, Indianola, Iowa until 2:00 p.m. on January 30, 2026. The bids will be acted upon by the Board of Trustees at its regular meeting to be held in the IMU Customer Service Center, Indianola, Iowa at 5:30 p.m. on February 9, 2026, or at such later time and place as may then be fixed.
Section 5: That the Notice to Bidders shall be posted in a relevant contractor plan room service with statewide circulation, in a relevant construction lead generating service with statewide circulation, and on the City of Indianola's website, which shall be in accordance with the State Code of Iowa. Posting shall be not less than thirteen clear days nor more than forty-five days prior to January 30, 2026, which is hereby fixed as the date for receiving bids.
Section 6: That the Board Secretary be and is hereby directed to publish notice of hearing once in the "Indianola Record Herald and Tribune", a legal newspaper, printed wholly in the English language, published at least once weekly and having general circulation in this City. Publication shall be not less than four clear days nor more than twenty days prior to the date hereinafter fixed as the date for a public hearing on the plans, specifications, form of contract and estimate of costs for the project, the hearing to be at 5:30 p.m. on February 9, 2026.

Passed and approved this 29th day of December, 2025.

_____
Dom Selgrade, Chairperson

_____
Monica Thompson, Board Secretary

INDIANOLA MUNICIPAL UTILITIES

EAST IOWA SUBSTATION SUBSTATION
CIRCUIT SWITCHER REPLACEMENT PROJECT

INSTALLATION CONTRACT AND SPECIFICATIONS

INDIANOLA MUNICIPAL UTILITIES
IMU
Electric • Communications • Water

ISSUED FOR BIDDING
DECEMBER 22, 2025

P & E ENGINEERING CO.
POWER SYSTEM ANALYSIS AND DESIGN

INDIANOLA MUNICIPAL UTILITIES
East Iowa Circuit Switcher Replacement Project - Installation
Section 00000 - Index

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00410	Bid Form (including Bidder Status Form)
00430	Bid Bond
	Contract Documents
00522	Contract for Construction of a Small Project
00610	Performance Bond
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	Construction Specifications
01000	General Requirements
01001	Sequence of Work
16910	Materials
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33000	Cast-In-Place Concrete
337210	Substation Structural Steel
337226	Substation Bus and Equipment
337233.13	Substation Relays & Controls
337233.19	Substation Testing & Commissioning
337233.33	Raceway for Substations
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Appendix A	East Iowa Substation Construction Drawings (separate volume)

Construction Drawings are listed on first page of Appendix A

NOTICE OF HEARING AND LETTING
EAST IOWA CIRCUIT SWITCHER REPLACEMENT PROJECT - INSTALLATION

Sealed proposals will be received by the Board of Trustees of Indianola Municipal Utilities (IMU), Indianola, Iowa, (Buyer) at the IMU Customer Service Center, 210 W. 2nd Ave., Indianola, Iowa until 2:00 P.M. local time on January 30th, 2025 for a project identified as the EAST IOWA CIRCUIT SWITCHER REPLACEMENT PROJECT - INSTALLATION, and as described in detail in the specifications for the project now on file in the office of the Board Secretary. Proposals will be opened in public session at that time. Proposals will be acted upon by the Board of Trustees at a meeting to be held at the IMU Customer Service Center, 210 W. 2nd Ave., Indianola, Iowa at 5:30 P.M. local time on February 9th, 2026, or at such later time and place as may then be fixed. At that time and place a hearing will be held on the proposed plans, specifications, form of contract and estimate of cost for the improvements, and at the hearing any interested person may appear and file objections to the project or to the cost of the improvements.

The contract includes providing materials and performing work necessary to replace two existing 69kV circuit switchers with circuit breakers, including testing and commissioning on two 69-13kV transformers at the East Iowa Substation, 1300 E. Iowa Avenue, Indianola, IA.

Each proposal shall be sealed in an envelope marked “CK601 AND CK602 REPLACEMENT PROJECT - INSTALLATION”. Each bid must be accompanied in a separate envelope by a bid bond, certified check or cashier’s check drawn on a State of Iowa or federally chartered bank, or a certified share draft on a State of Iowa or federally chartered credit union, in an amount not less than five per cent (5%) of the total value of the Proposal, and made payable to the Buyer as a security that the bidder will enter into a contract for the Work within ten (10) days after the award of the contract to such bidder.

Bidders shall not be permitted to withdraw their bids for a period of sixty (60) days after they are opened.

100% of the amount due the successful bidder will be paid not earlier than 31 days from the final acceptance of the improvements by IMU, subject to the conditions and in accordance with the provisions of Chapter 384 and 573 of the Code of Iowa

Payment to the Contractor for completion of the improvements will be made in cash derived from available cash on hand from revenue and such other sources as may be available to IMU. The City of Indianola shall not incur any general obligation for the Improvements. The contract for the furnishing of the improvements shall not constitute a general obligation of the City of Indianola nor be payable in any manner by taxation.

If the successful bidder fails to execute a contract with IMU for the Improvements, the certified check or cashier’s check deposited by the Supplier shall be cashed, or the bid bond declared forfeited, and proceeds retained by IMU as agreed liquidated damages.

Bidders will be required to complete a Bidder Status Form from the Iowa Department of Labor regarding Bidder’s resident status within the State of Iowa and to submit that form with the bid. Failure to submit a fully completed Bidder Status Form with the bid may result in the bid being deemed nonresponsive and rejected.

Work is to commence on or about February 26th, 2026 and shall be substantially complete not later than May 15th, 2026. Work shall be completed and ready for final payment not later than 30 days after substantial completion.

Plans and specifications governing the furnishing of materials have been prepared by P&E Engineering Co., 500 SW 7th Street, Suite 100, Des Moines, Iowa 50309. The plans and specifications, prior proceedings of IMU referring to and defining the improvements and a proposed contract are hereby made a part of this notice by reference. The proposed contracts shall be executed in accordance with them. Copies of the specifications may be obtained from P & E Engineering Co.

By virtue of statutory authority, preference will be given to products and provisions grown and produced within the State of Iowa and Iowa domestic labor.

IMU reserves the right to reject any or all proposals and to waive informalities. Published upon order of the Board of Trustees Indianola Municipal Utilities, Indianola, Iowa.

MONICA THOMPSON
Board Secretary

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ARTICLE 1—DEFINED TERMS

1.01 Terms used in these Instructions to Bidders have the meanings indicated in the General Conditions and Supplementary Conditions. Additional terms used in these Instructions to Bidders have the meanings indicated below:

A. *Issuing Office*—The office from which the Bidding Documents are to be issued, and which registers plan holders. The Issuing Office for this project will be P & E Engineering Co., 500 SW 7th St., Suite 100, Des Moines, IA 50309.

ARTICLE 2—BIDDING DOCUMENTS

2.01 Bidder shall obtain a complete set of Bidding Requirements and proposed Contract Documents (together, the Bidding Documents). See the Contract for Construction of a Small Project for a list of the Contract Documents. It is Bidder's responsibility to determine that it is using a complete set of documents in the preparation of a Bid. Bidder assumes sole responsibility for errors or misinterpretations resulting from the use of incomplete documents, by Bidder itself or by its prospective Subcontractors and Suppliers.

2.02 Bidding Documents are made available for the sole purpose of obtaining Bids for completion of the Project and permission to download or distribution of the Bidding Documents does not confer a license or grant permission or authorization for any other use. Authorization to download documents, or other distribution, includes the right for plan holders to print documents solely for their use, and the use of their prospective Subcontractors and Suppliers, provided the plan holder pays all costs associated with printing or reproduction. Printed documents may not be re-sold under any circumstances.

2.03 Bidder may register as a plan holder and obtain complete sets of Bidding Documents in printed or electronic (digital) format (compact disk, USB, or direct transmittal) from the Issuing Office. Bidders may rely that sets of Bidding Documents obtained from the Issuing Office are complete, unless an omission is blatant. Registered plan holders will receive Addenda issued by Owner.

2.04 Plan rooms (including construction information subscription services, and electronic and virtual plan rooms) may distribute the Bidding Documents, or make them available for examination. Those prospective bidders that obtain an electronic (digital) copy of the Bidding Documents from a plan room are encouraged to register as plan holders from the Issuing Office. Owner is not responsible for omissions in Bidding Documents or other documents obtained from plan rooms, or for a Bidder's failure to obtain Addenda from a plan room.

2.05 *Electronic Documents*

A. Bidding Documents will be made available as Electronic Documents. Bidding Documents will be provided in Adobe PDF (Portable Document Format) (.pdf). It is the intent of the Engineer and Owner that such Electronic Documents are to be exactly representative of the paper copies of the documents. However, because the Owner and Engineer cannot totally control the transmission and receipt of Electronic Documents nor the Contractor's means of reproduction of such documents, the Owner and Engineer cannot and do not guarantee that Electronic Documents and reproductions prepared from those versions are identical in every manner to the paper copies.

B. The Bidder may use and rely upon complete sets of Electronic Documents of the Bidding Documents, described in Paragraph 2.05.A above. However, Bidder assumes all risks associated with differences arising from transmission/receipt of Electronic Documents versions of Bidding Documents and reproductions prepared from those versions and, further, assumes all risks, costs, and responsibility associated with use of the Electronic Documents versions to derive information that is not explicitly contained in printed paper versions of the documents, and for Bidder's reliance upon such derived information.

C. After the Contract is awarded, the Owner will provide or direct the Engineer to provide for the use of the Contractor documents that were developed by Engineer as part of the Project design process, as Electronic Documents in native file formats.

1. Electronic Documents that are available in native file format include:

a. None

2. Release of such documents will be solely for the convenience of the Contractor. No such document is a Contract Document.

3. The Contractor shall take appropriate measures to verify that any electronic/digital information provided in Electronic Documents is appropriate and adequate for the Contractor's specific purposes.

4. In no case will the Contractor be entitled to additional compensation or time for completion due to any differences between the actual Contract Documents and any related document in native file format.

ARTICLE 3—QUALIFICATIONS OF BIDDERS

3.01 Bidders must complete a Bidder Status Form from the Iowa Department of Labor regarding the Contractor's resident status within the State of Iowa and submit that form with the bid. Failure to submit a fully completed Bidder Status Form with the bid may result in the bid being deemed nonresponsive and rejected.

3.02 To demonstrate Bidder's qualifications to perform the Work, after submitting its Bid and within five (5) days of Owner's request, Bidder must submit the following information:

A. Written evidence establishing its qualifications such as financial data, previous experience, and present commitments.

B. A written statement that Bidder is authorized to do business in the state where the Project is located, or a written certification that Bidder will obtain such authority prior to the Effective Date of the Contract.

C. Bidder's state or other contractor license number, if applicable.

D. Subcontractor and Supplier qualification information.

E. Other required information regarding qualifications.

3.03 A Bidder's failure to submit required qualification information within the times indicated may disqualify Bidder from receiving an award of the Contract.

3.04 No requirement in this Article 3 to submit information will prejudice the right of Owner to seek additional pertinent information regarding Bidder's qualifications.

ARTICLE 4—PRE-BID CONFERENCE

4.01 A pre-bid conference will not be held for this project.

ARTICLE 5—SITE AND OTHER AREAS; EXISTING SITE CONDITIONS; EXAMINATION OF SITE; OWNER'S SAFETY PROGRAM; OTHER WORK AT THE SITE

5.01 *Site Visit and Testing by Bidders*

A. Bidder may visit the Site and conduct a thorough visual examination of the Site and adjacent areas.

B. Bidders visiting the Site are required to arrange their own transportation to the Site.

C. All access to the Site other than during a regularly scheduled Site Visit must be coordinated through the following Owner contact. Bidder must conduct the required Site visit during normal working hours.

Mr. Nate Edwards
Lead Generation
Indianola Municipal Utilities
515-961-9444 (office)
nedwards@indianolaiowa.gov

D. Bidder is not required to conduct any subsurface testing, or exhaustive investigations of Site conditions.

E. On request, and to the extent Owner has control over the Site, and schedule permitting, the Owner will provide Bidder general access to the Site to conduct such additional examinations, investigations, explorations, tests, and studies as Bidder deems necessary for preparing and submitting a successful Bid. Owner will not have any obligation to grant such access if doing so is not practical because of existing operations, security or safety concerns, or restraints on Owner's authority regarding the Site. Bidder is responsible for establishing access needed to reach specific selected test sites.

5.02 *Owner's Safety Program*

A. Site visits and work at the Site may be governed by an Owner safety program. If an Owner safety program exists, it will be noted in the Supplementary Conditions.

5.03 *Other Work at the Site*

A. Reference is made to Article 4 of the General Requirements for the identification of the general nature of other work of which Owner is aware (if any) that is to be performed at the Site by Owner or others (such as utilities and other prime contractors) and relates to the Work contemplated by these Bidding Documents. If Owner is party to a written contract for such other work, then on request, Owner will provide to each Bidder access to examine such contracts (other than portions thereof related to price and other confidential matters), if any.

ARTICLE 6—BIDDER'S REPRESENTATIONS AND CERTIFICATIONS

6.01 *Express Representations and Certifications in Bid Form, Agreement*

A. The Bid Form that each Bidder will submit contains express representations regarding the Bidder's examination of Project documentation and preparation of the Bid, and certifications regarding lack of collusion or fraud in connection with the Bid. Bidder should review these representations and certifications, and assure that Bidder can make the representations and certifications in good faith, before executing and submitting its Bid.

B. If Bidder is awarded the Contract, Bidder (as Contractor) will make similar express representations and certifications when it executes the Agreement.

ARTICLE 7—INTERPRETATIONS AND ADDENDA

7.01 Owner on its own initiative may issue Addenda to clarify, correct, supplement, or change the Bidding Documents.

7.02 Bidder shall submit all questions about the meaning or intent of the Bidding Documents via email to Jared Kline at jakline@peengr.com. Email message must include "Question regarding IMU East Iowa Circuit Switcher Replacement Project" in the subject line. Confirm the email has been received by calling Jared Kline at 515-989-3083.

7.03 Interpretations or clarifications considered necessary by Engineer in response to such questions will be issued by Addenda delivered to all registered plan holders. Questions received less than seven days prior to the date for opening of Bids may not be answered.

7.04 Only responses set forth in an Addendum will be binding. Oral and other interpretations or clarifications will be without legal effect. Responses to questions are not part of the Contract Documents unless set forth in an Addendum that expressly modifies or supplements the Contract Documents.

ARTICLE 8—BID SECURITY

8.01 A Bid must be accompanied by Bid security made payable to Owner in an amount of **5** percent of Bidder's maximum Bid price (determined by adding the base bid and all alternates) and in the form prescribed in the NOTICE OF HEARING AND LETTING.

8.02 The Bid security of the apparent Successful Bidder will be retained until Owner awards the contract to such Bidder, and such Bidder has executed the Contract, furnished the required Contract security, and met the other conditions of the Notice of Award, whereupon the Bid security will be released. If the Successful Bidder fails to execute and deliver the Contract and furnish the required Contract security within 10 days after the Notice of Award, Owner may consider Bidder to be in default, annul the Notice of Award, and the Bid security of that Bidder will be forfeited. Such forfeiture will be Owner's exclusive remedy if Bidder defaults.

8.03 The Bid security of other Bidders that Owner believes to have a reasonable chance of receiving the award may be retained by Owner until the earlier of 7 days after the Effective Date of the

Contract or 61 days after the Bid opening, whereupon Bid security furnished by such Bidders will be released.

8.04 Bid security of other Bidders that Owner believes do not have a reasonable chance of receiving the award will be released within 7 days after the Bid opening.

ARTICLE 9—CONTRACT TIMES

9.01 The number of days within which, or the dates by which, the Work is to be (a) substantially completed and (b) ready for final payment, and (c) Milestones (if any) are to be achieved, are set forth in the Contract for Construction of a Small Project.

ARTICLE 10—SUBSTITUTE AND "OR EQUAL" ITEMS

10.01 The Contract for the Work, as awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents without consideration during the bidding and Contract award process of possible substitute or "or-equal" items. In cases in which the Contract allows the Contractor to request that Engineer authorize the use of a substitute or "or-equal" item of material or equipment, application for such acceptance may not be made to and will not be considered by Engineer until after the Effective Date of the Contract.

10.02 All prices that Bidder sets forth in its Bid will be based on the presumption that the Contractor will furnish the materials and equipment specified or described in the Bidding Documents, as supplemented by Addenda. Any assumptions regarding the possibility of post-Bid approvals of "or-equal" or substitution requests are made at Bidder's sole risk.

ARTICLE 11—SUBCONTRACTORS, SUPPLIERS, AND OTHERS

11.01 The apparent Successful Bidder, and any other Bidder so requested, must submit to Owner a list of the Subcontractors or Suppliers proposed for any portion of the Work within five days after Bid opening:

11.02 If requested by Owner, such list must be accompanied by an experience statement with pertinent information regarding similar projects and other evidence of qualification for each such Subcontractor. If Owner or Engineer, after due investigation, has reasonable objection to any proposed Subcontractor or Supplier, Owner may, before the Notice of Award is given, request apparent Successful Bidder to submit an acceptable substitute, in which case apparent Successful Bidder will submit a substitute.

11.03 If apparent Successful Bidder declines to make any such substitution, Owner may award the Contract to another Bidder who submits the Bid in the best interests of the project that proposes to use acceptable Subcontractors and Suppliers. Declining to make requested substitutions will not constitute grounds for forfeiture of the Bid security of any Bidder. Any Subcontractor or Supplier, so listed and against which Owner or Engineer makes no written objection prior to the giving of the Notice of Award will be deemed acceptable to Owner and Engineer subject to subsequent revocation of such acceptance as provided in Paragraph 7.04 of the Contract for Construction of a Small Project.

ARTICLE 12—PREPARATION OF BID

12.01 The Bid Form is included with the Bidding Documents.

A. All blanks on the Bid Form must be completed in ink and the Bid Form signed in ink. Erasures or alterations must be initialed in ink by the person signing the Bid Form. A Bid price must be indicated for each section, Bid item, alternate, adjustment unit price item, and unit price item listed therein.

B. If the Bid Form expressly indicates that submitting pricing on a specific alternate item is optional, and Bidder elects to not furnish pricing for such optional alternate item, then Bidder may enter the words "No Bid" or "Not Applicable."

12.02 If Bidder has obtained the Bidding Documents as Electronic Documents, then Bidder shall prepare its Bid on a paper copy of the Bid Form printed from the Electronic Documents version of the Bidding Documents. The printed copy of the Bid Form must be clearly legible, printed on 8½ inch by 11-inch paper and as closely identical in appearance to the Electronic Document version of the Bid Form as may be practical. The Owner reserves the right to accept Bid Forms which nominally vary in appearance from the original paper version of the Bid Form, providing that all required information and submittals are included with the Bid.

12.03 A Bid by a corporation must be executed in the corporate name by a corporate officer (whose title must appear under the signature), accompanied by evidence of authority to sign. The corporate address and state of incorporation must be shown.

12.04 A Bid by a partnership must be executed in the partnership name and signed by a partner (whose title must appear under the signature), accompanied by evidence of authority to sign. The official address of the partnership must be shown.

12.05 A Bid by a limited liability company must be executed in the name of the firm by a member or other authorized person and accompanied by evidence of authority to sign. The state of formation of the firm and the official address of the firm must be shown.

12.06 A Bid by an individual must show the Bidder's name and official address.

12.07 A Bid by a joint venture must be executed by an authorized representative of each joint venturer in the manner indicated on the Bid Form. The joint venture must have been formally established prior to submittal of a Bid, and the official address of the joint venture must be shown.

12.08 All names must be printed in ink below the signatures.

12.09 The Bid must contain an acknowledgment of receipt of all Addenda, the numbers of which must be filled in on the Bid Form.

12.10 Postal and e-mail addresses and telephone number for communications regarding the Bid must be shown.

12.11 The Bid must contain evidence of Bidder's authority to do business in the state where the Project is located, or Bidder must certify in writing that it will obtain such authority within the time for acceptance of Bids and attach such certification to the Bid.

12.12 If Bidder is required to be licensed to submit a Bid or perform the Work in the state where the Project is located, the Bid must contain evidence of Bidder's licensure, or Bidder must certify in writing that it will obtain such licensure within the time for acceptance of Bids and attach such

certification to the Bid. Bidder's state contractor license number, if any, must also be shown on the Bid Form.

ARTICLE 13—BASIS OF BID

13.01 *Lump Sum*

A. Bidders must submit a Bid on a lump sum basis for each item listed in the lump sum section of the Bid Form.

ARTICLE 14—SUBMITTAL OF BID

14.01 The Bidding Documents include one separate unbound copy of the Bid Form. The unbound copy of the Bid Form is to be completed and submitted with the Bid security, Bidder Status Form, and the other documents required to be submitted under the terms of Article 2 of the Bid Form. See Paragraph 12.02 for submittal of a Bid from Bid Documents that are received as Electronic Documents

14.02 A Bid must be received no later than the date and time prescribed and at the place indicated in the Advertisement or invitation to bid and must be enclosed in a plainly marked package with the Project title, and, if applicable, the designated portion of the Project for which the Bid is submitted, and the name and address of Bidder. This package shall be plainly labeled "BID ENCLOSED."

14.03 The sealed envelope containing the Bid and all required documents must be plainly marked with the notation "BID ENCLOSED".

14.04 The sealed envelope containing the bid security must be plainly marked with the notation "BID SECURTY ENCLOSED".

14.05 A Bid sent by mail shall be addressed to:

Indianola Municipal Utilities
Attn: Ms. Chris Longer
210 West 2nd Avenue
Indianola, IA 50125
515-961-9444

14.06 A bid sent by delivery service or hand delivered shall be delivered to:

Indianola Municipal Utilities
Attn: Ms. Chris Longer
210 West 2nd Avenue
Indianola, IA 50125
515-961-9444

14.07 Bids received after the date and time prescribed for the opening of bids, or not submitted at the correct location or in the designated manner, will not be accepted and will be returned to the Bidder unopened.

ARTICLE 15—MODIFICATION AND WITHDRAWAL OF BID

15.01 An unopened Bid may be withdrawn by an appropriate document duly executed in the same manner that a Bid must be executed and delivered to the place where Bids are to be submitted prior to the date and time for the opening of Bids. Upon receipt of such notice, the unopened Bid will be returned to the Bidder.

15.02 If a Bidder wishes to modify its Bid prior to Bid opening, Bidder must withdraw its initial Bid in the manner specified in Paragraph 15.01 and submit a new Bid prior to the date and time for the opening of Bids.

15.03 If within 24 hours after Bids are opened any Bidder files a duly signed written notice with Owner and promptly thereafter demonstrates to the reasonable satisfaction of Owner that there was a material and substantial mistake in the preparation of its Bid, the Bidder may withdraw its Bid, and the Bid security will be returned. Thereafter, if the Work is rebid, the Bidder will be disqualified from further bidding on the Work.

ARTICLE 16—OPENING OF BIDS

16.01 Bids will be opened at the time and place indicated in the Notice of Hearing and Letting and, unless obviously non-responsive, read aloud publicly. An abstract of the amounts of the base Bids and major alternates, if any, will be made available to Bidders after the opening of Bids.

ARTICLE 17—BIDS TO REMAIN SUBJECT TO ACCEPTANCE

17.01 All Bids will remain subject to acceptance for the period of time stated in the Bid Form, but Owner may, in its sole discretion, release any Bid and return the Bid security prior to the end of this period.

ARTICLE 18—EVALUATION OF BIDS AND AWARD OF CONTRACT

18.01 Owner reserves the right to reject any or all Bids, including without limitation, nonconforming, nonresponsive, unbalanced, or conditional Bids. Owner also reserves the right to waive all minor Bid informalities not involving price, time, or changes in the Work.

18.02 Owner will reject the Bid of any Bidder that Owner finds, after reasonable inquiry and evaluation, to not be responsible.

18.03 If Bidder purports to add terms or conditions to its Bid, takes exception to any provision of the Bidding Documents, or attempts to alter the contents of the Contract Documents for purposes of the Bid, whether in the Bid itself or in a separate communication to Owner or Engineer, then Owner will reject the Bid as nonresponsive.

18.04 If Owner awards the contract for the Work, such award will be to the responsible Bidder whose bid is considered to be in the best interest of the Owner.

18.05 *Evaluation of Bids*

A. In evaluating Bids, Owner will consider whether the Bids comply with the prescribed requirements, and such alternates, unit prices, and other data, as may be requested in the Bid Form or prior to the Notice of Award.

B. For the determination of the apparent successful Bidder when unit price bids are submitted, Bids will be compared on the basis of the total of the products of the estimated quantity of each item and unit price Bid for that item, together with any lump sum items.

18.06 In evaluating whether a Bidder is responsible, Owner will consider the qualifications of the Bidder and may consider the qualifications and experience of Subcontractors and Suppliers proposed for those portions of the Work for which the identity of Subcontractors and Suppliers must be submitted as provided in the Bidding Documents.

18.07 Owner may conduct such investigations as Owner deems necessary to establish the responsibility, qualifications, and financial ability of Bidders and any proposed Subcontractors or Suppliers.

ARTICLE 19—BONDS AND INSURANCE

19.01 Article 6 of the General Conditions, as may be modified by the Supplementary Conditions, sets forth Owner's requirements as to performance and payment bonds and insurance. When the Successful Bidder delivers the executed Agreement to Owner, it must be accompanied by required bonds and insurance documentation.

ARTICLE 20—SIGNING OF CONTRACT FOR CONSTRUCTION OF A SMALL PROJECT

20.01 When Owner issues a Notice of Award to the Successful Bidder, it will be accompanied by the unexecuted counterparts of the Contract for Construction of a Small Project along with the other Contract Documents as identified in the Contract for Construction of a Small Project. Within 10 days thereafter, Successful Bidder must execute and deliver the required number of counterparts of the Contract for Construction of a Small Project and any bonds and insurance documentation required to be delivered by the Contract Documents to Owner. Within 10 days thereafter, Owner will deliver one fully executed counterpart of the Contract for Construction of a Small Project to Successful Bidder, together with printed and/or electronic copies of the Contract Documents as stated in Paragraph 2.02 of the Contract for Construction of a Small Project.

ARTICLE 21—SALES AND USE TAXES

21.01 Owner is subject to state and local sales and use taxes on materials and equipment to be incorporated in the Work. **SAID TAXES SHALL BE INCLUDED IN THE BID**.

The terms used in this Bid with initial capital letters have the meanings stated in the Instructions to Bidders and the Contract for Construction of a Small Project.

ARTICLE 1—OWNER AND BIDDER

1.01 This Bid is submitted to:

Indianola Municipal Utilities
210 West 2nd Avenue
Indianola, IA 50125

The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into a Contract with Owner in the form included in the Bidding Documents to perform all Work as specified or indicated in the Bidding Documents for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Bidding Documents.

ARTICLE 2—ATTACHMENTS TO THIS BID

2.01 The following documents are submitted with and made a condition of this Bid:

A. Evidence of authority to do business in the state of the Project; or a written covenant to obtain such authority within the time for acceptance of Bids;

B. Contractor's license number as evidence of Bidder's State Contractor's License or a covenant by Bidder to obtain said license within the time for acceptance of Bids;

C. A completed Bidder Status Form regarding the Contractor's resident status within the State of Iowa. A blank Bidder Status Form follows this Bid Form.

ARTICLE 3—BASIS OF BID—LUMP SUM BID AND UNIT PRICES

3.01 *Lump Sum Bids*

A. Bidder (_____) will complete the Work in accordance with the Contract Documents for the following lump sum (stipulated) price(s):

1. Lump Sum Price (Single Lump Sum)

Lump Sum Bid Price	$

3.02 *Proposed Testing Contractor*

A. Bidder proposes to utilize the following testing contractor:

_____

ARTICLE 4—TIME OF COMPLETION

4.01 Bidder agrees that the Work will be substantially complete and will be completed and ready for final payment in accordance with Article 4 of the Contract for Construction of a Small Project (Section 00522) on or before the dates or within the number of calendar days indicated in the Contract.

ARTICLE 5—BIDDER'S ACKNOWLEDGEMENTS: ACCEPTANCE PERIOD, INSTRUCTIONS, AND RECEIPT OF ADDENDA

5.01 *Bid Acceptance Period*

A. This Bid will remain subject to acceptance for 60 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner.

5.02 *Instructions to Bidders*

A. Bidder accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of Bid security.

5.03 *Receipt of Addenda*

A. Bidder hereby acknowledges receipt of the following Addenda:

Addendum Number	Addendum Date

ARTICLE 6—BIDDER'S REPRESENTATIONS AND CERTIFICATIONS

6.01 *Bidder's Representations*

A. In submitting this Bid, Bidder represents the following:

1. Bidder has examined and carefully studied the Bidding Documents, including Addenda.
2. If necessary, Bidder has visited the Site, conducted a thorough visual examination of the Site and adjacent areas, and become familiar with the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
3. Bidder is familiar with all Laws and Regulations that may affect cost, progress, and performance of the Work.
4. Bidder has considered the information known to Bidder itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and the Technical Data identified in the Supplementary Conditions or by definition, with respect to the effect of such information, observations, and Technical Data on (a) the cost, progress, and performance of the Work; (b) the means, methods, techniques, sequences, and

procedures of construction to be employed by Bidder, if selected as Contractor; and (c) Bidder's (Contractor's) safety precautions and programs.

5. Based on the information and observations referred to in the preceding paragraph, Bidder agrees that no further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract.
6. Bidder is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.
7. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and of discrepancies between Site conditions and the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.
8. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.
9. The submission of this Bid constitutes an incontrovertible representation by Bidder that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

6.02 *Bidder's Certifications*

A. The Bidder certifies the following:

1. This Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation.
2. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid.
3. Bidder has not solicited or induced any individual or entity to refrain from bidding.
4. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph 6.02.A:
    a. Corrupt practice means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process.
    b. Fraudulent practice means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of Owner, (b) to establish bid prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition.
    c. Collusive practice means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish bid prices at artificial, non-competitive levels.

d. Coercive practice means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

BIDDER hereby submits this Bid as set forth above:

Bidder:

_____
(typed or printed name of organization)

By: _____
(individual's signature)

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Date: _____
(typed or printed)

If Bidder is a corporation, a partnership, or a joint venture, attach evidence of authority to sign.

Attest: _____
(individual's signature)

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Date: _____
(typed or printed)

Address for giving notices:

_____

_____

Bidder's Contact:

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Phone: _____

Email: _____

Address:

_____

_____

_____

Bidder's Contractor License No.: (if applicable) _____

Bidder Status Form

To be completed by all bidders — Part A

Please answer "Yes" or "No" for each of the following:

☐ Yes ☐ No My company is authorized to transact business in Iowa.
(To help you determine if your company is authorized, please review the worksheet on the next page).

☐ Yes ☐ No My company has an office to transact business in Iowa.

☐ Yes ☐ No My company's office in Iowa is suitable for more than receiving mail, telephone calls, and e-mail.

☐ Yes ☐ No My company has been conducting business in Iowa for at least 3 years prior to the first request for bids on this project.

☐ Yes ☐ No My company is not a subsidiary of another business entity or my company is a subsidiary of another business entity that would qualify as a resident bidder in Iowa.

If you answered "Yes" for each question above, your company qualifies as a resident bidder. Please complete Parts B and D of this form.

If you answered "No" to one or more questions above, your company is a nonresident bidder. Please complete Parts C and D of this form.

To be completed by resident bidders — Part B

My company has maintained offices in Iowa during the past 3 years at the following addresses:

Dates: _____ /_____ /_____ to _____ /_____ /_____ Address: _____

City, State, Zip: _____

Dates: _____ /_____ /_____ to _____ /_____ /_____ Address: _____

City, State, Zip: _____

Dates: _____ /_____ /_____ to _____ /_____ /_____ Address: _____

You may attach additional sheet(s) if needed. City, State, Zip: _____

To be completed by non-resident bidders — Part C

1. Name of home state or foreign country reported to the Iowa Secretary of State:

_____

2. Does your company's home state or foreign country offer preferences to resident bidders, resident labor force preferences or any other type of preference to bidders or laborers? ☐ Yes ☐ No

3. If you answered "Yes" to question 2, identify each preference offered by your company's home state or foreign country and the appropriate legal citation.

_____

_____

You may attach additional sheet(s) if needed.

To be completed by all bidders — Part D

I certify that the statements made on this document are true and complete to the best of my knowledge and I know that my failure to provide accurate and truthful information may be a reason to reject my bid.

Firm Name: _____

Signature: _____ Date: _____

You must submit the completed form to the governmental body requesting bids per 875 Iowa Administrative Code Chapter 156. This form has been approved by the Iowa Labor Commissioner.

Worksheet: Authorization to Transact Business

This worksheet may be used to help complete Part A of the Resident Bidder Status form. If at least one of the following describes your business, you are authorized to transact business in Iowa.

☐ Yes ☐ No My business is currently registered as a contractor with the Iowa Division of Labor.

☐ Yes ☐ No My business is a sole proprietorship and I am an Iowa resident for Iowa income tax purposes.

☐ Yes ☐ No My business is a general partnership or joint venture. More than 50 percent of the general partners or joint venture parties are residents of Iowa for Iowa income tax purposes.

☐ Yes ☐ No My business is an active corporation with the Iowa Secretary of State and has paid all fees required by the Secretary of State, has filed its most recent biennial report, and has not filed articles of dissolution.

☐ Yes ☐ No My business is a corporation whose articles of incorporation are filed in a state other than Iowa, the corporation has received a certificate of authority from the Iowa secretary of state, has filed its most recent biennial report with the secretary of state, and has neither received a certificate of withdrawal from the secretary of state nor had its authority revoked.

☐ Yes ☐ No My business is a limited liability partnership which has filed a statement of qualification in this state and the statement has not been canceled.

☐ Yes ☐ No My business is a limited liability partnership which has filed a statement of qualification in a state other than Iowa, has filed a statement of foreign qualification in Iowa and a statement of cancellation has not been filed.

☐ Yes ☐ No My business is a limited partnership or limited liability limited partnership which has filed a certificate of limited partnership in this state, and has not filed a statement of termination.

☐ Yes ☐ No My business is a limited partnership or a limited liability limited partnership whose certificate of limited partnership is filed in a state other than Iowa, the limited partnership or limited liability limited partnership has received notification from the Iowa secretary of state that the application for certificate of authority has been approved and no notice of cancellation has been filed by the limited partnership or the limited liability limited partnership.

☐ Yes ☐ No My business is a limited liability company whose certificate of organization is filed in Iowa and has not filed a statement of termination.

☐ Yes ☐ No My business is a limited liability company whose certificate of organization is filed in a state other than Iowa, has received a certificate of authority to transact business in Iowa and the certificate has not been revoked or canceled.

BID BOND (PENAL SUM FORM)

Bidder	**Surety**
Name:	Name:
Address *(principal place of business)*:	Address *(principal place of business)*:
Owner	**Bid**
Name: **INDIANOLA MUNICIPAL UTILITIES**	Project *(name and location)*:
Address *(principal place of business)*: **210 WEST 2ND AVE INDIANOLA, IA 50125**	**EAST IOWA CIRCUIT SWITCHER REPLACEMENT PROJECT - INSTALLATION INDIANOLA, IOWA**
	Bid Due Date: **JANUARY 30, 2025**
Bond	
Penal Sum:	
Date of Bond:	

Surety and Bidder, intending to be legally bound hereby, subject to the terms set forth in this Bid Bond, do each cause this Bid Bond to be duly executed by an authorized officer, agent, or representative.

Bidder	Surety
_____ *(Full formal name of Bidder)*	_____ *(Full formal name of Surety) (corporate seal)*
By: _____ *(Signature)*	By: _____ *(Signature) (Attach Power of Attorney)*
Name: _____ *(Printed or typed)*	Name: _____ *(Printed or typed)*
Title: _____	Title: _____
Attest: _____ *(Signature)*	Attest: _____ *(Signature)*
Name: _____ *(Printed or typed)*	Name: _____ *(Printed or typed)*
Title:	Title:

Notes: (1) Note: Addresses are to be used for giving any required notice. (2) Provide execution by any additional parties, such as joint venturers, if necessary.

1. Bidder and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to pay to Owner upon default of Bidder the penal sum set forth on the face of this Bond. Payment of the penal sum is the extent of Bidder's and Surety's liability. Recovery of such penal sum under the terms of this Bond will be Owner's sole and exclusive remedy upon default of Bidder.
2. Default of Bidder occurs upon the failure of Bidder to deliver within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents.
3. This obligation will be null and void if:
    3.1. Owner accepts Bidder's Bid and Bidder delivers within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents, or
    3.2. All Bids are rejected by Owner, or
    3.3. Owner fails to issue a Notice of Award to Bidder within the time specified in the Bidding Documents (or any extension thereof agreed to in writing by Bidder and, if applicable, consented to by Surety when required by Paragraph 5 hereof).
4. Payment under this Bond will be due and payable upon default of Bidder and within 30 calendar days after receipt by Bidder and Surety of written notice of default from Owner, which notice will be given with reasonable promptness, identifying this Bond and the Project and including a statement of the amount due.
5. Surety waives notice of any and all defenses based on or arising out of any time extension to issue Notice of Award agreed to in writing by Owner and Bidder, provided that the total time for issuing Notice of Award including extensions does not in the aggregate exceed 120 days from the Bid due date without Surety's written consent.
6. No suit or action will be commenced under this Bond prior to 30 calendar days after the notice of default required in Paragraph 4 above is received by Bidder and Surety, and in no case later than one year after the Bid due date.
7. Any suit or action under this Bond will be commenced only in a court of competent jurisdiction located in the state in which the Project is located.
8. Notices required hereunder must be in writing and sent to Bidder and Surety at their respective addresses shown on the face of this Bond. Such notices may be sent by personal delivery, commercial courier, or by United States Postal Service registered or certified mail, return receipt requested, postage pre-paid, and will be deemed to be effective upon receipt by the party concerned.
9. Surety shall cause to be attached to this Bond a current and effective Power of Attorney evidencing the authority of the officer, agent, or representative who executed this Bond on behalf of Surety to execute, seal, and deliver such Bond and bind the Surety thereby.
10. This Bond is intended to conform to all applicable statutory requirements. Any applicable requirement of any applicable statute that has been omitted from this Bond will be deemed to be included herein as if set forth at length. If any provision of this Bond conflicts with any applicable statute, then the provision of said statute governs and the remainder of this Bond that is not in conflict therewith continues in full force and effect.
11. The term "Bid" as used herein includes a Bid, offer, or proposal as applicable.

CONTRACT FOR CONSTRUCTION OF A SMALL PROJECT

This Contract is by and between INDIANOLA MUNICIPAL UTILITIES (Owner) and _____ (Contractor).

Owner and Contractor hereby agree as follows:

ARTICLE 1 - THE WORK

1.01 Work

A. Work includes all labor, materials, equipment, services, and documentation necessary to construct the Project defined herein. The Work may include related services such as testing, start-up, and commissioning, all as required by the Contract Documents.

B. The Contractor shall complete all Work as specified or indicated in the Contract Documents. The Project is generally described as follows:

1. **EAST IOWA CIRCUIT SWITCHER REPLACEMENT PROJECT - INSTALLATION** which includes providing materials and labor to replace two existing 69kV circuit switchers with circuit breakers. This includes installation, testing and commissioning.

2. The Site of the Work includes property, easements, and designated work areas described in greater detail in the Contract Documents but generally located at the Indianola Municipal Utilities East Iowa Substation.

ARTICLE 2 - CONTRACT DOCUMENTS

2.01 Intent of Contract Documents

A. It is the intent of the Contract Documents to describe a functionally complete project. The Contract Documents do not indicate or describe all the Work required to complete the Project. Additional details required for the correct installation of selected products are to be provided by the Contractor and coordinated with the Owner and Engineer. This Contract supersedes prior negotiations, representations, and agreements, whether written or oral. The Contract Documents are complementary; what is required by one part of the Contract Documents is as binding as if required by other parts of the Contract Documents.

B. During the performance of the Work and until final payment, Contractor and Owner shall submit all matters in question concerning the requirements of the Contract Documents or relating to the acceptability of the Work under the Contract Documents to the Engineer. Engineer will be the initial interpreter of the requirements of the Contract Documents, and judge of the acceptability of the Work thereunder.

C. Engineer will render a written clarification, interpretation, or decision on the issue submitted, or initiate a modification to the Contract Documents.

D. Contractor, and its subcontractors and suppliers, shall not have or acquire any title to or ownership rights to any of the Drawings, Specifications, or other documents (including copies or electronic media editions) prepared by Engineer or its consultants.

2.02 Contract Documents Defined

A. The Contract Documents consist of the following documents:

1. This Contract.
2. Performance bond.
3. Payment bond.
4. Specifications listed in the Table of Contents.
5. Appendices listed in the Table of Contents.
6. Drawings as listed on the Drawing Sheet Indexes.
7. Addenda.
8. Exhibits to this Contract (enumerated as follows):
    a. Contractor Bid.
9. The following which may be delivered or issued on or after the Effective Date of the Contract:
    a. Work Change Directives (EJCDC C-940).
    b. Change Orders (EJCDC C-941).
    c. Field Orders.

ARTICLE 3 - ENGINEER

3.01 Engineer

A. The Engineer for this Project is P&E Engineering Co. with offices at 500 SW 7th Street Suite 100, Des Moines, IA 50309.

ARTICLE 4 - CONTRACT TIMES

4.01 Contract Times

A. Provided ground conditions allow, work is expected to begin on or about February 26th, 2026, the Work will be substantially completed on or before May 15, 2026, and completed and ready for final payment on or before June 15, 2026.

4.02 Liquidated Damages

A. Liquidated damages will not be assessed.

4.03 Delays in Contractor's Progress

A. If Owner, Engineer, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in the Contract Times and Contract Price. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.

B. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delay, disruption, or interference caused by or within the control of Contractor or their subcontractors or suppliers.

C. If Contractor's performance or progress is delayed, disrupted, or interfered with by unanticipated causes not the fault of and beyond the control of Owner, Contractor, and those for which they are responsible, then Contractor shall be entitled to an equitable adjustment in Contract Times.

D. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for any delay, disruption, or interference if such delay is concurrent with a delay, disruption, or interference caused by or within the control of Contractor or Contractor's subcontractors or suppliers.

4.04 Progress Schedules

A. Contractor shall develop a progress schedule and submit to the Engineer for review and comment before starting Work on the Site. The Contractor shall modify the schedule in accordance with the comments provided by the Engineer.

B. The Contractor shall update and submit the progress schedule to the Engineer each month. The Owner may withhold payment if the Contractor fails to submit the schedule.

ARTICLE 5 - CONTRACT PRICE

5.01 Payment

A. Owner shall pay Contractor in accordance with the Contract Documents, the lump sum amount of $**[Contract Price]** for all Work.

ARTICLE 6 - BONDS AND INSURANCE

6.01 Bonds

A. Before starting Work, Contractor shall furnish a performance bond and a payment bond from surety companies that are duly licensed or authorized to issue bonds in the required amounts in the jurisdiction in which the Project is located. Each bond shall be in an amount equal to the Contract Price, as security for the faithful performance and payment of all of Contractor's obligations under the Contract. These bonds shall remain in effect until the completion of the correction period specified in Paragraph 7.12 but, in any case, not less than one year after the date when final payment becomes due.

6.02 Insurance

A. Before starting Work, Contractor shall furnish evidence of insurance from companies that are duly licensed or authorized in the jurisdiction in which the Project is located with a

minimum AM Best rating of A-VII or better. Contractor shall provide insurance in accordance with the following:

1. Contractor shall provide coverage for not less than the following amounts, or greater where required by Laws and Regulations:

   a. Workers' Compensation:

State:		Statutory
Employer's Liability:		
Bodily Injury, each Accident	$	1,000,000
Bodily Injury By Disease, each Employee	$	1,000,000
Bodily Injury/Disease Aggregate	$	1,000,000

   b. Commercial General Liability:

General Aggregate	$	2,000,000
Products - Completed Operations Aggregate	$	2,000,000
Personal and Advertising Injury	$	1,000,000
Each Occurrence (Bodily Injury and Property Damage)	$	1,000,000

   c. Automobile Liability herein:

Bodily Injury:		
Each Person	$	500,000
Each Accident	$	1,000,000
Property Damage:		
Each Accident	$	500,000
Combined Single Limit of:	$	1,000,000

   d. Excess or Umbrella Liability:

Per Occurrence	$	3,000,000
General Aggregate	$	3,000,000

   e. Contractor's Pollution Liability:

Each Occurrence	$	1,000,000
General Aggregate	$	1,000,000

B. All insurance policies required to be purchased and maintained will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 10 days prior written notice has been given to the insured and additional insured.

C. Automobile liability insurance provided by Contractor shall provide coverage against claims for damages because of bodily injury or death of any person or property damage arising out

of the ownership, maintenance, or use of any motor vehicle. The automobile liability policy shall be written on an occurrence basis.

D. Contractor's commercial general liability policy shall be written on a 1996 or later ISO commercial general liability occurrence form and include the following coverages and endorsements:

1. Products and completed operations coverage maintained for three years after final payment;

2. Blanket contractual liability coverage to the extent permitted by law;

3. Broad form property damage coverage; and

4. Severability of interest; underground, explosion, and collapse coverage; personal injury coverage.

E. The Contractor's commercial general liability and automobile liability, umbrella or excess, and pollution liability policies shall include and list Owner and Engineer and the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each as additional insureds; and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby (including as applicable those arising from both ongoing and completed operations) on a non-contributory basis.

1. Additional insured endorsements will include both ongoing operations and products and completed operations coverage through ISO Endorsements CG 20 10 10 01 and CG 20 37 10 01 (together). If Contractor demonstrates to Owner that the specified ISO endorsements are not commercially available, then Contractor may satisfy this requirement by providing equivalent endorsements.

2. Contractor shall provide ISO Endorsement CG 20 32 07 04, "Additional Insured—Engineers, Architects or Surveyors Not Engaged by the Named Insured" or its equivalent for design professional additional insureds.

F. Umbrella or excess liability insurance shall be written over the underlying employer's liability, commercial general liability, and automobile liability insurance. Subject to industry-standard exclusions, the coverage afforded shall be procured on a "follow the form" basis as to each of the underlying policies. Contractor may demonstrate to Owner that Contractor has met the combined limits of insurance (underlying policy plus applicable umbrella) specified for employer's liability, commercial general liability, and automobile liability through the primary policies alone, or through combinations of the primary insurance policies and an umbrella or excess liability policy.

G. The Contractor shall provide property insurance covering physical loss or damage during construction to structures, materials, fixtures, and equipment, including those materials, fixtures, or equipment in storage or transit.

H. If Contractor has failed to obtain and maintain required insurance, Owner may exclude the Contractor from the Site, impose an appropriate set-off against payment, and exercise Owner's termination rights under Article 15.

ARTICLE 7 - CONTRACTOR'S RESPONSIBILITIES

7.01 Supervision and Superintendence

A. Contractor shall supervise and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor shall be solely responsible for the means, methods, techniques, sequences, safety, and procedures of construction.

B. Contractor shall assign a competent resident superintendent who is to be present at all times during the execution of the Work. This resident superintendent shall not be replaced without written notice to and approval by the Owner and Engineer except under extraordinary circumstances.

C. Contractor shall at all times maintain good discipline and order at the Site.

D. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours, Monday through Friday.

7.02 Other Work at the Site

A. In addition to and apart from the Work of the Contractor, other work may occur at or adjacent to the Site. Contractor shall take reasonable and customary measures to avoid damaging, delaying, disrupting, or interfering with the work of Owner, any other contractor, or any utility owner performing other work at or adjacent to the Site.

