



Request for Proposal

STILLWATER KINZIE FDR 6 LINE PROTECTION UPGRADES

Solicitation No. 1382

Date: 9/6/23

ADVERTISEMENT FOR BIDS

BID OPENING: 2:00 p.m. CENTRAL TIME, 9/25/23

The Grand River Dam Authority (“GRDA”) is requesting Bids proposals to **Stillwater Kinzie FDR 6 Line Protection Upgrades** of which being performed and submitted in accordance with the terms of this Request for Proposal (“RFP”) for:

**Solicitation 1382
Stillwater Kinzie FDR 6 Line Protection Upgrades**

Bids must be submitted electronically via email to paul.proctor@grda.com. Bids received after the time set for the opening of the Bids will not be considered, absent a waiver by GRDA, at GRDA’s sole discretion, for good cause shown. All interested parties are invited to participate.

Procurement Agent Contact Information:

Paul Proctor, Procurement Specialist
Office: (405) 297-9963, ext. 6
Cell: (918) 500-0198
Fax: (918) 236-3042

Bids will not be publicly opened.

GRDA will accept questions regarding this RFP until 9/21/23 at 2:00 p.m. Central Time.

There will be **a mandatory pre-bid meeting on Thursday, September 14, 2023 at 10:30 AM CST**. The meeting will take place at the Holiday Inn Express Meeting Room: 715 S. Country Club Road, Stillwater, OK, 74074. A site visit to the project jobsite will take place immediately after the meeting, located at 301 S. Sangre RD, Stillwater, OK 74074 - LAT. = 36.120°, LONG. = -97.104. Vendors must attend these meetings in order to bid on the project, and a sign in sheet will be available.

Any applicable bonding requirement(s) will be addressed in the Contract between GRDA and the prevailing Bidder, (if any).

An electronic copy of this RFP may be found on GRDA’s website: [Bid List | GRDA](#).

All Bidders have a duty to monitor the website for written addenda to the RFP. Addenda modify the RFP terms, and Bidders will be bound by the terms of the RFP as amended.

REQUEST FOR PROPOSAL, REQUIREMENTS FOR BIDDING AND INSTRUCTIONS TO BIDDERS

I. DEFINITIONS:

1. **“Bid”** means the formal proposal submitted by a Bidder in response to this RFP.
2. **“Bidding Documents”** includes the RFP, the Requirements for Bidding and Instructions to Bidders, the Bid forms, the Specifications, the Contract, and any Addenda issued prior to receipt of Bids.
3. **“Board of Directors”** means the rule-making authority and governing body of the GRDA as defined by 82 O.S. § 863.2.
4. **“Contract”** means the pro forma contract attached to this RFP.
5. **“GRDA”** means the Grand River Dam Authority, a governmental agency of the State of Oklahoma, as defined by 82 O.S. § 861, *et seq.*
6. **“Procurement Administrator”** means the GRDA employee with direct supervisory capacity of the Procurement Unit.
7. **“Procurement Unit”** means the unit or department within GRDA that is responsible for administering procurement policies and procedures.
8. **“Treasurer”** means the GRDA employee who is selected by the Board of Directors of the Grand River Dam Authority as authorized by 82 O.S. § 864.A(2) to oversee and manage all fiscal and procurement functions.
9. **“Vice President”** means that GRDA employee who has direct supervisory responsibility over the facility or land upon which the project will be completed.

II. SPECIFIC BID PROCEDURES AND REQUIREMENTS

1. Invitation to Submit Bids. GRDA invites sealed Bids, in accordance with the requirements of the RFP, and on the attached form titled “PROPOSAL to the Grand River Dam Authority for Contract 44233”.
2. Form of Bid Submission.
 - a. Bids may be submitted via email to paul.proctor@grda.com.
3. Modification, Withdrawal, or Cancellation of Bids.
 - a. For physically submitted Bids, Bidders may withdraw, change, and resubmit their Bids by appearing in person prior to the time designated for the opening of the Bids. Upon presenting proper picture identification to the Procurement Administrator or an authorized representative, the Bid will be returned to the Bidder. The withdrawn Bid shall not be opened by or otherwise disclosed to GRDA. Withdrawn Bids may be resubmitted prior to the time designated for the opening of Bids provided the resubmitted bid is in complete conformance with these Instructions to Bidders. If electronic Bids have been specifically authorized by this RFP, Bidders may withdraw, change, and resubmit their Bids electronically on the bid room website prior to the time designated for the opening of Bids.

- b. A Bid may not be modified, withdrawn or canceled by the Bidder for sixty days after the time and date designated for the receipt of Bids.
4. Late Bids. Bids received after the time set for opening of Bids will not be considered absent a waiver by GRDA, at GRDA's sole discretion, for good cause shown. Bids received by mail will be notated with the date and time received at the GRDA facility designated in the solicitation. GRDA is not responsible for delay of receipt of Bids. If electronic Bids have been specifically authorized by this RFP, no electronic Bids will be received after the Bid opening date and time.
5. Bid Copies. Bidder shall submit the original Bid and one electronic copy of the Bid, which must be included on a flash drive, in a separate envelope with the Bid. The electronic copy of the Bid must be in .pdf format. Provided, if electronic Bids have been specifically authorized by this RFP, and Bidder submits the original Bid electronically, Bidder will not be required to provide GRDA a physical copy of the Bid.
6. Addenda and Interpretations for Bid
 - a. All clarifications, revisions, or changes to this RFP or any of the Bidding Documents (collectively, "Addenda") will be posted to the website. All Bidders have a duty to monitor the website for Addenda. By submitting a Bid, Bidder represents that Bidder has reviewed the most recent version of the RFP, and agrees to comply with the RFP and all Addenda.
 - b. Questions regarding this RFP must be submitted in writing via email to paul.proctor@grda.com on or before 2:00 PM Central Time on 9/21/23. No questions may be submitted orally.
 - c. GRDA may or may not respond to any such question. If GRDA responds, it will publish written Addenda to the website.
 - d. All Addenda shall become part of the Bidding Documents.
7. Site Inspection:

There will be **a mandatory pre-bid meeting on Thursday, September 14, 2023 at 10:30 AM CST**. The meeting will take place at the Holiday Inn Express Meeting Room: 715 S. Country Club Road, Stillwater, OK, 74074. A site visit to the project jobsite will take place immediately after the meeting, located at 301 S. Sangre RD, Stillwater, OK 74074 - LAT. = 36.120°, LONG. = -97.104. Vendors must attend these meetings in order to bid on the project, and a sign in sheet will be available.
8. Required Statements from Bidder to be Included in Bid. Each Bidder must accompany his Bid with a written statement under oath disclosing the following information:
 - a. The nature of any partnership, joint venture or other business relationships then in effect or which existed within one (1) year prior to the date of such statement with any architect, engineer or other party to the project;
 - b. Any such business relationship then in effect or which existed within one (1) year prior to the date of such statement between any officer or director of the Bidder company and any officer or director of any architectural or engineering firm or other party to the project; and
 - c. The names of all persons having any such business relationships and the positions they hold with their respective companies or firms. If no such business relationships exist, Bidder shall include a statement to that effect.
9. Bidder's References Must be Included in Bid: The Bidder must be experienced and an expert in substation construction. The Bidder must include with its bid listing at least five (5) references where the Bidder has successfully provided services of a similar nature. The listed references must describe the type of services provided and the value of the project. GRDA may make such investigations as necessary to determine the ability of the Bidder to perform the work and the Bidder shall furnish to GRDA all such information and data for this purpose as GRDA may request. GRDA reserves the right to reject any Bid if the evidence submitted by, or investigation of, such Bidder fails to satisfy GRDA that such Bidder is properly qualified to carry out the obligations of the Contract and to complete the work contemplated therein.

10. Qualifications of Supervisory Personnel. Bidder shall include the resume(s) of supervisory personnel that may be assigned work at GRDA. The Bidder must demonstrate that trained and experienced supervisory personnel are available to support the project.
11. Safety. GRDA will consider the safety records of potential contractors prior to awarding bids on contracts. Any Bid submitted must include the following documents for Bidder and for all subcontractors Bidder will use:
 - a. The past five (5) years' Occupational Safety and Health Administration (OSHA) 300 and OSHA 300A logs.
 - b. The past five (5) years' National Council on Compensation Insurance (NCCI) worker's compensation experience rating sheets.
12. Bid Detail Requirements: The Bid must provide sufficient details for GRDA to perform a complete Bid evaluation. The Bidder shall comply with all requirements in the specification.
13. Equal Opportunity Employment Requirements. GRDA is an Equal Opportunity Employer. GRDA does not discriminate in its hiring practices and requires its contractors to abide by all federal law applicable to discrimination. All Bidders shall acknowledge in the Bidding Documents that they are Equal Employment Opportunity employers.
14. Bidder's Representations. Each Bidder, by making a Bid, represents that:
 - a. The Bidder has read and understands the Bidding Documents and the Bid is made in accordance therewith;
 - b. The Bidder has had the opportunity to visit the site, if required, and is familiar with the local conditions under which the Work is to be performed and has correlated observations with the requirements of the proposed Contract documents; and
 - c. The Bid submitted is based upon the materials, systems and equipment required by the Bidding Documents without exception.
15. Form of Rates. Bids must include the following information in the form prescribed by Attachment H, Rate Quotation Sheet:
 - a. a list of holidays that may be observed by Bidder and Bidder's contractors during the performance of the project;
 - b. A lump-sum value that represents the total compensation that GRDA will provide to Bidder in exchange for Bidder's binding obligation to completely perform all of Bidder's duties arising under this RFP and the Contract.
16. List of Documents to be Submitted with Bid: All Bids must contain complete and executed originals of the following documents, in the form included in this RFP, and in the following order:
 - ATTACHMENT A: COVER LETTER AND EXECUTIVE SUMMARY (identifying the project and contract number)
 - ATTACHMENT B: CONTRACTOR'S BID / PROPOSAL

- ATTACHMENT C: LIST OF SUBCONTRACTORS
- ATTACHMENT D: EXCEPTION STATEMENT
- ATTACHMENT E: BIDDER'S PROPOSED CREW SCHEDULE
- ATTACHMENT F: LISTING OF APPLICABLE EXPERIENCE
- ATTACHMENT G: MINIMUM SAFETY REQUIREMENTS
- ATTACHMENT H: RATE QUOTATION SHEET
- ATTACHMENT I: NON-COLLUSION CERTIFICATE
- ATTACHMENT J: BUSINESS RELATIONSHIPS CERTIFICATE
- ATTACHMENT K: GRDA VISA PAYMENT PROGRAM
- ATTACHMENT L: EXECUTED NOTICE OF SPECIFICATIONS
- ATTACHMENT M: TECHNICAL SPECIFICATIONS & DRAWINGS
- ATTACHMENT N: PRO-FORMA CONTRACT TO BE EXECUTED BY PREVAILING BIDDER(S).

III. BID OPENING AND PRELIMINARY REVIEW

1. Bid Receipt and Opening

- a. There will be no public bid opening.

2. Information to be Announced at Public Bid Opening.

- a. There will be no public bid opening.

3. Preliminary Review. The Bids shall be initially reviewed for completeness and correctness. Any deficiency may be grounds for disqualifying the Bid. GRDA's review may include, but is not limited to, verifying that:

- a. each of the Addenda are acknowledged;
- b. each certificate is present and signed; and
- c. each Bid Document is properly signed.

4. GRDA Rejection of Incomplete Bids. GRDA may reject any bid that GRDA considers to be incomplete, improper, or non-responsive, in GRDA's sole discretion. This may include, but is not limited to, Bids in which the Bidder submits another form of Contract in lieu of the attached Contract. Bids will become the property of GRDA upon submission. **Exceptions taken to the Contract terms and/or Bidding Documents may be cause for rejection of a Bid.**

IV. BID EVALUATION

1. Bid Evaluation by GRDA. After the preliminary review, the Bids will be reviewed and evaluated by designees from the GRDA Procurement Unit and the appropriate Vice President. The following items may be reviewed:
 - a. Unit Price Compliance. If the RFP requires Bidder to submit unit prices, Bidder's failure to submit unit prices for any requested work item may cause GRDA to reject the Bid.
 - b. Materially Unbalanced Prices. If Bid prices are materially unbalanced between line items or subline items, GRDA may reject the Bid. A Bid may be materially unbalanced if it is based on prices significantly less than the cost for some work and prices which are significantly overstated in relation to the cost for other work, and GRDA either has reasonable doubt that the Bid will result in the lowest overall cost to GRDA, or the prices are so unbalanced GRDA determines to the Bid is tantamount to allowing an advance payment.
 - c. Technical and Commercial Qualifications. Bids may be evaluated based on technical and commercial criteria applicable to the scope of work specified. The evaluation criteria may include the Bid's:
 - i. Conformance to technical specifications;
 - ii. Evaluated price;
 - iii. Demonstration of project experience;
 - iv. Conformance to commercial terms; and
 - v. Overall value to GRDA.
 - d. Bidder's Performance Capability. GRDA may consider the Bidder's demonstrated ability to perform the required work. Any of the following may be grounds for disqualifying the Bidder.
 - i. More than one (1) Bid for the same work from an individual, firm, partnership, joint venture or corporation under the same or different names;
 - ii. Evidence of collusion among Bidders, subcontractors, or material suppliers;
 - iii. Lack of responsibility as shown by past work for GRDA judged from the standpoint of workmanship and progress;
 - iv. Uncompleted work under any Contract with GRDA or any other party;
 - v. Being in arrears on existing Contracts with the State of Oklahoma or GRDA, having defaulted or failed to comply with a previous State or GRDA Contract, or any other just and reasonable cause;
 - vi. Reasonable belief by GRDA that Bidder has engaged or is engaging in a discriminatory practice; or
 - vii. Any violation of the regulations of the Construction and Properties Department, in title 260, Chapter 65 of the Oklahoma Administrative Code, or other information indicating that the

bidder is no longer responsible nor qualified to do business with the State; or any violation of GRDA or Oklahoma Office of Management Enterprises Services rules, or other information indicating that the Bidder is no longer responsible nor qualified to do business with the State.

2. Lowest Responsible Bidder or Best Value Bid Comparisons. In comparing Bids, GRDA may consider not only the bid prices, but also other factors that impact whether a Bidder is the lowest responsible bidder or best value bidder, including, but not limited to, efficiency, reliability, durability, economy of operation and maintenance, accessibility for repairs, cost of special construction made necessary by the equipment offered, safety and performance record of the Bidder, relative risk associated with the Bidder, and any guarantees associated with the project. GRDA may, at GRDA's sole discretion, elect to enter into negotiations and allow for a best and final offer with one or more potential bidders on a best value award.

V. CONTRACT AWARD

1. Anticipated Contract Award. GRDA reserves the right to award multiple contracts, or no contracts, pursuant to this RFP. GRDA anticipates that, if a Contract is awarded pursuant to this RFP, the award will be made on or before: 6/14/23
2. Contract Award, Bonding, Insurance, and Execution.
 - a. Contract Award. The Contract(s), if any, shall be awarded to the best value Bidder as determined in the sole discretion of GRDA.
 - b. Contract Insurance. The prevailing Bidder must provide proof of insurance and bonding with terms approved by GRDA, to the extent such items are required by the Contract.
 - c. **Exceptions to Contract Limited to Exceptions Statement.** By submitting a Bid, all Bidders acknowledge and agree that all exceptions to the Contract must be specifically listed in the Exception Statement, and that: (i) any exceptions to the terms of the Contract in any other form are void and waived by Bidder; and (ii) Bidder will be deemed to have accepted the Contract as included in this RFP.

VI. OTHER PROVISIONS

1. Bid Ambiguities and Discrepancies. If the total price of the Bid is inconsistent with the unit price times number of units to be delivered, the unit price shall govern. If there is a variance between the amount in words and the figures, the amount in words shall govern.
2. Tax Exempt Status: GRDA is exempt from the payment of any Sales or Use Taxes and, pursuant to 68 O.S. § 1350, *et seq.*, and § 1401, *et seq.*
3. Applicable Laws: By submitting a Bid, the Bidder acknowledges that all applicable Oklahoma State laws, municipal ordinances, and the rules and regulations of all authorities having jurisdiction over construction of the project (in force and effect now, and as amended) shall apply to the Contract throughout, and they will be deemed to be included in the Contract. The laws of the State of Oklahoma shall apply to any dispute arising from or related to this Bid. The state district courts of the State of Oklahoma shall have exclusive jurisdiction and venue to adjudicate any such disputes.
4. Drug Free Workplace. GRDA seeks to provide a drug free workplace to all of its employees. All contractors working on a GRDA facility shall comply with GRDA's drug free workplace policies.
5. GRDA Reservation of Rights. GRDA reserves the right to reject any or all Bids, to waive any and all

informalities, to evaluate Bids, to award or not award contracts, and to disregard all nonconforming, nonresponsive, and/or conditional Bids.

-End of Page -

ATTACHMENT A: COVER LETTER AND EXECUTIVE SUMMARY
Solicitation 1382

(attach cover letter and executive summary)

**ATTACHMENT B: PROPOSAL TO THE GRAND RIVER DAM AUTHORITY
FOR SOLICITATION 1382**

MADE BY: _____

Business Address: _____

City _____ State _____ Zip Code _____

Telephone Number _____ Fax Number _____

E-Mail _____

The Bidder named above hereby tenders his Bid and declares that the only person or persons interested in this proposal is or are named above; that the Bid is made without collusion with any other Bidder and is in all respects without collusion or fraud. The Bidder further declares he has examined the pro forma contract, the specifications and the contract drawings referred to, all Bidding Documents, and has read the attached "REQUEST FOR PROPOSAL, REQUIREMENTS FOR BIDDING AND INSTRUCTIONS TO BIDDERS" for the **Stillwater Kinzie FDR 6 Line Protection Upgrades** and agrees to furnish all the materials necessary or proper to carry out such contract in the manner, on the terms, and under the conditions set forth therein and in the specifications, **and to perform all work in accordance with the terms of the Bidding Documents, including the RFP and the Contract, all at Contractor's bid price.**

Lump Sum. The sum of all payments delivered by GRDA to Contractor for all Work performed pursuant to this Contract may not exceed \$ _____ Dollars (\$ _____) ("Contract Price"). Contractor must completely perform all work necessary to satisfactorily complete the Project, in accordance with each of the terms of this Contract, for the Contract Price. This rate shall include all direct and indirect costs (e.g. all travel related costs, insurance, profit, administrative overhead, etc.).

Note: If this Bid is made by an individual, it shall be signed with his/her usual business signature, with his/her business address and place of residence; if by a firm, the co-partnership name shall be signed by a member of the firm and the name and address of each member shall be given; if by a corporation, it shall be signed by a duly authorized officer, with the corporate name attested by the corporate seal, and the business address of the corporation shall be given.

Signed: _____

(Seal)

ATTACHMENT C: LIST OF SUBCONTRACTORS
Solicitation 1382

Should this proposal be accepted by GRDA, the following subcontractors will be used (Attach additional pages if required. If no work will be subcontracted, state "NONE").:

Subcontractor identification is for information only and award of Contract does not constitute approval of identified subcontractors nor relieve the Bidder of the responsibility for providing qualified subcontractors. If any other subcontractors are used, Contractor must obtain GRDA advanced approval in writing.

Work Subcontracted

Firm Name and Address

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

ATTACHMENT D: EXCEPTION STATEMENT
Solicitation 1382

This part of the proposal must be completed even if no exceptions are stated.

EXCEPTIONS (Attach additional pages if required. If no exceptions, state “NONE”.)

An “Exception” is (1) Bidder’s inability or unwillingness to meet a term, condition, or specification in the manner specified in the Request for Proposal and/or (2) an additional term, condition, or specification proposed by Bidder. A copy of (1) the proposed Contract or GRDA Terms and Conditions and/or (2) Specifications is included in the Request for Proposal. In a document titled “Exception Statement” Bidder must clearly identify all Exceptions to the terms, conditions, and specifications. Bidder must also state with specificity the reasons for taking Exceptions and all modified terms and additional terms it proposes to be included in the final Contract or GRDA Terms and Conditions and Specifications.

One of the GRDA’s evaluation criteria will be the number and extent of the Exceptions. Bids containing Exceptions to the Contract, Terms and Conditions, and/or Specifications may be rejected as non-responsive. Other than Exceptions that are stated in the Exception Statement, each Bidder will be deemed to have agreed to comply with all terms, conditions, and specifications of this request for proposal. If Exceptions are not identified in the Bid Proposal, any Exception raised following the notification of the award of the contract could result in the Bid Proposal being rejected from further consideration.

If Exceptions are not identified in the Bid Proposal, any Exception raised following the notification of the award of the contract may not be considered and may result in the Bid Proposal being rejected from further consideration.

ATTACHMENT E: BIDDER'S PROPOSED CREW SCHEDULE
Solicitation 1382

Crew Foreman (attach experience description): _____

Crew Size: _____

Equipment: _____

Planned Work Schedule: _____ Days/Week; _____ a.m. to _____ p.m.

ATTACHMENT F: LISTING OF APPLICABLE EXPERIENCE
Solicitation 1382

ATTACHMENT G: MINIMUM SAFETY REQUIREMENTS
Solicitation 1382

GRDA will consider the safety records of potential contractors prior to awarding bids on contracts. Any bid submitted must include the following documents for Bidder and for all subcontractors Bidder will use:

- The past five (5) years' Occupational Safety and Health Administration (OSHA) 300 and OSHA 300A logs.
- The past five (5) years' National Council on Compensation Insurance (NCCI) worker's compensation experience rating sheets.

Bidders are required to answer the following questions and submit supporting documentation upon request:

- | | | |
|--|------------------------------|-----------------------------|
| Does the Bidder have a written safety program? | <input type="checkbox"/> YES | <input type="checkbox"/> NO |
| Does the Bidder conduct regular site safety inspections? | <input type="checkbox"/> YES | <input type="checkbox"/> NO |
| Does the Bidder have an active safety training program? | <input type="checkbox"/> YES | <input type="checkbox"/> NO |

ATTACHMENT H: UNIT AND TASK PRICE SCHEDULE

Stillwater-Kinzie Interconnect Substation Upgrade

Solicitation 1382

Task	Qty	Units	Unit Bid Price	Task Price
Mobilization	-	LS	\$	\$
Material Hauling	-	LS	\$	\$
Install Foundation: 69kV Circuit Breaker (SL10X11)	1	CY	\$	\$
Install Foundation: Capacitor Bank (SL13X4)	3	CY	\$	\$
Install Foundation: 69kV Reactor (GS-201)	2	CY	\$	\$
Install Foundation: 69kV Switch Stand (GS-210)	2	CY	\$	\$
Install Foundation: Capacitor Bank RPD (GS-211)	1	CY	\$	\$
Install Below Grade Conduit	-	LS	\$	\$
Install Below Grade Grounding	-	LS	\$	\$
Steel Erection	-	LS	\$	\$
Bus, Bus Fittings, Jumpers Installation	-	LS	\$	\$
Install Electrical Equipment	-	LS	\$	\$
Install Above Grade Enclosures	-	LS	\$	\$
Install Control Cable	-	LS	\$	\$
Install Above Grade Conduit	-	LS	\$	\$
Install Above Grade Grounding	-	LS	\$	\$
Install Relay Panel #105	1	EA	\$	\$
Removal of Existing Structures and Equipment	-	LS	\$	\$
Surplus Material Return	-	LS	\$	\$
Station Rock	30	CY	\$	\$
Clean-up	-	LS	\$	\$
De-Mobilization	-	LS	\$	\$
Total Contract Price				\$

UNIT LEGEND:
LS = LUMP SUM
LF=LINEAR FEET
CY= CUBIC YARD
EA= EACH

Concrete/Rebar and Labor cost for any volume adjustments - \$ _____/CY

Contractor represents that the values and descriptions listed in this Unit and Task Price Schedule are true and correct.

BIDDER: _____ DATE: _____

BY: _____
(Signature)

TITLE: _____

ATTACHMENT I: NON-COLLUSION CERTIFICATE
Solicitation 1382

A Non-Collusion Certificate shall be included with any competitive bid or contract submitted to the Authority for goods or services exceeding \$5,000.00 for this Request for Proposal or Request for Quote.

A. For purposes of competitive bid or contract, I certify under oath that:

1. I am the duly authorized agent of _____,
(Company Name)
the bidder submitting the competitive bid which is attached to this statement, for the purpose of certifying the facts pertaining to the existence of collusion among bidders and between bidders and state officials or employees, as well as facts pertaining to the giving or offering of things of value to government personnel in return for special consideration in the letting of any contract pursuant to said bid;
2. I am fully aware of the facts and circumstances surrounding the making of the bid to which this statement is attached and have been personally and directly involved in the proceedings leading to the submission of such bid; and
3. Neither the bidder, nor contractor, nor anyone subject to the bidder's or contractor's direction or control, has been a party:
 - a. to any collusion among bidders in restraint of freedom of competition by agreement to bid at a fixed price or to refrain from bidding,
 - b. to any collusion with any state official or employee as to quantity, quality or price in the prospective contract, or as to any other terms of such prospective contract, nor
 - c. in any discussions between bidders and any state official concerning exchange of money or other thing of value for special consideration in the letting of a contract, nor, whether competitively bid or not, has paid, given or donated or agreed to pay, give or donate to any officer or employee of the State of Oklahoma any money or other thing of value, either directly or indirectly, in procuring this contract herein.

B. The contractor further certifies that no person who has been involved in any manner in the development of said contract while employed by the State of Oklahoma shall be employed to fulfill any of the services provided for under said contract.

C. If any contract pursuant to this bid is for professional services as defined in 74 O.S. § 85.2.25, and if the final product is a written proposal, report or study, the contractor further certifies that (s)he has not previously provided the state agency or any other state agency with a final product that is a substantial duplication of the final product of the proposed contract.

Authorized Signature

Certified this Date

Printed Name

Title

Telephone Number

Fax Number

E-Mail

ATTACHMENT K: PAYMENT OPTIONS

Solicitation 1382

GRDA payment options are EPay or ACH

Preference may be given to vendors that accept EPay as method of payment if analysis estimates that such appears to result in a lower cost to GRDA. Additional payment terms may also be taken into consideration in the analysis process.

NOTE: This is not a credit card payment at time of sale (POS transaction). It is an electronic VISA payment after an invoice has been submitted and processed for payment. Payment terms on VISA payments are in accordance with those agreed upon on the solicitation and the resulting PO/Contract.

When a vendor elects to accept payment by EPay, the vendor will be assigned a 16-digit ghost account number (no physical plastic) which remains at a zero credit limit until an invoice is received from the vendor and processed by GRDA Accounts Payable. Once an invoice from a vendor has been processed for payment the vendor will receive a secure remittance advice via email providing the invoice information and full card account information authorizing the vendor to run the card and post the transaction at which time the account credit limit will return to zero until the next payment.

To learn more about the benefits of the Visa payment program, and to obtain answers to FAQ, click or copy and paste the following URL into your browser: www.bankofamerica.com/epayablesvendors.

Will accept payment by Visa: Yes No (check one)

Visa acceptance signature: _____

Designated Accounts Receivable Contact for Visa remittance advices:

Name: _____

Phone: _____

Email: _____

If a vendor elects to not accept EPay as the payment method, additional terms which provide discounts for earlier payment may be evaluated when making an award. Any such additional terms shall be for discounts for payment to be made no less than ten (10) days and may increase in five (5) day increments up to thirty (30) days. Discounts offered must be in half or whole percent increments. The date from which the discount time is calculated shall be the date of a valid invoice. An invoice is considered valid if it is sent to the proper recipient, the invoiced goods or services have been received, and the invoice includes sufficient detail as identified in the solicitation.

[GRDA Request for ACH Transaction and Authorization Form](#)

Thank you for providing the following information as GRDA moves toward a more efficient method of ACH as the payment method to our vendors. Please add the ACH routing and account number to future invoices if possible.

Vendor Information

Name: _____

Address: _____

City: _____ State: _____ Zip Code: _____

Email: _____

Phone: _____

ACH Delivery:

Bank Routing Number: _____ Account Number: _____

Bank Name: _____

Bank Address: _____

City: _____ State: _____ Zip Code: _____ Beneficiary

Name: _____

Supervisor Signature for approval of ACH _____

Thank you for your business! Sincerely,

Accounts Payable Department

Accounts.payable@grda.com

ATTACHMENT L: NOTICE OF SPECIFICATIONS
Solicitation 1382

The binding and mandatory Specifications applicable to this RFP are attached to the RFP as Exhibit M & Exhibit , and are hereby fully incorporated by reference.

By executing this form, Bidder acknowledges that Bidder has fully and completely examined the Specifications (a copy of which are included as Exhibit H to the Contract), and agrees that any work arising from or related to this Contract must be performed in full compliance with the Specifications.

Authorized Signature

Certified this Date

Printed Name

Title

Contract for Services RFP, Revision No. 11.20.2019

ATTACHMENT M: TECHNICAL SPECIFICATIONS & DRAWINGS
Solicitation 1382



Exhibit M



We deliver affordable, reliable ELECTRICITY, with a focus on EFFICIENCY and a commitment to ENVIRONMENTAL STEWARDSHIP.

We are dedicated to ECONOMIC DEVELOPMENT, providing resources and supporting economic growth.

Our EMPLOYEES are our greatest asset in meeting our mission to be an Oklahoma Agency of Excellence.



CONSTRUCTION SPECIFICATION

Stillwater-Kinzie Interconnect Substation Upgrade

Abstract

Upgrade of existing equipment at the Stillwater-Kinzie interconnect Substation, includes adding a Breaker, Switch, & re-installation of the Capacitor Bank

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0	6/16/2022		Steven Kroll, P.E.
Template Revision No.	Date	Manager, Substation Engineering	Sr. Engineering Manager

1 General

1.1 Miscellaneous

The Contractor shall abide and follow the attached “Technical Requirements” to perform the work described in the “Construction Specifications”.

1.1.1 Water:

Water is not available at the job site.

1.1.2 Electricity:

Electric power will NOT be provided for construction by GRDA. The contractor will be responsible in providing electrical power.

1.1.3 Sanitary Facilities:

Contractor shall provide an adequate number of portable toilets at each construction site for use by workers at the site during the duration of the contract. Portable toilets shall be maintained and cleaned on a regular basis. Rental costs for the toilets and maintenance services shall be included in the contract price.

1.1.4 Telephone:

Contractor shall provide his own telephone lines, if needed.

1.1.5 Contacts:

The GRDA Assistant General Manager has assigned the following Designated GRDA Representatives for purposes of this Contract.

- a) The **Project Manager** for this project is Kyle Birkenfeld at 918-824-7891 or 918-500-5953

1.1.6 Correspondence:

A copy of all correspondence and letters of transmittal shall be sent to: Grand River Dam Authority

Grand River Dam Authority
9933 East 16th Street
Tulsa, OK 74128

Attention: Kyle Birkenfeld, Project Manager
E-mail: kbirkenfeld@grda.com

In addition, a copy of all correspondence and letters of transmittal shall be sent to:

Grand River Dam Authority
P.O. Box 1128
Pryor, OK 74362-1128

Attention: Mr. Steven Kroll, P.E.
Sr. Engineering Manager

E-mail: steven.kroll@grda.com

1.1.7 Invoices:

Invoices for this work shall include the task order number, work order and work step, name of project, and a listing of the percentage of the units on the bid that have been completed as of the time period claimed in the invoice. The invoices should be formatted in the same as indicated in the "Unit Bid Price" schedule. Invoices shall be mailed to:

Accounts Payable
Grand River Dam Authority
P.O. Box 669
Chouteau, OK 74337

A copy of each invoice shall be sent to the GRDA Sr. Engineering Manager, Mr. Steven Kroll, P.E..

1.1.8 Safety:

The Contractor and his subcontractors shall follow all applicable OSHA and GRDA Safety Manual rules. In addition, the contractor shall have at least one person, on site that is OSHA 30 certified, as a minimum.

In addition, the Contractor shall have in place a safety program that is specific to this type of construction, including any site specific safety measures needed. The details of the program shall be included in the proposal.

The contractor is responsible to ensure that all sub-contractors also adhere to all OSHA and GRDA safety standards. The Contractor on-site Supervisor shall provide a weekly report to the GRDA Construction Coordinator/inspector, with daily safety talks, and will include any near misses, safety issues, etc. This shall be provided by Monday at noon the following week.

All Contractor and Subcontractor employees, while at the work site, shall wear appropriate clothing and protective equipment for the work being done.

All accidents shall be reported to the Construction Coordinator/inspector immediately.

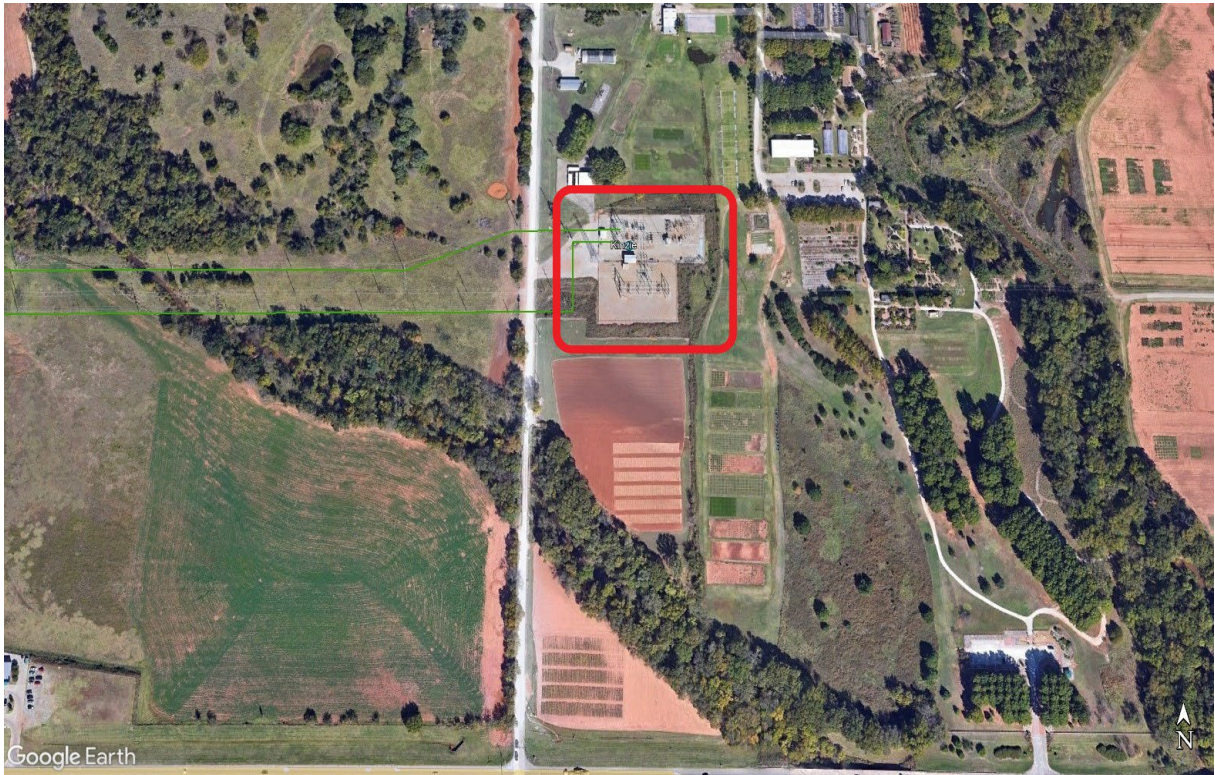
Contractor and Subcontractor personnel, who are not following the safety rules, will be immediately removed from the site by the contractor, and be banned from returning.

No pets shall be allowed at the jobsite.

2 Scope of Work

2.1 Location

This project is to upgrade and install new equipment including a breaker, a switch, and reinstallation of a capacitor bank in Stillwater, OK. The location for the substation is shown and listed below:



The Stillwater-Kinzie Interconnect Substation is in the city of Stillwater in Payne County, Oklahoma. The street address is:

301 S. Sangre RD
Stillwater, OK 74074
LAT. = 36.120°, LONG. = -97.104°

2.2 Project Description

This project shall consist of 69kV upgrades: 69kV Breaker, 69Kv Switch, 69Kv Reactors & Relay Protection Panel. New slab and pier foundations, conduit, grounding, control cables will be installed. Existing equipment and structures will be removed, and the existing capacitor bank will be installed onto a new foundation.

All Electrical connections are to be made with DMC Power Swage fittings unless specified in the drawings. Fittings provided by GRDA per Bill of Material, all tooling to be provided by contractor.

The construction shall be as indicated on the drawings and shall include, but is not limited to the following scope of work:

2.2.1 FOUNDATIONS

Contractor shall install the following foundations in accordance with the drawings. Refer to the drawings for the count and details of each foundation. The contractor is to submit the batch mix for GRDA approval, which should include the name and manufacturer for each admixture and for curing compound. The proposed mix design shall include test data at seven (7) and twenty-eight (28) days of cure from date of pour. A cylinder break will be required along with verification from the engineer before steel & equipment can be placed on the foundation. The concrete mix design strength shall be as listed in the Technical Specification section. Before the foundations are poured, the anchor bolt pattern for the related steel shall be verified by the contractor to ensure that the steel will mount on the foundation correctly.

2.2.1.1 Foundations List

FND #	DESCRIPTION
SL13X4	SLAB FOUNDATION – CAPACITOR BANK FOUNDATION
SL10X11	SLAB FOUNDATION – 69kv CIRCUIT BREAKER FOUNDATION
GS-201	PIER FOUNDATION - 69kV REACTOR STRUCTURE
GS-210	PIER FOUNDATION – 69kv SWITCH STRUCTURE
GS-211	PIER FOUNDATION – CAPACITOR BANK RPD STRUCTURE

2.2.1.2 Foundations Drawings List

DWG	DESCRIPTION
S351PG30	FOUNDATION LAYOUT
S351PG33	FOUNDATION DETAILS – SLAB FOUNDATIONS- 69kv CAP BANK
S351PG33	FOUNDATION DETAILS- SLAB FOUNDATIONS- 69Kv BREAKER
S351PG34	FOUNDATION DETAILS – PIER FOUNDATIONS--69kv SWITCH
S351PG35	FOUNDATION DETAILS- PIER FOUNDATIONS- 69Kv REACTORS
S351PG36	FOUNDATION DETAIL-PIER FOUNDATIONS- 69Kv RPD

2.2.2 STRUCTURAL STEEL ERECTION

The contractor shall assemble and erect the following galvanized steel structures provided by GRDA in accordance with the referenced drawings.

QTY	STR ID	STRUCTURE
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1	GS-201	69kV 3 PHASE REACTOR STRUCTURE (13'-0" STR HEIGHT)
1	GS-210	69KV SINGLE PHASE SWITCH STAND (12'-0" STR HEIGHT)
1	GS-211	69Kv SINGLE PHASE RPD SUPPORT STRUCTURE (8'-6" STR HEIGHT)

2.2.2.1 Structural Steel Drawing List

DWG	DESCRIPTION
S351PE01	EQUIPMENT LAYOUT
S351VS01	STEEL THREE PHASE, VERTICAL BREAK SWITCH STAND, 69kV 13'-0" BUS HEIGHT, LOW BUS, W/ ANCHOR BOLTS, NUTS, WASHERS & MOUNTING PLATES (GS-210)
S351VS02	STEEL 69Kv REACTOR SUPPORT (13FT), W/ ANCHOR BOLTS, NUTS, WASHERS & TEMPLATES (GS-201)
S351VS03	STEEL 69Kv SINGLE PHASE, RPD STRUCTURE, 8'-6", W/ ANCHOR BOLTS, NUTS, WASHERS & TEMPLATES (GS-211)

2.2.3 ELECTRICAL EQUIPMENT

The contractor shall install the following electrical equipment per drawings. The following items will be provided by GRDA.

- 69kV SF6 Gas Breaker
- 69kV Group Operated Switch
- 69kV Bus & Fittings
- 69KV Capacitor Bank
- 69KV Reactors
- Potential Transformer
- Relay Panel

2.2.4 STATION GROUNDING

Contractor shall install station grounding in accordance with the drawings.

DWG	DESCRIPTION
S351PG20	GROUNDING LAYOUT
S351PG21	GROUNDING DETAILS
S351PG22	GROUNDING DETAILS

Below grade ground connections are to be made with DMC Power Swage fittings. Fittings provided by GRDA per Bill of Material, all tooling to be provided by contractor.

2.2.5 CONDUIT AND CABLE

The contractor shall furnish and install all conduits in accordance with the drawings. The contractor is to provide a pull string in all conduits and seal them off with plugs on all open ends. The Contractor is to pull and install cables. Approximate cable lengths are given in the cable schedule; the Contractor is to verify and determine actual cable lengths. The project is within an energized substation and precautions

should be considered. The contractor could be directed to use hydro vac excavation to expose any existing conduit and cables to prevent potential contact and damage to station controls.

DWG	DESCRIPTION
S351PG10	CONDUIT LAYOUT
S351PG11	CONDUIT DETAILS
S105DT01	CABLE SCHEDULE

2.2.6 CONTROL & POWER CABLE TERMINATION

Termination of control cables is to be completed by the contractor. The Contractor shall pull all control and power cables listed in the Cable Schedule drawings as specified in the cable schedule, specifications and drawings to sufficient length as to be able to terminate at any point in the end enclosure. Some required work cable and termination work could be in energized areas during construction.

2.2.7 PROJECT CONSTRUCTION MEETINGS

During the course of the construction, there will be bi-weekly construction coordination meetings held at the site and or virtual. The contractor site superintendent (or his representative) shall attend and share those items of information as needed for the proper coordination of the activities at the site.

2.3 Construction Schedule

The contractor shall allocate crews and equipment as necessary to meet the following dates and those costs should be included in the bid. Contractors may be required to work with other crews. GRDA Utility crews may also be on the worksite during the construction period. Because of the nature of the work, ALL phases of the construction shall be coordinated with the GRDA inspector.

- a) This project shall begin work on or before: **<November 6, 2023>**
- b) This project shall be completed on or before: **<January 31, 2024>**

The Contractor shall provide a schedule of work to the Project Engineer at the beginning of construction. **This schedule is to be updated every two weeks**, reflecting the actual work completed and the expected timeline of the work remaining, and resubmitted to the Project Engineer.

2.4 Work to be Performed by Others

The following work will be accomplished by others. The contractor shall schedule his construction activities to coordinate with the activities of others and install the associated electrical connections as required to complete the installation and make ready for operation. Such items of this work include, but are not limited to, the following.

- a) Relay Settings and Commissioning
- b) Apparatus Commissioning

****** During the outage phase of this project, GRDA Substation, Line, and Relay crews might perform inspections and servicing activities. Coordination with these crews will be handled through the Construction Inspector. ******

2.5 Examination of Site

Prior to submitting a quotation, Contractor should carefully examine the work site and adjacent premises and should conduct necessary investigations to inform himself thoroughly of any difficulties involved in the completion of all work in accordance with the specifications and drawings. No plea of ignorance of conditions that exist or of difficulties that may be encountered in the execution of the work (due to failure in making the necessary preliminary examination and investigations) will be accepted as an excuse for any failure or omission on part of the Contractor to fulfill in every detail all of the requirements of the specifications and/or drawings.

2.6 Material Furnished by GRDA

See the Bill of Material in the drawing packages for the list of material to be furnished by GRDA.

All work of unloading, sorting, bundling, storing, and caring for GRDA furnished materials shall be performed by the Contractor and the costs are to be included in the bid price. Material furnished by GRDA shall be picked up at the Transmission & Engineering Storeroom, 4.5 miles East of HWY 69 on HWY 69A, Pryor, OK by the Contractor and transported to the job site. Costs associated with this material hauling shall be included in Contractor's bid. Not all the material will be available at the start of the job.