7.03 Services, Materials, and Equipment

A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start up, and completion of the Work, whether or not such items are specifically called for in the Contract Documents.

B. All materials and equipment incorporated into the Work shall be new, of good quality and shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable supplier, except as otherwise may be provided in the Contract Documents.

7.04 Subcontractors and Suppliers

A. Contractor may retain subcontractors and suppliers for the performance of parts of the Work. Such subcontractors and suppliers must be acceptable to Owner.

7.05 Quality Management

A. Contractor is fully responsible for managing quality to ensure Work is completed in accordance with the Contract Documents.

7.06 Licenses, Fees and Permits

A. Contractor shall pay all license fees and royalties and assume all costs incident to performing the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others.

B. Contractor shall obtain and pay for all construction permits and licenses unless otherwise provided in the Contract Documents.

7.07 Laws and Regulations; Taxes

A. Contractor shall give all notices required by and shall comply with all local, state, and federal Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.

B. Contractor shall bear all resulting costs and losses, and shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages if Contractor performs any Work or takes any other action knowing or having reason to know that it is contrary to Laws or Regulations.

C. Contractor shall pay all applicable sales, consumer, use, and other similar taxes Contractor is required to pay in accordance with Laws and Regulations.

7.08 Record Documents

A. Contractor shall maintain one printed record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, written interpretations and clarifications, and approved shop drawings in a safe place at the Site. Contractor shall annotate them to show changes made during construction. Contractor shall deliver these record documents to Engineer upon completion of the Work.

7.09 Safety and Protection

A. Contractor shall be solely responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work.

B. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury, or loss to:

1. All persons on the Site or who may be affected by the Work;

2. All the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and

3. Other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, other work in progress, utilities, and underground facilities not designated for removal, relocation, or replacement in the course of construction.

C. All damage, injury, or loss to any property caused, directly or indirectly, in whole or in part, by Contractor, or anyone for whose acts the Contractor may be liable, shall be remedied by Contractor at its expense (except damage or loss attributable to the fault of Contract Documents or to the acts or omissions of Owner or Engineer and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor).

D. Contractor shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or exchanged between or among employers at the Site in accordance with Laws or Regulations.

E. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor shall act to prevent threatened damage, injury, or loss. Contractor shall give Engineer prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby or are required as a result thereof. If Engineer determines that a change in the Contract Documents is required because of the action taken by Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued.

7.10 Shop Drawings, Samples, and Other Submittals

A. Contractor shall review and coordinate the shop drawing and samples with the requirements of the Work and the Contract Documents and shall verify all related field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information.

B. Each submittal shall bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review of that submittal, and that Contractor approves the submittal.

C. With each submittal, Contractor shall give Engineer specific written notice, in a communication separate from the submittal, of any variations that the shop drawing or sample may have from the requirements of the Contract Documents.

D. Engineer will provide timely review of shop drawings and samples.

E. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction or to safety precautions or programs.

F. Engineer's review and approval of a separate item does not indicate approval of the assembly in which the item functions.

G. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of shop drawings and submit, as required, new samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous submittals.

H. Shop drawings are not Contract Documents.

7.11 Warranties and Guarantees

A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer and its officers, directors, members, partners, employees, agents, consultants, and subcontractors shall be entitled to rely on Contractor's warranty and guarantee.

7.12 Correction Period

A. If within one year after the date of substantial completion, any Work is found to be defective, or if the repair of any damages to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas used by Contractor as permitted by Laws and Regulations, is found to be defective, then Contractor shall promptly and without cost to Owner, correct such defective Work.

7.13 Indemnification

A. To the fullest extent permitted by Laws and Regulations, and in addition to any other obligations of Contractor under the Contract or otherwise, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom but only to the extent caused by any negligent act or omission of Contractor, any subcontractor, any supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts they may be liable.

ARTICLE 8 - OWNER'S RESPONSIBILITIES

8.01 Owner's Responsibilities

A. Except as otherwise provided in the Contract Documents, Owner shall issue all communications directly to Contractor. Engineer will be responsive to questions from Owner and Contractor.

B. Owner shall make payments to Contractor as provided in this Contract.

C. Owner shall provide Site and easements required to construct the Project.

D. If Owner intends to contract with others for the performance of other work at or adjacent to the Site, unless stated elsewhere in the Contract Documents, Owner shall have sole authority and responsibility for such coordination.

E. The Owner shall be responsible for performing inspections and tests required by applicable codes.

F. The Owner shall not supervise, direct, or have control or authority over, nor be responsible for, Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Owner will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

G. While at the Site, Owner's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Owner has been informed.

H. Owner shall furnish copies of any applicable Owner safety programs to Contractor.

ARTICLE 9 - ENGINEER'S STATUS DURING CONSTRUCTION

9.01 Engineer's Status

A. Engineer will be Owner's representative during construction. The duties and responsibilities and the limitations of authority of Engineer as Owner's representative during construction are set forth in this Contract.

B. Neither Engineer's authority or responsibility under this Article 9 or under any other provision of the Contract, nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer, shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any subcontractor, any supplier, any other individual or entity, or to any surety for or employee or agent of any of them.

C. Engineer will make visits to the Site at intervals appropriate to the various stages of construction. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work.

D. Engineer has the authority to reject Work if Contractor fails to perform Work in accordance with the Contract Documents.

E. Engineer will render decisions regarding the requirements of the Contract Documents, and judge the acceptability of the Work.

F. Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

ARTICLE 10 - CHANGES IN THE WORK

10.01 Authority to Change the Work

A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work.

10.02 Change Orders

A. Owner and Contractor shall execute appropriate Change Orders covering:

1. Changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive;

2. Changes in the Work which are: (a) ordered by Owner or (b) agreed to by the parties or (c) resulting from the Engineer's decision, subject to the need for Engineer's recommendation if the change in the Work involves the design (as set forth in the Drawings, Specifications, or otherwise), or other engineering or technical matters; and

3. Changes in the Contract Price or Contract Times or other changes which embody the substance of any final binding results under Article 12.

B. If the provisions of any bond require notice to be given to a surety of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times), the giving of any such notice will be Contractor's responsibility. The amount of each applicable bond will be adjusted to reflect the effect of any such change.

ARTICLE 11 - DIFFERING SUBSURFACE OR PHYSICAL CONDITIONS

11.01 Differing Conditions Process

A. If Contractor believes that any subsurface or physical condition including but not limited to utilities or other underground facilities that are uncovered or revealed at the Site either differs materially from that shown or indicated in the Contract Documents or is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in Work of the character provided for in the Contract Documents then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except with respect to an emergency) until receipt of a written statement permitting Contractor to do so.

B. After receipt of written notice, Engineer will promptly:

1. Review the subsurface or physical condition in question;
2. Determine necessity for Owner obtaining additional exploration or tests with respect to the condition;
3. Determine whether the condition falls within the differing site condition as stated herein;
4. Obtain any pertinent cost or schedule information from Contractor;
5. Prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the subsurface or physical condition in question and the need for any change in the Drawings or Specifications; and
6. Advise Owner in writing of Engineer's findings, conclusions, and recommendations.

C. After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor regarding the subsurface or physical condition in question, addressing the resumption of Work in connection with such condition, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations, in whole or in part.

ARTICLE 12 - CLAIMS AND DISPUTE RESOLUTION

12.01 Claims Process

A. The party submitting a claim shall deliver it directly to the other party to the Contract and the Engineer promptly (but in no event later than 10 days) after the start of the event giving rise thereto.

B. The party receiving a claim shall review it thoroughly, giving full consideration to its merits. The two parties shall seek to resolve the claim through the exchange of information and direct negotiations. All actions taken on a claim shall be stated in writing and submitted to the other party.

C. If efforts to resolve a claim are not successful, the party receiving the claim may deny it by giving written notice of denial to the other party. If the receiving party does not take action on the claim within 45 days, the claim is deemed denied.

D. If the dispute is not resolved to the satisfaction of the parties, Owner or Contractor shall give written notice to the other party of the intent to submit the dispute to a court of competent jurisdiction unless the Owner and Contractor both agree to an alternative dispute resolution process.

ARTICLE 13 - TESTS AND INSPECTIONS; CORRECTION OF DEFECTIVE WORK

13.01 Tests and Inspections

A. Owner and Engineer will have access to the Site and the Work at reasonable times for their observation, inspection, and testing. Contractor shall provide them proper and safe conditions for such access.

B. Contractor shall give Engineer timely notice of readiness of the Work for all required inspections and tests, and shall cooperate with inspection and testing personnel to facilitate required inspections and tests. Testing and commissioning services will be provided by Contractor as part of the Work.

C. If any Work that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, Contractor shall, if requested by Engineer, uncover such Work for observation. Such uncovering shall be at Contractor's expense.

13.02 Defective Work

A. Contractor shall ensure that the Work is not defective.

B. Engineer has the authority to determine whether Work is defective, and to reject defective Work.

C. Prompt notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor.

D. The Contractor shall promptly correct all such defective Work.

E. When correcting defective Work, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.

F. If the Work is defective or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, then Owner may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated.

ARTICLE 14 - PAYMENTS TO CONTRACTOR

14.01 Progress Payments

A. The Contractor shall prepare a schedule of values that will serve as the basis for progress payments. The schedule of values will be in a form of application for payment acceptable to Engineer. The unit price breakdown submitted with the bid will be used for unit price work. Break lump sum items into units that will allow for measurement of Work in progress.

14.02 Applications for Payments:

A. Contractor shall submit an application for payment in a form acceptable to the Engineer, no more frequently than monthly, to Engineer. Applications for payment will be prepared and signed by Contractor. Contractor shall provide supporting documentation required by the Contract Documents. Payment will be paid for Work completed and materials stored on Owner premises as of the date of the application for payment.

B. Beginning with the second application for payment, each application shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied on account to discharge Contractor's legitimate obligations associated with prior applications for payment.

14.03 Retainage

A. The Owner shall retain 5% of each progress payment until the Work is substantially complete.

14.04 Review of Applications

A. Within 10 days after receipt of each application for payment, the Engineer will either indicate in writing a recommendation for payment and present the application for payment to Owner or return the application for payment to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. The Contractor will make the necessary corrections and resubmit the application for payment.

B. Engineer will recommend reductions in payment (set-offs) which, in the opinion of the Engineer, are necessary to protect Owner from loss because the Work is defective and requires correction or replacement.

C. The Owner is entitled to impose set-offs against payment based on any claims that have been made against Owner on account of Contractor's conduct in the performance of the Work, incurred costs, losses, or damages on account of Contractor's conduct in the performance of the Work, or liquidated damages that have accrued as a result of Contractor's failure to complete the Work.

14.05 Contractor's Warranty of Title

A. Contractor warrants and guarantees that title to all Work, materials, and equipment furnished under the Contract will pass to Owner free and clear of (1) all liens and other title defects, and (2) all patent, licensing, copyright, or royalty obligations, no later than seven days after the time of payment by Owner.

14.06 Substantial Completion

A. The Contractor shall notify Owner and Engineer in writing that the Work is substantially complete and request the Engineer issue a certificate of substantial completion when Contractor considers the Work ready for its intended use. Contractor shall at the same time submit to Owner and Engineer an initial draft of punch list items to be completed or corrected before final payment.

B. Engineer will make an inspection of the Work with the Owner and Contractor to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor and Owner in writing giving the reasons therefor.

C. If Engineer considers the Work substantially complete or upon resolution of all reasons for non-issuance of a certificate identified in 14.06.B, Engineer will deliver to Owner a certificate

of substantial completion which shall fix the date of substantial completion and include a punch list of items to be completed or corrected before final payment.

14.07 Final Inspection

A. Upon written notice from Contractor that the entire Work is complete, Engineer will promptly make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars in which this inspection reveals that the Work, or agreed portion thereof, is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

14.08 Final Payment

A. Contractor may make application for final payment after Contractor has satisfactorily completed all Work defined in the Contract, including providing all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of inspection, annotated record documents and other documents.

B. The final application for payment shall be accompanied (except as previously delivered) by:

1. All documentation called for in the Contract Documents;

2. Consent of the surety to final payment;

3. Satisfactory evidence that all title issues have been resolved such that title to all Work, materials, and equipment has passed to Owner free and clear of any liens or other title defects, or will so pass upon final payment;

4. A list of all disputes that Contractor believes are unsettled; and

5. Complete and legally effective releases or waivers (satisfactory to Owner) of all lien rights arising out of the Work, and of liens filed in connection with the Work.

C. The Work is complete (subject to surviving obligations) when it is ready for final payment as established by the Engineer's written recommendation of final payment.

14.09 Waiver of Claims

A. The making of final payment will not constitute a waiver by Owner of claims or rights against Contractor.

B. The acceptance of final payment by Contractor will constitute a waiver by Contractor of all claims and rights against Owner other than those pending matters that have been duly submitted.

ARTICLE 15 - SUSPENSION OF WORK AND TERMINATION

15.01 Owner May Suspend Work

A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 60 consecutive days by written notice to Contractor and Engineer. Such notice will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be entitled to an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension.

15.02 Owner May Terminate for Cause

A. Contractor's failure to perform the Work in accordance with the Contract Documents or other failure to comply with a material term of the Contract Documents will constitute a default by Contractor and justify termination for cause.

B. If Contractor defaults in its obligations, then after giving Contractor and any surety ten days written notice that Owner is considering a declaration that Contractor is in default and termination of the Contract, Owner may proceed to:

1. Declare Contractor to be in default, and give Contractor and any surety notice that the Contract is terminated; and

2. Enforce the rights available to Owner under any applicable performance bond.

C. Owner may not proceed with termination of the Contract under Paragraph 15.02.B if Contractor within seven days of receipt of notice of intent to terminate begins to correct its failure to perform and proceeds diligently to cure such failure.

D. Subject to the terms and operation of any applicable performance bond, if Owner has terminated the Contract for cause, Owner may exclude Contractor from the Site, take possession of the Work, incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere, and complete the Work as Owner may deem expedient.

E. In the case of a termination for cause, if the cost to complete the Work, including related claims, costs, losses, and damages, exceeds the unpaid contract balance, Contractor shall pay the difference to Owner.

15.03 Owner May Terminate for Convenience

A. Upon seven days written notice to Contractor, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for, without duplication of any items:

1. Completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;

2. Expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses; and

3. Other reasonable expenses directly attributable to termination, including costs incurred to prepare a termination for convenience cost proposal.

B. Contractor shall not be paid on account of loss of anticipated overhead, profits, or revenue, or other economic loss arising out of or resulting from such termination.

15.04 Contractor May Stop Work or Terminate

A. If, through no act or fault of Contractor, (1) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (2) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days written notice to Owner, and provided Owner does not remedy such

suspension or failure within that time, either stop the Work until payment is received, or terminate the Contract and recover payment from the Owner.

ARTICLE 16 - CONTRACTOR'S REPRESENTATIONS

16.01 Contractor Representations

A. Contractor makes the following representations when entering into this Contract:

1. Contractor has examined and carefully studied the Contract Documents, and any data and reference items identified in the Contract Documents.

2. Contractor has visited the Site, conducted a thorough visual examination of the Site and adjacent areas, and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.

3. Contractor is familiar with and is satisfied as to all Laws and Regulations that may affect cost, progress, and performance of the Work.

4. Contractor has considered the information known to Contractor itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Contract Documents; and the Site-related reports and drawings identified in the Contract Documents, with respect to the effect of such information, observations, and documents on:

   a. The cost, progress, and performance of the Work;

   b. The means, methods, techniques, sequences, and procedures of construction to be employed by Contractor; and

   c. Contractor's safety precautions and programs.

5. Based on the information and observations referred to in the preceding paragraph, Contractor agrees that no further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract.

6. Contractor is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Contract Documents.

7. Contractor has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Contractor has discovered in the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.

8. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

9. Contractor's entry into this Contract constitutes an incontrovertible representation by Contractor that, without exception, all prices in the Contract are premised upon performing and furnishing the Work required by the Contract Documents.

ARTICLE 17 - MISCELLANEOUS

17.01 Cumulative Remedies

A. The duties and obligations imposed by this Contract and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract. The provisions of this paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

17.02 Limitation of Damages

A. Neither Owner, Engineer, nor any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, shall be liable to Contractor for any claims, costs, losses, or damages sustained by Contractor on or in connection with any other project or anticipated project.

17.03 No Waiver

A. A party's non-enforcement of any provision shall not constitute a waiver of that provision, nor shall it affect the enforceability of that provision or of the remainder of this Contract.

17.04 Survival of Obligations

A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract, as well as all continuing obligations indicated in the Contract, will survive final payment, completion, and acceptance of the Work or termination or completion of the Contract or termination of the services of Contractor.

17.05 Contractor's Certifications

A. Contractor certifies that it has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for or in executing the Contract.

17.06 Controlling Law

A. This Contract is to be governed by the law of the state in which the Project is located.

IN WITNESS WHEREOF, Owner and Contractor have signed this Contract.

This Contract will be effective on _____ (which is the Effective Date of the Contract).

OWNER: INDIANOLA MUNICIPAL UTILITIES	CONTRACTOR:
_____	_____
By: _____	By: _____
Title: _____	Title: _____
	(If Contractor is a corporation, a partnership, or a joint venture, attach evidence of authority to sign.)
Attest: _____	Attest: _____
Title: _____	Title: _____
Address for giving notices:	Address for giving notices:
210 WEST 2ND AVE	
INDIANOLA, IA 50125	
	License No.: _____ (where applicable)
(If Owner is a corporation, attach evidence of authority to sign. If Owner is a public body, attach evidence of authority to sign and resolution or other documents authorizing execution of this Contract.)	***NOTE TO USER: Use in those states or other jurisdictions where applicable or required.***

PERFORMANCE BOND

Contractor Name: **[Full formal name of Contractor]** Address *(principal place of business)*: **[Address of Contractor's principal place of business]**	**Surety** Name: **[Full formal name of Surety]** Address *(principal place of business)*: **[Address of Surety's principal place of business]**
Owner Name: **INDIANOLA MUNICIPAL UTILITIES** Mailing address *(principal place of business)*: **210 WEST 2ND AVE** **INDIANOLA, IA 50125**	**Contract** Description *(name and location)*: **EAST IOWA CIRCUIT SWITCHER REPLACEMENT PROJECT - INSTALLATION** **INDIANOLA, IOWA** Contract Price: **[Amount from Contract]** Effective Date of Contract: **[Date from Contract]**

Bond

Bond Amount: **[Amount]**

Date of Bond: **[Date]**

(Date of Bond cannot be earlier than Effective Date of Contract)

Modifications to this Bond form:

☐ None ☐ See Paragraph 16

Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth in this Performance Bond, do each cause this Performance Bond to be duly executed by an authorized officer, agent, or representative.

Contractor as Principal	Surety
_____ *(Full formal name of Contractor)*	_____ *(Full formal name of Surety) (corporate seal)*
By: _____ *(Signature)*	By: _____ *(Signature)(Attach Power of Attorney)*
Name: _____ *(Printed or typed)*	Name: _____ *(Printed or typed)*
Title: _____	Title: _____
Attest: _____ *(Signature)*	Attest: _____ *(Signature)*
Name: _____ *(Printed or typed)*	Name: _____ *(Printed or typed)*
Title: _____	Title: _____

Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party is considered plural where applicable.

1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner for the performance of the Construction Contract, which is incorporated herein by reference.
2. If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except when applicable to participate in a conference as provided in Paragraph 3.
3. If there is no Owner Default under the Construction Contract, the Surety's obligation under this Bond will arise after:
    3.1. The Owner first provides notice to the Contractor and the Surety that the Owner is considering declaring a Contractor Default. Such notice may indicate whether the Owner is requesting a conference among the Owner, Contractor, and Surety to discuss the Contractor's performance. If the Owner does not request a conference, the Surety may, within five (5) business days after receipt of the Owner's notice, request such a conference. If the Surety timely requests a conference, the Owner shall attend. Unless the Owner agrees otherwise, any conference requested under this Paragraph 3.1 will be held within ten (10) business days of the Surety's receipt of the Owner's notice. If the Owner, the Contractor, and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement does not waive the Owner's right, if any, subsequently to declare a Contractor Default;
    3.2. The Owner declares a Contractor Default, terminates the Construction Contract and notifies the Surety; and
    3.3. The Owner has agreed to pay the Balance of the Contract Price in accordance with the terms of the Construction Contract to the Surety or to a contractor selected to perform the Construction Contract.
4. Failure on the part of the Owner to comply with the notice requirement in Paragraph 3.1 does not constitute a failure to comply with a condition precedent to the Surety's obligations, or release the Surety from its obligations, except to the extent the Surety demonstrates actual prejudice.
5. When the Owner has satisfied the conditions of Paragraph 3, the Surety shall promptly and at the Surety's expense take one of the following actions:
    5.1. Arrange for the Contractor, with the consent of the Owner, to perform and complete the Construction Contract;
    5.2. Undertake to perform and complete the Construction Contract itself, through its agents or independent contractors;
    5.3. Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and a contractor selected with the Owners concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Paragraph 7 in excess of the Balance of the Contract Price incurred by the Owner as a result of the Contractor Default; or
    5.4. Waive its right to perform and complete, arrange for completion, or obtain a new contractor, and with reasonable promptness under the circumstances:

5.4.1 After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, make payment to the Owner; or

5.4.2 Deny liability in whole or in part and notify the Owner, citing the reasons for denial.

6. If the Surety does not proceed as provided in Paragraph 5 with reasonable promptness, the Surety shall be deemed to be in default on this Bond seven days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Paragraph 5.4, and the Owner refuses the payment, or the Surety has denied liability, in whole or in part, without further notice, the Owner shall be entitled to enforce any remedy available to the Owner.

7. If the Surety elects to act under Paragraph 5.1, 5.2, or 5.3, then the responsibilities of the Surety to the Owner will not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety will not be greater than those of the Owner under the Construction Contract. Subject to the commitment by the Owner to pay the Balance of the Contract Price, the Surety is obligated, without duplication for:

   7.1. the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;

   7.2. additional legal, design professional, and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Paragraph 5; and

   7.3. liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.

8. If the Surety elects to act under Paragraph 5.1, 5.3, or 5.4, the Surety's liability is limited to the amount of this Bond.

9. The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Construction Contract, and the Balance of the Contract Price will not be reduced or set off on account of any such unrelated obligations. No right of action will accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators, successors, and assigns.

10. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.

11. Any proceeding, legal or equitable, under this Bond must be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and must be instituted within two years after a declaration of Contractor Default or within two years after the Contractor ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this paragraph are void or prohibited by law, the minimum periods of limitations available to sureties as a defense in the jurisdiction of the suit will be applicable.

12. Notice to the Surety, the Owner, or the Contractor must be mailed or delivered to the address shown on the page on which their signature appears.

13. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement will be deemed deleted therefrom and provisions conforming to such

statutory or other legal requirement will be deemed incorporated herein. When so furnished, the intent is that this Bond will be construed as a statutory bond and not as a common law bond.

14. Definitions

    14.1. *Balance of the Contract Price*—The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made including allowance for the Contractor for any amounts received or to be received by the Owner in settlement of insurance or other claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.

    14.2. *Construction Contract*—The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and changes made to the agreement and the Contract Documents.

    14.3. *Contractor Default*—Failure of the Contractor, which has not been remedied or waived, to perform or otherwise to comply with a material term of the Construction Contract.

    14.4. *Owner Default*—Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

    14.5. *Contract Documents*—All the documents that comprise the agreement between the Owner and Contractor.

15. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond will be deemed to be Subcontractor and the term Owner will be deemed to be Contractor.

16. Modifications to this Bond are as follows: **[Describe modification or enter "None"]**

PAYMENT BOND

Contractor	**Surety**
Name:	Name:
Address *(principal place of business)*:	Address *(principal place of business)*:
Owner	**Contract**
Name: **INDIANOLA MUNICIPAL UTILITIES** Mailing address *(principal place of business)*: **210 WEST 2ND AVE** **INDIANOLA, IA 50125**	Description *(name and location)*: **EAST IOWA CIRCUIT SWITCHER REPLACEMENT PROJECT - INSTALLATION** **INDIANOLA, IOWA** Contract Price: Effective Date of Contract:

Bond

Bond Amount:

Date of Bond:

(Date of Bond cannot be earlier than Effective Date of Contract)

Modifications to this Bond form:

☒ None ☐ See Paragraph 18

Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth in this Payment Bond, do each cause this Payment Bond to be duly executed by an authorized officer, agent, or representative.

Contractor as Principal	Surety
_____	_____
(Full formal name of Contractor)	*(Full formal name of Surety) (corporate seal)*
By: _____	By: _____
(Signature)	*(Signature)(Attach Power of Attorney)*
Name: _____	Name: _____
(Printed or typed)	*(Printed or typed)*
Title: _____	Title: _____
Attest: _____	Attest: _____
(Signature)	*(Signature)*
Name: _____	Name: _____
(Printed or typed)	*(Printed or typed)*
Title: _____	Title: _____

Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party is considered plural where applicable.

1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner to pay for labor, materials, and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference, subject to the following terms.
2. If the Contractor promptly makes payment of all sums due to Claimants, and defends, indemnifies, and holds harmless the Owner from claims, demands, liens, or suits by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, then the Surety and the Contractor shall have no obligation under this Bond.
3. If there is no Owner Default under the Construction Contract, the Surety's obligation to the Owner under this Bond will arise after the Owner has promptly notified the Contractor and the Surety (at the address described in Paragraph 13) of claims, demands, liens, or suits against the Owner or the Owner's property by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, and tendered defense of such claims, demands, liens, or suits to the Contractor and the Surety.
4. When the Owner has satisfied the conditions in Paragraph 3, the Surety shall promptly and at the Surety's expense defend, indemnify, and hold harmless the Owner against a duly tendered claim, demand, lien, or suit.
5. The Surety's obligations to a Claimant under this Bond will arise after the following:
    5.1. Claimants who do not have a direct contract with the Contractor
        5.1.1. have furnished a written notice of non-payment to the Contractor, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were, or equipment was, furnished or supplied or for whom the labor was done or performed, within ninety (90) days after having last performed labor or last furnished materials or equipment included in the Claim; and
        5.1.2. have sent a Claim to the Surety (at the address described in Paragraph 13).
    5.2. Claimants who are employed by or have a direct contract with the Contractor have sent a Claim to the Surety (at the address described in Paragraph 13).
6. If a notice of non-payment required by Paragraph 5.1.1 is given by the Owner to the Contractor, that is sufficient to satisfy a Claimant's obligation to furnish a written notice of non-payment under Paragraph 5.1.1.
7. When a Claimant has satisfied the conditions of Paragraph 5.1 or 5.2, whichever is applicable, the Surety shall promptly and at the Surety's expense take the following actions:
    7.1. Send an answer to the Claimant, with a copy to the Owner, within sixty (60) days after receipt of the Claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed; and
    7.2. Pay or arrange for payment of any undisputed amounts.
    7.3. The Surety's failure to discharge its obligations under Paragraph 7.1 or 7.2 will not be deemed to constitute a waiver of defenses the Surety or Contractor may have or acquire as to a Claim, except as to undisputed amounts for which the Surety and Claimant have reached agreement. If, however, the Surety fails to discharge its obligations under Paragraph 7.1 or 7.2, the Surety shall indemnify the Claimant for the reasonable attorney's fees the Claimant incurs thereafter to recover any sums found to be due and owing to the Claimant.

8. The Surety's total obligation will not exceed the amount of this Bond, plus the amount of reasonable attorney's fees provided under Paragraph 7.3, and the amount of this Bond will be credited for any payments made in good faith by the Surety.

9. Amounts owed by the Owner to the Contractor under the Construction Contract will be used for the performance of the Construction Contract and to satisfy claims, if any, under any construction performance bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Construction Contract are dedicated to satisfying obligations of the Contractor and Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.

10. The Surety shall not be liable to the Owner, Claimants, or others for obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for the payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligation to make payments to or give notice on behalf of Claimants, or otherwise have any obligations to Claimants under this Bond.

11. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.

12. No suit or action will be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the state in which the project that is the subject of the Construction Contract is located or after the expiration of one year from the date (1) on which the Claimant sent a Claim to the Surety pursuant to Paragraph 5.1.2 or 5.2, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit will be applicable.

13. Notice and Claims to the Surety, the Owner, or the Contractor must be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, will be sufficient compliance as of the date received.

14. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement will be deemed deleted here from and provisions conforming to such statutory or other legal requirement will be deemed incorporated herein. When so furnished, the intent is that this Bond will be construed as a statutory bond and not as a common law bond.

15. Upon requests by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor and Owner shall promptly furnish a copy of this Bond or shall permit a copy to be made.

16. Definitions

    16.1. *Claim*—A written statement by the Claimant including at a minimum:

        16.1.1. The name of the Claimant;

        16.1.2. The name of the person for whom the labor was done, or materials or equipment furnished;

        16.1.3. A copy of the agreement or purchase order pursuant to which labor, materials, or equipment was furnished for use in the performance of the Construction Contract;

        16.1.4. A brief description of the labor, materials, or equipment furnished;

16.1.5. The date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Construction Contract;

16.1.6. The total amount earned by the Claimant for labor, materials, or equipment furnished as of the date of the Claim;

16.1.7. The total amount of previous payments received by the Claimant; and

16.1.8. The total amount due and unpaid to the Claimant for labor, materials, or equipment furnished as of the date of the Claim.

16.2. *Claimant*—An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials, or equipment for use in the performance of the Construction Contract. The term Claimant also includes any individual or entity that has rightfully asserted a claim under an applicable mechanic's lien or similar statute against the real property upon which the Project is located. The intent of this Bond is to include without limitation in the terms of "labor, materials, or equipment" that part of the water, gas, power, light, heat, oil, gasoline, telephone service, or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials, or equipment were furnished.

16.3. *Construction Contract*—The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and all changes made to the agreement and the Contract Documents.

16.4. *Owner Default*—Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

16.5. *Contract Documents*—All the documents that comprise the agreement between the Owner and Contractor.

17. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond will be deemed to be Subcontractor and the term Owner will be deemed to be Contractor.

18. Modifications to this Bond are as follows: **NONE**

1.0 PROJECT DESCRIPTION

1.1 The Project includes providing labor and material to replace two existing 69kV circuit switchers at the East Iowa Substation with circuit breakers. The East Iowa Substation is located within the City of Indianola, Iowa. This project includes furnishing miscellaneous materials, labor, tools, equipment, supervision, and other items necessary to complete the entire project defined in these bid documents.

1.2 In addition to the removal of the circuit switchers and installation of the new circuit breakers, the Project includes testing necessary to assure correct operation of the new circuit breakers and associated protection schemes, modify data concentrator programming using configuration files provided by Engineer, verifying that the impacted scanned points are correctly provided to the SCADA system data concentrator, and that control points operate correctly.

2.0 SCOPE OF WORK

2.1 The drawings, bill of materials, and specifications listed in the Index in Section 00000 are intended to cover all materials, equipment, and work necessary to complete this project as described, except for those items that are specifically listed as being supplied or completed by Owner or by others, and except for problems with the existing substation schematics and wiring diagrams.

2.2 The existing substation drawings are not complete and have not been updated to include modifications. Contractor shall include time to thoroughly trace all circuits impacted by the replacement project and document deviations from project drawings. Deviations shall be provided to Engineer for resolution. Change orders will be considered for major deviations. Change orders will not be considered for minor changes only requiring jumpers within the same or adjacent switchgear cubicles.

2.3 Work generally consists of the following major items of work but is not limited to the items listed below. Refer to drawings for plans and details and definition of the work to the extent possible.

a. Contractor shall schedule preconstruction meeting within two weeks after receiving Notice to Proceed. Meeting will be held at Indianola Municipal Utilities. A virtual preconstruction meeting will not be acceptable.

b. Furnish labor and materials as required.

c. At East Iowa Substation:
   1) Order materials
   2) Preschedule outages per Section 01001 Sequence of work.
   3) Trace existing circuits, verify accuracy of existing schematics and wiring diagrams, resolve discrepancies with Engineer.
   4) Remove existing circuit switchers CK601 and CK602.

5) Remove existing control and AC and DC supply cables between CK601 and CK602 and the switchgear buildings. Cut conduits off and cap conduits below grade, seal ends in switchgear building.
6) Remove existing buswork between the main east-west bus and the existing circuit switchers as shown on the plan and section view drawings.
7) Install disconnect switches on existing steel structures.
8) Install support insulators on the existing steel structures as shown on the plan and section view drawings.
9) Connect disconnect switches to existing east-west buswork and new circuit breakers.
10) Connect circuit breakers to voltage and current transformers and power transformers as shown on the plan and section view drawings.
11) Install 3" PVC conduits between CK601 control cabinet and East Iowa #1 (east building) and between CK602 control cabinet and East Iowa #2 (west building).
12) Bond circuit breakers and disconnect operators to existing ground grid.
13) Install permanent CT shorting jumpers in the CK601 and CK602 control cabinets.
14) Install and connect new control and AC and DC supply cables to CK601 and CK602 as shown on the drawings and cable schedule.
15) Install 12 pole GE EB25B12 terminal block in East Iowa #1 Station Power cubicle.
16) Modify cubicle wiring in the East Iowa #1 Intertie, Station Power and Auxiliary cubicles and Relay Panel #1.
17) Install 12 pole GE EB25B12 terminal block in East Iowa #2 relay panel.
18) Modify wiring in East Iowa #2 relay panel and intertie cubicle.
19) Install settings in SEL annunciator panels in CK601 and CK602 control cabinets. Annunciator settings will be provided by Engineer in .rdb format.
20) Test and commission new equipment and circuits that are impacted by changes. This includes CK601, CK602, CK230, and CK240 trip and close circuits.
21) Apply configuration changes to existing RTUs using configuration files provided by Engineer.
22) Assist as needed during testing to verify SCADA system additions and deletions

2.4 Contractor shall test phasing before beginning removal work and confirm phasing immediately after reenergizing each transformer and before supplying load.

2.5 Contractor will furnish all equipment and materials required to complete the Work except for the circuit breakers and disconnect switches.

2.6 Contractor shall provide as-built data for the system as installed as described in Section 17839. This shall include red-line notations on drawings to show all field changes that affect the schematic or wiring diagrams.

3.0 DRAWINGS

3.1 Drawings showing device and wiring removals and additions are listed on the coversheet for the drawing volume. Panel layout and schematic diagrams are provided with bid

drawings and point to point wiring diagrams, where available, will be provided with final construction drawings.

3.2 Drawings are as complete and accurate as possible, however, they are original to the substation and have not been updated as modifications have been made. The set is incomplete and numerous discrepancies exist. Neither Owner nor Engineer guarantees complete accuracy. See paragraph 2.2 above.

3.3 Point to point wiring diagrams are listed on the drawing coversheets.

3.4 Schematic and wiring diagrams do not exist for internal wiring and cable connections to the RTU at East Iowa. Contractor will be required to remove and install connections to existing terminal blocks in the RTU. The only SCADA points changes envisioned are to replace the existing CK601 and CK602 status contact and add an alarm from the SEL annunciator panels in CK601 and CK602. All time required to investigate and formulate these connections must be included in the Contractor bid and no scope changes will be made to cover this work.

4.0 WORK BY OWNER OR BY OTHERS

4.1 The following work is not a part of this Contract and will be performed by the Owner or others.

a. Circuit breakers and disconnect switches have been purchased by Owner and will be stored in a warehouse adjacent to the East Iowa substation.

5.0 SCHEDULE

5.1 Contractor may begin work at any time after receiving a Notice to Proceed and when ground conditions permit. The Notice to Proceed is expected to be issued on or about February 26th, 2026. Provided the Notice to Proceed is issued on February 26th and ground conditions permit below grade work starting March 9th, 2026, work must be substantially completed by May 15th, 2026; with Final Completion by June 15th, 2026. Completion date will be adjusted should either of these conditions not be met.

5.2 Contractor will cooperate with Owner in scheduling equipment outages. Substantial switching is required to remove load from the transformers and Owner will need to make crews available. A minimum of 1 week's notice is required.

5.3 For purposes of preparing their bid, Contractor shall assume work will be permitted normal business days, Monday through Friday, between 7:00 AM and 5:00 PM at East Iowa Substation. Requests by Contractor for Owner to permit Contractor personnel that are qualified to work in an energized substation to work outside of these stated hours will be considered by Owner. Owner retains the sole right to grant or deny permission to work outside of the stated hours.

5.4 Contractor shall manage and schedule the Work to permit returning the transformers to service as soon as possible and to minimize the length of time needed to complete the project. Owner also strongly desires that both transformers be available before summer.

6.0 SEQUENCE OF WORK

6.1 A suggested sequence is shown in Section 01001. Final Work sequence is subject to adjustment with agreement of the Contractor and Owner. The Contractor must provide a general work plan for approval by the Owner prior to starting work on the Project.

7.0 NEW MATERIALS

7.1 Contractor is to furnish and pay for all materials necessary for the completion of the Work. All materials supplied by Contractor shall be new and unused and shall be as specified in the Bill of Materials and project drawings.

7.2 Contractor may arrange with Owner to store materials to be provided by Contractor at the work location.

8.0 REMOVED MATERIALS

8.1 The contractor will be responsible for disposing of all removed materials; Owner does not intend to retain any removed items for future use.

9.0 SITE AND OTHER AREAS

9.1 Contractor shall confine his operations to the substation and control room sites described in the drawings.

10.0 ENERGIZED EQUIPMENT

10.1 Contractor acknowledges that Contractor and Contractor's employees are aware of the potentially dangerous nature of electricity and are qualified to work on and in the vicinity of secondary (600 volt class), medium voltage (15kV class), and high voltage (69kV class) electric facilities that have not been de-energized. The existing facilities shall remain in operation and energized at all times except when outages are scheduled. Contractor shall take all necessary steps to protect the existing facilities and maintain them so that they do not interfere with or pose a danger to either the new construction, Contractor activities, Contractor's Personnel, Owner's workers, or the general public. The cost of such actions shall be included in Contractor's prices as no separate payment will be made.

10.2 In the event the work cannot be performed safely, Contractor shall notify Owner and Engineer, and shall cease work until arrangements are made to proceed safely.

10.3 Contractor shall ensure that only qualified persons are permitted to work on or near energized facilities, and that all applicable standards and regulations are followed, including observance of approach boundaries as specified in NFPA 70E-2021.

10.4 As much as possible, bus differential and breaker failure relaying at both substations shall remain in service during the project. Contractor shall provide prior notice to Owner and Engineer if these protection systems will need to be removed from service.

11.0 OUTAGES

11.1 All equipment outages required for the execution of the Work shall be kept to the shortest time duration possible.

11.2 Any and all required equipment outages shall be scheduled and coordinated with Owner in advance of the expected date of the outage.

11.3 The outages listed below are anticipated to be necessary for the work. The contractor is encouraged to suggest revisions to this list with the overall goals of reducing the quantity of outages needed or reducing outage durations while maintaining personnel safety and security of electrical service to Owner's customers.

11.4 East Iowa Substation

a. An outage of the 69kV transformer bus at East Iowa Substation will be provided to remove CK601, install disconnect switches CK601A and CK602A, and temporarily reconnect existing CK602 to allow Transformer 2 to be used while work on CK601 progresses.

b. After work on CK601 is completed, CK602 can be removed and replaced while Transformer 1 remains in service.

12.0 SWITCHING

12.1 All switching required for the prosecution of the Work will be performed by Owner.

13.0 TESTING

13.1 Contractor shall retain a subcontractor that is routinely engaged in the testing of utility protection and control systems to test existing circuits that are impacted by the project and the new circuit breakers.

13.2 The existing substation drawings have not been updated as modifications have been made and are out of date.

13.3 Scott Steinmetz of Steinmetz Corporation has significant recent experience in the East Iowa Substation and is Owner's preferred testing contractor. Steinmetz Corporation's phone number is available upon request from Engineer. Proposed testing contractor must be submitted with the bid. Should owner require an alternate testing subcontractor, a change order will be issued in the amount of the cost increase occasioned by change.

13.4 Alternate testing contractors must be approved prior to beginning work. See testing subcontractor qualification information in Sections 1.4 and 1.5 of Specification 337233.19.

END OF SECTION 01000

1.0 SCHEDULE

1.1 Ground conditions permitting, contractor may begin work at any time after receiving a Notice to Proceed and receipt of materials. The start date will be mutually agreed to by the Owner and Contractor.

1.2 Contractor may begin work at any time after receiving a Notice to Proceed and when ground conditions permit. The Notice to Proceed is expected to be issued on or about February 26th, 2026. Provided the Notice to Proceed is issued on February 26th and ground conditions permit below grade work starting March 9th, 2026, work must be substantially completed by May 15th, 2026; with Final Completion by June 15th, 2026. Completion date will be adjusted should either of these conditions not be met.

1.3 Owner has purchased the circuit breakers and disconnect switches separately. The circuit breakers are expected to arrive in January 2026.

1.4 Contractor shall order materials to provide for delivery of all materials before the start date.

2.0 SEQUENCE OF WORK

2.1 Contractor shall schedule a preconstruction meeting within two weeks of receipt of Notice to Proceed. Meeting shall be held in Indianola. Virtual participation is not acceptable.

2.2 Contractor shall perform as much prework and preparatory work as possible before beginning of outages to minimize the duration of each equipment outage. This work shall include thoroughly tracing all circuits that will be modified, comparing findings to the existing schematics and wiring diagrams and resolving discrepancies with the Engineer prior to proceeding.

2.2 A preliminary suggested sequence is provided below. The actual Work sequence is subject to change depending upon needs of the Contractor and the Owner. The Contractor must submit a general work plan for approval by the Owner prior to starting work on the Project. Revisions to the sequence suggested by Contractor will be considered by Owner. Owner retains the sole right to approve the work sequence.

A. Contractor receives Notice to Proceed.

B. Contractor orders materials.

C. Contractor schedules preconstruction meeting within two weeks of receipt of Notice to Proceed. Meeting shall be held at Indianola Municipal Utilities. Virtual participation is not acceptable.

D. Contractor traces all circuits impacted by the replacement project and document deviations from project drawings. Contractor provides deviations to Engineer for resolution.

E. Contractor receives materials.

F. Owner switches customer load normally served from East Iowa Substation to Westside Substation.

G. Owner deenergizes 69kV transformer bus at East Iowa.

H. During transformer bus outage on the East Iowa transformer bus: modify existing structures. Install disconnect switches CK601A and CK602A. Temporarily reconnect CK602 to CK602A to allow transformer T2 to temporarily serve load while CK601 is replaced.

I. Owner energizes East Iowa transformer bus, Owner switches load to East Iowa Transformer 2.

J. Contractor removes CK601, removes upper portion of existing foundation, pours new foundation. Proposed curing times will be discussed during the preconstruction meeting. While Owner desires shorter curing times, curing times shorter than 1 week will generally not be permissible. See Specification 033000.

K. While concrete cures, contactor installs conduit to East Iowa #1 (east) building and makes wiring changes in East Iowa #1 building.

L. After concrete has cured, install circuit breaker, add conduit riser, bond circuit breaker to ground grid, pull control cables, terminate control cables, test circuit breaker and modified circuits.

M. Owner energizes CK601 and Transformer 1, switches load from Transformer 2 to Transformer 1.

N. Contractor removes CK602, removes upper portion of existing foundation, pours new foundation.

O. While concrete cures, contactor installs conduit to East Iowa #2 (west) building and makes wiring changes in East Iowa #2 building.

P. After concrete has cured, install circuit breaker, add conduit riser, bond circuit breaker to ground grid, pull control cables, terminate control cables, test circuit breaker and modified circuits.

Q. Energize CK602 and Transformer 2.

END OF SECTION 01001

1.0 PROJECT MATERIAL

1.1 Project Materials quantities and catalog numbers are called out in the construction drawings. This section provides a guide to help Contractor find all material items included in the construction drawings.

1.2 This section is provided solely as a reference and guide for Contractor. All material required to complete the Work as described by the Contract Documents is to be provided by Contractor, regardless of whether or not any specific items are included in the drawings or this specification section.

1.3 Materials required are summarized below.

Drawing	Item	Comments
S101	Anchor bolts Rebar Concrete Granular subbase	
S201	Conduit and conduit fittings	
S400	Insulators Insulator supports 336 kcmil ACSR Bus support Terminals Tees Transition plates Conduit and conduit fittings Bare 4/0 Copper (grounding) Cadweld connectors Bronze ground clamps	
CKR-472	1-pole branch circuit breakers	Acceptable to reuse existing if they are single pole 20 or 30A and condition is good.
CKR-472	2-pole branch circuit breakers	Acceptable to reuse existing if condition is good.
E-15	PVC conduit and PVC LBs for building conduit entrance	
R401B & R402B	Burndy narrow tongue lug for #6 Cu Heat shrink tubing	For DC supply
R-471	20A Single pole branch breakers for existing AC panelboards	See notes regarding reusing existing circuit breakers.
R-500A	Control Cables	Minimum size of S601A and S602A is #16AWG. Contractor may choose a larger size for convenience. C1A and C1B are not necessary if existing wiring can be traced.
3-628-8	12 Pole terminal block (GE EB25B12)	
3-628-29	12 Pole terminal block (GE EB25B12)	

END OF SECTION 16910

SECTION 017839 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for project record documents, including the following:

1. Record Drawings.
2. Record Product Data.
3. Miscellaneous record submittals.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.

1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.

a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
b. Accurately record information in an acceptable drawing technique.
c. Record data as soon as possible after obtaining it.

2. Content: Types of items requiring marking include, but are not limited to, the following:

a. Dimensional changes to Drawings.
b. Revisions to details shown on Drawings.
c. Locations and depths of underground utilities.
d. Revisions to routing of conduits.
e. Revisions to electrical circuitry.
f. Actual equipment locations.

g. Changes made by Change Order or Work Change Directive.
h. Changes made following Engineer's written orders.
i. Details not on the original Contract Drawings.
j. Discrepancies in the original Contract Drawings.
k. Field records for variable and concealed conditions.
l. Record information on the Work that is shown only schematically.

3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
4. Mark record sets with red-colored pencil or pen. Use other colors to distinguish between changes for different categories of the Work at same location.
5. Mark important additional information that was either shown schematically or omitted from original Drawings.
6. Note Construction Change Directive numbers, Change Order numbers, and similar identification, where applicable.

2.2 TESTING DOCUMENTATION

A. Testing Documentation: Provide test logs and test reports as described in Section 337233.19.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.

B. Maintenance of Record Documents: Store record documents in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Engineer's reference during normal working hours.

C. Existing substation drawings are incomplete and have inconsistencies. Contractor shall document errors discovered while tracing wiring and their resolution on the red-line drawing sets.

END OF SECTION 017839

INDIANOLA MUNICIPAL UTILITIES
REPLACE BREAKERS CK601 & CK602

SECTION 033000 - CAST-IN-PLACE CONCRETE

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 cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:

1. Footings.
2. Foundation walls.
3. Slabs-on-grade.
4. Suspended slabs.
5. Concrete toppings.
6. Building frame members.
7. Building walls.

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

1.4 SUBMITTALS

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

B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1. Indicate amounts of mixing water to be withheld for later addition at Project site.

C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.

D. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.

1. Location of construction joints is subject to approval of the Engineer.

E. Samples: For waterstops.

F. Material Certificates: For each of the following, signed by manufacturers:

1. Cementitious materials.
2. Admixtures.
3. Form materials and form-release agents.
4. Steel reinforcement and accessories.
5. Waterstops.
6. Curing compounds.
7. Semirigid joint filler.
8. Joint-filler strips.

G. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:

1. Aggregates. Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity**.**

H. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.

B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

C. Testing Agency Qualifications: An independent agency, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.

D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.

E. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301, "Specifications for Structural Concrete," Sections 1 through 5.
2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

F. Preinstallation Conference: Conduct conference at Project site.

1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:

a. Contractor's superintendent.
b. Independent testing agency responsible for concrete design mixtures.
c. Ready-mix concrete manufacturer.
d. Concrete subcontractor.

2. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint-filler strips, semirigid joint fillers, anchor rod and anchorage device installation tolerances, steel reinforcement installation, and concrete protection.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

B. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

1. Plywood, metal, or other approved panel materials.
2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:

a. High-density overlay, Class 1 or better.

b. Medium-density overlay, Class 1 or better; mill-release agent treated and edge sealed.
c. Structural 1, B-B or better; mill oiled and edge sealed.
d. B-B (Concrete Form), Class 1 or better; mill oiled and edge sealed.

B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

C. Forms for Cylindrical Columns, Pedestals, and Supports: Metal, glass-fiber-reinforced plastic, paper, or fiber tubes that will produce surfaces with gradual or abrupt irregularities not exceeding specified formwork surface class. Provide units with sufficient wall thickness to resist plastic concrete loads without detrimental deformation.

D. Void Forms: Biodegradable paper surface, treated for moisture resistance, structurally sufficient to support weight of plastic concrete and other superimposed loads.

E. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.

F. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

1. Formulate form-release agent with rust inhibitor for steel form-facing materials.

G. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

1. Furnish units that will leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.
2. Furnish ties that, when removed, will leave holes no larger than 1 inch in diameter in concrete surface.
3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

2.2 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.

2.3 GLASS FIBER REINFORCED POLYMER REINFORCEMENT

A. Reinforcing Bars: ASTM D 7957 and ASTM D 8505

2.4 REINFORCEMENT ACCESSORIES

A. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel

wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:

1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.
2. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer-coated wire bar supports.
3. For zinc-coated reinforcement, use galvanized wire or dielectric-polymer-coated wire bar supports.

2.5 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:

1. Portland Cement: ASTM C 150, Type I or Type II. Supplement with the following:

a. Fly Ash: ASTM C 618, Class F or C.
b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.

B. Silica Fume: ASTM C 1240, amorphous silica.

C. Normal-Weight Aggregates: ASTM C 33, coarse aggregate or better, graded. Provide aggregates from a single source.

1. Maximum Coarse-Aggregate Size: 3/4 inch nominal.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement. Only natural material will be allowed.

D. Water: ASTM C 94/C 94M and potable.

2.6 ADMIXTURES

A. Air-Entraining Admixture: ASTM C 260.

2.7 WATERSTOPS

A. Chemically Resistant Flexible Waterstops: Linear low density polyethylene waterstops, for embedding in concrete to prevent passage of fluids through joints; resistant to oils, solvents, and chemicals. Factory fabricate corners, intersections, and directional changes.

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

a. WESTEC Barrier Technologies, Inc.; 600 Series TPE-R.

2. Profile: Ribbed with center bulb.
3. Dimensions: 6 inches by 3/8 inch thick; nontapered.

2.8 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.

B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

C. Water: Potable.

D. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. BASF Construction Chemicals - Building Systems; Kure 1315.
b. ChemMasters; Polyseal WB.
c. Conspec by Dayton Superior; Sealcure 1315 WB.
d. Edoco by Dayton Superior; Cureseal 1315 WB.
e. Euclid Chemical Company (The), an RPM company; Super Diamond Clear VOX; LusterSeal WB 300.
f. Kaufman Products, Inc.; Sure Cure 25 Emulsion.
g. Lambert Corporation; UV Safe Seal.
h. L&M Construction Chemicals, Inc.; Lumiseal WB Plus.
i. Meadows, W. R., Inc.; Vocomp-30.
j. Metalcrete Industries; Metcure 30.
k. Right Pointe; Right Sheen WB30.
l. Symons by Dayton Superior; Cure & Seal 31 Percent E.
m. Vexcon Chemicals, Inc.; Vexcon Starseal 1315.

2.9 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.

B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 per ASTM D 2240.

2.10 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.

1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.

B. Cementitious Materials: Use fly ash, pozzolan, ground granulated blast-furnace slag, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent.

C. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

2.11 CONCRETE MIXTURES FOR BUILDING ELEMENTS

A. Footings: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 4500 psi at 28 days.
2. Maximum Water-Cementitious Materials Ratio: 0.45.
3. Slump Limit: 3 inches, plus or minus 1 inch.
4. Air Content: 6.0 percent, plus or minus 1.5 percent at point of delivery for 3/4-inch nominal maximum aggregate size.

B. Slabs-on-Grade: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 4500 psi at 28 days.
2. Maximum Water-Cementitious Materials Ratio: 0.45.
3. Slump Limit: 3 inches, plus or minus 1 inch.
4. Air Content: 6.0 percent, plus or minus 1.5 percent at point of delivery for 3/4-inch nominal maximum aggregate size.

2.12 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.13 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.

1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Mix concrete materials in appropriate drum-type batch machine mixer.

1. For mixer capacity of 1 cu. yd. or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.
2. For mixer capacity larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd.
3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixture time, quantity, and amount of water added. Record approximate location of final deposit in structure.

PART 3 - EXECUTION

3.1 FORMWORK

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:

1. Class A, 1/8 inch for smooth-formed finished surfaces.

D. Construct forms tight enough to prevent loss of concrete mortar.

E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.

1. Install keyways, reglets, recesses, and the like, for easy removal.
2. Do not use rust-stained steel form-facing material.

F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

H. Chamfer exterior corners and edges of permanently exposed concrete.

I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."
2. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
3. Install dovetail anchor slots in concrete structures as indicated.

3.3 REMOVING AND REUSING FORMS

A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations and curing and protection operations need to be maintained.

1. Leave formwork for beam soffits, joists, slabs, and other structural elements that supports weight of concrete in place until concrete has achieved its 28-day design compressive strength.
2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.

B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.

C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Engineer.

3.4 STEEL AND GLASS FIBER REINFORCED POLYMER REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.

1. Weld reinforcing bars according to AWS D1.4/D 1.4M, where indicated.

D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

3.5 WATERSTOPS

A. Flexible Waterstops: Install in construction joints and at other joints indicated to form a continuous diaphragm. Install in longest lengths practicable. Support and protect exposed waterstops during progress of the Work. Field fabricate joints in waterstops according to manufacturer's written instructions.

3.6 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Engineer.

C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
2. Maintain reinforcement in position on chairs during concrete placement.
3. Screed slab surfaces with a straightedge and strike off to correct elevations.
4. Slope surfaces uniformly to drains where required.
5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

F. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

G. Hot-Weather Placement: Comply with ACI 301 and as follows:

1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3.7 FINISHING FORMED SURFACES

A. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces exposed to public view.

B. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.8 FINISHING FLOORS AND SLABS

A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and elsewhere as indicated.

1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Engineer before application.

3.9 MISCELLANEOUS CONCRETE ITEMS

A. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates from manufacturer furnishing machines and equipment.

3.10 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.

D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.

E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

    a. Water.
    b. Continuous water-fog spray.
    c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

    a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
    b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
    c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project.

3. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.11 JOINT FILLING

A. Prepare, clean, and install joint filler according to manufacturer's written instructions.

1. Defer joint filling until concrete has aged at least one month(s). Do not fill joints until construction traffic has permanently ceased.

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.

C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.12 FIELD QUALITY CONTROL

A. Testing and Inspecting: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.

B. Inspections:

1. Steel reinforcement placement.
2. Steel reinforcement welding.
3. Headed bolts and studs.
4. Verification of use of required design mixture.
5. Concrete placement, including conveying and depositing.
6. Curing procedures and maintenance of curing temperature.
7. Verification of concrete strength before removal of shores and forms from beams and slabs.

C. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:

1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
2. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. or fraction thereof of each concrete mixture placed each day.

a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

3. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
4. Air Content: ASTM C 231, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
5. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
6. Unit Weight: ASTM C 138, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
7. Compression Test Specimens: ASTM C 31/C 31M.

    a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
    b. Cast and field cure two sets of two standard cylinder specimens for each composite sample.

8. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.

    a. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.
    b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.

9. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
10. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
11. Test results shall be reported in writing to Engineer, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
12. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Engineer but will not be used as sole basis for approval or rejection of concrete.
13. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Engineer. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Engineer.
14. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

15. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

END OF SECTION 033000

INDIANOLA MUNICIPAL UTILITIES
EAST IOWA CIRCUIT SWITCHER REPLACEMENT PROJECT - INSTALLATION

SECTION 337210 –SUBSTATION STRUCTURAL STEEL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes methods and materials for substation steel structures.

1.3 QUALITY ASSURANCE

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

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

C. Welders shall be experienced and certified in the methods for welding structural steel. Welder shall be certified by passing the tests described by the American Welding Society (AWS). Welders shall have been tested within the past twelve months. Submit one copy of the welder's qualification records to Engineer.

PART 2 - PRODUCTS

2.1 STEEL STRUCTURES

A. Steel structures will be furnished by Contractor.

B. Structure details provided on drawing E1091-S500.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Steel structures shall be assembled in accordance with manufacturer's detail and erection drawings with bolts, washers, and nuts furnished by the fabricator. Structure details provided on drawing E1091-S500.

B. Steel structures shall not be installed on concrete foundations until the following conditions are met.

1. Structure without overhead conductor attachments: Foundations at 70% of 28 day strength.
2. Structure with overhead conductor attachments (dead ends and shield masts): Foundations at 70% of 28 day strength for setting of structures and 100% of 28 day strength before attachment of conductors.

C. Slings or other equipment used for picking up members or portions of structures shall be of such material or protected in such a way as not to cut into corners or edges of the members, damage the finish, or distort or overstress members when heavy lifts are made. Members or portions of structures shall be raised in such a manner that no dragging on the ground or against portions of structures already erected will occur.

D. When portions of structures are being ground assembled, such assembly shall be on surfaces or blocking which will provide support to prevent distortion or damage to structure steel. All bolts shall be installed in all connections of ground assembled portions of the structures before erection.

E. Mud, dirt, oil, and other foreign matter shall be removed from the members before erection, with special attention given to cleaning the contact surfaces at joints before bolting up bolts and nuts.

F. Switch and bus support stands shall be erected perfectly plumb. All other structures, including all vertical members thereof, shall be erected plumb within a tolerance of 1/8 inch in 10 feet. Horizontal members shall be level. Extreme care shall be taken to establish and maintain the true geometric shape of each portion of structure assembled.

G. Repairs:

1. Pieces bent in handling may be used if they can be straightened without structurally damaging the metal. If bent pieces cannot be repaired to the satisfaction of Engineer, they shall be replaced. Steel which Contractor has damaged shall be repaired or replaced at Contractor's expense.
2. This shall include minor deficiencies in fabrication, shipping and handling damage, and areas or field drilling or modifications. Small areas shall be repaired with zinc-rich paint which when dry shall have a minimum of 94% zinc dust by weight. When directed by the Engineer, larger areas shall be repaired with zinc-rich solders using the method recommended by the manufacturer. For further details see ASTM A70-80 Standard Practice for Repair of Damaged Hot-dip Galvanizing Coatings.
3. If blind or partially blind holes are encountered after members have been properly assembled and erected by approved methods, Owner shall be notified, and redrilling or other corrections shall be undertaken under his direction.
4. Contractor shall notify Engineer of shop errors and damaged steel. Engineer will decide the manner in which corrections shall be made. Shop errors and damaged steel shall be corrected as determined by Engineer.

3.2 BOLTS

A. Wedge washers, lock washers, and space washers shall be used as specified on the steel erection drawings washers, and nuts furnished by the fabricator.

B. The correct length of bolts shall be used for all connections in accordance with the bolt assembly lists furnished on the drawings. Bolts shall be normally installed so that the nuts are on the inside or on the top of the structure members. Only wrenches of proper size which will not deform the nuts or damage the surface finish are to be used. Torque wrenches shall be used to tighten bolts. These wrenches shall be calibrated so as not to exceed the torque limits recommended by the steel supplier.

C. After bolt tightening is completed on an erected structure, Engineer will make spot-checks on bolts. Contractor shall provide the calibrated torque wrenches and the necessary platforms, equipment, and personnel to conduct the random checks.

END OF SECTION 337210

INDIANOLA MUNICIPAL UTILITIES
EAST IOWA CIRCUIT SWITCHER REPLACEMENT PROJECT - INSTALLATION

SECTION 337226 –SUBSTATION BUS AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes methods and materials for the follow:
   1. Rigid and wire bus.
   2. Disconnect switches.
   3. Insulators.
   4. Equipment identification.

1.3 QUALITY ASSURANCE

A. Welders shall be experienced and certified in the methods for welding structural steel. Welder shall be certified by passing the tests described by the American Welding Society (AWS). Welders shall have been tested within the past twelve months. Submit one copy of the welder's qualification records to Engineer.

PART 2 - PRODUCTS

2.1 MATERIALS

A. The following items will be furnished by the Owner or others. Furnish the following:

   1. Disconnect Switches

B. Contractor will furnish the following:

   1. ACSR wire
   2. Insulators
   3. Surge arresters.
   4. Connectors for tubing and wire connections.

C. Equipment Identification

   1. Furnish equipment identification numbers as indicated on the drawings.

2. Furnish all hardware including beam grips, pipe clamps for installation of the identification numbers. Mounting hardware shall be stainless steel or aluminum.

PART 3 - EXECUTION

3.1 RIGID BUS AND WIRE JUMPERS

A. Rigid Bus:

1. Contractor shall unpack, clean, and check for damage all aluminum bus tubing immediately upon receipt of material. Contractor shall remove all packaging materials which might damage the bus finish and store the bus in a manner that the finish will be protected. Contractor shall inform Engineer if there is any damage to the bus when it is received. Contractor will be responsible for cost of replacing any bus which is damaged after it is received.
2. The aluminum bus will usually be furnished in several lengths to accommodate assembly and erection operations and allow a minimum of cutting and jointing. Contractor shall plan his work to best facilitate the lengths of bus that are available, making every effort to minimize cutting and splicing of the bus.
3. Tubular bus bends shall be made using a hydraulic bender and shall be free of kinks or surface damage. Tubular bus bends shall be made with an inside radii of 5 to 7 times the nominal pipe size unless the drawings specify otherwise.
4. All bus tubing shall be carefully handled and erected to provide a bus system without dents, abrasions, discolorations or structural or surface damage. The completed bus installation shall be completely smooth to the touch.
5. Horizontal aluminum tubular buswork shall have ACSR or all aluminum cable installed inside them for the full length of the bus for vibration dampening. Dampening cable shall be installed in buses for lengths greater than 10'-0". Damping cable sizes to be used are shown on the drawings.
6. One-fourth (1/4)-inch drain holes shall be drilled in all bus risers, bends, A-frames, and horizontal runs at the lowest practical point to drain moisture accumulation. All holes shall be reamed to remove sharp edges.
7. End caps shall be installed in all open ends of tubing.
8. Splices shall be used only where shown on the drawings or as approved by Engineer.

B. Wire Cables:

1. Copper, all aluminum, and ACSR buswork and jumpers are to be installed as shown on the drawings.
2. Jumpers and buses shall be smoothly formed and adjacent runs shall be similarly and symmetrically shaped to provide a uniform and pleasing appearance throughout.
3. Stranded conductor shall be installed without twists or kinks and shall be handled to avoid abrasions or other damage.
4. No splices shall be allowed in jumpers of overhead stain buses.
5. All strain busses and incoming line conductors shall be sagged in accordance with the values supplied.

C. Bolted Connectors:

1. Connectors shall be installed in accordance with the manufacturer's instructions.
2. Torque wrenches shall be used to tighten all bolted current carrying joints. Wrenches shall be calibrated so as not to exceed the torque limits of the bolts as established by the fitting manufacturers. Bolts shall be tightened simultaneously throughout each connection, being careful to avoid ovaling or flattening of the tubing or wire conductor by overtightening.

D. Compression Connectors:

1. Connectors shall be installed in accordance with the manufacturer's instructions.
2. Install compression fittings with tools and dies recommended by the manufacture.
3. Electrical filler compound shall be used inside each barrel prior to being compressed. Compression fittings shall be pressed so that they are straight when installed.

E. Welded Connectors:

1. Connectors shall be installed in accordance with the manufacturer's instructions
2. All welds shall be performed by a welder qualified per AWS B-3.0 or AAQQW-25.
3. Welding process shall utilize either the Tungsten Inert-Gas arc process (TIG) or Metal Inert-Gas process (MIG) for all aluminum welding.
4. All welding shall be done in strict conformance with the latest edition of the American Welding society and the Aluminum Association.
5. The shielding gas use for aluminum welding shall be commercially prepared and shall be certified as being welding grade and purity. The gas shall be one of one hundred percent (100%) argon or a mixture of seventy-five percent (75%) helium and twenty-five percent (25%) argon for MIG and one hundred percent (100%) argon for TIG.
6. Type ER4043 filler metal shall be used for all aluminum welding, except for those isolated cases where the base material is other than type 356, 6061 or 6063 normally used in the electrical power industry. Only the highest quality filler material shall be used. Filler material shall be stored in a dry, warm, uniform temperature storage area. The original carton shall not be opened until the filler material is actually needed for welding.
7. Filler rod for the TIG process shall be kept in a container that is kept closed except during rod removal.
8. Filler metal wire for the MIG process shall be uniform in diameter, of a suitable temper, free form slivers, scratches, inclusions; kinks, waves, or sharp bends, and spooled so that it is free to unwind without restrictions. Proper pitch and cast shall also be maintained to prevent wandering of the wire as it emerges from the electrode gun. Wire left on the machine overnight shall be sealed to prevent contamination. Wire left on the machine that is not scheduled for use in less than twenty-four (24) hours shall be returned to its original carton and tightly sealed.
9. All surfaces to be welded shall be thoroughly cleaned to remove all moisture, grease, oil, grit, and other foreign martial prior to welding. Cleaning shall be performed as close to the actual welding time as possible while still allowing sufficient time for complete drying of cleaning solvents. Surface shall then be wiped just prior to welding with a clean cloth, dry cloth to remove solvent scum and any moisture that may be present.
10. The edges of the material to be welded together shall be prepared in conformance with the data tables and joint design drawings of the Welding Handbook RP69 of the American Welding Society.
11. If deemed necessary, the Owner swill select welds which shall be radiographically tested by a certified approved testing laboratory. The results, comments, and recommendations shall be sent to the Owner. All testing costs shall be borne by the Contractor.

F. Bolted Connections:

1. For aluminum to aluminum and aluminum to plated bronze connections coat contact surfaces with a liberal coat of Electrical Joint Compound (Burndy Pentrox A or approved equal). Vigorously clean all aluminum contact surfaces with a stiff stainless steel wire brush to remove oxides. Do not wire brush plated contact surfaces. Install bolting hardware finger tight.
2. For aluminum to bare bronze connections coat contact surfaces with a liberal coat of Electrical Joint Compound. Vigorously clean all contact surfaces with a stiff stainless steel wire brush to remove oxides. Install a bronze to aluminum bi-metallic transition plate between the surfaces. Install bolting hardware finger tight.
3. For bare bronze to bare bronze connections vigorously clean all contact surfaces with a stiff stainless steel wire brush to remove oxides.
4. Stainless steel hardware shall be installed for all aluminum to aluminum and aluminum to bronze connections. Bolted connections shall be made with the proper size and length hex head bolts, flat washer, lock washers, Belleville washers, and nuts as shown on the drawings. Stainless steel hardware shall be type 316.
5. Silicon bronze hardware shall be installed for all bronze to bronze connections. Bronze hardware shall be high strength silicon bronze.
6. Torque wrenches shall be used to tighten all bolted current carrying joints. Alternately (criss-cross) and evenly tighten bolts to proper torque. Only wrenches of proper size which will not deform the nuts, or damage the surface finish are to be used. These wrenches shall be calibrated to provide the torques indicated on the drawings. Bolts shall not extend beyond the nut more than one-half (1/2) bolt diameter.
7. After the bus installation is completed, Engineer may make spot-checks on bolts. Contractor shall provide the calibrated torque wrenches and the necessary platforms, equipment, and personnel to conduct the random checks. Contractor will be required to tighten bolts found not to be tight, and in case the number so found is 5 percent or greater of the total bolts checked, Contractor will be required to go over the entire bus system and check or tighten all bolts.

3.2 DISCONNECT SWITCHES

A. Contractor shall uncrate, assemble, install and adjust all group operated switches and operating mechanisms in accordance with the manufacturer's instructions.

B. Whenever possible, the switch poles are to be assembled on the ground and installed as a complete pole unit. Preliminary adjustments are to be made on the ground. Final adjustments shall be made after the pole units have been installed in their final location and after the buswork has been connected to the switch terminals.

C. Group operated switches shall be installed such that the blades open and close simultaneously. Switches will be operated and adjusted until approved by the Owner.

D. Switch operating handles and operating platforms shall be arranged and aligned to ensure proper switching from the platform.

E. Install mechanical interlocks, electrical interlocks, or key interlocks as rewired by the drawings

F. All switch operating mechanisms are to be assembled and installed as shown on the operating mechanism assembly drawings and as described in the manufacturer's instructions. The interphase bar between the pole units is to be installed and adjusted accurately. Any set screws and pins shall not be set until the final adjustment of the switch has been completed and approved by Owner.

G. Install switch position auxiliary switches as required by the drawings.

3.3 INSULATORS

A. Insulators shall be cleaned of oil, dirt, paper, tape, or other foreign materials. Any insulator having its surface glaze damaged in any way shall not be installed.

B. Install all miscellaneous hardware including bus support fittings, bolts, nuts, lock washers, shackles, etc.

3.4 EQUIPMENT IDENTIFICATION

A. Install equipment identification numbers. Location of the number shall not affect operation of the equipment.

B. Identification numbers for switches, instrument transformers, and phase designations shall be mounted directly to the steel structures.

C. Identification numbers for power transformers, circuit breakers, and other large devices shall be installed on the control cabinet door.

D. Engineer will provide a list of devices and the identification numbers. Engineer will designate location of identification numbers for special devices.

END OF SECTION 337226

INDIANOLA MUNICIPAL UTILITIES
EAST IOWA CIRCUIT SWITCHER REPLACEMENT PROJECT - INSTALLATION

SECTION 337233.13 – SUBSTATION RELAYS & CONTROLS

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.

B. Section 33 Substation Control Wiring.

1.2 SUMMARY

A. This Section includes the following:
1. Relays and control devices
2. Communication devices.
3. Special cables.
4. Accessories.

1.3 DEFINITIONS

A.

ANSI	American National Standards Institute
ASTM	American Society for the Testing of Materials
IEEE	Institute of Electrical and Electronics Engineers
NEMA	National Electric Manufacturers Association
NFPA	National Fire Protection Association
UL	Underwriters Laboratories

1.4 SUBMITTALS

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

PART 2 - PRODUCTS

2.1 RELAYS AND DEVICES

A. No relays are scheduled for replacement.

2.2 ACCESSORIES

A. Fuses Holder & Fuses: Provide manufacturer's slugs for neutral pole of heater AC supply as shown on drawings. Fuses are expected to be Mersen type OT (Class K5).

B. Branch Circuit Breakers: AC and DC supply to circuit breakers will be supplied by branch breakers is existing panelboards. Existing branch circuit breakers are expected to be suitable for reuse. If circuit breakers are not suitable for reuse, replace with manufacturer, model number, and ratings shall be as indicated on the drawings.

C. Terminal Blocks: Supply GE EB25B12 12 pole terminal blocks in locations shown on drawings.

D. Device Labels: Device labels shall be adhesive labels and have 3/8" (minimum) black lettering on a white background.

E. Required wiring accessories: Furnish accessories such as cleats, mounting straps, wire ties, insulated ring lugs and mounting hardware as required.

2.3 INSTRUCTION MANUALS

A. All equipment instruction literature shall be bound in a heavy duty "D" ring binder. Additional binders, numbered consecutively, may be used if required. The front of each binder shall be labeled with the Owner, Contractor, and Project name. Each binder shall include a Table of Contents.

PART 3 - EXECUTION

3.1 GENERAL

A. All work performed on the relay panels shall be performed by personnel experienced in working with energized utility style relay and control panels.

B. The existing relay panels shall remain energized as much as possible subject to Contractor work procedures. When modifying the existing relay panels, Contractor shall take all necessary precautions to prevent inadvertent operation of relays or controls.

C. All work performed on the relay panels shall be performed by personnel experienced in working with energized utility-style relay and control panels. Experience in utility transmission and distribution substations is required. Personnel must be fully capable of reading, interpreting, and completing wiring in accordance with prepared wiring diagrams.

3.2 NEW PANELS

A. Mount panels as indicated on the drawings.

B. Properly secure each panel to the building structure and to adjacent panels.

C. Ground all panels.

3.3 EXISTING PANELS

A. The existing relay panels shall remain energized as much as possible subject to Contractor work procedures. When modifying the existing relay panels, Contractor shall take all necessary precautions to prevent inadvertent operation of relays or controls

B. All panel cuts and scratches shall be touched up with paint to match the existing panel finish.

C. Blank Covers: Install blank cover plates over openings for future devices or removed.

D. New devices shall be mounted parallel and perpendicular to existing devices

E. All panel cuts and scratches shall be touched up with paint to match the existing panel finish.

F. Contractor shall be responsible for maintaining an as-constructed set of drawings which will be provided to the Engineer at the completion of the project.

G. At locations described on the drawings, Contractor shall install blank cover plates over openings that result from removal of some devices. Coverplates shall be constructed from 11-gauge steel and painted to match the existing panels.

H. Required wiring accessories: Furnish accessories such as cleats, mounting straps, wire ties, insulated ring lugs and mounting hardware as required.

3.4 WIRING

A. All wiring shall be 600 volt, crosslink polyethylene insulated, Type SIS, No. 12 (65 strand) switchboard wire.

B. All wiring to Electroswitch rotary switches and lockout relays shall be spirally bundled around the switch to allow the switch to be “rolled” out of the panel for future wiring changes.

C. All wires shall be kept as short as practical with no excess wire coiled up or looped in the wire ducts. All wiring shall be neatly and carefully installed by workmen skilled in such installation.

D. Cables and wires shall be installed and terminated in accordance with Substation Control Wiring Requirements as noted on the drawings.

E. All wires shall be kept as short as practical with no excess wire coiled up or looped in the wire ducts. All wiring shall be neatly and carefully installed by workmen skilled in such installation.

F. Wires shall be terminated with insulated ring type insulated lugs, securely crimped. Ring lug terminals shall be Thomas & Betts or Burndy. NOTE: <u>No slotted terminal connectors shall be used. Use of non-approved lugs may result in rejection of work and complete retermination of all wiring</u>

G. Sufficient care shall be exercised in the use of crimp-on terminal connectors to insure that each wire is firmly attached to the connector and that proper wire strip length, as determined by the

lug manufacturer, is followed. Conductor insulation shall be squarely and evenly cut and shall be continuous with the connector barrel.

H. Only controlled-cycle compression tools supplied by the manufacturer of the ring lug being used are acceptable. Use of compression tools not supplied by the ring lug manufacturer may result in rejection of work and complete retermination of all wiring

I. Install special cables as required.

J. All wiring or cables that are disconnected shall be completely removed from wireways and wire looms. Disconnected wiring shall not be left in the relay panels.

K. If large wire sizes require use of non-insulated lugs, cover lug barrel with 600V heat shrink tubing.

3.5 ACCESSORIES

A. Device Nameplates: Assure a clean surface exists prior to adhering nameplates. Nameplates to be installed level.

B. Device Labels: A device location label used to locate each device with respect to the point-to-point wiring diagrams shall be installed next to each device inside the panel. These adhesive labels shall have 3/8” black letters on a ¾” x 1” white background.

C. Wiring ducts shall be used as much as possible for all wire bundles. These plastic ducts shall be securely fastened to the panel and shall be completely independent of the relay cases and other equipment mounted on the panel.

D. Required wiring accessories such as cleats, mounting straps, terminal connectors, fuse blocks, terminal boards, cartridge fuses of the ratings shown and the like, shall be provided by the Contractor.

END OF SECTION 337233.13

INDIANOLA MUNICIPAL UTILITIES
EAST IOWA CIRCUIT SWITCHER REPLACEMENT PROJECT - INSTALLATION

SECTION 337233.19 – SUBSTATION TESTING & COMMISSIONING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Section 337243 Substation Control Wiring.

1.2 SUMMARY

A. This Section includes the following: Testing and commissioning of substation equipment, auxiliary equipment, relays, circuits, and controls, etc.

B. Equipment and systems to be tested include the following:

1. Perform acceptance tests on new circuit breakers CK601 and CK602 including auxiliary systems, CTs, etc.
2. CK601 trip and close circuits including wiring and functional tests.
3. CK230 trip and close circuits including wiring and functional tests.
4. CK602 trip and close circuits including wiring and functional tests.
5. CK240 trip and close circuits including wiring and functional tests.
6. Functional testing of all modified circuits.
7. All circuits that will be modified must be traced prior to beginning work. All discrepancies between existing wiring and drawings must be resolved with Engineer prior to proceeding with modifications.
8. Confirm phasing against measurements taken on the existing system prior to reenergizing transformers.
9. Test newly installed equipment ground leads.

C. The following tests will be performed by Others:
1. Modifications to Owner’s SCADA master station.

1.3 STANDARDS

A. Testing shall adhere to the requirements and recommendations contained in the following standards:

1. American National Standards Institute (ANSI):
   - C12.1 Code for Electricity Metering
   - C12.11 Instrument Transformers for Revenue Metering, 10 kV BIL through 350 kV BIL.
   - C12.13 Electronic Time-of-Use Registers for Electricity Meters.
   - C12.15 Electricity Metering - Solid-State Demand Registers for Electromechanical Watthour Meters

C12.16 Solid-State Electricity Meters.
C63.2 Electromagnetic Noise and Field-Strength Instrumentation, 10kHz to 40GHz.

2. American Society for Testing and Materials (ASTM):
   D877 Test Method for Dielectric Breakdown Voltage of Insulating Liquids Using Disk Electrodes.
   D1816 Test Method for Dielectric Breakdown Voltage of Insulating Oils of Petroleum Origin Using VDE Electrodes.
3. Institute of Electrical and Electronics Engineers (IEEE):
   C2 National Electrical Safety Code.
   C37.20.1 Metal-Enclosed Low-Voltage Power Circuit Breaker Switchgear.
   C37.20.2 Metal-Clad and Station-Type Cubicle Switchgear.
   C37.20.3 Metal-Enclosed Interrupter Switchgear.
   C57.13 Requirements for Instrument Transformers.
   C57.13.1 Guide for Field Testing of Relaying Current Transformers.
   C57.13.2 Conformance Test Procedures for Instrument Transformers.
   C57.13.3 Guide for Grounding of Instrument Transformer Secondary Circuits and Cases.
   450 Maintenance, Testing, and Replacement of Large Lead Storage Batteries for Generating Stations and Substations
4. National Fire Protection Association (NFPA)
   70 National Electrical Code.
5. National Electrical Manufacturers Association (NEMA) and Insulated Cable Engineers Association (ICEA):
   WC 3/ICEA S-19-81 Rubber-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.
   WC 5/ICEA S-61-402 Thermoplastic-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.
   WC 7/ICEA S-66-524 Cross-Linked-Thermosetting-Polyethylene-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.
   WC 8/ICEA S-68-516 Ethylene-Propylene-Rubber-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.
7. InterNational Electrical Testing Association (NETA)
   ATS-2017 Standard for Acceptance Testing Specifications for Electrical Power Equipment and Systems
8. North American Electric Reliability Council (NERC)
   PRC-005 Transmission and Generation Protection System Maintenance and Testing
   PRC-008 Underfrequency Load Shedding Equipment Maintenance Programs
   PRC-011 UVLS System Maintenance and Testing
   PRC-017 Special Protection System Maintenance and Testing

1.4 TESTING SUBCONTRACTOR

A. Testing shall be performed by a subcontractor routinely engaged in the setting and testing of utility grade power system equipment, relays, protection schemes, and associated devices.

B. Detailed information concerning the proposed testing subcontractor's experience shall be provided. Documentation of subcontractor's experience shall include, at minimum, a list of

substation relay and control projects completed during the last year; detailed description of experience with electromechanical and Basler Electric Company devices; a listing of the subcontractor's testing equipment; names and resumes of personnel who will be assigned to the project; and utility references including names and phone numbers for the specific personnel and the subcontractor in general.

C. Scott Steinmetz of Steinmetz Corporation has significant recent experience in the East Iowa Substation and is Owner's preferred testing contractor. Steinmetz Corporation's phone number is available upon request from Engineer. Proposed testing contractor must be submitted with the bid. Alternate testing contractors must be approved prior to beginning work.

1.5 PERSONNEL

A. The lead testing technician shall have a minimum of 10 years experience testing utility protection and control equipment. Experience shall include a minimum of 5 years being in responsible charge of testing programs for substations of similar size and nature as this project and shall include the testing and commissioning of substations with similar types of relays and control schemes. Experience shall include a complete scope of testing such as is specified in these specifications. Lead testing technicians shall be certified in accordance with ANSI/NETA ETT-2000 and shall have a current Level III or higher certification.

B. Additional testing technicians shall have a minimum of 5 years testing experience in utility testing. Experience shall include the testing and commissioning of substations with similar types of relays and control schemes and shall include a complete scope of testing such as is specified in these specifications. Testing technicians shall be certified in accordance with ANSI/NETA ETT-2000.

C. Resumes of lead testing technician and all additional testing technicians that will be assigned to the project shall be provided to Owner at least 30 days prior to commencement of testing. Testing contractor shall replace any testing personnel that Owner does not deem qualified at any time before or during the testing process. Owner reserves absolute right to determine the necessity of such replacement.

1.6 TEST EQUIPMENT

A. Test equipment listed below is the minimum required to perform the testing and checkout of the relay and control systems. Test technicians must be familiar with the use of this equipment and have a thorough understanding of the devices that are being tested.

B. All test equipment shall have been tested, calibrated, and certified by the equipment manufacturer within 12 months prior to performing the tests. Copies of all certificates shall be provided to Owner prior to testing.

C. Relay Test Set
1. Voltage Source: Device(s) capable of supplying three independent voltage sources (1-250V) that are accurately variable both in magnitude and phase angle.
2. Current Source: Device(s) capable of supplying three independent current sources (0-25A) that are accurately variable both in magnitude and phase angle.

3. Frequency source: Device that is capable of supplying two voltage sources (0-150V) with one of the sources capable of supplying accurately variable frequency. Frequency shall be variable from 55-65 Hz minimum with at least 0.1 degree resolution.
4. Digital Timer: Device capable of timing contact or DC voltage transitions integral with the operation of the voltage and current sources. Timer resolution must be 0.0001 second or better.
5. The accuracy of all sources shall be equal to or better than the following:
   a. Magnitude: ± 0.5%
   b. Phase Angle: ± 0.5 degrees
   c. Frequency: ± 0.01%
   d. Time Measurement: ± 0.0001 sec
   e. The distortion of the sine wave sources must be less than 2 percent.
6. Acceptable Devices:
   a. Three (3) Doble F2350 series units
   b. One (1) Doble F6000 series unit
   c. AVO – Pulsar System with appropriate modules
   d. Powertec – DFR
   e. Omicron – CMC 156

D. Transducer & Meter Calibrator
1. Acceptable Devices:
   a. Scientific Columbus Model 6444 Transducer Calibrator
   b. Powertec TTS Calpro
   c. Combination System consisting of either Relay Test Set from above list with Arbiter Systems Model 931A Power System Analyzer (in RMS mode) connected between test set and transducer or meter or Relay Test Set from above list using external AC (True RMS) and DC voltmeters and current meters from acceptable meter list. Sufficient quantity of meters must be used to simultaneously monitor input voltage, current, and output current (if applicable).
2. All devices must have at least 0.2% accuracy

E. Voltmeter and Ammeter; Multimeters used during the calibration of meters, transducers and relays must be high accuracy digital meters that meet the following specifications:
1. 4 ½ digit or better resolution
2. True RMS AC measurement
3. Basic DC Accuracy: 0.05% of scale used
4. Basic AC Accuracy: 0.2% of scale used

F. Phase Angle Meter
1. An analog or digital phase angle meter shall be utilized during testing of the auto synchronizing system or sync check functions.
2. Digital or analog phase angle meters are acceptable for recording voltage and current load and phase angle values. Clamp-on phase angle meters are not acceptable.

G. CT Test Equipment: A device specifically designed to test CTs shall be used. Approved devices include:
1. AVO Current Transformer Excitation Test set, Model CTER-
2. Appropriate Vanguard Instruments CT Excitation Test Set device

H. Test Jack Devices: Where ABB FT-1 and FT-19R test switches are used, disconnection of internal wiring is discouraged and is to be performed only when absolutely necessary. To this end, it will be necessary to have sufficient quantities of the appropriate ABB test jacks to enable use of the test switches.

I. Computer Terminal and Printer: A computer terminal and associated communications cables for communicating with the various relays is required. Special software to communicate with a) test equipment, b) substation integration devices, and/or intelligent equipment devices (i.e. relays, panel meters, transformer tap controllers, etc) will NOT be provided by Owner however Owner is expecting the special software to be used.

J. Megohmmeter: A 2500-volt megohmmeter is required to test insulation. The meter shall have minimum accuracy of 5%.

K. Infrared Scanning Equipment: Infrared scanning equipment shall provide a hard copy to record the thermal image, temperature of the object, ambient temperature, degrees temperature rise above ambient, and date of the recording. Manufacturer's information on the scanning equipment shall be submitted for review.

L. Phase Rotation Meter

M. AC High Potential Unit
1. An AC high potential test set with an available test voltage of at least 36kV AC is required to test the vacuum interrupters in the vacuum circuit breakers.
2. Acceptable devices
   a. Hipotronics Model 860P
   b. Hipotronics Model 880PL
   c. Hipotronics Model 7BT 60
   d. AVO - Biddle Catalog 222060

N. Low Resistance Test Unit (Ductor)
1. AVO

O. High AC Current (Primary Injection) Test Set with minimum continuous current output capacity of 100 amps
1. SMC Raptor MS

1.7 SCHEDULE

A. Lead testing technician shall provide a testing program and schedule to indicate the sequence of the work and the time period during which it will be completed. The program/schedule shall be updated on a weekly basis. The program/schedule shall be provided to Owner on a weekly basis at a meeting scheduled mutually with Owner.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 GENERAL

A. Existing relay panels shall remain energized at all times. When testing relay panels, Contractor shall take all necessary precautions to prevent inadvertent operation of relays or controls.

B. Furnish qualified test personnel to initiate and manage the test program for this project. Provide qualified test technicians as necessary to perform all testing required under these specifications.

C. Furnish all test equipment as specified or required to properly perform each specified or required test to completely verify the proper operation of all equipment and systems.

3.2 REQUIRED TESTING AND COMMISSIONING SERVICES

A. Testing is to be as complete and as extensive as necessary to assure the proper operation of all equipment and protective systems for all equipment within the substation and for all equipment extending from the substation.

B. Subcontractor shall provide a written test plan for the testing to be completed for this project. The plan shall be inclusive, indicating the tests that are to be completed, the equipment that will be tested, and the schemes that will be tested. The plan shall also include the interconnecting parties that require coordination for tests such as those required for the transmission lines. The test plan shall incorporate a schedule that indicates when item-specific testing will be performed. Owner may assign representatives to witness testing based upon this schedule. Contractor may be required to repeat testing in the presence of Owner’s representative should performance of testing vary from the schedule without advance notice to Owner.

C. Test and set all of the relays according to settings provided by Engineer.

D. Function test all circuits installed for this project using primary or secondary current and voltage injection. Current and voltage values used to activate relays shall be based on values necessary to confirm the differing modes of operation for each relay, such as zone 1, zone 2, zone 3, overcurrent conditions, overvoltage conditions, undervoltage conditions, underfrequency conditions, and etc. This will include all AC potential and current circuits and all control circuits. This testing will be done in conjunction with the testing and checkout by Owner on the SCADA system. These values will be used to confirm the data connections to the communications processors, ethernet switch, SCADA RTU, and Control Center.

E. Provide contact status change or signal inputs to RTU equipment to confirm proper operation of the equipment.

F. Simulate in-service fault operation using current and voltage injection tests to trip protective equipment for all of the protective schemes.

G. Perform all initial pre-energization tests or checks to confirm the readiness of equipment to be energized.

H. Perform all load tests, checks or verification procedures to confirm the proper connection and operation of circuits, relays, protection schemes, etc. being placed in service. This includes satellite-controlled synchronous end-to-end tests on all transmission lines that utilize piloted protection schemes.

I. Confirm the proper operation of all circuits installed or revised for the project. This will include using a set of substation control drawings and checking the proper operation of each contact opening/closure, switch opening/closure, operation of each coil, relay, etc. that is connected into the circuits. Each device confirmed for proper operation shall be “yellow lined” to indicate the device has been checked and found operating properly. If necessary, incidental corrections shall be coordinated with the Engineer, implemented, placed into service, and functionally tested. For the purpose of the contract, the testing contractor shall include a minimum of 200 conductor termination relocations and the addition of 200 wire jumpers, complete with terminations.

J. Provide thermal infrared scans of power equipment, bus, control equipment, auxiliary equipment, etc under the maximum load conditions possible.

3.3 REQUIRED RELAY AND RELATED DEVICES TESTS

A. Tests covered by this specification shall include but not be limited to the following:

B. Megger Tests:
1. Megger all power equipment for 1 minute at 2500V.
2. Do not megger any protective relays, communication processors, lighted nameplates, or other equipment that contains electronic components.

C. Current Transformer Tests (new breaker CTs only):
1. Verify nameplate data with drawings and specifications.
2. Verify grounding.
3. Verify correct connections with system requirements.
4. Verify bolted electrical connections with low resistance ohmmeter or calibrated torque wrench.
5. Visually check polarity mark orientation on all CTs with the contract drawings and manufacturer's drawings.
6. Perform CT polarity test per IEEE C57.13.1 or as follows:
    a. Insert a milliammeter by test plug or jumpers to check that proper circuit continuity and polarity is present in each instrument, relay, switch, auxiliary equipment, etc., that should be connected to the CT being tested; repeat for every CT.
    b. Attach the "negative" lead of a 12-volt automotive battery to the unmarked terminal of the CT primary.
    c. Momentarily touch the "plus" lead of the battery to marked CT primary lead then release the battery positive lead. The milliammeter will read up scale to indicate the correct continuity and polarity.
    d. When testing power transformer CTs, avoid touching the battery, battery leads, and transformer terminals during the test.

7. Ratio CTs at all taps using the voltage or current method per IEEE C57.13.1.
8. Perform megger test on CT primary winding with CT secondary grounded.
9. Perform demagnetization and excitation tests on CTs in accordance with ANSI C57.13 as the final test on each CT.
10. Power factor tests.
11. Verify that all CT secondary circuits are grounded at one and only one point as shown on drawings.
12. All CTs are to remain shorted until it is determined in the course of the testing procedure the CT is properly loaded.

D. Sudden Pressure Relay:
1. Pressure test the relay in accordance with the manufacturer's instructions to verify proper operation of device and electrical contacts.
2. Megger contact to case.

E. Alarm Sensor Testing:
1. Megger all leads of device to case. (Consult instruction book for voltage level to be used to assure no damage across open contacts.
2. Induce the device to operate with proper input medium (heat, cooling, pressure, vacuum, voltage, current, etc.) and verify operation of the device at the correct input medium level by monitoring the output contacts with an ohmmeter.

F. Annunciator Testing:
1. Check each unit of annunciators by closing or opening the trouble contact and observing operation of control board.
2. Check all annunciator lamps, bell cutoff, and reset operation.

G. Relay Switchboards:
1. Visually inspect all equipment, wiring, etc.
2. Verify grounding.
3. Instrument transformer tests.
4. Alarm sensor testing.
5. Annunciator testing.
6. Molded-case circuit breaker trip testing.
7. Relay testing
8. Control and instrument switch testing.
9. Instrument calibration.
10. Verify correctness/completeness of engraved nameplates.

H. Communications Processors:
1. Verify cabling between communications processors, SEL relays, and other devices.
2. Install settings and functionally test communications processors.
3. Adjust analog point scaling as required to provide correct analog quantities to SCADA systems.
4. Verify grounding.

I. Instrument Calibration:
1. Verify nameplate data.
2. Visually inspect for damage.

J. Protection and control scheme wire checks:

1. Testing shall include a thorough review of the schematic diagrams and checking each element to verify that it is functioning properly within the scheme. The drawing elements are to be yellow-lined when it is determined that part of the circuit is operating correctly. The circuits to be included for the review include:
2. Current transformer circuits
3. Potential transformer circuits
4. Control circuits
5. Auxiliary power circuits
6. Include all circuits to the yard equipment

K. Functional Tests:
1. Functional tests shall include a complete simulation of operation of the protection and control schemes by injecting current and voltage signals into the secondary or primary circuits to confirm proper operation of the circuits and controlled equipment. This testing is to be concluded prior to energization of any equipment associated with the protection and control scheme. This testing shall include the following:
   a. Inject current and voltages into the secondary circuits to the relays, meters, and monitoring devices. Primary current injection may be used in lieu of secondary current injection.
   b. Measure voltage, current, and phase angles into or out of all equipment on the circuit.
   c. Increase values to actuate pickup of the relays for the different relay settings to demonstrate proper operation of the relays and the control circuits.

2. Perform the trip tests for the differing substation configurations that the station may experience during switching or operating conditions. All functions, including, but not limited to, pilot trip, non-pilot trip, reclosing, and breaker failure schemes with direct transfer trip shall be demonstrated.
3. Record all tests on forms provided by the tester.

3.4 EQUIPMENT TESTS

A. High Voltage Circuit Breaker Tests:
1. Verify nameplate data.
2. Verify grounding.
3. Inspect physical and mechanical condition.
4. Inspect operating mechanism and SF6 gas insulation system.
5. Test for SF6 leaks.
6. Verify operation of alarms and pressure switches for pneumatic, hydraulic, or SF6 gas pressure.
7. Perform mechanical operation tests on mechanism per manufacturer’s documentation
8. Verify bolted connections with low resistance ohmmeter or calibrated torque wrench.
9. Perform time travel analysis.
10. Megger tests.
11. Ductor tests.
12. Functional tests.
13. Power factor tests.
14. High potential tests (not required for SF6 breakers.)
15. Verify cubicle heater operation.
16. Instrument transformer tests.

17. Verify correct operation of electrical close, electrical trip, trip-free and antipump functions.
18. Perform minimum pickup voltage tests on close and trip coils per manufacturer's documentation.
19. Check auxiliary switch connections, contacts, and operating linkages.
20. Check proper operation of heaters, motors, compressors (air, oil, SF6 gas), gauges, valves, and accessories.
21. Check to see if compressors, motors, or pumps run excessively.
22. Motor tests.
23. Record as-found and as-left counter readings.

B. Low Voltage (< 600V) Power Circuit Breaker Tests:
1. Molded-case circuit breaker trip tests.
   a. Check for proper current rating to circuit connected.
   b. Verify proper operation of ground detector on all GFI breakers.
   c. Adjust and test pickup settings using primary current injection.