2.7 Receiving of Material

- a) All material will be checked out with written forms signed by both the Contractor and GRDA personnel and charged to the proper work order and account. After the Contractor has accepted the materials furnished by GRDA as being in good condition and the correct quantity at the time of issuance, the Contractor is responsible for loss or damage of any nature until the finished structure and surplus materials are accounted for and accepted by GRDA.
- b) The contractor shall be charged the replacement cost for any materials lost or damaged after delivery.
- c) GRDA will periodically furnish Material Status Reports to Contractor indicating GRDA furnished materials on hand and materials on order but not delivered.
- d) Contractor shall accept delivery of the materials provided by GRDA at job site or at the warehouse and shall provide the Construction Coordinator/Inspector with an accurate record of all materials received, condition of material received, and of the disposition and use of such materials.
- e) Contractor shall furnish Supervision, manpower and equipment to unload at the site, handle, haul, sort, store, block, and protect the received materials. Contractor shall reload and re-haul GRDA-furnished materials as required to transport all previously delivered materials from the existing marshaling yards to the work site or storage sites, the cost of which shall be included in the various unit prices where such materials are used.
- f) Hardware shall be handled in such a manner as to protect the finish and shall be clean and bright and free from nicks, chips, or other marks when installed on the structures.

- g) Materials received in damaged condition shall be processed as directed by GRDA. Contractor shall report any shortage or damaged materials, in writing, to GRDA within forty-eight (48) hours of receipt of materials. If any damage is so encountered, the damaged materials may be replaced by GRDA, or it may be repaired by Contractor, if so directed by GRDA. Contractor shall cooperate with GRDA in the event claims for damage against the transportation company are required. If shortage and/or damage reports are not furnished to GRDA within forty-eight (48) hours after receipt of materials by Contractor, the cost of the shortage and/or damage shall be borne by Contractor, if not otherwise collectable.
- h) Delivery schedules will be established with various suppliers by GRDA to provide materials in sufficient quantities for orderly and timely incorporation in the work.

2.8 Surplus and Scrap Material

- a) Contractor shall separate surplus material and scrap material as required by the Construction Inspector and GRDA Warehouse personnel.
- b) Surplus and scrap Material shall be taken to the GRDA facility designated by the Construction Inspector and placed in a manner that will facilitate the return of the Surplus Material to the GRDA Warehouse and for the disposal of the material that has been determined to be Junk Material.
- c) An inventory of returned Surplus Material, in units, will be kept by Contractor. Construction Inspector will initial the inventory when acceptable as accurate and complete. The inventory shall be provided to GRDA Stores Personnel when the Surplus Material is returned.
- d) All returned conductor and shield wire shall be rolled onto wood reels, or coiled and banded.
- e) GRDA may furnish bins at the site for selected recyclable material, depending on the specific project. This will be identified at the pre-bid. The contractor shall make efforts to keep the material separated correctly. At present the bins will be for copper, aluminum, and small steel items.

2.9 Material Furnished by the Contractor

Contractor shall furnish all material (not specifically furnished by GRDA, see the Bill of Material) needed to make this a complete Substation. Below is a partial list (not inclusive) of items to be furnished by the Contractor.

- a) Crushed rock
- b) Fill dirt
- c) Conduit and fittings
- d) Concrete
- e) Rebar and ties
- f) Concrete forms and braces
- g) Exothermic shots and molds needed in excess of those provided by GRDA
- h) Equipment mounting bolts and miscellaneous fasteners needed in excess of those provided by GRDA
- i) Bus and terminal bolts and miscellaneous fasteners needed in excess of those provided by GRDA
- j) Grounding terminal bolts and miscellaneous fasteners needed in excess of those provided by GRDA

- k) Control cable termination fittings
- l) Contractor shall furnish all expendable tools, supplies, and services that are not provided by GRDA.

2.10 Contractor's Responsibility

1. The Contractor shall provide all machinery, tools, equipment, conveyances, permits, materials, supervision, and labor for construction. The only exceptions are GRDA furnished materials as defined in this specification.
2. Any material furnished by the Contractor shall be shown as "Material Provided" on the Contractor's billing. Copies of backup invoices from the vendors shall be provided to GRDA.
3. Contractor shall bring any discrepancy or error found on GRDA drawings to the attention of the Construction Coordinator/Inspector immediately.
4. The Contractor shall provide a qualified on-site Supervisor who is experienced and familiar with all the aspects of construction of this type substation, foundations, and transmission line work. The Supervisor shall be knowledgeable of the safety considerations and rules involved in performing construction work within an energized high voltage substation. The supervisor shall be present at all times that the Contractor's crews are at the site and whenever any subcontractor(s) is at the site. This supervision shall be at the Contractor's expense and included in the bid price.
5. The work under this contract may be in progress concurrent with other construction activities. The Contractor shall coordinate his activities and cooperate with the other Contractors or GRDA crews in the best interests of the project.
6. The Contractor shall make provisions for an area for storage of materials at or near the site. The Contractor shall use mats, dunnage, pallets, or other approved items on which the materials shall be stored, and shall keep the area clean. Equipment should be stored in a manner to prevent damage, and allow easy access for removal of material as required.
7. The Contractor shall keep the site graded smooth and the yard clean of excess material to the satisfaction of GRDA's Inspector at all times.
8. All work shall be done and completed in a skillful and workmanlike manner using GRDA standards and manufacturer or GRDA drawings.
9. Should the Contractor desire a field office, telephone, or water at the substation, it shall be at the Contractor's expense.
10. If, during spreading of substation rock, mechanical equipment used by the Contractor comes in contact with a foundation in such a manner that causes chips, broken corners, or cracks in the concrete, the foundation shall be repaired or replaced at the Contractor's expense.

11. The contractor shall be responsible for prompt unloading of any materials delivered to the job site (required for the work scope defined herein) during a regular 5-day work-week and shall pay any demurrage resulting from delays in unloading.
12. Contractor shall collect all surplus material and return it to GRDA's designated warehouse. Loading and transporting this material shall be at the Contractor's expense and included in the bid price.
13. Upon completion of work, the Contractor shall dispose of any and all non-usable excess materials (less surplus material). All usable materials are to be returned to GRDA.
14. Any additional work and/or changes to the scope of work described herein (after award of the contract) and/or considered to be an extra cost to the contract price shall be brought to the attention of the GRDA's Coordinator/Inspector and Project Engineer prior to initiation of said work for additional payments to be considered. Extra payments will be made only when authorized by GRDA and pre-approved according to the Change Order process defined in Section 3.7 of the Contract. The value of any work not covered by the unit prices will be negotiated between contractor and GRDA.
15. If work is to be performed in an energized substation, Contractor is responsible for maintaining safe working clearances.
16. No employee of Contractor shall have alcohol, or illegal drugs on his/her person or in any vehicle while on site, or while crossing the adjacent lands going to and from said rights-of-way or site. No employee of the Contractor who is under the influence of alcohol or illegal drugs shall be allowed on the work site.
17. Contractor shall use due care to minimize all construction damages. GRDA will be responsible for construction damages to crops, furrows, lands, or personal property which GRDA deems normal and reasonably necessary, provided Contractor has complied with specifications and Contract provisions. Contractor shall pay for all other construction damages.
18. Contractor will not leave holes open overnight. Open holes are to be properly covered and/or fenced, if required, to avoid property damage or injury to personnel. All holes left by the Contractor shall be filled with native soils and machine tamped to surrounding grade.
19. Contractor will be responsible for restoring the surrounding area, disturbed by the construction, to the conditions found at the time construction began as near as reasonably possible.
20. Contractor shall be responsible for the maintenance of existing roads, drainage ditches, and levees, including construction easements if any, from the date any work is begun on the job to the date of its final acceptance.
21. Contractor shall be responsible for the accuracy of all dimensions within the various sections of work according to the figured dimensions of the drawings. Figured dimensions shall, in all cases, be taken in preference to scale measurements, and detailed drawings consistent with general drawings, in preference to general drawings of the same part of the work.

22. Contractor shall exercise care with its operations near existing roads, drainage ditches, and levees. It is a requirement that Contractor maintain the roads, levees, and waterways in such condition that damage to the roads, levees, ditches, or to abutting property shall not result from his operations. Obstruction of natural flow in waterways by stockpiling or storing materials or by placement of equipment or supplies will not be permitted. Collections of debris that prohibit or inhibit normal functioning of drainage facilities shall be removed.
23. Contractor shall make all necessary provisions and do all work required by its operations under the Contract to prevent any interference with power or communications lines, with their operation or maintenance or services thereon, all in a manner satisfactory to GRDA or operator thereof and all costs incidentals thereto shall be included in the bid price.
24. Permanent relocation of communication and power lines, if any, made necessary by this construction work will be the responsibility of GRDA. Any damage done by Contractor to power lines or communication lines shall be Contractor's responsibility and may be settled and paid for by GRDA and charged to Contractor.
25. Contractor and sub-contractor(s) personnel shall not be permitted to enter substation property without prior arrangement and approval from the Construction Coordinator/Inspector.
26. Contractor shall not use the control building for storage or use its sanitation facilities. Contractor shall enter control building only when necessary to perform work as described in Contract.
27. No mechanical diggers may be used for the installation of new conduits or grounding in areas where existing active conduits, direct-buried conductors, and/or grounding are located. This work must be done by hydro-excavation or by hand.
28. Contractor shall take proper means to protect the adjacent areas, structures, and apparatus in any way encountered. The Contractor or sub-contractor(s) shall cooperate with the Construction Inspector and do its work in such a manner as to make as little annoyance as possible to the adjacent property owners and residents.
29. Contractor's employees will properly conduct themselves at all times, keeping in mind the good customer relations which GRDA maintains.
30. Contractor is to keep personnel, material, and vehicles on the designated landowner roads or rights-of way.
31. It is Contractor's responsibility to ensure the base line stakes are intact, and if not, to notify GRDA 48 hours before re-staking is required.
32. Contractor shall install all GRDA furnished signs, switch numbers, feeder numbers, and phase letters. Contractor shall furnish bolts, nuts, washers, and conduit clamps necessary for mounting.

33. Contractor shall make minor modifications required to manufacture, assemble, or mount GRDA furnished material (i.e. making small straps or brackets, drilling, re-drilling, or tapping holes, etc.). All minor modifications requiring ten man-hours or fewer shall be at Contractor's expense and included in bid price. Any modifications requiring more than ten man-hours and any additional cost shall be mutually agreed to with the Construction Coordinator/Inspector and authorized by GRDA using the procedure outlined for Change Orders in Section 3.7 of the Contract in advance of performing the work.
34. Contractor shall field assemble all equipment (except transformer(s)) per manufacturer's instructions and connect it per GRDA's drawings and specifications.
35. Contractor shall, at all times, have at least two crewmembers who speak fluent English. In addition, the site supervisor shall be fluent in English.
36. The Contractor shall provide temporary fencing, as required, such that the energized substation equipment is never accessible to the general public or grazing animals on the properties.
37. Contractor shall provide only qualified journeymen workers for each task, with no more than 1 apprentice per 1 journeyman, and all workers shall perform their work in a safe manner at all times. In this sub-paragraph, a journeyman shall mean a person who has had a minimum of 4 years of relevant on-the-job experience in all aspects of the work to be performed, under the guidance of a qualified journeyman, or as defined by Oklahoma State Statutes.
38. Contractor shall use only Oklahoma licensed electrical journeymen (industrial, commercial) for the work consisting of conduit installation, cable pulling, and control cable terminations.
39. Contractor must obtain GRDA's permission to de-mobilize any personnel and/or equipment for the purpose of relocating to another project or for storm recovery work that is not GRDA affiliated.
40. The contractor shall install and maintain a silt fence or other SWPPP items around the site, if required by the drawings and other parts of this specification.

2.11 GRDA Construction Field Inspector's Responsibilities

1. The GRDA's Construction Field Inspector shall:
 - a. Assist Contractor in coordinating and issuing of material.
 - b. Maintain a schedule of the project with information provided by Contractor.
 - c. Inspect Contractor's work for conformance to specifications.
 - d. Collect and maintain foundation logs and other construction documentation.
 - e. Coordinate any electrical switching clearances required for construction.
 - f. Prepare regular weekly reports of construction progress as required for the Project Engineer and others.
 - g. Assist in resolving any material delivery problems.

- h. Assist Contractor in the preparation of field-initiated Contract Change Order Requests as required for approval through the Change Order process defined in the Contract.
 - i. Be responsible for "As Built" drawings and Equipment Capabilities Drawings.
 - j. Document and submit design adjustments and technical questions to Project Engineer.
 - k. Record any changes during construction that would improve future designs.
 - l. Assist in preparation of completion reports for work orders.
 - m. Other tasks as required to complete the project correctly and safely.
 - n. Require the removal from the site (in the view of GRDA) of any unqualified or unsafe contractor worker.
2. In no event shall the Construction Coordinator/Field Inspector's actions excuse the Contractor from its responsibility under the contract (1) to meet all technical specifications and (2) provide all safety precautions necessary in the performance of the work.

2.12 GRDA Project Manager's Responsibility

- 1. The GRDA's Project Manager shall:
 - a. Review and approve payment invoices prior to forwarding them to the AGM.
 - b. Review and, if acceptable, approve the engineering and technical changes proposed by the Contractor within any Contractor-initiated Change Order Requests.
 - c. Initiate and prepare and GRDA-initiated Change Order Requests.
 - d. Act as the GRDA resource to provide decisions to the Contractor concerning technical and engineering questions that may arise during the construction project.
- 2. In no event shall the Project Manager's actions excuse the Contractor from its responsibility under the contract (1) to meet all technical specifications and (2) provide all safety precautions necessary in the performance of the work.

2.13 GRDA Project Engineer's Responsibilities

- 1. The GRDA's Project Engineer shall:
 - a. Assist in the review of invoices prior to forwarding them to the AGM.
 - b. Review and, if acceptable, approve the engineering and technical changes proposed by the Contractor within any Contractor-initiated Change Order Requests.
 - c. Initiate and prepare and GRDA-initiated Change Order Requests.
 - d. Make regular visits to the site to review progress.
 - e. Act as the GRDA resource to provide decisions to the Contractor concerning technical and engineering questions that may arise during the construction project.
- 2. In no event shall the Project Engineer's actions excuse the Contractor from its responsibility under the contract (1) to meet all technical specifications and (2) provide all safety precautions necessary in the performance of the work.

3 Exceptions and Bid Schedule

Any and all exceptions to the requirements of these specifications shall be clearly documented by the bidder in bidder's proposal.

Contractor shall begin work promptly (see section 2.3) after receipt of official Notice to Proceed. Before start of work, Contractor shall update the schedule provided to GRDA on the bid proposal with a written

work schedule or a Gantt Chart, relating the sequence, approximate duration, and approximate start/end dates for each phase of the required work.

The successful Contractor shall be required to attend a pre-construction meeting at the Engineering office in Pryor. The meeting will be held within two weeks after the award of the contract.

4 SUBSTATION CONSTRUCTION TECHNICAL REQUIREMENTS

TR-1 SURVEYING

1. All work shall be done to the lines, grades, and elevations indicated on the drawings. The Contractor shall provide suitable equipment and competent workmen who shall locate and layout the work.
2. The Contractor shall preserve all monuments, benchmarks, reference points, and stakes. The Contractor will be charged with the expense of replacement of any such items destroyed and shall be responsible for any error or loss of time that he may have caused. Permanent monuments or benchmarks, which must be removed or disturbed, shall be protected until they can be properly relocated. The Contractor shall furnish materials and assistance for the proper replacement of such monuments or benchmarks.
3. The Contractor is to protect and not disturb any of the centerline hubs, which are set or will be set.

TR-2 EARTHWORK

1. The Contractor shall make efforts to locate all underground utilities such as direct burial electrical and communication cables, fluid-carrying pipelines whether they be gas or liquid drainage lines such as storm sewer or sanitary sewage, and any other obstructions. Should an underground utility interfere with the site work, it shall be the Contractor's responsibility to contact the owners and have the exact location of the underground utility made known. GRDA does not guarantee their location by GRDA's plot plan dimensions or guarantee that all underground items have been found.
2. Ground surfaces within the construction areas shall be cleared of all trees, brush, debris, surface vegetation, topsoil, and humus materials down to the subsoil. Stumps and roots larger than two inches in diameter shall be completely grubbed and removed. Matted roots shall be removed regardless of size. Surface vegetation shall be removed complete with roots to a depth of not less than four (4) inches below the ground surface.

The Contractor shall remove all combustible and other waste materials from the construction areas and dispose of it at the Contractor's expense.

Organic topsoil that is free of trash, vegetation, rocks, and roots, shall be stockpiled for later use under these specifications. Other topsoil shall be removed at Contractor's expense.

3. Trees outside the construction area shall be preserved and protected. Unless specifically authorized by GRDA, trees shall be removed from only those areas which will be cut or filled. Consideration will be given to the removal of additional trees only where deemed essential by GRDA, for the safe, effective execution of the work. The trees left standing shall be adequately protected from permanent damage by construction operations. Trimming of standing trees, where required, shall be directed by GRDA's Construction Coordinator/Inspector.

4. All materials necessary for the construction of fills and embankments shall be obtained from contractor procured borrow areas if soil on site is determined to be inadequate by GRDA.

The fill material shall be classified by ASTM D2487 as GW, GP, GM, GC, SW, SP, SW, SC or other material approved by the GRDA Project Engineer with a maximum liquid limit of 35, a maximum plasticity index of 12 and a maximum of 25 percent by weight passing a No. 200 sieve.

All material placed in fills and embankments shall be free from rocks or stones larger than six (6) inches at their greatest dimension, brush, stumps, logs, roots, debris, and organic or other deleterious materials. No rock or stones shall be placed in the upper 18 inches of any fill or embankment. Rocks or stones within the allowable size limit may be incorporated in the remainder of fills and embankments provided they are distributed so that they do not interfere with proper compaction.

5. After preparation of the fill or embankment site, the subgrade shall be leveled and rolled so surface materials of the subgrade will be as compact and well bonded with the first layer of the fill or embankment as specified for subsequent layers.
6. All fill and embankment materials shall be placed in 2 or more horizontal layers not to exceed eight (8) inches in uncompacted thickness. Material deposited in piles or wind rows by excavating and hauling equipment shall be spread and leveled before compaction. Each layer of material being compacted shall have the best practicable uniform moisture content to ensure satisfactory compaction. The Contractor shall add water, and harrow, disc, blade, or otherwise work the material in each layer as required to ensure uniform moisture content and adequate compaction. Each layer shall be thoroughly compacted by rolling and/or by sheep footing. The compacted density of each layer shall be at least 95 percent of the maximum density at optimum moisture content as determined by ASTM D698 when that test is appropriate, or 70 percent of relative density as determined by ASTM D2049 when that test is appropriate. If the material fails to meet the density specified, compaction methods shall be altered.
7. After all construction work under these specifications has been completed, all ground surface areas shall be graded. The grading shall be finished to the contours and elevations indicated on the drawings, or, if not indicated, to the matching contours and elevations of the original, undisturbed ground surface. In any event, the final grading shall provide smooth, uniform surfacing and effective drainage of the ground areas.
8. Materials which are not suitable for fills and embankments, shall be disposed of in a manner and location as approved by GRDA's Construction Coordinator/Inspector. Materials shall be deposited in the disposal areas and leveled and compacted in 12-inch maximum layers. Compaction shall be by not less than three passes by appropriate equipment.
9. Fills and embankments that settle or erode and facilities damaged by such settlement or erosion, shall be repaired, as set out in the general conditions of the contract. The settled or eroded areas shall be refilled, compacted, and graded to conform to the elevation indicated on

- the drawings or to the elevation of the adjacent ground surface. Damaged facilities shall be repaired in a manner acceptable to GRDA.
10. All field and laboratory testing required, to determine compliance with the requirements of this section, will be provided by the Contractor. One density test shall be conducted per 10,000 square feet of each lift of fill material placed or fraction thereof. A minimum of one density test per lift of fill material shall be performed. Density tests may be conducted using either ASTM D1556 "Density and Unit Weight of Soil in Place by the Sand Cone Method" or ASTM D2922 "Density of Soil and Soil- Aggregate in Place by Nuclear Methods (Shallow Depth)". The Contractor will furnish two (2) copies of the test results to the GRDA's and/or CPN's Construction Coordinator/Inspector within 2 working days of the test.
 11. Maximum density for cohesive compacted materials placed under this section will be determined in accordance with ASTM D698. The term "relative maximum density" shall be as defined in ASTM D698.
 12. Relative density for non-cohesive compacted materials placed under this section will be determined in accordance with ASTM D2049. The term "relative density" shall be as defined in ASTM D2049.
 13. If silt fences are required for the project, the contractor shall install and maintain them for the project duration. At the end of the project, they are to be removed. If these are required, see the Storm Water Discharge Plan, as furnished by GRDA for details.
 14. After subgrade preparation and prior to applying the final aggregate layer, areas to receive aggregate surfacing shall be treated with a weed eradicant and soil fumigant, by the Contractor. Weed eradicant and soil fumigant shall be applied in strict accordance with the manufacturer's instructions. The weed eradicant and soil fumigant shall be Allied Chemical "UROX" or "URAB"; Du Pont "Hyvar-X" or "Hyvar XL"; or U.S. Borax "Ureabor".

TR-3 SEEDING

1. General: This section covers the seeding of disturbed earth and sloped areas created by the construction covered by this specification. All areas disturbed during site preparation shall be seeded except for finished driveway areas, the area inside the substation fence, and the 3' – 5' substation perimeter apron.

This work shall include the furnishing of all labor and materials including fertilizer, seed, and all equipment necessary for the preparation of the seedbed, planting of seed, the application of fertilizer, rolling, watering and maintenance. Eroded areas shall be repaired prior to preparation of the seedbed. Additional material shall be added and compacted as required to provide uniform slopes with effective drainage.

The seeding contractor shall furnish equipment manufactured expressly for the work.

2. Materials for seeding:

Fertilizer. Fertilizer shall be applied in appropriate portions if required to ensure adequate establishment of grass to prevent erosion of finished grade.

Commercial fertilizer shall be uniform in composition, free flowing, and suitable for application with approved equipment. Fertilizer shall be stored in a weatherproof storage place in such a manner that it will be kept dry, and its effectiveness will not be impaired.

Seed. Rye grass seed (or approved substitute) in appropriate quantity to establish growth sufficient to prevent erosion of finished grades, shall be applied to all required areas.

3. Seed Application:

Topsoil. The Contractor shall be responsible for the procurement and distribution of suitable topsoil, as approved by the GRDA/ Inspector. The topsoil, as specified, may be obtained from stockpiles on GRDA's property, if available. If GRDA has no available topsoil, the Contractor shall locate and furnish suitable topsoil.

Topsoil for planting operations shall be fertile friable, natural loam containing a liberal amount of humus, and shall be capable of sustaining vigorous plant growth. Topsoil shall be free of subsoil and shall be reasonably free to stone, lumps, clods of hard earth, plants or their roots, stalks, and other extraneous matter.

4. Watering. Watering will be required over the entire seeded area if rainfall is not sufficient to germinate the seed immediately. Water shall be applied to penetrate three inches into the soil immediately after compaction is completed. Watering should be sufficient to establish a complete cover of green before the weather retards growth.

It shall be the responsibility of the Contractor to furnish all pipes, pumps, hose, sprinklers, water, and all other necessary materials to apply water as necessary for maximum growth.

5. Guarantee. The Contractor shall guarantee all work and materials for a period of one year after completion of seeding work. During the guarantee period, all seed that dies shall be replaced by and at the expense of the Contractor.

TR-4 FOUNDATION EXCAVATION AND BACKFILL

The specific type of foundation to be used at each structure location shall be shown in the drawings.

The foundation concrete shall cure a minimum of seven (7) days before erecting steel or applying any loads.

Mat foundations and grade beams should be neatly excavated. Excavation should be accomplished with a smooth-mouthed bucket. If a toothed bucket is used, excavation with this bucket should stop 6-inches above bottom (invert) grade and the excavation completed with a smooth-mouth bucket or by hand labor. Steel should be placed, and the foundation concrete placed the same day as excavation. Debris in the bottom of the excavation should be removed prior to steel placement. If

for some reason the foundation concrete cannot be placed the same day as excavation, the Construction Coordinator/Inspector may require it be sealed to protect the exposed foundation site.

The excavation should be sloped sufficiently to create an internal sump for the runoff collection and removal. Surface runoff water accumulating at the bottom of the excavation should be pumped out prior to concrete placement.

Under no circumstances should accumulated water be allowed to affect the quality of the bearing surface adversely.

Drilled piers should be dry augered and constructed in an expeditious manner. Concrete should be placed in the footing excavations immediately following drilling, under-reaming, and inspection. Under no circumstances should the excavation remain open more than eight (8) hours unless permitted by GRDA's and/or Inspector. Surface runoff or ground water influx accumulating in the excavation should be pumped out prior to placing concrete in drilled pier.

No concrete shall be placed in water except with the written permission of GRDA, and the method of depositing the concrete shall be approved by GRDA.

Top surfaces of substation foundations shall be steel trowel finish with a permissible variation of elevation shown of plus or minus 1/16 inch. The edges of slab type foundations shall have a 3/4 inch chamfer, unless otherwise shown on the drawings.

Pier type foundations with round caps shall be formed using "Sonotube" or reusable round metal forms. The top edge of all round cap foundations shall have a 3/4" chamfer. A "bolt-on" chamfer strip shall be used to obtain the necessary 3/4" chamfer. Sides of all substation foundations, including round caps and chamfers (above finished grade to a minimum of six (6) inches below finished grade) shall be rubbed with carborundum stones. That portion of forms covering the concrete to be rubbed may be removed as soon as concrete has set a minimum of twelve (12) hours. All other forms must be allowed to remain in place a minimum of seven (7) days. Concrete work is not to proceed without authorization of the Construction Coordinator/Inspector.

EXCESS EXCAVATION SOIL AND DEBRIS SHALL BE REMOVED FROM THE PROPERTY AND PROPERLY DISPOSED OF BY THE CONTRACTOR.

All reinforcement bars must have 3" (minimum) clearance on all sides, top and bottom.

The Contractor shall furnish all concrete, reinforcing steel, chamfer strips, and other form material.

For concrete cast-in-place foundation piers, the volume of over excavation shall be filled with concrete. Concrete shall not be placed against backfill or disturbed earth.

The cost of additional concrete used in the foundation (due to over excavation) shall be borne by the Contractor, unless otherwise approved in writing by GRDA.

The quality of the hole will be approved by GRDA before any concrete is placed in the excavation. Where water is encountered, the hole shall be kept dry by pumping during the installation of the foundation.

If unsuitable material is encountered at the bottom of cast-in-place concrete piers, GRDA may direct that a deeper cylinder be installed, and the basis of payment will be the Contract unit price for the depth of circular pier actually installed.

GRDA will furnish all anchor bolts unless otherwise specified in the Drawings.

The Contractor shall maintain accurate records which shall contain the following information for each pier:

1. Contractor's name
2. Drill rig operator's name Pier number and location Shaft diameter
3. Ground elevation Top elevation of shaft
4. Top elevation of rock, when applicable Bottom elevation of shaft
5. Ground water elevation
6. Caving or sloughing of excavation Drilling difficulties
7. Casing insertion, size and length, and whether or not removed Date and time of start and finish excavation
8. Length and diameter of reinforcing bar cage Date and time concrete placed
9. Calculated volume of excavation based on diameter of shaft and bell Total quantity of concrete placed

TR-5 CONCRETE

1. General.

This section covers all cast-in-place concrete and includes reinforcing steel, forms, finishing, curing and other appurtenant work. The Contractor shall notify GRDA 24 hours prior to concrete placement. No concrete shall be placed without the approval of the Construction Coordinator/Inspector.

2. Materials: Where the use of the following material is specified herein, such material shall be in accordance with these requirements:

Cement - ASTM C150, Type I, II

Fine Aggregate - Clean natural sand, ASTM C33. Artificial or manufactured sand will not be used unless specific prior approval of the GRDA is obtained.

Coarse Aggregate - Crushed stone, washed gravel, or other approved inert granular material conforming to ASTM C33. The size of the aggregate shall conform to be ASTM 57 unless otherwise required or permitted by GRDA.

Water - Fresh, clean and free from injurious amounts of oils, acids, alkalis, salts, organized materials or other substances that may be deleterious to concrete or steel.

Admixtures - Admixtures to be used in concrete, when required or permitted, shall conform to the listed specifications.

Air-Entraining Agent - Shall conform to ASTM C260

Water Reducing Agent - Shall conform to ASTM C494, Type A (water reducing)

Water Reducing Retarder - Shall conform to ASTM C494, Type D (water reducing and retarding)

Water Reducing Accel. - Shall conform to ASTM C484, Type E (water reducing and accelerating)

Reinforcing Steel ASTM 615, Grade 60 - Rebar yield strength should match the yield strength used for design

3. Forms:

Pier Form - Sonatube, Sonoco Products, Co., Hartsville, S.C., or approved equal. Lumber - Straight, uniform width and thickness.

Form Oil - Light colored paraffin oil or other approved non-staining material. Polyethylene Film - Fed. Spec. L-P-378, Type I; 6 mil

Membrane Curing - Fed. Spec. TT-C-800, chlorinated rubber, compound minimum 18 percent solids.

4. Limiting Requirements – Concrete shall be controlled within the following limiting requirements:

- a. Specified compressive strength @ 28 days shall be a minimum of 4,000 psi.
 - i. Average strength of a single pour shall exceed specified compressive strength as required in accordance with ACI 318.
- b. Concrete shall be air entrained.

Total air content required (air-entrained and entrapped air) shall be:

Normal Max Size Coarse Aggregate	Total Air Content	
3/4"	6%	±1
1"	5%	±1

Air content shall be measured by ASTM C231, "Test for air content of freshly mixed concrete by pressure method".

- c. Concrete shall be proportioned and produced to have a slump between 3” and 5”. No concrete shall be placed with a slump greater than 5”.

Slump shall be determined by ASTM C143, "Standard Method of Test for Slump of Portland Cement Concrete".

- d. Maximum size of coarse aggregate shall not exceed:
 - i. One-fifth narrowest dimension between forms.
 - ii. Three-fourths minimum clear spacing between reinforcing bars.
 - iii. One-third thickness of slabs.
- e. Concrete may be adjusted to produce the required rate of hardening for varied climatic and job site conditions by incorporation of appropriate admixtures. Prior approval by GRDA is required before these adjustments may be made.

Concrete mix proportions shall be determined on the basis of field experience of trial mixtures in accordance with the provisions of ACI 318. All concrete mix designs shall be approved by GRDA prior to their use on this project.

5. Batching and Mixing – Batching and mixing shall conform to ASTM C94, except as otherwise specified herein.

Before unloading the concrete at the site, a copy of the delivery ticket shall be furnished to the GRDA's Representative. The ticket shall include the following information:

- a. Ticket number.
- b. Time batched.
- c. Time arrived on jobsite.
- d. Time at start of discharge from truck.
- e. Time at end of discharge from truck.
- f. Amount of concrete (by volume).
- g. Mix number.
- h. Batch Type.
- i. Amount of all water added at jobsite by Contractor.
- j. Number of revolutions on the truck's revolution counter before batching and after placement is completed.
- k. Truck number.
- l. Truck driver's name.
- m. Types and quantities of admixtures added to the batch.
- n. Slump of concrete.

When a truck mixer or agitator is used for transporting concrete, the concrete shall be delivered to the site of the work and discharge shall be complete within 1-1/2 hours, or before the drum has revolved 300 revolutions, whichever comes first, after the introduction of the mixing water to the cement and aggregates, or the introduction of the cement to the aggregates, unless a longer time is specifically authorized by the Construction Coordinator/Inspector. In hot weather, or under conditions contributing to quick stiffening of the concrete, a time less than 1-1/2 hours may be required by GRDA.

6. Placement – Concrete shall be conveyed to the point of final deposit and placed by methods which will prevent the separation or loss of the ingredients. During and immediately after depositing, all concrete shall be thoroughly compacted, worked around all reinforcements and embedment's, and worked into the corners of the forms. Unless otherwise authorized, compaction shall be by immersion-type vibrators only.

Concrete shall be placed in accordance with ACI 304, ACI 305, and ACI 306, as applicable.

Excavation, where practicable, shall be dewatered before placing concrete.

Concrete shall be placed with an approved drop pipe in excavations deeper than 10 feet.
Concrete shall be placed with an approved funneling device in excavations less than 10 feet.

Contractor shall not place concrete that has partially hardened or has been contaminated by foreign materials. Mud or foreign materials shall be prevented from entering the concrete or forms during placement operations. Should soil, rock or other foreign material enter the excavation and contaminate the concrete, the contaminated concrete shall be removed before completing the pour.

Concrete shall be placed at a sufficient rate to assure that lifts below have not taken set before fresh concrete is deposited.

Vibrators shall not be dragged through the concrete. Vibrator should be inserted and withdrawn slowly with the vibrator running continuously so that no hole will be left in the concrete. Contractor shall not flow concrete from one location to another by use of a vibrator.

Concrete shall remain in the forms for a minimum of 12 hours.

When loose soil, a high-water table, or other condition which causes the sides or bottom of the excavation to be unstable is encountered, the excavation shall be advanced through use of slurry, a temporary casing, or other approved method. Slurry, temporary casing, or permanent casing shall be used only with the approval of GRDA's Representative.

Concrete placed through slurry or under water shall be pumped with an approved concrete pump as follows:

- a. Concrete shall be placed using a rigid pipe or flexible hose. Placement shall be started with the lower end of the pipe or hose sealed with a rubber gasket wood plug with a line attached, or similar device, lowered to the bottom with the pipes or hose dry. The plug shall be displaced by the concrete and retrieved from the work. The water shall be displaced as the concrete is placed and the end of the pipe or hose shall be kept embedded 2 to 5 feet in the concrete as the concrete is placed.
- b. Should the end of the pipe or hose be accidentally pulled out of the concrete during the placement, the pour shall be immediately discontinued, and the pipe or hose withdrawn from the hole. The pipe or hose shall be resealed at the bottom and returned to the hole with the sealed end inserted into the concrete. Pouring may then be resumed.
- c. The cutoff point shown on the drawings shall be over poured. The excess concrete shall then be dipped out, and visual inspection made of the concrete at the top of the pour. If any contamination of the concrete is observed, it will be necessary to reinsert the pipe or hose a sufficient distance into the concrete and to continue pouring fresh concrete until the contaminated concrete has been replaced by uncontaminated concrete.

Water added to concrete shall be at the Contractor's risk. If water or any admixtures are added at the site, the concrete shall be remixed for a minimum of 25 revolutions.

Cold joints and construction joints are not permitted unless otherwise indicated or specified.

7. Hot Weather Concreting – Except as modified herein, hot weather concreting shall comply with ACI 605. At air temperatures of 90 degrees F or above, special procedures shall be adopted to keep the concrete as cool as possible during placement and curing. The temperature of the concrete shall not exceed 90 degrees F when it is placed in the work.

Whenever the air temperature exceeds 95 degrees F, membrane cured slabs shall be kept wet to promote cooling of the concrete during the curing periods.

8. Cold Weather Concreting – Except as modified herein, cold weather concreting shall comply with ACI 306. The temperature of concrete at the time of mixing shall be not less than that shown in the following table for corresponding outdoor temperature (in shade) existing at the time of placement:

<u>Outdoor Temperature</u>	<u>Concrete Temperature</u>
Below 30°F	70°F
Between 30°F & 45°F	60°F
Above 45°F	45°F (50° F if temperatures are expected to decrease during curing period)

When deposited, the temperature of heated concrete shall not be over 80° F.

When freezing temperatures may be expected during the curing periods, suitable means shall be provided for maintaining the concrete at a temperature of not less than 50 degrees F for five days or 70 degrees F for three days after the concrete is placed. Concrete and adjacent form surfaces shall be kept moist at all times. Sudden cooling of concrete shall not be permitted.

The use of calcium chloride will be permitted **PROVIDED THAT** justification for its use is provided to GRDA and the use of it is approved by GRDA prior to its use.

9. Reinforcement – Reinforcing bars shall conform to ASTM Standard Specification for Deformed Billet Steel Bars for Concrete Reinforcement, Designation A615, Fy = 60 ksi.

Steel reinforcing bars shall be supplied by the contractor. Bars shall be placed in the concrete where shown on the drawings. Unless otherwise shown on the drawings or directed, measurements made in placing the bars shall be to the centerlines of the bars. Reinforcement drawings show bar placement details and bar bending details, including bar lists and bending schedules. Before the reinforcing bars are placed, the surfaces of bars and the surfaces of any metal bar supports shall be cleaned of heavy flaky rusts, loose mill scale, dirt, grease or other foreign substances. After being placed, the reinforcing bars shall be maintained in a clean condition until they are completely embedded in concrete. Main reinforcement shall have a minimum clear protective cover to the face of concrete as shown on the drawings. Reinforcing bars shall be accurately placed and secured in position so that they will not be displaced during

the placing of concrete, and special care shall be exercised to prevent any disturbance of the reinforcing bars in the concrete that has already been placed. Precast concrete blocks may be used for supporting reinforcing bars.

Rustproof metal chairs, metal hangers, metal spacers, or other satisfactory metal supports may be used for supporting reinforcing bars.

Welding on reinforcing bars in lieu of tie wire will not be permitted. A minimum of 50% of the rebar in rebar cages shall be tied with wire.

Reinforcing cages outside their final position in the foundation shall be of sufficient rigidity to permit lifting and handling without deformation.

Lap splices in reinforcing bars shall be a minimum length as calculated for Class B splices in accordance with ACI 318 latest revision, unless otherwise shown on the drawings or approved in writing by GRDA. Welded splices shall not be used for reinforcing bars.

10. Forms – Forms shall be designed to produce hardened concrete having the shape, lines, and dimensions shown on the drawings. Forms shall be substantial and sufficiently tight to prevent leakage of mortar and shall be maintained in proper position and accurate alignment. Forms shall be thoroughly cleaned and oiled before concrete is placed and shall not be removed until the concrete has hardened sufficiently to support all loads without damage.

Where concrete is placed against dry or porous surfaces, such surfaces shall be covered with polyethylene film to protect the concrete from loss of water. Joints in the film shall be sealed with waterproof sealing tape. Unless otherwise permitted by GRDA, all concrete except pier concrete which is in contact with earth or granular fill shall be placed against 10 mil polyethylene film.

Vertical concrete surfaces above extended footings shall be formed.

Form ties shall be of the removable end, permanently embedded body type. Outer ends of the permanently embedded portions of form ties shall be at least one inch back from adjacent outer concrete faces.

Chamfer strips shall be placed in forms to bevel all foundation edges and corners except where otherwise noted. Bevel dimensions shall be 3/4 inch by 3/4 inch unless otherwise shown on the drawings.

11. Embedment's – Materials that are to be embedded in the concrete shall be accurately positioned and securely anchored. Embedment's shall be clean of all concrete spatter and other foreign substances.
12. Finishing Formed Surfaces – All fins and other surface projections shall be removed from all formed surfaces from which the forms are stripped except exterior surfaces that will be in contact with earth backfill. The surfaces shall be rubbed down using a mortar mix made from the same cement the foundation concrete is made of. This will assure color blending.

The removable ends of all form ties shall be removed and the recesses resulting from such removal shall be filled with mortar.

13. Finishing Unformed Surfaces – The unformed surfaces of concrete shall be screeded and given an initial float finish followed by a second floating at the time of initial set.
14. Curing – Concrete shall be protected from loss of moisture for at least seven (7) days by polyethylene film or membrane curing compound. Membrane curing compound shall be applied as recommended by the manufacturer. Concrete shall not be permitted to freeze for at least seven (7) days following placement.
15. Repairing Defective Concrete – Defects in formed concrete surfaces shall be repaired to the satisfaction of GRDA within 24 hours, and defective concrete shall be replaced within 48 hours after the adjacent forms have been removed. All concrete which is porous, honey combed, and otherwise defective to a depth in excess of one inch shall be cut out and removed.

Concrete repair work shall be performed in a manner that will not interfere with thorough curing of surrounding concrete. Mortar and concrete used in repair work shall be adequately cured and rubbed out.

16. Concrete Testing – The contractor shall provide an A.C.I. certified concrete testing company, acceptable to the owner, to conduct quality control testing of the concrete used on this project.

The Contractor's independent testing laboratory shall furnish test equipment, test cylinder molds, and trained personnel (ACI Concrete Laboratory Testing Technician – Grade 1 or equivalent) to perform all required field tests, make the required concrete test cylinders and deliver test cylinders to the testing laboratory. Concrete sampling for tests and cylinder making shall be done conforming to ASTM C172.

All test cylinders shall conform to the size and shape of requirements conforming to ASTM Specifications C 470/C and 470M.

The Field Testing Technician shall perform the following tests:

- a. Prepare test cylinders conforming to ASTM C31, with not less than one set of cylinders (minimum four cylinders) from each concrete foundation or each 30 cubic yards or fraction thereof. Each set shall be taken from only one batch of concrete. Any additional random testing will be done at the discretion of GRDA's Representative up to approximately every 15 cubic yards of concrete.
- b. Cylinders shall be identified with the following information:
 - i. Date and time prepared.
 - ii. Delivery ticket number.
 - iii. Sequential cylinder numbers indicating structure number and cylinder number (e.g. 1/1-01).

- c. Slump Test conforming to ASTM C143.
- d. Air Content Test conforming to ASTM C231.
- e. Temperature determination conforming to ASTM C1064.

The Field-Testing Technician shall discard concrete used for slump and air tests and deliver the test cylinders to the Testing Laboratory for compressive strength tests. Slump and Air Test results shall be furnished to the Testing Laboratory for inclusion in the Cylinder Test Reports.

The Testing Laboratory will cure and test concrete cylinders conforming to ASTM C192 and C39, testing two cylinders at seven days of age and two at 28 days of age.

The Contractor shall make arrangements with the Testing Laboratory to receive a copy of all test reports and for the Testing Laboratory to send 1 hard copy and 1 electronic copy of all test reports to GRDA. The costs of providing the reports will be paid by the Contractor.

Should the statistical data indicate an unacceptable combination of average strength and standard deviation, the Contractor shall take immediate corrective action as instructed by GRDA.

17. Submittals – The Contractor shall provide the following submittals to GRDA prior to foundation installation for GRDA’s approval:
- a. Concrete Mix Design.
 - b. Reinforcing steel bar schedule, details and erection drawings.
 - c. Selected Testing Laboratory name and address.
 - d. Name and address of ready-mix plants that will supply the concrete.
 - e. Grouts and curing agents.

TR-6 ROADS

1. GRDA assumes no responsibility for securing right to use or the condition of maintenance of any road (including public roads) or structure that may be used by the Contractor in performing the work under this Contract or in the transferring of materials to and from the site of the work. Roads must be returned to their original condition.
2. GRDA will make no payment to the Contractor for any work done in constructing, improving, repairing, or maintaining any road or structure for use in the performance of work under this Contract, unless the road construction is part of the contract and included as a pay item.
3. Roads subject to interference by the work shall be kept open. The Contractor shall provide, erect and maintain, at its own expense, effective barricades on which shall be placed acceptable warning and/or detour signs at each side of any road obstruction caused by the operations of the Contractor and shall comply with Federal, State, and Local regulations.

TR-7 CULVERTS

1. GRDA’s Grading Layout and/or Plot Plan drawing will show culverts that will be required for the

project.

2. Culverts and associated materials shall conform to the following requirements:

Reinforced concrete pipe: ASTM C-76 - Size, shape, gage, and lengths as indicated on the GRDA drawings.