C. Supervisory Remote Terminal:
1. Contractor will test all changes to cables and wires and check terminations to the supervisory remote terminal.
2. Verify grounding.
3. Contractor will assist the owner or manufacturer's field representative in functional and operational tests of the supervisory remote terminal unit to assure correctness of control, status point, and analog metering operation.

D. Outdoor Bus
1. Compare bus arrangement and phasing cuts with drawings and specifications.
2. Check bolted connections with a low resistance ohmmeter or with a calibrated torque wrench.
3. Megger tests.
4. Verify grounding.

E. Miscellaneous Equipment Tests:
1. Test all miscellaneous equipment furnished by equipment manufacturer as recommended by manufacturer. Perform other tests recommended by the manufacturer or ANSI/NETA ATS-2009 to assure correctness of operation of equipment within the substation.

3.5 EQUIPMENT ENERGIZATION

A. Planning
1. A meeting will be held between responsible parties approximately two (2) weeks ahead of equipment outages and equipment energizations to review the work to be accomplished.
2. The schedule for the work, including the tasks to be accomplished, the time periods for the tasks, intermediate testing and check points, etc. will be reviewed.
3. During any scheduled outage, a weekly meeting, or more often as site conditions dictate, will be held to review progress, status, and site conditions that may affect the progress of the work.
4. Review phasing prior to beginning work. Measurements shall be used later after the transformers are reenergized.

B. Transformer Outages
   1. Transformer outages will not take place until all practical prior work has been completed such that the outage duration is minimized.
   2. The scheduling and release of a transformer outage will be completely at the discretion of the IMU and will not be unreasonably withheld.
   3. The installation and testing of the equipment, circuits, and schemes shall be planned and sequenced to minimize the amount of outage time required, and as much as is practicable, allow the equipment to be re-energized when not required for construction or testing.

C. Equipment energization:
   1. A coordination meeting shall be held approximately 1 day in advance of the scheduled energization.
   2. Responsibilities of Testing Technician during the pre-energization and energization tasks.
      a. Witness initial energization of equipment.
      b. Assure that the initial energization sequence is followed as determined in the initial coordination meeting.
      c. Perform all testing and checks necessary to confirm the equipment, relays, etc. are operating properly, seeing the proper voltage, currents, phase angles, or other properties as required for proper operation.
      d. Record all tests and checks on forms provided by the testing technician.
      e. Coordinate with test technicians (including test technicians with other company affiliations) at other locations remote from the substation to assure proper operation of the facilities being placed in service.
      f. Provide notification to other responsible personnel when tests have proven the equipment is operating satisfactorily and he is ready to proceed with additional energization of equipment.
   3. Testing Technician shall provide testing personnel during initial energization of each circuit breaker as may be required during the energization sequence.
      a. Perform the following insulation tests prior to energizing high voltage equipment.
      b. Megger each HV piece of equipment, bus, etc. just before energization or after construction work is completed. Megger phase to phase and phase to ground for each phase. Disconnect and reconnect transformer neutrals as necessary to isolate grounds on system for the testing.
      c. Investigate and resolve improper results of the tests before continuing with the energization.
      d. Verify phasing of the bus and incoming lines to the substation.
      e. Responsible parties shall agree that the substation is ready for energization prior to commencing the Energization sequence.
   4. Energization
      a. Perform the energization of equipment in accordance with the energization schedule previously established.
      b. Perform the necessary tests and checks including comparing phasing prior to supplying load from the reenergized transformer.
      c. Continue with the next step of the energization procedure when and only when responsible parties agree the tests and checks are complete and the equipment is operating properly.

3.6 POST ENERGIZATION TESTS AND FOLLOWUP

A. Immediately after the initial energization of new equipment, the testing technician shall complete load tests and checks to include the following:
   1. Measure currents, voltages, and phase angles at the inputs or outputs of all relays, meters, monitoring equipment, etc. Confirm the proper inputs to all equipment due to external equipment measurements.
   2. Record all measurements on forms provided by the testing technician.
   3. Confirm with responsible parties when all post-energizing testing is completed and the equipment or sub-sections thereof are ready for commercial operation.

B. Complete marks, comments to record drawings and submit to Engineer for revision of drawings.

C. Test technician shall submit final copies of all test reports to Engineer.

D. Contractor shall provide an event record, in electronic format, from each microprocessor-based relay set or reset under this project to Engineer. Event shall be generated by a trigger command to the relay. The trigger shall be initiated after final settings have been placed on the relay. Events shall be emailed to Engineer no later than 24 hours after the line terminal is commissioned and placed into service.

3.7 GROUND TESTING

A. If possible, perform ground tests prior to static wire attachment to line dead-end towers, or disconnect static jumpers for insulated static wire installations. Supplemental ground wires that extend outside the substation fence shall be disconnected before testing. Testing shall be performed before underground cable shields and concentric neutrals are connected to the ground grid. If the grounding system includes counterpoises, they shall remain connected during testing.

B. Perform the following tests on portions of the ground grid that are modified:
   1. Verify ground system is in compliance with drawings and specifications and, where applicable, the NFPA 70 National Electrical Code Article 250.
   2. Inspect physical and mechanical condition
   3. Test bolted electrical connections with low-resistance ohmmeter and investigate values greater than 50 percent higher than the lowest resistance value obtained.
   4. Verify tightness of bolted connections with calibrated torque wrench in accordance with manufacturer’s published data.
   5. Perform high-current ground grid injection tests on all new grounding leads connected to the ground grid system:
      a. Document test locations by marking up a copy of the ground grid plan. Number all test points and enter numbers on test report.
      b. Use all necessary safety precautions prior to performing this testing, especially in an energized substation. On all ground conductors, current flow is likely even when no fault exists. During fault conditions, extremely high fault current can flow through the station ground grid, resulting in extremely high voltages. Due to the long cable lengths and the possibility of high step potential, all personnel working with or in contact of the test leads must wear low-voltage rubber gloves.

c. The reference connection shall normally be the transformer neutral. In large stations, the reference connection may need to be moved. Begin a new test report for each reference connection. Describe reference connection point on test report.
d. Test leads must not be coiled at any time during testing.
e. If equipment or structures have two ground leads, lift one when possible before injecting current. Multiple leads provide multiple paths to the grid, making interpretation of results very difficult.
f. Inject a minimum of 100 amps on each new ground lead that extends above the substation surface.
g. Enter test point number, amps injected, volts measured on test form.
h. Calculate total test impedance by dividing volts by amps and enter on test report.
i. Measure tare impedance of test leads and enter on test report.
j. Subtract tare impedance from total test impedance to determine actual impedance and enter on test report.

6. Obtain point-to-point resistance measurements between the ground grid and all major new electrical equipment frames, structures, buildings, etc.
   a. Investigate all point-to-point resistance values that exceed 0.5 ohms.
   b. Record results and notify Engineer if any reading exceeds 1 ohm.

3.8 DOCUMENTATION

A. A written log shall be maintained of the testing performed noting the date, time and personnel performing the tests. Contractor shall develop and maintain test forms for each device or system tested. The form shall include all pertinent nameplate data including model and serial numbers, the date and time of the test and the person performing the tests.

B. A written log shall be maintained of the testing performed noting the date, time and personnel performing the tests. Contractor shall develop and maintain test forms for each device or system tested. The form shall include all pertinent nameplate data including model and serial numbers, the date and time of the test and the person performing the test.

C. The testing logs and test forms shall be available on-site for viewing by Owner or his representatives at all times. At the completion of the project, two copies of the testing log and the testing forms shall be delivered to Owner for his records.

D. Testing Documentation. Testing contractor shall provide test data forms and record all tests. Tests shall be recorded on the actual forms. Recording test data on backup data sheets and transposing the data at a later date is not acceptable. Completed test forms shall be signed and dated on the date they are completed. Two copies of completed test forms shall be submitted to OWNER on a weekly basis. Testing technician shall maintain two sets of full size drawings. One set shall be used to yellow line circuits/schemes indicating that the testing has been completed and schemes have been proven correct. The second set shall be used to mark any changes, revisions, etc. to the drawings. Both sets shall be submitted to the Engineer at the completion of the project.

E. Maintenance Records. Record all inspections and maintenance data for each piece of equipment. A separate form shall be used for each individual piece of equipment. Equipment ID numbers will be used to identify the equipment whenever available. Record the following information on the forms: date, time, inspected by, readings and status, conditions found, test results, and any maintenance or corrective work performed. Completed inspection and

maintenance forms shall be delivered to Owner after the completion of the Work. All forms used for inspections and maintenance shall be pre-approved, in writing, by Owner before testing can begin.

F. Maintain an as-constructed set of drawings during the construction of the Work. Deliver the as-constructed drawings to Engineer at the completion of the Work.

G. Test reports shall at minimum include the following:
1. Summary of project.
2. Description of equipment tested.
3. Description of tests.
4. Test data.
5. Analysis and recommendations.

H. Test data records shall at minimum include the following:
1. Identification of the testing contractor.
2. Equipment identification.
3. Humidity, temperature, and other conditions that may affect test results.
4. Date of inspections, maintenance, tests, or calibrations.
5. Identification of the testing technician.
6. Indication of inspections, tests, maintenance, and/or calibrations to be performed and recorded.
7. Indication of the expected results when calibrations are to be performed.
8. Indication of as-found and as-left results, as applicable.
9. Sufficient spaces to allow all results and comments to be included.

I. Documentation of test procedures, test results, and test equipment certifications shall be provided for all systems and equipment as required in applicable NERC standards. Documentation shall be in a format acceptable to demonstrate compliance with NERC standards in effect at the time the testing is completed. Testing Contractor shall assist the Owner with the initial NERC compliance audit following commissioning of the project by providing any additional documentation or certification necessary to assure compliance with NERC standards that apply to protection system testing.

END OF SECTION 337233.19

INDIANOLA MUNICIPAL UTILITIES
EAST IOWA CIRCUIT SWITCHER REPLACEMENT PROJECT - INSTALLATION

SECTION 337233.33 - RACEWAY AND BOXES FOR SUBSTATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Conduit, ducts, and duct accessories for direct-buried and concrete-encased duct banks, and in single duct runs.
2. Raceways, fittings, boxes, enclosures, and cabinets for substation electrical wiring.

1.3 DEFINITIONS

A. EMT: Electrical metallic tubing.

B. IMC: Intermediate metal conduit.

C. RMC: Rigid metallic conduit.

D. FMC: Flexible metal conduit.

E. LFMC: Liquidtight flexible metal conduit.

F. LFNC: Liquidtight flexible nonmetallic conduit.

G. ENT: Electrical nonmetallic tubing.

H. RNC: Rigid nonmetallic conduit.

1.4 SUBMITTALS

A. Product Data: For duct bank materials, surface raceways, wireways and fittings, handholes, hinged-cover enclosures, and cabinets.

B. Shop Drawings: For the following raceway components. Include plans, elevations, sections, details, and attachments to other work.

1. Custom enclosures and cabinets.

1.5 QUALITY ASSURANCE

A. Comply with ANSI C2, National Electrical Safety Code

B. Comply with NFPA 70, National Electrical Code.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver conduits to Project site with ends capped. Store nonmetallic ducts with supports to prevent bending, warping, and deforming.

B. Store precast concrete and other factory-fabricated underground utility structures at Project site as recommended by manufacturer to prevent physical damage. Arrange so identification markings are visible.

C. Lift and support precast concrete units only at designated lifting or supporting points.

1.7 COORDINATION

A. Coordinate layout and installation of ducts, manholes, handholes, and boxes with final arrangement of other utilities, site grading, and surface features as determined in the field.

B. Coordinate elevations of ducts and duct-bank entrances into manholes, handholes, and boxes with final locations and profiles of ducts and duct banks as determined by coordination with other utilities, underground obstructions, and surface features. Revise locations and elevations from those indicated as required to suit field conditions and to ensure that duct runs drain to manholes and handholes, and as approved by Engineer.

PART 2 - PRODUCTS

2.1 METAL CONDUIT AND TUBING

A. RMC - Rigid Metal Conduit: ANSI C80.1.

B. IMC – Intermediate Metal Conduit: ANSI C80.6.

C. EMT – Electrical Metal Tubing: ANSI C80.3.

D. LFMC – Liquid tight Flexible Metal Conduit: Flexible steel conduit with PVC jacket.

E. RNC – Rigid Nonmetallic Conduit

F. Fittings for Conduit (Including all Types and Flexible and Liquidtight), EMT, and Cable: NEMA FB 1; listed for type and size raceway with which used, and for application and environment in which installed.

1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886.
2. Fittings for EMT: Steel or die-cast, compression type.

3. Coating for Fittings for PVC-Coated Conduit: Minimum thickness, 0.040 inch, with overlapping sleeves protecting threaded joints.

G. Joint Compound for Rigid Steel Conduit or IMC: Listed for use in cable connector assemblies, and compounded for use to lubricate and protect threaded raceway joints from corrosion and enhance their conductivity.

2.2 NONMETALLIC CONDUIT AND TUBING (PVC)

A. RNC: NEMA TC 2, Type EPC-40-PVC, UL 651, with matching fittings by same manufacturer as the conduit, complying with NEMA TC 3 and UL 514B.

B. Duct Accessories:

1. Duct Separators: Factory-fabricated rigid PVC interlocking spacers, sized for type and sizes of ducts with which used, and selected to provide minimum duct spacings indicated while supporting ducts during concreting or backfilling.
2. Warning Tape: Underground-line warning tape specified in Division 33 Section "Electrical Identification."

2.3 OPTICAL FIBER/COMMUNICATIONS CABLE RACEWAY AND FITTINGS

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

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

1. Arnco Corporation.
2. Carlon Electrical Products.
3. Or approved equivalent.

C. Description: Comply with UL 2024; flexible type, approved for general-use installation.

2.4 METAL WIREWAYS

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

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

1. Cooper B-Line, Inc.
2. Hoffman.
3. Square D.
4. Or approve equivalent.

C. Description: Sheet metal sized and shaped as indicated, NEMA 250, Type 1, unless otherwise indicated.

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

E. Wireway Covers: Hinged type.

F. Finish: Manufacturer's standard enamel finish.

2.5 BOXES, ENCLOSURES, AND CABINETS

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

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

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

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

E. Cabinets:

1. Indoor: NEMA 250, Type 1, galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
2. Outdoor: NEMA 250, Type 3R, stainless steel or aluminum box with removable interior back panel.
3. Metal barriers to separate wiring of different systems and voltage.
4. Accessory feet where required for freestanding equipment.
5. Hinged door in front cover with latch and concealed hinge.
6. Additional accessories as indicated on the drawings.

2.6 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

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

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

a. Cooper B-Line, Inc.; a division of Cooper Industries.
b. Thomas & Betts Corporation.
c. Unistrut; Tyco International, Ltd.

2. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.

3. Channel Dimensions: Selected for applicable load criteria.

B. Raceway and Cable Supports: As described in NECA 1 and NECA 101.

C. 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.

D. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; 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, zinc-coated steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.
2. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
3. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
4. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
5. Toggle Bolts: All-steel springhead type.
6. Hanger Rods: Threaded steel.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

A. Outdoor Control Raceway: Apply raceway products as specified below, unless otherwise indicated:

1. Exposed Conduit: Rigid steel conduit.
2. Underground Conduit: RNC, Type EPC-40-PVC, with Schedule 40 fittings, direct buried.
3. ~~Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.~~
4. ~~Pull Boxes: Precast concrete.~~
5. ~~Application of Handholes and Boxes for Underground Wiring:~~

~~a. Handholes and Pull Boxes in Driveway, Parking Lot, and Off-Roadway Locations, Subject to Occasional, Nondeliberate Loading by Heavy Vehicles: [**Polymer concrete**] [**Fiberglass enclosures with polymer-concrete frame and cover**] [**Fiberglass-reinforced polyester resin**], SCTE 77, Tier 15 structural load rating.~~

~~b. Handholes and Pull Boxes in Sidewalk and Similar Applications with a Safety Factor for Nondeliberate Loading by Vehicles: [**Polymer-concrete units**] [**Heavy-duty fiberglass units with polymer-concrete frame and cover**], SCTE 77, Tier 8 structural load rating.~~

c. ~~Handholes and Pull Boxes Subject to Light-Duty Pedestrian Traffic Only: Fiberglass-reinforced polyester resin, structurally tested according to SCTE 77 with 3000-lbf vertical loading.~~

B. Indoor Control Raceway: Apply raceway products as specified below, unless otherwise indicated:

1. Exposed, Not Subject to Physical Damage: EMT.
2. Exposed and Subject to Severe Physical Damage: IMC or RMC. Includes raceways as indicated on the drawings.
3. Connection to Vibrating Equipment (Including Transformers, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
4. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4, stainless steel or aluminum in damp or wet locations.

C. Outdoor Collector or Feeder Raceway (Medium Voltage): Apply raceway products as specified below, unless otherwise indicated:

1. Exposed Conduit: RMC.
2. Underground Conduit: RNC, Type EPC-40-PVC, with Schedule 80 fittings, concrete encased.
3. Pull Boxes and Manholes: Precast concrete

D. Minimum Raceway Size: 1/2-inch trade size for indoor and 1-inch trade size for outdoor.

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

1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings.

2. EMT Conduit: Use steel or die-cast compression fittings.

3.2 INSTALLATION

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

B. Complete raceway installation before starting conductor installation.

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

D. Install no more than the equivalent of four 90-degree bends in any conduit run except for communications conduits, for which fewer bends are allowed.

E. Raceways Embedded in Slabs:

1. Run conduit parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support.
2. Change from ENT to RNC, Type EPC-40-PVC, rigid steel conduit, or IMC before rising above the floor.

F. 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.

G. 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.

H. Raceways for Optical Fiber and Communications Cable: Install raceways, metallic and nonmetallic, rigid and flexible, as follows:

1. 3/4-Inch Trade Size and Smaller: Install raceways in maximum lengths of 50 feet.
2. 1-Inch Trade Size and Larger: Install raceways in maximum lengths of 75 feet.
3. Install with a maximum of two 90-degree bends or equivalent for each length of raceway unless Drawings show stricter requirements. Separate lengths with pull or junction boxes or terminations at distribution frames or cabinets where necessary to comply with these requirements.

I. Flexible Conduit Connections: Use maximum of 48 inches of flexible conduit for equipment subject to vibration, noise transmission, or movement; and for transformers and motors.

1. Use LFMC or LFNC in damp or wet locations not subject to severe physical damage.

3.3 SUPPORT AND ATTACHMENT

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

B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as scheduled in NECA 1, where its Table 1 lists maximum spacings less than stated in NFPA 70. Minimum rod size shall be 1/4 inch in diameter.

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

D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to structural elements by the following methods unless otherwise indicated by code:

1. To Wood: Fasten with lag screws or through bolts.
2. To New Concrete: Bolt to concrete inserts.
3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
4. To Existing Concrete: Expansion anchor fasteners.
5. To Steel: Beam clamps..
6. To Light Steel: Sheet metal screws.

3.4 INSTALLATION OF UNDERGROUND CONDUIT

A. Direct-Buried Conduit:

1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom as specified in Division 31 Section "Earth Moving" for pipe less than 6 inches in nominal diameter.
2. Install backfill as specified in Division 31 Section "Earth Moving."
3. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction as specified in Division 31 Section "Earth Moving."
4. Install manufactured duct elbows for stub-ups at poles and equipment and at building entrances through the floor, unless otherwise indicated. Encase elbows for stub-up ducts throughout the length of the elbow.
5. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through the floor.

    a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches of concrete.
    b. For stub-ups at equipment mounted on outdoor concrete bases, extend steel conduit horizontally a minimum of 60 inches from edge of equipment pad or foundation. Install insulated grounding bushings on terminations at equipment.

3.5 EARTHWORK

A. Excavation and Backfill: Comply with Division 31 Section "Earthwork," but do not use heavy-duty, hydraulic-operated, compaction equipment.

B. Restore surface features at areas disturbed by excavation and reestablish original grades, unless otherwise indicated. Replace removed sod immediately after backfilling is completed.

C. Restore areas disturbed by trenching, storing of dirt, cable laying, and other work. Restore vegetation and include necessary topsoiling, fertilizing, liming, seeding, sodding, sprigging, and mulching.

3.6 DUCT INSTALLATION

A. Slope: Pitch ducts a minimum slope of 1:300 down toward manholes and handholes and away from buildings and equipment. Slope ducts from a high point in runs between two manholes to drain in both directions.

B. Curves and Bends: Use 5-degree angle couplings for small changes in direction. Use manufactured long sweep bends with a minimum radius as noted on the drawings, both horizontally and vertically, at other locations, unless otherwise indicated.

C. Joints: Use solvent-cemented joints in ducts and fittings and make watertight according to manufacturer's written instructions. Stagger couplings so those of adjacent ducts do not lie in same plane.

D. Duct Entrances to Manholes and Concrete and Polymer Concrete Handholes: Use end bells, spaced as required for each duct size.

1. Begin change from regular spacing to end-bell spacing 10 feet from the end bell without reducing duct line slope and without forming a trap in the line.
2. Grout end bells into structure walls from both sides to provide watertight entrances.

E. Sealing: Provide temporary closure at terminations of ducts that have cables pulled. Seal spare ducts at terminations.

F. Pulling Cord: Install 100-lbf-test nylon cord in all ducts, including spares.

~~G. Concrete-Encased Ducts: Support ducts on duct separators.~~

~~1. Separator Installation: Space separators close enough to prevent sagging and deforming of ducts, with not less than 4 spacers per 20 feet of duct. Secure separators to earth and to ducts to prevent floating during concreting. Stagger separators approximately 6 inches between tiers. Tie entire assembly together using fabric straps; do not use tie wires or reinforcing steel that may form conductive or magnetic loops around ducts or duct groups.~~
~~2. Concreting Sequence: Pour each run of envelope between manholes or other terminations in one continuous operation.~~

~~a. Start at one end and finish at the other, allowing for expansion and contraction of ducts as their temperature changes during and after the pour. Use expansion fittings installed according to manufacturer's written recommendations, or use other specific measures to prevent expansion-contraction damage.~~
~~b. If more than one pour is necessary, terminate each pour in a vertical plane and install 3/4-inch reinforcing rod dowels extending 18 inches into concrete on both sides of joint near corners of envelope.~~

~~3. Pouring Concrete: Spade concrete carefully during pours to prevent voids under and between conduits and at exterior surface of envelope. Do not allow a heavy mass of concrete to fall directly onto ducts. Use a plank to direct concrete down sides of bank assembly to trench bottom. Allow concrete to flow to center of bank and rise up in middle, uniformly filling all open spaces. Do not use power-driven agitating equipment unless specifically designed for duct-bank application.~~
~~4. Reinforcement: Reinforce concrete-encased duct banks where they cross disturbed earth and where indicated. Arrange reinforcing rods and ties without forming conductive or magnetic loops around ducts or duct groups.~~
~~5. Forms: Use walls of trench to form side walls of duct bank where soil is self-supporting and concrete envelope can be poured without soil inclusions; otherwise, use forms.~~
~~6. Minimum Space between Ducts: 3 inches between ducts and exterior envelope wall, 2 inches between ducts for like services, and 4 inches between power and signal ducts.~~
~~7. Depth: Install top of duct bank at least 24 inches below finished grade in areas not subject to deliberate traffic, and at least 30 inches below finished grade in deliberate traffic paths for vehicles, unless otherwise indicated.~~

8. Stub-Ups: Use manufactured duct elbows for stub-ups at poles and equipment and at building entrances through the floor, unless otherwise indicated. Extend concrete encasement throughout the length of the elbow.
9. Stub-Ups: Use manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through the floor.

    a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches of concrete.
    b. Stub-Ups to Equipment: For equipment mounted on outdoor concrete bases, extend steel conduit horizontally a minimum of 60 inches from edge of base. Install insulated grounding bushings on terminations at equipment.

10. Warning Tape: Bury warning tape approximately 12 inches above all concrete-encased ducts and duct banks. Align tape parallel to and within 3 inches of the centerline of duct bank. Provide an additional warning tape for each 12-inch increment of duct bank width over a nominal 18 inches. Space additional tapes 12 inches apart, horizontally.

H. Direct-Buried Duct Banks:

1. Support ducts on duct separators coordinated with duct size, duct spacing, and outdoor temperature.
2. Space separators close enough to prevent sagging and deforming of ducts, with not less than 4 spacers per 20 feet of duct. Secure separators to earth and to ducts to prevent displacement during backfill and yet permit linear duct movement due to expansion and contraction as temperature changes. Stagger spacers approximately 6 inches between tiers.
3. Excavate trench bottom to provide firm and uniform support for duct bank. Prepare trench bottoms as specified in Division 2 Section "Earthwork" for pipes less than 6 inches in nominal diameter.
4. Install backfill as specified in Division 2 Section "Earthwork."
5. After installing first tier of ducts, backfill and compact. Start at tie-in point and work toward end of duct run, leaving ducts at end of run free to move with expansion and contraction as temperature changes during this process. Repeat procedure after placing each tier. After placing last tier, hand place backfill to 4 inches over ducts and hand tamp. Firmly tamp backfill around ducts to provide maximum supporting strength. Use hand tamper only. After placing controlled backfill over final tier, make final duct connections at end of run and complete backfilling with normal compaction as specified in Division 2 Section "Earthwork."
6. Install ducts with a minimum of 3 inches between ducts for like services and 6 inches between power and signal ducts.
7. Depth: Install top of duct bank at least 36 inches (below finished grade, unless otherwise indicated.
8. Set elevation of bottom of duct bank below the frost line.
9. Install manufactured duct elbows for stub-ups at poles and equipment and at building entrances through the floor, unless otherwise indicated. Encase elbows for stub-up ducts throughout the length of the elbow.
10. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through the floor.

    a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches of concrete.

b. For equipment mounted on outdoor concrete bases, extend steel conduit horizontally a minimum of 60 inches from edge of equipment pad or foundation. Install insulated grounding bushings on terminations at equipment.

3.7 INSTALLATION OF CONCRETE MANHOLES, HANDHOLES, AND BOXES

A. Cast-in-Place Manhole Installation:

1. Finish interior surfaces with a smooth-troweled finish.
2. Windows for Future Duct Connections: Form and pour concrete knockout panels 1-1/2 to 2 inches thick, arranged as indicated.
3. Cast-in-place concrete, formwork, and reinforcement are specified in Division 3 Section "Cast-in-Place Concrete."

B. Precast Concrete Handhole and Manhole Installation:

1. Comply with ASTM C 891, unless otherwise indicated.
2. Install units level and plumb and with orientation and depth coordinated with connecting ducts to minimize bends and deflections required for proper entrances.
3. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1-inch sieve to No. 4 sieve and compacted to same density as adjacent undisturbed earth.

C. Elevations:

1. Manhole Roof: Install with rooftop at elevation indaiscted on drawings..
2. Handhole Covers: In paved areas and trafficways, set surface flush with finished grade. Set covers of other handholes 1 inch above finished grade.

D. Drainage: Install drains in bottom of manholes where indicated. Coordinate with drainage provisions indicated.

E. Waterproofing: Apply waterproofing to exterior surfaces of manholes[**and handholes**] after concrete has cured at least three days. Waterproofing materials and installation are specified in Division 7 Section "[**Elastomeric Sheet Waterproofing**] [**Thermoplastic Sheet Waterproofing**]." After ducts have been connected and grouted, and before backfilling, waterproof joints and connections and touch up abrasions and scars. Waterproof exterior of manhole chimneys after mortar has cured at least three days.

F. Dampproofing: Apply dampproofing to exterior surfaces of manholes[**and handholes**] after concrete has cured at least three days. Dampproofing materials and installation are specified in Division 7 Section "Bituminous Dampproofing." After ducts have been connected and grouted, and before backfilling, dampproof joints and connections and touch up abrasions and scars. Dampproof exterior of manhole chimneys after mortar has cured at least three days.

G. Hardware: Install removable hardware, including pulling eyes, cable stanchions, and cable arms, as required for installation and support of cables and conductors and as indicated.

~~H. Field-Installed Bolting Anchors in Manholes and Concrete Handholes: Do not drill deeper than 3-7/8 inches for manholes and 2 inches for handholes, for anchor bolts installed in the field. Use a minimum of two anchors for each cable stanchion.~~

~~I. Warning Sign: Install "Confined Space Hazard" warning sign on the inside surface of each manhole cover.~~

~~3.8 INSTALLATION OF HANDHOLES AND BOXES OTHER THAN PRECAST CONCRETE~~

~~A. Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting ducts to minimize bends and deflections required for proper entrances. Use box extension if required to match depths of ducts, and seal joint between box and extension as recommended by the manufacturer.~~

~~B. Unless otherwise indicated, support units on a level bed of crushed stone or gravel and compacted to same density as adjacent undisturbed earth.~~

~~C. Elevation: In paved areas and trafficways, set so cover surface will be flush with finished grade. Set covers of other handholes 1 inch above finished grade.~~

~~D. Install removable hardware, including pulling eyes, cable stanchions, cable arms, and insulators, as required for installation and support of cables and conductors and as indicated. Select arm lengths to be long enough to provide spare space for future cables, but short enough to preserve adequate working clearances in the enclosure.~~

~~E. Field-cut openings for ducts and conduits according to enclosure manufacturer's written instructions. Cut wall of enclosure with a tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.~~

~~3.9 INSTALLATION OF UNDERGROUND HANDHOLES AND BOXES~~

~~A. Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting conduits to minimize bends and deflections required for proper entrances.~~

~~B. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1/2-inch sieve to No. 4 sieve and compacted to same density as adjacent undisturbed earth.~~

~~C. Elevation: In paved areas, set so cover surface will be flush with finished grade. Set covers of other enclosures 1 inch above finished grade.~~

~~D. Field-cut openings for conduits according to enclosure manufacturer's written instructions. Cut wall of enclosure with a tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.~~

3.10 PROTECTION

A. Provide final protection and maintain conditions that ensure coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
2. Repair damage to paint finishes with matching touchup coating recommended by manufacturer.

3.11 GROUNDING

A. Ground underground ducts and utility structures according to Division 33 Section "Substation Grounding."

3.12 FIELD QUALITY CONTROL

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

1. Pull aluminum or wood test mandrel through duct to prove joint integrity and test for out-of-round duct. Provide mandrel equal to 80 percent fill of duct. If obstructions are indicated, remove obstructions and retest.

B. Correct deficiencies and retest as specified above to demonstrate compliance.

3.13 CLEANING

A. Pull leather-washer-type duct cleaner, with graduated washer sizes, through full length of ducts. Follow with rubber duct swab for final cleaning and to assist in spreading lubricant throughout ducts.

B. Clean internal surfaces of manholes, including sump. Remove foreign material.

END OF SECTION 337233.33

INDIANOLA MUNICIPAL UTILITIES
EAST IOWA CIRCUIT SWITCHER REPLACEMENT PROJECT – INSTALLATION

SECTION 337243 – SUBSTATION CONTROL CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Control wires and cables.

1.3 DEFINITIONS

A.

ANSI	American National Standards Institute.
ASTM	American Society for the Testing of Materials
ICEA	Insulated Cable Engineers Association
IEEE	Institute of Electrical and Electronics Engineers
NEMA	National Electric Manufacturers Association
NFPA	National Fire Protection Association
UL	Underwriters Laboratories

1.4 SUBMITTALS

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

1.5 QUALITY ASSURANCE

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

B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

A. Copper Conductor: Stranded, bare (per ASTM B3) or tinned (per ASTM B33) copper. Stranding shall be per ASTM B8 class B (7 strand) or class C (19 strand).

B. Multi-conductor Control Cable:

1. Service Conditions: Designed for service at a maximum continuous operating temperature of 90 degrees C in dry and damp locations or 75 degrees C in wet locations. All control cables shall be suitable for installation in conduits, ducts, trays, or direct buried. Cables shall be resistant to damage from heat, flame, moisture, oil, sunlight, and mechanical abrasion which can occur in an electrical substation environment.
2. Multi-conductor Control Cable: Rated 600 volt, Type TC, and meet the requirements of ICEA S-73-532. Individual conductors shall be stranded copper with a minimum of 30 mils of cross-linked polyethylene flame-retardant insulation. The insulated conductors shall have an overall jacket. The jacket shall be black in color and a minimum of 60 mils of a flame retardant material. When required, the cable shall include a 5 mil corrugated copper tape shield, applied longitudinally.
3. Multi-conductor Color Code: Per ICEA Method 1, Table K-2. Color codes shall be as follows for control circuits and DC supply circuits:

4 and 12 Conductor Cables

Conductor Number	Base Color	Tracer Color
1	Black	
2	Red	
3	Blue	
4	Orange	
5	Yellow	
6	Brown	
7	Red	Black
8	Blue	Black
9	Orange	Black
10	Yellow	Black
11	Brown	Black
12	Black	Red

2 Conductor Cables

Conductor Number	Base Color
1	Black
2	Red

4. Multi-conductor Color Code: Per ICEA Method 1, Table K-2. Color codes shall be as follows for AC supply circuits:

4 Conductor Cables

Conductor Number	Base Color
1	Black
2	White
3	Red
4	Green

C. Twisted Pair Control Cable (where required): Rated 300 volts, Type PLTC. Individual conductors shall be stranded copper with a polyvinyl chloride or cross-linked polyethylene flame-retardant insulation. The insulated conductor assembly shall be covered with a shield and have an overall jacket. The jacket shall be flame retardant.

D. Internal Panel or Equipment Wiring For Field Installation: 600 volt, #12 AWG, 65 strand, copper wire with cross-linked polyethylene, type SIS insulation. Color to be gray unless noted otherwise on the drawings.

2.2 ACCESSORIES

A. Lugs: Non-Insulated ring type insulated lugs. Ring lug terminals shall be Thomas & Betts or Burndy. NOTE: No slotted (spade type) terminal connectors shall be used.

B. Cable Identification Tags: Panduit part no. SSM2S-C, SSM2S-D or approved equal. Tags shall be hand lettered using an ultrafine point, black ink, permanent marking pen as manufactured by Sharpie or approved equal.

C. Cable Ties: Black plastic, weather and ultraviolet resistant, Panduit type PLT or approved equal.

D. Wire Labels: All wires shall be labeled at both ends with heat shrink machine-printed markers. Each marker shall clearly indicate the exact individual wire designation as shown on the cable connection diagrams. Non-heat shrink markers may be permitted on a case-by-case basis upon request. Markers shall face out and will be labeled to be read with minimal effort.

E. Cable Shield Bond Connections: Tyco Electronics Termi-Foil terminals and splices for aluminum or copper foil or strip, catalog no. 329254, with barrel for #10-#12 AWG wire. Install Termi-Foil connectors with Tyco Electronics Termi-Foil Hand Crimping Tool, catalog no. 68026.

F. Terminations on Phoenix Terminal Blocks: When required by the manufacturer, use ferrules manufactured by Phoenix Contact, correctly sized for the conductor to be landed on that terminal.

PART 3 - EXECUTION

3.1 INSTALLATION OF CONTROL CABLES

A. All wiring between the various pieces of equipment shall be installed as shown on the plans. All wiring shall be enclosed in raceway, cable trays, or wireways of the size specified on the plans or as approved by Engineer.

B. The Cable Schedule, which is included in the drawings, lists power, control, and communications cables necessary for this installation. The Schedule shows the endpoints of each circuit, the number of conductors, size of the conductors, and the approximate lengths. The lengths are not cutting lengths, but are included only as an aid in laying out the circuits.

C. Cable jackets shall be removed using the appropriate cable tool which has a settable cutter adjusted so as not to damage the conductor insulation. Conductor insulation shall be removed using the appropriate stripping tool adjusted so as not to damage the wire strands. Knives shall not be used on any cables. Any cables or wire damaged during installation shall be replaced at Contractor's expense.

D. No cable shall be installed until the conduits for the particular cable runs have been completely installed, thoroughly cleaned and mandreled.

E. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway. Cable lubricants recommended by the cable manufacturer may be used as an aid to the pulling of cable. Grease or other materials harmful to cable insulation shall not be allowed.

F. All cables in each conduit shall be pulled simultaneously, using cable grips and swivels or other devices subject to the approval Engineer. Cable tension shall not exceed the maximum tension recommended by the cable manufacturer. Cables shall always be protected from mechanical injury and from moisture at the unprotected ends.

G. Conductors shall be continuous from terminal to terminal. No splices will be permitted.

H. Care must be taken not to have the conductors pulled tight or kinked in the conduits or boxes. Where control wires from more than one conduit pass through a common pull box, the group of wires from each conduit shall be bound together with tie wraps spaced at six inch intervals.

I. All cable and wire shall be installed in a workmanlike manner. Cables shall be neatly trained, without interlacing, in all trays and boxes. Sufficient lengths of cable shall be pulled into equipment panels, boxes, etc., to permit a neat arrangement. Groups of control wires carried in the same conduit to a terminal block or like termination point shall, after leaving the conduit, be formed and firmly, but not tightly, tied with cable tie wraps.

J. Cable forming shall be done in a manner that will not permit sharp bends over conduit bushings. The bending radius in any cable shall not be less than the minimum bending radius recommended by the cable manufacturer. Damaged or out-of-place cable shall be replaced at the Contractor's expense.

K. Multi-conductor cable jackets shall be removed as required to train and terminate the conductors. In control cabinets, the cable jacket shall be left on the cable, as far as possible, to the point of the first conductor branch. At relay panels the cable jackets shall be removed to within 3 inches of the entrance to the panel or, in the case of existing substations, removed in a manner similar to existing cable jackets. Cables shall be clamped or secured in a manner to avoid tension on individual conductors or terminals. Spare conductors shall be left long enough to reach any terminal.

L. Insulated conductors from which the jacket is removed shall be neatly trained in bundles and the bundle firmly but not tightly tied, using cable tie wraps made for this purpose. The individual conductors, including all spare conductors, of the cables shall be unlaced prior to tying in bundles.

M. Identify all cables at terminations and in all pull boxes. Cable tags shall bear the corresponding cable number shown on the Cable Schedule. Cable numbers shall be written legibly with a permanent marker.

N. 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.

O. Arrange cables in parallel and fasten each cable in place as required to maintain cables in parallel runs.

P. Install all jumpers as shown on wiring and connection diagrams.

Q. Bundle cables in the cable tray where the cables pass from the tray to relay panels so that they can pass through one opening in the tray at each side of the relay panel.

R. Install dropout fittings to protect communications cables at exits from communication cable tray to relay panels.

S. All communication cables that extend from relay panel to relay panel or from a relay panel to equipment located elsewhere within the control building shall be installed in the overhead communication cable tray.

3.2 WIRE TERMINATIONS

A. Extra care shall be exercised in the use of crimp-on terminal connectors to make certain that each wire is firmly attached to the connector. Use only controlled cycle compression tools supplied by the manufacturer of the ring lug being used (Thomas & Betts or Burndy). Conductor insulation shall be squarely and evenly cut and it shall be continuous with the connector barrel.

B. Cable shields, when present, shall be terminated by connecting the drain wire or corrugated copper tape shield to a ground bus with a compression terminal. Approved termination methods for corrugated tape shields include Tyco Electronics Termi-foil terminals (installed with controlled-cycle compression tools manufactured expressly for that purpose) and the BSW Floating Bond manufactured by Electric Motion Company, Inc. Cable shields may be

terminated at one or both ends depending on the application and on the substation design. The proper method will be noted on the drawings or defined in the Special Conditions.

C. Solderless ring-type terminal lugs shall be used to connect all wires #8 AWG and smaller to studs.

D. Terminations on larger conductors shall have at least two indentations.

E. Wires terminated on Phoenix terminal blocks shall have the correct size of Phoenix ferrule installed to prevent individual strands from straying and making contact with adjacent wires and terminals.

F. Wire sizes larger than #8 AWG terminating on 30A (GE EB25 type) terminal blocks, will require a Burndy narrow tongue lug. Where large wire sizes require use of non-insulated lugs, cover lug barrel with 600V heat shrink tubing. Strand shaving is not acceptable.

3.3 ACCESSORIES

A. Identify all cables at terminations and in all pull boxes. Cable tags shall bear the corresponding cable number shown on the Cable Schedule. Cable numbers shall be written legibly with a permanent marker.

3.4 REMOVALS

A. All cables and wires that are disconnected and not reused shall be completely removed from panels, wireways, and wire looms.

END OF SECTION 337243

INDIANOLA MUNICIPAL UTILITIES
EAST IOWA CIRCUIT SWITCHER REPLACEMENT PROJECT - INSTALLATION

SECTION 337300 – MAJOR EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes methods and materials for the following:
   1. SF6 Circuit Breakers

PART 2 - PRODUCTS

2.1 MATERIALS

A. The following items will be furnished by the Owner.

   1. SF6 Circuit Breakers

B. Equipment Identification

   1. Furnish equipment identification numbers as indicated on the drawings.
   2. Furnish all hardware including beam grips, pipe clamps for installation of the identification numbers. Mounting hardware shall be stainless steel or aluminum.

PART 3 - EXECUTION

3.1 SF6 CIRCUIT BREAKER

A. Contractor shall unload and inspect the circuit breaker.

B. Contractor shall completely install the circuit breakers according to the drawings. This installation shall include, but not be limited to, the following: placing breaker on the foundation, ground connections, connections between the breaker bushings and the station bus work, control duct connections, and control and power cables.

C. The manufacturer will furnish the SF6 gas. Contractor shall fill the breakers to the proper pressure.

D. All work on the circuit breakers shall be done according to the manufacturer's instructions.

E. Contractor shall not connect the jumpers to the high voltage bushings until the testing of the breaker has been completed.

END OF SECTION 337300

INDIANOLA MUNICIPAL UTILITIES
EAST IOWA CIRCUIT SWITCHER REPLACEMENT PROJECT - INSTALLATION

SECTION 337923 – UTILITY SUBSTATION GROUNDING

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.

B. Division 33 Section Substation Testing and Commissioning.

1.2 SUMMARY

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

1.3 QUALITY ASSURANCE

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

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

PART 2 - PRODUCTS

2.1 CONDUCTORS

A. Conductors: Install solid conductor for No. 6 AWG and smaller, and stranded conductors for No. 4 AWG and larger, unless otherwise indicated

B. Bare Copper Conductors:

1. Solid Conductors: ASTM B 3.
2. Stranded Conductors: ASTM B 8.
3. Tinned Conductors: ASTM B 33.

2.2 CONNECTORS

A. Above Grade Bolted Connectors for Conductors: Copper or copper alloy, bolted pressure-type, with silicon bronze hardware .

B. Bolted Connectors for Fence: Copper or copper alloy, bolted pressure-type, with silicon bronze or galvanized hardware.

C. Above Grade Compression Connectors: Copper compression, “C” or “H” style and compression terminals.

D. Installation Hardware: Silicon bronze bolts, nuts, and spring type washers..

E. Exothermic Welds: Materials by Cadweld or Thermoweld. Molds and powder cartridges shall be as recommended by manufacturer of the molds used.

F. Below Grade Compression: Burndy HyGround irreversible compression connections.

2.3 GROUND RODS

A. Copper weld, section type.

B. Diameters and lengths as indicated on drawings.

PART 3 - EXECUTION

3.1 APPLICATIONS

A. Ground Rods: Install ground rods vertically in locations as indicted on drawings. Drive rods to depth indicated.

B. Underground Grounding Conductors: Install bare copper conductor, size as indicted on the drawings.

1. Bury at depth below grade as indicate don the drawings (before application of surface rock).
2. Duct-Bank Grounding Conductor: Bury 12 inches above duct bank when indicated as part of duct-bank installation.
3. Route conductors as indicted on drawings. Install using as few joints as possible.

C. Conductor Terminations and Connections:

1. Equipment Grounding Conductor Terminations: Bolted connectors.
2. Grounding Conductor Connections to Structural Steel: Bolted connectors.
3. Underground Connections: **Exothermic welded connectors or irreversible compression connectors approved for below grade installation.**

3.2 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:

3.3 INSTALLATION

A. Below Grade Grounding Conductors
   1. Route along shortest and straightest paths. Conductor shall be free from kinks, breaks, or other damage after installation.
   2. Conductor shall be thoroughly cleaned prior to making connections. Follow connector manufacturer's instructions.
   3. All junctions and splices shall be made at ground rod locations whenever reasonably possible.

B. Above Grade Grounding Conductors
   1. Ground fence and gates as indicated on the drawings.
   2. Ground all steel structures and equipment as indicated on the drawings. Equipment includes but is not limited to panels, junction boxes, and auxiliary equipment.
   3. Paint, rust, or other non-conducting material shall be removed from the contact surfaces and these surfaces shall be coated with oxide-inhibiting compound prior to making ground connections.
   4. Ground bars in panels shall be solidly grounded to the ground grid with #6 solid or larger copper wire.
   5. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

C. Cable Trench Grounding Conductors
   1. Install ground conductor in cables trench.
   2. Use ground clips furnished with the cable trench for installing the conductor.

D. Conduit & Cable Sheath Grounding
   1. All metallic conduit shall be effectively grounded at terminations in conformance with the National Electrical Code.
   2. All metallic cable shielding and sheath shall be grounded at terminations.

3.4 FIELD QUALITY CONTROL

A. All below grade grounding cables and connections shall be inspected by Owner before they are covered with earth.

B. Perform testing of ground grid. Comply with requirements in Division 33 Substation Testing and Commissioning Section.

END OF SECTION 337923

INDIANOLA MUNICIPAL UTILITIES

EAST IOWA SUBSTATION SUBSTATION
CIRCUIT SWITCHER REPLACEMENT PROJECT

INSTALLATION CONTRACT AND SPECIFICATIONS

INDIANOLA MUNICIPAL UTILITIES
IMU
Electric • Communications • Water

ISSUED FOR BIDDING
DECEMBER 22, 2025

P & E ENGINEERING CO.
POWER SYSTEM ANALYSIS AND DESIGN

INDIANOLA MUNICIPAL UTILITIES
East Iowa Circuit Switcher Replacement Project - Installation
Section 00000 - Index

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337243	Substation Control Conductors and Cables
337300	Major Equipment
337923	Utility Substation Grounding
Appendix A	East Iowa Substation Construction Drawings (separate volume)

Construction Drawings are listed on first page of Appendix A

NOTICE OF HEARING AND LETTING
EAST IOWA CIRCUIT SWITCHER REPLACEMENT PROJECT - INSTALLATION

Sealed proposals will be received by the Board of Trustees of Indianola Municipal Utilities (IMU), Indianola, Iowa, (Buyer) at the IMU Customer Service Center, 210 W. 2nd Ave., Indianola, Iowa until 2:00 P.M. local time on January 30th, 2025 for a project identified as the EAST IOWA CIRCUIT SWITCHER REPLACEMENT PROJECT - INSTALLATION, and as described in detail in the specifications for the project now on file in the office of the Board Secretary. Proposals will be opened in public session at that time. Proposals will be acted upon by the Board of Trustees at a meeting to be held at the IMU Customer Service Center, 210 W. 2nd Ave., Indianola, Iowa at 5:30 P.M. local time on February 9th, 2026, or at such later time and place as may then be fixed. At that time and place a hearing will be held on the proposed plans, specifications, form of contract and estimate of cost for the improvements, and at the hearing any interested person may appear and file objections to the project or to the cost of the improvements.

The contract includes providing materials and performing work necessary to replace two existing 69kV circuit switchers with circuit breakers, including testing and commissioning on two 69-13kV transformers at the East Iowa Substation, 1300 E. Iowa Avenue, Indianola, IA.

Each proposal shall be sealed in an envelope marked “CK601 AND CK602 REPLACEMENT PROJECT - INSTALLATION”. Each bid must be accompanied in a separate envelope by a bid bond, certified check or cashier’s check drawn on a State of Iowa or federally chartered bank, or a certified share draft on a State of Iowa or federally chartered credit union, in an amount not less than five per cent (5%) of the total value of the Proposal, and made payable to the Buyer as a security that the bidder will enter into a contract for the Work within ten (10) days after the award of the contract to such bidder.

Bidders shall not be permitted to withdraw their bids for a period of sixty (60) days after they are opened.

100% of the amount due the successful bidder will be paid not earlier than 31 days from the final acceptance of the improvements by IMU, subject to the conditions and in accordance with the provisions of Chapter 384 and 573 of the Code of Iowa

Payment to the Contractor for completion of the improvements will be made in cash derived from available cash on hand from revenue and such other sources as may be available to IMU. The City of Indianola shall not incur any general obligation for the Improvements. The contract for the furnishing of the improvements shall not constitute a general obligation of the City of Indianola nor be payable in any manner by taxation.

If the successful bidder fails to execute a contract with IMU for the Improvements, the certified check or cashier’s check deposited by the Supplier shall be cashed, or the bid bond declared forfeited, and proceeds retained by IMU as agreed liquidated damages.

Bidders will be required to complete a Bidder Status Form from the Iowa Department of Labor regarding Bidder’s resident status within the State of Iowa and to submit that form with the bid. Failure to submit a fully completed Bidder Status Form with the bid may result in the bid being deemed nonresponsive and rejected.

Work is to commence on or about February 26th, 2026 and shall be substantially complete not later than May 15th, 2026. Work shall be completed and ready for final payment not later than 30 days after substantial completion.

Plans and specifications governing the furnishing of materials have been prepared by P&E Engineering Co., 500 SW 7th Street, Suite 100, Des Moines, Iowa 50309. The plans and specifications, prior proceedings of IMU referring to and defining the improvements and a proposed contract are hereby made a part of this notice by reference. The proposed contracts shall be executed in accordance with them. Copies of the specifications may be obtained from P & E Engineering Co.

By virtue of statutory authority, preference will be given to products and provisions grown and produced within the State of Iowa and Iowa domestic labor.

IMU reserves the right to reject any or all proposals and to waive informalities. Published upon order of the Board of Trustees Indianola Municipal Utilities, Indianola, Iowa.

MONICA THOMPSON
Board Secretary

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ARTICLE 1—DEFINED TERMS

1.01 Terms used in these Instructions to Bidders have the meanings indicated in the General Conditions and Supplementary Conditions. Additional terms used in these Instructions to Bidders have the meanings indicated below:

A. *Issuing Office*—The office from which the Bidding Documents are to be issued, and which registers plan holders. The Issuing Office for this project will be P & E Engineering Co., 500 SW 7th St., Suite 100, Des Moines, IA 50309.

ARTICLE 2—BIDDING DOCUMENTS

2.01 Bidder shall obtain a complete set of Bidding Requirements and proposed Contract Documents (together, the Bidding Documents). See the Contract for Construction of a Small Project for a list of the Contract Documents. It is Bidder's responsibility to determine that it is using a complete set of documents in the preparation of a Bid. Bidder assumes sole responsibility for errors or misinterpretations resulting from the use of incomplete documents, by Bidder itself or by its prospective Subcontractors and Suppliers.

2.02 Bidding Documents are made available for the sole purpose of obtaining Bids for completion of the Project and permission to download or distribution of the Bidding Documents does not confer a license or grant permission or authorization for any other use. Authorization to download documents, or other distribution, includes the right for plan holders to print documents solely for their use, and the use of their prospective Subcontractors and Suppliers, provided the plan holder pays all costs associated with printing or reproduction. Printed documents may not be re-sold under any circumstances.

2.03 Bidder may register as a plan holder and obtain complete sets of Bidding Documents in printed or electronic (digital) format (compact disk, USB, or direct transmittal) from the Issuing Office. Bidders may rely that sets of Bidding Documents obtained from the Issuing Office are complete, unless an omission is blatant. Registered plan holders will receive Addenda issued by Owner.

2.04 Plan rooms (including construction information subscription services, and electronic and virtual plan rooms) may distribute the Bidding Documents, or make them available for examination. Those prospective bidders that obtain an electronic (digital) copy of the Bidding Documents from a plan room are encouraged to register as plan holders from the Issuing Office. Owner is not responsible for omissions in Bidding Documents or other documents obtained from plan rooms, or for a Bidder's failure to obtain Addenda from a plan room.

2.05 *Electronic Documents*

A. Bidding Documents will be made available as Electronic Documents. Bidding Documents will be provided in Adobe PDF (Portable Document Format) (.pdf). It is the intent of the Engineer and Owner that such Electronic Documents are to be exactly representative of the paper copies of the documents. However, because the Owner and Engineer cannot totally control the transmission and receipt of Electronic Documents nor the Contractor's means of reproduction of such documents, the Owner and Engineer cannot and do not guarantee that Electronic Documents and reproductions prepared from those versions are identical in every manner to the paper copies.

B. The Bidder may use and rely upon complete sets of Electronic Documents of the Bidding Documents, described in Paragraph 2.05.A above. However, Bidder assumes all risks associated with differences arising from transmission/receipt of Electronic Documents versions of Bidding Documents and reproductions prepared from those versions and, further, assumes all risks, costs, and responsibility associated with use of the Electronic Documents versions to derive information that is not explicitly contained in printed paper versions of the documents, and for Bidder's reliance upon such derived information.

C. After the Contract is awarded, the Owner will provide or direct the Engineer to provide for the use of the Contractor documents that were developed by Engineer as part of the Project design process, as Electronic Documents in native file formats.

1. Electronic Documents that are available in native file format include:

a. None

2. Release of such documents will be solely for the convenience of the Contractor. No such document is a Contract Document.

3. The Contractor shall take appropriate measures to verify that any electronic/digital information provided in Electronic Documents is appropriate and adequate for the Contractor's specific purposes.

4. In no case will the Contractor be entitled to additional compensation or time for completion due to any differences between the actual Contract Documents and any related document in native file format.

ARTICLE 3—QUALIFICATIONS OF BIDDERS

3.01 Bidders must complete a Bidder Status Form from the Iowa Department of Labor regarding the Contractor's resident status within the State of Iowa and submit that form with the bid. Failure to submit a fully completed Bidder Status Form with the bid may result in the bid being deemed nonresponsive and rejected.

3.02 To demonstrate Bidder's qualifications to perform the Work, after submitting its Bid and within five (5) days of Owner's request, Bidder must submit the following information:

A. Written evidence establishing its qualifications such as financial data, previous experience, and present commitments.

B. A written statement that Bidder is authorized to do business in the state where the Project is located, or a written certification that Bidder will obtain such authority prior to the Effective Date of the Contract.

C. Bidder's state or other contractor license number, if applicable.

D. Subcontractor and Supplier qualification information.

E. Other required information regarding qualifications.

3.03 A Bidder's failure to submit required qualification information within the times indicated may disqualify Bidder from receiving an award of the Contract.

3.04 No requirement in this Article 3 to submit information will prejudice the right of Owner to seek additional pertinent information regarding Bidder's qualifications.

ARTICLE 4—PRE-BID CONFERENCE

4.01 A pre-bid conference will not be held for this project.

ARTICLE 5—SITE AND OTHER AREAS; EXISTING SITE CONDITIONS; EXAMINATION OF SITE; OWNER'S SAFETY PROGRAM; OTHER WORK AT THE SITE

5.01 *Site Visit and Testing by Bidders*

A. Bidder may visit the Site and conduct a thorough visual examination of the Site and adjacent areas.

B. Bidders visiting the Site are required to arrange their own transportation to the Site.

C. All access to the Site other than during a regularly scheduled Site Visit must be coordinated through the following Owner contact. Bidder must conduct the required Site visit during normal working hours.

Mr. Nate Edwards
Lead Generation
Indianola Municipal Utilities
515-961-9444 (office)
nedwards@indianolaiowa.gov

D. Bidder is not required to conduct any subsurface testing, or exhaustive investigations of Site conditions.

E. On request, and to the extent Owner has control over the Site, and schedule permitting, the Owner will provide Bidder general access to the Site to conduct such additional examinations, investigations, explorations, tests, and studies as Bidder deems necessary for preparing and submitting a successful Bid. Owner will not have any obligation to grant such access if doing so is not practical because of existing operations, security or safety concerns, or restraints on Owner's authority regarding the Site. Bidder is responsible for establishing access needed to reach specific selected test sites.

5.02 *Owner's Safety Program*

A. Site visits and work at the Site may be governed by an Owner safety program. If an Owner safety program exists, it will be noted in the Supplementary Conditions.

5.03 *Other Work at the Site*

A. Reference is made to Article 4 of the General Requirements for the identification of the general nature of other work of which Owner is aware (if any) that is to be performed at the Site by Owner or others (such as utilities and other prime contractors) and relates to the Work contemplated by these Bidding Documents. If Owner is party to a written contract for such other work, then on request, Owner will provide to each Bidder access to examine such contracts (other than portions thereof related to price and other confidential matters), if any.

ARTICLE 6—BIDDER'S REPRESENTATIONS AND CERTIFICATIONS

6.01 *Express Representations and Certifications in Bid Form, Agreement*

A. The Bid Form that each Bidder will submit contains express representations regarding the Bidder's examination of Project documentation and preparation of the Bid, and certifications regarding lack of collusion or fraud in connection with the Bid. Bidder should review these representations and certifications, and assure that Bidder can make the representations and certifications in good faith, before executing and submitting its Bid.

B. If Bidder is awarded the Contract, Bidder (as Contractor) will make similar express representations and certifications when it executes the Agreement.

ARTICLE 7—INTERPRETATIONS AND ADDENDA

7.01 Owner on its own initiative may issue Addenda to clarify, correct, supplement, or change the Bidding Documents.

7.02 Bidder shall submit all questions about the meaning or intent of the Bidding Documents via email to Jared Kline at jakline@peengr.com. Email message must include "Question regarding IMU East Iowa Circuit Switcher Replacement Project" in the subject line. Confirm the email has been received by calling Jared Kline at 515-989-3083.

7.03 Interpretations or clarifications considered necessary by Engineer in response to such questions will be issued by Addenda delivered to all registered plan holders. Questions received less than seven days prior to the date for opening of Bids may not be answered.

7.04 Only responses set forth in an Addendum will be binding. Oral and other interpretations or clarifications will be without legal effect. Responses to questions are not part of the Contract Documents unless set forth in an Addendum that expressly modifies or supplements the Contract Documents.

ARTICLE 8—BID SECURITY

8.01 A Bid must be accompanied by Bid security made payable to Owner in an amount of **5** percent of Bidder's maximum Bid price (determined by adding the base bid and all alternates) and in the form prescribed in the NOTICE OF HEARING AND LETTING.

8.02 The Bid security of the apparent Successful Bidder will be retained until Owner awards the contract to such Bidder, and such Bidder has executed the Contract, furnished the required Contract security, and met the other conditions of the Notice of Award, whereupon the Bid security will be released. If the Successful Bidder fails to execute and deliver the Contract and furnish the required Contract security within 10 days after the Notice of Award, Owner may consider Bidder to be in default, annul the Notice of Award, and the Bid security of that Bidder will be forfeited. Such forfeiture will be Owner's exclusive remedy if Bidder defaults.

8.03 The Bid security of other Bidders that Owner believes to have a reasonable chance of receiving the award may be retained by Owner until the earlier of 7 days after the Effective Date of the

Contract or 61 days after the Bid opening, whereupon Bid security furnished by such Bidders will be released.

8.04 Bid security of other Bidders that Owner believes do not have a reasonable chance of receiving the award will be released within 7 days after the Bid opening.

ARTICLE 9—CONTRACT TIMES

9.01 The number of days within which, or the dates by which, the Work is to be (a) substantially completed and (b) ready for final payment, and (c) Milestones (if any) are to be achieved, are set forth in the Contract for Construction of a Small Project.

ARTICLE 10—SUBSTITUTE AND "OR EQUAL" ITEMS

10.01 The Contract for the Work, as awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents without consideration during the bidding and Contract award process of possible substitute or "or-equal" items. In cases in which the Contract allows the Contractor to request that Engineer authorize the use of a substitute or "or-equal" item of material or equipment, application for such acceptance may not be made to and will not be considered by Engineer until after the Effective Date of the Contract.

10.02 All prices that Bidder sets forth in its Bid will be based on the presumption that the Contractor will furnish the materials and equipment specified or described in the Bidding Documents, as supplemented by Addenda. Any assumptions regarding the possibility of post-Bid approvals of "or-equal" or substitution requests are made at Bidder's sole risk.

ARTICLE 11—SUBCONTRACTORS, SUPPLIERS, AND OTHERS

11.01 The apparent Successful Bidder, and any other Bidder so requested, must submit to Owner a list of the Subcontractors or Suppliers proposed for any portion of the Work within five days after Bid opening:

11.02 If requested by Owner, such list must be accompanied by an experience statement with pertinent information regarding similar projects and other evidence of qualification for each such Subcontractor. If Owner or Engineer, after due investigation, has reasonable objection to any proposed Subcontractor or Supplier, Owner may, before the Notice of Award is given, request apparent Successful Bidder to submit an acceptable substitute, in which case apparent Successful Bidder will submit a substitute.

11.03 If apparent Successful Bidder declines to make any such substitution, Owner may award the Contract to another Bidder who submits the Bid in the best interests of the project that proposes to use acceptable Subcontractors and Suppliers. Declining to make requested substitutions will not constitute grounds for forfeiture of the Bid security of any Bidder. Any Subcontractor or Supplier, so listed and against which Owner or Engineer makes no written objection prior to the giving of the Notice of Award will be deemed acceptable to Owner and Engineer subject to subsequent revocation of such acceptance as provided in Paragraph 7.04 of the Contract for Construction of a Small Project.

ARTICLE 12—PREPARATION OF BID

12.01 The Bid Form is included with the Bidding Documents.

A. All blanks on the Bid Form must be completed in ink and the Bid Form signed in ink. Erasures or alterations must be initialed in ink by the person signing the Bid Form. A Bid price must be indicated for each section, Bid item, alternate, adjustment unit price item, and unit price item listed therein.

B. If the Bid Form expressly indicates that submitting pricing on a specific alternate item is optional, and Bidder elects to not furnish pricing for such optional alternate item, then Bidder may enter the words "No Bid" or "Not Applicable."

12.02 If Bidder has obtained the Bidding Documents as Electronic Documents, then Bidder shall prepare its Bid on a paper copy of the Bid Form printed from the Electronic Documents version of the Bidding Documents. The printed copy of the Bid Form must be clearly legible, printed on 8½ inch by 11-inch paper and as closely identical in appearance to the Electronic Document version of the Bid Form as may be practical. The Owner reserves the right to accept Bid Forms which nominally vary in appearance from the original paper version of the Bid Form, providing that all required information and submittals are included with the Bid.

12.03 A Bid by a corporation must be executed in the corporate name by a corporate officer (whose title must appear under the signature), accompanied by evidence of authority to sign. The corporate address and state of incorporation must be shown.

12.04 A Bid by a partnership must be executed in the partnership name and signed by a partner (whose title must appear under the signature), accompanied by evidence of authority to sign. The official address of the partnership must be shown.

12.05 A Bid by a limited liability company must be executed in the name of the firm by a member or other authorized person and accompanied by evidence of authority to sign. The state of formation of the firm and the official address of the firm must be shown.

12.06 A Bid by an individual must show the Bidder's name and official address.

12.07 A Bid by a joint venture must be executed by an authorized representative of each joint venturer in the manner indicated on the Bid Form. The joint venture must have been formally established prior to submittal of a Bid, and the official address of the joint venture must be shown.

12.08 All names must be printed in ink below the signatures.

12.09 The Bid must contain an acknowledgment of receipt of all Addenda, the numbers of which must be filled in on the Bid Form.

12.10 Postal and e-mail addresses and telephone number for communications regarding the Bid must be shown.

12.11 The Bid must contain evidence of Bidder's authority to do business in the state where the Project is located, or Bidder must certify in writing that it will obtain such authority within the time for acceptance of Bids and attach such certification to the Bid.

12.12 If Bidder is required to be licensed to submit a Bid or perform the Work in the state where the Project is located, the Bid must contain evidence of Bidder's licensure, or Bidder must certify in writing that it will obtain such licensure within the time for acceptance of Bids and attach such

certification to the Bid. Bidder's state contractor license number, if any, must also be shown on the Bid Form.

ARTICLE 13—BASIS OF BID

13.01 *Lump Sum*

A. Bidders must submit a Bid on a lump sum basis for each item listed in the lump sum section of the Bid Form.

ARTICLE 14—SUBMITTAL OF BID

14.01 The Bidding Documents include one separate unbound copy of the Bid Form. The unbound copy of the Bid Form is to be completed and submitted with the Bid security, Bidder Status Form, and the other documents required to be submitted under the terms of Article 2 of the Bid Form. See Paragraph 12.02 for submittal of a Bid from Bid Documents that are received as Electronic Documents

14.02 A Bid must be received no later than the date and time prescribed and at the place indicated in the Advertisement or invitation to bid and must be enclosed in a plainly marked package with the Project title, and, if applicable, the designated portion of the Project for which the Bid is submitted, and the name and address of Bidder. This package shall be plainly labeled "BID ENCLOSED."

14.03 The sealed envelope containing the Bid and all required documents must be plainly marked with the notation "BID ENCLOSED".

14.04 The sealed envelope containing the bid security must be plainly marked with the notation "BID SECURTY ENCLOSED".

14.05 A Bid sent by mail shall be addressed to:

Indianola Municipal Utilities
Attn: Ms. Chris Longer
210 West 2nd Avenue
Indianola, IA 50125
515-961-9444

14.06 A bid sent by delivery service or hand delivered shall be delivered to:

Indianola Municipal Utilities
Attn: Ms. Chris Longer
210 West 2nd Avenue
Indianola, IA 50125
515-961-9444

14.07 Bids received after the date and time prescribed for the opening of bids, or not submitted at the correct location or in the designated manner, will not be accepted and will be returned to the Bidder unopened.

ARTICLE 15—MODIFICATION AND WITHDRAWAL OF BID

15.01 An unopened Bid may be withdrawn by an appropriate document duly executed in the same manner that a Bid must be executed and delivered to the place where Bids are to be submitted prior to the date and time for the opening of Bids. Upon receipt of such notice, the unopened Bid will be returned to the Bidder.

15.02 If a Bidder wishes to modify its Bid prior to Bid opening, Bidder must withdraw its initial Bid in the manner specified in Paragraph 15.01 and submit a new Bid prior to the date and time for the opening of Bids.

15.03 If within 24 hours after Bids are opened any Bidder files a duly signed written notice with Owner and promptly thereafter demonstrates to the reasonable satisfaction of Owner that there was a material and substantial mistake in the preparation of its Bid, the Bidder may withdraw its Bid, and the Bid security will be returned. Thereafter, if the Work is rebid, the Bidder will be disqualified from further bidding on the Work.

ARTICLE 16—OPENING OF BIDS

16.01 Bids will be opened at the time and place indicated in the Notice of Hearing and Letting and, unless obviously non-responsive, read aloud publicly. An abstract of the amounts of the base Bids and major alternates, if any, will be made available to Bidders after the opening of Bids.

ARTICLE 17—BIDS TO REMAIN SUBJECT TO ACCEPTANCE

17.01 All Bids will remain subject to acceptance for the period of time stated in the Bid Form, but Owner may, in its sole discretion, release any Bid and return the Bid security prior to the end of this period.

ARTICLE 18—EVALUATION OF BIDS AND AWARD OF CONTRACT

18.01 Owner reserves the right to reject any or all Bids, including without limitation, nonconforming, nonresponsive, unbalanced, or conditional Bids. Owner also reserves the right to waive all minor Bid informalities not involving price, time, or changes in the Work.

18.02 Owner will reject the Bid of any Bidder that Owner finds, after reasonable inquiry and evaluation, to not be responsible.

18.03 If Bidder purports to add terms or conditions to its Bid, takes exception to any provision of the Bidding Documents, or attempts to alter the contents of the Contract Documents for purposes of the Bid, whether in the Bid itself or in a separate communication to Owner or Engineer, then Owner will reject the Bid as nonresponsive.

18.04 If Owner awards the contract for the Work, such award will be to the responsible Bidder whose bid is considered to be in the best interest of the Owner.

18.05 *Evaluation of Bids*

A. In evaluating Bids, Owner will consider whether the Bids comply with the prescribed requirements, and such alternates, unit prices, and other data, as may be requested in the Bid Form or prior to the Notice of Award.

B. For the determination of the apparent successful Bidder when unit price bids are submitted, Bids will be compared on the basis of the total of the products of the estimated quantity of each item and unit price Bid for that item, together with any lump sum items.

18.06 In evaluating whether a Bidder is responsible, Owner will consider the qualifications of the Bidder and may consider the qualifications and experience of Subcontractors and Suppliers proposed for those portions of the Work for which the identity of Subcontractors and Suppliers must be submitted as provided in the Bidding Documents.

18.07 Owner may conduct such investigations as Owner deems necessary to establish the responsibility, qualifications, and financial ability of Bidders and any proposed Subcontractors or Suppliers.

ARTICLE 19—BONDS AND INSURANCE

19.01 Article 6 of the General Conditions, as may be modified by the Supplementary Conditions, sets forth Owner's requirements as to performance and payment bonds and insurance. When the Successful Bidder delivers the executed Agreement to Owner, it must be accompanied by required bonds and insurance documentation.

ARTICLE 20—SIGNING OF CONTRACT FOR CONSTRUCTION OF A SMALL PROJECT

20.01 When Owner issues a Notice of Award to the Successful Bidder, it will be accompanied by the unexecuted counterparts of the Contract for Construction of a Small Project along with the other Contract Documents as identified in the Contract for Construction of a Small Project. Within 10 days thereafter, Successful Bidder must execute and deliver the required number of counterparts of the Contract for Construction of a Small Project and any bonds and insurance documentation required to be delivered by the Contract Documents to Owner. Within 10 days thereafter, Owner will deliver one fully executed counterpart of the Contract for Construction of a Small Project to Successful Bidder, together with printed and/or electronic copies of the Contract Documents as stated in Paragraph 2.02 of the Contract for Construction of a Small Project.

ARTICLE 21—SALES AND USE TAXES

21.01 Owner is subject to state and local sales and use taxes on materials and equipment to be incorporated in the Work. **SAID TAXES SHALL BE INCLUDED IN THE BID**.

The terms used in this Bid with initial capital letters have the meanings stated in the Instructions to Bidders and the Contract for Construction of a Small Project.

ARTICLE 1—OWNER AND BIDDER

1.01 This Bid is submitted to:

Indianola Municipal Utilities
210 West 2nd Avenue
Indianola, IA 50125

The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into a Contract with Owner in the form included in the Bidding Documents to perform all Work as specified or indicated in the Bidding Documents for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Bidding Documents.

ARTICLE 2—ATTACHMENTS TO THIS BID

2.01 The following documents are submitted with and made a condition of this Bid:

A. Evidence of authority to do business in the state of the Project; or a written covenant to obtain such authority within the time for acceptance of Bids;

B. Contractor's license number as evidence of Bidder's State Contractor's License or a covenant by Bidder to obtain said license within the time for acceptance of Bids;

C. A completed Bidder Status Form regarding the Contractor's resident status within the State of Iowa. A blank Bidder Status Form follows this Bid Form.

ARTICLE 3—BASIS OF BID—LUMP SUM BID AND UNIT PRICES

3.01 *Lump Sum Bids*

A. Bidder (_____) will complete the Work in accordance with the Contract Documents for the following lump sum (stipulated) price(s):

1. Lump Sum Price (Single Lump Sum)

Lump Sum Bid Price	$

3.02 *Proposed Testing Contractor*

A. Bidder proposes to utilize the following testing contractor:

_____

ARTICLE 4—TIME OF COMPLETION

4.01 Bidder agrees that the Work will be substantially complete and will be completed and ready for final payment in accordance with Article 4 of the Contract for Construction of a Small Project (Section 00522) on or before the dates or within the number of calendar days indicated in the Contract.

ARTICLE 5—BIDDER'S ACKNOWLEDGEMENTS: ACCEPTANCE PERIOD, INSTRUCTIONS, AND RECEIPT OF ADDENDA

5.01 *Bid Acceptance Period*

A. This Bid will remain subject to acceptance for 60 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner.

5.02 *Instructions to Bidders*

A. Bidder accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of Bid security.

5.03 *Receipt of Addenda*

A. Bidder hereby acknowledges receipt of the following Addenda:

Addendum Number	Addendum Date

ARTICLE 6—BIDDER'S REPRESENTATIONS AND CERTIFICATIONS

6.01 *Bidder's Representations*

A. In submitting this Bid, Bidder represents the following:

1. Bidder has examined and carefully studied the Bidding Documents, including Addenda.
2. If necessary, Bidder has visited the Site, conducted a thorough visual examination of the Site and adjacent areas, and become familiar with the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
3. Bidder is familiar with all Laws and Regulations that may affect cost, progress, and performance of the Work.
4. Bidder has considered the information known to Bidder itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and the Technical Data identified in the Supplementary Conditions or by definition, with respect to the effect of such information, observations, and Technical Data on (a) the cost, progress, and performance of the Work; (b) the means, methods, techniques, sequences, and

procedures of construction to be employed by Bidder, if selected as Contractor; and (c) Bidder's (Contractor's) safety precautions and programs.

5. Based on the information and observations referred to in the preceding paragraph, Bidder agrees that no further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract.
6. Bidder is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.
7. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and of discrepancies between Site conditions and the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.
8. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.
9. The submission of this Bid constitutes an incontrovertible representation by Bidder that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

6.02 *Bidder's Certifications*

A. The Bidder certifies the following:

1. This Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation.
2. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid.
3. Bidder has not solicited or induced any individual or entity to refrain from bidding.
4. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph 6.02.A:
    a. Corrupt practice means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process.
    b. Fraudulent practice means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of Owner, (b) to establish bid prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition.
    c. Collusive practice means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish bid prices at artificial, non-competitive levels.

d. Coercive practice means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

BIDDER hereby submits this Bid as set forth above:

Bidder:

_____
(typed or printed name of organization)

By: _____
(individual's signature)

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Date: _____
(typed or printed)

If Bidder is a corporation, a partnership, or a joint venture, attach evidence of authority to sign.

Attest: _____
(individual's signature)

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Date: _____
(typed or printed)

Address for giving notices:

_____

_____

Bidder's Contact:

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Phone: _____

Email: _____

Address:

_____

_____

_____

Bidder's Contractor License No.: (if applicable) _____

Bidder Status Form

To be completed by all bidders — Part A

Please answer "Yes" or "No" for each of the following:

☐ Yes ☐ No My company is authorized to transact business in Iowa.
(To help you determine if your company is authorized, please review the worksheet on the next page).

☐ Yes ☐ No My company has an office to transact business in Iowa.

☐ Yes ☐ No My company's office in Iowa is suitable for more than receiving mail, telephone calls, and e-mail.

☐ Yes ☐ No My company has been conducting business in Iowa for at least 3 years prior to the first request for bids on this project.

☐ Yes ☐ No My company is not a subsidiary of another business entity or my company is a subsidiary of another business entity that would qualify as a resident bidder in Iowa.

If you answered "Yes" for each question above, your company qualifies as a resident bidder. Please complete Parts B and D of this form.

If you answered "No" to one or more questions above, your company is a nonresident bidder. Please complete Parts C and D of this form.

To be completed by resident bidders — Part B

My company has maintained offices in Iowa during the past 3 years at the following addresses:

Dates: _____ /_____ /_____ to _____ /_____ /_____ Address: _____

City, State, Zip: _____

Dates: _____ /_____ /_____ to _____ /_____ /_____ Address: _____

City, State, Zip: _____

Dates: _____ /_____ /_____ to _____ /_____ /_____ Address: _____

You may attach additional sheet(s) if needed. City, State, Zip: _____

To be completed by non-resident bidders — Part C

1. Name of home state or foreign country reported to the Iowa Secretary of State:

_____

2. Does your company's home state or foreign country offer preferences to resident bidders, resident labor force preferences or any other type of preference to bidders or laborers? ☐ Yes ☐ No

3. If you answered "Yes" to question 2, identify each preference offered by your company's home state or foreign country and the appropriate legal citation.

_____

_____

You may attach additional sheet(s) if needed.

To be completed by all bidders — Part D

I certify that the statements made on this document are true and complete to the best of my knowledge and I know that my failure to provide accurate and truthful information may be a reason to reject my bid.

Firm Name: _____

Signature: _____ Date: _____

You must submit the completed form to the governmental body requesting bids per 875 Iowa Administrative Code Chapter 156. This form has been approved by the Iowa Labor Commissioner.

Worksheet: Authorization to Transact Business

This worksheet may be used to help complete Part A of the Resident Bidder Status form. If at least one of the following describes your business, you are authorized to transact business in Iowa.

☐ Yes ☐ No My business is currently registered as a contractor with the Iowa Division of Labor.

☐ Yes ☐ No My business is a sole proprietorship and I am an Iowa resident for Iowa income tax purposes.

☐ Yes ☐ No My business is a general partnership or joint venture. More than 50 percent of the general partners or joint venture parties are residents of Iowa for Iowa income tax purposes.

☐ Yes ☐ No My business is an active corporation with the Iowa Secretary of State and has paid all fees required by the Secretary of State, has filed its most recent biennial report, and has not filed articles of dissolution.

☐ Yes ☐ No My business is a corporation whose articles of incorporation are filed in a state other than Iowa, the corporation has received a certificate of authority from the Iowa secretary of state, has filed its most recent biennial report with the secretary of state, and has neither received a certificate of withdrawal from the secretary of state nor had its authority revoked.

☐ Yes ☐ No My business is a limited liability partnership which has filed a statement of qualification in this state and the statement has not been canceled.

☐ Yes ☐ No My business is a limited liability partnership which has filed a statement of qualification in a state other than Iowa, has filed a statement of foreign qualification in Iowa and a statement of cancellation has not been filed.

☐ Yes ☐ No My business is a limited partnership or limited liability limited partnership which has filed a certificate of limited partnership in this state, and has not filed a statement of termination.

☐ Yes ☐ No My business is a limited partnership or a limited liability limited partnership whose certificate of limited partnership is filed in a state other than Iowa, the limited partnership or limited liability limited partnership has received notification from the Iowa secretary of state that the application for certificate of authority has been approved and no notice of cancellation has been filed by the limited partnership or the limited liability limited partnership.

☐ Yes ☐ No My business is a limited liability company whose certificate of organization is filed in Iowa and has not filed a statement of termination.

☐ Yes ☐ No My business is a limited liability company whose certificate of organization is filed in a state other than Iowa, has received a certificate of authority to transact business in Iowa and the certificate has not been revoked or canceled.

BID BOND (PENAL SUM FORM)

Bidder	**Surety**
Name:	Name:
Address *(principal place of business)*:	Address *(principal place of business)*:
Owner	**Bid**
Name: **INDIANOLA MUNICIPAL UTILITIES**	Project *(name and location)*:
Address *(principal place of business)*: **210 WEST 2ND AVE INDIANOLA, IA 50125**	**EAST IOWA CIRCUIT SWITCHER REPLACEMENT PROJECT - INSTALLATION INDIANOLA, IOWA**
	Bid Due Date: **JANUARY 30, 2025**
Bond	
Penal Sum:	
Date of Bond:	

Surety and Bidder, intending to be legally bound hereby, subject to the terms set forth in this Bid Bond, do each cause this Bid Bond to be duly executed by an authorized officer, agent, or representative.

Bidder	Surety
_____ *(Full formal name of Bidder)*	_____ *(Full formal name of Surety) (corporate seal)*
By: _____ *(Signature)*	By: _____ *(Signature) (Attach Power of Attorney)*
Name: _____ *(Printed or typed)*	Name: _____ *(Printed or typed)*
Title: _____	Title: _____
Attest: _____ *(Signature)*	Attest: _____ *(Signature)*
Name: _____ *(Printed or typed)*	Name: _____ *(Printed or typed)*
Title:	Title:

Notes: (1) Note: Addresses are to be used for giving any required notice. (2) Provide execution by any additional parties, such as joint venturers, if necessary.

1. Bidder and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to pay to Owner upon default of Bidder the penal sum set forth on the face of this Bond. Payment of the penal sum is the extent of Bidder's and Surety's liability. Recovery of such penal sum under the terms of this Bond will be Owner's sole and exclusive remedy upon default of Bidder.
2. Default of Bidder occurs upon the failure of Bidder to deliver within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents.
3. This obligation will be null and void if:
    3.1. Owner accepts Bidder's Bid and Bidder delivers within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents, or
    3.2. All Bids are rejected by Owner, or
    3.3. Owner fails to issue a Notice of Award to Bidder within the time specified in the Bidding Documents (or any extension thereof agreed to in writing by Bidder and, if applicable, consented to by Surety when required by Paragraph 5 hereof).
4. Payment under this Bond will be due and payable upon default of Bidder and within 30 calendar days after receipt by Bidder and Surety of written notice of default from Owner, which notice will be given with reasonable promptness, identifying this Bond and the Project and including a statement of the amount due.
5. Surety waives notice of any and all defenses based on or arising out of any time extension to issue Notice of Award agreed to in writing by Owner and Bidder, provided that the total time for issuing Notice of Award including extensions does not in the aggregate exceed 120 days from the Bid due date without Surety's written consent.
6. No suit or action will be commenced under this Bond prior to 30 calendar days after the notice of default required in Paragraph 4 above is received by Bidder and Surety, and in no case later than one year after the Bid due date.
7. Any suit or action under this Bond will be commenced only in a court of competent jurisdiction located in the state in which the Project is located.
8. Notices required hereunder must be in writing and sent to Bidder and Surety at their respective addresses shown on the face of this Bond. Such notices may be sent by personal delivery, commercial courier, or by United States Postal Service registered or certified mail, return receipt requested, postage pre-paid, and will be deemed to be effective upon receipt by the party concerned.
9. Surety shall cause to be attached to this Bond a current and effective Power of Attorney evidencing the authority of the officer, agent, or representative who executed this Bond on behalf of Surety to execute, seal, and deliver such Bond and bind the Surety thereby.
10. This Bond is intended to conform to all applicable statutory requirements. Any applicable requirement of any applicable statute that has been omitted from this Bond will be deemed to be included herein as if set forth at length. If any provision of this Bond conflicts with any applicable statute, then the provision of said statute governs and the remainder of this Bond that is not in conflict therewith continues in full force and effect.
11. The term "Bid" as used herein includes a Bid, offer, or proposal as applicable.

CONTRACT FOR CONSTRUCTION OF A SMALL PROJECT

This Contract is by and between INDIANOLA MUNICIPAL UTILITIES (Owner) and _____ (Contractor).

Owner and Contractor hereby agree as follows:

ARTICLE 1 - THE WORK

1.01 Work

A. Work includes all labor, materials, equipment, services, and documentation necessary to construct the Project defined herein. The Work may include related services such as testing, start-up, and commissioning, all as required by the Contract Documents.

B. The Contractor shall complete all Work as specified or indicated in the Contract Documents. The Project is generally described as follows:

1. **EAST IOWA CIRCUIT SWITCHER REPLACEMENT PROJECT - INSTALLATION** which includes providing materials and labor to replace two existing 69kV circuit switchers with circuit breakers. This includes installation, testing and commissioning.

2. The Site of the Work includes property, easements, and designated work areas described in greater detail in the Contract Documents but generally located at the Indianola Municipal Utilities East Iowa Substation.

ARTICLE 2 - CONTRACT DOCUMENTS

2.01 Intent of Contract Documents

A. It is the intent of the Contract Documents to describe a functionally complete project. The Contract Documents do not indicate or describe all the Work required to complete the Project. Additional details required for the correct installation of selected products are to be provided by the Contractor and coordinated with the Owner and Engineer. This Contract supersedes prior negotiations, representations, and agreements, whether written or oral. The Contract Documents are complementary; what is required by one part of the Contract Documents is as binding as if required by other parts of the Contract Documents.

B. During the performance of the Work and until final payment, Contractor and Owner shall submit all matters in question concerning the requirements of the Contract Documents or relating to the acceptability of the Work under the Contract Documents to the Engineer. Engineer will be the initial interpreter of the requirements of the Contract Documents, and judge of the acceptability of the Work thereunder.

C. Engineer will render a written clarification, interpretation, or decision on the issue submitted, or initiate a modification to the Contract Documents.

D. Contractor, and its subcontractors and suppliers, shall not have or acquire any title to or ownership rights to any of the Drawings, Specifications, or other documents (including copies or electronic media editions) prepared by Engineer or its consultants.

2.02 Contract Documents Defined

A. The Contract Documents consist of the following documents:

1. This Contract.
2. Performance bond.
3. Payment bond.
4. Specifications listed in the Table of Contents.
5. Appendices listed in the Table of Contents.
6. Drawings as listed on the Drawing Sheet Indexes.
7. Addenda.
8. Exhibits to this Contract (enumerated as follows):
    a. Contractor Bid.
9. The following which may be delivered or issued on or after the Effective Date of the Contract:
    a. Work Change Directives (EJCDC C-940).
    b. Change Orders (EJCDC C-941).
    c. Field Orders.

ARTICLE 3 - ENGINEER

3.01 Engineer

A. The Engineer for this Project is P&E Engineering Co. with offices at 500 SW 7th Street Suite 100, Des Moines, IA 50309.

ARTICLE 4 - CONTRACT TIMES

4.01 Contract Times

A. Provided ground conditions allow, work is expected to begin on or about February 26th, 2026, the Work will be substantially completed on or before May 15, 2026, and completed and ready for final payment on or before June 15, 2026.

4.02 Liquidated Damages

A. Liquidated damages will not be assessed.

4.03 Delays in Contractor's Progress

A. If Owner, Engineer, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in the Contract Times and Contract Price. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.

B. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delay, disruption, or interference caused by or within the control of Contractor or their subcontractors or suppliers.

C. If Contractor's performance or progress is delayed, disrupted, or interfered with by unanticipated causes not the fault of and beyond the control of Owner, Contractor, and those for which they are responsible, then Contractor shall be entitled to an equitable adjustment in Contract Times.

D. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for any delay, disruption, or interference if such delay is concurrent with a delay, disruption, or interference caused by or within the control of Contractor or Contractor's subcontractors or suppliers.

4.04 Progress Schedules

A. Contractor shall develop a progress schedule and submit to the Engineer for review and comment before starting Work on the Site. The Contractor shall modify the schedule in accordance with the comments provided by the Engineer.

B. The Contractor shall update and submit the progress schedule to the Engineer each month. The Owner may withhold payment if the Contractor fails to submit the schedule.

ARTICLE 5 - CONTRACT PRICE

5.01 Payment

A. Owner shall pay Contractor in accordance with the Contract Documents, the lump sum amount of $**[Contract Price]** for all Work.

ARTICLE 6 - BONDS AND INSURANCE

6.01 Bonds

A. Before starting Work, Contractor shall furnish a performance bond and a payment bond from surety companies that are duly licensed or authorized to issue bonds in the required amounts in the jurisdiction in which the Project is located. Each bond shall be in an amount equal to the Contract Price, as security for the faithful performance and payment of all of Contractor's obligations under the Contract. These bonds shall remain in effect until the completion of the correction period specified in Paragraph 7.12 but, in any case, not less than one year after the date when final payment becomes due.

6.02 Insurance

A. Before starting Work, Contractor shall furnish evidence of insurance from companies that are duly licensed or authorized in the jurisdiction in which the Project is located with a

minimum AM Best rating of A-VII or better. Contractor shall provide insurance in accordance with the following:

1. Contractor shall provide coverage for not less than the following amounts, or greater where required by Laws and Regulations:

   a. Workers' Compensation:

State:		Statutory
Employer's Liability:		
Bodily Injury, each Accident	$	1,000,000
Bodily Injury By Disease, each Employee	$	1,000,000
Bodily Injury/Disease Aggregate	$	1,000,000

   b. Commercial General Liability:

General Aggregate	$	2,000,000
Products - Completed Operations Aggregate	$	2,000,000
Personal and Advertising Injury	$	1,000,000
Each Occurrence (Bodily Injury and Property Damage)	$	1,000,000

   c. Automobile Liability herein:

Bodily Injury:		
Each Person	$	500,000
Each Accident	$	1,000,000
Property Damage:		
Each Accident	$	500,000
Combined Single Limit of:	$	1,000,000

   d. Excess or Umbrella Liability:

Per Occurrence	$	3,000,000
General Aggregate	$	3,000,000

   e. Contractor's Pollution Liability:

Each Occurrence	$	1,000,000
General Aggregate	$	1,000,000

B. All insurance policies required to be purchased and maintained will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 10 days prior written notice has been given to the insured and additional insured.

C. Automobile liability insurance provided by Contractor shall provide coverage against claims for damages because of bodily injury or death of any person or property damage arising out

of the ownership, maintenance, or use of any motor vehicle. The automobile liability policy shall be written on an occurrence basis.

D. Contractor's commercial general liability policy shall be written on a 1996 or later ISO commercial general liability occurrence form and include the following coverages and endorsements:

1. Products and completed operations coverage maintained for three years after final payment;

2. Blanket contractual liability coverage to the extent permitted by law;

3. Broad form property damage coverage; and

4. Severability of interest; underground, explosion, and collapse coverage; personal injury coverage.

E. The Contractor's commercial general liability and automobile liability, umbrella or excess, and pollution liability policies shall include and list Owner and Engineer and the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each as additional insureds; and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby (including as applicable those arising from both ongoing and completed operations) on a non-contributory basis.

1. Additional insured endorsements will include both ongoing operations and products and completed operations coverage through ISO Endorsements CG 20 10 10 01 and CG 20 37 10 01 (together). If Contractor demonstrates to Owner that the specified ISO endorsements are not commercially available, then Contractor may satisfy this requirement by providing equivalent endorsements.

2. Contractor shall provide ISO Endorsement CG 20 32 07 04, "Additional Insured—Engineers, Architects or Surveyors Not Engaged by the Named Insured" or its equivalent for design professional additional insureds.

F. Umbrella or excess liability insurance shall be written over the underlying employer's liability, commercial general liability, and automobile liability insurance. Subject to industry-standard exclusions, the coverage afforded shall be procured on a "follow the form" basis as to each of the underlying policies. Contractor may demonstrate to Owner that Contractor has met the combined limits of insurance (underlying policy plus applicable umbrella) specified for employer's liability, commercial general liability, and automobile liability through the primary policies alone, or through combinations of the primary insurance policies and an umbrella or excess liability policy.

G. The Contractor shall provide property insurance covering physical loss or damage during construction to structures, materials, fixtures, and equipment, including those materials, fixtures, or equipment in storage or transit.

H. If Contractor has failed to obtain and maintain required insurance, Owner may exclude the Contractor from the Site, impose an appropriate set-off against payment, and exercise Owner's termination rights under Article 15.

ARTICLE 7 - CONTRACTOR'S RESPONSIBILITIES

7.01 Supervision and Superintendence

A. Contractor shall supervise and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor shall be solely responsible for the means, methods, techniques, sequences, safety, and procedures of construction.

B. Contractor shall assign a competent resident superintendent who is to be present at all times during the execution of the Work. This resident superintendent shall not be replaced without written notice to and approval by the Owner and Engineer except under extraordinary circumstances.

C. Contractor shall at all times maintain good discipline and order at the Site.

D. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours, Monday through Friday.

7.02 Other Work at the Site

A. In addition to and apart from the Work of the Contractor, other work may occur at or adjacent to the Site. Contractor shall take reasonable and customary measures to avoid damaging, delaying, disrupting, or interfering with the work of Owner, any other contractor, or any utility owner performing other work at or adjacent to the Site.

7.03 Services, Materials, and Equipment

A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start up, and completion of the Work, whether or not such items are specifically called for in the Contract Documents.

B. All materials and equipment incorporated into the Work shall be new, of good quality and shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable supplier, except as otherwise may be provided in the Contract Documents.

7.04 Subcontractors and Suppliers

A. Contractor may retain subcontractors and suppliers for the performance of parts of the Work. Such subcontractors and suppliers must be acceptable to Owner.

7.05 Quality Management

A. Contractor is fully responsible for managing quality to ensure Work is completed in accordance with the Contract Documents.

7.06 Licenses, Fees and Permits

A. Contractor shall pay all license fees and royalties and assume all costs incident to performing the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others.

B. Contractor shall obtain and pay for all construction permits and licenses unless otherwise provided in the Contract Documents.

7.07 Laws and Regulations; Taxes

A. Contractor shall give all notices required by and shall comply with all local, state, and federal Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.

B. Contractor shall bear all resulting costs and losses, and shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages if Contractor performs any Work or takes any other action knowing or having reason to know that it is contrary to Laws or Regulations.

C. Contractor shall pay all applicable sales, consumer, use, and other similar taxes Contractor is required to pay in accordance with Laws and Regulations.

7.08 Record Documents

A. Contractor shall maintain one printed record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, written interpretations and clarifications, and approved shop drawings in a safe place at the Site. Contractor shall annotate them to show changes made during construction. Contractor shall deliver these record documents to Engineer upon completion of the Work.

7.09 Safety and Protection

A. Contractor shall be solely responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work.

B. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury, or loss to:

1. All persons on the Site or who may be affected by the Work;

2. All the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and

3. Other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, other work in progress, utilities, and underground facilities not designated for removal, relocation, or replacement in the course of construction.

C. All damage, injury, or loss to any property caused, directly or indirectly, in whole or in part, by Contractor, or anyone for whose acts the Contractor may be liable, shall be remedied by Contractor at its expense (except damage or loss attributable to the fault of Contract Documents or to the acts or omissions of Owner or Engineer and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor).

D. Contractor shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or exchanged between or among employers at the Site in accordance with Laws or Regulations.

E. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor shall act to prevent threatened damage, injury, or loss. Contractor shall give Engineer prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby or are required as a result thereof. If Engineer determines that a change in the Contract Documents is required because of the action taken by Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued.

7.10 Shop Drawings, Samples, and Other Submittals

A. Contractor shall review and coordinate the shop drawing and samples with the requirements of the Work and the Contract Documents and shall verify all related field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information.

B. Each submittal shall bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review of that submittal, and that Contractor approves the submittal.

C. With each submittal, Contractor shall give Engineer specific written notice, in a communication separate from the submittal, of any variations that the shop drawing or sample may have from the requirements of the Contract Documents.

D. Engineer will provide timely review of shop drawings and samples.

E. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction or to safety precautions or programs.

F. Engineer's review and approval of a separate item does not indicate approval of the assembly in which the item functions.

G. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of shop drawings and submit, as required, new samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous submittals.

H. Shop drawings are not Contract Documents.

7.11 Warranties and Guarantees

A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer and its officers, directors, members, partners, employees, agents, consultants, and subcontractors shall be entitled to rely on Contractor's warranty and guarantee.

7.12 Correction Period

A. If within one year after the date of substantial completion, any Work is found to be defective, or if the repair of any damages to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas used by Contractor as permitted by Laws and Regulations, is found to be defective, then Contractor shall promptly and without cost to Owner, correct such defective Work.

7.13 Indemnification

A. To the fullest extent permitted by Laws and Regulations, and in addition to any other obligations of Contractor under the Contract or otherwise, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom but only to the extent caused by any negligent act or omission of Contractor, any subcontractor, any supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts they may be liable.