Steel pipe: 16 gauge corrugated hot dipped galvanized, round, lengths and sizes as directed by the GRDA.

3. Culvert trenches shall be carefully graded to the required slopes then carefully tamped to receive and fit the lower part of the pipe. If rock is encountered in the excavation it shall be removed and replaced with suitable earth or granular fill material to a minimum depth of six (6) inches below the bottom of the pipe.
4. Culvert pipe shall be laid on the prepared bed starting at the outlet end with sections firmly joined, and with the outside laps of circumferential joints (if any) pointing upstream. Longitudinal seams shall be placed at the side of the trench.
5. Backfill shall be placed adjacent to and over the pipe in six (6) inch lifts, with each layer thoroughly compacted (minimum 12 inch covering).

TR-8 CRUSHED ROCK SURFACING

1. Subgrade preparation: Immediately prior to surfacing, the subgrade shall be shaped to the grade and cross-section indicated on the drawings.
2. The surface course shall be five (5) inches compacted thickness per attached drawings. Initially spread to (6) inches before compaction.
3. The compacted surfaces shall be free of ruts, depressions, and other surface disturbances and shall be finished to the lines and grades indicated on the drawings.
4. Surfaced areas shall be maintained by the Contractor until final acceptance of the work under these specifications.

Material shall conform to the following:

Crushed Stone. Crushed stone surface for the substation surface shall conform to Type 'A', of Oklahoma Department of Transportation Section 703.01 – Mineral Aggregate, Miscellaneous Use. Any sub base stone specified on the drawings shall be Type 'C' of the Oklahoma Department of Transportation Section 703.01 – Mineral Aggregate, Miscellaneous Use.

Crushed stone shall consist of fragments of hard, durable particles of stone showing an abrasion loss of not more than 40%, containing not more than 5% soft, friable material (No Fines), and shall be free from an excess of flat or elongated pieces. Below, for reference, is the gradation

requirements (refer to the ODT standard for the most current standard and the complete requirements):

Sieve Size Percent Passing (By Weight)

	<u>TYPE A</u>	<u>TYPE C</u>
2 inch		100
1 1/2"	100	90 - 100
1"		80 - 100
3/4 "	40 – 100	
1/2 "		60 - 80
3/8 "	30 – 75	
No. 4	25 – 60	40 – 60
No. 10	20 – 43	25 – 45
No. 40	8 – 26	15 – 30
No 200	4 – 12	0 - 5

The material passing the 40 sieve shall conform to the following requirements:

Liquid Limit (Max) 25

Plasticity Index (Max) 6

Measurement. The stone will be measured by the ton, the weight determined by weighing the transporting vehicle loaded and empty.

Stone Revetments. Shall be hard, durable stone that will not disintegrate upon exposure to the elements or be easily broken from handling. Stone shall be well mixed and reasonably free from earth, dust, and other objectionable materials. Stone used for erosion control or for retention ponds, shall be as specified in the Grading Detail.

Placing. The stone revetment shall be dumped or rolled into place in such a manner that the smaller stones will be uniformly distributed through the mass. Sufficient handwork shall be done to procure a neat and uniform surface.

Measurement. The stone revetment will be measured by the ton, the weight determined by weighing the transporting vehicle loaded and empty. The quantity, installed and accepted, will be paid for at the contract unit price.

Payment will be made under:

Pay Item:	Pay Unit:
Stone Revetment for	Square Yard Erosion Control (12" thick)
Stone Revetment for	Square Yard Pond (4" thick)
Surface Rock	Cubic Yard (6" thick)

TR-9 GROUNDING

1. The station grounding system consists of a buried main grid, which is interconnected with driven ground rods and/or ground wells. The grounding system shall be connected to all structures and noncurrent carrying metal parts of electrical equipment such as tanks, switch mats, switch handles, frames, bases, cabinets, and connections from equipment neutrals.
2. The main below-grade ground grid shall consist of soft-drawn copper cable buried a minimum of 24" below dirt grade arranged in the pattern shown on the plan view. Above grade ground connections are to be constructed with Copper Weld conductor. Each structure is to be connected to a minimum of two (2) #4/0 cables (unless noted otherwise on the drawings).
3. Ground rods shall be $\frac{5}{8}$ " or $\frac{3}{4}$ " diameter, 10' minimum, copper-clad steel rods furnished for this purpose. Connections between the rod and the ground grid shall be copper wire, size as per GRDA Drawings.
4. All below grade grounding system connections shall be made using the exothermic process or Swage Compression as shown on GRDA drawings. Connections shall include all cable-to-cable splices, T's, X's, etc.; all cable to ground rods; and cable lug terminations to steel unless otherwise shown.
5. Once the grounding system is complete, GRDA shall test the designed ground system and if additional ground rods and/or grounding materials are required, these shall be installed in accordance with GRDA's directions.
6. Grounding of all equipment frames, tanks, switch handles, switch mats, or bases shall be connected to the main ground grid as shown on GRDA drawings by Copper Weld cable. The ground connections, when bolted, shall be bolted to the equipment with $\frac{1}{2}$ " S.S. bolts, (2) flat and (1) Belleville washer with silicon bronze nuts. Bolt length shall not exceed five threads showing past nut, after nut is torqued. All bolts to point north, east, or down when feasible. When other methods of grounding are used, such as a single groove clamp, these shall be used as shown on the drawings.
7. Group operated switch mechanism shafts shall be grounded to the operating handle with approved grounding (Braid) devices.
8. All grounding shall be performed as shown on GRDA Construction drawings and details. All nut and bolt connections shall be made with bolts long enough to have at least one full thread of the bolt past the nut, and no more than 5 full threads past the nut.
9. Electrical equipment mounted by bolts to a well-grounded steel structure shall be considered adequately grounded. A copper bus is not required between equipment and structure unless specified in drawings.

10. Switch ground mats shall be installed being held down with rebar stakes. Switch ground plates shall be installed by being placed on the final rock grade and held in place with rebar stakes. The Contractor shall furnish rebar stakes.
11. All exothermic and Swage ground grid connections shall not be buried until inspected and approved by the Construction Coordinator/Inspector.

12. Exothermic Welds:

The Contractor shall supply all shots required more than those provided by GRDA. All shots and molds shall either be Cadweld or Thremoweld brand. The shots must be from the same manufacturer. The exothermic welds shall be installed as per the following specifications:

a. Conductor General

- i. Clean and dry the conductor removing any contaminants (oil, insulation, water, etc.) present in conductors.
- ii. Use a safety solvent to wash the conductor, and then dry it.
- iii. Remove oxides with a wire brush.
- iv. Dry conductors with a torch.
- v. If slag deposits cover more than 20% of the connection surface, or any strands are exposed after slag has been removed, the connection must be rejected.
- vi. The connection should be essentially free from porosity.

b. Mold, General

- i. A mold is designed to last for an average of 50 connections. This will vary according to the care given the mold during use.
- ii. If the mold is excessively worn, replace it with a new mold.
- iii. Molds shall not be altered in the field.
- iv. Heat mold with torch (to above 212°) to dry the mold after each use.
- v. Remove any mold packing material or contaminants in weld cavity of the mold.
- vi. Clean the mold with a soft brush, cloth, or newspaper. DO NOT USE A WIRE BRUSH.
- vii. Apply Cadweld / or equal "mold sealer" external to the mold around the conductor or rod to retard leakage of the weld metal.

- c. Welding to Steel and/or Ground Rods
 - i. Clean the steel and/or ground rod with a rasp or grinder to bright metal. All scale, paint, and/or other coating must be removed. Wire brush will NOT suffice. Grease must be removed with safety solvent before cleaning.
 - ii. Clean galvanized surfaces with a wire brush or emery cloth. Extra heavy-galvanized steel must be cleaned with a rasp.
 - iii. If the steel and/or ground rod is moist, heat with a torch (from the back side if possible). Any carbon deposit from the flame must be removed.

13. Ground Wells

- a. The construction of the ground wells shall be as detailed on the drawings.
- b. The backfill material shall be BENTONITE.
- c. The bentonite shall be mixed with water to form a slurry mixture with the consistency of pancake batter. The water mixture shall be between 14 and 18 gallons of water to 50 pounds of bentonite.
- d. The copper electrode shall be installed, with a weight on the end, extending to the bottom of the well before the bentonite is installed.
- e. The well shall be filled with bentonite to within 6" of the horizontal run of ground cable (within 2'-6" of the surface).
- f. All wells shall be filled with the electrode and bentonite on the same day as the well is drilled. If this becomes impossible and is approved by the Construction Coordinator/Inspector, the filling may be delayed. However, the well must be cleaned out just before the electrode and bentonite is installed, using a method approved by the Construction Coordinator/Inspector.

TR-10 STATION POST INSULATOR ASSEMBLY

1. General

GRDA will supply insulators in quantities and strengths required for use in the assemblies. The insulators shall be assembled in accordance with the drawings.

The strength of insulator to be used on each structure is shown on the drawings furnished by GRDA. The Contractor shall exercise care that the correct strength of insulator is used at each structure.

Hardware shall be handled in such a manner as to prevent contacting the ground. All hardware items shall be clean when installed.

Horizontal bolts or pins shall have the nut and/or cotter on the structure side of the connection. In the case of the horizontal conductor configurations, horizontal bolts or pins of center-phase

connections shall have the nut and/or cotter consistently on one side or the other of the connections. On steel towers, these nuts and/or cotters shall face the ladder leg side. Vertical bolts or pins shall have the nut and/or cotter on the underside of the connection.

Ball and socket connections in a horizontal or semi-horizontal plan, as in dead-end or vee string configurations, shall have the cotter pins installed with the eyes on top so that the spread portions may be viewed from the ground. Ball and socket connections in a vertical plan shall have the eyes of the cotter pins on the tower side with the long axis of the pins perpendicular to the conductor.

Humpback cotters shall not be spread. Straight cotters shall have the ends spread and turned back to an opening of 180 degrees. Cotter pins in the suspension insulators must not be spread.

Heat-treated “U” bolts of suspension and dead-end clamps shall be properly seated and nuts uniformly tightened, as indicated on an approved torque wrench, to the following torque limits.

“U” Bolt Size (in.) Minimum (ft. – lbs.) Maximum (ft. – lbs.)

1/2	45	50
9/16	65	70
5/8	80	85
3/4	95	100

After the initial tightening of dead-end clamps, the “U” bolt shall be further seated by firmly driving them down with a hammer. The nuts shall then be fully retightened to the proper torque.

All other bolted fittings shall be installed with bolts properly seated and nuts securely and uniformly tightened.

Bolted electrical contact surfaces of jumper terminals, paralleled groove clamps, terminal lugs, tee connectors, etc., shall be cleaned, coated with Alcoa No. 2 electrical joint compound, abraded through the grease with emery cloth or wire brush, and then bolted together with grease in place. All bolted electrical connections shall be torqued in accordance with the manufacturer’s recommendations.

2. Handling of Insulators

All insulators shall be handled carefully during transportation, assembly and installation on the structures or equipment to avoid chipping or damage of any kind.

All insulators shall be clean when installed and all other parts free from dirt.

Only clean rags, or other methods acceptable to GRDA, free from any abrasive material, shall be used for cleaning insulators.

Wire brushes shall not be used for the cleaning of any parts, metal or otherwise. Workmen shall not climb on insulators at any time.

In the completed substation, all insulators and insulator assemblies shall be clean.

3. Damaged Insulators

Damaged insulators shall not be installed.

All damaged or defective insulators shall be returned to GRDA's designated yard for inspection and disposition by GRDA.

TR-11 DISCONNECT SWITCHES

Disconnecting switches shall be field assembled by the Contractor on station post insulators and installed on structures intended for these purposes. The control mechanism for the switch shall be installed and the switches shall be aligned for perfect and free operation in accordance with the manufacturer's instructions or recommendations. Switches shall be connected to the station bus per the GRDA drawings and manufacturer specifications.

Motor operated switches should have 180° degree CCW rotation to open, as viewed from the top.

Set screws shall not be set until the switches have been inspected by GRDA's construction coordinator/inspector or GRDA substation personnel.

TR-12 CONDUIT AND RACEWAY

1. General

All wiring is to be inspected by GRDA for adherence to practices and GRDA standards and all devices used for installing the control cable will be checked for proper operation.

Contractor shall install all cables in accordance with drawings and the Cable Schedule included there with.

Immediately after cables are cut from the reels, they shall be identified at both ends with cable markers. The cable markers shall be securely fastened to the cables to make certain that they will not become separated from the cables during the training and termination process. Where more than one cable is installed in a conduit there shall be a tag for each cable. The cables shall be identified individually where they enter into the conduit. The cable tags shall be located at convenient locations for inspection and shall not be concealed by equipment or other material.

The Contractor shall store reels in an area reserved only for that purpose and shall protect them from damage by construction activities or the handling of other material in storage. Wire in coils, and any wiring accessories, which can be damaged by moisture or rough handling, shall be kept in a storeroom or suitable trailer.

In handling reels, proper precaution shall be taken by the Contractor to prevent any damage to the cable or any reel that is returnable for reel credit. Reels shall be rolled only in the direction indicated by the manufacturer and no reel containing cable shall be dropped from a truck or from

any other comparable height, under any circumstances. In turning reels, particularly after the lagging has been removed, bars shall be used in such a manner that they will not bear against the cable. Reels shall not be rolled over rocks or other projecting objects that are liable to damage the cable, and when it is necessary to roll unlagged reels over soft ground, plank tracks shall be provided by the Contractor to keep the reel from sinking causing possible damage to the cable.

2. Direct Buried

Where new cable trench is required, a trench with a minimum 12" width shall be excavated to a depth of 18" below finished grade. A 3" layer of sand shall be placed in the trench and cables, then laid in place in the center of the ditch. An additional 3" layer of sand shall be placed over the cables, then covered with the 2" X 8" pressure treated timbers.

Cable shall be installed in the trenches or raceways in accordance with GRDA's Substation Cable Tabulation and Drawings. Allowances should be made for proper lead length to all equipment. Under no circumstances shall a cable be spliced in the substation.

3. Conduit and Cable

Conduit runs shall be installed a minimum of 18" below final yard grade. In an energized substation the contractor could be directed to use hydrovac excavation to expose any existing conduit and cables to prevent potential contact and damages to station controls. The Contractor shall leave sufficient length of cable at each end of the conduits so that connections can be made to all electrical equipment. The Contractor shall identify each cable at both ends with T&B Ty – Raps and T&B markers provided by the Contractor.

All rigid PVC conduits, condulets, and conduit fittings will be supplied by the Contractor. All material should be of the same type (manufacturer) and color when feasible. (Minimize mix and match for appearance and consistency). Conduit and connectors shall be Electrical Grade Schedule 40. Minimum conduit size in the yard shall be 1 ½" in inside diameter, except as noted on the drawings. When three or more conduits are installed in one trench, the conduits shall be held in place with spacers (of the proper size) to assure that the spacing between the conduits is held in a uniform manner. Spacers shall be installed at least every three (3) feet along the conduit run.

All field cut conduits shall be cut square, and then reamed to remove any sharp edges. Conduit bends shall be made so that the internal diameter of the conduit will not be effectively reduced and the protective coating on the inside and outside of the conduit is not injured.

Conduit mounting brackets must adequately anchor and support the weight of the conduit and the contents without visible deflection. Whenever such brackets are not adequate to withstand the tensions incurred during the cable pulling operation, the Contractor shall temporarily brace such conduits and supports.

Conduit terminations shall be provided by the Contractor with a bushing or suitable protector to guard against damage to the insulation or outside covering of the cables.

Any cable pulled in a manner resulting in damage to the shielding shall be removed and replaced at the direction of the Construction Coordinator/Inspector and at the

Contractor's expense. The Contractor shall utilize non-hardening cable pulling lubricant at all times.

Openings beneath equipment shall be closed with Carboline Pyrofoam 700 or acceptable equal where the cables are in conduits and the conduits project through the openings.

Where the cables entering the equipment are not in enclosing raceways, the openings shall be closed with Dow Corning 3-6548 silicone RTV foam, Manville Type 103 Cera Form board, or acceptable equal flame retardant materials. The Cera Form boards shall be not less than 1 inch thick and shall be cut to fit closely around the outside surfaces of the cable where the cable passes through the boards. The boards shall be securely placed in the floor opening and all openings around the cables and the boards shall be sealed with Manville Cerablanket or acceptable equal and all exposed surfaces of the board and Cerablanket shall be covered with a 1/8 inch thick coating of Carboline Intumastic 285.

Openings shall not be closed until all the cables through the openings have been installed and tested.

Unused openings beneath equipment shall be closed with Carboline Pyrofoam 700, Manville Cera Form board coated with a 1/8 inch thick coating of Carboline Intumastic 285, Dow Corning 3-6548 silicone RTV foam, or acceptable equal flame retardant materials.

Installation of materials shall be in accordance with the manufacturer's recommendations. The materials shall be finished to provide a smooth, neat appearance.

Liquid tight flexible conduits shall be installed with sufficient slack and with large enough radius bends to prevent kinking or straining that might damage the conduit joints or jacket. In terminating such conduit, the Contractor shall not remove any of the jacket material from the flexible steel edges. No flexible conduit or fittings shall extend below the finished rock surface. Flexible conduit shall not exceed 4' in length without expressed permission from GRDA. All flexible conduits longer than 6' shall be secured with conduit clamps at a maximum of every 4'.

The Contractor shall install pull-tape or pull-rope in all spare conduits.

In an energized substation the contractor could be directed to use hydro vac excavation to expose any existing conduit and cables to prevent potential contact and damage to station controls.

The contractor shall repair driveways cut during control cable installation. Repairs shall be completed in accordance with the requirements outlined in Earthwork section.

TR-13 ALUMINUM BUS AND CONNECTORS

1. The GRDA will furnish all aluminum bus, bus bar, bus connectors, and bus support fittings.

2. The Contractor shall install aluminum tubular bus, welded (or Deutsch, whichever is provided) connections and joints, including any "A" frames, flexible risers and runs to switches and other equipment in the yard. Install 336 MCM ACSR in 2" or 2½" runs over 19 feet in length and 795 MCM ACSR in 4" or 6" aluminum bus runs over 23 feet in length.
3. To minimize corona loss, any roughness of welds shall be stainless steel wire brushed and sanded with emery paper or crocus cloth to present a smooth finish.
4. All bolted and compression connectors and equipment terminals which join aluminum to aluminum shall have Contractor provided oxide inhibitor such as "NO-OX-ID A Special" compound liberally applied to such contact surfaces in accordance with the manufacturer's instructions. Bus connections shall be bolted with ½" S.S. bolts, (2) flat and (1) Belleville washer with silicon bronze nuts with maximum five threads showing past nut once torqued. All bolts to point North, East, down or to the outside of equipment frames (i.e. breakers, transformers, etc.).
5. All connections involving aluminum and copper shall be buffered by aluminum-copper bi-metal transition pad furnished by the GRDA.
6. All bus connections to terminal connectors shall be completed by the Contractor either by welding, bolting, compression, or all, as may be required. The Contractor shall complete the attachment and connection of all aluminum or copper wire to equipment connectors and bus supports, as required for a complete installation ready for service.
7. Production welds shall be examined visually. Any weld with a linear crackline indication shall be rejected. All welds shall be to the satisfaction of the Construction Coordinator. Any weld deemed not satisfactory by the Construction Coordinator/Inspector shall be removed and replaced at the Contractor's expense.
8. All tubing lengths used in connections to equipment shall be formed from one continuous piece, whenever feasible. All tubular bus shall be installed straight, level and/or plumb. Installation, support, or alignment of bus components which does not produce these conditions will not be accepted. The Contractor shall use particular care in the storage, handling, and installation of the tubular bus, fittings, and connectors to avoid indentations and/or abrasions of any kind. Prior to installation, the Contractor shall inspect the tubular bus, fittings, and connectors for indentations, abrasions, pits, burs, and defects of any kind, which shall be repaired by hand rubbing with a fine emery cloth. Upon completing the tubular bus installation, the Construction Coordinator/Inspector will inspect the work to assure compliance with the above requirements. Improperly installed and/or damaged tubular bus, fittings, and connectors, shall be repaired or replaced to the satisfaction of the Construction Coordinator/Inspector by the Contractor at no additional cost to GRDA.

9. All bends in tubing shall be made in a neat manner, without damage to the tubing, and shall be free of kinks, indentations, or flattened surfaces. All bends shall be made at normal temperature and the use of heat in making bends will not be permitted.
10. All tube cutting shall be done with an approved pipe cutter. No flame cutting will be permitted.
11. The Contractor shall furnish all welding rods or wire, as necessary, for completing any welded electrical installations required by this specification. For compression type fittings (Deutsch/or similar), the Contractor shall supply the necessary equipment to install the connectors properly.
12. Expansion connectors shall be installed per manufacturer's instructions and properly adjusted for ambient temperature.
13. The Contractor shall cut, drill, and bend aluminum bus bar as needed to complete the aluminum bus installation, as per the GRDA Drawings. Bus bar shall be furnished by GRDA.
14. The Contractor shall be responsible for the aluminum alloy 4043 welding wire, consumable gases, tools, machinery, safety, equipment and manpower to clean, weld and fabricate, erect or install the bus, drill a minimum of two (2), ¼" weep holes per each run, and make all connections to the equipment in accordance with GRDA Drawings and in a manner satisfactory to GRDA.
15. Welder Qualifications - The Contractor is responsible for the quality of welding. ASME Section IX, "Welding Qualifications", shall be used as a guide for the qualification of welding procedures and operators. The welder must be a certified welder of aluminum and show evidence of proficiency by welding a series of samples as a prerequisite to making the final weld. If GRDA desires, the samples are to be tested in the field by bending to the fatigue point or taking a cross section of the joint and inspecting it visually. Welders, after qualifying, shall not be replaced on this welding duty unless such action is acceptable to GRDA. All welds shall be made by reversed-polarity direct current, gas metal-arc (MIG) or alternating current gas tungsten-arc (TIG) welding process. The shielding gas shall be welding grade argon, helium, or a mixture of the two.
16. Welds - All joints to be welded shall be free of moisture and hydrocarbon. Degreasing shall be done with a non-toxic solvent (naphtha, mineral spirits, alcohol, or acetone) to leave a minimum of residual on the parts. Sufficient time must be allowed for evaporation of the solvent prior to welding. Wire brushing with a stainless steel wire brush should be employed after solvent cleaning to remove any oxide films, water stains, etc. and to permit optimum fusion and soundness of the weld. The working area shall be shielded from winds and drafts by barriers and covers and protected from atmospheric contamination. All welds shall be made with clean metal and the completed weld shall have a smooth finish and shall indicate good fusion with parent metal. Defective areas must be entirely removed by chipping or machinery prior to application of subsequent weld passes. The cross sectional area of the weld should not be less than that of the smallest member being joined. Members being joined should be tack welded in

place to prevent misalignment during the welding process. Support and alignment shall be as required to provide a finished bus arrangement with correct centerlines to adjacent sections.

17. Torque Values - If the equipment manufacturer's erection instructions do not include recommended torque values for bolt tightening or specify an alternate method for tightening bolted electrical connections, torque values shall be in accordance with those listed in the table which follows (torque values listed on the issued for construction drawings, if present, overrule this table). This table is not to be used when Belleville washers are used.

Torque Values For Dry, Unplated, Nonlubricated Bolts

Bolt Size	18-8 Stainless Steel	Brass	Silicon Bronze	Aluminum 24ST-4	316 Stainless Steel
	ft.-lb.	ft.-lb.	ft.-lb.	ft.-lb.	ft.-lb.
1/4"-20	6	5	6	4	7
1/4"-28	8	6	7	5	8
5/16"-18	11	9	10	7	12
5/16"-24	12	10	11	7	12
3/8"-16	20	16	18	12	21
3/8"-24	22	18	20	13	23
7/16"-14	31	26	29	19	33
7/16"-20	33	27	31	20	35
1/2"-13	43	35	40	26	45
1/2"-20	45	37	42	27	47
9/16"-12	57	47	53	34	59
9/16"-18	63	51	58	38	66

Bolt Size	18-8 Stainless Steel	Brass	Silicon Bronze	Aluminum 24ST-4	316 Stainless Steel
	ft.-lb.	ft.-lb.	ft.-lb.	ft.-lb.	ft.-lb.
5/8"-11	93	76	86	60	97
5/8"-18	104	85	96	67	108

3/4"-10	128	104	118	82	132
3/4"-16	124	102	115	80	130
7/8"-9	194	159	178	125	202
7/8"-14	193	158	178	124	202
1"-8	287	235	265	184	300
1"-14	259	212	240	166	271

TR-14 STRUCTURES AND STEEL

1. General

Each separate component of the structure will be distinctly marked (by mfg.) with letters and numbers to identify the position of the component in the structure.

Bolts, nuts, washers, plates, brackets and other small parts will be bundled in packages convenient for handling and marked for identification (by mfg.).

Any shipping lists prepared by the fabricator will be furnished to the Contractor.

There may be some redrilling or adjustment needed to the structures, in order to make the components correctly fit. The contractor shall plan on 5% redrill of mounting holes.

2. Unloading and Handling Structure Components

When unloading the structures, the Contractor shall note the condition of all components and report any damage to the galvanizing or the structure components to the Construction Coordinator/Inspector and confirm such damage on the carrier's shipping papers at the time of delivery.

If damaged components are encountered, GRDA shall direct whether the component is to be repaired or replaced.

Stored structures shall be placed on adequate blocking to prevent dirt, mud, and other foreign materials from adhering to the structures.

Care shall be exercised during unloading and handling to avoid the bending of the components, damaging the galvanizing, or otherwise damaging the structure.

Structure components shall not be dragged. Slings for picking up the structures shall be of such material or protected in such a way as not to cut into the steel components or otherwise damage the galvanizing.

Components bent, twisted, or damaged during unloading or in transit from the point of delivery to the structure site, or at the structure site, shall not be erected, but shall be reported

immediately to the Construction Coordinator/Inspector. Such damaged components shall be replaced or repaired at the direction of the Construction Coordinator/Inspector, and at the expense of the Contractor.

When approved by GRDA, materials on which galvanizing has been broken or otherwise damaged may be cleaned by wiping with clean rags saturated in mineral spirits or xylene and then painted with Galvanox or other equivalent protection as approved by GRDA.

3. Erection Procedures

The Contractor shall assemble and erect the structures in accordance with the fabricator's erection drawings, bills of material, bolt lists, and other drawings furnished by GRDA.

The structure type, pole heights, location, and orientation shall be in accordance with the construction Drawings furnished by GRDA.

The weight of each component of the structure will be shown on the fabricator's erection drawings. The erection drawings will also show the center of gravity of each component and the lifting points for one or two point erection lifting of each component.

The method of structure assembly and erection by the Contractor is subject to review and approval by GRDA. However, the Contractor shall remain fully responsible for the erection operation regardless of such review and approval by GRDA.

The structures shall be erected square and plumb, or in the correct cambered position if required.

The method of assembling and erecting shall be such that no component is subjected to an erection stress greater than that for which it is designed.

All erection limitations or procedures shown on the fabricator's erection drawings shall be strictly observed.

Extreme care shall be taken to establish and maintain the true geometric shape of the component or complete structure being assembled and erected.

Misalignment or misfit of adjacent sections or members due to the method of assembly or erection shall be corrected by adjusting the assembly or erection method as required to eliminate the problem.

Bolts shall be of the type, length, and diameter shown on the drawings. Only wrenches of proper size, which will not deform the nuts nor cut the protective coating, shall be used.

Bolts shall be installed in the orientation shown on the erection drawings and included in these specifications.

All components shall be clean at the joints before being bolted together.

Nuts shall be installed with the flat surfaces against the face of the component being bolted, and torqued to the specified value.

After the structure is completely erected, the structure shall be inspected by the Contractor to verify that all bolts are installed correctly.

Any bolts of incorrect diameter and length shall be replaced.

A standard nut and jam nut shall be used at each bolt unless otherwise shown or directed by GRDA or the fabricator's drawings.

After all bolting is completed on an erected structure; GRDA will make spot checks to verify bolt tightness.

4. Ground Assembly

When portions of structures are being pre-assembled on the ground before erection, such assembly shall be on surfaces or blocking which will provide support to prevent distortion of the components and prevent dirt, mud and other foreign materials from adhering to the component.

All bolts shall be installed in all connections of pre-assembled structures and bolts shall be at least finger tight.

Poles, components and complete structures shall be handled and erected with slings and other equipment of such materials and suitably protected so as not to cut, bend or otherwise damage the structure components or finish.

All necessary measures shall be taken by the Contractor during handling and erection to prevent damage to the structure and its finish

Components of structures shall be erected in such a manner that no dragging against other components already connected shall occur.

A reasonable amount of drifting will be permitted with suitable measures taken to minimize or eliminate damage to the finish coating.

Re-drilling, reaming, or other corrective measures, if required, shall be undertaken only as directed by GRDA.

5. Misfabrication Correction

The Contractor shall notify the Construction Coordinator/Inspector of any fabrication errors or damaged components.

No correction, repair, or replacement of misfabricated or damaged components shall be undertaken without the approval of GRDA.

No drilling, welding or other modification will be allowed on the steel poles without the approval of GRDA.

6. Structure Identification

Any structure number signs shall be mounted on the arm of steel pole structures.

The signs and attachment devices for these signs will be furnished by the Contractor and are to be mounted according to instructions.

The Contractor shall drill pilot holes in the face of the structure arm and attach signs with self-tapping screws.

7. Existing Steel Structures

Existing steel may require modifications to the members to accommodate the new equipment. This may require the relocation of web members and/or drilling new mounting holes. In some cases additional brackets may need to be added to mount equipment or components on. The contractor shall plan on drilling 100% of needed mounting holes of new equipment or components.

The contractor shall plan to install all added brackets that, as identified on the drawings, are needed to either relocate or install new equipment and components. These added brackets may require the contractor to drill new holes in the steel.

TR-15 ROCK EXCAVATION

Rock excavation shall consist of boulders exceeding one-half cubic yard in volume or solid ledge rock which in the opinion of GRDA, requires its removal, drilling, wedging, sledging, or barring.

No soft or disintegrated rock which can be removed with a pick or digging machine, no loose, shaken or previously blasted rock, no broken stones, and no rock which may fall into the opened excavation from outside the limits of excavation will be considered as rock excavation.

When solid rock is encountered in the excavation, it shall be stripped of earth, and GRDA notified and given proper time to measure the same before removal; all rock removed which has not been measured by GRDA will not be estimated as rock excavation.

Blasting shall not be allowed unless authorized by GRDA and shall be subject to all landowners' within a three-quarter mile radius signed approval.

Explosives shall be stored, handled and used as prescribed by the laws and regulations of the United States and the political subdivisions thereof. Special attention shall be given to the immediate disposal of paper wrappings from explosives, which are poisonous to livestock.

All permits for the use of explosives required by Federal, State, and Local authorities shall be obtained by the Contractor.

The use of explosives will be considered as incidental, included in the unit price and not as a separate work unit.

The Contractor is responsible for, and hereby indemnifies GRDA from any and all damage resulting from the use of explosives.

After rock has been measured, a cylindrical excavation shall be cut by drilling, sledging or such other means as may be necessary to the normal foundation depth and of a diameter equal to the normal foundation diameter.

In estimating the number of cubic yards of rock excavation, the radius squared of the foundation excavated will be multiplied by the average depth from the surface of the rock to the normal depth of the foundation. This result, multiplied by the number "pi" and recorded in cubic feet and divided by 27 will give the number of cubic yards allowed.

In general, the natural earth at each structure site shall be disturbed as little as possible during construction.

In all cases, the ground surface at each structure site shall be graded to provide drainage away from structure legs and completed reasonably smooth and compact.

No additional payment shall be made for rock excavation. The Contractor shall include the cost of rock excavation in the unit price for the concrete installation.

TR-16 TEMPORARY CASINGS

Temporary casings, if required to maintain the dimensions of the excavation, shall be of sufficient strength and rigidity to maintain the excavation lines against the soil and water pressures present in the excavation.

The temporary casing shall fit the augured hole tightly and be one inch greater than the diameter of the caisson.

Preferably, the casings shall follow the excavation without driving; but if the site conditions prevent this, driving or jacking will be permissible.

All casings shall be removed from the excavation as the concrete is being placed to prevent soil or other matter from sloughing into the excavation. Permanent casings will be used only with the written permission of GRDA.

The Contractor shall furnish the temporary casings and shall bear all costs associated with the installation and removal of the casings, unless otherwise stated by GRDA.

TR-17 SHIELD WIRE INSTALLATION

The Contractor shall install the shield wires in accordance with the drawings, specifications and data furnished by GRDA.

The method proposed by the Contractor for stringing the shield wires shall be reviewed by GRDA prior to commencement of stringing.

Particular care shall be taken to ensure that the shield wire does not become kinked, twisted, abraded, or damaged in any manner.

The shield wire shall be attached to the hardware assembly by bolted suspension clamps or compression connections as shown on the drawings. All assemblies shall be installed to the recommendations of the manufacturer.

Shield wire jumper loops shall be of sufficient length and formed to provide a uniform curving transition from dead-end assembly to dead-end assembly. The minimum distance from the jumper loop to the structure shall be 3".

TR-18 BARBED WIRE FENCE

1. This section covers the material and construction of a five (5) strand barbed wire fence to stand 4' – 2" above surface grade when erected. The location of the fence, if required on this project, is identified on the drawings.

2. MATERIALS:

Barbed Wire (manufactured in U.S.A.) shall consist of two #12 ½ gauge, class 3 twisted galvanized steel line wires with four point hardened #14 gauge barbs. Barbs shall be spaced no more than 5" apart. Gaucho wire is unacceptable.

Corner/Gate Posts shall be 8" dia. X 8' – 0" long ACA or CCA treated southern pine set 3' – 6" deep, and shall be plumb in appearance.

Pull Post/Braces shall be 4" dia. X 8' – 0" long ACA or CCA treated southern pine set 3' – 6" deep, and shall be plumb in appearance.

Line Posts shall be 6' – 6" long heavy-duty steel "T" posts with anchor plate and tie wire notches. Posts shall be hot-dip galvanized or painted with an anti-corrosive paint. Posts shall be set 2' – 0" deep, and be plumb in appearance.

Gates with materials for locking will be provided by the GRDA.

Staples shall be 1 ½" long galvanized cut point type.

Wire Ties shall be #9 gauge galvanized steel.

3. INSTALLATION: All materials shall be new and both materials and workmanship be first quality. The fence shall be erected true to the established lines shown on the fence site plan drawing. Fence wire shall be taut.
 - a. At grade depressions where stresses tend to pull the line posts out of the ground, a corner post shall be installed at the critical point. In situations where a corner post is not adequate, the project engineer will determine an alternate method of construction.
 - b. An intermediate brace (pull post assembly) shall be installed at intervals in the fence span as follows:

<u>FENCE SPAN (FT.)</u>	<u>NUMBER OF BRACES REQUIRED</u>
400 - 600	One at center of span
600 - 1000	Two at equal intervals
1000 - 1400	Three at equal intervals
1400 - 1800	Four at equal intervals
1800 - 2200	Five at equal intervals

- c. All wood posts are to be set in concrete.

TR-19 CHAIN LINK SUBSTATION FENCE

- 1. Fence shall consist of one of the following alternatives. The specific option shall be detailed on the project drawings. In all cases the bottom of the fabric shall be installed such that it is 4" above the soil. Fence Posts are to be installed on 10' spacing normally. Any adjustment needed from this shall be at one end of a run. The 10' shall be a maximum spacing.

- a. New eight-foot high fence

The Contractor shall furnish the material and perform the labor for erecting a seven-foot high (7') galvanized chain-link fence topped with three strands of barbed wire one-foot high (1'), complete with gates, as shown on the drawings and specified herein. The overall height of the fence, with barbed wire is eight feet – four inches (8'- 4") [from the top of dirt grade to the bottom of the fabric is 4", the fabric is 7', and the barbed wire is 1'].

- b. Fencing with razor wire

If fencing is to be topped with razor wire, the specifications below apply as applicable for providing and installing the razor wire on an existing fence. Existing fencing will usually be eighty-four inches (84") high and above that will be a combination of the three strands of barbed wire. The Contractor will remove the existing extension arms and barbed wire, supply and install 90° V-shaped extension arms, and supply and install new barbed wire and razor wire as shown on the drawings and specified herein. The overall fence height will remain at eight feet (8').

- c. Drawings

Vendor shall submit drawings on all component parts. Samples and test certificates on materials will be furnished as requested by GRDA.

2. MATERIAL:

- a. Fabric

The fabric shall be eighty-four inches (84") high, woven in a two-inch (2") diamond shaped "chain link" mesh. Top selvage shall have a twisted and barbed finish and the bottom

selvage to have a knuckle finish. Fabric shall be constructed from zinc coated steel (hot-dip galvanized after weaving). Wire shall be nine-gauge (9 ga.) with tensile strength of 80,000 pounds per square inch. Fabric shall be true and even, so that when installed the weave will not be irregular or uneven but will be free of "waves" and will present a neat appearance.

The fabric shall be zinc coated in accordance with the latest ASTM A392 for Class II, two ounces (2.0 oz.) of zinc per square foot of wire surface.

b. Bottom Tension Wire

One (1) strand of nine-gauge (9 ga.) galvanized steel spring coil wire, with fasteners, shall be furnished for entire length of fence by fence supplier, installed at the bottom of fabric when fence is erected, and fastened with eleven-gauge (11 ga.) hog rings on twenty-four inch (24") centers. The coating shall be same type as fabric.

c. Barbed Wire

Barbed wire shall consist of three (3) strands each (6 strands required for razor wire installations) of galvanized #12-1/2 gauge wire, twisted, with large four (4) point hardened aluminum #14 gauge barbs or steel barbs, with complete barbed wire assembly galvanized after fabrication. Barbs shall be spaced no more than five inches (5") apart.

d. Razor Wire

Razor wire shall be manufactured with a continuous one-inch (1") wide by 0.020" thick stainless steel tape containing clusters of four (4), needle-sharp barbs located on four-inch (4") centers. Sharpened blades in the clusters are in an elongated "H" pattern with each leg being approximately 1.2" long measured from the center of the cluster. The stainless steel tape is cold pressed around a high tensile spring steel core wire and formed into a coil to produce eighteen-inch (18") diameter loops.

e. Fabric Ties

Fabric ties shall be furnished for attaching fence fabric to line posts every fourteen (14") inches and for attaching fabric to top rail every twenty-four (24") inches. The fabric ties for the top rail and the line posts; nine-gauge (9 ga.) galvanized steel tie wires shall be used.

f. Extension Arms

All line and corner posts shall be fitted with galvanized 45° extension arms (90° extension arms required for razor wire installations). Arms to carry the three (3) barbed wires (6 wires for razor wire installations) shall be securely fastened to the line posts. Top most barbed wire shall be twelve inches (12") above fabric and twelve inches (12") out from top rail. Extension arms on intermediate posts shall be made of heavy duty pressed steel or malleable iron and those on all corner posts shall be made of eleven-gauge (11 ga.) heavy pressed steel or heavy malleable iron. Arms having projections that bend down over the barbed wires are not acceptable. Wires must fit in slot on the arm and be locked in place.

Arms are to be riveted or welded to base before galvanizing. Arms shall withstand a minimum weight of 250 pounds from end of arm.

g. Line Post

Line posts shall be pipe, two (2") Nominal Pipe Size, Schedule 40 or greater, minimum yield strength 25,000 PSI. Posts are to be hot-dip galvanized 2 oz. per sq. ft. Posts shall be of sufficient length to be set in two-feet, six-inches (2'-6") deep concrete foundation.

h. End, Corner Post

Corner posts shall be constructed of three-inch (3") Nominal Pipe Size, hot-dip galvanized pipe, Schedule 40 or greater. Used, re-rolled, or open seam posts are not permitted. Posts shall be of sufficient length to be set in a three-foot, six-inch (3'-6") deep concrete foundation.

i. Gate Posts

Gate Post Size	Wt Per Foot	Gate Opening Dimension
3"	Nominal Pipe Size - 7.58 Lbs.	Single to 7' or double 14'
3-1/2"	Nominal Pipe Size - 9.11 Lbs.	Single 8' or double to 20'
6"	Nominal Pipe Size - 18.97 Lbs.	Single to 18' or double to 36'
8"	Nominal Pipe Size - 28.55 Lbs.	Over 36'

j. Gate Frames

Gate frames shall be constructed of hot-dip galvanized pipe. Corner fittings are to be heavy pressed steel or heavy malleable iron ells with four rivets per corner. Barbed

wire and fittings shall be included. For gates fourteen-feet (14') and larger, the contractor shall furnish one and one-quarter inch (1-1/4") Nominal Size Pipe, Schedule 40 or greater, for internal bracing. Pipe bracing shall be in the pattern shown on the drawings. Gate fabric shall be the same as that used for the fence.

k. Walk-in Gates

Walk-in gates shall be single-hung gates normally for a four-foot (4') wide opening, constructed in accordance with items in this specification.

l. Drive-in Gates

Drive-in gates shall be double-hung gates, width as specified, constructed in accordance with items in this specification.

m. Locking

All gates shall have provision for padlocking. Latch and locking hardware is to be heavy malleable iron or heavy duty pressed steel and must be hot dipped galvanized after fabrication.

n. Miscellaneous Gate Fittings

Hinges shall be heavy pattern with large bearing surfaces of adequate strength for the gate and shall not turn under the action of the gate. Hinge action shall be such that gates may be easily opened and closed by one person. Hinges shall provide for full 120-degree inward swing of gate leaf.

Latches shall be plunger bar type and arranged to engage the gate stop as shown on the drawings. Single gates less than ten-feet (10') wide may be provided with a forked latch. Latches shall be arranged for padlocking with the padlock accessible from both sides of the gate.

Stops shall consist of a roadway plate with anchor set in concrete and arranged to engage the plunger.

Keepers shall consist of mechanical devices for securing and supporting the free end of gates when in the full-open position.

Gates shall be installed so that they cannot be removed without disassembly of the hardware.

o. Top Rail

Top rail shall be constructed of one and one-quarter inch (1-1/4") Nominal Size Pipe, hot-dip galvanized, Schedule 40 or greater, provided with outside sleeve type couplings

not less than seven inches (7") long. Couplings must fit top rail snugly to prevent sagging of top rail at joints. Top rail to pass through base of line post tops and form a continuous brace from end to end of each stretch of fence. Top rail to be securely fastened to end, gate, or corner posts by heavy duty pressed steel connections. Top rail is to be provided in random lengths averaging not less than twenty (20') feet in length. The Contractor shall provide expansion couplings in straight sections longer than 100 feet.

p. Braces

Horizontal braces are to be used on end gate and corner posts. Braces are to be one-piece, constructed of same material as top rail, to be spaced midway between top rail and ground, and to extend from end, gate, or corner post to first adjacent line post.

q. Tension Bars and Bands

Tension bars for attaching fabric to terminal posts shall be one-quarter inch (1/4") by three-quarter inch (3/4") high carbon steel. Bands for attaching tension bar to terminal posts shall be eleven-gauge (11 ga.), one-inch (1") wide with three-eighths inch (3/8") carriage bolts and nuts spaced on fourteen-inch (14") centers. Banding for braces at ends and corners is to be eleven-gauge (11 ga.), one and one-quarter inch (1-1/4") wide.

r) Miscellaneous Fittings

All fittings required for proper installation of fence shall be malleable iron or heavy duty pressed steel and must be hot dipped galvanized after fabrication.

s) Galvanizing

All items shall be hot-dip galvanized after fabrication in accordance with the latest approved ASTM Specifications. Unless specified otherwise, minimum galvanizing shall be 2.0 ounces of zinc per square foot of surface.

t) Tolerance

Standard Mill Tolerance on all framework members and chain link fabric will apply.

2) CONSTRUCTION:

a) Concrete:

All concrete shall conform to the General Specifications for Concrete Work. The cost of the concrete shall be included in the fencing pricing.

b) Galvanized Chain-Link Fence:

The fenced areas are shown on the plot plan and the fence shall be installed in accordance with the manufacturer's recommendation and these specifications.

The fence shall be either eight (8') or nine (9') feet high (as per the drawing and application) above finished rock grade when erected (including barbed wire). The fence fabric shall be stretched tight.

All line posts shall be spaced not more than ten (10') feet apart on centers. They shall be set not less than two and one-half (2-1/2') feet in concrete, the concrete to be not less than ten (10") inches in diameter. Posts shall be centered in the concrete and holes.

Extension arms are to be in the shape of a forty-five degree (45°), designed to extend at a forty-five (45°) degree angle to the outside from vertical, with lock wire for securely fastening the barbed wire, equally spaced with the top strands located twelve (12") inches above the fabric and twelve (12") inches out from the fence line. The barbed wire shall be so attached to the extension arm in an angle slot that it will automatically lock in place by tension. The barbed wire will be stretched tight the full length before locking in.

The razor wire (if required on the drawings) shall be attached to the barbed wire and extension arms using hog rings. The razor wire shall be positioned so that one complete coil extends approximately eighteen inches (18") horizontally along the barbed wire.

Braces are to be installed midway between the top rail and ground, and to extend from terminal post to first adjacent line post. Braces are to be securely fastened to posts by heavy

duty pressed steel connections, then trussed from line post back to base of terminal post with three-eighths (3/8") inch galvanized rod, complete with truss tightener.

Terminal end and corner posts shall be set not less than three-feet, six-inches (3'-6") deep in concrete, the concrete to be not less than eighteen (18") inches in diameter. Gate posts shall be set not less than three-feet, six-inches (3'-6") deep in concrete, the concrete to be not less than twenty-four inches (24") in diameter.

The chain-link fabric shall be securely fastened to the line post with six-gauge (6 ga.) wire clips spaced approximately fourteen (14") inches apart. The chain-link fabric shall be securely fastened to the top rail with nine-gauge (9 ga.) tie wires on approximately twenty-four inch (24") centers and to the bottom tension wire with eleven-gauge (11 ga.) hog rings on twenty-four inch (24") centers. The chain-link fabric shall be securely fastened to all terminal posts by one-fourth (1/4") inch by three-fourth (3/4") inch

tension bars with heavy eleven gauge (11 ga.) pressed steel bands spaced approximately fourteen (14") inches apart.

The fence shall be installed level with finish grade as directed by GRDA. The finished job will leave the bottom portion of the fabric even with the top of the crushed rock.

c) Gates:

The gates shall be located as shown on the drawings and shall be installed in accordance with the manufacturer's recommendations. Post spacing must be such that the gate may be located beginning at any ten (10') foot interval in any side, except within the first ten-foot (10') distance from any corner post.

The gate stop (for latch plunger) and gate keepers shall be installed in concrete that is eighteen inches (18") in diameter and a minimum of two-feet (2') deep. Gate stop shall be positioned with its edges at the elevation of the finished grade.

Gate keepers shall be positioned to support and hold the gate in the open position. Keepers shall be located approximately two-thirds (2/3) of the gate section length away from the gate post and elevated above the finished grade to engage the bottom gate pipe rail.

Three strands of barbed wire shall be attached to the gate-frame posts using bands above the fabric, as shown on the drawing. Razor wire, if required on the drawings, shall be installed around the barbed wire strands, and attached to the barbed wire with hog rings.

TR-20 TECHNICAL DRAWINGS

A list of drawings that pertain to this project is included on the project cover or index drawings.

TR-21 MATERIAL LIST

The material listed on the attached drawings is the material being furnished by GRDA. All other materials required for the completion of this work but not listed herein are to be furnished by the Contractor.

TR-22 CABLE TABULATION

The cable tabulation for the project is found on the attached drawing. The contractor is responsible for furnishing the raceway and installing cables and raceway. Cables shall be pulled between field equipment and control panels. Termination on both ends by GRDA crews.

TR-23 INSULATED CONDUCTORS

1) General:

Insulated cable, conductors, and conductor accessories shall be furnished by GRDA (unless listed elsewhere to be furnished by the Contractor) and installed by the Contractor in accordance with the requirements of this section of these specifications. Insulated cable, conductors, and conductor accessories shall be furnished in quantities sufficient for a complete installation as indicated in the circuit lists, on the drawings, and in these specifications.

The Contractor shall test the insulation on the cable prior to removing the cable from the warehouse. An acceptable value will be provided at the beginning of the project. The Contractor shall test the insulation of the cable after it is installed, and before terminating the cable.

In general, all devices furnished under these specifications and requiring electrical connections shall be designed for wiring into electrical enclosures with terminal blocks.

Terminal blocks shall be furnished for conductors requiring connection to circuits external to the specified equipment, for internal circuits crossing shipping splits, and where equipment parts replacement and maintenance will be facilitated.

Splices will not be permitted.

All wiring leaving an enclosure shall leave from terminal blocks and not from other devices in the enclosure.

Auxiliary equipment such as terminal blocks, auxiliary relays, or contactors shall be readily accessible. Auxiliary equipment shall be located in compartments, enclosures, or junction boxes in such an arrangement that service personnel will have direct access to the equipment without removal of barriers, cover plates, or wiring.

Terminal blocks for external connections shall be grouped in the instrument and control compartment for easy accessibility, unrestricted by interference from structural members and instruments. Sufficient space shall be provided on each side of each terminal block to allow an orderly arrangement of all leads to be terminated on the block.

Terminal blocks shall not be mounted in compartments containing uninsulated conductors operating at voltages above 1000 volts.

Materials containing asbestos shall not be used in any of the wiring devices or cable.

Cable reels shall be stored and handled in a manner which will prevent physical damage to the cable. Cable reels shall be stored on a hard surface to prevent contact between cable insulation and earth due to sinking of the reel.

Installation shall be defined to include placement, terminating conductors, coiling and taping of spare conductors, identification, testing, and verification of each circuit, cable, and conductor. Installation of cable in existing trays or cable trench shall also include removal and replacement of existing cable tray or cable trench covers.

Terminating a conductor shall include installing cable termination kits for shielded cable, attaching the conductor at its designated location and insulating the entire connection where specified or required by the application.

2) Cable Specifications:

The cable furnished shall conform to the Cable Specification Sheet(s) included at the end of this section.

The term "Type" used in the circuit list, on the drawings, and in these specifications refers to the letter identification indicated on each Cable Specification Sheet.

a) Coaxial Cable:

Coaxial cable (when specified) used for connection between carrier cabinets and line tuning units shall be 52 ohm RG-8A/U coaxial cable. The cable shall have an 8 mil thick aluminum flat tape water block and an overall chlorinated polyethylene jacket. The cable shall be Belden Catalog No. 9251-A282-BV. This cable is a special run item.

b) Test Reports:

Unless otherwise specified, the Contractor shall submit three copies of manufacturers' test reports on each cable to the Engineer.

c) Color Coding:

The color code used for multiconductor, shielded control cable shall be in accordance with Table K-1 of ICEA S-73-532 as indicated on the Specification and Data Sheet(s). All of the wiring diagrams being prepared by the Engineer are based on the color code specified on the Specification and Data Sheet(s). The Table K-1 color codes are as follows:

Conductor	Method 1 Table K-1
1	Black
2	White
3	Red
4	Green
5	Orange
6	Blue
7	White-Black
8	Red-Black
9	Green-Black
10	Orange-Black
11	Blue-Black
12	Black-White
13	Red-White
Conductor	Method 1 Table K-1
14	Green-White
15	Blue-White

3) Conductor Accessories:

All conductor accessories including connectors, terminations, insulating materials, support grips, markers, and cable ties shall be furnished and installed.

Supplier's installation instructions shall be obtained for cable accessories. These instructions shall be in the possession of the craftsmen while installing the accessories and shall be available to the designated Work Inspector for reference.

a) Terminal Connectors for Conductors 8 AWG and Larger:

Terminal connectors for conductors 8 AWG and larger shall be pressure or bolted clamp type, Burndy Qiklug, Varilug, or acceptable equal; or compression type, Burndy Type YAV or YA (long barrel), Panduit Type LCA or LCC, or acceptable equal. Acceptable connectors included with Owner-furnished equipment may be used.

b) Terminal Connectors for Conductors Smaller than 8 AWG:

Terminal connectors for conductors smaller than 8 AWG shall be compression type connectors properly sized for the conductor and the terminal. The connectors shall be constructed of fine grade high conductivity copper in accordance with QQ-C-576 and shall be tin plated in accordance with MIL-T-10727. The interior surface of the connector wire barrel shall be serrated, and the exterior surface of the connector wire barrel shall be provided with crimp guides.

Noninsulated terminal connectors shall be provided on conductors terminated on devices equipped with individual fitted covers, such as General Electric Type SB-I control switches and General Electric Type HEA lockout relays. Preinsulated ring type terminal connectors shall be used on all current and potential transformer circuits. All other terminal connectors for conductors smaller than 8 AWG shall be preinsulated ring type or preinsulated spade type.

Preinsulated terminal connectors shall include a vinyl insulating sleeve, color coded to indicate conductor size. Preinsulated terminal connectors shall include a metallic support sleeve bonded to the vinyl insulating sleeve and designed to grip the conductor insulation.

Ring type connectors shall be manufactured by AMP, 3M, Panduit, or acceptable equal. Spade type connectors shall be AMP slotted spring spade, 3M Scotchlok Series 6l snap spade, or Panduit locking fork terminal connectors.

c) Terminal Blocks:

Terminal blocks for conductors rated 600 volts or less shall be strap screw type, rated 600 volts, shall have 20 percent more terminal points than the quantity of conductors requiring termination, and shall have white marking strips. Terminal blocks shall be sized for the conductor being terminated except that terminal blocks for all conductors 10 AWG and smaller shall be Marathon 1500 Series or acceptable equal.

Each terminal block, terminal, conductor, relay, breaker, fuse block, and other auxiliary devices shall be permanently labeled to coincide with the identification indicated on the drawings. All terminals provided for termination of external circuits shall be identified by inscribing terminal designations acceptable to GRDA on the terminal block white marking strips with permanent black ink. All internal wiring terminations shall be identified by printing on conductor identification sleeves. A conductor identification sleeve shall be provided on each end of each internal conductor. Each sleeve shall be marked with the opposite end destination identification using permanent black ink. Conductor identification shall be permanent, unaffected by age, heat, or solvents, and not easily dislodged. Adhesive labels are not acceptable.

The arrangement of connections on terminal blocks shall be acceptable to GRDA.

All connections requiring disconnect plug and receptacle type devices shall be provided with factory terminated conductors on each plug and receptacle. Plugs and receptacles shall be factory wired into junction boxes containing terminal blocks for external connections. All conductors on the disconnect portion of plug-receptacle assemblies shall be in a common jacket. The plug-receptacle assemblies shall have provisions for locking the devices together. The assembly shall also be watertight when installed outdoors.

All temporary wiring installed in the factory for equipment testing shall be removed prior to shipment of the equipment.

Reference to NEC means the codes and standards as defined by the USA National Electrical Code, ANSI/NFPA 70.

d) Crimping Tools:

Crimping tools used to secure conductors in compression type connectors or terminal lugs shall be those made for that purpose and for the conductor sizes involved. The crimping tools shall accurately crimp the connector barrel and shall accurately crimp the conductor insulation support sleeve where provided. Crimping tools shall be

provided with guides to position connectors in the tool, shall be provided with stopsto prevent overcrimping, and shall be of a type which prevents the tools from opening until the crimp action is completed. Crimping tools shall be a product of the connector manufacturer or shall be as recommended by the connector manufacturer and acceptable to the Construction Coordinator/Inspector for use with the connectors. The Contractor shall establish and maintain a tool certification program to ensure that crimping tools are kept in accurate operating condition.

e) Insulating Materials:

Insulating materials for termination insulation shall be in accordance with the following.

i) 600 Volt Cable:

Insulating materials for terminal connectors or compression type connectors shall consist of varnished cambric tape, rubber tape, and vinyl tape. Taping materials shall be as listed below or acceptable equal:

Varnished Cambric Tape--3M Company Irvington 2520. Rubber Tape--3M Company Scotch 130C.

Vinyl Tape--3M Company Scotch 33+.

f) Support Grips:

Cable support grips shall be either split or closed woven wire type as manufactured by The Kellems Division, Harvey Hubbell Incorporated, Stonington, Connecticut.

g) Wire and Cable Markers:

Markers for wire and cable circuits shall be of an opaque nylon material arranged to include a marker board, nonreleasing holding device, and cable fastening tail. The marker board shall not be less than 3/4 inch wide, 2-1/2 inches long, and 15 mils thick and shall be Panduit Corp. Part No. MP250 marker plates or acceptable equal. One side shall be roughened to hold black nylon marking ink from a fine tip pen similar to Thomas & Betts Company "TY-RAP" marking pen, Catalog No. WTI63M-I, or Panduit Corp. Part No. PFX-0 marking pen. Identification shall be permanent and waterproof. The holding device shall be designed to allow the fastening tail to pass around the cable through the holding device and prevent the removal of the tail without cutting it loose from the marker.

h) Cable Ties:

Lacing materials for field installed cable shall be nonreleasing weather-resistant black nylon ties manufactured by Thomas & Betts Company, Elizabeth, New Jersey; Panduit Corp., Tinley Park, Illinois; 3M Company; or acceptable equal.

i) Arcproofing Material:

Material for arcproofing cable shall be an unsupported intumescent self-extinguishing elastomer tape, 3M Company Scotch Brand No. 77 or acceptable equal, and a pressure sensitive silicone adhesive backed glass cloth holding tape, 3M Company Scotch Brand No. 69 or acceptable equal.

j) Cable Shield Bonding Connectors:

Cable shield bonding connectors for use with shielded power, control, and instrumentation cable shall be Scotchlock 4460, manufactured by the 3M Company; Nicopress Shield Connector B-2974, manufactured by National Telephone Supply Company; Surgegard Shield Bond Connector, manufactured by Brand-Rex Company; or acceptable equal.

Cable shield bonding connectors shall be installed on one end of each shielded power, control, and instrumentation cable listed in the circuit lists.

4) Installation:

Conductor installation shall be in accordance with the cable manufacturer's recommendations and the articles which follow.

a) Cable Placement:

All cable described in the circuit lists shall be routed as indicated therein. Routing of other cable shall be as indicated on the drawings.

Cable shall not be handled when the cable temperature is below the minimum temperature recommended by the manufacturer. If cable heating is required prior to placement, the cable shall be stored in a heated building in accordance with the manufacturer's

recommendations for at least 24 hours. Cable shall be placed the same day it is removed from heated storage.

If at any time during the progress of the work the Contractor finds raceways which appear inadequate to accommodate the assigned cable, he shall notify the Construction Coordinator/Inspector at once and shall discontinue any further work on the questionable raceway until advised by the Construction Coordinator/Inspector as to how he shall proceed.

Immediately prior to the placement of each cable or cable group, the raceway route to be followed shall be inspected and ascertained to be complete in installation and free of all materials detrimental to the cable or its placement. All cable assigned to a particular duct or conduit shall be grouped and pulled in simultaneously using cable grips and acceptable lubricants.

All cable shall be carefully checked both as to size and length before being pulled into conduits or ducts. Cable pulled into the wrong conduit or duct or cut too short to rack, train, and splice as specified herein shall be removed and replaced by and at the expense of the Contractor. Cable removed from one conduit or duct shall not be pulled into another conduit or duct.

i) Cable in Trays:

All cable shall be carefully laid in or pulled through the tray system so that neither the cable nor the trays are damaged. Cable may be laid along the side of the tray system during placement provided it is protected from dirt, water, oil, or other detrimental materials and from mechanical injury. Cable shall be cut sufficiently long to conform to the contour of the trays, with particular attention paid to vertical inside bends. All excessive slack shall be removed from the cable so that it lies parallel to the sides of the trays. Multiple single conductor cable which constitutes a single power circuit shall be grouped together to minimize magnetic influence on other cable in the area. The cable shall be tied to the trays with nylon ties at 10 foot intervals to hold it in place. Cable clamps designed for holding the cable inside the trays shall be installed at all vertical bends.

ii) Cable Pulling:

Fishing and pulling shall be done with flexible round metal tape, CO₂ propelled polyethylene cord, nylon rope, or manila rope.

Unless specified otherwise or acceptable to the Construction Coordinator/Inspector, cable shall not be pulled in a single pull through two sections of Engineer-designed raceway connected by a manhole or pull box. Cable shall be pulled out at each manhole and pull box to the length required for termination. Prior to repulling of the pulled out cable, the cable shall be thoroughly inspected, cleaned, and relubricated. Damaged cable shall be removed and replaced by and at the expense of the Contractor.

Cable may be pulled in a single pull through two sections of Engineer-designed raceway connected by a manhole or pull box only if it can be determined by calculation to the

satisfaction of the Construction Coordinator/Inspector, that the pulling tension will not exceed the maximum tension allowed by the cable manufacturer.

iii) Cable Grips:

Factory installed pulling eyes shall be used for pulling cable where they are available. Woven wire cable grips shall be used to pull all single conductor cable 2/0 AWG and larger, where pulling eyes are not available, and all multi-conductor cable. Pulling loops shall be used to pull single conductor cable smaller than 2/0 AWG. All sharp points and edges on the hardware attaching the pulling rope to the cable shall be taped to prevent snagging or damaging the raceway.

When a cable grip or pulling eye is used for pulling, the area of the cable covered by the grip or seal plus 6 inches shall be cut off and discarded when the pull is completed. When pulling loops are used, the entire loop shall be cut off and discarded when the pull is completed.

As soon as the cable is pulled into place, the pulling eyes, cable grips, or pulling loops shall be removed and any cable which was sealed shall be resealed.

iv) Swivels:

A reliable nonfreezing type of swivel, or swivel connection, shall be inserted between the pulling rope and the cable pulling eye, grip, or loop to prevent twisting under strain.

v) Feeding Tubes:

A 4 inch or larger flexible feeding tube, with a removable nozzle sized to fit the ducts, shall be used in pulling all underground cable. The bending radius of the tube shall not be less than the minimum bending radius of the cable specified in this section under the article titled Cable Bends.

vi) Pulling Lubricants:

Only lubricants recommended by the cable manufacturer and acceptable to the Construction Coordinator/Inspector shall be used. Lubricants shall be applied liberally and continuously during the pull.

vii) Inspection:

The outside of each cable reel shall be carefully inspected and protruding nails, fastenings, or other objects which might damage the cable shall be removed. A thorough visual inspection for flaws, breaks, or abrasions in the cable sheath shall be made as the cable leaves the reel, and the pulling speed shall be slow enough to permit this inspection. Damage to the sheath or finish of the cable shall be sufficient cause for rejecting the cable. Cable damaged in any way during installation shall be replaced by and at the expense of the Contractor.

viii) Pulling Tension:

The pulling tension of any cable shall not exceed the maximum tension recommended by the cable manufacturer. Pulling mechanisms of both the manual and power types used by the Contractor shall have the rated capacity in tons clearly marked on the mechanism. Whenever the capacity of the pulling mechanism exceeds the recommended pulling tension of the cable as given by the cable manufacturer, a dynamometer shall be used to show the tension on the cable and the indicator shall be constantly watched. If any excessive strain develops, the pulling operation shall be stopped at once and the difficulty determined and corrected.

ix) Sidewall Pressure:

To avoid insulation damage from excessive sidewall pressure at bends, the pulling tension in pounds at a bend shall not exceed 300 times the radius of the bend in feet.

x) Cable Bends:

Tape shielded, flat tape armored, and wire armored cable shall not be bent to a radius of less than 12 times the overall cable diameter. All other cables shall not be bent to a radius of less than eight times the cable diameter.

xi) Supports:

All cable supports and securing devices shall have bearing surfaces located parallel to the surfaces of the cable sheath and shall be installed to provide adequate support without deformation of the cable jackets or insulation.

Adequate cable end lengths shall be provided and properly placed in junction boxes to avoid longitudinal strains and distorting pressures on the cable at conduit bushings and duct end bells.

Final inspection shall be made after all cable is in place and, where supports or raceway fittings deform the cable jacket, additional supports shall be provided as directed by the designated Work Inspector. Additional cable protection such as a wrapping of light rubber belting, friction tape, or similar material shall be provided where required.

Cable in vertical runs shall be supported by woven wire grips in accordance with the NEC requirements, except that the distance between supports shall conform to the following:

Vertical Cable Support Spacing		
Conductor Size	Aluminum Conductor	Copper Conductor

1/0 AWG and smaller	150 feet	150 feet
2/0 AWG thru 500 Mcm	100 feet	50 feet
Larger than 500 Mcm	70 feet	30 feet

xii) Spare Conductors:

All spare conductors of a multi-conductor cable shall be left at their maximum lengths for possible replacement of any other conductors in the cable. Each spare conductor shall be neatly coiled and then taped to the conductors being used.

xiii) Lacing:

Nylon ties shall be used to neatly lace together conductors entering switchboards and similar locations after the conductors have emerged from their supporting raceway and before they are attached to terminals.

xiv) Cable Identification:

The Contractor shall identify the ends of all circuits listed in the circuit lists.

Each marker shall bear the number of the circuit according to the circuit lists and drawings.

At terminations, the Contractor shall identify each conductor of power circuits, each multi-conductor cable, and each conductor of circuits consisting of multiple single conductors where the conductors are not otherwise identified. Markers shall be attached where the first individual conductor is routed away from the assembly. Each phase of multiphase power circuits shall be individually identified.

One end of each marker board shall remain free of the fastening tail, and the entire marker shall be so attached that it is readily visible for circuit identification.

xv) Splices:

No splices shall be made in conductors for instrument circuits or control circuits. Shields may be spliced where necessary to permit connection to the station ground.

Power cable circuits may be spliced only by methods and at locations acceptable to the Construction Coordinator/Inspector.

b) Terminations:

Cable shall be terminated in accordance with the following requirements: Train cable in place and cut squarely to required length. Avoid sharp bends.

Remove necessary amount of cable jacket and insulation without damage to the conductor.

Install terminals or terminal connectors as required, ensuring a firm metal-to-metal contact.

Insulate each connection of cable to an insulated conductor (whether cable, bus, or equipment bushing). The insulation shall cover all exposed surfaces of the conductors; the insulation voltage level of the completed termination shall be not less than the insulation voltage level of the connected conductors.

i) Insulation of 600 Volt Cable Connections:

Where connections of cable rated 600 volts or less require insulation, all exposed conductor, and connector surfaces shall be covered with tape in accordance with the following:

One half-lapped layer of varnished cambric tape.

A minimum of three half-lapped layers of rubber tape, elongated not more than 20 percent, applied over the varnished cambric tape.

A minimum of three half-lapped layers of vinyl tape applied over the rubber tape. The vinyl tape shall extend a minimum of two cable diameters over the cable jacket and a similar distance over the insulation of the conductor to which the cable is connected.

c) Tests after Placement:

All insulated conductors shall be electrically tested after placement.

All circuits, including lighting circuits, shall be tested with the circuit complete except for connections to equipment. All splices, stress cones on shielded cable, and terminal connector attachments shall be complete prior to testing.

In addition to the tests performed after cable placement is complete, continuity tests and insulation tests shall be performed on all supervisory and communication cable before and after each splice is made.

Any circuit failing to test satisfactorily shall be replaced or repaired and then retested. All equipment and labor required for testing shall be furnished by the Contractor.

i) Continuity and Identification Tests:

All insulated conductors shall be tested for continuity and conductor identification.

(1) Continuity tests:

Continuity tests shall include all tests necessary to confirm that each conductor is continuous throughout its entire length.

(2) Identification tests:

Identification tests shall include all tests necessary to confirm that the conductor being investigated originates and terminates at the locations designated in the circuit lists or indicated on the drawings.

ii) Insulation Tests:

Resistance from ground provided by the insulation on all field installed insulated conductors shall be measured.

(1) Cable rated 600 volts and below:

All insulated conductors except supervisory and communication cable, rated 600 volts and below shall be tested with a 1000 volt megger or an equivalent testing device. Insulation resistance measurements shall be made between each conductor and ground and between each conductor and all other conductors of the same circuit. Minimum acceptable resistance values shall be approximately 10 megaohms.

(2) Supervisory and communication cable:

All insulated conductors of supervisory and communication cable shall be tested with a 500 volt megger or an equivalent testing device. Insulation resistance measurements shall be made between each conductor and the cable

shielding tape and between the two conductors in each pair. Minimum acceptable resistance values shall be 10 megaohms divided by the actual cable length in miles.

d) OPGW Line Termination:

The OPGW outdoor splice enclosure shall be installed as indicated on the drawings. The splice closure shall be sized to accommodate fusion splice tray(s). The OPGW splice closure shall be complete with splice tray and all accessories required for splicing the cable and sealing the splice closure.

TR-24 SEDIMENT EROSION AND ENVIRONMENTAL CONTROL

1) General:

This section covers materials and procedures selected to control erosion during construction, to assure that sediment is trapped for removal, and to provide direction should environmental artifact be discovered during construction.

Sediment and erosion control facilities shall be constructed in such a manner as to insure that sediment and sediment laden water do not enter the drainage system, public roadways, or violate applicable water standards.

It is the intent of these specifications that the substation shall be constructed with a minimum of disruption to the natural surroundings and ground cover.

2) Description of Control Methods:

Sediment and erosion control procedures and methods shall be in accordance with applicable State, County, and City requirements and as specified herein. Silt fence or straw bales may be used to control soil erosion and sediment runoff at the Contractor's option.

a) Silt Fence:

The silt fence is intended to intercept water runoff and reduce the transport of sediment from the construction site by providing a temporary barrier to sediment and reducing runoff velocities. Silt fencing shall be installed where ground cover is removed and sloping grades are present. Filter fabric material shall be Synthetic Industries 401 or acceptable equal.

b) Straw Bales:

Straw bales are intended to intercept water runoff, filter runoff of sediment from the construction site, and reduce runoff velocities. Straw bales shall be installed where ground cover is removed and sloping grades are present.

3) Maintenance:

Sediment and erosion control facilities shall be inspected and maintained according to the SWPPP. At no time shall more than one foot of sediment be allowed to accumulate behind the silt fence and straw bales. Accumulated sediment shall be removed and any damaged silt fence or straw bales repaired.

4) Removal of Facilities:

Silt fences and straw bales shall be removed when they have served their useful purpose, but not before the upslope area has been repaired, seeded, and permanently stabilized as directed by the designated Work Inspector.

5) Environmental Artifacts:

Construction personnel shall be cautioned to watch for buried artifacts and bones during earth moving. If any such items are found, work should cease immediately and the Inspector notified.

6) Erosion and Environmental Planning and Permitting:

The following permits and plans shall be developed and implemented by the Contractor.

a) Spill Prevention Control and Countermeasure (SPCC) Plan:

If the contractor will have oil and fuel storage in excess of 1,320 gallons on one site during construction, the Contractor shall design, implement, manage, and maintain a SPCC Plan. The Contractor shall be responsible for its development and implementation, with concurrence from GRDA.

b) NPDES General Storm Water Permit for Construction:

The Contractor shall obtain a NPDES General Storm Water Permit for Construction, unless furnished by GRDA.

STILLWATER KINZIE SUBSTATION 138/69kV

STATION ADDRESS: 301 S SANGRE RD, STILLWATER OK 74074

GPS: LAT. = 36.120°, LONG. = -97.104°

Drawing #	Revision	Date	Drawing Title
S351DZ01	3	8/24/2023	DRAWING INDEX
S351DM01	0	5/9/2023	MATERIAL LIST 2023 CONSTRUCTION
S351DT01	0	5/9/2023	CABLE SCHEDULE 2023 CONSTRUCTION
S351PE01	5	8/24/2023	ELECTRICAL PLAN
S351PE04	0	5/9/2023	SECTION G-G & H-H
S351PE05	0	5/9/2023	BUS ASSEMBLY DETAILS
S351PG10	2	8/24/2023	CONDUIT LAYOUT
S351PG11	0	5/9/2023	CONDUIT DETAILS
S351PG20	3	8/24/2023	GROUNDING LAYOUT
S351PG21	0	5/9/2023	GROUNDING DETAILS
S351PG22	0	5/9/2023	GROUNDING DETAILS
S351PG30	5	8/24/2023	FOUNDATION LAYOUT
S351PG33	2	8/24/2023	FOUNDATION DETAILS - SLAB FOUNDATIONS - 69kV CAP BANK AND BREAKER
S351PG34	1	8/24/2023	FOUNDATION DETAILS 'D' - 69kV SWITCH STAND
S351PG35	1	8/24/2023	FOUNDATION DETAILS 'C' - 69kV REACTOR SUPPORT
S351PG36	1	8/24/2023	FOUNDATION DETAILS 'A' - 69kV RPD SUPPORT
S351VS01	0	8/11/2023	69kV 3Ø REACTOR SUPPORT, STRUCTURE (GS-201)
S351VS02	0	8/11/2023	69kV 1Ø SWITCH STAND, STRUCTURE (GS-210)
S351VS03	0	8/11/2023	69kV 1Ø RPD SUPPORT, STRUCTURE (GS-211)
S351PH01	2	5/9/2023	CONTROL HOUSE LAYOUT
S351PP001	1	5/9/2023	STEEL DETAILS & ELEVATIONS FOR PANELS 103 & 104
S351PP002	0	5/9/2023	PANEL #104 BOM & NAMEPLATES
S351PP105	0	5/9/2023	PNL #105 ELEVATION 138kV FDR 6 & BKR 670
S351SB10870	3	8/24/2023	BKR 10870 DC SCHEMATIC
S351SB670	3	8/24/2023	BKR 670 DC SCHEMATIC
S351SB81	1	8/24/2023	DC SCHEMATIC 69kV BKR 81 PNL #104 TRIP, CLOSE & MOTOR CIRCUITS
S351SB82	1	8/24/2023	DC SCHEMATIC 69kV BKR 81 PNL #104 HEATER CIRCUIT & ALARMS
S351SD001	1	8/24/2023	CAP BANK SEL 487V PRL PROTECTION PNL #104
S351SD002	1	8/24/2023	DC SCHEMATIC BKR FAIL RELAY (50BF/50A/51A-351S) 69kV BKR 81 PNL #104
S351SF061	1	8/24/2023	DC SCHEMATIC PRIMARY RELAY (87L/21P/67P-311L) 138kV FDR 6 PNL #105
S351SF062	1	8/24/2023	DC SCHEMATIC BKR FAIL RELAY (50BF/25/79-351S) 138kV BKR 670 PNL #105
S351SF063	1	8/24/2023	DC SCHEMATIC ALTERNATE RELAY (21A/67A-311C) 138kV FDR 6 PNL #105
S351SF064	1	8/24/2023	DC SCHEMATIC CARRIER (UPLC2) PNL #105 FDR 6
S351SO01	11	8/24/2023	ONE LINE DIAGRAM
S351SO12	10	8/24/2023	THREE LINE AC CURRENT SCHEMATIC
S351SO13	9	8/24/2023	THREE LINE AC POTENTIAL SCHEMATIC
S351SO15	5	8/24/2023	ONE-LINE DIAGRAM METERING & RELAYING 138kV AND CITY AUTOTRANSFORMER
S351SO17	1	8/24/2023	ONE-LINE DIAGRAM METERING & RELAYING CAP BANK AND CITY 69kV
S351SO17-TEMP	1	8/24/2023	ONE-LINE DIAGRAM METERING & RELAYING CAP BANK AND CITY 69kV (TEMP)
S351SO18	1	8/24/2023	THREE-LINE DIAGRAM GRDA 69kV CAPACITOR BANK
S351SR01	7	8/24/2023	ANNUNCIATOR NAMEPLATE
S351SR01-1	5	8/24/2023	ANNUNCIATOR SCHEMATIC (SHEET 1) PNL 101
S351SR01-2	1	8/24/2023	ANNUNCIATOR SCHEMATIC (SHEET 2) PNL 101
S351WB81	1	8/24/2023	WIRING DIAGRAM 69kV CIRCUIT BREAKER 81
S351WP101	2	8/24/2023	TERMINAL BLOCK WIRING DIAGRAM PANEL 101
S351WP101-2	2	8/24/2023	WIRING DIAGRAM PANEL 101
S351WP103	2	8/24/2023	WIRING DIAGRAM PANEL 103 CB 10870
S351WP104	2	8/24/2023	WIRING DIAGRAM PANEL 104 - 69kV CAPACITOR BANK & 138kV BUS DIFFERENTIAL
S351WP104-2	1	8/24/2023	RELAY PNL 104 CAP BANK WIRING DIAGRAM (SH. 2 OF 3)
S351WP104-3	1	8/24/2023	RELAY PNL 104 CAP BANK WIRING DIAGRAM (SH. 3 OF 3)
S351WP105-1	1	8/24/2023	WIRING DIAGRAM 138kV FDR 6 & BKR 670 PNL #105 (SHEET 1 OF 2)
S351WP105-2	1	8/24/2023	WIRING DIAGRAM 138kV FDR 6 & BKR 670 PNL #105 (SHEET 2 OF 2)
S351WZ02	4	8/24/2023	CONTROL BUILDING AC/DC PANEL
S351WZ03	1	8/24/2023	WIRING DIAGRAM RPD TERMINAL BOX AND DEMARCATON CABINET

Drawing #	Revision	Date	Drawing Title
S351PP001-DEMO	0	5/9/2023	STEEL DETAILS & ELEVATIONS FOR PANELS 103 & 104 (DEMO)
S351SB10870-DEMO	0	5/9/2023	BKR 10870 DC SCHEMATIC DEMOLITION
S351SB670-DEMO	0	5/9/2023	BKR 670 DC SCHEMATIC DEMOLITION
S351SO12-DEMO	0	5/9/2023	THREE LINE AC CURRENT SCHEMATIC DEMOLITION
S351SO13-DEMO	0	5/9/2023	THREE LINE AC POTENTIAL SCHEMATIC DEMOLITION
S351SR01-1-DEMO	0	5/9/2023	ANNUNCIATOR SCHEMATIC PNL 101 DEMOLITION
S351SR01-DEMO	0	5/9/2023	ANNUNCIATOR NAMEPLATE DEMOLITION
S351WP101-2-DEMO	0	5/9/2023	WIRING DIAGRAM PANEL 101 DEMOLITION
S351WP101-DEMO	0	5/9/2023	TERMINAL BLOCK WIRING DIAGRAM PANEL 101 DEMOLITION
S351WP103-DEMO	0	5/9/2023	WIRING DIAGRAM PANEL 103 CB 10870 DEMOLITION
S351WP104-DEMO	0	5/9/2023	WIRING SCHEMATIC PANEL 104 - CB 670 DEMOLITION



4555 W Memorial Rd.
Oklahoma City, OK 73142

ISSUED FOR BID

GRAND RIVER DAM AUTHORITY
STILLWATER KINZIE INTERCONNECT S351
STILLWATER, OKLAHOMA 138/69kV

DRAWING INDEX

DESCRIPTION: ISSUED FOR BID	3	RF022-01145	8/24/2023	NC	BE	CP	NC
DESCRIPTION: ISSUE FOR REVIEW	2	RF022-01145	8/14/2023	CP	BE	JS	-
DESCRIPTION: F6 PNL REPLACEMENT & CAP BANK BKR ADDITION	1	RF022-01145	5/9/23	NC	BE	LA	NC
ENGINEER: NC	SCALE: NONE	DATE: 08/22/22	REV.				
DRAWN BY: RE	DRAWING NO.	SHEET 1 OF 1	3				
CHECKED BY: LA	S351DZ01						
APPROVED BY: NC	OLD DRAWING NO.:						
REV. NO.	JOB NO.	DATE	DESIGN ENGR	DFT	DESIGN CHECK	ISSUE APPROV	



P.O. BOX 669
CHOUTEAU, OK 74337

Project Name -		Stillwater Kinzie 2023 Construction		Work Order # -	RF022-01145
ITEM	AMOUNT/QTY	DESCRIPTION	MANUFACTURER	Catalog #	GRDA Stock Number
BOLTS					
NB-2D	104	BOLT-SS. 1/2" X 2.5", ASSEMBLY WITH BELLVILLE WASHER, FLAT WASHER, LOCK WASHER, AND SILICONE BRONZE NUT	Marsh	IF# 1010502503	33-316-5
NB-2H	3	BOLT-SS. 1/2" X 1", ASSEMBLY WITH BELLVILLE WASHER, FLAT WASHER, LOCK WASHER, AND SILICONE BRONZE NUT			
BUS MATERIAL					
B-3A	3	STATION POST INSULATOR, STANDARD STRENGTH, 69kV, 350KV BIL, 3" BOLT CIRCLE (TOP AND BOTOM). TR 216		LOCKE: PS03510	26-26
B-5A	175	336.4 ACSR, 26/7 STRANDING. 510 AMPS. LINNET		LINNET	46-73-2
B-34A	1	ENCLOSURE, METAL, ELECTRICAL. NEMA, WATER TIGHT, HINDGED DOOR WITH LATCHES. WITH STEEL PANEL. 20" H X 20" W X 10" D		Hoffman: A202010LP	31-1043 & 31-1043-1
B-34B	1	ENCLOSURE, FIBERGLASS, ELECTRICAL. NEMA, WATER TIGHT, HINDGED DOOR WITH LATCHES. WITH STEEL PANEL. 24" H X 24" W X 8" D		Hoffman: A24H2408ALLP	31-1071 & 31-1071-1
B-51J	25	TERMINAL, ALUMINUM SWAGE COMPRESSION, 4-HOLE 4" NEMA PAD, (LINNET - 336.4 ACSR, 26/7 STR), STRAIGHT		DMC# CPLK9442D03975S	-
B-53J	1	TERMINAL, ALUMINUM SWAGE COMPRESSION, 4-HOLE 4" NEMA PAD, (LINNET - 336.4 ACSR, 26/7 STR), 90 DEG		DMC# CPLK9449D03975S	-
CONTROL CABLE					
C-1	2500	4/C #10 AWG, STRANDED Cu COND., 600V PVC INSUL. 90° C, K1 COLOR CODE, 19 STRAND, UNSHIELDED			046-0356-000-000
C-2	1500	12/C #10 AWG, STRANDED Cu COND., 600V PVC INSUL. 90° C, K1 COLOR CODE, 19 STRAND, UNSHIELDED			046-0046-000-000
DISCONNECT SWITCHES					
DS-16E	1	VERTICAL BREAK SWITCH, STAND MOUNTED FOR LOW BUS, 69kV, 1200A, 6' PH-PH SWING HANDLE.			-
POWER CIRCUIT BREAKER					
CB-3	1	BREAKER: 69KV, 1200A, 31.5KVA INTERRUPTING RATING. 125VDC OPERATED. TWELVE 1200:5, C-800 CURRENT TRANSFORMERS			042-1383-XXX-000
STRUCTURES & STEEL ACCESSORIES					
GS-201	1	STEEL THREE PHASE, LOW BUS STAND (13FT), W/ ANCHOR BOLTS, NUTS, WASHERS & TEMPLATES			-
GS-210	1	STEEL THREE PHASE, VERTICAL BREAK SWITCH STAND, 69kV 13'-0" BUS HEIGHT, LOW BUS, W/ ANCHOR BOLTS, NUTS, WASHERS & MOUNTING PLATES			-
GS-211	1	STEEL SINGLE PHASE, RPD STRUCTURE, 69kV 8'-6", W/ ANCHOR BOLTS, NUTS, WASHERS & TEMPLATES			-
CAPACITOR BANK					
CP-1	1	CAPACITOR BANK, 69kV, 7.2MVAR, WITH STAND, BUS, INSULATORS, BOLTS, AND FUSES (EXISTING BANK TO BE RELOCATED)	ABB		-
TS-1	3	TRANSIENT SWITCHING REACTOR, 69kV, 550 uH			-
DS-28	36	S&C FUSE LINK 10K	S&C	265010R1	-
TRANSFORMERS					
RPD-1	1	TRANSFORMER: RESISTIVE POTENTIAL DEVICE: 34.5KV, 200KVBIL. 60 HZ. 120 VAC (CAPACITOR BANK NEUTRAL POTENTIAL)			-
GROUNDING					
GD-1	350	4/0 COPPER WIRE, BARE, 19 STRAND, SOFT-DRAWN.		PRIORITY WIRE P16R1	46-87-6
GD-2D	70	4/0 COPPER, SOFT DRAWN, BARE, 7 STRAND. COPPERWELD.			46-87-6
GD-2E	15	#2 AWG WIRE, SOFT DRAWN, BARE, 4 STRAND, COPPERWELD			
GD-6A	5	GROUND ROD, COPPER CLAD STEEL, 3/4" X 10'		Joslyn #J9170	30-291-6
GD-11	4	GROUND CLAMP, BRONZE, TWO CABLES TO FLAT #4 SOL-300 MCM STRANDED COPPER		A# GC-143A-02-1/2	48-335-2
GD-14	7	GROUND CLAMP, BRONZE, SINGLE CABLE TO FLAT #4 SOL-300 MCM STRANDED COPPER		A# GC-141A-02-1/2	48-713
GD-19	1	PLATFORM: GROUNDING, SWITCH OPERATOR, HEAVY DUTY GALVANIZED STEEL, SIZE: 49" X 33"			42-105-10
GD-30	19	SPLIT CONNECTOR, SWAGE COMPRESSION #4/0 TO #4/0 CU		DMC# GC888B004-004	
GD-30B	4	SPLIT CONNECTOR, SWAGE COMPRESSION #4/0 TO #2 CU		DMC# GC721B02G-004	
GD-31	5	ELBOW CONNECTOR, SWAGE COMPRESSION #4/0 CU TO 3/4" ROD		DMC# GC739B004-682	



4555 W Memorial Rd.
Oklahoma City, OK 73142



DESCRIPTION: F6 PNL REPLACEMENT & CAP BANK BKR ADDITION					
0	RF022-01145	5/9/23	NC	BE	LA NC
REV	JOB NO.	DATE	DESIGN ENGR	DFTR	DESIGN CHECK
					ISSUE APPROVD

ISSUED FOR CONSTRUCTION

GRAND RIVER DAM AUTHORITY
STILLWATER KINZIE INTERCONNECT S351
STILLWATER, OKLAHOMA 138/69kV

MATERIAL LIST
2023 CONSTRUCTION



ENGINEER: NC	SCALE: NONE	DATE: 5/9/23	REV.
DRAWN BY: RE	DRAWING NO.	SHEET 1 OF 1	0
CHECKED BY: LA	S351DM01		
APPROVED BY: NC	OLD DRAWING NO.:		

P.O. BOX 669
SHUTEAU, OK 74337

STILLWATER KINZIE INTERCONNECT CABLE SCHEDULE (RF022-01145)