ARTICLE 8 - OWNER'S RESPONSIBILITIES

8.01 Owner's Responsibilities

A. Except as otherwise provided in the Contract Documents, Owner shall issue all communications directly to Contractor. Engineer will be responsive to questions from Owner and Contractor.

B. Owner shall make payments to Contractor as provided in this Contract.

C. Owner shall provide Site and easements required to construct the Project.

D. If Owner intends to contract with others for the performance of other work at or adjacent to the Site, unless stated elsewhere in the Contract Documents, Owner shall have sole authority and responsibility for such coordination.

E. The Owner shall be responsible for performing inspections and tests required by applicable codes.

F. The Owner shall not supervise, direct, or have control or authority over, nor be responsible for, Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Owner will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

G. While at the Site, Owner's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Owner has been informed.

H. Owner shall furnish copies of any applicable Owner safety programs to Contractor.

ARTICLE 9 - ENGINEER'S STATUS DURING CONSTRUCTION

9.01 Engineer's Status

A. Engineer will be Owner's representative during construction. The duties and responsibilities and the limitations of authority of Engineer as Owner's representative during construction are set forth in this Contract.

B. Neither Engineer's authority or responsibility under this Article 9 or under any other provision of the Contract, nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer, shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any subcontractor, any supplier, any other individual or entity, or to any surety for or employee or agent of any of them.

C. Engineer will make visits to the Site at intervals appropriate to the various stages of construction. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work.

D. Engineer has the authority to reject Work if Contractor fails to perform Work in accordance with the Contract Documents.

E. Engineer will render decisions regarding the requirements of the Contract Documents, and judge the acceptability of the Work.

F. Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

ARTICLE 10 - CHANGES IN THE WORK

10.01 Authority to Change the Work

A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work.

10.02 Change Orders

A. Owner and Contractor shall execute appropriate Change Orders covering:

1. Changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive;

2. Changes in the Work which are: (a) ordered by Owner or (b) agreed to by the parties or (c) resulting from the Engineer's decision, subject to the need for Engineer's recommendation if the change in the Work involves the design (as set forth in the Drawings, Specifications, or otherwise), or other engineering or technical matters; and

3. Changes in the Contract Price or Contract Times or other changes which embody the substance of any final binding results under Article 12.

B. If the provisions of any bond require notice to be given to a surety of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times), the giving of any such notice will be Contractor's responsibility. The amount of each applicable bond will be adjusted to reflect the effect of any such change.

ARTICLE 11 - DIFFERING SUBSURFACE OR PHYSICAL CONDITIONS

11.01 Differing Conditions Process

A. If Contractor believes that any subsurface or physical condition including but not limited to utilities or other underground facilities that are uncovered or revealed at the Site either differs materially from that shown or indicated in the Contract Documents or is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in Work of the character provided for in the Contract Documents then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except with respect to an emergency) until receipt of a written statement permitting Contractor to do so.

B. After receipt of written notice, Engineer will promptly:

1. Review the subsurface or physical condition in question;

2. Determine necessity for Owner obtaining additional exploration or tests with respect to the condition;

3. Determine whether the condition falls within the differing site condition as stated herein;

4. Obtain any pertinent cost or schedule information from Contractor;

5. Prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the subsurface or physical condition in question and the need for any change in the Drawings or Specifications; and

6. Advise Owner in writing of Engineer's findings, conclusions, and recommendations.

C. After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor regarding the subsurface or physical condition in question, addressing the resumption of Work in connection with such condition, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations, in whole or in part.

ARTICLE 12 - CLAIMS AND DISPUTE RESOLUTION

12.01 Claims Process

A. The party submitting a claim shall deliver it directly to the other party to the Contract and the Engineer promptly (but in no event later than 10 days) after the start of the event giving rise thereto.

B. The party receiving a claim shall review it thoroughly, giving full consideration to its merits. The two parties shall seek to resolve the claim through the exchange of information and direct negotiations. All actions taken on a claim shall be stated in writing and submitted to the other party.

C. If efforts to resolve a claim are not successful, the party receiving the claim may deny it by giving written notice of denial to the other party. If the receiving party does not take action on the claim within 45 days, the claim is deemed denied.

D. If the dispute is not resolved to the satisfaction of the parties, Owner or Contractor shall give written notice to the other party of the intent to submit the dispute to a court of competent jurisdiction unless the Owner and Contractor both agree to an alternative dispute resolution process.

ARTICLE 13 - TESTS AND INSPECTIONS; CORRECTION OF DEFECTIVE WORK

13.01 Tests and Inspections

A. Owner and Engineer will have access to the Site and the Work at reasonable times for their observation, inspection, and testing. Contractor shall provide them proper and safe conditions for such access.

B. Contractor shall give Engineer timely notice of readiness of the Work for all required inspections and tests, and shall cooperate with inspection and testing personnel to facilitate required inspections and tests. Testing and commissioning services will be provided by Contractor as part of the Work.

C. If any Work that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, Contractor shall, if requested by Engineer, uncover such Work for observation. Such uncovering shall be at Contractor's expense.

13.02 Defective Work

A. Contractor shall ensure that the Work is not defective.

B. Engineer has the authority to determine whether Work is defective, and to reject defective Work.

C. Prompt notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor.

D. The Contractor shall promptly correct all such defective Work.

E. When correcting defective Work, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.

F. If the Work is defective or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, then Owner may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated.

ARTICLE 14 - PAYMENTS TO CONTRACTOR

14.01 Progress Payments

A. The Contractor shall prepare a schedule of values that will serve as the basis for progress payments. The schedule of values will be in a form of application for payment acceptable to Engineer. The unit price breakdown submitted with the bid will be used for unit price work. Break lump sum items into units that will allow for measurement of Work in progress.

14.02 Applications for Payments:

A. Contractor shall submit an application for payment in a form acceptable to the Engineer, no more frequently than monthly, to Engineer. Applications for payment will be prepared and signed by Contractor. Contractor shall provide supporting documentation required by the Contract Documents. Payment will be paid for Work completed and materials stored on Owner premises as of the date of the application for payment.

B. Beginning with the second application for payment, each application shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied on account to discharge Contractor's legitimate obligations associated with prior applications for payment.

14.03 Retainage

A. The Owner shall retain 5% of each progress payment until the Work is substantially complete.

14.04 Review of Applications

A. Within 10 days after receipt of each application for payment, the Engineer will either indicate in writing a recommendation for payment and present the application for payment to Owner or return the application for payment to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. The Contractor will make the necessary corrections and resubmit the application for payment.

B. Engineer will recommend reductions in payment (set-offs) which, in the opinion of the Engineer, are necessary to protect Owner from loss because the Work is defective and requires correction or replacement.

C. The Owner is entitled to impose set-offs against payment based on any claims that have been made against Owner on account of Contractor's conduct in the performance of the Work, incurred costs, losses, or damages on account of Contractor's conduct in the performance of the Work, or liquidated damages that have accrued as a result of Contractor's failure to complete the Work.

14.05 Contractor's Warranty of Title

A. Contractor warrants and guarantees that title to all Work, materials, and equipment furnished under the Contract will pass to Owner free and clear of (1) all liens and other title defects, and (2) all patent, licensing, copyright, or royalty obligations, no later than seven days after the time of payment by Owner.

14.06 Substantial Completion

A. The Contractor shall notify Owner and Engineer in writing that the Work is substantially complete and request the Engineer issue a certificate of substantial completion when Contractor considers the Work ready for its intended use. Contractor shall at the same time submit to Owner and Engineer an initial draft of punch list items to be completed or corrected before final payment.

B. Engineer will make an inspection of the Work with the Owner and Contractor to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor and Owner in writing giving the reasons therefor.

C. If Engineer considers the Work substantially complete or upon resolution of all reasons for non-issuance of a certificate identified in 14.06.B, Engineer will deliver to Owner a certificate

of substantial completion which shall fix the date of substantial completion and include a punch list of items to be completed or corrected before final payment.

14.07 Final Inspection

A. Upon written notice from Contractor that the entire Work is complete, Engineer will promptly make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars in which this inspection reveals that the Work, or agreed portion thereof, is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

14.08 Final Payment

A. Contractor may make application for final payment after Contractor has satisfactorily completed all Work defined in the Contract, including providing all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of inspection, annotated record documents and other documents.

B. The final application for payment shall be accompanied (except as previously delivered) by:

1. All documentation called for in the Contract Documents;

2. Consent of the surety to final payment;

3. Satisfactory evidence that all title issues have been resolved such that title to all Work, materials, and equipment has passed to Owner free and clear of any liens or other title defects, or will so pass upon final payment;

4. A list of all disputes that Contractor believes are unsettled; and

5. Complete and legally effective releases or waivers (satisfactory to Owner) of all lien rights arising out of the Work, and of liens filed in connection with the Work.

C. The Work is complete (subject to surviving obligations) when it is ready for final payment as established by the Engineer's written recommendation of final payment.

14.09 Waiver of Claims

A. The making of final payment will not constitute a waiver by Owner of claims or rights against Contractor.

B. The acceptance of final payment by Contractor will constitute a waiver by Contractor of all claims and rights against Owner other than those pending matters that have been duly submitted.

ARTICLE 15 - SUSPENSION OF WORK AND TERMINATION

15.01 Owner May Suspend Work

A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 60 consecutive days by written notice to Contractor and Engineer. Such notice will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be entitled to an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension.

15.02 Owner May Terminate for Cause

A. Contractor's failure to perform the Work in accordance with the Contract Documents or other failure to comply with a material term of the Contract Documents will constitute a default by Contractor and justify termination for cause.

B. If Contractor defaults in its obligations, then after giving Contractor and any surety ten days written notice that Owner is considering a declaration that Contractor is in default and termination of the Contract, Owner may proceed to:

1. Declare Contractor to be in default, and give Contractor and any surety notice that the Contract is terminated; and

2. Enforce the rights available to Owner under any applicable performance bond.

C. Owner may not proceed with termination of the Contract under Paragraph 15.02.B if Contractor within seven days of receipt of notice of intent to terminate begins to correct its failure to perform and proceeds diligently to cure such failure.

D. Subject to the terms and operation of any applicable performance bond, if Owner has terminated the Contract for cause, Owner may exclude Contractor from the Site, take possession of the Work, incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere, and complete the Work as Owner may deem expedient.

E. In the case of a termination for cause, if the cost to complete the Work, including related claims, costs, losses, and damages, exceeds the unpaid contract balance, Contractor shall pay the difference to Owner.

15.03 Owner May Terminate for Convenience

A. Upon seven days written notice to Contractor, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for, without duplication of any items:

1. Completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;

2. Expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses; and

3. Other reasonable expenses directly attributable to termination, including costs incurred to prepare a termination for convenience cost proposal.

B. Contractor shall not be paid on account of loss of anticipated overhead, profits, or revenue, or other economic loss arising out of or resulting from such termination.

15.04 Contractor May Stop Work or Terminate

A. If, through no act or fault of Contractor, (1) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (2) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days written notice to Owner, and provided Owner does not remedy such

suspension or failure within that time, either stop the Work until payment is received, or terminate the Contract and recover payment from the Owner.

ARTICLE 16 - CONTRACTOR'S REPRESENTATIONS

16.01 Contractor Representations

A. Contractor makes the following representations when entering into this Contract:

1. Contractor has examined and carefully studied the Contract Documents, and any data and reference items identified in the Contract Documents.

2. Contractor has visited the Site, conducted a thorough visual examination of the Site and adjacent areas, and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.

3. Contractor is familiar with and is satisfied as to all Laws and Regulations that may affect cost, progress, and performance of the Work.

4. Contractor has considered the information known to Contractor itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Contract Documents; and the Site-related reports and drawings identified in the Contract Documents, with respect to the effect of such information, observations, and documents on:

   a. The cost, progress, and performance of the Work;

   b. The means, methods, techniques, sequences, and procedures of construction to be employed by Contractor; and

   c. Contractor's safety precautions and programs.

5. Based on the information and observations referred to in the preceding paragraph, Contractor agrees that no further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract.

6. Contractor is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Contract Documents.

7. Contractor has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Contractor has discovered in the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.

8. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

9. Contractor's entry into this Contract constitutes an incontrovertible representation by Contractor that, without exception, all prices in the Contract are premised upon performing and furnishing the Work required by the Contract Documents.

ARTICLE 17 - MISCELLANEOUS

17.01 Cumulative Remedies

A. The duties and obligations imposed by this Contract and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract. The provisions of this paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

17.02 Limitation of Damages

A. Neither Owner, Engineer, nor any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, shall be liable to Contractor for any claims, costs, losses, or damages sustained by Contractor on or in connection with any other project or anticipated project.

17.03 No Waiver

A. A party's non-enforcement of any provision shall not constitute a waiver of that provision, nor shall it affect the enforceability of that provision or of the remainder of this Contract.

17.04 Survival of Obligations

A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract, as well as all continuing obligations indicated in the Contract, will survive final payment, completion, and acceptance of the Work or termination or completion of the Contract or termination of the services of Contractor.

17.05 Contractor's Certifications

A. Contractor certifies that it has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for or in executing the Contract.

17.06 Controlling Law

A. This Contract is to be governed by the law of the state in which the Project is located.

IN WITNESS WHEREOF, Owner and Contractor have signed this Contract.

This Contract will be effective on _____ (which is the Effective Date of the Contract).

OWNER: INDIANOLA MUNICIPAL UTILITIES	CONTRACTOR:
_____	_____
By: _____	By: _____
Title: _____	Title: _____
	(If Contractor is a corporation, a partnership, or a joint venture, attach evidence of authority to sign.)
Attest: _____	Attest: _____
Title: _____	Title: _____
Address for giving notices:	Address for giving notices:
210 WEST 2ND AVE	_____
INDIANOLA, IA 50125	_____
_____	_____
	License No.: _____ (where applicable)
(If Owner is a corporation, attach evidence of authority to sign. If Owner is a public body, attach evidence of authority to sign and resolution or other documents authorizing execution of this Contract.)	***NOTE TO USER: Use in those states or other jurisdictions where applicable or required.***

PERFORMANCE BOND

Contractor Name: **[Full formal name of Contractor]** Address *(principal place of business)*: **[Address of Contractor's principal place of business]**	**Surety** Name: **[Full formal name of Surety]** Address *(principal place of business)*: **[Address of Surety's principal place of business]**
Owner Name: **INDIANOLA MUNICIPAL UTILITIES** Mailing address *(principal place of business)*: **210 WEST 2ND AVE** **INDIANOLA, IA 50125**	**Contract** Description *(name and location)*: **EAST IOWA CIRCUIT SWITCHER REPLACEMENT PROJECT - INSTALLATION** **INDIANOLA, IOWA** Contract Price: **[Amount from Contract]** Effective Date of Contract: **[Date from Contract]**

Bond

Bond Amount: **[Amount]**

Date of Bond: **[Date]**

(Date of Bond cannot be earlier than Effective Date of Contract)

Modifications to this Bond form:

☐ None ☐ See Paragraph 16

Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth in this Performance Bond, do each cause this Performance Bond to be duly executed by an authorized officer, agent, or representative.

Contractor as Principal	Surety
_____ *(Full formal name of Contractor)*	_____ *(Full formal name of Surety) (corporate seal)*
By: _____ *(Signature)*	By: _____ *(Signature)(Attach Power of Attorney)*
Name: _____ *(Printed or typed)*	Name: _____ *(Printed or typed)*
Title: _____	Title: _____
Attest: _____ *(Signature)*	Attest: _____ *(Signature)*
Name: _____ *(Printed or typed)*	Name: _____ *(Printed or typed)*
Title: _____	Title: _____

Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party is considered plural where applicable.

1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner for the performance of the Construction Contract, which is incorporated herein by reference.

2. If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except when applicable to participate in a conference as provided in Paragraph 3.

3. If there is no Owner Default under the Construction Contract, the Surety's obligation under this Bond will arise after:

    3.1. The Owner first provides notice to the Contractor and the Surety that the Owner is considering declaring a Contractor Default. Such notice may indicate whether the Owner is requesting a conference among the Owner, Contractor, and Surety to discuss the Contractor's performance. If the Owner does not request a conference, the Surety may, within five (5) business days after receipt of the Owner's notice, request such a conference. If the Surety timely requests a conference, the Owner shall attend. Unless the Owner agrees otherwise, any conference requested under this Paragraph 3.1 will be held within ten (10) business days of the Surety's receipt of the Owner's notice. If the Owner, the Contractor, and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement does not waive the Owner's right, if any, subsequently to declare a Contractor Default;

    3.2. The Owner declares a Contractor Default, terminates the Construction Contract and notifies the Surety; and

    3.3. The Owner has agreed to pay the Balance of the Contract Price in accordance with the terms of the Construction Contract to the Surety or to a contractor selected to perform the Construction Contract.

4. Failure on the part of the Owner to comply with the notice requirement in Paragraph 3.1 does not constitute a failure to comply with a condition precedent to the Surety's obligations, or release the Surety from its obligations, except to the extent the Surety demonstrates actual prejudice.

5. When the Owner has satisfied the conditions of Paragraph 3, the Surety shall promptly and at the Surety's expense take one of the following actions:

    5.1. Arrange for the Contractor, with the consent of the Owner, to perform and complete the Construction Contract;

    5.2. Undertake to perform and complete the Construction Contract itself, through its agents or independent contractors;

    5.3. Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and a contractor selected with the Owners concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Paragraph 7 in excess of the Balance of the Contract Price incurred by the Owner as a result of the Contractor Default; or

    5.4. Waive its right to perform and complete, arrange for completion, or obtain a new contractor, and with reasonable promptness under the circumstances:

5.4.1 After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, make payment to the Owner; or

5.4.2 Deny liability in whole or in part and notify the Owner, citing the reasons for denial.

6. If the Surety does not proceed as provided in Paragraph 5 with reasonable promptness, the Surety shall be deemed to be in default on this Bond seven days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Paragraph 5.4, and the Owner refuses the payment, or the Surety has denied liability, in whole or in part, without further notice, the Owner shall be entitled to enforce any remedy available to the Owner.

7. If the Surety elects to act under Paragraph 5.1, 5.2, or 5.3, then the responsibilities of the Surety to the Owner will not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety will not be greater than those of the Owner under the Construction Contract. Subject to the commitment by the Owner to pay the Balance of the Contract Price, the Surety is obligated, without duplication for:

   7.1. the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;

   7.2. additional legal, design professional, and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Paragraph 5; and

   7.3. liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.

8. If the Surety elects to act under Paragraph 5.1, 5.3, or 5.4, the Surety's liability is limited to the amount of this Bond.

9. The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Construction Contract, and the Balance of the Contract Price will not be reduced or set off on account of any such unrelated obligations. No right of action will accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators, successors, and assigns.

10. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.

11. Any proceeding, legal or equitable, under this Bond must be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and must be instituted within two years after a declaration of Contractor Default or within two years after the Contractor ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this paragraph are void or prohibited by law, the minimum periods of limitations available to sureties as a defense in the jurisdiction of the suit will be applicable.

12. Notice to the Surety, the Owner, or the Contractor must be mailed or delivered to the address shown on the page on which their signature appears.

13. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement will be deemed deleted therefrom and provisions conforming to such

statutory or other legal requirement will be deemed incorporated herein. When so furnished, the intent is that this Bond will be construed as a statutory bond and not as a common law bond.

14. Definitions

    14.1. *Balance of the Contract Price*—The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made including allowance for the Contractor for any amounts received or to be received by the Owner in settlement of insurance or other claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.

    14.2. *Construction Contract*—The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and changes made to the agreement and the Contract Documents.

    14.3. *Contractor Default*—Failure of the Contractor, which has not been remedied or waived, to perform or otherwise to comply with a material term of the Construction Contract.

    14.4. *Owner Default*—Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

    14.5. *Contract Documents*—All the documents that comprise the agreement between the Owner and Contractor.

15. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond will be deemed to be Subcontractor and the term Owner will be deemed to be Contractor.

16. Modifications to this Bond are as follows: **[Describe modification or enter "None"]**

PAYMENT BOND

Contractor	**Surety**
Name:	Name:
Address *(principal place of business)*:	Address *(principal place of business)*:
Owner	**Contract**
Name: **INDIANOLA MUNICIPAL UTILITIES** Mailing address *(principal place of business)*: **210 WEST 2ND AVE** **INDIANOLA, IA 50125**	Description *(name and location)*: **EAST IOWA CIRCUIT SWITCHER REPLACEMENT PROJECT - INSTALLATION** **INDIANOLA, IOWA** Contract Price: Effective Date of Contract:

Bond

Bond Amount:

Date of Bond:

(Date of Bond cannot be earlier than Effective Date of Contract)

Modifications to this Bond form:

☒ None ☐ See Paragraph 18

Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth in this Payment Bond, do each cause this Payment Bond to be duly executed by an authorized officer, agent, or representative.

Contractor as Principal	Surety
_____	_____
(Full formal name of Contractor)	*(Full formal name of Surety) (corporate seal)*
By: _____	By: _____
(Signature)	*(Signature)(Attach Power of Attorney)*
Name: _____	Name: _____
(Printed or typed)	*(Printed or typed)*
Title: _____	Title: _____
Attest: _____	Attest: _____
(Signature)	*(Signature)*
Name: _____	Name: _____
(Printed or typed)	*(Printed or typed)*
Title: _____	Title: _____

Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party is considered plural where applicable.

1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner to pay for labor, materials, and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference, subject to the following terms.
2. If the Contractor promptly makes payment of all sums due to Claimants, and defends, indemnifies, and holds harmless the Owner from claims, demands, liens, or suits by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, then the Surety and the Contractor shall have no obligation under this Bond.
3. If there is no Owner Default under the Construction Contract, the Surety's obligation to the Owner under this Bond will arise after the Owner has promptly notified the Contractor and the Surety (at the address described in Paragraph 13) of claims, demands, liens, or suits against the Owner or the Owner's property by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, and tendered defense of such claims, demands, liens, or suits to the Contractor and the Surety.
4. When the Owner has satisfied the conditions in Paragraph 3, the Surety shall promptly and at the Surety's expense defend, indemnify, and hold harmless the Owner against a duly tendered claim, demand, lien, or suit.
5. The Surety's obligations to a Claimant under this Bond will arise after the following:
    5.1. Claimants who do not have a direct contract with the Contractor
        5.1.1. have furnished a written notice of non-payment to the Contractor, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were, or equipment was, furnished or supplied or for whom the labor was done or performed, within ninety (90) days after having last performed labor or last furnished materials or equipment included in the Claim; and
        5.1.2. have sent a Claim to the Surety (at the address described in Paragraph 13).
    5.2. Claimants who are employed by or have a direct contract with the Contractor have sent a Claim to the Surety (at the address described in Paragraph 13).
6. If a notice of non-payment required by Paragraph 5.1.1 is given by the Owner to the Contractor, that is sufficient to satisfy a Claimant's obligation to furnish a written notice of non-payment under Paragraph 5.1.1.
7. When a Claimant has satisfied the conditions of Paragraph 5.1 or 5.2, whichever is applicable, the Surety shall promptly and at the Surety's expense take the following actions:
    7.1. Send an answer to the Claimant, with a copy to the Owner, within sixty (60) days after receipt of the Claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed; and
    7.2. Pay or arrange for payment of any undisputed amounts.
    7.3. The Surety's failure to discharge its obligations under Paragraph 7.1 or 7.2 will not be deemed to constitute a waiver of defenses the Surety or Contractor may have or acquire as to a Claim, except as to undisputed amounts for which the Surety and Claimant have reached agreement. If, however, the Surety fails to discharge its obligations under Paragraph 7.1 or 7.2, the Surety shall indemnify the Claimant for the reasonable attorney's fees the Claimant incurs thereafter to recover any sums found to be due and owing to the Claimant.

8. The Surety's total obligation will not exceed the amount of this Bond, plus the amount of reasonable attorney's fees provided under Paragraph 7.3, and the amount of this Bond will be credited for any payments made in good faith by the Surety.

9. Amounts owed by the Owner to the Contractor under the Construction Contract will be used for the performance of the Construction Contract and to satisfy claims, if any, under any construction performance bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Construction Contract are dedicated to satisfying obligations of the Contractor and Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.

10. The Surety shall not be liable to the Owner, Claimants, or others for obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for the payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligation to make payments to or give notice on behalf of Claimants, or otherwise have any obligations to Claimants under this Bond.

11. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.

12. No suit or action will be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the state in which the project that is the subject of the Construction Contract is located or after the expiration of one year from the date (1) on which the Claimant sent a Claim to the Surety pursuant to Paragraph 5.1.2 or 5.2, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit will be applicable.

13. Notice and Claims to the Surety, the Owner, or the Contractor must be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, will be sufficient compliance as of the date received.

14. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement will be deemed deleted here from and provisions conforming to such statutory or other legal requirement will be deemed incorporated herein. When so furnished, the intent is that this Bond will be construed as a statutory bond and not as a common law bond.

15. Upon requests by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor and Owner shall promptly furnish a copy of this Bond or shall permit a copy to be made.

16. Definitions

    16.1. *Claim*—A written statement by the Claimant including at a minimum:

        16.1.1. The name of the Claimant;

        16.1.2. The name of the person for whom the labor was done, or materials or equipment furnished;

        16.1.3. A copy of the agreement or purchase order pursuant to which labor, materials, or equipment was furnished for use in the performance of the Construction Contract;

        16.1.4. A brief description of the labor, materials, or equipment furnished;

16.1.5. The date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Construction Contract;

16.1.6. The total amount earned by the Claimant for labor, materials, or equipment furnished as of the date of the Claim;

16.1.7. The total amount of previous payments received by the Claimant; and

16.1.8. The total amount due and unpaid to the Claimant for labor, materials, or equipment furnished as of the date of the Claim.

16.2. *Claimant*—An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials, or equipment for use in the performance of the Construction Contract. The term Claimant also includes any individual or entity that has rightfully asserted a claim under an applicable mechanic's lien or similar statute against the real property upon which the Project is located. The intent of this Bond is to include without limitation in the terms of "labor, materials, or equipment" that part of the water, gas, power, light, heat, oil, gasoline, telephone service, or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials, or equipment were furnished.

16.3. *Construction Contract*—The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and all changes made to the agreement and the Contract Documents.

16.4. *Owner Default*—Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

16.5. *Contract Documents*—All the documents that comprise the agreement between the Owner and Contractor.

17. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond will be deemed to be Subcontractor and the term Owner will be deemed to be Contractor.

18. Modifications to this Bond are as follows: **NONE**

1.0 PROJECT DESCRIPTION

1.1 The Project includes providing labor and material to replace two existing 69kV circuit switchers at the East Iowa Substation with circuit breakers. The East Iowa Substation is located within the City of Indianola, Iowa. This project includes furnishing miscellaneous materials, labor, tools, equipment, supervision, and other items necessary to complete the entire project defined in these bid documents.

1.2 In addition to the removal of the circuit switchers and installation of the new circuit breakers, the Project includes testing necessary to assure correct operation of the new circuit breakers and associated protection schemes, modify data concentrator programming using configuration files provided by Engineer, verifying that the impacted scanned points are correctly provided to the SCADA system data concentrator, and that control points operate correctly.

2.0 SCOPE OF WORK

2.1 The drawings, bill of materials, and specifications listed in the Index in Section 00000 are intended to cover all materials, equipment, and work necessary to complete this project as described, except for those items that are specifically listed as being supplied or completed by Owner or by others, and except for problems with the existing substation schematics and wiring diagrams.

2.2 The existing substation drawings are not complete and have not been updated to include modifications. Contractor shall include time to thoroughly trace all circuits impacted by the replacement project and document deviations from project drawings. Deviations shall be provided to Engineer for resolution. Change orders will be considered for major deviations. Change orders will not be considered for minor changes only requiring jumpers within the same or adjacent switchgear cubicles.

2.3 Work generally consists of the following major items of work but is not limited to the items listed below. Refer to drawings for plans and details and definition of the work to the extent possible.

a. Contractor shall schedule preconstruction meeting within two weeks after receiving Notice to Proceed. Meeting will be held at Indianola Municipal Utilities. A virtual preconstruction meeting will not be acceptable.

b. Furnish labor and materials as required.

c. At East Iowa Substation:
   1) Order materials
   2) Preschedule outages per Section 01001 Sequence of work.
   3) Trace existing circuits, verify accuracy of existing schematics and wiring diagrams, resolve discrepancies with Engineer.
   4) Remove existing circuit switchers CK601 and CK602.

5) Remove existing control and AC and DC supply cables between CK601 and CK602 and the switchgear buildings. Cut conduits off and cap conduits below grade, seal ends in switchgear building.
6) Remove existing buswork between the main east-west bus and the existing circuit switchers as shown on the plan and section view drawings.
7) Install disconnect switches on existing steel structures.
8) Install support insulators on the existing steel structures as shown on the plan and section view drawings.
9) Connect disconnect switches to existing east-west buswork and new circuit breakers.
10) Connect circuit breakers to voltage and current transformers and power transformers as shown on the plan and section view drawings.
11) Install 3" PVC conduits between CK601 control cabinet and East Iowa #1 (east building) and between CK602 control cabinet and East Iowa #2 (west building).
12) Bond circuit breakers and disconnect operators to existing ground grid.
13) Install permanent CT shorting jumpers in the CK601 and CK602 control cabinets.
14) Install and connect new control and AC and DC supply cables to CK601 and CK602 as shown on the drawings and cable schedule.
15) Install 12 pole GE EB25B12 terminal block in East Iowa #1 Station Power cubicle.
16) Modify cubicle wiring in the East Iowa #1 Intertie, Station Power and Auxiliary cubicles and Relay Panel #1.
17) Install 12 pole GE EB25B12 terminal block in East Iowa #2 relay panel.
18) Modify wiring in East Iowa #2 relay panel and intertie cubicle.
19) Install settings in SEL annunciator panels in CK601 and CK602 control cabinets. Annunciator settings will be provided by Engineer in .rdb format.
20) Test and commission new equipment and circuits that are impacted by changes. This includes CK601, CK602, CK230, and CK240 trip and close circuits.
21) Apply configuration changes to existing RTUs using configuration files provided by Engineer.
22) Assist as needed during testing to verify SCADA system additions and deletions

2.4 Contractor shall test phasing before beginning removal work and confirm phasing immediately after reenergizing each transformer and before supplying load.

2.5 Contractor will furnish all equipment and materials required to complete the Work except for the circuit breakers and disconnect switches.

2.6 Contractor shall provide as-built data for the system as installed as described in Section 17839. This shall include red-line notations on drawings to show all field changes that affect the schematic or wiring diagrams.

3.0 DRAWINGS

3.1 Drawings showing device and wiring removals and additions are listed on the coversheet for the drawing volume. Panel layout and schematic diagrams are provided with bid

drawings and point to point wiring diagrams, where available, will be provided with final construction drawings.

3.2 Drawings are as complete and accurate as possible, however, they are original to the substation and have not been updated as modifications have been made. The set is incomplete and numerous discrepancies exist. Neither Owner nor Engineer guarantees complete accuracy. See paragraph 2.2 above.

3.3 Point to point wiring diagrams are listed on the drawing coversheets.

3.4 Schematic and wiring diagrams do not exist for internal wiring and cable connections to the RTU at East Iowa. Contractor will be required to remove and install connections to existing terminal blocks in the RTU. The only SCADA points changes envisioned are to replace the existing CK601 and CK602 status contact and add an alarm from the SEL annunciator panels in CK601 and CK602. All time required to investigate and formulate these connections must be included in the Contractor bid and no scope changes will be made to cover this work.

4.0 WORK BY OWNER OR BY OTHERS

4.1 The following work is not a part of this Contract and will be performed by the Owner or others.

a. Circuit breakers and disconnect switches have been purchased by Owner and will be stored in a warehouse adjacent to the East Iowa substation.

5.0 SCHEDULE

5.1 Contractor may begin work at any time after receiving a Notice to Proceed and when ground conditions permit. The Notice to Proceed is expected to be issued on or about February 26th, 2026. Provided the Notice to Proceed is issued on February 26th and ground conditions permit below grade work starting March 9th, 2026, work must be substantially completed by May 15th, 2026; with Final Completion by June 15th, 2026. Completion date will be adjusted should either of these conditions not be met.

5.2 Contractor will cooperate with Owner in scheduling equipment outages. Substantial switching is required to remove load from the transformers and Owner will need to make crews available. A minimum of 1 week's notice is required.

5.3 For purposes of preparing their bid, Contractor shall assume work will be permitted normal business days, Monday through Friday, between 7:00 AM and 5:00 PM at East Iowa Substation. Requests by Contractor for Owner to permit Contractor personnel that are qualified to work in an energized substation to work outside of these stated hours will be considered by Owner. Owner retains the sole right to grant or deny permission to work outside of the stated hours.

5.4 Contractor shall manage and schedule the Work to permit returning the transformers to service as soon as possible and to minimize the length of time needed to complete the project. Owner also strongly desires that both transformers be available before summer.

6.0 SEQUENCE OF WORK

6.1 A suggested sequence is shown in Section 01001. Final Work sequence is subject to adjustment with agreement of the Contractor and Owner. The Contractor must provide a general work plan for approval by the Owner prior to starting work on the Project.

7.0 NEW MATERIALS

7.1 Contractor is to furnish and pay for all materials necessary for the completion of the Work. All materials supplied by Contractor shall be new and unused and shall be as specified in the Bill of Materials and project drawings.

7.2 Contractor may arrange with Owner to store materials to be provided by Contractor at the work location.

8.0 REMOVED MATERIALS

8.1 The contractor will be responsible for disposing of all removed materials; Owner does not intend to retain any removed items for future use.

9.0 SITE AND OTHER AREAS

9.1 Contractor shall confine his operations to the substation and control room sites described in the drawings.

10.0 ENERGIZED EQUIPMENT

10.1 Contractor acknowledges that Contractor and Contractor's employees are aware of the potentially dangerous nature of electricity and are qualified to work on and in the vicinity of secondary (600 volt class), medium voltage (15kV class), and high voltage (69kV class) electric facilities that have not been de-energized. The existing facilities shall remain in operation and energized at all times except when outages are scheduled. Contractor shall take all necessary steps to protect the existing facilities and maintain them so that they do not interfere with or pose a danger to either the new construction, Contractor activities, Contractor's Personnel, Owner's workers, or the general public. The cost of such actions shall be included in Contractor's prices as no separate payment will be made.

10.2 In the event the work cannot be performed safely, Contractor shall notify Owner and Engineer, and shall cease work until arrangements are made to proceed safely.

10.3 Contractor shall ensure that only qualified persons are permitted to work on or near energized facilities, and that all applicable standards and regulations are followed, including observance of approach boundaries as specified in NFPA 70E-2021.

10.4 As much as possible, bus differential and breaker failure relaying at both substations shall remain in service during the project. Contractor shall provide prior notice to Owner and Engineer if these protection systems will need to be removed from service.

11.0 OUTAGES

11.1 All equipment outages required for the execution of the Work shall be kept to the shortest time duration possible.

11.2 Any and all required equipment outages shall be scheduled and coordinated with Owner in advance of the expected date of the outage.

11.3 The outages listed below are anticipated to be necessary for the work. The contractor is encouraged to suggest revisions to this list with the overall goals of reducing the quantity of outages needed or reducing outage durations while maintaining personnel safety and security of electrical service to Owner's customers.

11.4 East Iowa Substation

a. An outage of the 69kV transformer bus at East Iowa Substation will be provided to remove CK601, install disconnect switches CK601A and CK602A, and temporarily reconnect existing CK602 to allow Transformer 2 to be used while work on CK601 progresses.

b. After work on CK601 is completed, CK602 can be removed and replaced while Transformer 1 remains in service.

12.0 SWITCHING

12.1 All switching required for the prosecution of the Work will be performed by Owner.

13.0 TESTING

13.1 Contractor shall retain a subcontractor that is routinely engaged in the testing of utility protection and control systems to test existing circuits that are impacted by the project and the new circuit breakers.

13.2 The existing substation drawings have not been updated as modifications have been made and are out of date.

13.3 Scott Steinmetz of Steinmetz Corporation has significant recent experience in the East Iowa Substation and is Owner's preferred testing contractor. Steinmetz Corporation's phone number is available upon request from Engineer. Proposed testing contractor must be submitted with the bid. Should owner require an alternate testing subcontractor, a change order will be issued in the amount of the cost increase occasioned by change.

13.4 Alternate testing contractors must be approved prior to beginning work. See testing subcontractor qualification information in Sections 1.4 and 1.5 of Specification 337233.19.

END OF SECTION 01000

1.0 SCHEDULE

1.1 Ground conditions permitting, contractor may begin work at any time after receiving a Notice to Proceed and receipt of materials. The start date will be mutually agreed to by the Owner and Contractor.

1.2 Contractor may begin work at any time after receiving a Notice to Proceed and when ground conditions permit. The Notice to Proceed is expected to be issued on or about February 26th, 2026. Provided the Notice to Proceed is issued on February 26th and ground conditions permit below grade work starting March 9th, 2026, work must be substantially completed by May 15th, 2026; with Final Completion by June 15th, 2026. Completion date will be adjusted should either of these conditions not be met.

1.3 Owner has purchased the circuit breakers and disconnect switches separately. The circuit breakers are expected to arrive in January 2026.

1.4 Contractor shall order materials to provide for delivery of all materials before the start date.

2.0 SEQUENCE OF WORK

2.1 Contractor shall schedule a preconstruction meeting within two weeks of receipt of Notice to Proceed. Meeting shall be held in Indianola. Virtual participation is not acceptable.

2.2 Contractor shall perform as much prework and preparatory work as possible before beginning of outages to minimize the duration of each equipment outage. This work shall include thoroughly tracing all circuits that will be modified, comparing findings to the existing schematics and wiring diagrams and resolving discrepancies with the Engineer prior to proceeding.

2.2 A preliminary suggested sequence is provided below. The actual Work sequence is subject to change depending upon needs of the Contractor and the Owner. The Contractor must submit a general work plan for approval by the Owner prior to starting work on the Project. Revisions to the sequence suggested by Contractor will be considered by Owner. Owner retains the sole right to approve the work sequence.

A. Contractor receives Notice to Proceed.

B. Contractor orders materials.

C. Contractor schedules preconstruction meeting within two weeks of receipt of Notice to Proceed. Meeting shall be held at Indianola Municipal Utilities. Virtual participation is not acceptable.

D. Contractor traces all circuits impacted by the replacement project and document deviations from project drawings. Contractor provides deviations to Engineer for resolution.

E. Contractor receives materials.

F. Owner switches customer load normally served from East Iowa Substation to Westside Substation.

G. Owner deenergizes 69kV transformer bus at East Iowa.

H. During transformer bus outage on the East Iowa transformer bus: modify existing structures. Install disconnect switches CK601A and CK602A. Temporarily reconnect CK602 to CK602A to allow transformer T2 to temporarily serve load while CK601 is replaced.

I. Owner energizes East Iowa transformer bus, Owner switches load to East Iowa Transformer 2.

J. Contractor removes CK601, removes upper portion of existing foundation, pours new foundation. Proposed curing times will be discussed during the preconstruction meeting. While Owner desires shorter curing times, curing times shorter than 1 week will generally not be permissible. See Specification 033000.

K. While concrete cures, contactor installs conduit to East Iowa #1 (east) building and makes wiring changes in East Iowa #1 building.

L. After concrete has cured, install circuit breaker, add conduit riser, bond circuit breaker to ground grid, pull control cables, terminate control cables, test circuit breaker and modified circuits.

M. Owner energizes CK601 and Transformer 1, switches load from Transformer 2 to Transformer 1.

N. Contractor removes CK602, removes upper portion of existing foundation, pours new foundation.

O. While concrete cures, contactor installs conduit to East Iowa #2 (west) building and makes wiring changes in East Iowa #2 building.

P. After concrete has cured, install circuit breaker, add conduit riser, bond circuit breaker to ground grid, pull control cables, terminate control cables, test circuit breaker and modified circuits.

Q. Energize CK602 and Transformer 2.

END OF SECTION 01001

1.0 PROJECT MATERIAL

1.1 Project Materials quantities and catalog numbers are called out in the construction drawings. This section provides a guide to help Contractor find all material items included in the construction drawings.

1.2 This section is provided solely as a reference and guide for Contractor. All material required to complete the Work as described by the Contract Documents is to be provided by Contractor, regardless of whether or not any specific items are included in the drawings or this specification section.

1.3 Materials required are summarized below.

Drawing	Item	Comments
S101	Anchor bolts Rebar Concrete Granular subbase	
S201	Conduit and conduit fittings	
S400	Insulators Insulator supports 336 kcmil ACSR Bus support Terminals Tees Transition plates Conduit and conduit fittings Bare 4/0 Copper (grounding) Cadweld connectors Bronze ground clamps	
CKR-472	1-pole branch circuit breakers	Acceptable to reuse existing if they are single pole 20 or 30A and condition is good.
CKR-472	2-pole branch circuit breakers	Acceptable to reuse existing if condition is good.
E-15	PVC conduit and PVC LBs for building conduit entrance	
R401B & R402B	Burndy narrow tongue lug for #6 Cu Heat shrink tubing	For DC supply
R-471	20A Single pole branch breakers for existing AC panelboards	See notes regarding reusing existing circuit breakers.
R-500A	Control Cables	Minimum size of S601A and S602A is #16AWG. Contractor may choose a larger size for convenience. C1A and C1B are not necessary if existing wiring can be traced.
3-628-8	12 Pole terminal block (GE EB25B12)	
3-628-29	12 Pole terminal block (GE EB25B12)	

END OF SECTION 16910

SECTION 017839 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for project record documents, including the following:

1. Record Drawings.
2. Record Product Data.
3. Miscellaneous record submittals.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.

1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.

a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
b. Accurately record information in an acceptable drawing technique.
c. Record data as soon as possible after obtaining it.

2. Content: Types of items requiring marking include, but are not limited to, the following:

a. Dimensional changes to Drawings.
b. Revisions to details shown on Drawings.
c. Locations and depths of underground utilities.
d. Revisions to routing of conduits.
e. Revisions to electrical circuitry.
f. Actual equipment locations.

g. Changes made by Change Order or Work Change Directive.
h. Changes made following Engineer's written orders.
i. Details not on the original Contract Drawings.
j. Discrepancies in the original Contract Drawings.
k. Field records for variable and concealed conditions.
l. Record information on the Work that is shown only schematically.

3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
4. Mark record sets with red-colored pencil or pen. Use other colors to distinguish between changes for different categories of the Work at same location.
5. Mark important additional information that was either shown schematically or omitted from original Drawings.
6. Note Construction Change Directive numbers, Change Order numbers, and similar identification, where applicable.

2.2 TESTING DOCUMENTATION

A. Testing Documentation: Provide test logs and test reports as described in Section 337233.19.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.

B. Maintenance of Record Documents: Store record documents in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Engineer's reference during normal working hours.

C. Existing substation drawings are incomplete and have inconsistencies. Contractor shall document errors discovered while tracing wiring and their resolution on the red-line drawing sets.

END OF SECTION 017839

INDIANOLA MUNICIPAL UTILITIES
REPLACE BREAKERS CK601 & CK602

SECTION 033000 - CAST-IN-PLACE CONCRETE

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 cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:

1. Footings.
2. Foundation walls.
3. Slabs-on-grade.
4. Suspended slabs.
5. Concrete toppings.
6. Building frame members.
7. Building walls.

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

1.4 SUBMITTALS

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

B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1. Indicate amounts of mixing water to be withheld for later addition at Project site.

C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.

D. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.

1. Location of construction joints is subject to approval of the Engineer.

E. Samples: For waterstops.

F. Material Certificates: For each of the following, signed by manufacturers:

1. Cementitious materials.
2. Admixtures.
3. Form materials and form-release agents.
4. Steel reinforcement and accessories.
5. Waterstops.
6. Curing compounds.
7. Semirigid joint filler.
8. Joint-filler strips.

G. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:

1. Aggregates. Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity**.**

H. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.

B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

C. Testing Agency Qualifications: An independent agency, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.

D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.

E. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301, "Specifications for Structural Concrete," Sections 1 through 5.
2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

F. Preinstallation Conference: Conduct conference at Project site.

1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:

a. Contractor's superintendent.
b. Independent testing agency responsible for concrete design mixtures.
c. Ready-mix concrete manufacturer.
d. Concrete subcontractor.

2. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint-filler strips, semirigid joint fillers, anchor rod and anchorage device installation tolerances, steel reinforcement installation, and concrete protection.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

B. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

1. Plywood, metal, or other approved panel materials.
2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:

a. High-density overlay, Class 1 or better.

b. Medium-density overlay, Class 1 or better; mill-release agent treated and edge sealed.
c. Structural 1, B-B or better; mill oiled and edge sealed.
d. B-B (Concrete Form), Class 1 or better; mill oiled and edge sealed.

B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

C. Forms for Cylindrical Columns, Pedestals, and Supports: Metal, glass-fiber-reinforced plastic, paper, or fiber tubes that will produce surfaces with gradual or abrupt irregularities not exceeding specified formwork surface class. Provide units with sufficient wall thickness to resist plastic concrete loads without detrimental deformation.

D. Void Forms: Biodegradable paper surface, treated for moisture resistance, structurally sufficient to support weight of plastic concrete and other superimposed loads.

E. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.

F. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

1. Formulate form-release agent with rust inhibitor for steel form-facing materials.

G. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

1. Furnish units that will leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.
2. Furnish ties that, when removed, will leave holes no larger than 1 inch in diameter in concrete surface.
3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

2.2 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.

2.3 GLASS FIBER REINFORCED POLYMER REINFORCEMENT

A. Reinforcing Bars: ASTM D 7957 and ASTM D 8505

2.4 REINFORCEMENT ACCESSORIES

A. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel

wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:

1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.
2. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer-coated wire bar supports.
3. For zinc-coated reinforcement, use galvanized wire or dielectric-polymer-coated wire bar supports.

2.5 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:

1. Portland Cement: ASTM C 150, Type I or Type II. Supplement with the following:

a. Fly Ash: ASTM C 618, Class F or C.
b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.

B. Silica Fume: ASTM C 1240, amorphous silica.

C. Normal-Weight Aggregates: ASTM C 33, coarse aggregate or better, graded. Provide aggregates from a single source.

1. Maximum Coarse-Aggregate Size: 3/4 inch nominal.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement. Only natural material will be allowed.

D. Water: ASTM C 94/C 94M and potable.

2.6 ADMIXTURES

A. Air-Entraining Admixture: ASTM C 260.

2.7 WATERSTOPS

A. Chemically Resistant Flexible Waterstops: Linear low density polyethylene waterstops, for embedding in concrete to prevent passage of fluids through joints; resistant to oils, solvents, and chemicals. Factory fabricate corners, intersections, and directional changes.

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

a. WESTEC Barrier Technologies, Inc.; 600 Series TPE-R.

2. Profile: Ribbed with center bulb.
3. Dimensions: 6 inches by 3/8 inch thick; nontapered.

2.8 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.

B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

C. Water: Potable.

D. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. BASF Construction Chemicals - Building Systems; Kure 1315.
b. ChemMasters; Polyseal WB.
c. Conspec by Dayton Superior; Sealcure 1315 WB.
d. Edoco by Dayton Superior; Cureseal 1315 WB.
e. Euclid Chemical Company (The), an RPM company; Super Diamond Clear VOX; LusterSeal WB 300.
f. Kaufman Products, Inc.; Sure Cure 25 Emulsion.
g. Lambert Corporation; UV Safe Seal.
h. L&M Construction Chemicals, Inc.; Lumiseal WB Plus.
i. Meadows, W. R., Inc.; Vocomp-30.
j. Metalcrete Industries; Metcure 30.
k. Right Pointe; Right Sheen WB30.
l. Symons by Dayton Superior; Cure & Seal 31 Percent E.
m. Vexcon Chemicals, Inc.; Vexcon Starseal 1315.