CABLE NO.	FROM	TO	NO. WIRES	SIZE	LENGTH	FUNCTION
BKR 670						
Y14-17	PNL 105 (MOVED FROM PNL 104)	BKR 670	12/C	#10		BREAKER CONTROL
Y14-18	PNL 105 (MOVED FROM PNL 104)	BKR 670	12/C	#10		BREAKER STATUS
Y14-20	PNL 105 (MOVED FROM PNL 104)	BKR 670	4/C	#10		FEEDER 6 ALTERNATE CT
Y14-21	PNL 105 (MOVED FROM PNL 104)	BKR 670	4/C	#10		FEEDER 6 PRIMARY CT
BKR 81						
Y23001	PNL 104	BKR 81	4/C	#10	337'	CAP BANK PRIMARY CT
Y23002	PNL 104	BKR 81	4/C	#10	337'	CAP BANK ALTERNATE CT
Y23003	DEMARICATION CABINET	BKR 81	4/C	#10	193'	69kV BUS PRIMARY CT
Y23004	DEMARICATION CABINET	BKR 81	4/C	#10	193'	69kV BUS ALTERNATE CT
Y23005	PNL 104	DEMARICATION CABINET	12/C	#10	145'	69kV BUS PT
Y23006	PNL 104	CAP BANK NEUTRAL RPD	4/C	#10	306'	CAP BANK NEUTRAL POTENTIAL
Y23007	PNL 104	BKR 81	12/C	#10	337'	BREAKER CONTROL
Y23008	PNL 104	BKR 81	12/C	#10	337'	BREAKER ALARMS
Y23009	DC PANEL	BKR 81	4/C	#10	340'	CLOSE & TC1 DC
Y23010	DC PANEL	BKR 81	4/C	#10	340'	TC2 & MOTOR DC
Y23011	AC PANEL	BKR 81	4/C	#10	346'	AC SUPPLY
PNL 105						
Y23101	PNL 103	PNL 105	12/C	#10	24'	BREAKER 670 FAILURE
Y23102	PNL 104	PNL 105	12/C	#10	21'	BREAKER 670 FAILURE
Y23103	PNL 101	PNL 105	12/C	#10	48'	ALARMS
Y23104	PNL 104	PNL 105	12/C	#10	21'	BREAKER 670 FAILURE
Y23105	DC PANEL	PNL 105	4/C	#10	52'	PRIMARY DC SOURCE
Y23106	DC PANEL	PNL 105	4/C	#10	52'	ALTERNATE DC SOURCE
Y23107	PNL 104	PNL 105	12/C	#10	21'	138kV BUS PT AND FDR 6 CCVT
PNL 104						
Y23201	PNL 101	PNL 104	12/C	#10	51'	ALARMS
Y23202	DEMARICATION CABINET	PNL 104	12/C	#10	145'	BREAKER 81 FAILURE
Y23203	DEMARICATION CABINET	PNL 104	12/C	#10	145'	BREAKER 81 FAILURE



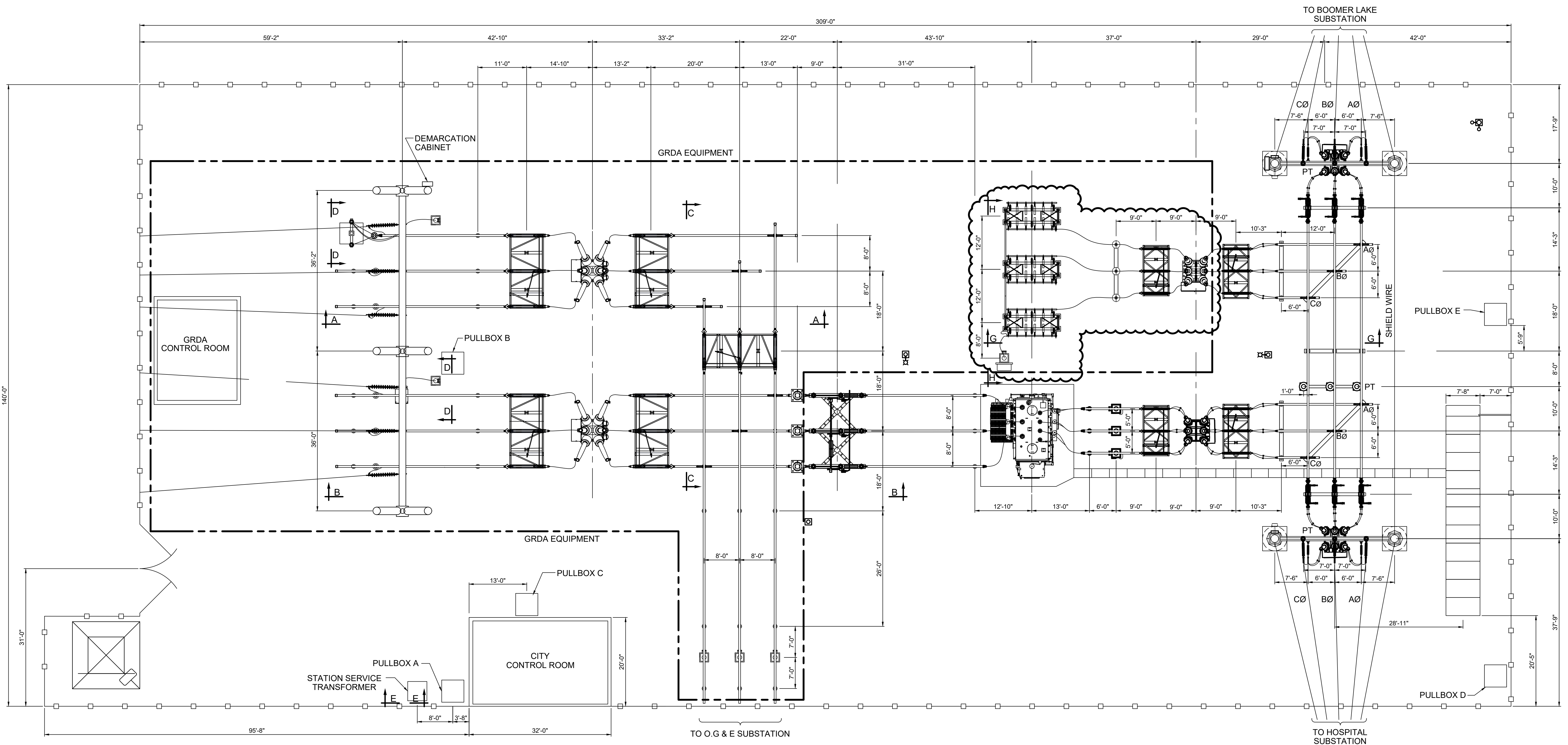
4555 W MEMORIAL RD.
OKLAHOMA CITY, OK 73142



DESCRIPTION: F6 PNL REPLACEMENT & CAP BANK BKR ADDITION						ISSUED FOR CONSTRUCTION				
0	RF022-01145	5/9/23	NC	BE	TM	NC	GRDA GRAND RIVER DAM AUTHORITY STILLWATER KINZIE INTERCONNECT S351 STILLWATER, OKLAHOMA 138/69kV			
						CABLE SCHEDULE 2023 CONSTRUCTION				
REV. NO.	JOB NO.	DATE	DESIGN ENGR	DFTR	DESIGN CHECK	ISSUE APPRVD	ENGINEER: NC	SCALE: NONE	DATE: 5/9/23	REV. 0
							DRAWN BY: BE	DRAWING NO. S351DT01		
							CHECKED BY: LA/CP			
							APPROVED BY: NC			



P.O. BOX 669
SHUTEAU, OK 74337

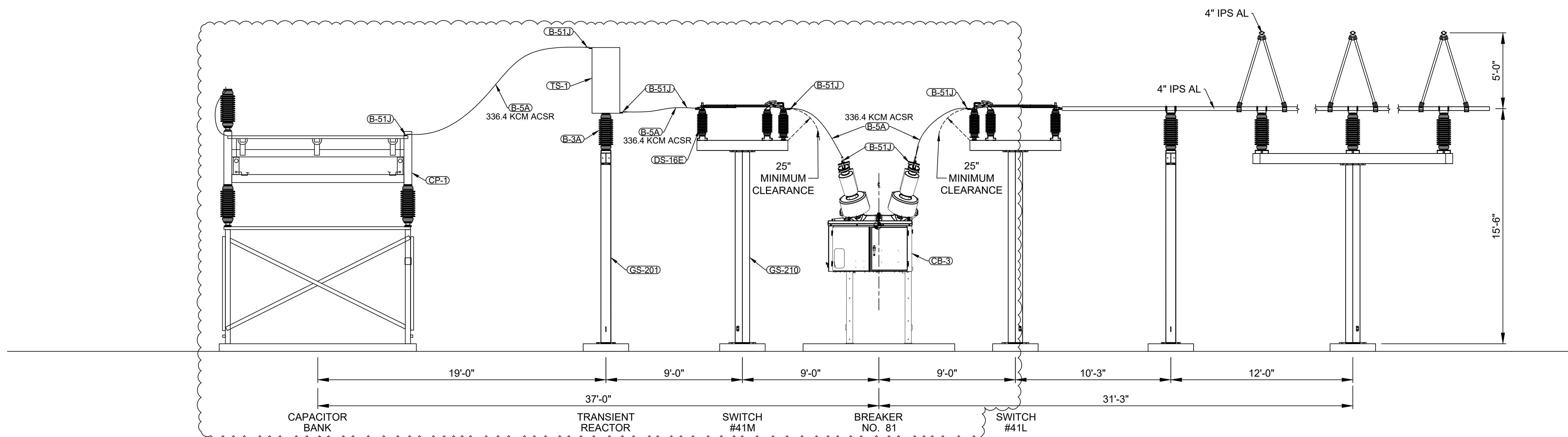


NOTES:
 1. 2024 CONSTRUCTION TO BE PERFORMED BY CITY OF STILLWATER

REFERENCE DRAWINGS:
 S351PE02 ELECTRICAL ELEVATIONS
 S351PE03 ELEVATION F-F
 S351PE04 ELEVATION G-G AND H-H

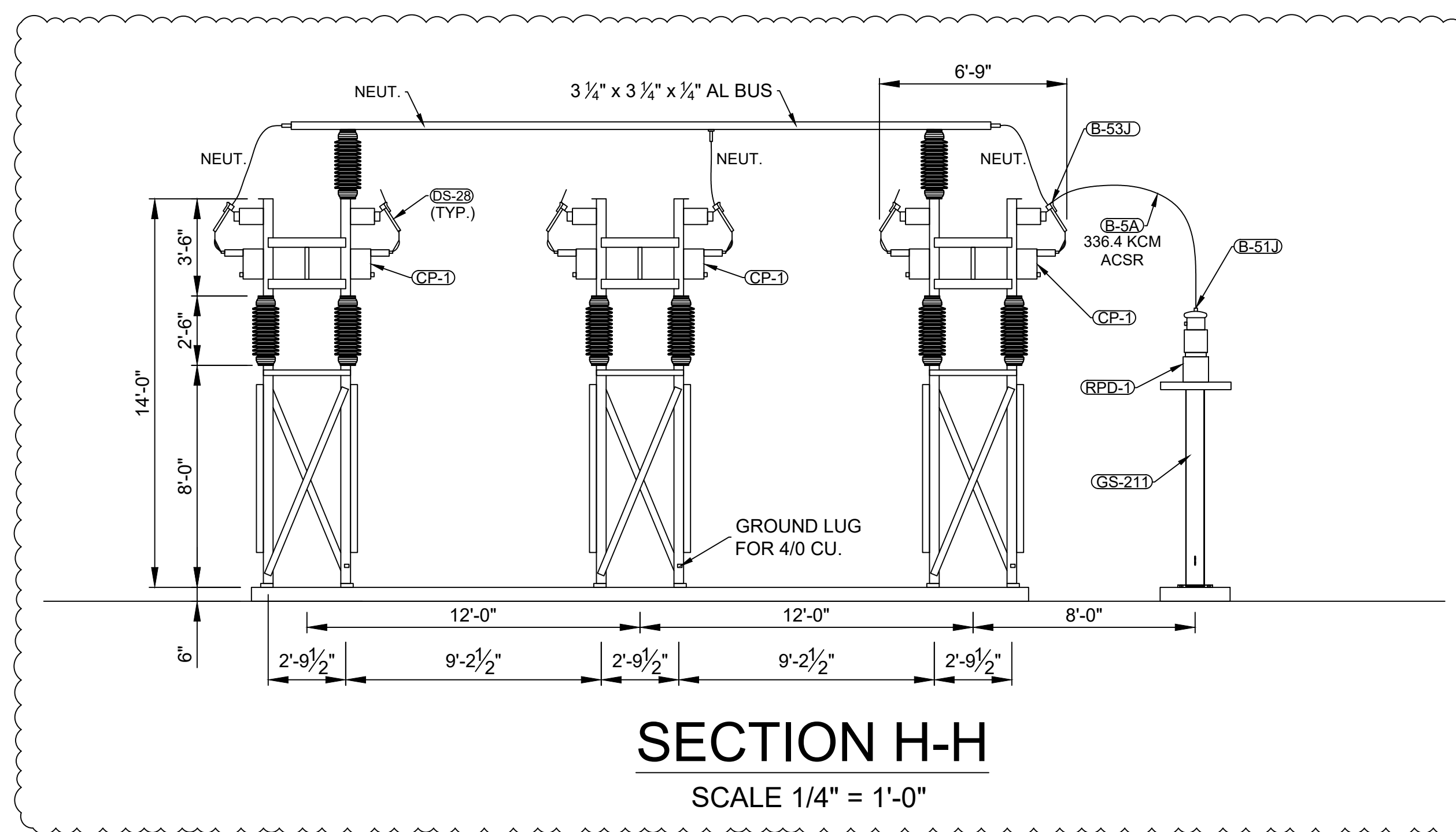


DESCRIPTION: ISSUED FOR BID		GRAND RIVER DAM AUTHORITY		STILLWATER KINZIE INTERCONNECT S351		STILLWATER, OKLAHOMA		138/69AV			
5	RF022-01145	8/24/2023	NC	BE	TM	NC					
DESCRIPTION: ISSUE FOR REVIEW											
4	RF022-01145	8/14/2023	CP	BE	JS	-					
DESCRIPTION: CAPACITOR BANK BREAKER ADDITION											
3	RF022-01145	5/5/2023	NC	BE	LA	NC					
DESCRIPTION: ASBUILT WAVE TRAP REPLACEMENT											
2	-	07OCT16	RM	TT	RM						
REV NO.	JOB NO.	DATE	DESIGN ENGR	DFTR	DESIGN CHECK	ISSUE APPROVD					
									ENGINEER: NC DRAWN BY: RE CHECKED BY: LA APPROVED BY: NC	SCALE: NONE DATE: 8/22/2022 SHEET 1 OF 1 S351PE01 OLD DRAWING NO.:	REV. 5



SECTION G-G

SCALE 1/4" = 1'-0"



SECTION H-H

SCALE 1/4" = 1'-0"

REFERENCE DRAWINGS:

- S351PE01 ELECTRICAL PLAN
- S351PE05 BUS ASSEMBLY DETAILS

ISSUED FOR CONSTRUCTION

GRAND RIVER DAM AUTHORITY
 STILLWATER KINZIE INTERCONNECT S351
 STILLWATER, OKLAHOMA 138/69kV

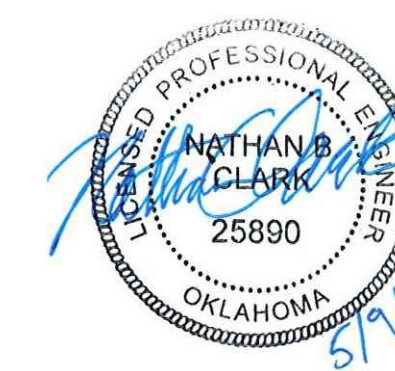
SECTION G-G & H-H

REV.	JOB NO.	DATE	DESIGN ENGR	DFTR	DESIGN CHECK	ISSUE APPRVD
0	RF022-01145	5/9/23	NC	BE	LA	NC

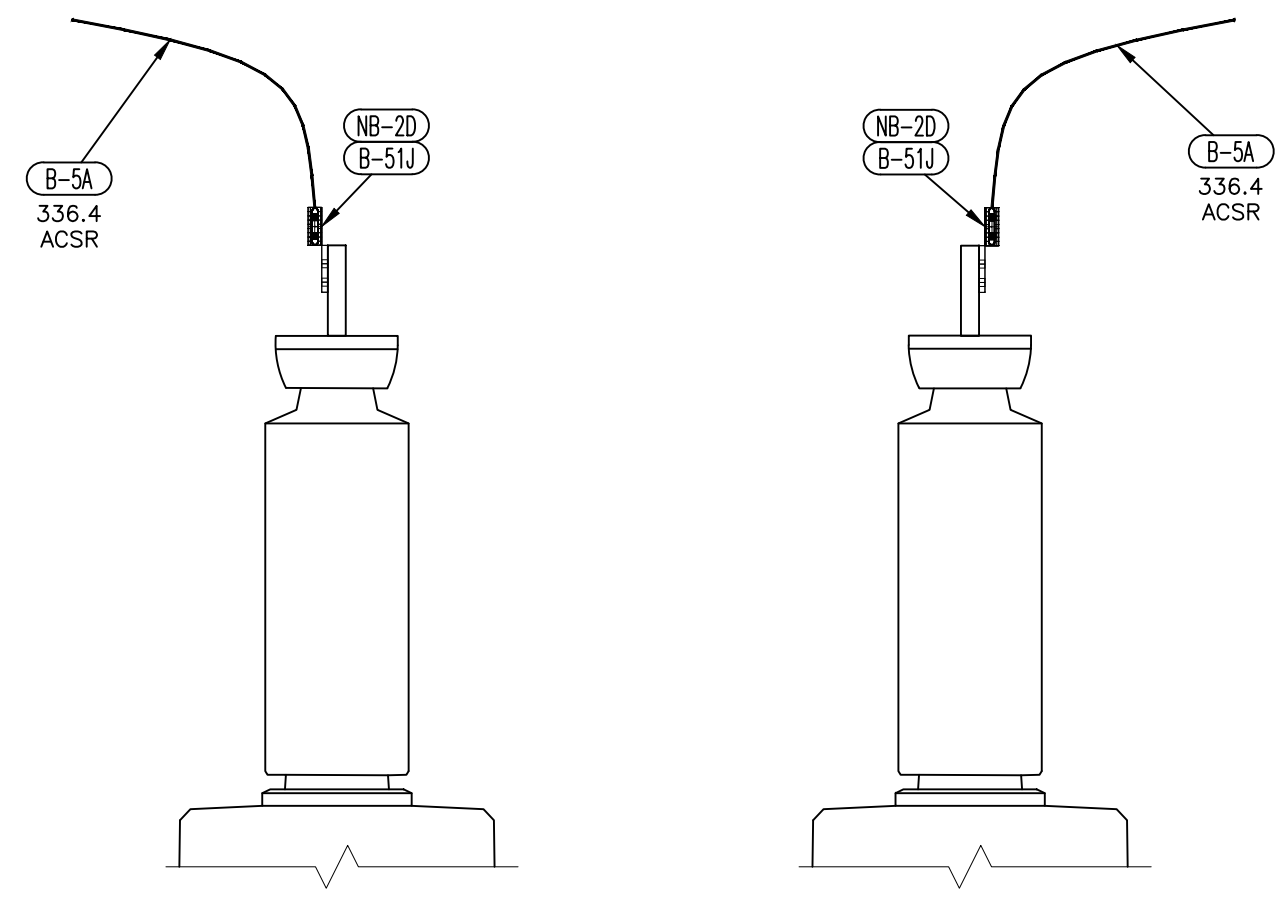
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DRAWN BY: RE	DRAWING NO.	SHEET 1 OF 1	0
CHECKED BY: LA	S351PE04		
APPROVED BY: NC	OLD DRAWING NO.:		



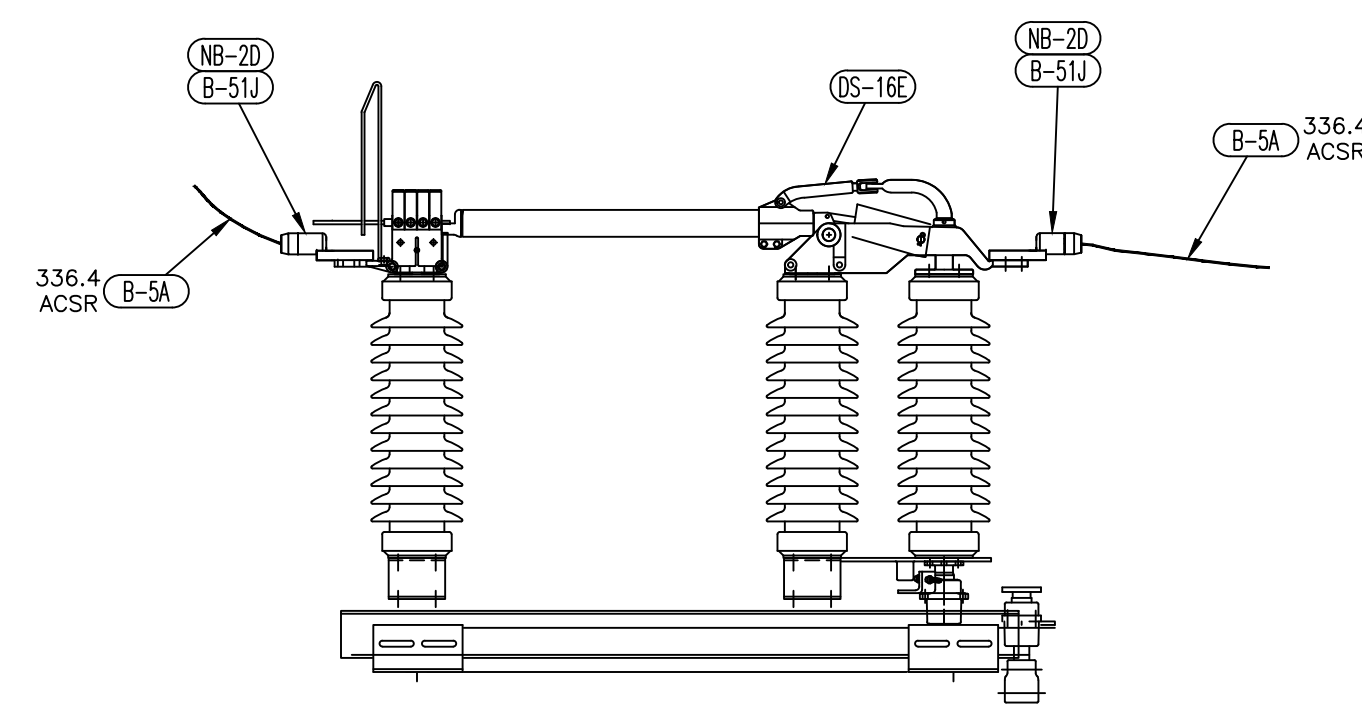
4555 W Memorial Rd.
 Oklahoma City, OK 73142



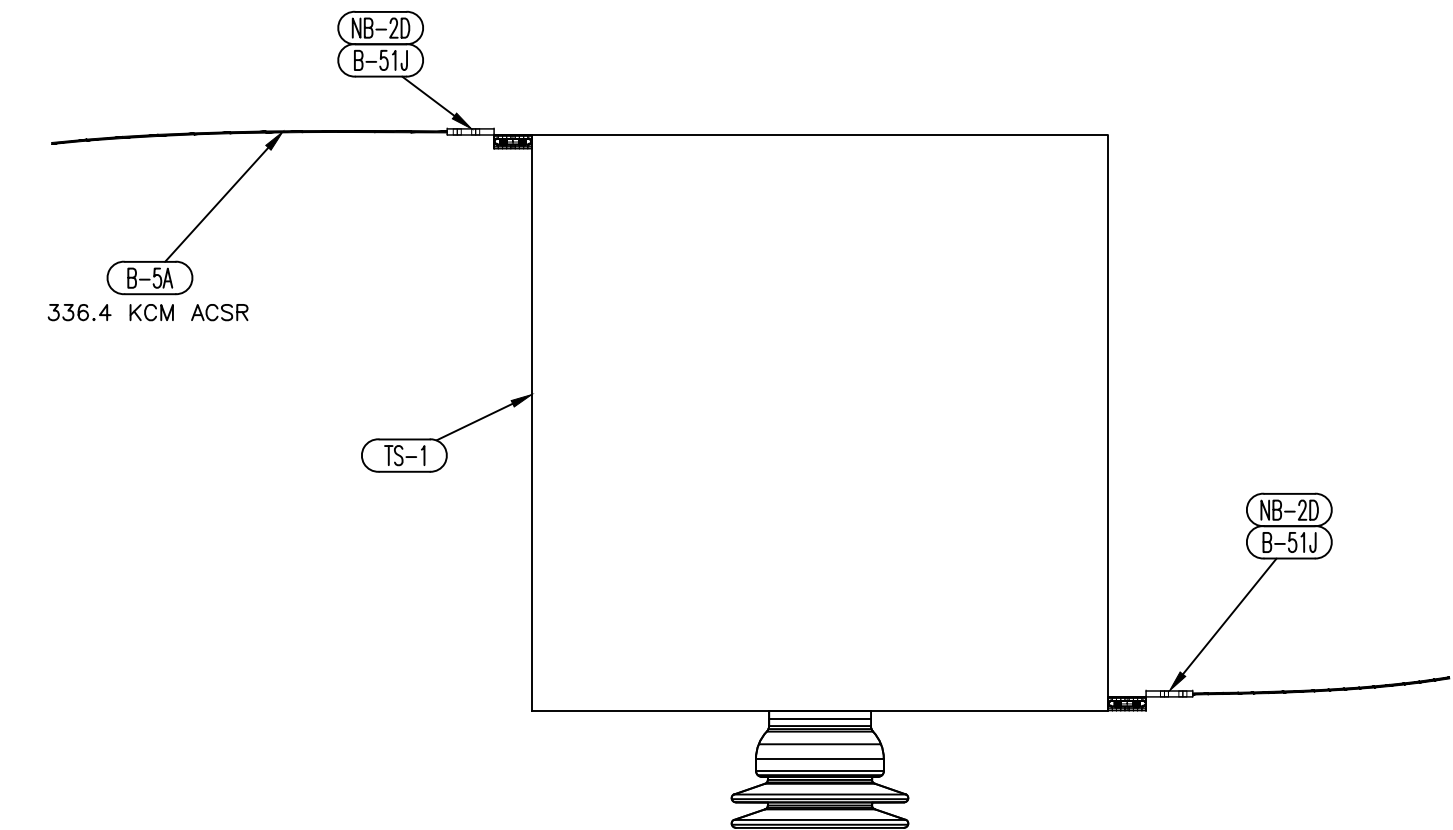
P.O. BOX 669
 SHUTEAU, OK 74337



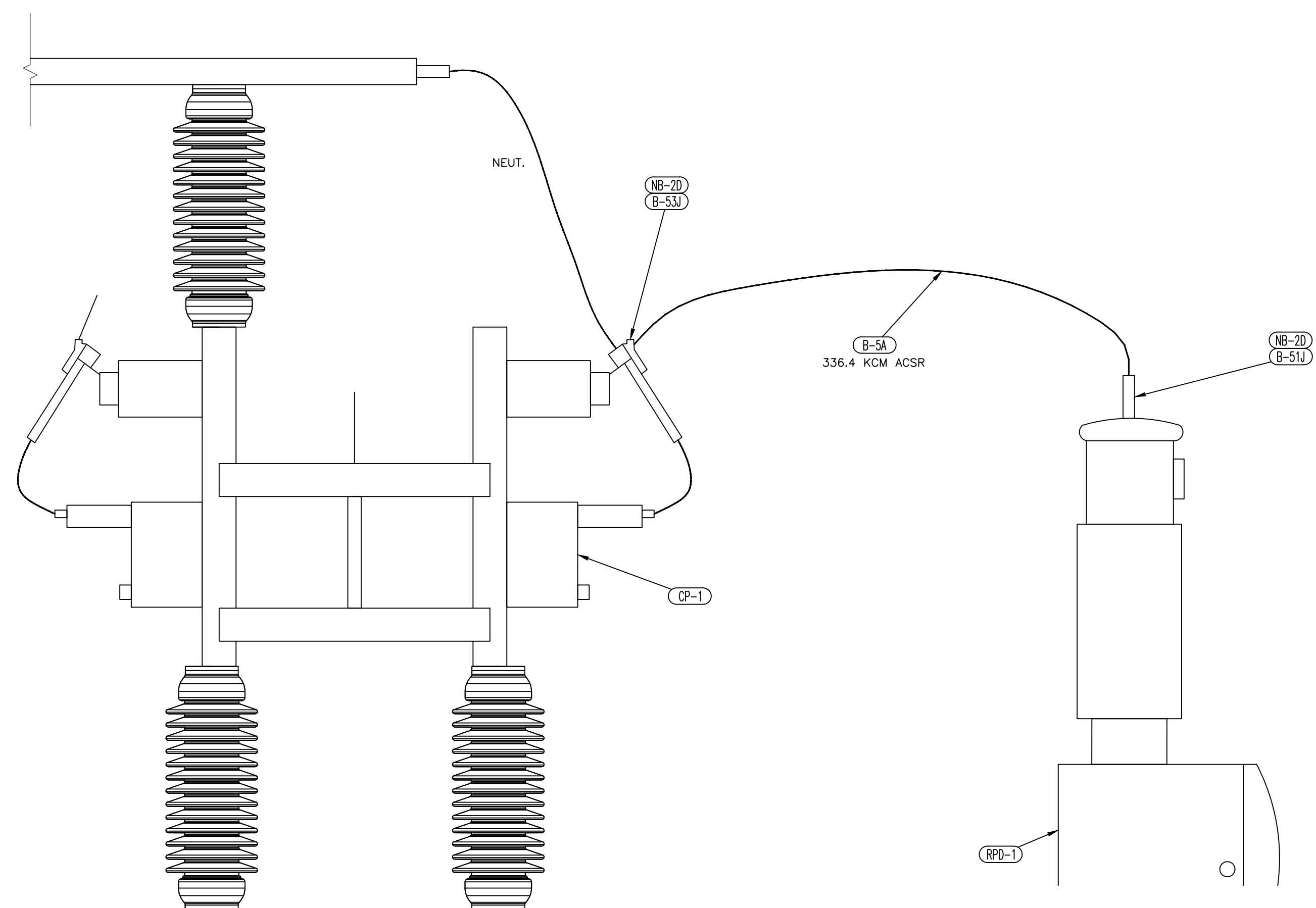
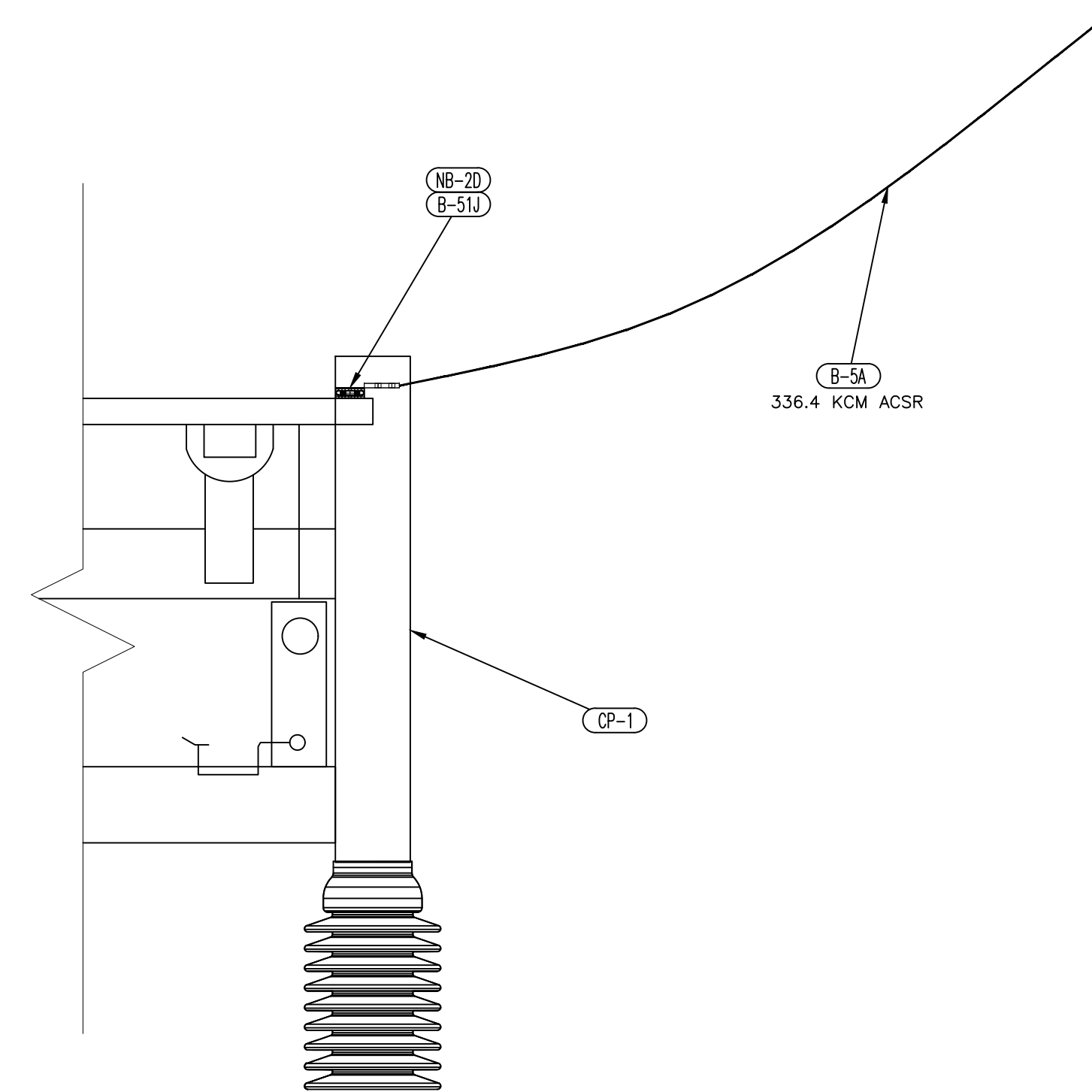
69kV BREAKER – SWAGE



69kV BREAKER DISC SWITCH – SWAGE



69kV TRANSIENT REACTOR – SWAGE



69kV CAPACITOR BANK – SWAGE

REFERENCE DRAWINGS
 S351PE01 ELECTRICAL LAYOUT
 S351PE04 SECTION G-G & H-H

DESCRIPTION: CAPACITOR BANK BREAKER ADDITION						
REV NO.	JOB NO.	DATE	DESIGN ENGR	DFTR	DESIGN CHECK	ISSUE APPRVD
0	RF022-01145	5/9/23	NC	BE	LA	NC

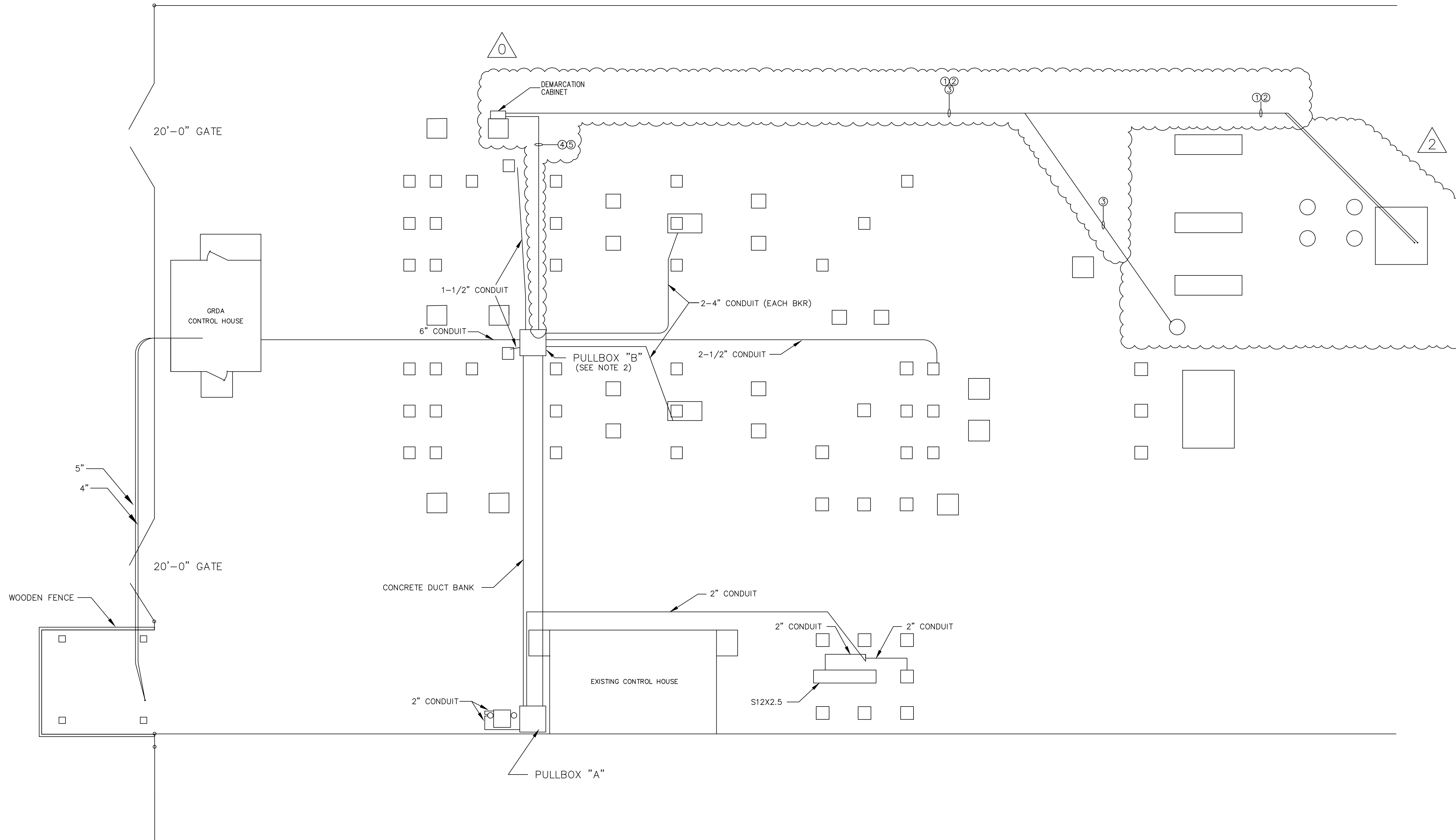
ISSUED FOR CONSTRUCTION
 GRAND RIVER DAM AUTHORITY
 STILLWATER KINZIE INTERCONNECT S351
 STILLWATER, OKLAHOMA 138/69kV

BUS ASSEMBLY DETAILS

ENGINEER: NC SCALE: NONE DATE: 5/9/23 REV. 0
 DRAWN BY: BE DRAWING NO. S351PE05
 CHECKED BY: APPROVED BY:



CONDUIT SCHEDULE - 2023 CONSTRUCTION				
NO.	FROM	TO	SIZE	PURPOSE
1	BKR. NO. 81	DEMARICATION CABINET	4"	BKR. PRI. CURRENTS & CONTROL
2	BKR. NO. 81	DEMARICATION CABINET	4"	BKR. ALT. CURRENTS & CONTROL
3	CAP. BANK RPD J-BOX	DEMARICATION CABINET	2"	CAP. BANK NEUTRAL POTENTIAL
4	DEMARICATION CABINET	PULL BOX 'B'	4"	CABLES TO BUILDING
5	DEMARICATION CABINET	PULL BOX 'B'	4"	CABLES TO BUILDING



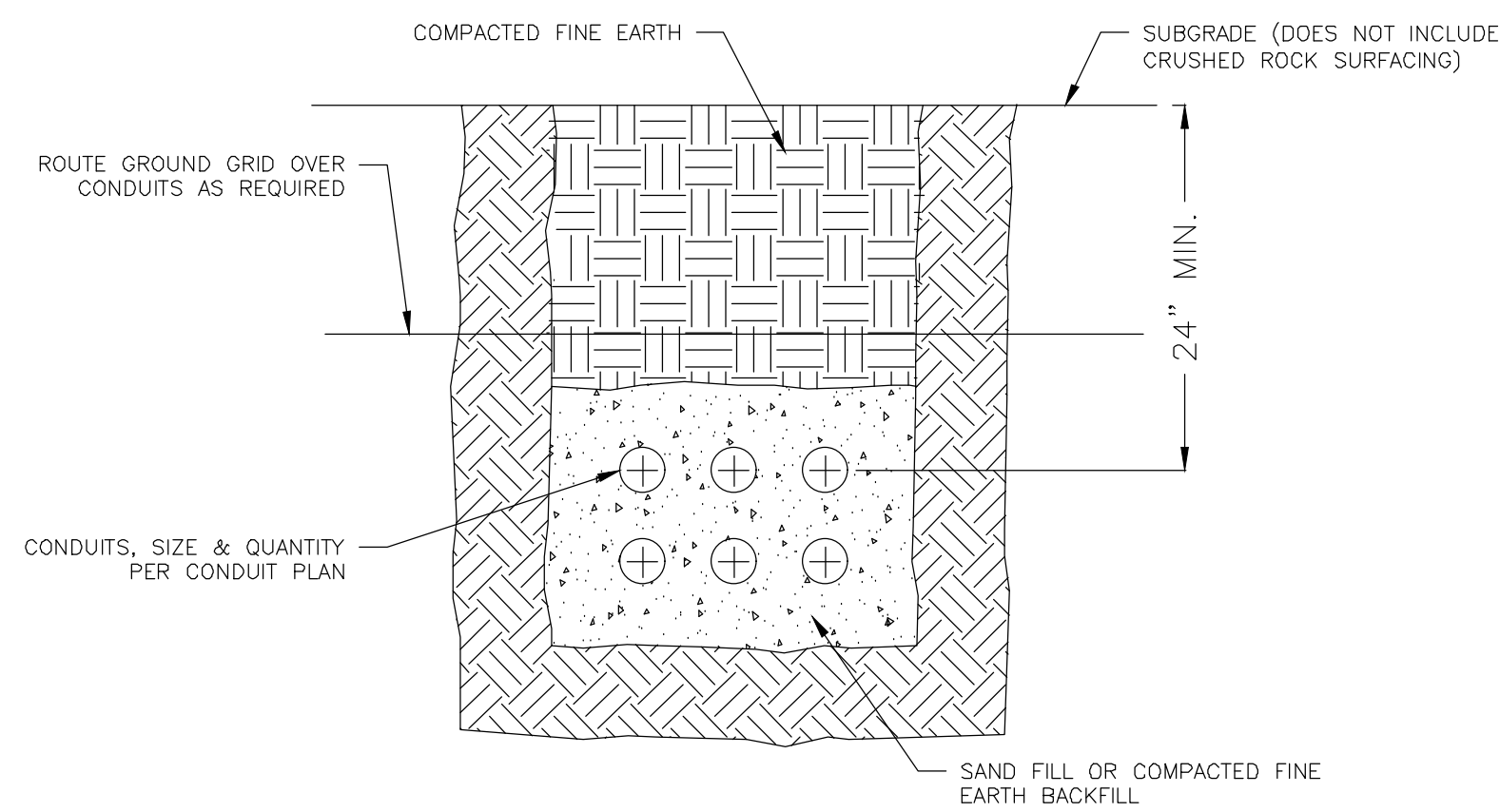
REFERENCE DRAWINGS:
 ED-10 CONDUIT PLAN (CITY)
 S351PE01 ELECTRICAL PLAN
 S351PG11 CONDUIT DETAILS

NOTES:

1. RUN 1-1/2" CONDUITS BETWEEN METERING UNIT TERMINAL BOXES.
2. FOR PULLBOX SECTIONS & DETAILS SEE GRDA DWG. D1402.
3. FOR CITY CONDUITS SEE DWG. ED-10.

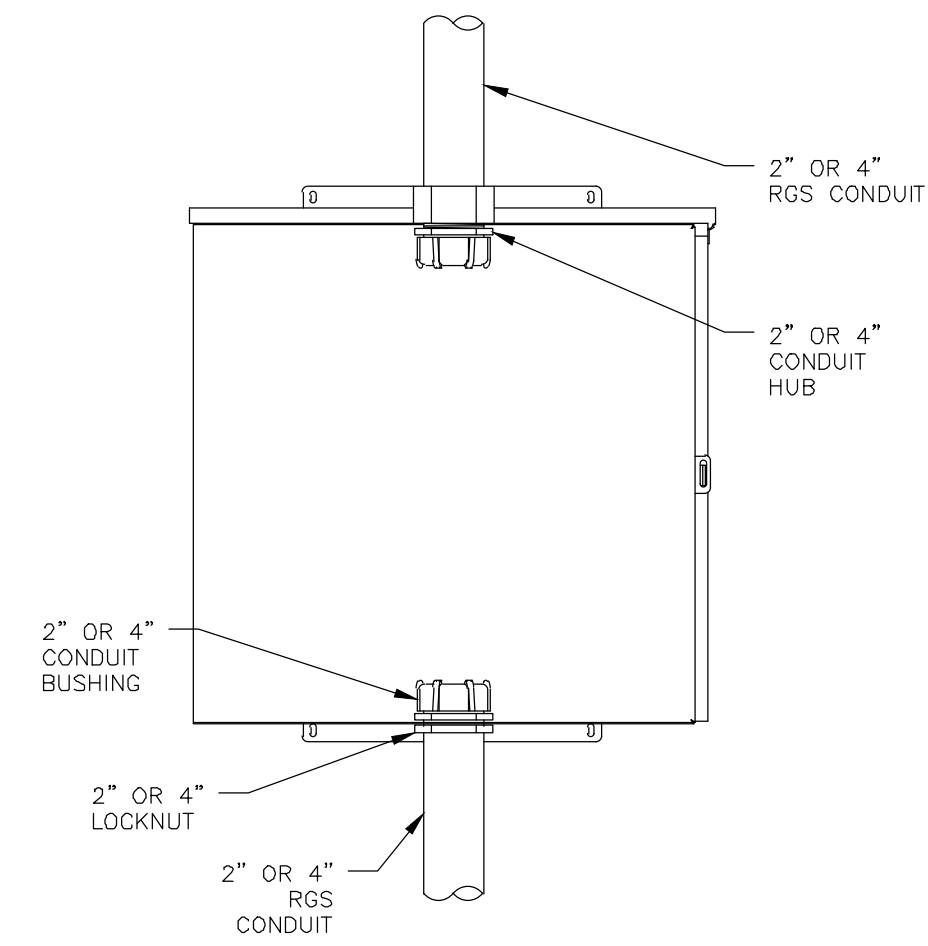


DESCRIPTION: ISSUED FOR BID		GRAND RIVER DAM AUTHORITY		STILLWATER KINZIE INTERCONNECT S351		STILLWATER, OKLAHOMA		138/69KV		
2	RF022-01145	8/24/2023	NC	BE	TM	NC				
DESCRIPTION: CAPACITOR BANK BREAKER ADDITION										
1	RF022-01145	8/14/2023	CP	BE	JS	-				
DESCRIPTION: CAPACITOR BANK BREAKER ADDITION										
0	RF022-01145	5/9/23	NC	BE	LA	NC				
REV. NO.		JOB NO.	DATE	DESIGN ENGR.	DFTR	DESIGN CHECK	ISSUE APPROVD			
		GRDA		ENGINEER: NC	SCALE: NONE	DATE: 8/22/2022	REV.			
		P.O. BOX 669 CHOUTEAU, OK 74337		DRAWN BY: RE	DRAWING NO.	SHEET 1 OF 1	2			
				CHECKED BY: LA	S351PG10					
				APPROVED BY: NC	OLD DRAWING NO.:					



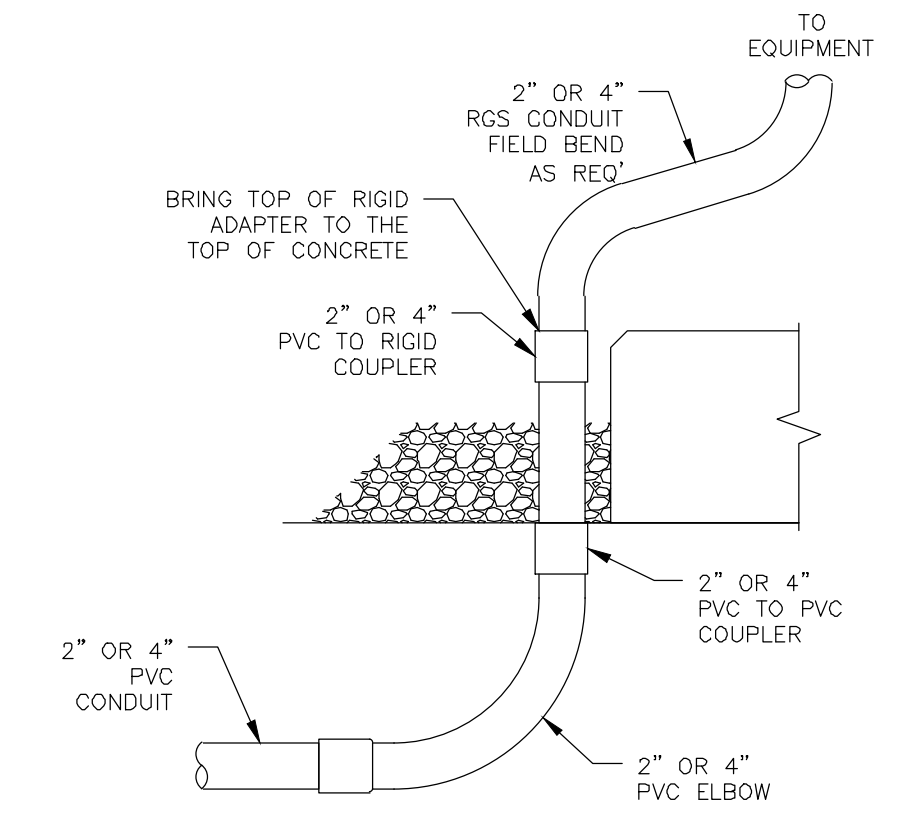
DIRECT BURIED CONDUIT

DETAIL C1



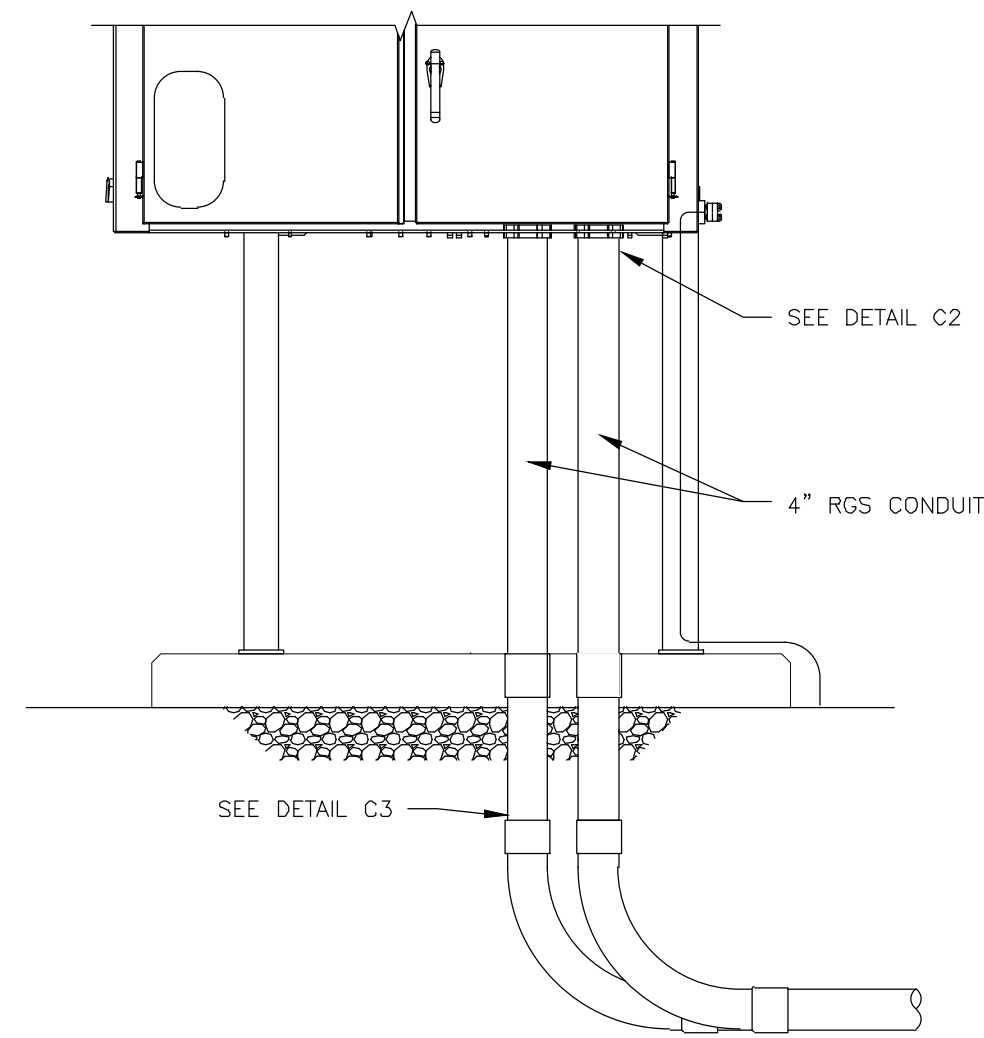
JUNCTION BOX CONDUIT ENTRANCES

DETAIL C2



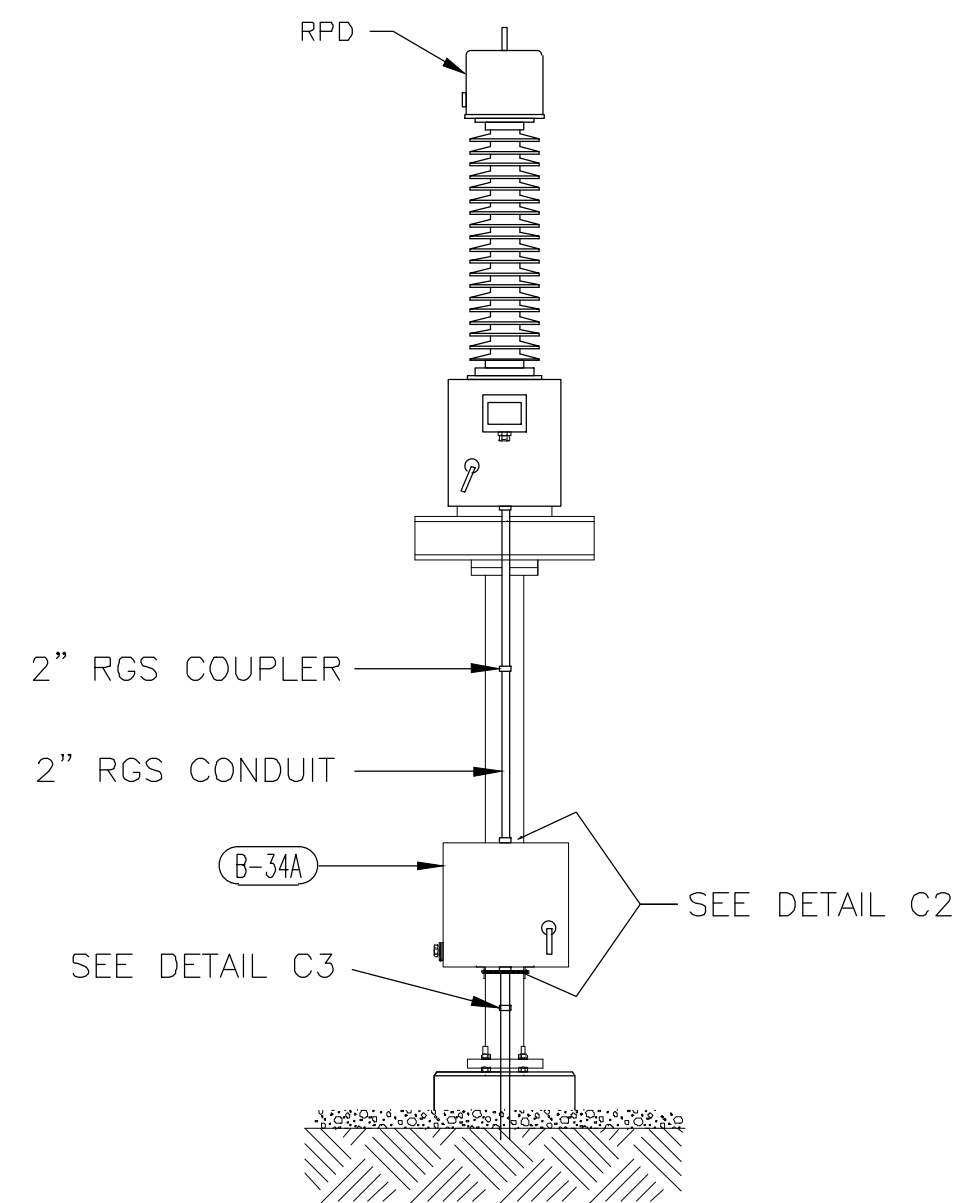
CONDUIT BELOW/ABOVE GRADE TRANSITION

DETAIL C3



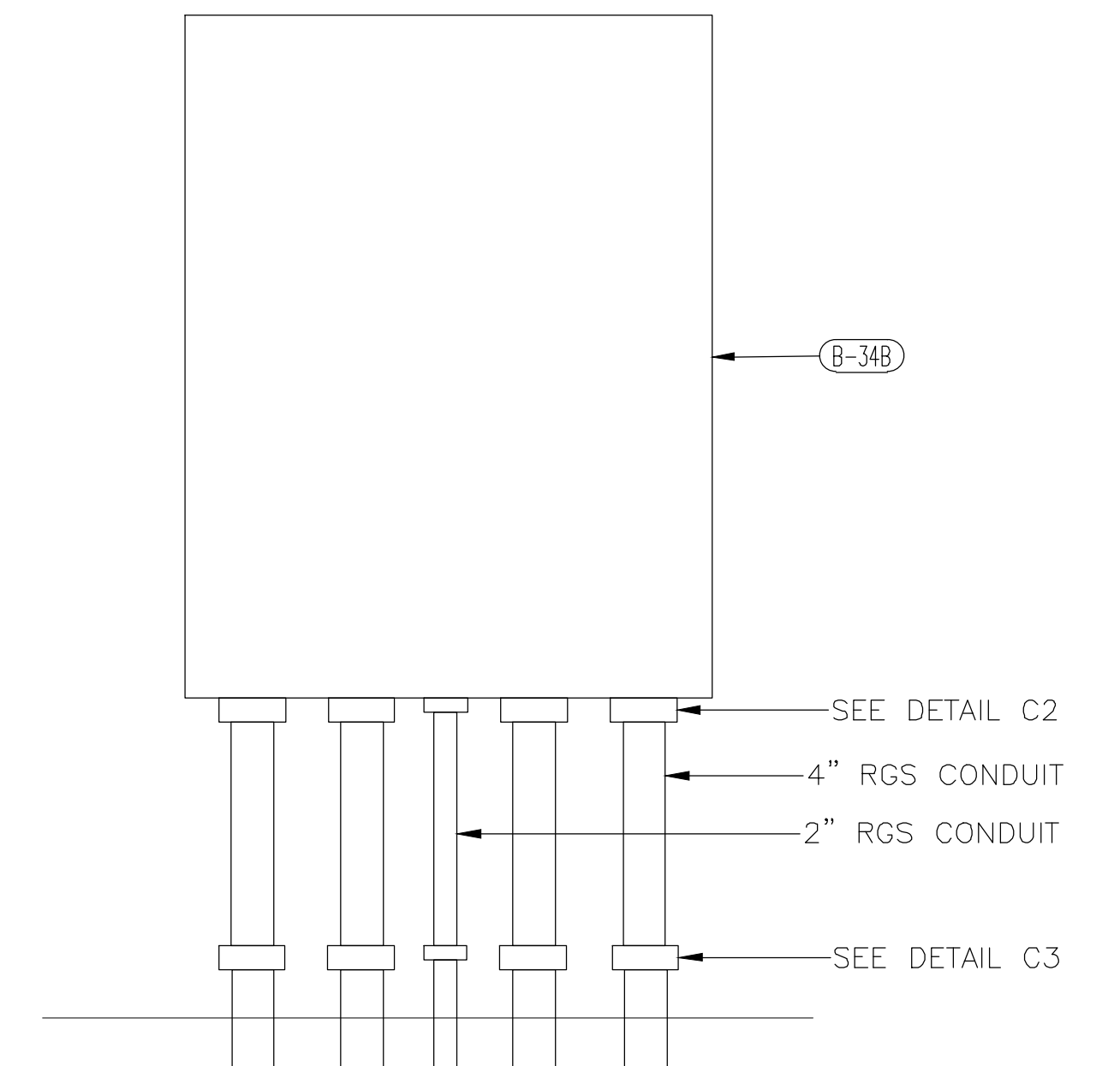
69kV CIRCUIT BREAKER

DETAIL C4



RPD CONDUIT 1 ϕ STRUCTURE

DETAIL C5



DEMARICATION CABINET

DETAIL C6



4555 W MEMORIAL RD.
OKLAHOMA CITY, OK 73142

REFERENCE DRAWINGS
S351PE01 ELECTRICAL PLAN
S351PE10 CONDUIT PLAN



DESCRIPTION: CAPACITOR BANK BREAKER ADDITION						
REV NO.	JOB NO.	DATE	DESIGN ENGR	DFTR	DESIGN CHECK	ISSUE APPROVD
0	RF022-01145	5/9/23	NC	BE	LA	NC

ISSUED FOR CONSTRUCTION

GRAND RIVER DAM AUTHORITY
STILLWATER KINZIE INTERCONNECT S351
STILLWATER, OKLAHOMA 138/69kV

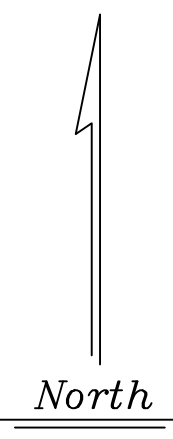
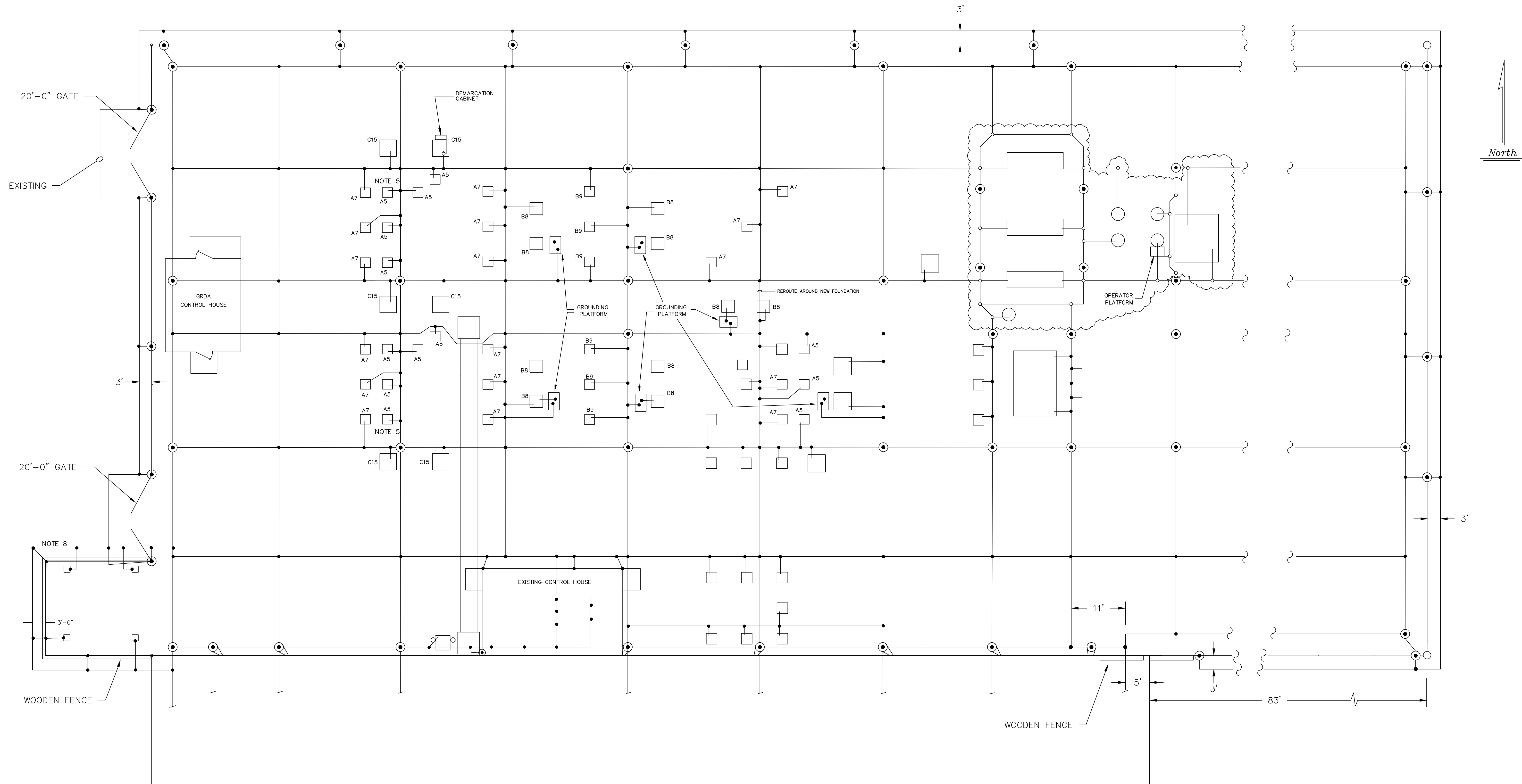
CONDUIT DETAILS



ENGINEER: NC
DRAWN BY: BE
CHECKED BY: BE
P.O. BOX 669
CHOUTEAU, OK 74337

SCALE: NONE
DATE: 5/9/23
DRAWING NO. S351PG11
SHEET 1 OF 1

REV. 0



LEGEND:

- ⊕ EXOTHERMIC CONNECTION
- ⊙ 5/8" x 10' GROUND ROD
- ⊕ SWAGE CONNECTION

REFERENCE DRAWINGS

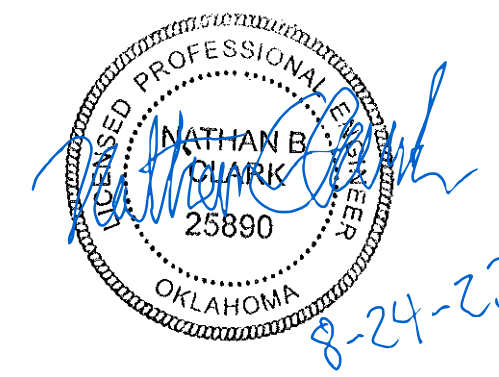
- S351PE01 ELECTRICAL PLAN
- S351PG21 GROUNDING DETAILS
- S351PG22 GROUNDING DETAILS

NOTE:

1. GRID CONDUCTOR IS #4/0 AWG BARE COPPER.



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Oklahoma City, OK 73142



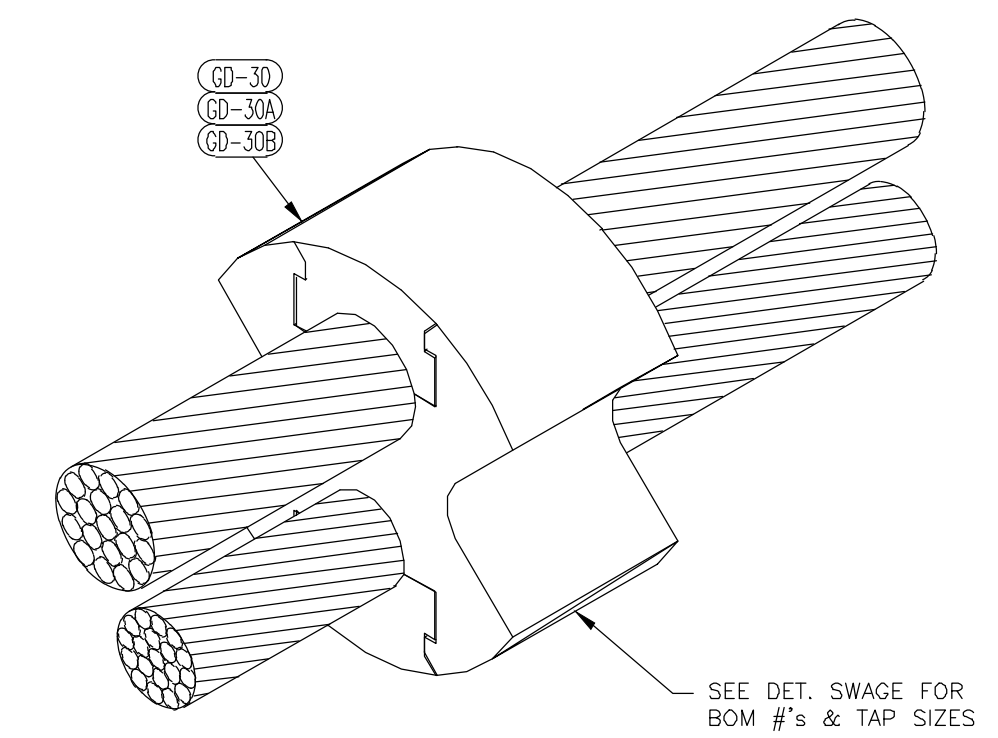
DESCRIPTION: ISSUED FOR BID							GRAND RIVER DAM AUTHORITY STILLWATER KINZIE INTERCONNECT S351 STILLWATER, OKLAHOMA 138/69KV			
3	RF022-01145	8/24/2023	NC	BE	TM	NC				
DESCRIPTION: CAPACITOR BANK BREAKER ADDITION							GROUNDING LAYOUT			
2	RF022-01145	8/14/2023	CP	BE	JS	-				
DESCRIPTION: CAPACITOR BANK BREAKER ADDITION							GRDA P.O. BOX 669 CHOUTEAU, OK 74337			
1	RF022-01145	5/9/23	NC	BE	LA	NC				
DESCRIPTION: AS BUILT.							ENGINEER: _____ SCALE: NONE DATE: 12/2/1986 DRAWN BY: DA DRAWING NO. _____ SHEET 1 OF 1 CHECKED BY: _____ S351PG20 APPROVED BY: _____ OLD DRAWING NO.: D-1200			
REV. NO.	JOB NO.	DATE	DESIGN ENGR.	DFTR	DESIGN CHECK	ISSUE APPROVD	REV. 3			

GENERAL NOTES:

- USE #80 GRIT EMERY CLOTH FOR BRIGHT CLEANING OF SOLID CONDUCTOR SURFACES, AND WIRE BRUSH FOR ALL STRANDED CONDUCTORS BEFORE SWAGE CONNECTION.
- REFER TO MANUFACTURER'S GUIDELINES FOR PROCEDURES FOR PERFORMING SWAGE CONNECTIONS.
- A NO-OX-ID ELECTRICAL JOINT COMPOUND CORROSION INHIBITOR SHALL BE USED IN THE FOLLOWING APPLICATIONS:
 - BETWEEN ALL CONNECTOR CONTACT SURFACES
 - TO LUBRICATE UNLUBRICATED BOLTS MADE OF BRONZE, STAINLESS STEEL OR ALUMINUM USED WITH ELECTRICAL CONNECTORS.
 - TO IMPROVE CONNECTIONS AND PREVENT CORROSION OF GROUND BUS CONNECTIONS
- GROUND WIRE SHALL BE CONTINUOUS FROM POINT OF ORIGIN TO GRID. SPLICING OF GROUND WIRE WITH MECHANICAL CONNECTORS IS NOT PERMITTED. JUMPERS FROM ABOVE GRADE CONNECTIONS TO BELOW GRADE GRID SHALL BE COPPERWELD, AND STRUCTURES SHALL BE CONNECTED TO GRID AT TWO DIFFERENT GRID RUNS.
- CONTRACTOR SHALL COIL UP ENOUGH CONDUCTOR SO AS TO REACH THE EQUIPMENT GROUNDING CONNECTIONS WITHOUT REQUIRING A SPLICE.
- SECURE GROUND CONDUCTOR TO STEEL MAXIMUM 6' APART.

BOM	DESCRIPTION	RUN	TAP	DMC PART #	TOOL HEAD ASSY	INSPECTION GAUGE
GD-30	PARALLEL, SPLIT, CU	#4/0	#4/0	GC888B004-004	DLT45CLHA11130	GCIG200-11130
GD-30A	PARALLEL, SPLIT, CU	#4/0	#2/0	GC888B002-004	DLT45CLHA11130	GCIG200-11130
GD-30B	PARALLEL, SPLIT, CU	#4/0	#2	GC721B02G-004	DLT45CLHA11130	GCIG200-11130
GD-31	ELBOW, SPLIT, CU	#4/0	3/4" ROD	GC739B004-682	DLT45CLHA03975	GCIG200-03975
GD-32	TERMINAL, 1 HOLE, OFFSET PAD, CU	#2	NA	GC910BL02GT	DLT45CLHA03975	GCIG200-03975
GD-33	TERMINAL, 2 HOLE, OFFSET PAD, CU	#4/0	NA	GC920B004T	DLT45CLHA03975	GCIG200-03975

SWAGE ASSEMBLY TABLE

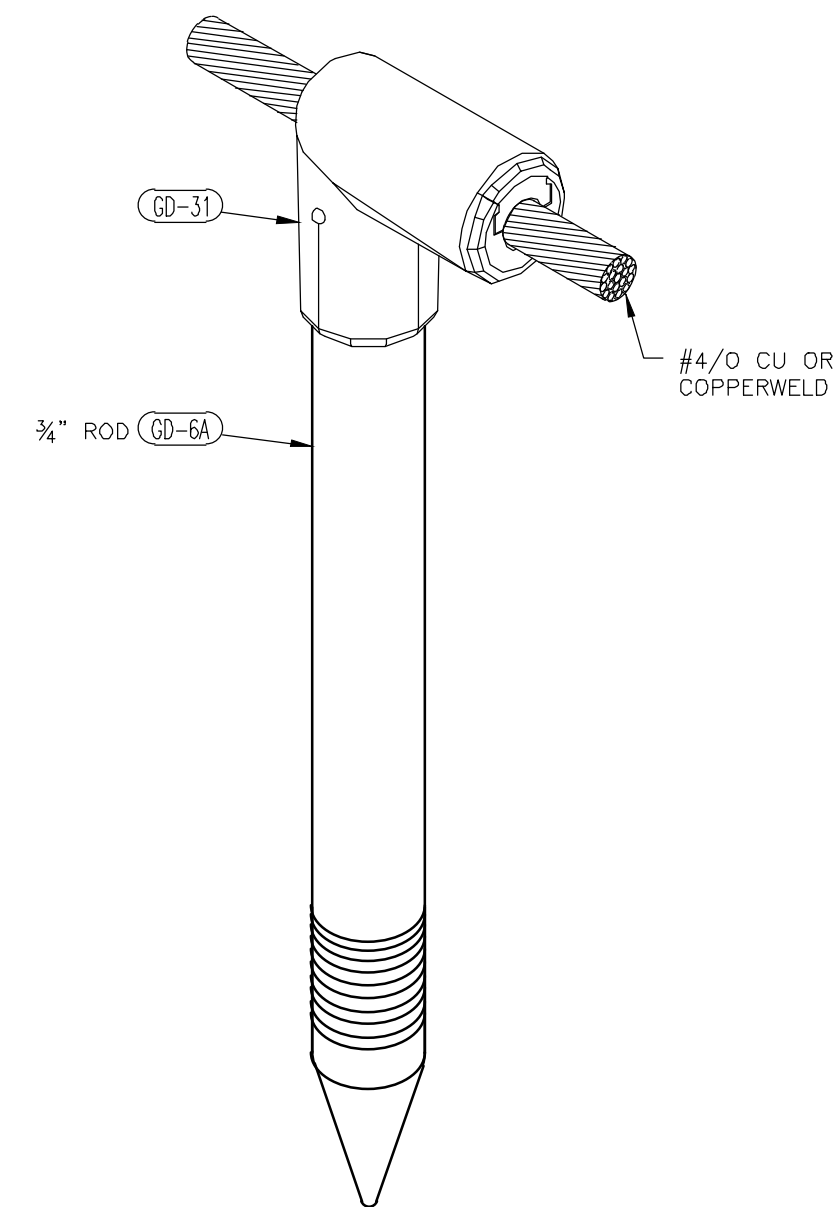


TEE, CROSS, AND SPLICE PARALLEL CONDUCTOR CONNECTOR - SWAGE

DETAIL NOTES

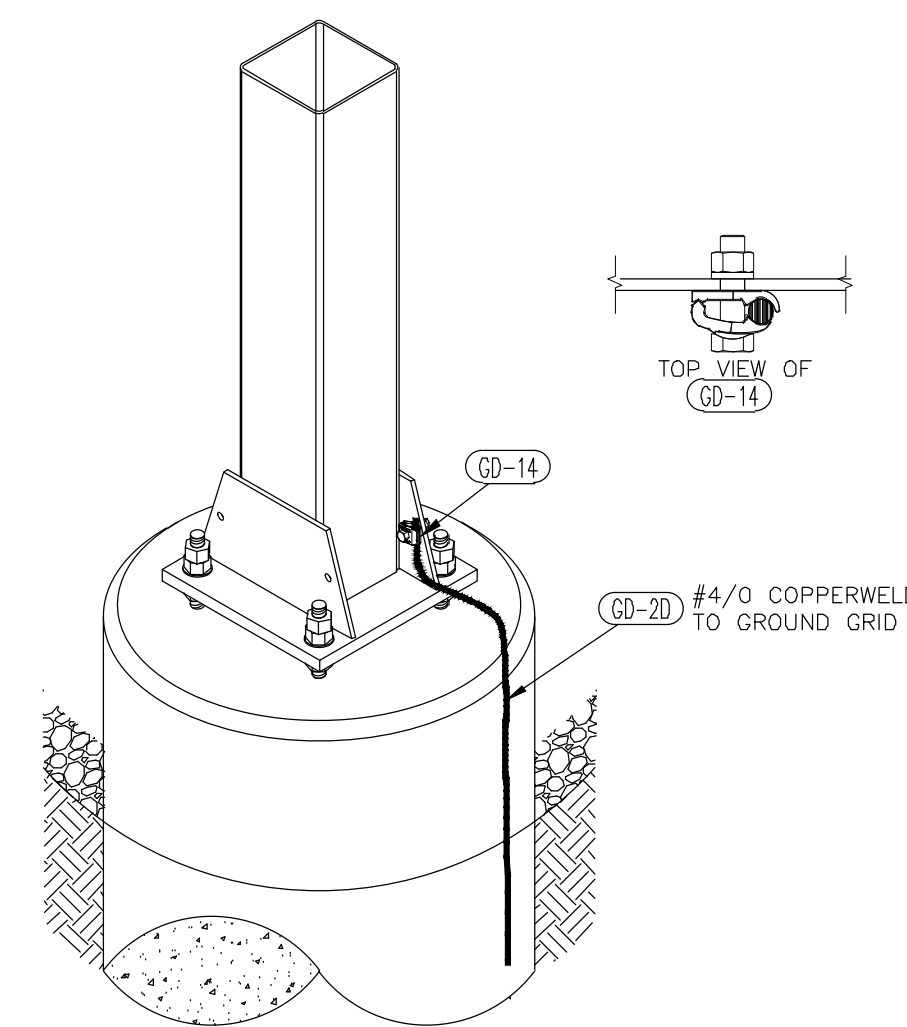
DETAIL SWAGE

DETAIL G1



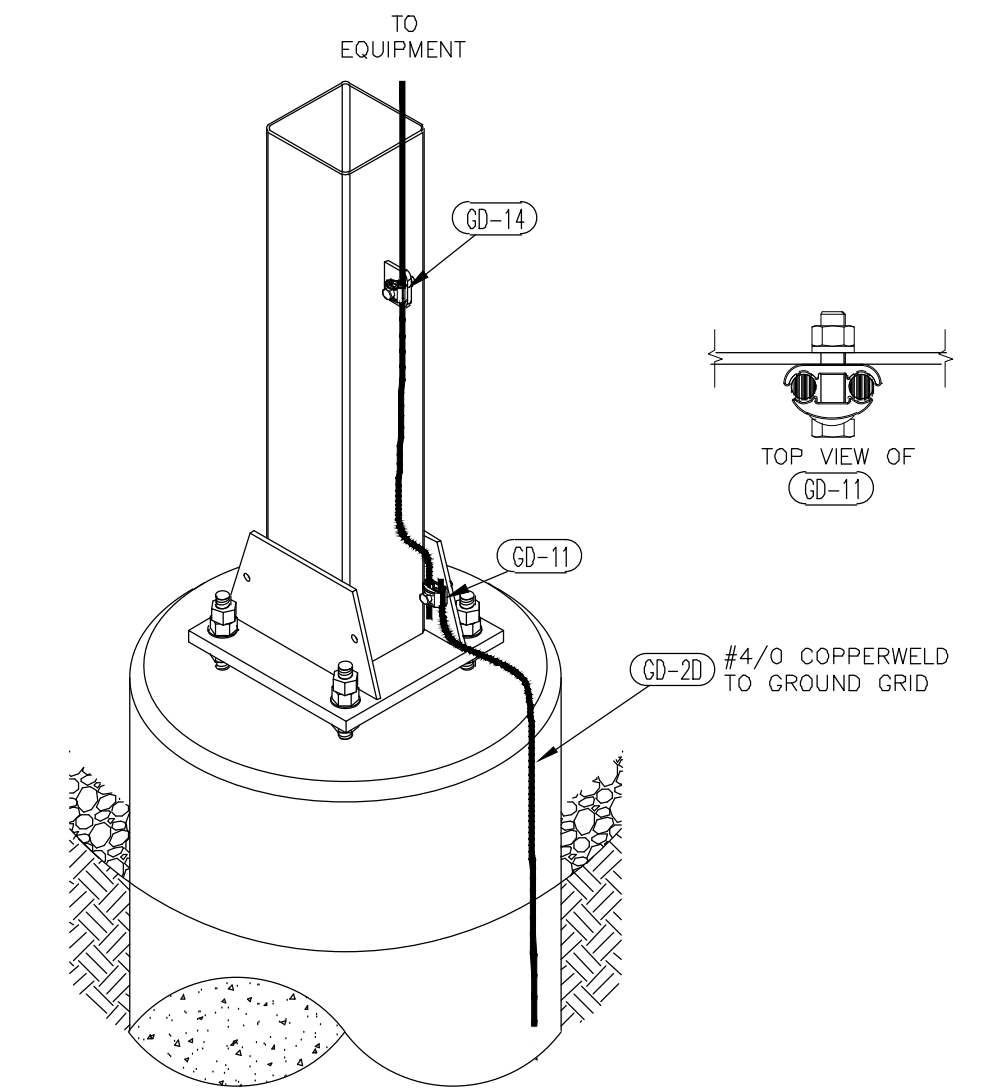
GROUND ROD TO CONDUCTOR CONNECTOR - SWAGE

DETAIL G2



STRUCTURE GROUNDING WITHOUT EQUIPMENT

DETAIL G3



STRUCTURE GROUNDING WITH EQUIPMENT

ISSUED FOR CONSTRUCTION

DETAIL G4



4555 W MEMORIAL RD.
OKLAHOMA CITY, OK 73142

REFERENCE DRAWINGS

- S351PE01 ELECTRICAL LAYOUT
- S351PG20 GROUNDING PLAN
- S351PG22 GROUNDING DETAILS
- S351PG30 FOUNDATION PLAN

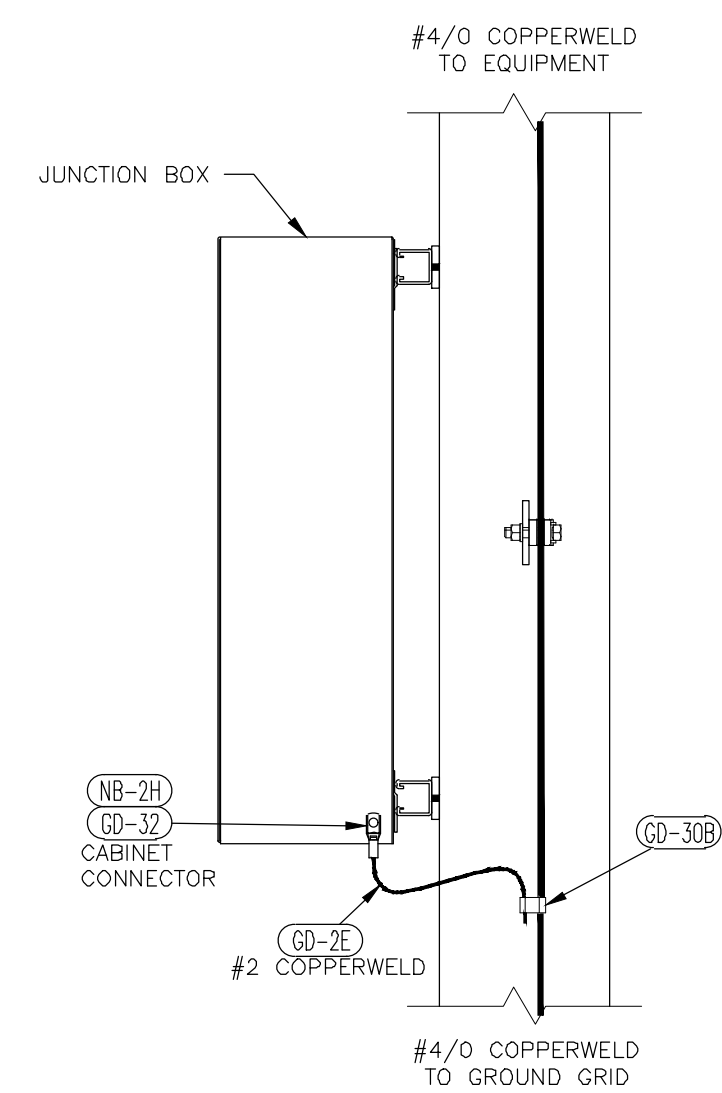


REV NO.	JOB NO.	DATE	DESIGN ENGR	DFTR	DESIGN CHECK	ISSUE APPROVD
0	RF022-01145	5/9/23	NC	BE	LA	NC

GRAND RIVER DAM AUTHORITY
STILLWATER KINZIE INTERCONNECT S351
STILLWATER, OKLAHOMA 138/69kV

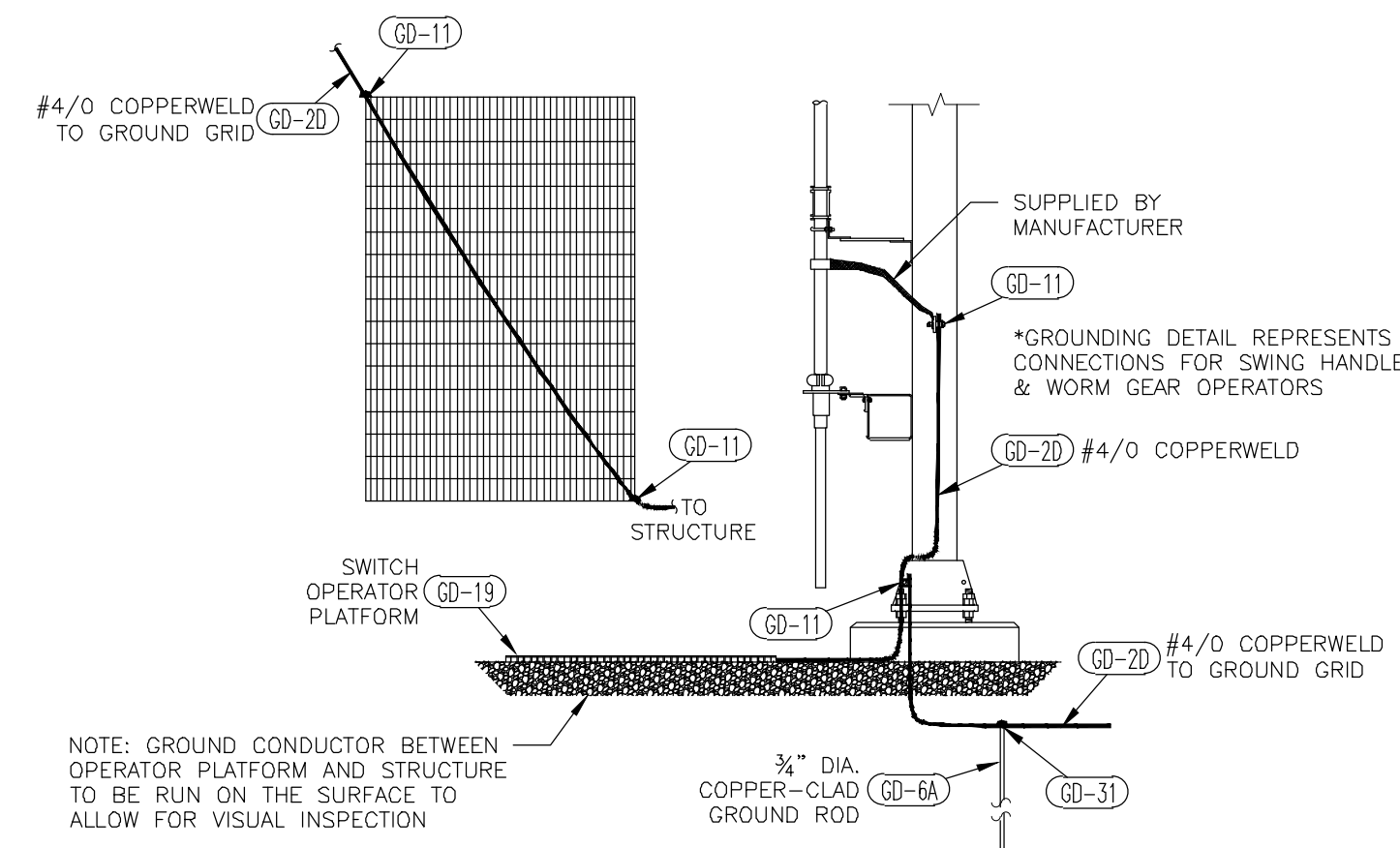
GROUNDING DETAILS

ENGINEER: NC SCALE: NONE DATE: 5/9/23 REV. 0
DRAWN BY: BE DRAWING NO. S351PG21
CHECKED BY: P.O. BOX 669
APPROVED BY: CHOUTEAU, OK 74337