2.9 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.

B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 per ASTM D 2240.

2.10 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.

1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.

B. Cementitious Materials: Use fly ash, pozzolan, ground granulated blast-furnace slag, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent.

C. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

2.11 CONCRETE MIXTURES FOR BUILDING ELEMENTS

A. Footings: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 4500 psi at 28 days.
2. Maximum Water-Cementitious Materials Ratio: 0.45.
3. Slump Limit: 3 inches, plus or minus 1 inch.
4. Air Content: 6.0 percent, plus or minus 1.5 percent at point of delivery for 3/4-inch nominal maximum aggregate size.

B. Slabs-on-Grade: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 4500 psi at 28 days.
2. Maximum Water-Cementitious Materials Ratio: 0.45.
3. Slump Limit: 3 inches, plus or minus 1 inch.
4. Air Content: 6.0 percent, plus or minus 1.5 percent at point of delivery for 3/4-inch nominal maximum aggregate size.

2.12 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.13 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.

1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Mix concrete materials in appropriate drum-type batch machine mixer.

1. For mixer capacity of 1 cu. yd. or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.
2. For mixer capacity larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd.
3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixture time, quantity, and amount of water added. Record approximate location of final deposit in structure.

PART 3 - EXECUTION

3.1 FORMWORK

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:

1. Class A, 1/8 inch for smooth-formed finished surfaces.

D. Construct forms tight enough to prevent loss of concrete mortar.

E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.

1. Install keyways, reglets, recesses, and the like, for easy removal.
2. Do not use rust-stained steel form-facing material.

F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

H. Chamfer exterior corners and edges of permanently exposed concrete.

I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."
2. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
3. Install dovetail anchor slots in concrete structures as indicated.

3.3 REMOVING AND REUSING FORMS

A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations and curing and protection operations need to be maintained.

1. Leave formwork for beam soffits, joists, slabs, and other structural elements that supports weight of concrete in place until concrete has achieved its 28-day design compressive strength.
2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.

B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.

C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Engineer.

3.4 STEEL AND GLASS FIBER REINFORCED POLYMER REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.

1. Weld reinforcing bars according to AWS D1.4/D 1.4M, where indicated.

D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

3.5 WATERSTOPS

A. Flexible Waterstops: Install in construction joints and at other joints indicated to form a continuous diaphragm. Install in longest lengths practicable. Support and protect exposed waterstops during progress of the Work. Field fabricate joints in waterstops according to manufacturer's written instructions.

3.6 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Engineer.

C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
2. Maintain reinforcement in position on chairs during concrete placement.
3. Screed slab surfaces with a straightedge and strike off to correct elevations.
4. Slope surfaces uniformly to drains where required.
5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

F. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

G. Hot-Weather Placement: Comply with ACI 301 and as follows:

1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3.7 FINISHING FORMED SURFACES

A. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces exposed to public view.

B. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.8 FINISHING FLOORS AND SLABS

A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and elsewhere as indicated.

1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Engineer before application.

3.9 MISCELLANEOUS CONCRETE ITEMS

A. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates from manufacturer furnishing machines and equipment.

3.10 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.

D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.

E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

    a. Water.
    b. Continuous water-fog spray.
    c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

    a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
    b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
    c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project.

3. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.11 JOINT FILLING

A. Prepare, clean, and install joint filler according to manufacturer's written instructions.

1. Defer joint filling until concrete has aged at least one month(s). Do not fill joints until construction traffic has permanently ceased.

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.

C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.12 FIELD QUALITY CONTROL

A. Testing and Inspecting: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.

B. Inspections:

1. Steel reinforcement placement.
2. Steel reinforcement welding.
3. Headed bolts and studs.
4. Verification of use of required design mixture.
5. Concrete placement, including conveying and depositing.
6. Curing procedures and maintenance of curing temperature.
7. Verification of concrete strength before removal of shores and forms from beams and slabs.

C. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:

1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
2. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. or fraction thereof of each concrete mixture placed each day.

a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

3. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
4. Air Content: ASTM C 231, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
5. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
6. Unit Weight: ASTM C 138, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
7. Compression Test Specimens: ASTM C 31/C 31M.

    a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
    b. Cast and field cure two sets of two standard cylinder specimens for each composite sample.

8. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.

    a. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.
    b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.

9. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
10. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
11. Test results shall be reported in writing to Engineer, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
12. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Engineer but will not be used as sole basis for approval or rejection of concrete.
13. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Engineer. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Engineer.
14. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

15. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

END OF SECTION 033000

INDIANOLA MUNICIPAL UTILITIES
EAST IOWA CIRCUIT SWITCHER REPLACEMENT PROJECT - INSTALLATION

SECTION 337210 –SUBSTATION STRUCTURAL STEEL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes methods and materials for substation steel structures.

1.3 QUALITY ASSURANCE

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

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

C. Welders shall be experienced and certified in the methods for welding structural steel. Welder shall be certified by passing the tests described by the American Welding Society (AWS). Welders shall have been tested within the past twelve months. Submit one copy of the welder's qualification records to Engineer.

PART 2 - PRODUCTS

2.1 STEEL STRUCTURES

A. Steel structures will be furnished by Contractor.

B. Structure details provided on drawing E1091-S500.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Steel structures shall be assembled in accordance with manufacturer's detail and erection drawings with bolts, washers, and nuts furnished by the fabricator. Structure details provided on drawing E1091-S500.

B. Steel structures shall not be installed on concrete foundations until the following conditions are met.

1. Structure without overhead conductor attachments: Foundations at 70% of 28 day strength.
2. Structure with overhead conductor attachments (dead ends and shield masts): Foundations at 70% of 28 day strength for setting of structures and 100% of 28 day strength before attachment of conductors.

C. Slings or other equipment used for picking up members or portions of structures shall be of such material or protected in such a way as not to cut into corners or edges of the members, damage the finish, or distort or overstress members when heavy lifts are made. Members or portions of structures shall be raised in such a manner that no dragging on the ground or against portions of structures already erected will occur.

D. When portions of structures are being ground assembled, such assembly shall be on surfaces or blocking which will provide support to prevent distortion or damage to structure steel. All bolts shall be installed in all connections of ground assembled portions of the structures before erection.

E. Mud, dirt, oil, and other foreign matter shall be removed from the members before erection, with special attention given to cleaning the contact surfaces at joints before bolting up bolts and nuts.

F. Switch and bus support stands shall be erected perfectly plumb. All other structures, including all vertical members thereof, shall be erected plumb within a tolerance of 1/8 inch in 10 feet. Horizontal members shall be level. Extreme care shall be taken to establish and maintain the true geometric shape of each portion of structure assembled.

G. Repairs:

1. Pieces bent in handling may be used if they can be straightened without structurally damaging the metal. If bent pieces cannot be repaired to the satisfaction of Engineer, they shall be replaced. Steel which Contractor has damaged shall be repaired or replaced at Contractor's expense.
2. This shall include minor deficiencies in fabrication, shipping and handling damage, and areas or field drilling or modifications. Small areas shall be repaired with zinc-rich paint which when dry shall have a minimum of 94% zinc dust by weight. When directed by the Engineer, larger areas shall be repaired with zinc-rich solders using the method recommended by the manufacturer. For further details see ASTM A70-80 Standard Practice for Repair of Damaged Hot-dip Galvanizing Coatings.
3. If blind or partially blind holes are encountered after members have been properly assembled and erected by approved methods, Owner shall be notified, and redrilling or other corrections shall be undertaken under his direction.
4. Contractor shall notify Engineer of shop errors and damaged steel. Engineer will decide the manner in which corrections shall be made. Shop errors and damaged steel shall be corrected as determined by Engineer.

3.2 BOLTS

A. Wedge washers, lock washers, and space washers shall be used as specified on the steel erection drawings washers, and nuts furnished by the fabricator.

B. The correct length of bolts shall be used for all connections in accordance with the bolt assembly lists furnished on the drawings. Bolts shall be normally installed so that the nuts are on the inside or on the top of the structure members. Only wrenches of proper size which will not deform the nuts or damage the surface finish are to be used. Torque wrenches shall be used to tighten bolts. These wrenches shall be calibrated so as not to exceed the torque limits recommended by the steel supplier.

C. After bolt tightening is completed on an erected structure, Engineer will make spot-checks on bolts. Contractor shall provide the calibrated torque wrenches and the necessary platforms, equipment, and personnel to conduct the random checks.

END OF SECTION 337210

INDIANOLA MUNICIPAL UTILITIES
EAST IOWA CIRCUIT SWITCHER REPLACEMENT PROJECT - INSTALLATION

SECTION 337226 –SUBSTATION BUS AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes methods and materials for the follow:
   1. Rigid and wire bus.
   2. Disconnect switches.
   3. Insulators.
   4. Equipment identification.

1.3 QUALITY ASSURANCE

A. Welders shall be experienced and certified in the methods for welding structural steel. Welder shall be certified by passing the tests described by the American Welding Society (AWS). Welders shall have been tested within the past twelve months. Submit one copy of the welder's qualification records to Engineer.

PART 2 - PRODUCTS

2.1 MATERIALS

A. The following items will be furnished by the Owner or others. Furnish the following:

   1. Disconnect Switches

B. Contractor will furnish the following:

   1. ACSR wire
   2. Insulators
   3. Surge arresters.
   4. Connectors for tubing and wire connections.

C. Equipment Identification

   1. Furnish equipment identification numbers as indicated on the drawings.

2. Furnish all hardware including beam grips, pipe clamps for installation of the identification numbers. Mounting hardware shall be stainless steel or aluminum.

PART 3 - EXECUTION

3.1 RIGID BUS AND WIRE JUMPERS

A. Rigid Bus:

1. Contractor shall unpack, clean, and check for damage all aluminum bus tubing immediately upon receipt of material. Contractor shall remove all packaging materials which might damage the bus finish and store the bus in a manner that the finish will be protected. Contractor shall inform Engineer if there is any damage to the bus when it is received. Contractor will be responsible for cost of replacing any bus which is damaged after it is received.
2. The aluminum bus will usually be furnished in several lengths to accommodate assembly and erection operations and allow a minimum of cutting and jointing. Contractor shall plan his work to best facilitate the lengths of bus that are available, making every effort to minimize cutting and splicing of the bus.
3. Tubular bus bends shall be made using a hydraulic bender and shall be free of kinks or surface damage. Tubular bus bends shall be made with an inside radii of 5 to 7 times the nominal pipe size unless the drawings specify otherwise.
4. All bus tubing shall be carefully handled and erected to provide a bus system without dents, abrasions, discolorations or structural or surface damage. The completed bus installation shall be completely smooth to the touch.
5. Horizontal aluminum tubular buswork shall have ACSR or all aluminum cable installed inside them for the full length of the bus for vibration dampening. Dampening cable shall be installed in buses for lengths greater than 10'-0". Damping cable sizes to be used are shown on the drawings.
6. One-fourth (1/4)-inch drain holes shall be drilled in all bus risers, bends, A-frames, and horizontal runs at the lowest practical point to drain moisture accumulation. All holes shall be reamed to remove sharp edges.
7. End caps shall be installed in all open ends of tubing.
8. Splices shall be used only where shown on the drawings or as approved by Engineer.

B. Wire Cables:

1. Copper, all aluminum, and ACSR buswork and jumpers are to be installed as shown on the drawings.
2. Jumpers and buses shall be smoothly formed and adjacent runs shall be similarly and symmetrically shaped to provide a uniform and pleasing appearance throughout.
3. Stranded conductor shall be installed without twists or kinks and shall be handled to avoid abrasions or other damage.
4. No splices shall be allowed in jumpers of overhead stain buses.
5. All strain busses and incoming line conductors shall be sagged in accordance with the values supplied.

C. Bolted Connectors:

1. Connectors shall be installed in accordance with the manufacturer's instructions.
2. Torque wrenches shall be used to tighten all bolted current carrying joints. Wrenches shall be calibrated so as not to exceed the torque limits of the bolts as established by the fitting manufacturers. Bolts shall be tightened simultaneously throughout each connection, being careful to avoid ovaling or flattening of the tubing or wire conductor by overtightening.

D. Compression Connectors:

1. Connectors shall be installed in accordance with the manufacturer's instructions.
2. Install compression fittings with tools and dies recommended by the manufacture.
3. Electrical filler compound shall be used inside each barrel prior to being compressed. Compression fittings shall be pressed so that they are straight when installed.

E. Welded Connectors:

1. Connectors shall be installed in accordance with the manufacturer's instructions
2. All welds shall be performed by a welder qualified per AWS B-3.0 or AAQQW-25.
3. Welding process shall utilize either the Tungsten Inert-Gas arc process (TIG) or Metal Inert-Gas process (MIG) for all aluminum welding.
4. All welding shall be done in strict conformance with the latest edition of the American Welding society and the Aluminum Association.
5. The shielding gas use for aluminum welding shall be commercially prepared and shall be certified as being welding grade and purity. The gas shall be one of one hundred percent (100%) argon or a mixture of seventy-five percent (75%) helium and twenty-five percent (25%) argon for MIG and one hundred percent (100%) argon for TIG.
6. Type ER4043 filler metal shall be used for all aluminum welding, except for those isolated cases where the base material is other than type 356, 6061 or 6063 normally used in the electrical power industry. Only the highest quality filler material shall be used. Filler material shall be stored in a dry, warm, uniform temperature storage area. The original carton shall not be opened until the filler material is actually needed for welding.
7. Filler rod for the TIG process shall be kept in a container that is kept closed except during rod removal.
8. Filler metal wire for the MIG process shall be uniform in diameter, of a suitable temper, free form slivers, scratches, inclusions; kinks, waves, or sharp bends, and spooled so that it is free to unwind without restrictions. Proper pitch and cast shall also be maintained to prevent wandering of the wire as it emerges from the electrode gun. Wire left on the machine overnight shall be sealed to prevent contamination. Wire left on the machine that is not scheduled for use in less than twenty-four (24) hours shall be returned to its original carton and tightly sealed.
9. All surfaces to be welded shall be thoroughly cleaned to remove all moisture, grease, oil, grit, and other foreign martial prior to welding. Cleaning shall be performed as close to the actual welding time as possible while still allowing sufficient time for complete drying of cleaning solvents. Surface shall then be wiped just prior to welding with a clean cloth, dry cloth to remove solvent scum and any moisture that may be present.
10. The edges of the material to be welded together shall be prepared in conformance with the data tables and joint design drawings of the Welding Handbook RP69 of the American Welding Society.
11. If deemed necessary, the Owner swill select welds which shall be radiographically tested by a certified approved testing laboratory. The results, comments, and recommendations shall be sent to the Owner. All testing costs shall be borne by the Contractor.

F. Bolted Connections:

1. For aluminum to aluminum and aluminum to plated bronze connections coat contact surfaces with a liberal coat of Electrical Joint Compound (Burndy Pentrox A or approved equal). Vigorously clean all aluminum contact surfaces with a stiff stainless steel wire brush to remove oxides. Do not wire brush plated contact surfaces. Install bolting hardware finger tight.
2. For aluminum to bare bronze connections coat contact surfaces with a liberal coat of Electrical Joint Compound. Vigorously clean all contact surfaces with a stiff stainless steel wire brush to remove oxides. Install a bronze to aluminum bi-metallic transition plate between the surfaces. Install bolting hardware finger tight.
3. For bare bronze to bare bronze connections vigorously clean all contact surfaces with a stiff stainless steel wire brush to remove oxides.
4. Stainless steel hardware shall be installed for all aluminum to aluminum and aluminum to bronze connections. Bolted connections shall be made with the proper size and length hex head bolts, flat washer, lock washers, Belleville washers, and nuts as shown on the drawings. Stainless steel hardware shall be type 316.
5. Silicon bronze hardware shall be installed for all bronze to bronze connections. Bronze hardware shall be high strength silicon bronze.
6. Torque wrenches shall be used to tighten all bolted current carrying joints. Alternately (criss-cross) and evenly tighten bolts to proper torque. Only wrenches of proper size which will not deform the nuts, or damage the surface finish are to be used. These wrenches shall be calibrated to provide the torques indicated on the drawings. Bolts shall not extend beyond the nut more than one-half (1/2) bolt diameter.
7. After the bus installation is completed, Engineer may make spot-checks on bolts. Contractor shall provide the calibrated torque wrenches and the necessary platforms, equipment, and personnel to conduct the random checks. Contractor will be required to tighten bolts found not to be tight, and in case the number so found is 5 percent or greater of the total bolts checked, Contractor will be required to go over the entire bus system and check or tighten all bolts.

3.2 DISCONNECT SWITCHES

A. Contractor shall uncrate, assemble, install and adjust all group operated switches and operating mechanisms in accordance with the manufacturer's instructions.

B. Whenever possible, the switch poles are to be assembled on the ground and installed as a complete pole unit. Preliminary adjustments are to be made on the ground. Final adjustments shall be made after the pole units have been installed in their final location and after the buswork has been connected to the switch terminals.

C. Group operated switches shall be installed such that the blades open and close simultaneously. Switches will be operated and adjusted until approved by the Owner.

D. Switch operating handles and operating platforms shall be arranged and aligned to ensure proper switching from the platform.

E. Install mechanical interlocks, electrical interlocks, or key interlocks as rewired by the drawings

F. All switch operating mechanisms are to be assembled and installed as shown on the operating mechanism assembly drawings and as described in the manufacturer's instructions. The interphase bar between the pole units is to be installed and adjusted accurately. Any set screws and pins shall not be set until the final adjustment of the switch has been completed and approved by Owner.

G. Install switch position auxiliary switches as required by the drawings.

3.3 INSULATORS

A. Insulators shall be cleaned of oil, dirt, paper, tape, or other foreign materials. Any insulator having its surface glaze damaged in any way shall not be installed.

B. Install all miscellaneous hardware including bus support fittings, bolts, nuts, lock washers, shackles, etc.

3.4 EQUIPMENT IDENTIFICATION

A. Install equipment identification numbers. Location of the number shall not affect operation of the equipment.

B. Identification numbers for switches, instrument transformers, and phase designations shall be mounted directly to the steel structures.

C. Identification numbers for power transformers, circuit breakers, and other large devices shall be installed on the control cabinet door.

D. Engineer will provide a list of devices and the identification numbers. Engineer will designate location of identification numbers for special devices.

END OF SECTION 337226

INDIANOLA MUNICIPAL UTILITIES
EAST IOWA CIRCUIT SWITCHER REPLACEMENT PROJECT - INSTALLATION

SECTION 337233.13 – SUBSTATION RELAYS & CONTROLS

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.

B. Section 33 Substation Control Wiring.

1.2 SUMMARY

A. This Section includes the following:
1. Relays and control devices
2. Communication devices.
3. Special cables.
4. Accessories.

1.3 DEFINITIONS

A.

ANSI	American National Standards Institute
ASTM	American Society for the Testing of Materials
IEEE	Institute of Electrical and Electronics Engineers
NEMA	National Electric Manufacturers Association
NFPA	National Fire Protection Association
UL	Underwriters Laboratories

1.4 SUBMITTALS

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

PART 2 - PRODUCTS

2.1 RELAYS AND DEVICES

A. No relays are scheduled for replacement.

2.2 ACCESSORIES

A. Fuses Holder & Fuses: Provide manufacturer's slugs for neutral pole of heater AC supply as shown on drawings. Fuses are expected to be Mersen type OT (Class K5).

B. Branch Circuit Breakers: AC and DC supply to circuit breakers will be supplied by branch breakers is existing panelboards. Existing branch circuit breakers are expected to be suitable for reuse. If circuit breakers are not suitable for reuse, replace with manufacturer, model number, and ratings shall be as indicated on the drawings.

C. Terminal Blocks: Supply GE EB25B12 12 pole terminal blocks in locations shown on drawings.

D. Device Labels: Device labels shall be adhesive labels and have 3/8" (minimum) black lettering on a white background.

E. Required wiring accessories: Furnish accessories such as cleats, mounting straps, wire ties, insulated ring lugs and mounting hardware as required.

2.3 INSTRUCTION MANUALS

A. All equipment instruction literature shall be bound in a heavy duty "D" ring binder. Additional binders, numbered consecutively, may be used if required. The front of each binder shall be labeled with the Owner, Contractor, and Project name. Each binder shall include a Table of Contents.

PART 3 - EXECUTION

3.1 GENERAL

A. All work performed on the relay panels shall be performed by personnel experienced in working with energized utility style relay and control panels.

B. The existing relay panels shall remain energized as much as possible subject to Contractor work procedures. When modifying the existing relay panels, Contractor shall take all necessary precautions to prevent inadvertent operation of relays or controls.

C. All work performed on the relay panels shall be performed by personnel experienced in working with energized utility-style relay and control panels. Experience in utility transmission and distribution substations is required. Personnel must be fully capable of reading, interpreting, and completing wiring in accordance with prepared wiring diagrams.

3.2 NEW PANELS

A. Mount panels as indicated on the drawings.

B. Properly secure each panel to the building structure and to adjacent panels.

C. Ground all panels.

3.3 EXISTING PANELS

A. The existing relay panels shall remain energized as much as possible subject to Contractor work procedures. When modifying the existing relay panels, Contractor shall take all necessary precautions to prevent inadvertent operation of relays or controls

B. All panel cuts and scratches shall be touched up with paint to match the existing panel finish.

C. Blank Covers: Install blank cover plates over openings for future devices or removed.

D. New devices shall be mounted parallel and perpendicular to existing devices

E. All panel cuts and scratches shall be touched up with paint to match the existing panel finish.

F. Contractor shall be responsible for maintaining an as-constructed set of drawings which will be provided to the Engineer at the completion of the project.

G. At locations described on the drawings, Contractor shall install blank cover plates over openings that result from removal of some devices. Coverplates shall be constructed from 11-gauge steel and painted to match the existing panels.

H. Required wiring accessories: Furnish accessories such as cleats, mounting straps, wire ties, insulated ring lugs and mounting hardware as required.

3.4 WIRING

A. All wiring shall be 600 volt, crosslink polyethylene insulated, Type SIS, No. 12 (65 strand) switchboard wire.

B. All wiring to Electroswitch rotary switches and lockout relays shall be spirally bundled around the switch to allow the switch to be “rolled” out of the panel for future wiring changes.

C. All wires shall be kept as short as practical with no excess wire coiled up or looped in the wire ducts. All wiring shall be neatly and carefully installed by workmen skilled in such installation.

D. Cables and wires shall be installed and terminated in accordance with Substation Control Wiring Requirements as noted on the drawings.

E. All wires shall be kept as short as practical with no excess wire coiled up or looped in the wire ducts. All wiring shall be neatly and carefully installed by workmen skilled in such installation.

F. Wires shall be terminated with insulated ring type insulated lugs, securely crimped. Ring lug terminals shall be Thomas & Betts or Burndy. NOTE: <u>No slotted terminal connectors shall be used. Use of non-approved lugs may result in rejection of work and complete retermination of all wiring</u>

G. Sufficient care shall be exercised in the use of crimp-on terminal connectors to insure that each wire is firmly attached to the connector and that proper wire strip length, as determined by the

lug manufacturer, is followed. Conductor insulation shall be squarely and evenly cut and shall be continuous with the connector barrel.

H. Only controlled-cycle compression tools supplied by the manufacturer of the ring lug being used are acceptable. Use of compression tools not supplied by the ring lug manufacturer may result in rejection of work and complete retermination of all wiring

I. Install special cables as required.

J. All wiring or cables that are disconnected shall be completely removed from wireways and wire looms. Disconnected wiring shall not be left in the relay panels.

K. If large wire sizes require use of non-insulated lugs, cover lug barrel with 600V heat shrink tubing.

3.5 ACCESSORIES

A. Device Nameplates: Assure a clean surface exists prior to adhering nameplates. Nameplates to be installed level.

B. Device Labels: A device location label used to locate each device with respect to the point-to-point wiring diagrams shall be installed next to each device inside the panel. These adhesive labels shall have 3/8” black letters on a ¾” x 1” white background.

C. Wiring ducts shall be used as much as possible for all wire bundles. These plastic ducts shall be securely fastened to the panel and shall be completely independent of the relay cases and other equipment mounted on the panel.

D. Required wiring accessories such as cleats, mounting straps, terminal connectors, fuse blocks, terminal boards, cartridge fuses of the ratings shown and the like, shall be provided by the Contractor.

END OF SECTION 337233.13

INDIANOLA MUNICIPAL UTILITIES
EAST IOWA CIRCUIT SWITCHER REPLACEMENT PROJECT - INSTALLATION

SECTION 337233.19 – SUBSTATION TESTING & COMMISSIONING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Section 337243 Substation Control Wiring.

1.2 SUMMARY

A. This Section includes the following: Testing and commissioning of substation equipment, auxiliary equipment, relays, circuits, and controls, etc.

B. Equipment and systems to be tested include the following:

1. Perform acceptance tests on new circuit breakers CK601 and CK602 including auxiliary systems, CTs, etc.
2. CK601 trip and close circuits including wiring and functional tests.
3. CK230 trip and close circuits including wiring and functional tests.
4. CK602 trip and close circuits including wiring and functional tests.
5. CK240 trip and close circuits including wiring and functional tests.
6. Functional testing of all modified circuits.
7. All circuits that will be modified must be traced prior to beginning work. All discrepancies between existing wiring and drawings must be resolved with Engineer prior to proceeding with modifications.
8. Confirm phasing against measurements taken on the existing system prior to reenergizing transformers.
9. Test newly installed equipment ground leads.

C. The following tests will be performed by Others:
1. Modifications to Owner’s SCADA master station.

1.3 STANDARDS

A. Testing shall adhere to the requirements and recommendations contained in the following standards:

1. American National Standards Institute (ANSI):
   - C12.1 Code for Electricity Metering
   - C12.11 Instrument Transformers for Revenue Metering, 10 kV BIL through 350 kV BIL.
   - C12.13 Electronic Time-of-Use Registers for Electricity Meters.
   - C12.15 Electricity Metering - Solid-State Demand Registers for Electromechanical Watthour Meters

C12.16 Solid-State Electricity Meters.
C63.2 Electromagnetic Noise and Field-Strength Instrumentation, 10kHz to 40GHz.

2. American Society for Testing and Materials (ASTM):
   D877 Test Method for Dielectric Breakdown Voltage of Insulating Liquids Using Disk Electrodes.
   D1816 Test Method for Dielectric Breakdown Voltage of Insulating Oils of Petroleum Origin Using VDE Electrodes.
3. Institute of Electrical and Electronics Engineers (IEEE):
   C2 National Electrical Safety Code.
   C37.20.1 Metal-Enclosed Low-Voltage Power Circuit Breaker Switchgear.
   C37.20.2 Metal-Clad and Station-Type Cubicle Switchgear.
   C37.20.3 Metal-Enclosed Interrupter Switchgear.
   C57.13 Requirements for Instrument Transformers.
   C57.13.1 Guide for Field Testing of Relaying Current Transformers.
   C57.13.2 Conformance Test Procedures for Instrument Transformers.
   C57.13.3 Guide for Grounding of Instrument Transformer Secondary Circuits and Cases.
   450 Maintenance, Testing, and Replacement of Large Lead Storage Batteries for Generating Stations and Substations
4. National Fire Protection Association (NFPA)
   70 National Electrical Code.
5. National Electrical Manufacturers Association (NEMA) and Insulated Cable Engineers Association (ICEA):
   WC 3/ICEA S-19-81 Rubber-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.
   WC 5/ICEA S-61-402 Thermoplastic-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.
   WC 7/ICEA S-66-524 Cross-Linked-Thermosetting-Polyethylene-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.
   WC 8/ICEA S-68-516 Ethylene-Propylene-Rubber-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.
7. InterNational Electrical Testing Association (NETA)
   ATS-2017 Standard for Acceptance Testing Specifications for Electrical Power Equipment and Systems
8. North American Electric Reliability Council (NERC)
   PRC-005 Transmission and Generation Protection System Maintenance and Testing
   PRC-008 Underfrequency Load Shedding Equipment Maintenance Programs
   PRC-011 UVLS System Maintenance and Testing
   PRC-017 Special Protection System Maintenance and Testing

1.4 TESTING SUBCONTRACTOR

A. Testing shall be performed by a subcontractor routinely engaged in the setting and testing of utility grade power system equipment, relays, protection schemes, and associated devices.

B. Detailed information concerning the proposed testing subcontractor’s experience shall be provided. Documentation of subcontractor’s experience shall include, at minimum, a list of

substation relay and control projects completed during the last year; detailed description of experience with electromechanical and Basler Electric Company devices; a listing of the subcontractor's testing equipment; names and resumes of personnel who will be assigned to the project; and utility references including names and phone numbers for the specific personnel and the subcontractor in general.

C. Scott Steinmetz of Steinmetz Corporation has significant recent experience in the East Iowa Substation and is Owner's preferred testing contractor. Steinmetz Corporation's phone number is available upon request from Engineer. Proposed testing contractor must be submitted with the bid. Alternate testing contractors must be approved prior to beginning work.

1.5 PERSONNEL

A. The lead testing technician shall have a minimum of 10 years experience testing utility protection and control equipment. Experience shall include a minimum of 5 years being in responsible charge of testing programs for substations of similar size and nature as this project and shall include the testing and commissioning of substations with similar types of relays and control schemes. Experience shall include a complete scope of testing such as is specified in these specifications. Lead testing technicians shall be certified in accordance with ANSI/NETA ETT-2000 and shall have a current Level III or higher certification.

B. Additional testing technicians shall have a minimum of 5 years testing experience in utility testing. Experience shall include the testing and commissioning of substations with similar types of relays and control schemes and shall include a complete scope of testing such as is specified in these specifications. Testing technicians shall be certified in accordance with ANSI/NETA ETT-2000.

C. Resumes of lead testing technician and all additional testing technicians that will be assigned to the project shall be provided to Owner at least 30 days prior to commencement of testing. Testing contractor shall replace any testing personnel that Owner does not deem qualified at any time before or during the testing process. Owner reserves absolute right to determine the necessity of such replacement.

1.6 TEST EQUIPMENT

A. Test equipment listed below is the minimum required to perform the testing and checkout of the relay and control systems. Test technicians must be familiar with the use of this equipment and have a thorough understanding of the devices that are being tested.

B. All test equipment shall have been tested, calibrated, and certified by the equipment manufacturer within 12 months prior to performing the tests. Copies of all certificates shall be provided to Owner prior to testing.

C. Relay Test Set
1. Voltage Source: Device(s) capable of supplying three independent voltage sources (1-250V) that are accurately variable both in magnitude and phase angle.
2. Current Source: Device(s) capable of supplying three independent current sources (0-25A) that are accurately variable both in magnitude and phase angle.

3. Frequency source: Device that is capable of supplying two voltage sources (0-150V) with one of the sources capable of supplying accurately variable frequency. Frequency shall be variable from 55-65 Hz minimum with at least 0.1 degree resolution.
4. Digital Timer: Device capable of timing contact or DC voltage transitions integral with the operation of the voltage and current sources. Timer resolution must be 0.0001 second or better.
5. The accuracy of all sources shall be equal to or better than the following:
   a. Magnitude: ± 0.5%
   b. Phase Angle: ± 0.5 degrees
   c. Frequency: ± 0.01%
   d. Time Measurement: ± 0.0001 sec
   e. The distortion of the sine wave sources must be less than 2 percent.
6. Acceptable Devices:
   a. Three (3) Doble F2350 series units
   b. One (1) Doble F6000 series unit
   c. AVO – Pulsar System with appropriate modules
   d. Powertec – DFR
   e. Omicron – CMC 156

D. Transducer & Meter Calibrator
1. Acceptable Devices:
   a. Scientific Columbus Model 6444 Transducer Calibrator
   b. Powertec TTS Calpro
   c. Combination System consisting of either Relay Test Set from above list with Arbiter Systems Model 931A Power System Analyzer (in RMS mode) connected between test set and transducer or meter or Relay Test Set from above list using external AC (True RMS) and DC voltmeters and current meters from acceptable meter list. Sufficient quantity of meters must be used to simultaneously monitor input voltage, current, and output current (if applicable).
2. All devices must have at least 0.2% accuracy

E. Voltmeter and Ammeter; Multimeters used during the calibration of meters, transducers and relays must be high accuracy digital meters that meet the following specifications:
1. 4 ½ digit or better resolution
2. True RMS AC measurement
3. Basic DC Accuracy: 0.05% of scale used
4. Basic AC Accuracy: 0.2% of scale used

F. Phase Angle Meter
1. An analog or digital phase angle meter shall be utilized during testing of the auto synchronizing system or sync check functions.
2. Digital or analog phase angle meters are acceptable for recording voltage and current load and phase angle values. Clamp-on phase angle meters are not acceptable.

G. CT Test Equipment: A device specifically designed to test CTs shall be used. Approved devices include:
1. AVO Current Transformer Excitation Test set, Model CTER-
2. Appropriate Vanguard Instruments CT Excitation Test Set device

H. Test Jack Devices: Where ABB FT-1 and FT-19R test switches are used, disconnection of internal wiring is discouraged and is to be performed only when absolutely necessary. To this end, it will be necessary to have sufficient quantities of the appropriate ABB test jacks to enable use of the test switches.

I. Computer Terminal and Printer: A computer terminal and associated communications cables for communicating with the various relays is required. Special software to communicate with a) test equipment, b) substation integration devices, and/or intelligent equipment devices (i.e. relays, panel meters, transformer tap controllers, etc) will NOT be provided by Owner however Owner is expecting the special software to be used.

J. Megohmmeter: A 2500-volt megohmmeter is required to test insulation. The meter shall have minimum accuracy of 5%.

K. Infrared Scanning Equipment: Infrared scanning equipment shall provide a hard copy to record the thermal image, temperature of the object, ambient temperature, degrees temperature rise above ambient, and date of the recording. Manufacturer’s information on the scanning equipment shall be submitted for review.

L. Phase Rotation Meter

M. AC High Potential Unit
1. An AC high potential test set with an available test voltage of at least 36kV AC is required to test the vacuum interrupters in the vacuum circuit breakers.
2. Acceptable devices
   a. Hipotronics Model 860P
   b. Hipotronics Model 880PL
   c. Hipotronics Model 7BT 60
   d. AVO - Biddle Catalog 222060

N. Low Resistance Test Unit (Ductor)
1. AVO

O. High AC Current (Primary Injection) Test Set with minimum continuous current output capacity of 100 amps
1. SMC Raptor MS

1.7 SCHEDULE

A. Lead testing technician shall provide a testing program and schedule to indicate the sequence of the work and the time period during which it will be completed. The program/schedule shall be updated on a weekly basis. The program/schedule shall be provided to Owner on a weekly basis at a meeting scheduled mutually with Owner.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 GENERAL

A. Existing relay panels shall remain energized at all times. When testing relay panels, Contractor shall take all necessary precautions to prevent inadvertent operation of relays or controls.

B. Furnish qualified test personnel to initiate and manage the test program for this project. Provide qualified test technicians as necessary to perform all testing required under these specifications.

C. Furnish all test equipment as specified or required to properly perform each specified or required test to completely verify the proper operation of all equipment and systems.

3.2 REQUIRED TESTING AND COMMISSIONING SERVICES

A. Testing is to be as complete and as extensive as necessary to assure the proper operation of all equipment and protective systems for all equipment within the substation and for all equipment extending from the substation.

B. Subcontractor shall provide a written test plan for the testing to be completed for this project. The plan shall be inclusive, indicating the tests that are to be completed, the equipment that will be tested, and the schemes that will be tested. The plan shall also include the interconnecting parties that require coordination for tests such as those required for the transmission lines. The test plan shall incorporate a schedule that indicates when item-specific testing will be performed. Owner may assign representatives to witness testing based upon this schedule. Contractor may be required to repeat testing in the presence of Owner’s representative should performance of testing vary from the schedule without advance notice to Owner.

C. Test and set all of the relays according to settings provided by Engineer.

D. Function test all circuits installed for this project using primary or secondary current and voltage injection. Current and voltage values used to activate relays shall be based on values necessary to confirm the differing modes of operation for each relay, such as zone 1, zone 2, zone 3, overcurrent conditions, overvoltage conditions, undervoltage conditions, underfrequency conditions, and etc. This will include all AC potential and current circuits and all control circuits. This testing will be done in conjunction with the testing and checkout by Owner on the SCADA system. These values will be used to confirm the data connections to the communications processors, ethernet switch, SCADA RTU, and Control Center.

E. Provide contact status change or signal inputs to RTU equipment to confirm proper operation of the equipment.

F. Simulate in-service fault operation using current and voltage injection tests to trip protective equipment for all of the protective schemes.

G. Perform all initial pre-energization tests or checks to confirm the readiness of equipment to be energized.

H. Perform all load tests, checks or verification procedures to confirm the proper connection and operation of circuits, relays, protection schemes, etc. being placed in service. This includes satellite-controlled synchronous end-to-end tests on all transmission lines that utilize piloted protection schemes.

I. Confirm the proper operation of all circuits installed or revised for the project. This will include using a set of substation control drawings and checking the proper operation of each contact opening/closure, switch opening/closure, operation of each coil, relay, etc. that is connected into the circuits. Each device confirmed for proper operation shall be “yellow lined” to indicate the device has been checked and found operating properly. If necessary, incidental corrections shall be coordinated with the Engineer, implemented, placed into service, and functionally tested. For the purpose of the contract, the testing contractor shall include a minimum of 200 conductor termination relocations and the addition of 200 wire jumpers, complete with terminations.

J. Provide thermal infrared scans of power equipment, bus, control equipment, auxiliary equipment, etc under the maximum load conditions possible.

3.3 REQUIRED RELAY AND RELATED DEVICES TESTS

A. Tests covered by this specification shall include but not be limited to the following:

B. Megger Tests:
1. Megger all power equipment for 1 minute at 2500V.
2. Do not megger any protective relays, communication processors, lighted nameplates, or other equipment that contains electronic components.

C. Current Transformer Tests (new breaker CTs only):
1. Verify nameplate data with drawings and specifications.
2. Verify grounding.
3. Verify correct connections with system requirements.
4. Verify bolted electrical connections with low resistance ohmmeter or calibrated torque wrench.
5. Visually check polarity mark orientation on all CTs with the contract drawings and manufacturer's drawings.
6. Perform CT polarity test per IEEE C57.13.1 or as follows:
    a. Insert a milliammeter by test plug or jumpers to check that proper circuit continuity and polarity is present in each instrument, relay, switch, auxiliary equipment, etc., that should be connected to the CT being tested; repeat for every CT.
    b. Attach the "negative" lead of a 12-volt automotive battery to the unmarked terminal of the CT primary.
    c. Momentarily touch the "plus" lead of the battery to marked CT primary lead then release the battery positive lead. The milliammeter will read up scale to indicate the correct continuity and polarity.
    d. When testing power transformer CTs, avoid touching the battery, battery leads, and transformer terminals during the test.

7. Ratio CTs at all taps using the voltage or current method per IEEE C57.13.1.
8. Perform megger test on CT primary winding with CT secondary grounded.
9. Perform demagnetization and excitation tests on CTs in accordance with ANSI C57.13 as the final test on each CT.
10. Power factor tests.
11. Verify that all CT secondary circuits are grounded at one and only one point as shown on drawings.
12. All CTs are to remain shorted until it is determined in the course of the testing procedure the CT is properly loaded.

D. Sudden Pressure Relay:
1. Pressure test the relay in accordance with the manufacturer's instructions to verify proper operation of device and electrical contacts.
2. Megger contact to case.

E. Alarm Sensor Testing:
1. Megger all leads of device to case. (Consult instruction book for voltage level to be used to assure no damage across open contacts.
2. Induce the device to operate with proper input medium (heat, cooling, pressure, vacuum, voltage, current, etc.) and verify operation of the device at the correct input medium level by monitoring the output contacts with an ohmmeter.

F. Annunciator Testing:
1. Check each unit of annunciators by closing or opening the trouble contact and observing operation of control board.
2. Check all annunciator lamps, bell cutoff, and reset operation.

G. Relay Switchboards:
1. Visually inspect all equipment, wiring, etc.
2. Verify grounding.
3. Instrument transformer tests.
4. Alarm sensor testing.
5. Annunciator testing.
6. Molded-case circuit breaker trip testing.
7. Relay testing
8. Control and instrument switch testing.
9. Instrument calibration.
10. Verify correctness/completeness of engraved nameplates.

H. Communications Processors:
1. Verify cabling between communications processors, SEL relays, and other devices.
2. Install settings and functionally test communications processors.
3. Adjust analog point scaling as required to provide correct analog quantities to SCADA systems.
4. Verify grounding.

I. Instrument Calibration:
1. Verify nameplate data.
2. Visually inspect for damage.

J. Protection and control scheme wire checks:

1. Testing shall include a thorough review of the schematic diagrams and checking each element to verify that it is functioning properly within the scheme. The drawing elements are to be yellow-lined when it is determined that part of the circuit is operating correctly. The circuits to be included for the review include:
2. Current transformer circuits
3. Potential transformer circuits
4. Control circuits
5. Auxiliary power circuits
6. Include all circuits to the yard equipment

K. Functional Tests:
1. Functional tests shall include a complete simulation of operation of the protection and control schemes by injecting current and voltage signals into the secondary or primary circuits to confirm proper operation of the circuits and controlled equipment. This testing is to be concluded prior to energization of any equipment associated with the protection and control scheme. This testing shall include the following:
   a. Inject current and voltages into the secondary circuits to the relays, meters, and monitoring devices. Primary current injection may be used in lieu of secondary current injection.
   b. Measure voltage, current, and phase angles into or out of all equipment on the circuit.
   c. Increase values to actuate pickup of the relays for the different relay settings to demonstrate proper operation of the relays and the control circuits.

2. Perform the trip tests for the differing substation configurations that the station may experience during switching or operating conditions. All functions, including, but not limited to, pilot trip, non-pilot trip, reclosing, and breaker failure schemes with direct transfer trip shall be demonstrated.
3. Record all tests on forms provided by the tester.

3.4 EQUIPMENT TESTS

A. High Voltage Circuit Breaker Tests:
1. Verify nameplate data.
2. Verify grounding.
3. Inspect physical and mechanical condition.
4. Inspect operating mechanism and SF6 gas insulation system.
5. Test for SF6 leaks.
6. Verify operation of alarms and pressure switches for pneumatic, hydraulic, or SF6 gas pressure.
7. Perform mechanical operation tests on mechanism per manufacturer’s documentation
8. Verify bolted connections with low resistance ohmmeter or calibrated torque wrench.
9. Perform time travel analysis.
10. Megger tests.
11. Ductor tests.
12. Functional tests.
13. Power factor tests.
14. High potential tests (not required for SF6 breakers.)
15. Verify cubicle heater operation.
16. Instrument transformer tests.

17. Verify correct operation of electrical close, electrical trip, trip-free and antipump functions.
18. Perform minimum pickup voltage tests on close and trip coils per manufacturer's documentation.
19. Check auxiliary switch connections, contacts, and operating linkages.
20. Check proper operation of heaters, motors, compressors (air, oil, SF6 gas), gauges, valves, and accessories.
21. Check to see if compressors, motors, or pumps run excessively.
22. Motor tests.
23. Record as-found and as-left counter readings.

B. Low Voltage (< 600V) Power Circuit Breaker Tests:
1. Molded-case circuit breaker trip tests.
   a. Check for proper current rating to circuit connected.
   b. Verify proper operation of ground detector on all GFI breakers.
   c. Adjust and test pickup settings using primary current injection.

C. Supervisory Remote Terminal:
1. Contractor will test all changes to cables and wires and check terminations to the supervisory remote terminal.
2. Verify grounding.
3. Contractor will assist the owner or manufacturer's field representative in functional and operational tests of the supervisory remote terminal unit to assure correctness of control, status point, and analog metering operation.

D. Outdoor Bus
1. Compare bus arrangement and phasing cuts with drawings and specifications.
2. Check bolted connections with a low resistance ohmmeter or with a calibrated torque wrench.
3. Megger tests.
4. Verify grounding.

E. Miscellaneous Equipment Tests:
1. Test all miscellaneous equipment furnished by equipment manufacturer as recommended by manufacturer. Perform other tests recommended by the manufacturer or ANSI/NETA ATS-2009 to assure correctness of operation of equipment within the substation.

3.5 EQUIPMENT ENERGIZATION

A. Planning
1. A meeting will be held between responsible parties approximately two (2) weeks ahead of equipment outages and equipment energizations to review the work to be accomplished.
2. The schedule for the work, including the tasks to be accomplished, the time periods for the tasks, intermediate testing and check points, etc. will be reviewed.
3. During any scheduled outage, a weekly meeting, or more often as site conditions dictate, will be held to review progress, status, and site conditions that may affect the progress of the work.
4. Review phasing prior to beginning work. Measurements shall be used later after the transformers are reenergized.

B. Transformer Outages
   1. Transformer outages will not take place until all practical prior work has been completed such that the outage duration is minimized.
   2. The scheduling and release of a transformer outage will be completely at the discretion of the IMU and will not be unreasonably withheld.
   3. The installation and testing of the equipment, circuits, and schemes shall be planned and sequenced to minimize the amount of outage time required, and as much as is practicable, allow the equipment to be re-energized when not required for construction or testing.

C. Equipment energization:
   1. A coordination meeting shall be held approximately 1 day in advance of the scheduled energization.
   2. Responsibilities of Testing Technician during the pre-energization and energization tasks.
      a. Witness initial energization of equipment.
      b. Assure that the initial energization sequence is followed as determined in the initial coordination meeting.
      c. Perform all testing and checks necessary to confirm the equipment, relays, etc. are operating properly, seeing the proper voltage, currents, phase angles, or other properties as required for proper operation.
      d. Record all tests and checks on forms provided by the testing technician.
      e. Coordinate with test technicians (including test technicians with other company affiliations) at other locations remote from the substation to assure proper operation of the facilities being placed in service.
      f. Provide notification to other responsible personnel when tests have proven the equipment is operating satisfactorily and he is ready to proceed with additional energization of equipment.
   3. Testing Technician shall provide testing personnel during initial energization of each circuit breaker as may be required during the energization sequence.
      a. Perform the following insulation tests prior to energizing high voltage equipment.
      b. Megger each HV piece of equipment, bus, etc. just before energization or after construction work is completed. Megger phase to phase and phase to ground for each phase. Disconnect and reconnect transformer neutrals as necessary to isolate grounds on system for the testing.
      c. Investigate and resolve improper results of the tests before continuing with the energization.
      d. Verify phasing of the bus and incoming lines to the substation.
      e. Responsible parties shall agree that the substation is ready for energization prior to commencing the Energization sequence.
   4. Energization
      a. Perform the energization of equipment in accordance with the energization schedule previously established.
      b. Perform the necessary tests and checks including comparing phasing prior to supplying load from the reenergized transformer.
      c. Continue with the next step of the energization procedure when and only when responsible parties agree the tests and checks are complete and the equipment is operating properly.

3.6 POST ENERGIZATION TESTS AND FOLLOWUP

A. Immediately after the initial energization of new equipment, the testing technician shall complete load tests and checks to include the following:
   1. Measure currents, voltages, and phase angles at the inputs or outputs of all relays, meters, monitoring equipment, etc. Confirm the proper inputs to all equipment due to external equipment measurements.
   2. Record all measurements on forms provided by the testing technician.
   3. Confirm with responsible parties when all post-energizing testing is completed and the equipment or sub-sections thereof are ready for commercial operation.

B. Complete marks, comments to record drawings and submit to Engineer for revision of drawings.

C. Test technician shall submit final copies of all test reports to Engineer.

D. Contractor shall provide an event record, in electronic format, from each microprocessor-based relay set or reset under this project to Engineer. Event shall be generated by a trigger command to the relay. The trigger shall be initiated after final settings have been placed on the relay. Events shall be emailed to Engineer no later than 24 hours after the line terminal is commissioned and placed into service.

3.7 GROUND TESTING

A. If possible, perform ground tests prior to static wire attachment to line dead-end towers, or disconnect static jumpers for insulated static wire installations. Supplemental ground wires that extend outside the substation fence shall be disconnected before testing. Testing shall be performed before underground cable shields and concentric neutrals are connected to the ground grid. If the grounding system includes counterpoises, they shall remain connected during testing.

B. Perform the following tests on portions of the ground grid that are modified:
   1. Verify ground system is in compliance with drawings and specifications and, where applicable, the NFPA 70 National Electrical Code Article 250.
   2. Inspect physical and mechanical condition
   3. Test bolted electrical connections with low-resistance ohmmeter and investigate values greater than 50 percent higher than the lowest resistance value obtained.
   4. Verify tightness of bolted connections with calibrated torque wrench in accordance with manufacturer’s published data.
   5. Perform high-current ground grid injection tests on all new grounding leads connected to the ground grid system:
      a. Document test locations by marking up a copy of the ground grid plan. Number all test points and enter numbers on test report.
      b. Use all necessary safety precautions prior to performing this testing, especially in an energized substation. On all ground conductors, current flow is likely even when no fault exists. During fault conditions, extremely high fault current can flow through the station ground grid, resulting in extremely high voltages. Due to the long cable lengths and the possibility of high step potential, all personnel working with or in contact of the test leads must wear low-voltage rubber gloves.

c. The reference connection shall normally be the transformer neutral. In large stations, the reference connection may need to be moved. Begin a new test report for each reference connection. Describe reference connection point on test report.
d. Test leads must not be coiled at any time during testing.
e. If equipment or structures have two ground leads, lift one when possible before injecting current. Multiple leads provide multiple paths to the grid, making interpretation of results very difficult.
f. Inject a minimum of 100 amps on each new ground lead that extends above the substation surface.
g. Enter test point number, amps injected, volts measured on test form.
h. Calculate total test impedance by dividing volts by amps and enter on test report.
i. Measure tare impedance of test leads and enter on test report.
j. Subtract tare impedance from total test impedance to determine actual impedance and enter on test report.

6. Obtain point-to-point resistance measurements between the ground grid and all major new electrical equipment frames, structures, buildings, etc.
   a. Investigate all point-to-point resistance values that exceed 0.5 ohms.
   b. Record results and notify Engineer if any reading exceeds 1 ohm.

3.8 DOCUMENTATION

A. A written log shall be maintained of the testing performed noting the date, time and personnel performing the tests. Contractor shall develop and maintain test forms for each device or system tested. The form shall include all pertinent nameplate data including model and serial numbers, the date and time of the test and the person performing the tests.

B. A written log shall be maintained of the testing performed noting the date, time and personnel performing the tests. Contractor shall develop and maintain test forms for each device or system tested. The form shall include all pertinent nameplate data including model and serial numbers, the date and time of the test and the person performing the test.

C. The testing logs and test forms shall be available on-site for viewing by Owner or his representatives at all times. At the completion of the project, two copies of the testing log and the testing forms shall be delivered to Owner for his records.

D. Testing Documentation. Testing contractor shall provide test data forms and record all tests. Tests shall be recorded on the actual forms. Recording test data on backup data sheets and transposing the data at a later date is not acceptable. Completed test forms shall be signed and dated on the date they are completed. Two copies of completed test forms shall be submitted to OWNER on a weekly basis. Testing technician shall maintain two sets of full size drawings. One set shall be used to yellow line circuits/schemes indicating that the testing has been completed and schemes have been proven correct. The second set shall be used to mark any changes, revisions, etc. to the drawings. Both sets shall be submitted to the Engineer at the completion of the project.

E. Maintenance Records. Record all inspections and maintenance data for each piece of equipment. A separate form shall be used for each individual piece of equipment. Equipment ID numbers will be used to identify the equipment whenever available. Record the following information on the forms: date, time, inspected by, readings and status, conditions found, test results, and any maintenance or corrective work performed. Completed inspection and

maintenance forms shall be delivered to Owner after the completion of the Work. All forms used for inspections and maintenance shall be pre-approved, in writing, by Owner before testing can begin.

F. Maintain an as-constructed set of drawings during the construction of the Work. Deliver the as-constructed drawings to Engineer at the completion of the Work.

G. Test reports shall at minimum include the following:
1. Summary of project.
2. Description of equipment tested.
3. Description of tests.
4. Test data.
5. Analysis and recommendations.

H. Test data records shall at minimum include the following:
1. Identification of the testing contractor.
2. Equipment identification.
3. Humidity, temperature, and other conditions that may affect test results.
4. Date of inspections, maintenance, tests, or calibrations.
5. Identification of the testing technician.
6. Indication of inspections, tests, maintenance, and/or calibrations to be performed and recorded.
7. Indication of the expected results when calibrations are to be performed.
8. Indication of as-found and as-left results, as applicable.
9. Sufficient spaces to allow all results and comments to be included.

I. Documentation of test procedures, test results, and test equipment certifications shall be provided for all systems and equipment as required in applicable NERC standards. Documentation shall be in a format acceptable to demonstrate compliance with NERC standards in effect at the time the testing is completed. Testing Contractor shall assist the Owner with the initial NERC compliance audit following commissioning of the project by providing any additional documentation or certification necessary to assure compliance with NERC standards that apply to protection system testing.

END OF SECTION 337233.19

INDIANOLA MUNICIPAL UTILITIES
EAST IOWA CIRCUIT SWITCHER REPLACEMENT PROJECT - INSTALLATION

SECTION 337233.33 - RACEWAY AND BOXES FOR SUBSTATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Conduit, ducts, and duct accessories for direct-buried and concrete-encased duct banks, and in single duct runs.
2. Raceways, fittings, boxes, enclosures, and cabinets for substation electrical wiring.

1.3 DEFINITIONS

A. EMT: Electrical metallic tubing.

B. IMC: Intermediate metal conduit.

C. RMC: Rigid metallic conduit.

D. FMC: Flexible metal conduit.

E. LFMC: Liquidtight flexible metal conduit.

F. LFNC: Liquidtight flexible nonmetallic conduit.

G. ENT: Electrical nonmetallic tubing.

H. RNC: Rigid nonmetallic conduit.

1.4 SUBMITTALS

A. Product Data: For duct bank materials, surface raceways, wireways and fittings, handholes, hinged-cover enclosures, and cabinets.

B. Shop Drawings: For the following raceway components. Include plans, elevations, sections, details, and attachments to other work.

1. Custom enclosures and cabinets.

1.5 QUALITY ASSURANCE

A. Comply with ANSI C2, National Electrical Safety Code

B. Comply with NFPA 70, National Electrical Code.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver conduits to Project site with ends capped. Store nonmetallic ducts with supports to prevent bending, warping, and deforming.

B. Store precast concrete and other factory-fabricated underground utility structures at Project site as recommended by manufacturer to prevent physical damage. Arrange so identification markings are visible.

C. Lift and support precast concrete units only at designated lifting or supporting points.

1.7 COORDINATION

A. Coordinate layout and installation of ducts, manholes, handholes, and boxes with final arrangement of other utilities, site grading, and surface features as determined in the field.

B. Coordinate elevations of ducts and duct-bank entrances into manholes, handholes, and boxes with final locations and profiles of ducts and duct banks as determined by coordination with other utilities, underground obstructions, and surface features. Revise locations and elevations from those indicated as required to suit field conditions and to ensure that duct runs drain to manholes and handholes, and as approved by Engineer.

PART 2 - PRODUCTS

2.1 METAL CONDUIT AND TUBING

A. RMC - Rigid Metal Conduit: ANSI C80.1.

B. IMC – Intermediate Metal Conduit: ANSI C80.6.

C. EMT – Electrical Metal Tubing: ANSI C80.3.

D. LFMC – Liquid tight Flexible Metal Conduit: Flexible steel conduit with PVC jacket.

E. RNC – Rigid Nonmetallic Conduit

F. Fittings for Conduit (Including all Types and Flexible and Liquidtight), EMT, and Cable: NEMA FB 1; listed for type and size raceway with which used, and for application and environment in which installed.

1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886.
2. Fittings for EMT: Steel or die-cast, compression type.

3. Coating for Fittings for PVC-Coated Conduit: Minimum thickness, 0.040 inch, with overlapping sleeves protecting threaded joints.

G. Joint Compound for Rigid Steel Conduit or IMC: Listed for use in cable connector assemblies, and compounded for use to lubricate and protect threaded raceway joints from corrosion and enhance their conductivity.

2.2 NONMETALLIC CONDUIT AND TUBING (PVC)

A. RNC: NEMA TC 2, Type EPC-40-PVC, UL 651, with matching fittings by same manufacturer as the conduit, complying with NEMA TC 3 and UL 514B.

B. Duct Accessories:

1. Duct Separators: Factory-fabricated rigid PVC interlocking spacers, sized for type and sizes of ducts with which used, and selected to provide minimum duct spacings indicated while supporting ducts during concreting or backfilling.
2. Warning Tape: Underground-line warning tape specified in Division 33 Section "Electrical Identification."

2.3 OPTICAL FIBER/COMMUNICATIONS CABLE RACEWAY AND FITTINGS

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

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

1. Arnco Corporation.
2. Carlon Electrical Products.
3. Or approved equivalent.

C. Description: Comply with UL 2024; flexible type, approved for general-use installation.

2.4 METAL WIREWAYS

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

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

1. Cooper B-Line, Inc.
2. Hoffman.
3. Square D.
4. Or approve equivalent.

C. Description: Sheet metal sized and shaped as indicated, NEMA 250, Type 1, unless otherwise indicated.

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

E. Wireway Covers: Hinged type.

F. Finish: Manufacturer's standard enamel finish.

2.5 BOXES, ENCLOSURES, AND CABINETS

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

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

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

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

E. Cabinets:

1. Indoor: NEMA 250, Type 1, galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
2. Outdoor: NEMA 250, Type 3R, stainless steel or aluminum box with removable interior back panel.
3. Metal barriers to separate wiring of different systems and voltage.
4. Accessory feet where required for freestanding equipment.
5. Hinged door in front cover with latch and concealed hinge.
6. Additional accessories as indicated on the drawings.

2.6 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

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

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

a. Cooper B-Line, Inc.; a division of Cooper Industries.
b. Thomas & Betts Corporation.
c. Unistrut; Tyco International, Ltd.

2. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.

3. Channel Dimensions: Selected for applicable load criteria.

B. Raceway and Cable Supports: As described in NECA 1 and NECA 101.

C. 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.

D. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; 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, zinc-coated steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.
2. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
3. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
4. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
5. Toggle Bolts: All-steel springhead type.
6. Hanger Rods: Threaded steel.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

A. Outdoor Control Raceway: Apply raceway products as specified below, unless otherwise indicated:

1. Exposed Conduit: Rigid steel conduit.
2. Underground Conduit: RNC, Type EPC-40-PVC, with Schedule 40 fittings, direct buried.
3. ~~Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.~~
4. ~~Pull Boxes: Precast concrete.~~
5. ~~Application of Handholes and Boxes for Underground Wiring:~~

~~a. Handholes and Pull Boxes in Driveway, Parking Lot, and Off-Roadway Locations, Subject to Occasional, Nondeliberate Loading by Heavy Vehicles: [**Polymer concrete**] [**Fiberglass enclosures with polymer-concrete frame and cover**] [**Fiberglass-reinforced polyester resin**], SCTE 77, Tier 15 structural load rating.~~

~~b. Handholes and Pull Boxes in Sidewalk and Similar Applications with a Safety Factor for Nondeliberate Loading by Vehicles: [**Polymer-concrete units**] [**Heavy-duty fiberglass units with polymer-concrete frame and cover**], SCTE 77, Tier 8 structural load rating.~~

c. ~~Handholes and Pull Boxes Subject to Light-Duty Pedestrian Traffic Only: Fiberglass-reinforced polyester resin, structurally tested according to SCTE 77 with 3000-lbf vertical loading.~~

B. Indoor Control Raceway: Apply raceway products as specified below, unless otherwise indicated:

1. Exposed, Not Subject to Physical Damage: EMT.
2. Exposed and Subject to Severe Physical Damage: IMC or RMC. Includes raceways as indicated on the drawings.
3. Connection to Vibrating Equipment (Including Transformers, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
4. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4, stainless steel or aluminum in damp or wet locations.

C. Outdoor Collector or Feeder Raceway (Medium Voltage): Apply raceway products as specified below, unless otherwise indicated:

1. Exposed Conduit: RMC.
2. Underground Conduit: RNC, Type EPC-40-PVC, with Schedule 80 fittings, concrete encased.
3. Pull Boxes and Manholes: Precast concrete

D. Minimum Raceway Size: 1/2-inch trade size for indoor and 1-inch trade size for outdoor.

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

1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings.

2. EMT Conduit: Use steel or die-cast compression fittings.

3.2 INSTALLATION

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

B. Complete raceway installation before starting conductor installation.

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

D. Install no more than the equivalent of four 90-degree bends in any conduit run except for communications conduits, for which fewer bends are allowed.

E. Raceways Embedded in Slabs:

1. Run conduit parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support.
2. Change from ENT to RNC, Type EPC-40-PVC, rigid steel conduit, or IMC before rising above the floor.

F. 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.

G. 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.

H. Raceways for Optical Fiber and Communications Cable: Install raceways, metallic and nonmetallic, rigid and flexible, as follows:

1. 3/4-Inch Trade Size and Smaller: Install raceways in maximum lengths of 50 feet.
2. 1-Inch Trade Size and Larger: Install raceways in maximum lengths of 75 feet.
3. Install with a maximum of two 90-degree bends or equivalent for each length of raceway unless Drawings show stricter requirements. Separate lengths with pull or junction boxes or terminations at distribution frames or cabinets where necessary to comply with these requirements.

I. Flexible Conduit Connections: Use maximum of 48 inches of flexible conduit for equipment subject to vibration, noise transmission, or movement; and for transformers and motors.

1. Use LFMC or LFNC in damp or wet locations not subject to severe physical damage.

3.3 SUPPORT AND ATTACHMENT

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

B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as scheduled in NECA 1, where its Table 1 lists maximum spacings less than stated in NFPA 70. Minimum rod size shall be 1/4 inch in diameter.

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

D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to structural elements by the following methods unless otherwise indicated by code:

1. To Wood: Fasten with lag screws or through bolts.
2. To New Concrete: Bolt to concrete inserts.
3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
4. To Existing Concrete: Expansion anchor fasteners.
5. To Steel: Beam clamps..
6. To Light Steel: Sheet metal screws.

3.4 INSTALLATION OF UNDERGROUND CONDUIT

A. Direct-Buried Conduit:

1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom as specified in Division 31 Section "Earth Moving" for pipe less than 6 inches in nominal diameter.
2. Install backfill as specified in Division 31 Section "Earth Moving."
3. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction as specified in Division 31 Section "Earth Moving."
4. Install manufactured duct elbows for stub-ups at poles and equipment and at building entrances through the floor, unless otherwise indicated. Encase elbows for stub-up ducts throughout the length of the elbow.
5. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through the floor.

    a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches of concrete.
    b. For stub-ups at equipment mounted on outdoor concrete bases, extend steel conduit horizontally a minimum of 60 inches from edge of equipment pad or foundation. Install insulated grounding bushings on terminations at equipment.

3.5 EARTHWORK

A. Excavation and Backfill: Comply with Division 31 Section "Earthwork," but do not use heavy-duty, hydraulic-operated, compaction equipment.

B. Restore surface features at areas disturbed by excavation and reestablish original grades, unless otherwise indicated. Replace removed sod immediately after backfilling is completed.

C. Restore areas disturbed by trenching, storing of dirt, cable laying, and other work. Restore vegetation and include necessary topsoiling, fertilizing, liming, seeding, sodding, sprigging, and mulching.

3.6 DUCT INSTALLATION

A. Slope: Pitch ducts a minimum slope of 1:300 down toward manholes and handholes and away from buildings and equipment. Slope ducts from a high point in runs between two manholes to drain in both directions.

B. Curves and Bends: Use 5-degree angle couplings for small changes in direction. Use manufactured long sweep bends with a minimum radius as noted on the drawings, both horizontally and vertically, at other locations, unless otherwise indicated.

C. Joints: Use solvent-cemented joints in ducts and fittings and make watertight according to manufacturer's written instructions. Stagger couplings so those of adjacent ducts do not lie in same plane.

D. Duct Entrances to Manholes and Concrete and Polymer Concrete Handholes: Use end bells, spaced as required for each duct size.

1. Begin change from regular spacing to end-bell spacing 10 feet from the end bell without reducing duct line slope and without forming a trap in the line.
2. Grout end bells into structure walls from both sides to provide watertight entrances.

E. Sealing: Provide temporary closure at terminations of ducts that have cables pulled. Seal spare ducts at terminations.

F. Pulling Cord: Install 100-lbf-test nylon cord in all ducts, including spares.

~~G. Concrete-Encased Ducts: Support ducts on duct separators.~~

~~1. Separator Installation: Space separators close enough to prevent sagging and deforming of ducts, with not less than 4 spacers per 20 feet of duct. Secure separators to earth and to ducts to prevent floating during concreting. Stagger separators approximately 6 inches between tiers. Tie entire assembly together using fabric straps; do not use tie wires or reinforcing steel that may form conductive or magnetic loops around ducts or duct groups.~~
~~2. Concreting Sequence: Pour each run of envelope between manholes or other terminations in one continuous operation.~~

~~a. Start at one end and finish at the other, allowing for expansion and contraction of ducts as their temperature changes during and after the pour. Use expansion fittings installed according to manufacturer's written recommendations, or use other specific measures to prevent expansion-contraction damage.~~
~~b. If more than one pour is necessary, terminate each pour in a vertical plane and install 3/4-inch reinforcing rod dowels extending 18 inches into concrete on both sides of joint near corners of envelope.~~

~~3. Pouring Concrete: Spade concrete carefully during pours to prevent voids under and between conduits and at exterior surface of envelope. Do not allow a heavy mass of concrete to fall directly onto ducts. Use a plank to direct concrete down sides of bank assembly to trench bottom. Allow concrete to flow to center of bank and rise up in middle, uniformly filling all open spaces. Do not use power-driven agitating equipment unless specifically designed for duct-bank application.~~
~~4. Reinforcement: Reinforce concrete-encased duct banks where they cross disturbed earth and where indicated. Arrange reinforcing rods and ties without forming conductive or magnetic loops around ducts or duct groups.~~
~~5. Forms: Use walls of trench to form side walls of duct bank where soil is self-supporting and concrete envelope can be poured without soil inclusions; otherwise, use forms.~~
~~6. Minimum Space between Ducts: 3 inches between ducts and exterior envelope wall, 2 inches between ducts for like services, and 4 inches between power and signal ducts.~~
~~7. Depth: Install top of duct bank at least 24 inches below finished grade in areas not subject to deliberate traffic, and at least 30 inches below finished grade in deliberate traffic paths for vehicles, unless otherwise indicated.~~

8. Stub-Ups: Use manufactured duct elbows for stub-ups at poles and equipment and at building entrances through the floor, unless otherwise indicated. Extend concrete encasement throughout the length of the elbow.
9. Stub-Ups: Use manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through the floor.

    a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches of concrete.
    b. Stub-Ups to Equipment: For equipment mounted on outdoor concrete bases, extend steel conduit horizontally a minimum of 60 inches from edge of base. Install insulated grounding bushings on terminations at equipment.

10. Warning Tape: Bury warning tape approximately 12 inches above all concrete-encased ducts and duct banks. Align tape parallel to and within 3 inches of the centerline of duct bank. Provide an additional warning tape for each 12-inch increment of duct bank width over a nominal 18 inches. Space additional tapes 12 inches apart, horizontally.

H. Direct-Buried Duct Banks:

1. Support ducts on duct separators coordinated with duct size, duct spacing, and outdoor temperature.
2. Space separators close enough to prevent sagging and deforming of ducts, with not less than 4 spacers per 20 feet of duct. Secure separators to earth and to ducts to prevent displacement during backfill and yet permit linear duct movement due to expansion and contraction as temperature changes. Stagger spacers approximately 6 inches between tiers.
3. Excavate trench bottom to provide firm and uniform support for duct bank. Prepare trench bottoms as specified in Division 2 Section "Earthwork" for pipes less than 6 inches in nominal diameter.
4. Install backfill as specified in Division 2 Section "Earthwork."
5. After installing first tier of ducts, backfill and compact. Start at tie-in point and work toward end of duct run, leaving ducts at end of run free to move with expansion and contraction as temperature changes during this process. Repeat procedure after placing each tier. After placing last tier, hand place backfill to 4 inches over ducts and hand tamp. Firmly tamp backfill around ducts to provide maximum supporting strength. Use hand tamper only. After placing controlled backfill over final tier, make final duct connections at end of run and complete backfilling with normal compaction as specified in Division 2 Section "Earthwork."
6. Install ducts with a minimum of 3 inches between ducts for like services and 6 inches between power and signal ducts.
7. Depth: Install top of duct bank at least 36 inches (below finished grade, unless otherwise indicated.
8. Set elevation of bottom of duct bank below the frost line.
9. Install manufactured duct elbows for stub-ups at poles and equipment and at building entrances through the floor, unless otherwise indicated. Encase elbows for stub-up ducts throughout the length of the elbow.
10. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through the floor.

    a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches of concrete.

b. For equipment mounted on outdoor concrete bases, extend steel conduit horizontally a minimum of 60 inches from edge of equipment pad or foundation. Install insulated grounding bushings on terminations at equipment.

3.7 INSTALLATION OF CONCRETE MANHOLES, HANDHOLES, AND BOXES

A. Cast-in-Place Manhole Installation:

1. Finish interior surfaces with a smooth-troweled finish.
2. Windows for Future Duct Connections: Form and pour concrete knockout panels 1-1/2 to 2 inches thick, arranged as indicated.
3. Cast-in-place concrete, formwork, and reinforcement are specified in Division 3 Section "Cast-in-Place Concrete."

B. Precast Concrete Handhole and Manhole Installation:

1. Comply with ASTM C 891, unless otherwise indicated.
2. Install units level and plumb and with orientation and depth coordinated with connecting ducts to minimize bends and deflections required for proper entrances.
3. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1-inch sieve to No. 4 sieve and compacted to same density as adjacent undisturbed earth.

C. Elevations:

1. Manhole Roof: Install with rooftop at elevation indaiscted on drawings..
2. Handhole Covers: In paved areas and trafficways, set surface flush with finished grade. Set covers of other handholes 1 inch above finished grade.

D. Drainage: Install drains in bottom of manholes where indicated. Coordinate with drainage provisions indicated.

E. Waterproofing: Apply waterproofing to exterior surfaces of manholes[**and handholes**] after concrete has cured at least three days. Waterproofing materials and installation are specified in Division 7 Section "[**Elastomeric Sheet Waterproofing**] [**Thermoplastic Sheet Waterproofing**]." After ducts have been connected and grouted, and before backfilling, waterproof joints and connections and touch up abrasions and scars. Waterproof exterior of manhole chimneys after mortar has cured at least three days.

F. Dampproofing: Apply dampproofing to exterior surfaces of manholes[**and handholes**] after concrete has cured at least three days. Dampproofing materials and installation are specified in Division 7 Section "Bituminous Dampproofing." After ducts have been connected and grouted, and before backfilling, dampproof joints and connections and touch up abrasions and scars. Dampproof exterior of manhole chimneys after mortar has cured at least three days.

G. Hardware: Install removable hardware, including pulling eyes, cable stanchions, and cable arms, as required for installation and support of cables and conductors and as indicated.

~~H. Field-Installed Bolting Anchors in Manholes and Concrete Handholes: Do not drill deeper than 3-7/8 inches for manholes and 2 inches for handholes, for anchor bolts installed in the field. Use a minimum of two anchors for each cable stanchion.~~

~~I. Warning Sign: Install "Confined Space Hazard" warning sign on the inside surface of each manhole cover.~~

~~3.8 INSTALLATION OF HANDHOLES AND BOXES OTHER THAN PRECAST CONCRETE~~

~~A. Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting ducts to minimize bends and deflections required for proper entrances. Use box extension if required to match depths of ducts, and seal joint between box and extension as recommended by the manufacturer.~~

~~B. Unless otherwise indicated, support units on a level bed of crushed stone or gravel and compacted to same density as adjacent undisturbed earth.~~

~~C. Elevation: In paved areas and trafficways, set so cover surface will be flush with finished grade. Set covers of other handholes 1 inch above finished grade.~~

~~D. Install removable hardware, including pulling eyes, cable stanchions, cable arms, and insulators, as required for installation and support of cables and conductors and as indicated. Select arm lengths to be long enough to provide spare space for future cables, but short enough to preserve adequate working clearances in the enclosure.~~

~~E. Field-cut openings for ducts and conduits according to enclosure manufacturer's written instructions. Cut wall of enclosure with a tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.~~

~~3.9 INSTALLATION OF UNDERGROUND HANDHOLES AND BOXES~~

~~A. Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting conduits to minimize bends and deflections required for proper entrances.~~

~~B. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1/2-inch sieve to No. 4 sieve and compacted to same density as adjacent undisturbed earth.~~

~~C. Elevation: In paved areas, set so cover surface will be flush with finished grade. Set covers of other enclosures 1 inch above finished grade.~~

~~D. Field-cut openings for conduits according to enclosure manufacturer's written instructions. Cut wall of enclosure with a tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.~~

3.10 PROTECTION

A. Provide final protection and maintain conditions that ensure coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
2. Repair damage to paint finishes with matching touchup coating recommended by manufacturer.

3.11 GROUNDING

A. Ground underground ducts and utility structures according to Division 33 Section "Substation Grounding."

3.12 FIELD QUALITY CONTROL

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

1. Pull aluminum or wood test mandrel through duct to prove joint integrity and test for out-of-round duct. Provide mandrel equal to 80 percent fill of duct. If obstructions are indicated, remove obstructions and retest.

B. Correct deficiencies and retest as specified above to demonstrate compliance.

3.13 CLEANING

A. Pull leather-washer-type duct cleaner, with graduated washer sizes, through full length of ducts. Follow with rubber duct swab for final cleaning and to assist in spreading lubricant throughout ducts.

B. Clean internal surfaces of manholes, including sump. Remove foreign material.

END OF SECTION 337233.33

INDIANOLA MUNICIPAL UTILITIES
EAST IOWA CIRCUIT SWITCHER REPLACEMENT PROJECT – INSTALLATION

SECTION 337243 – SUBSTATION CONTROL CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Control wires and cables.

1.3 DEFINITIONS

A.

ANSI	American National Standards Institute.
ASTM	American Society for the Testing of Materials
ICEA	Insulated Cable Engineers Association
IEEE	Institute of Electrical and Electronics Engineers
NEMA	National Electric Manufacturers Association
NFPA	National Fire Protection Association
UL	Underwriters Laboratories

1.4 SUBMITTALS

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

1.5 QUALITY ASSURANCE

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

B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

A. Copper Conductor: Stranded, bare (per ASTM B3) or tinned (per ASTM B33) copper. Stranding shall be per ASTM B8 class B (7 strand) or class C (19 strand).

B. Multi-conductor Control Cable:

1. Service Conditions: Designed for service at a maximum continuous operating temperature of 90 degrees C in dry and damp locations or 75 degrees C in wet locations. All control cables shall be suitable for installation in conduits, ducts, trays, or direct buried. Cables shall be resistant to damage from heat, flame, moisture, oil, sunlight, and mechanical abrasion which can occur in an electrical substation environment.
2. Multi-conductor Control Cable: Rated 600 volt, Type TC, and meet the requirements of ICEA S-73-532. Individual conductors shall be stranded copper with a minimum of 30 mils of cross-linked polyethylene flame-retardant insulation. The insulated conductors shall have an overall jacket. The jacket shall be black in color and a minimum of 60 mils of a flame retardant material. When required, the cable shall include a 5 mil corrugated copper tape shield, applied longitudinally.
3. Multi-conductor Color Code: Per ICEA Method 1, Table K-2. Color codes shall be as follows for control circuits and DC supply circuits:

4 and 12 Conductor Cables

Conductor Number	Base Color	Tracer Color
1	Black	
2	Red	
3	Blue	
4	Orange	
5	Yellow	
6	Brown	
7	Red	Black
8	Blue	Black
9	Orange	Black
10	Yellow	Black
11	Brown	Black
12	Black	Red

2 Conductor Cables

Conductor Number	Base Color
1	Black
2	Red

4. Multi-conductor Color Code: Per ICEA Method 1, Table K-2. Color codes shall be as follows for AC supply circuits:

4 Conductor Cables

Conductor Number	Base Color
1	Black
2	White
3	Red
4	Green

C. Twisted Pair Control Cable (where required): Rated 300 volts, Type PLTC. Individual conductors shall be stranded copper with a polyvinyl chloride or cross-linked polyethylene flame-retardant insulation. The insulated conductor assembly shall be covered with a shield and have an overall jacket. The jacket shall be flame retardant.

D. Internal Panel or Equipment Wiring For Field Installation: 600 volt, #12 AWG, 65 strand, copper wire with cross-linked polyethylene, type SIS insulation. Color to be gray unless noted otherwise on the drawings.

2.2 ACCESSORIES

A. Lugs: Non-Insulated ring type insulated lugs. Ring lug terminals shall be Thomas & Betts or Burndy. NOTE: No slotted (spade type) terminal connectors shall be used.

B. Cable Identification Tags: Panduit part no. SSM2S-C, SSM2S-D or approved equal. Tags shall be hand lettered using an ultrafine point, black ink, permanent marking pen as manufactured by Sharpie or approved equal.

C. Cable Ties: Black plastic, weather and ultraviolet resistant, Panduit type PLT or approved equal.

D. Wire Labels: All wires shall be labeled at both ends with heat shrink machine-printed markers. Each marker shall clearly indicate the exact individual wire designation as shown on the cable connection diagrams. Non-heat shrink markers may be permitted on a case-by-case basis upon request. Markers shall face out and will be labeled to be read with minimal effort.

E. Cable Shield Bond Connections: Tyco Electronics Termi-Foil terminals and splices for aluminum or copper foil or strip, catalog no. 329254, with barrel for #10-#12 AWG wire. Install Termi-Foil connectors with Tyco Electronics Termi-Foil Hand Crimping Tool, catalog no. 68026.

F. Terminations on Phoenix Terminal Blocks: When required by the manufacturer, use ferrules manufactured by Phoenix Contact, correctly sized for the conductor to be landed on that terminal.

PART 3 - EXECUTION

3.1 INSTALLATION OF CONTROL CABLES

A. All wiring between the various pieces of equipment shall be installed as shown on the plans. All wiring shall be enclosed in raceway, cable trays, or wireways of the size specified on the plans or as approved by Engineer.

B. The Cable Schedule, which is included in the drawings, lists power, control, and communications cables necessary for this installation. The Schedule shows the endpoints of each circuit, the number of conductors, size of the conductors, and the approximate lengths. The lengths are not cutting lengths, but are included only as an aid in laying out the circuits.

C. Cable jackets shall be removed using the appropriate cable tool which has a settable cutter adjusted so as not to damage the conductor insulation. Conductor insulation shall be removed using the appropriate stripping tool adjusted so as not to damage the wire strands. Knives shall not be used on any cables. Any cables or wire damaged during installation shall be replaced at Contractor's expense.

D. No cable shall be installed until the conduits for the particular cable runs have been completely installed, thoroughly cleaned and mandreled.

E. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway. Cable lubricants recommended by the cable manufacturer may be used as an aid to the pulling of cable. Grease or other materials harmful to cable insulation shall not be allowed.

F. All cables in each conduit shall be pulled simultaneously, using cable grips and swivels or other devices subject to the approval Engineer. Cable tension shall not exceed the maximum tension recommended by the cable manufacturer. Cables shall always be protected from mechanical injury and from moisture at the unprotected ends.

G. Conductors shall be continuous from terminal to terminal. No splices will be permitted.

H. Care must be taken not to have the conductors pulled tight or kinked in the conduits or boxes. Where control wires from more than one conduit pass through a common pull box, the group of wires from each conduit shall be bound together with tie wraps spaced at six inch intervals.

I. All cable and wire shall be installed in a workmanlike manner. Cables shall be neatly trained, without interlacing, in all trays and boxes. Sufficient lengths of cable shall be pulled into equipment panels, boxes, etc., to permit a neat arrangement. Groups of control wires carried in the same conduit to a terminal block or like termination point shall, after leaving the conduit, be formed and firmly, but not tightly, tied with cable tie wraps.

J. Cable forming shall be done in a manner that will not permit sharp bends over conduit bushings. The bending radius in any cable shall not be less than the minimum bending radius recommended by the cable manufacturer. Damaged or out-of-place cable shall be replaced at the Contractor's expense.

K. Multi-conductor cable jackets shall be removed as required to train and terminate the conductors. In control cabinets, the cable jacket shall be left on the cable, as far as possible, to the point of the first conductor branch. At relay panels the cable jackets shall be removed to within 3 inches of the entrance to the panel or, in the case of existing substations, removed in a manner similar to existing cable jackets. Cables shall be clamped or secured in a manner to avoid tension on individual conductors or terminals. Spare conductors shall be left long enough to reach any terminal.

L. Insulated conductors from which the jacket is removed shall be neatly trained in bundles and the bundle firmly but not tightly tied, using cable tie wraps made for this purpose. The individual conductors, including all spare conductors, of the cables shall be unlaced prior to tying in bundles.

M. Identify all cables at terminations and in all pull boxes. Cable tags shall bear the corresponding cable number shown on the Cable Schedule. Cable numbers shall be written legibly with a permanent marker.

N. 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.

O. Arrange cables in parallel and fasten each cable in place as required to maintain cables in parallel runs.

P. Install all jumpers as shown on wiring and connection diagrams.

Q. Bundle cables in the cable tray where the cables pass from the tray to relay panels so that they can pass through one opening in the tray at each side of the relay panel.

R. Install dropout fittings to protect communications cables at exits from communication cable tray to relay panels.

S. All communication cables that extend from relay panel to relay panel or from a relay panel to equipment located elsewhere within the control building shall be installed in the overhead communication cable tray.

3.2 WIRE TERMINATIONS

A. Extra care shall be exercised in the use of crimp-on terminal connectors to make certain that each wire is firmly attached to the connector. Use only controlled cycle compression tools supplied by the manufacturer of the ring lug being used (Thomas & Betts or Burndy). Conductor insulation shall be squarely and evenly cut and it shall be continuous with the connector barrel.

B. Cable shields, when present, shall be terminated by connecting the drain wire or corrugated copper tape shield to a ground bus with a compression terminal. Approved termination methods for corrugated tape shields include Tyco Electronics Termi-foil terminals (installed with controlled-cycle compression tools manufactured expressly for that purpose) and the BSW Floating Bond manufactured by Electric Motion Company, Inc. Cable shields may be

terminated at one or both ends depending on the application and on the substation design. The proper method will be noted on the drawings or defined in the Special Conditions.

C. Solderless ring-type terminal lugs shall be used to connect all wires #8 AWG and smaller to studs.

D. Terminations on larger conductors shall have at least two indentations.

E. Wires terminated on Phoenix terminal blocks shall have the correct size of Phoenix ferrule installed to prevent individual strands from straying and making contact with adjacent wires and terminals.

F. Wire sizes larger than #8 AWG terminating on 30A (GE EB25 type) terminal blocks, will require a Burndy narrow tongue lug. Where large wire sizes require use of non-insulated lugs, cover lug barrel with 600V heat shrink tubing. Strand shaving is not acceptable.

3.3 ACCESSORIES

A. Identify all cables at terminations and in all pull boxes. Cable tags shall bear the corresponding cable number shown on the Cable Schedule. Cable numbers shall be written legibly with a permanent marker.

3.4 REMOVALS

A. All cables and wires that are disconnected and not reused shall be completely removed from panels, wireways, and wire looms.

END OF SECTION 337243

INDIANOLA MUNICIPAL UTILITIES
EAST IOWA CIRCUIT SWITCHER REPLACEMENT PROJECT - INSTALLATION

SECTION 337300 – MAJOR EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes methods and materials for the following:
   1. SF6 Circuit Breakers

PART 2 - PRODUCTS

2.1 MATERIALS

A. The following items will be furnished by the Owner.

   1. SF6 Circuit Breakers

B. Equipment Identification

   1. Furnish equipment identification numbers as indicated on the drawings.
   2. Furnish all hardware including beam grips, pipe clamps for installation of the identification numbers. Mounting hardware shall be stainless steel or aluminum.

PART 3 - EXECUTION

3.1 SF6 CIRCUIT BREAKER

A. Contractor shall unload and inspect the circuit breaker.

B. Contractor shall completely install the circuit breakers according to the drawings. This installation shall include, but not be limited to, the following: placing breaker on the foundation, ground connections, connections between the breaker bushings and the station bus work, control duct connections, and control and power cables.

C. The manufacturer will furnish the SF6 gas. Contractor shall fill the breakers to the proper pressure.

D. All work on the circuit breakers shall be done according to the manufacturer's instructions.

E. Contractor shall not connect the jumpers to the high voltage bushings until the testing of the breaker has been completed.

END OF SECTION 337300

INDIANOLA MUNICIPAL UTILITIES
EAST IOWA CIRCUIT SWITCHER REPLACEMENT PROJECT - INSTALLATION

SECTION 337923 – UTILITY SUBSTATION GROUNDING

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.

B. Division 33 Section Substation Testing and Commissioning.

1.2 SUMMARY

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

1.3 QUALITY ASSURANCE

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

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

PART 2 - PRODUCTS

2.1 CONDUCTORS

A. Conductors: Install solid conductor for No. 6 AWG and smaller, and stranded conductors for No. 4 AWG and larger, unless otherwise indicated

B. Bare Copper Conductors:

1. Solid Conductors: ASTM B 3.
2. Stranded Conductors: ASTM B 8.
3. Tinned Conductors: ASTM B 33.

2.2 CONNECTORS

A. Above Grade Bolted Connectors for Conductors: Copper or copper alloy, bolted pressure-type, with silicon bronze hardware .

B. Bolted Connectors for Fence: Copper or copper alloy, bolted pressure-type, with silicon bronze or galvanized hardware.

C. Above Grade Compression Connectors: Copper compression, “C” or “H” style and compression terminals.

D. Installation Hardware: Silicon bronze bolts, nuts, and spring type washers..

E. Exothermic Welds: Materials by Cadweld or Thermoweld. Molds and powder cartridges shall be as recommended by manufacturer of the molds used.

F. Below Grade Compression: Burndy HyGround irreversible compression connections.

2.3 GROUND RODS

A. Copper weld, section type.

B. Diameters and lengths as indicated on drawings.

PART 3 - EXECUTION

3.1 APPLICATIONS

A. Ground Rods: Install ground rods vertically in locations as indicted on drawings. Drive rods to depth indicated.

B. Underground Grounding Conductors: Install bare copper conductor, size as indicted on the drawings.

1. Bury at depth below grade as indicate don the drawings (before application of surface rock).
2. Duct-Bank Grounding Conductor: Bury 12 inches above duct bank when indicated as part of duct-bank installation.
3. Route conductors as indicted on drawings. Install using as few joints as possible.

C. Conductor Terminations and Connections:

1. Equipment Grounding Conductor Terminations: Bolted connectors.
2. Grounding Conductor Connections to Structural Steel: Bolted connectors.
3. Underground Connections: **Exothermic welded connectors or irreversible compression connectors approved for below grade installation.**

3.2 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:

3.3 INSTALLATION

A. Below Grade Grounding Conductors
   1. Route along shortest and straightest paths. Conductor shall be free from kinks, breaks, or other damage after installation.
   2. Conductor shall be thoroughly cleaned prior to making connections. Follow connector manufacturer's instructions.
   3. All junctions and splices shall be made at ground rod locations whenever reasonably possible.

B. Above Grade Grounding Conductors
   1. Ground fence and gates as indicated on the drawings.
   2. Ground all steel structures and equipment as indicated on the drawings. Equipment includes but is not limited to panels, junction boxes, and auxiliary equipment.
   3. Paint, rust, or other non-conducting material shall be removed from the contact surfaces and these surfaces shall be coated with oxide-inhibiting compound prior to making ground connections.
   4. Ground bars in panels shall be solidly grounded to the ground grid with #6 solid or larger copper wire.
   5. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

C. Cable Trench Grounding Conductors
   1. Install ground conductor in cables trench.
   2. Use ground clips furnished with the cable trench for installing the conductor.

D. Conduit & Cable Sheath Grounding
   1. All metallic conduit shall be effectively grounded at terminations in conformance with the National Electrical Code.
   2. All metallic cable shielding and sheath shall be grounded at terminations.

3.4 FIELD QUALITY CONTROL

A. All below grade grounding cables and connections shall be inspected by Owner before they are covered with earth.

B. Perform testing of ground grid. Comply with requirements in Division 33 Substation Testing and Commissioning Section.

END OF SECTION 337923

INDIANOLA MUNICIPAL UTILITIES
IMU
Electric • Communications • Water

MEMORANDUM

To: IMU Board of Trustees of the Electric, Water and Communications Utilities

From:

Date: December 26, 2025

Subject: Resolution Authorizing Modification of Calix Service Cloud Agreement

Recommendation:

Attachments:
1. Resolution Authorizing Modification of Calix Service Cloud Agreement
2. Indianola Updated Service Cloud Agreement 2026

RESOLUTION NO. 2025

RESOLUTION AUTHORIZING MODIFICATION OF CALIX SERVICE CLOUD AGREEMENT

WHEREAS, Indianola Municipal Utilities needs to engage a company to provide support cloud services; and

WHEREAS, Calix has prepared and presented an agreement for these services for a three-year period; and

WHEREAS, Whereas Customer and Calix are Parties to the Calix Service Cloud Order Document (Ref#2023-224685-0437) last signed December 12, 2023 ("Existing OD"). The Existing OD is hereby terminated on August 31, 2026 ("Termination Date") and replaced with this Order Document as of the Service Start Date. For the avoidance of doubt, Services and billing under the Existing OD will continue until Termination Date.

WHEREAS the Board of Trustees finds that the proposed modified contract with Calix should be approved and the Communications Superintendent authorized to execute the same.

NOW, THEREFORE, BE IT RESOLVED by the Indianola Municipal Utilities Board of Trustees that

1. The modified contract for support cloud services between Indianola Municipal Utilities and Calix is hereby approved.
2. The Communications Superintendent is authorized and directed to execute the contract on behalf of Indianola Municipal Utilities.

Passed this 29th day of December 2025.

_____
Dom Selgrade, Chair

ATTEST:

_____
Monica Thompson BOT Secretary

Service Cloud Order Document

Customer Information

Company Name INDIANOLA MUNICIPAL UTILITIES
Business Address: 210 West 2nd Avenue,
Indianola, IA 50125
United States
Shipping Address: 210 West 2nd Avenue,
Indianola, IA 50125
United States

Customer Contact
Name: Kurt Ripperger
Email: kripperger@imufiber.com
Phone: (515) 962-5283
Shipping Contact
Name: Kurt Ripperger
Email: kripperger@imufiber.com

This Order Document for Service Cloud ("Services") is effective as of the date last signed ("Effective Date"), the Service Start Date is as outlined in the Pricing section below (“Service Start Date”), and this Order Document is subject to the Calix Master Purchase and License Agreement ("Agreement") between the undersigned ("Customer") and Calix, Inc. ("Calix"). Calix and Customer may be referred to herein individually as "Party" or together as "Parties".

Existing Order

Whereas Customer and Calix are Parties to the Calix Service Cloud Order Document (Ref#2023-224685-0437) last signed December 12, 2023 (“Existing OD”). The Existing OD is hereby terminated on August 31, 2026 (“Termination Date”) and replaced with this Order Document as of the Service Start Date. For the avoidance of doubt, Services and billing under the Existing OD will continue until Termination Date.

Service Start Date: September 01, 2026 A Service Start Date is required for this Order Document to be valid. Customer acknowledges that the Service Start Date is appropriate, and invoicing will commence as described herein.

Pricing Terms

Period 1: 12 months	Unit Of Measure	Duration	Price/Mo.	Qty	Ext. Price
000-01267	CSC Managed Subs	12 Months	$0.75	4000	$36,000.00
Calix Service Cloud - Experience Management Edition					
			Period 1 Total		**$36,000.00**

Period 2: 12 months	Unit Of Measure	Duration	Price/Mo.	Qty	Ext. Price
000-01267	CSC Managed Subs	12 Months	$0.75	4100	$36,900.00
Calix Service Cloud - Experience Management Edition					
			Period 2 Total		**$36,900.00**

Period 3: 12 months	Unit Of Measure	Duration	Price/Mo.	Qty	Ext. Price
000-01267	CSC Managed Subs	12 Months	$0.75	4200	$37,800.00
Calix Service Cloud - Experience Management Edition					
			Period 3 Total		**$37,800.00**

Calix Service Cloud Experience Management Edition includes the following:

- Calix Service Cloud - Experience Management Edition
- Service Cloud Support
- Service Cloud Guidance

Payment

The Services are billed monthly in advance at the prices above in USD. Billed quantity is based on the greater of the minimum quantity listed, or the previous month's usage determined by Calix. Payments are due within thirty (30) days of invoice date. Payment is subject to the terms and conditions as outlined in the Agreement.

Term, Renewal and ETF

The Services will commence on the Services Start Date and shall continue for an initial term of 36 months plus an initial period (if applicable). Thereafter, the Services will automatically renew for successive 36 month periods beginning at the end of the most recent term, unless either party provides written notice to not renew not less than 60 days before the end of the then-current term. Calix reserves the right to increase the pricing upon automatic renewal by up to 10% of the then-current price. In the event of non-renewal, this Order Document shall terminate upon the end of the then-current term. Customer shall pay Calix fees for early termination ("ETF") for the termination of Services prior to the end of the then-current term in an amount equal to the remaining months of the term multiplied by the applicable monthly fees. Beginning on the Service Start Date, the Service will be enabled.

Cloud Guidance Service

Calix Cloud Guidance Services are delivered through teams who have experience with the customers' business challenges and are described in the following Service Description Document (SDD).

https://www.calix.com/content/dam/calix-com/assets/services/sd/customer-success-services.pdf

IN WITNESS, WHEREOF, each party hereto has caused this Order Document to be executed by an authorized representative as of the Effective Date.

Calix, Inc.	**INDIANOLA MUNICIPAL UTILITIES**
By _____	By _____
Name _____	Name _____
Title _____	Title _____
Date _____	Date _____

Purchase Authorization

A purchase order reference is required for all periods prior to processing this order and commencement of Services. The following purchase orders have been authorized to fund this purchase:

Period 1 PO:

Period 2 PO:

Period 3 PO:

Note: If Customer's business practice is not to issue purchase orders for all or some of the periods, please note the reference number 2025-297861-3635 as the PO# authorizing Calix to use the reference number for booking and invoicing purposes. "TBD" or invalid purchase order references will not be accepted.