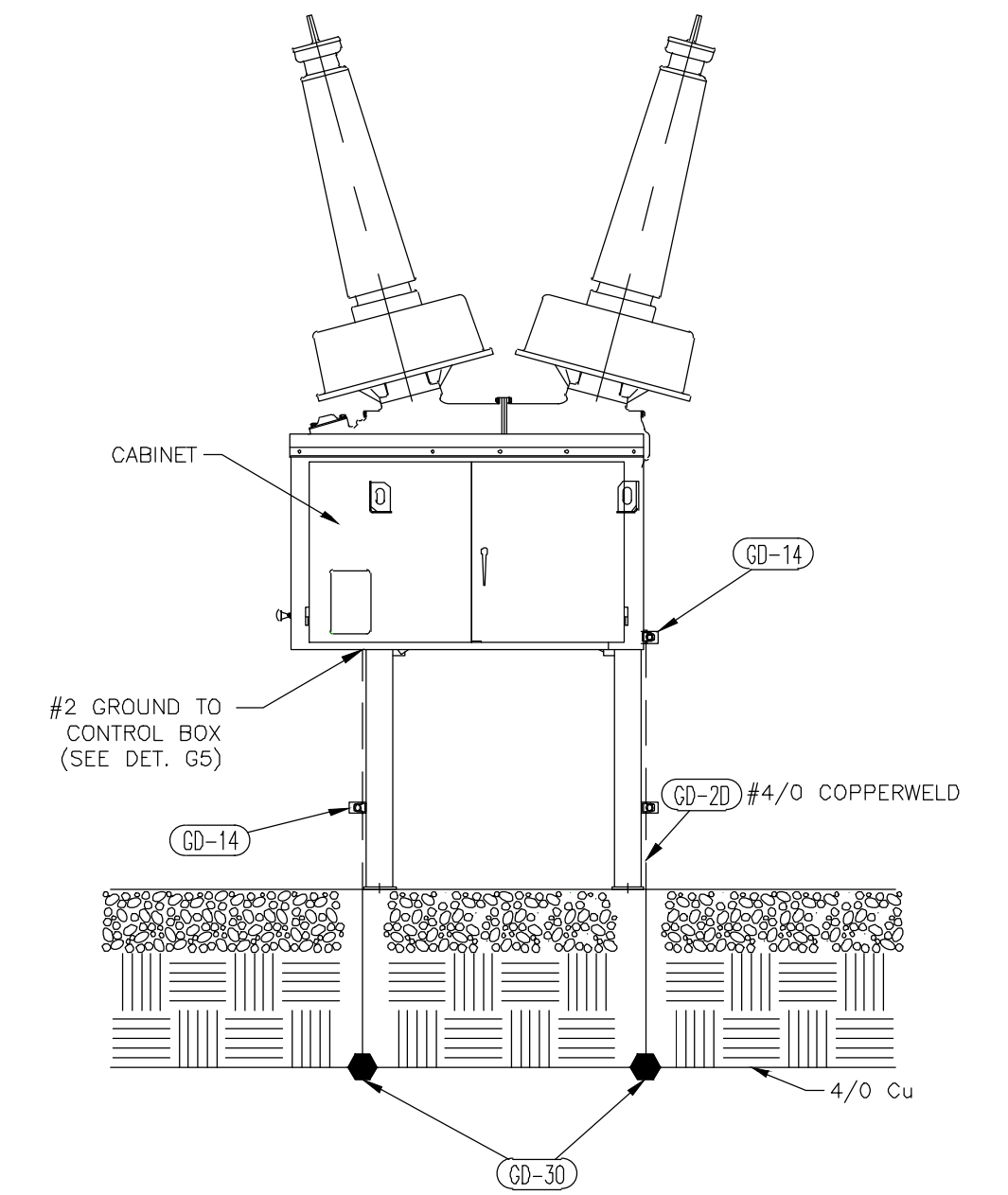
CABINET GROUNDING - SWAGE

DETAIL G5



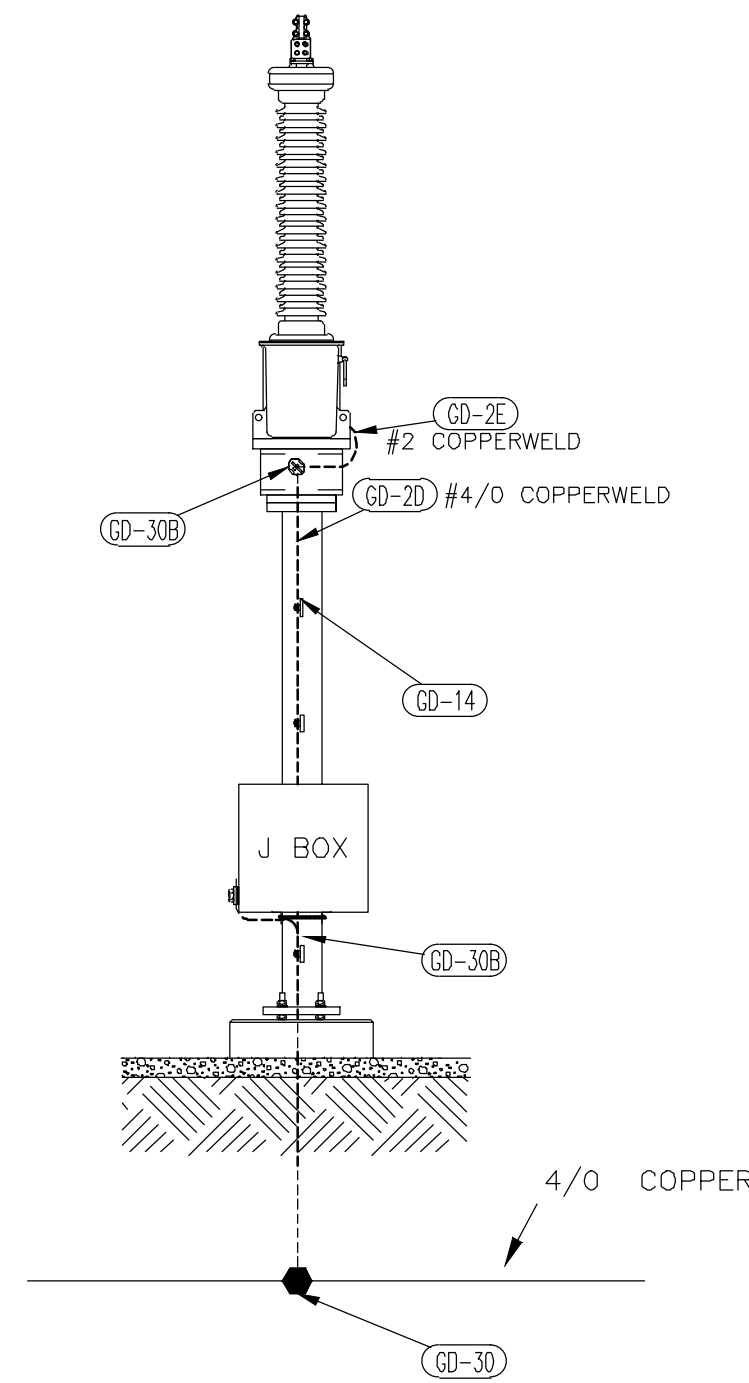
69/161kV SWITCH GROUNDING - SWAGE

DETAIL G6



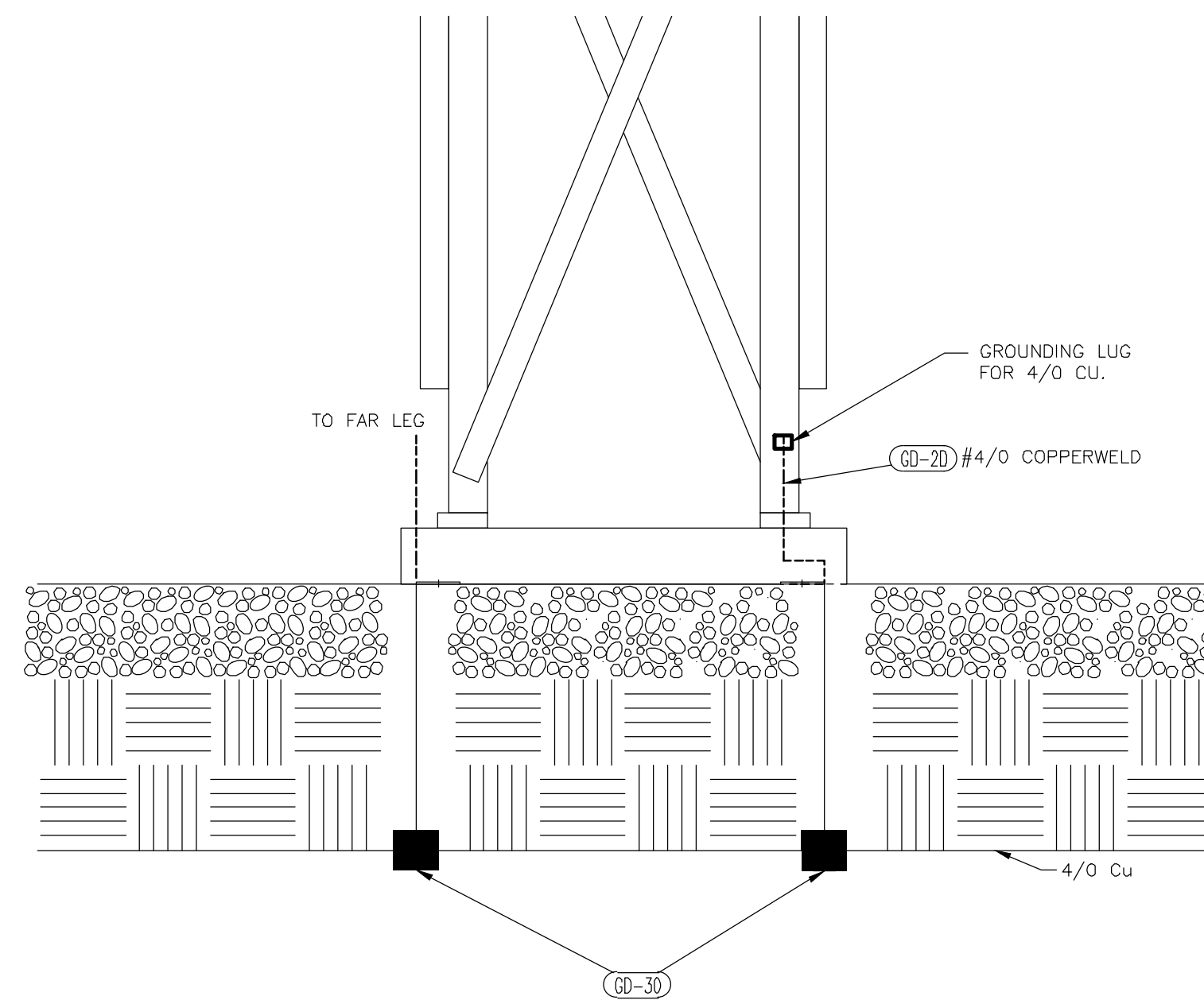
SINGLE-FRAME BREAKER GROUNDING - SWAGE

DETAIL G7



SINGLE PHASE PT GROUNDING - SWAGE

DETAIL G8



SINGLE-FRAME BREAKER GROUNDING - SWAGE

DETAIL G9

- REFERENCE DRAWINGS:
- S351PE01 ELECTRICAL LAYOUT
 - S351PG20 GROUNDING PLAN
 - S351PG21 GROUNDING DETAILS
 - S351PG30 FOUNDATION PLAN



REV NO.	JOB NO.	DATE	DESIGN ENGR	DFTR	DESIGN CHECK	ISSUE APPROVD
0	RF022-01145	5/9/23	NC	BE	LA	NC

ISSUED FOR CONSTRUCTION

GRAND RIVER DAM AUTHORITY
 STILLWATER KINZIE INTERCONNECT S351
 STILLWATER, OKLAHOMA 138/69kV

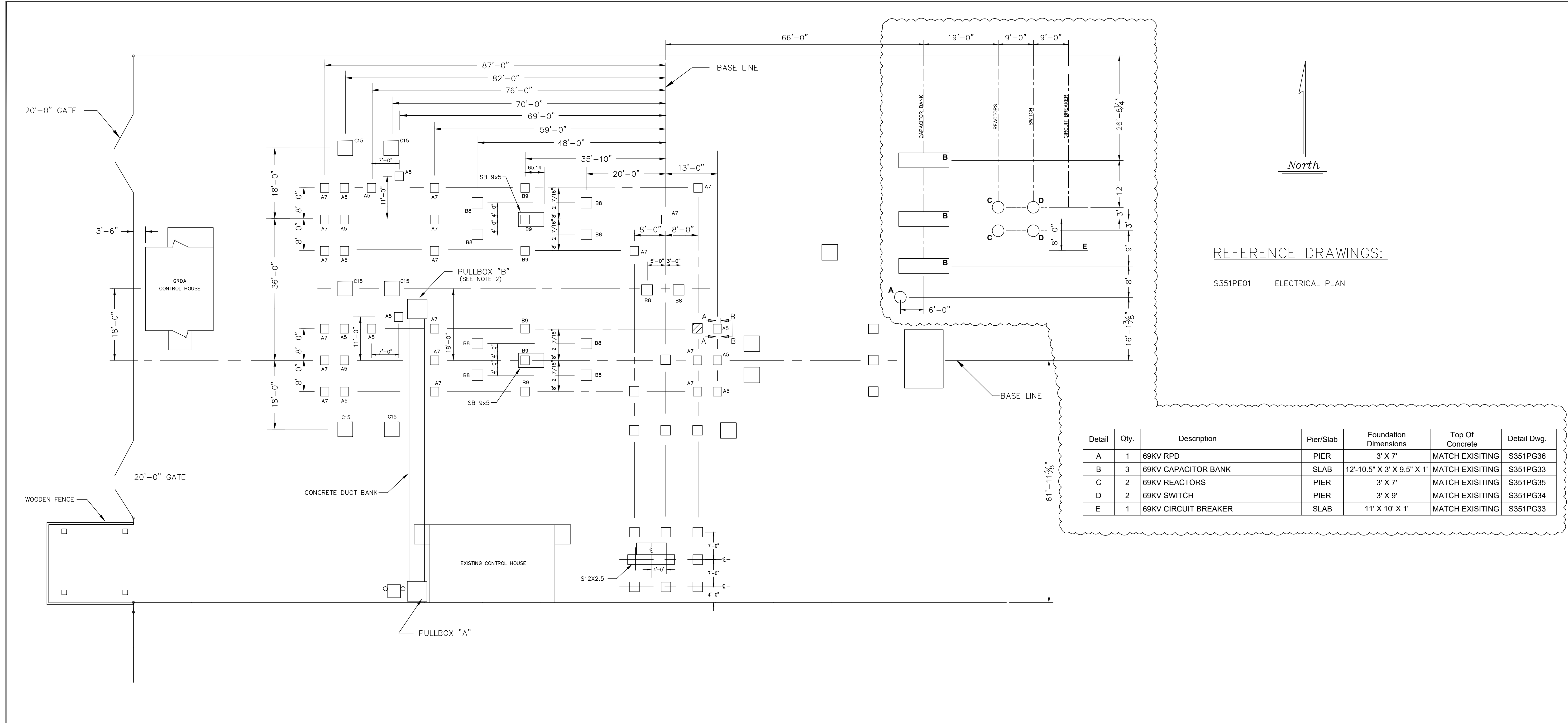
GROUNDING DETAILS



ENGINEER: NC	SCALE: NONE	DATE: 5/9/23	REV. 0
DRAWN BY: BE	DRAWING NO. S351PG22		
CHECKED BY:	APPROVED BY:		



4555 W MEMORIAL RD.
 OKLAHOMA CITY, OK 73142



REFERENCE DRAWINGS:

S351PE01 ELECTRICAL PLAN

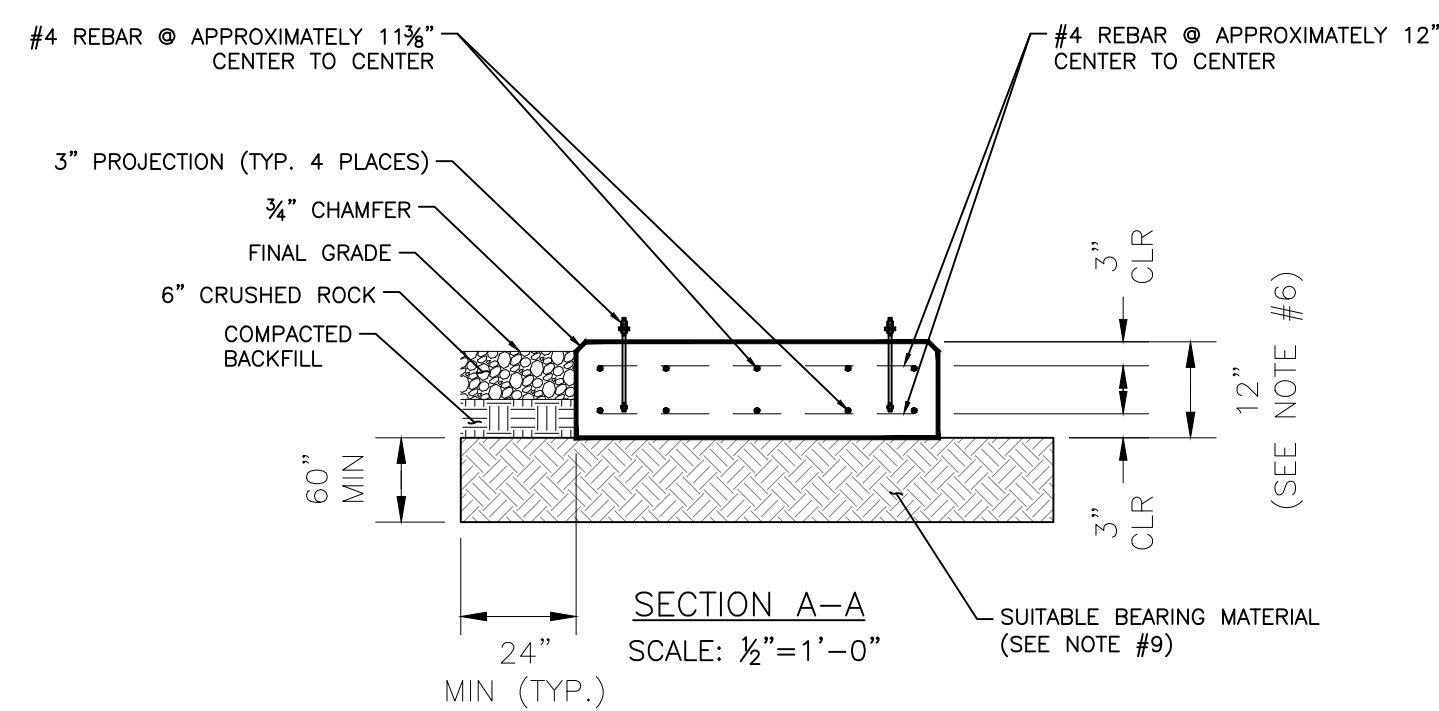
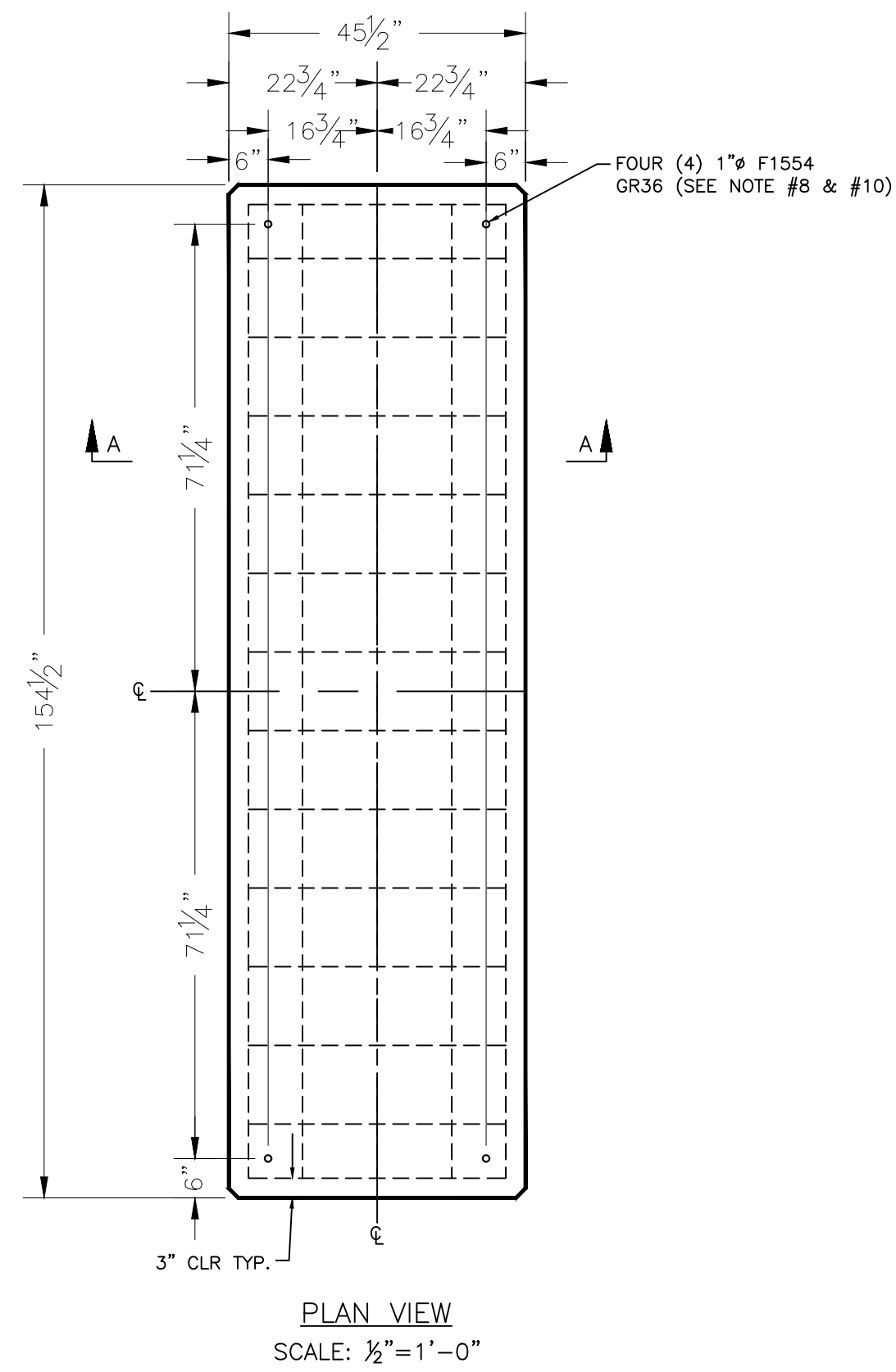
Detail	Qty.	Description	Pier/Slab	Foundation Dimensions	Top Of Concrete	Detail Dwg.
A	1	69KV RPD	PIER	3' X 7'	MATCH EXISTING	S351PG36
B	3	69KV CAPACITOR BANK	SLAB	12'-10.5" X 3' X 9.5" X 1'	MATCH EXISTING	S351PG33
C	2	69KV REACTORS	PIER	3' X 7'	MATCH EXISTING	S351PG35
D	2	69KV SWITCH	PIER	3' X 9'	MATCH EXISTING	S351PG34
E	1	69KV CIRCUIT BREAKER	SLAB	11' X 10' X 1'	MATCH EXISTING	S351PG33

NOTES:

- ALL FOUNDATIONS 887'-6" TO MATCH EXISTING FOUNDATIONS
- FOR PULLBOX SECTIONS & DETAILS SEE GRDA DWG. D1402.



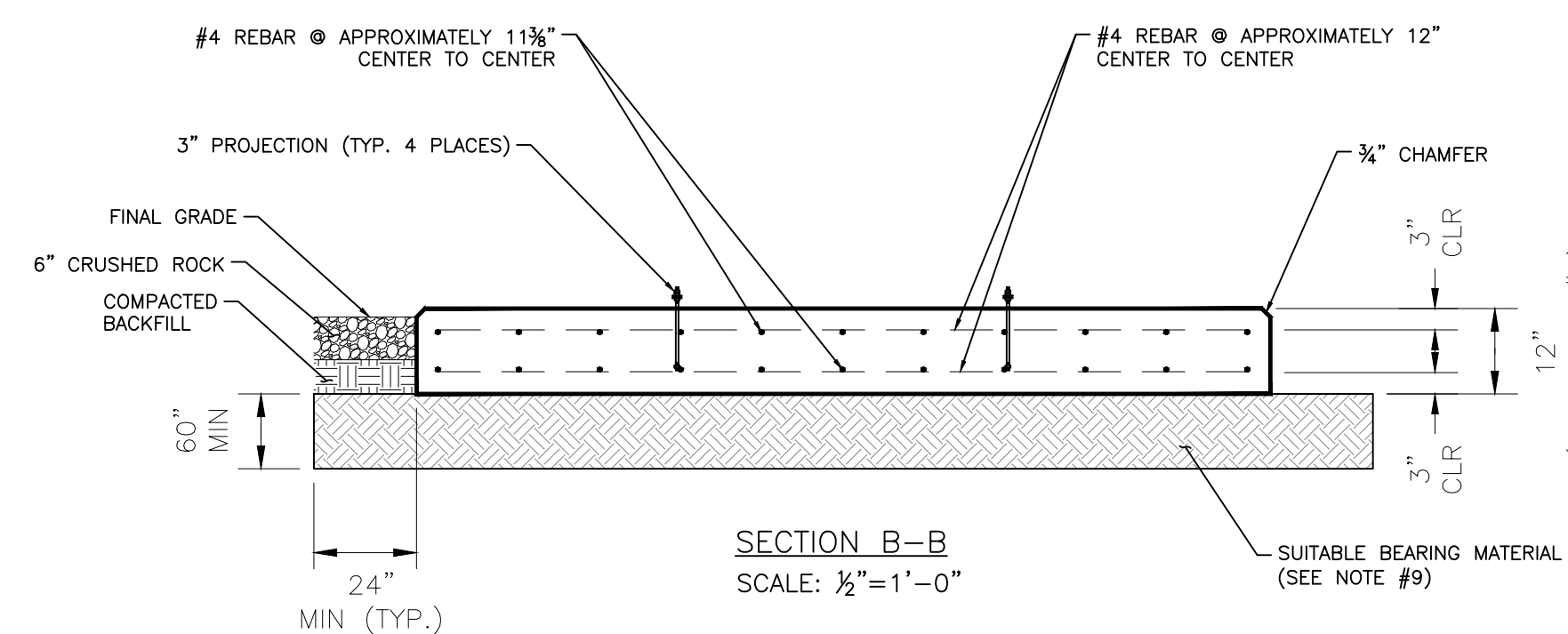
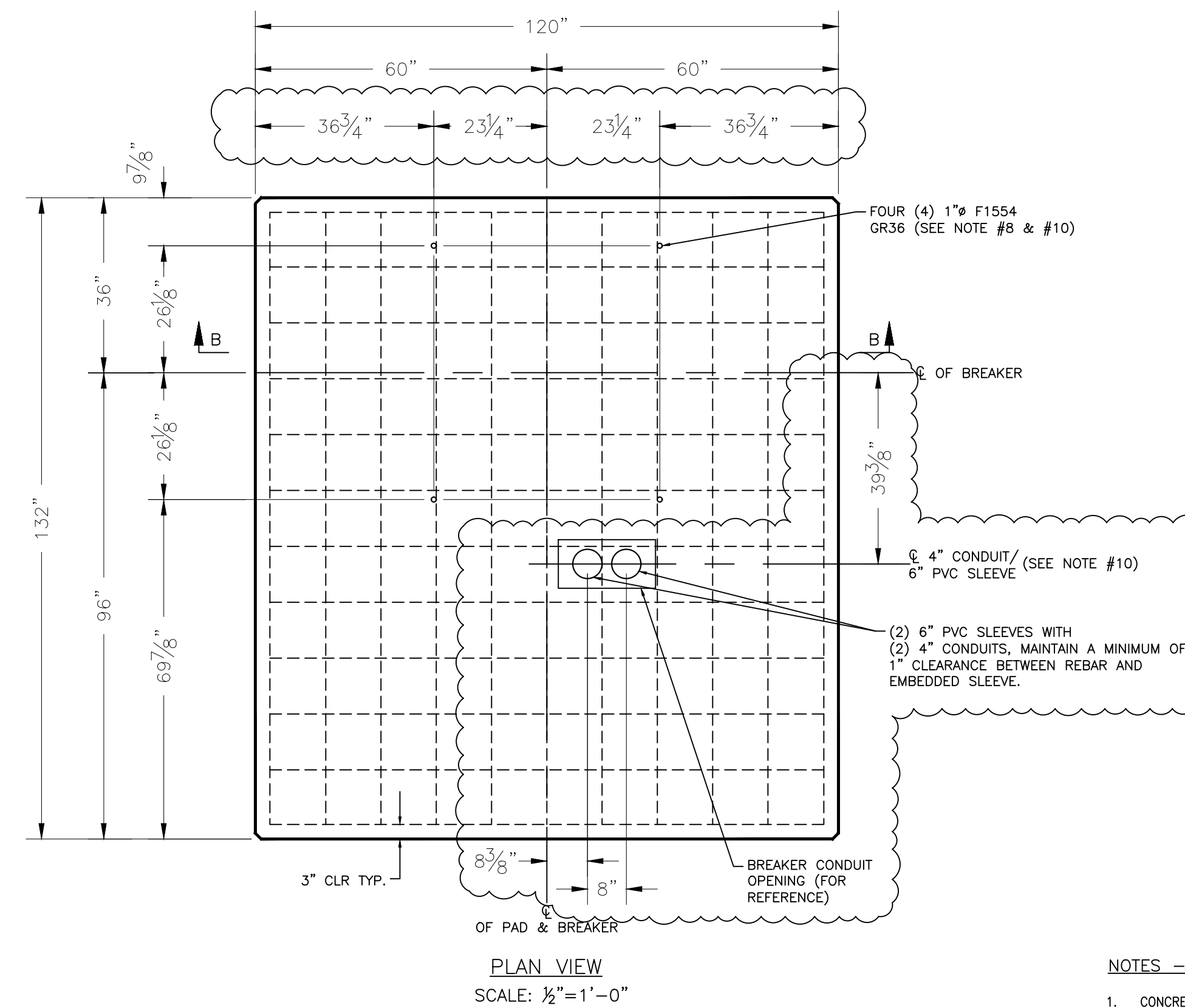
DESCRIPTION: ISSUED FOR BID		GRAND RIVER DAM AUTHORITY	
5	RF022-01145 8/24/2023 NC BE TM NC	STILLWATER KINZIE INTERCONNECT S351	
DESCRIPTION: ISSUE FOR REVIEW		STILLWATER, OKLAHOMA 138/69KV	
4	RF022-01145 8/14/2023 CP BE JS -	FOUNDATION LAYOUT	
DESCRIPTION: CAPACITOR BANK BREAKER ADDITION			
3	RF022-01145 5/9/23 NC BE LA NC	ENGINEER: BA SCALE: NONE DATE: 8/29/2014 REV. 5	
DESCRIPTION: ADDED NEW BKR FDN		DRAWN BY: RC DRAWING NO. SHEET 1 OF 1	
2	RF014-00635 BA TT	CHECKED BY: BA S351PG30	
REV. NO.	JOB NO. DATE DESIGN ENGR DFTR DESIGN CHECK ISSUE APPROVD	P.O. BOX 669 CHOUTEAU, OK 74337 APPROVED BY: XXX OLD DRAWING NO.: D-1199	



DETAIL B
CAPACITOR BANK FOUNDATION
QUANTITY: 3

NOTES - FOUNDATION SL13X4 (CAP BANK):

- CONCRETE SHALL HAVE A 28-DAY COMPRESSIVE STRENGTH OF 4,000 PSI.
- ALL REBAR TO BE #4, ASTM A-615, GRADE 60.
- MAINTAIN A MINIMUM OF 3" BETWEEN BAR AND FACE OF CONCRETE.
- REBAR TO BE ON APPROXIMATELY 11 3/8" & 12" CENTERS AS SHOWN.
- ALL FOOTING EDGES ABOVE GROUND WILL HAVE 3/4" CHAMFER, UNLESS OTHERWISE NOTED.
- DEPTH DIMENSION IS PROPOSED FOR INSTALLATIONS ON STABLE SURFACES. ALL FOOTINGS MUST EXTEND TO SOLID UNDISTURBED EARTH.
- SEE MANUFACTURER PRINT FOR EQUIPMENT DETAILS.
- CONTRACTOR TO PROVIDE ANCHOR RODS AS REQUIRED FOR INSTALLATION OF EQUIPMENT. ALL ANCHOR RODS SHALL BE CAST-IN-PLACE ANCHOR RODS EMBEDDED A MINIMUM OF 9" INTO THE FOOTING WITH A MINIMUM 3" PROJECTION ABOVE THE CONCRETE SURFACE OR AS NOTED ON THE EQUIPMENT MANUFACTURER'S PRINTED INSTALLATION INSTRUCTIONS, WHICHEVER IS GREATER. ANCHOR ROD DIAMETER SHALL BE AS STATED IN THE MANUFACTURER'S PRINTED INSTALLATION INSTRUCTIONS. ALL CAST IN PLACE ANCHOR RODS SHALL BE GALVANIZED ASTM F1554 GR 36 AND SHALL HAVE A NUT AND STANDARD WASHER TACK WELDED TO THE EMBEDDED END.
- UNSUITABLE BEARING MATERIALS SHALL BE REMOVED AND REPLACED AS INDICATED IN THE GEOTECHNICAL ENGINEERING REPORT BY HINDERLITER DATED JUNE 10, 2022.
- FIELD TO ADJUST REBAR SPACING AS NECESSARY TO AVOID CONFLICT WITH ANCHOR BOLTS.



DETAIL E
69kV CIRCUIT BREAKER FOUNDATION
QUANTITY: 1

NOTES - FOUNDATION SL10X11 (BREAKERS):

- CONCRETE SHALL HAVE A 28-DAY COMPRESSIVE STRENGTH OF 4,000 PSI.
- ALL REBAR TO BE #4, ASTM A-615, GRADE 60.
- MAINTAIN A MINIMUM OF 3" BETWEEN BAR AND FACE OF CONCRETE.
- REBAR TO BE ON APPROXIMATELY 1-1 3/8" & 12" CENTERS AS SHOWN.
- ALL FOOTING EDGES ABOVE GROUND WILL HAVE 3/4" CHAMFER, UNLESS OTHERWISE NOTED.
- DEPTH DIMENSION IS PROPOSED FOR INSTALLATIONS ON STABLE SURFACES. ALL FOOTINGS MUST EXTEND TO SOLID UNDISTURBED EARTH.
- SEE MANUFACTURER PRINT FOR EQUIPMENT DETAILS.
- CONTRACTOR TO PROVIDE ANCHOR RODS AS REQUIRED FOR INSTALLATION OF EQUIPMENT. ALL ANCHOR RODS SHALL BE CAST-IN-PLACE ANCHOR RODS EMBEDDED A MINIMUM OF 9" INTO THE FOOTING WITH A MINIMUM 3" PROJECTION ABOVE THE CONCRETE SURFACE OR AS NOTED ON THE EQUIPMENT MANUFACTURER'S PRINTED INSTALLATION INSTRUCTIONS, WHICHEVER IS GREATER. ANCHOR ROD DIAMETER SHALL BE AS STATED IN THE MANUFACTURER'S PRINTED INSTALLATION INSTRUCTIONS. ALL CAST IN PLACE ANCHOR RODS SHALL BE GALVANIZED ASTM F1554 GR 36 AND SHALL HAVE A NUT AND STANDARD WASHER TACK WELDED TO THE EMBEDDED END.
- UNSUITABLE BEARING MATERIALS SHALL BE REMOVED AND REPLACED AS INDICATED IN THE GEOTECHNICAL ENGINEERING REPORT BY HINDERLITER DATED JUNE 10, 2022.
- FIELD TO ADJUST REBAR SPACING AS NECESSARY TO AVOID CONFLICT WITH ANCHOR BOLTS AND CONDUITS.

REFERENCE DRAWINGS:

- S351PE01 ELECTRICAL PLAN
- S351PG10 CONDUIT LAYOUT
- S351PG20 GROUNDING LAYOUT
- S351PG30 FOUNDATION LAYOUT

DESCRIPTION: ADD CONDUIT AND UPDATE ANCHOR BOLT DIMENSIONS						
2	RF022-01145	8/24/2023	NC	BE	CP	CS
DESCRIPTION: ISSUE FOR REVIEW						
1	RF022-01145	8/14/2023	CP	BE	JS	-
DESCRIPTION: ISSUED FOR CONSTRUCTION						
0	RF022-01145	12/5/23	NC	BE	CP	CS
REV NO.	JOB NO.	DATE	DESIGN ENGR	DFT	DESIGN CHECK	ISSUE APPROV

GRAND RIVER DAM AUTHORITY
STILLWATER KINZIE INTERCONNECT S351
STILLWATER, OKLAHOMA 138/69kV

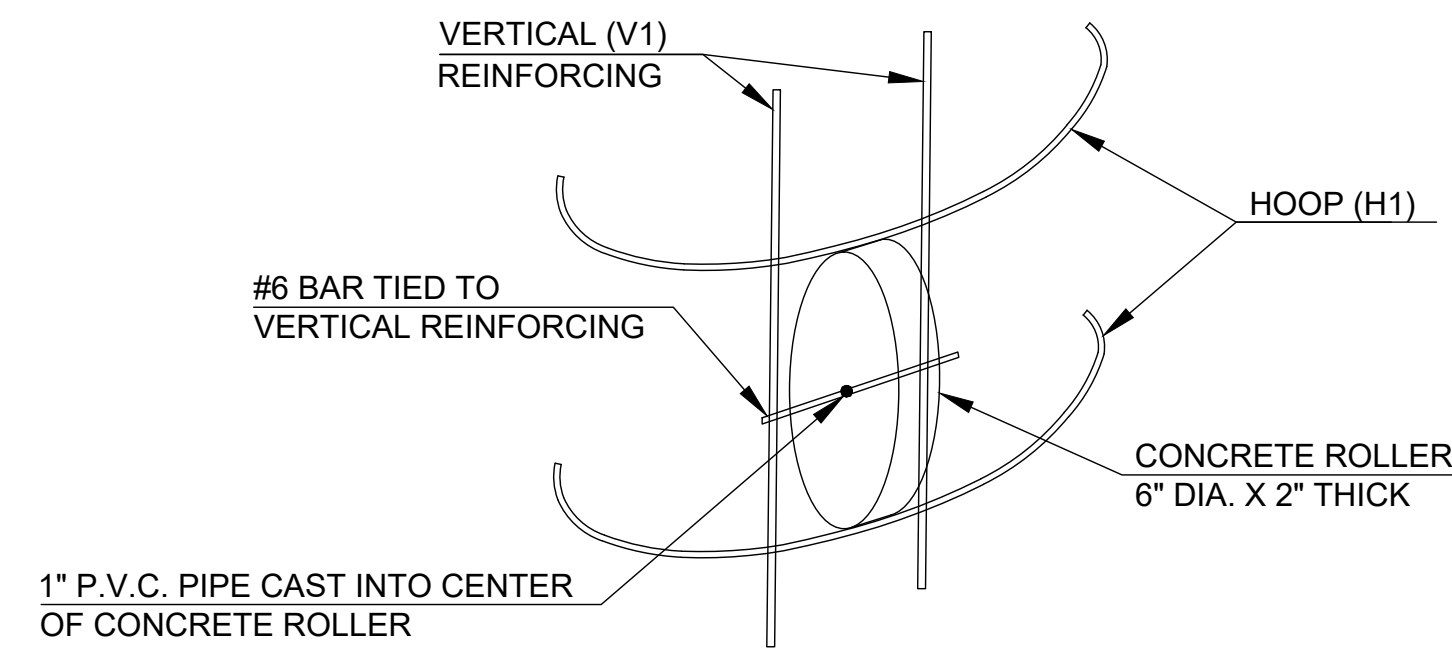
FOUNDATION DETAILS B & E
69kV CAP BANK AND CIRCUIT BREAKER

ENGINEER: NC	SCALE: NONE	DATE: 12/5/23	REV.
DRAWN BY: BE	DRAWING NO. S351PG33		2
CHECKED BY: CP	P.O. BOX 669 CHOUTEAU, OK 74337		
APPROVED BY: CS			

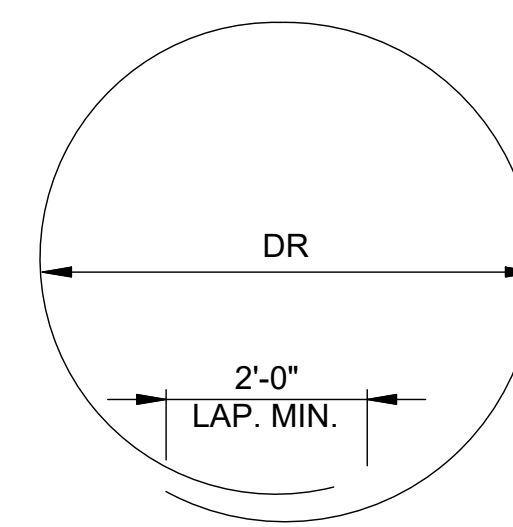


4555 W Memorial Rd.
Oklahoma City, OK 73142



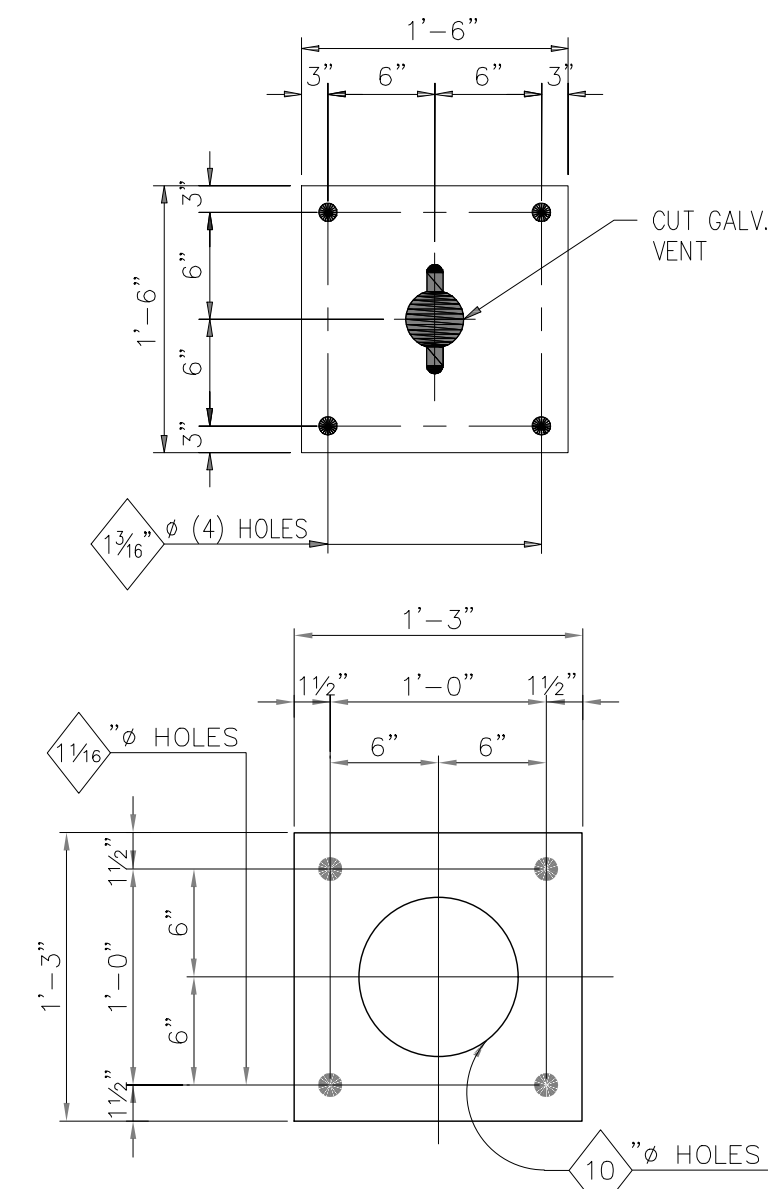


CONCRETE ROLLER DETAIL



H1 BAR BEND DETAIL

NOTE:
ALL REINFORCING STEEL DIMENSIONS
ARE OUT TO OUT



ANCHOR ROD DIMENSIONS			
ANCHOR ROD LENGTH			
ANCHOR ROD DIAMETER	ANCHOR ROD LENGTH	T1 (THREADS)	T2 (THREADS)
1"	3'-0"	7"	3"

- ANCHOR ROD NOTES
- ALL ANCHOR RODS SHALL BE ASTM F1554 GRADE 55 WITH (4) ASTM A563 GRADE A OR C HEAVY HEX NUTS AND (4) ASTM F436 FLAT WASHERS EACH AND SHALL BE GALVANIZED ACCORDING TO ASTM A153 UNLESS NOTED OTHERWISE.
 - ALL ANCHOR RODS SHALL BE SET WITH THE AID OF SETTING TEMPLATES.

ANCHOR ROD TEMPLATE - 2TP2

STRUCTURE BASE PLATE, ANCHOR BOLTS, AND TEMPLATES

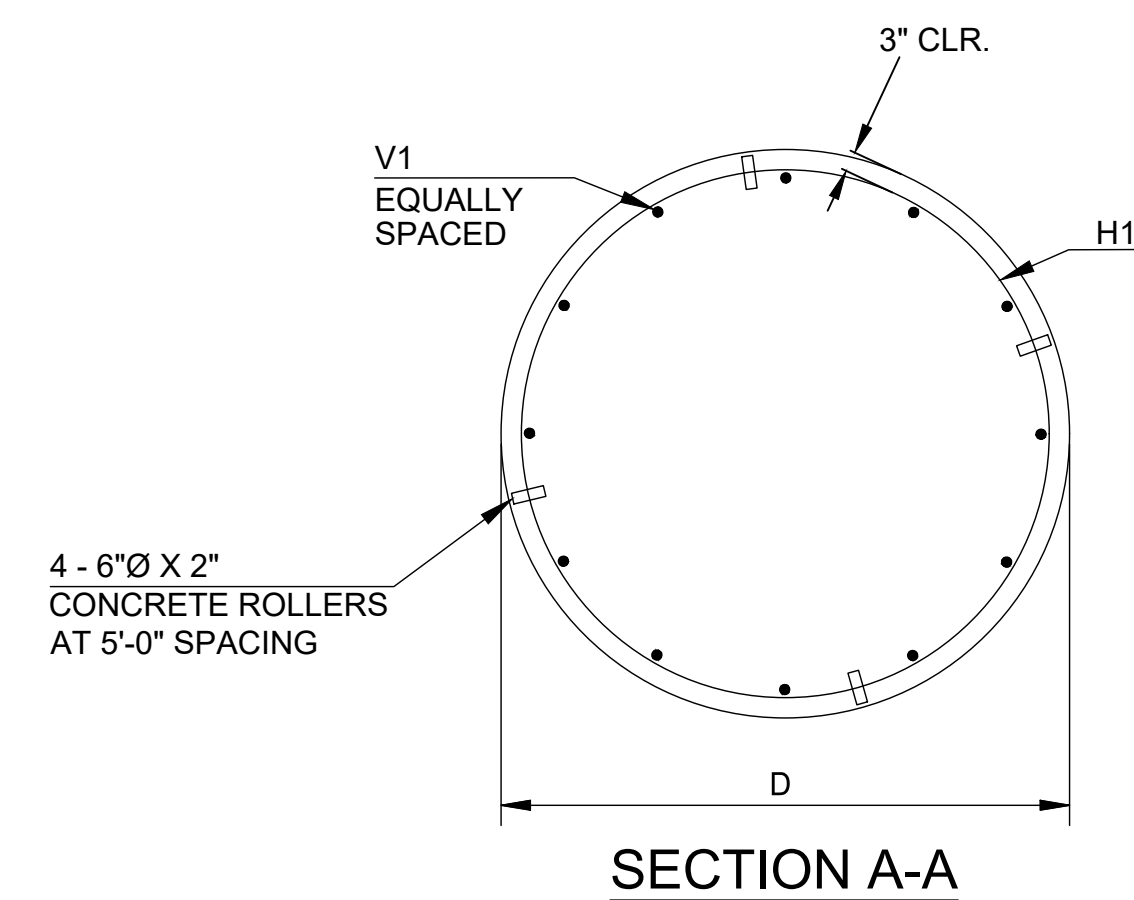
FOUNDATION	PIER QTY	DIAMETER "D" (FT)	LENGTH "L" (FT)	CONCRETE (YD ³ /PIER)	H1			V1			
					SIZE	LENGTH	QTY	DR	SIZE	LENGTH	QTY
D	2	3'-0"	8'-0"	*4.7	#4	9'-11"	10	2'-4"	#8	8'-6"	15

GENERAL NOTES

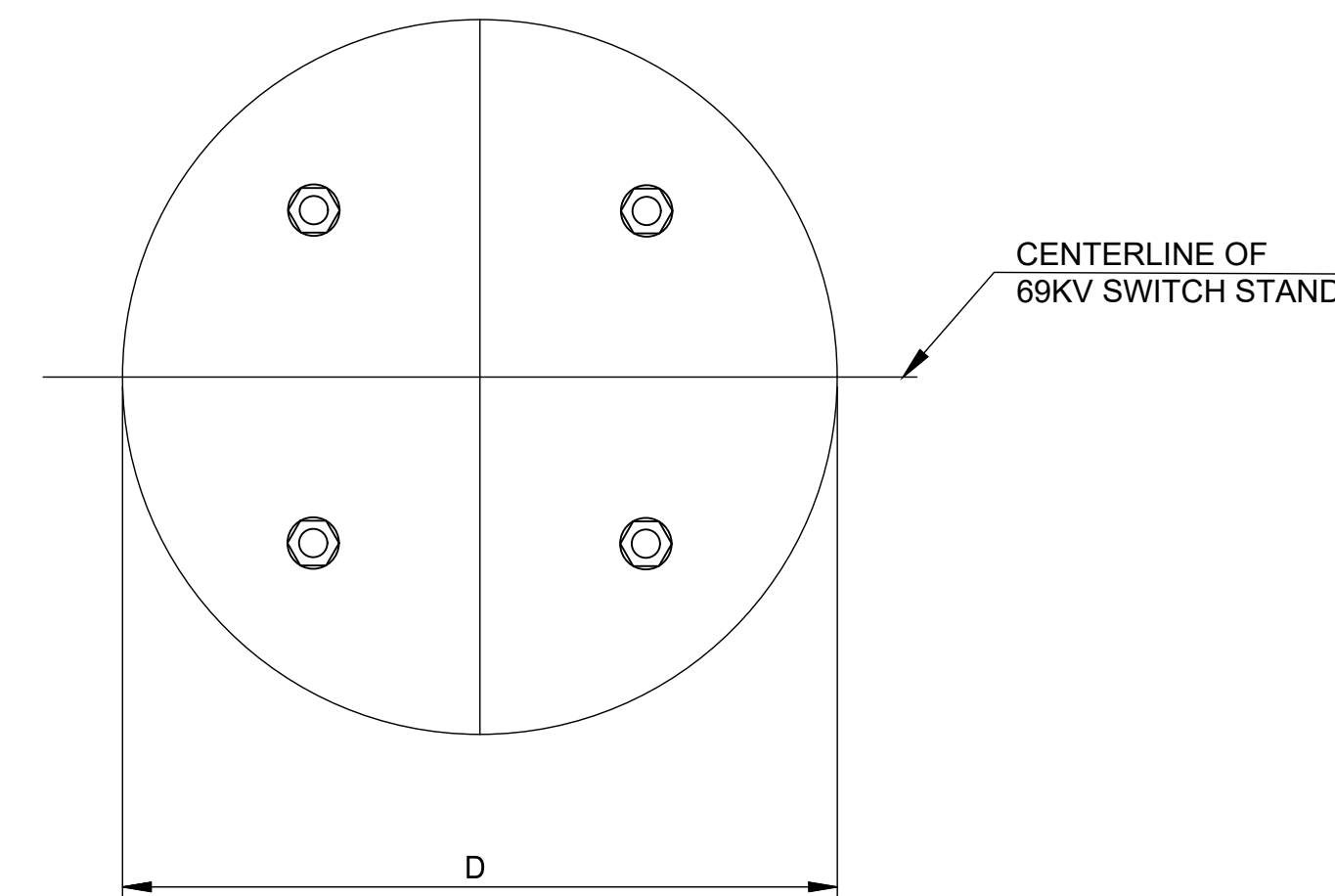
- CONCRETE SHALL BE HIGH EARLY STRENGTH WITH A MINIMUM COMPRESSIVE STRENGTH OF 4000 PSI AT 28 DAYS. CONCRETE SLUMP 1% (±1%) AND SHALL BE 6"±1". CONCRETE SHALL BE AIR ENTRAINED AT 4% EACH TRUCK LOAD TESTED AND RESULTS REPORTED TO PROJECT ENGINEER*. CONCRETE SHALL NOT EXCEED 90°F AT THE TIME OF PLACEMENT IN THE FORMS.
- TREMIE SHALL BE USED WHEN VERTICAL DROP FROM END OF CHUTE EXCEEDS 5'.
- REINFORCING STEEL SHALL BE FREE FROM RUST, MUD & GREASE.
- REINFORCING STEEL SHALL BE A615 GRADE 60.
- WHENEVER HOLE IS OVEREXCAVATED FOR ANY REASON, THE VOLUME OF OVEREXCAVATION SHALL BE FILLED WITH CONCRETE.
- POLE SHALL NOT BE LOADED UNTIL CONCRETE HAS REACHED 4000 PSI COMPRESSIVE STRENGTH OR AS DIRECTED BY THE ENGINEER.
- MINIMUM OF FOUR (4) TEST CYLINDERS SHALL BE TAKEN FROM THE FIRST TRUCK LOAD OF CONCRETE AND EVERY THIRD TRUCK THEREAFTER. TWO (2) CYLINDER SHALL BE BROKEN AT SEVEN DAYS AND THE REMAINING TWO (2) BROKEN AT 28 DAYS FOR ACCEPTANCE. TWO COPIES OF THE TEST REPORT SHALL BE SENT TO THE PROJECT ENGINEER*.
- FINISH SOIL GRADE AROUND COMPLETED PIER TO BE SLOPED TO DRAIN WATER AWAY FROM PIER. EXCESS SOIL TO BE REMOVED FROM RIGHT-OF-WAY.
- CONCRETE USED IN THE CONCRETE ROLLER SHALL HAVE A MINIMUM 28 DAY COMPRESSION STRENGTH OF 4,000 PSI. SLAB BOLSTERS, HIGH CHAIRS, OR PLASTIC ROLLERS SHALL NOT BE SUBSTITUTED FOR THE CONCRETE ROLLERS.
- SUBSTATION ENGINEERING OR CONSTRUCTION INSPECTOR MAY REQUEST ADDITIONAL TESTS TO BE MADE. CONTRACTOR WILL BE RESPONSIBLE FOR ALL TESTS AND ASSOCIATED COSTS. *11. THIS IS AN ESTIMATED CONCRETE VOLUME. CONTRACTOR TO CALCULATE ACTUAL CONCRETE VOLUME PRIOR TO JOB. DEPENDING ON SITE CONDITIONS, ADDITIONAL CONCRETE MAY BE REQUIRED.
- IF LOCK WASHER IS NOT PROVIDED, PEEN THE NUT AFTER LEVELING STRUCTURE.
- SEE HINDERLITER GEOTECHNICAL REPORT JUNE 10, 2022 FOR SOIL BORES, CONDITIONS, AND RECOMMENDATION. GROUNDWATER FOUND AT 17'-4".

REFERENCE DRAWINGS:

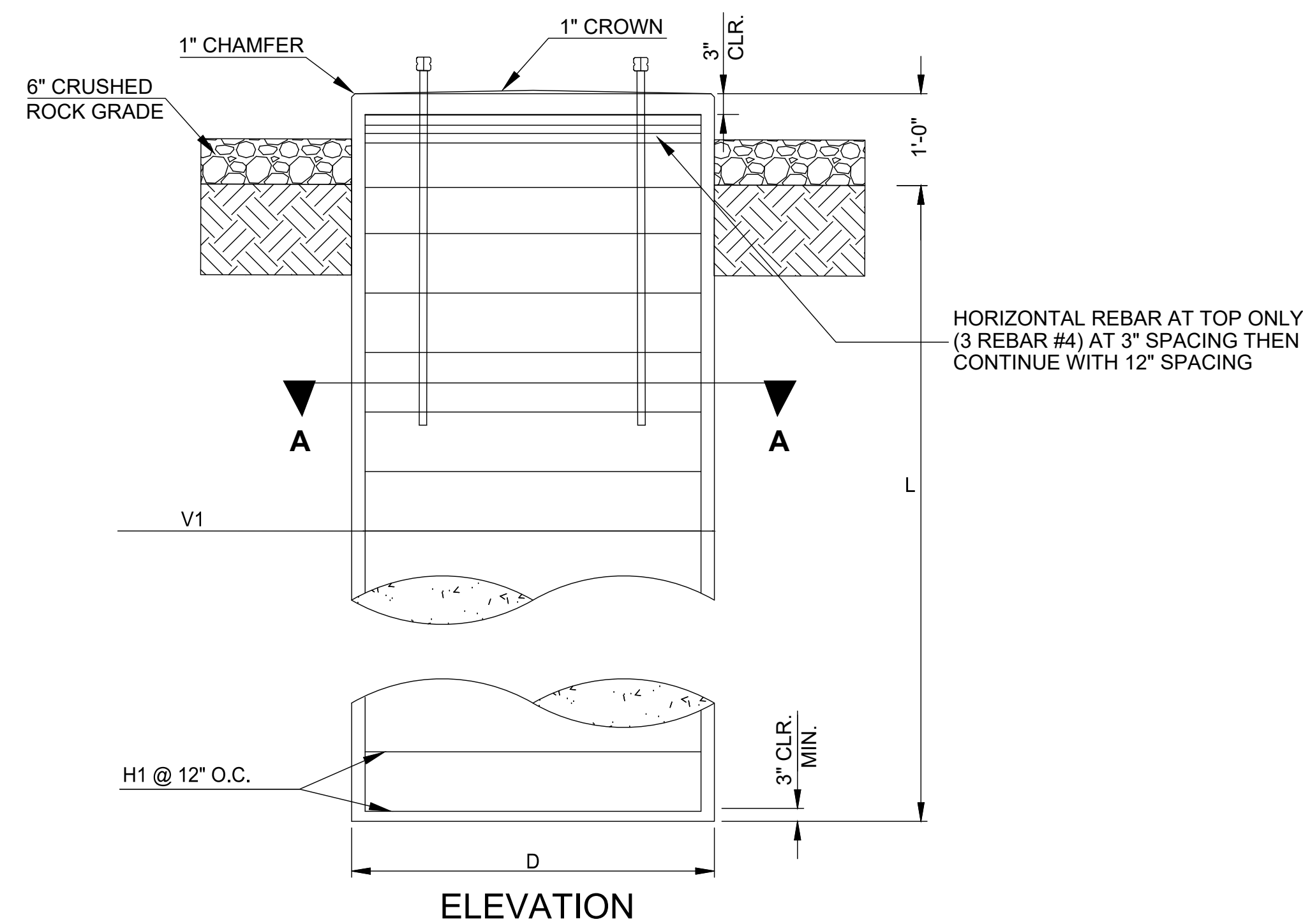
- S351PG30 FOUNDATION PLAN
- S351VS01 SWITCH STAND STRUCTURE (GS-201)



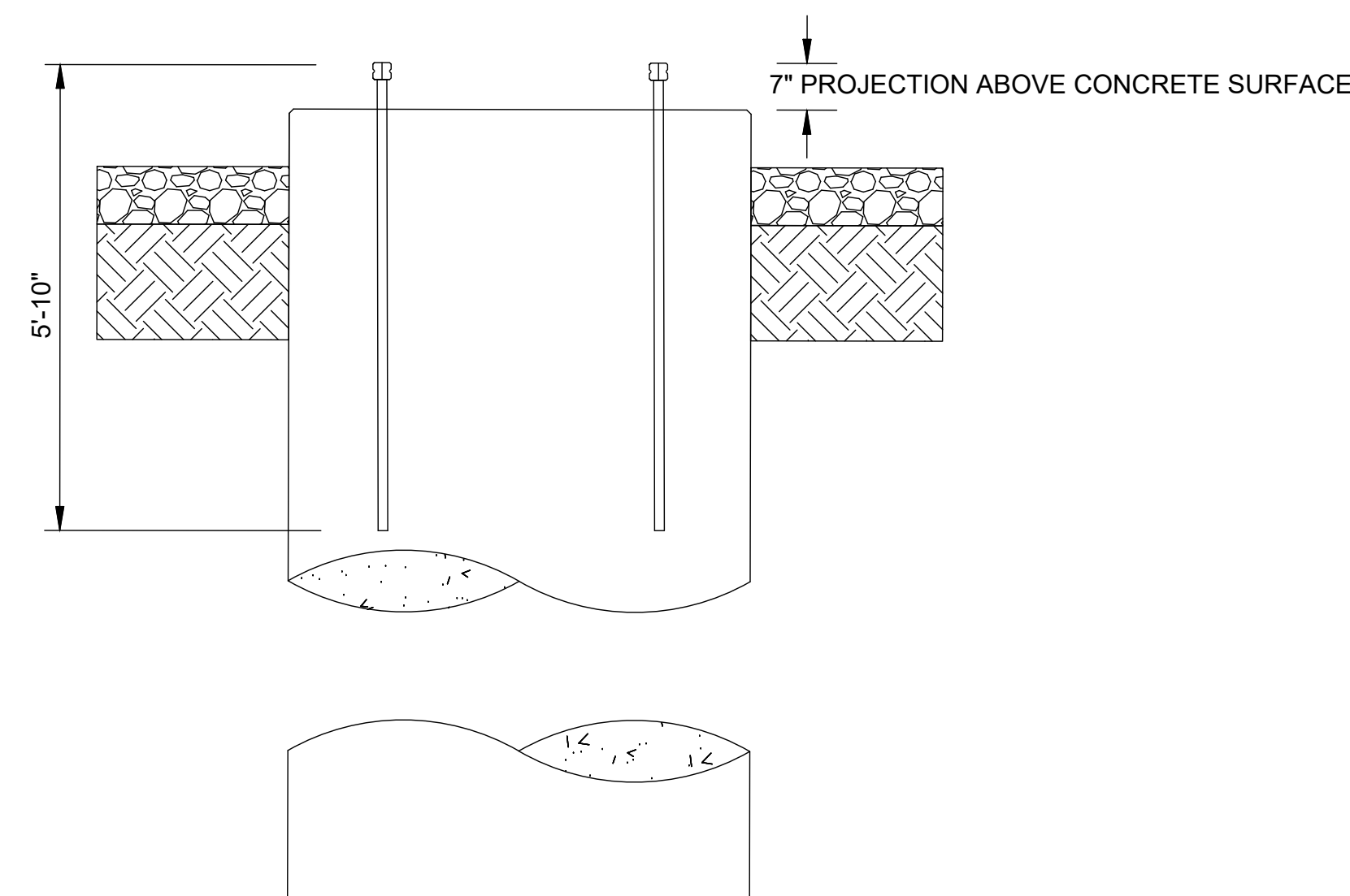
SECTION A-A



PLAN VIEW



ELEVATION



ELEVATION

ANCHOR BOLT CAGE ORIENTATION

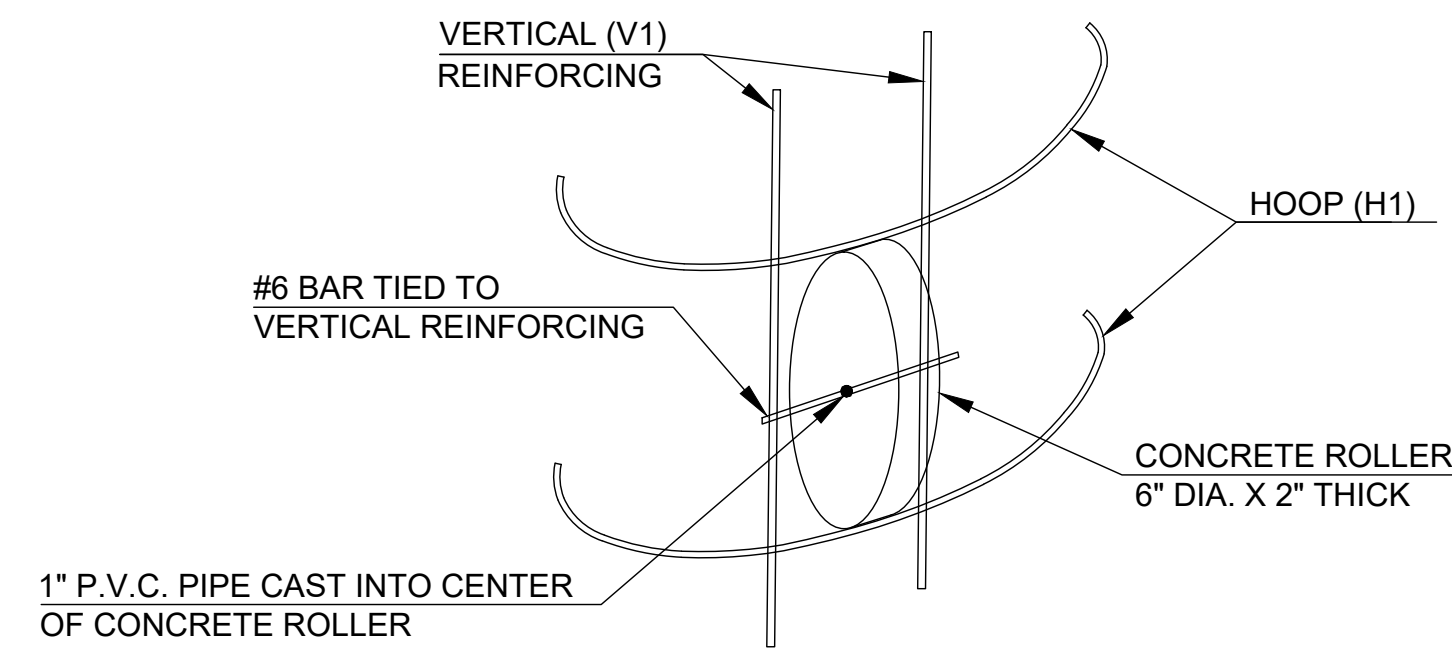
DETAIL 'D'



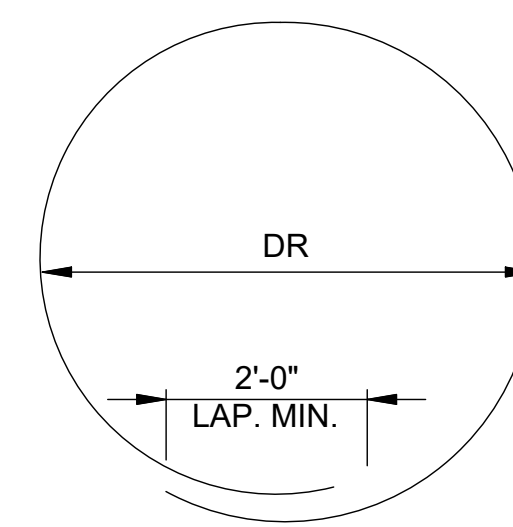
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T. 405-753-4200



DESCRIPTION: ISSUED FOR CONSTRUCTION						GRAND RIVER DAM AUTHORITY				
1	RF022-01145	8/24/2023	CP	BE	JS	STILLWATER, OKLAHOMA 138/69kV				
DESCRIPTION: ISSUE FOR REVIEW						FOUNDATION DETAILS - 'D'				
0	RF022-01145	8/14/2023	CP	BE	JS	69kV SWITCH STAND				
REV NO.	JOB NO.	DATE	DESIGN ENGR	DFT	DESIGN CHECK	ISSUE APPROV	ENGINEER	SCALE: NTS	DATE: 8/14/2023	REV.
							GRDA			1
							P.O. BOX 669 CHOUTEAU, OK 74337			S351PG34

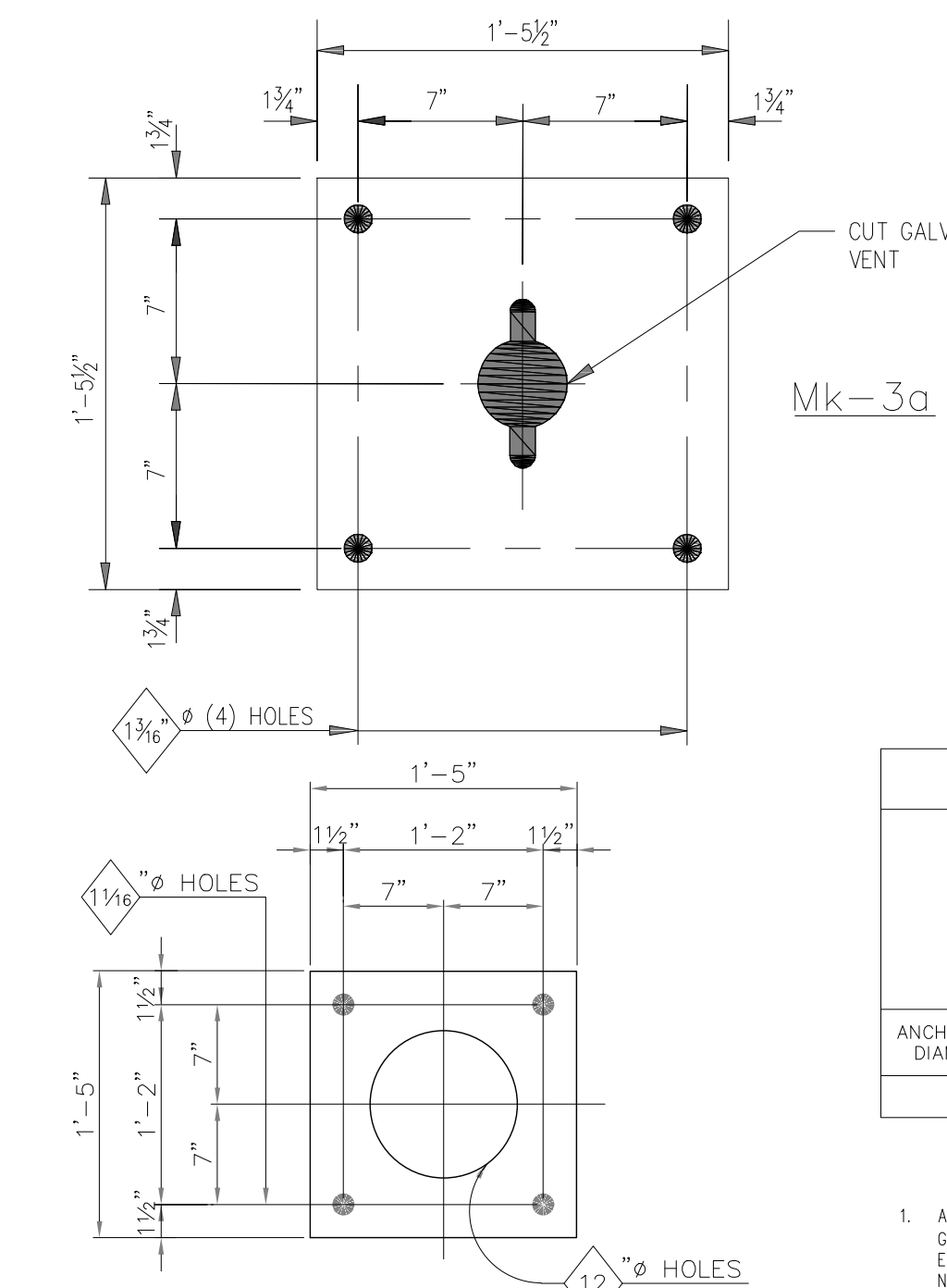


CONCRETE ROLLER DETAIL



H1 BAR BEND DETAIL

NOTE:
ALL REINFORCING STEEL DIMENSIONS
ARE OUT TO OUT



STRUCTURE BASE PLATE, ANCHOR BOLTS, AND TEMPLATES

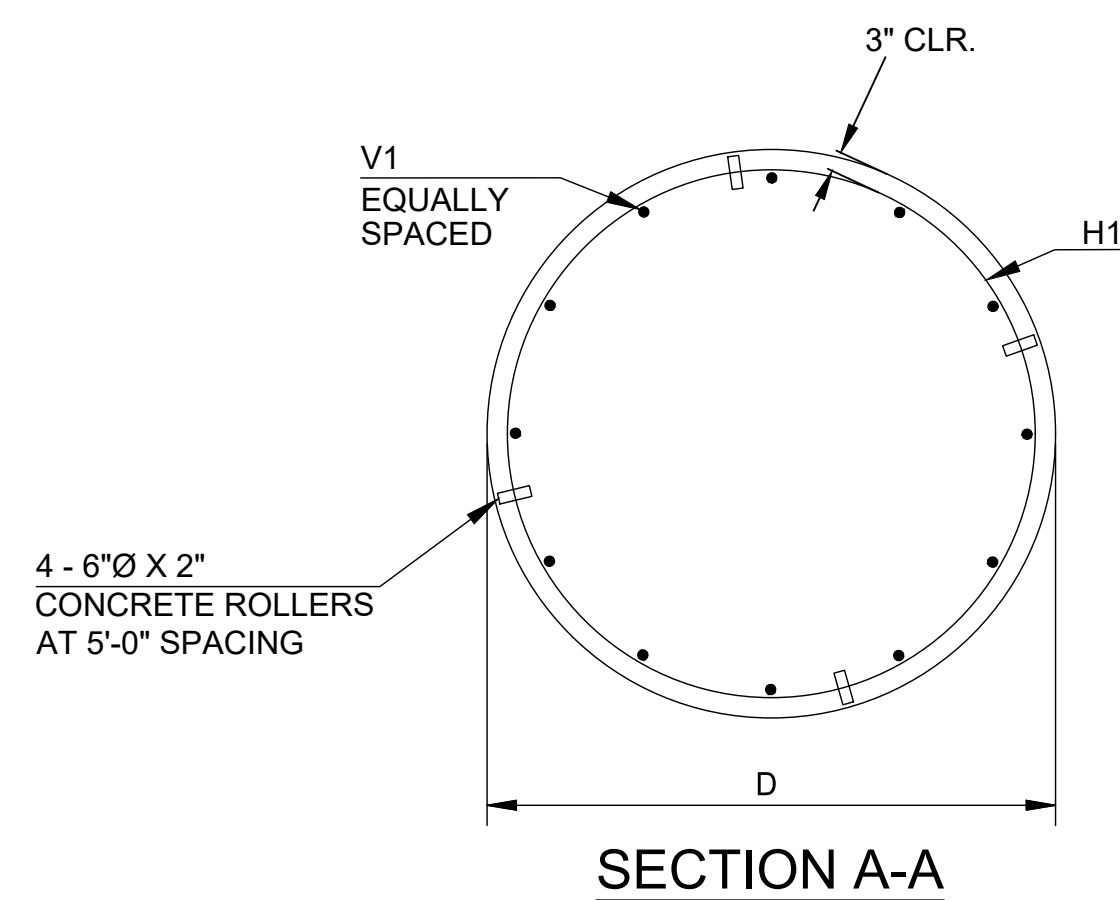
FOUNDATION	PIER QTY	DIAMETER "D" (FT)	LENGTH "L" (FT)	CONCRETE (YD ³ /PIER)	H1				V1		
					SIZE	LENGTH	QTY	DR	SIZE	LENGTH	QTY
C	2	3'-0"	6'-0"	*3.8	#4	9'-11"	8	2'-4"	#8	6'-6"	15

GENERAL NOTES

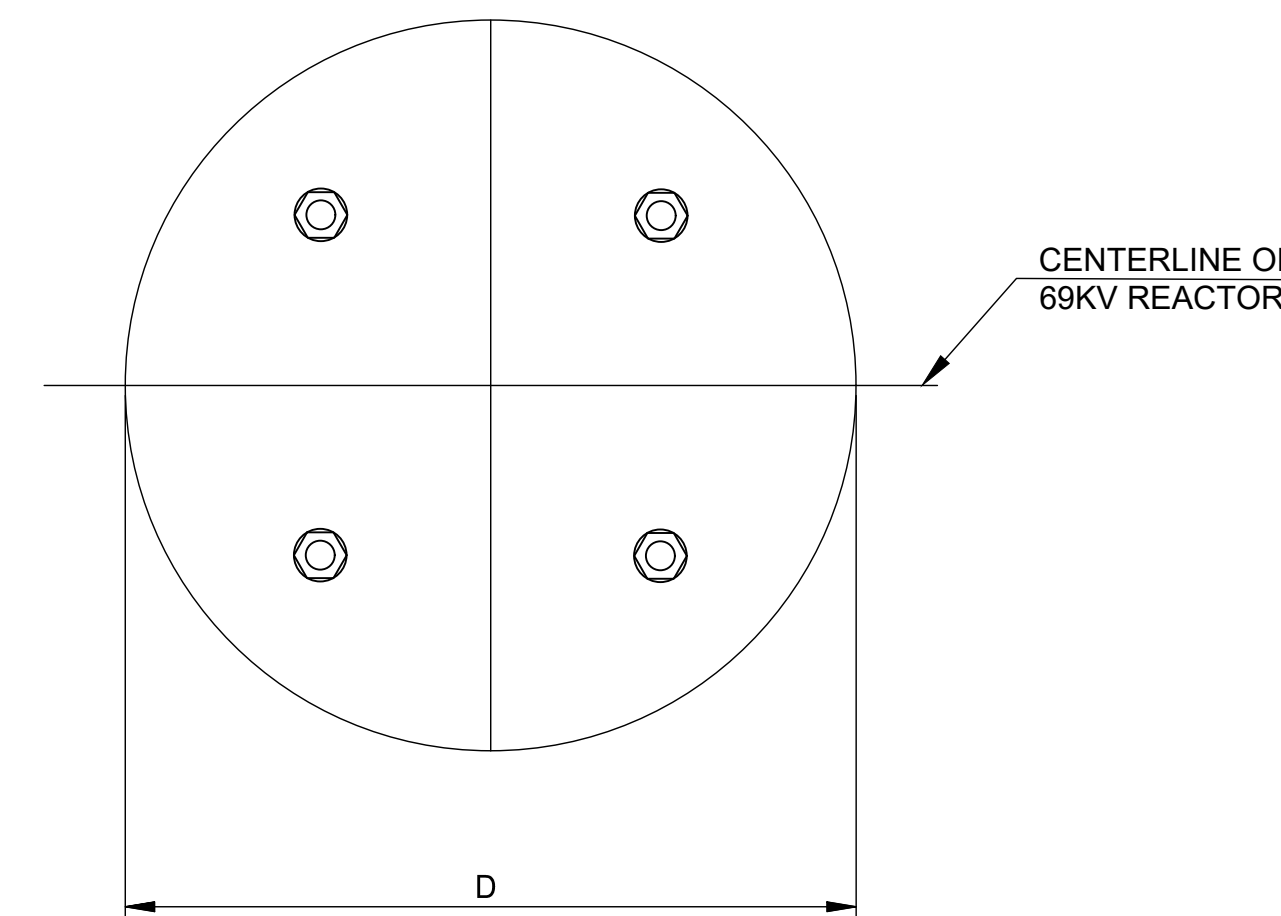
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- TREMIE SHALL BE USED WHEN VERTICAL DROP FROM END OF CHUTE EXCEEDS 5'.
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- SEE HINDERLITER GEOTECHNICAL REPORT JUNE 10, 2022 FOR SOIL BORES, CONDITIONS, AND RECOMMENDATION. GROUNDWATER FOUND AT 17'-4".

REFERENCE DRAWINGS:

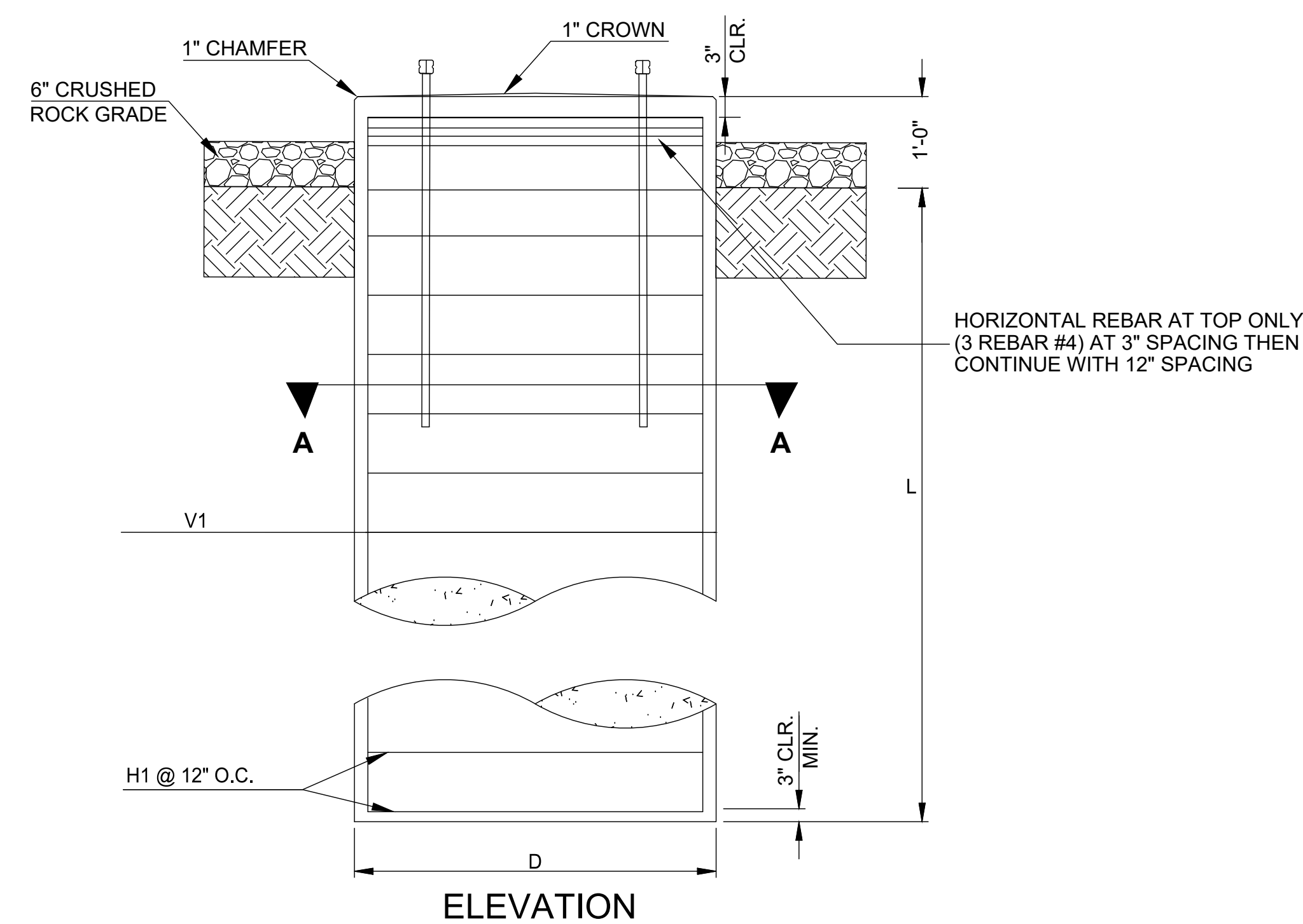
- S351PG30 FOUNDATION PLAN
- S351VS02 REACTOR SUPPORT STRUCTURE (GS-201)



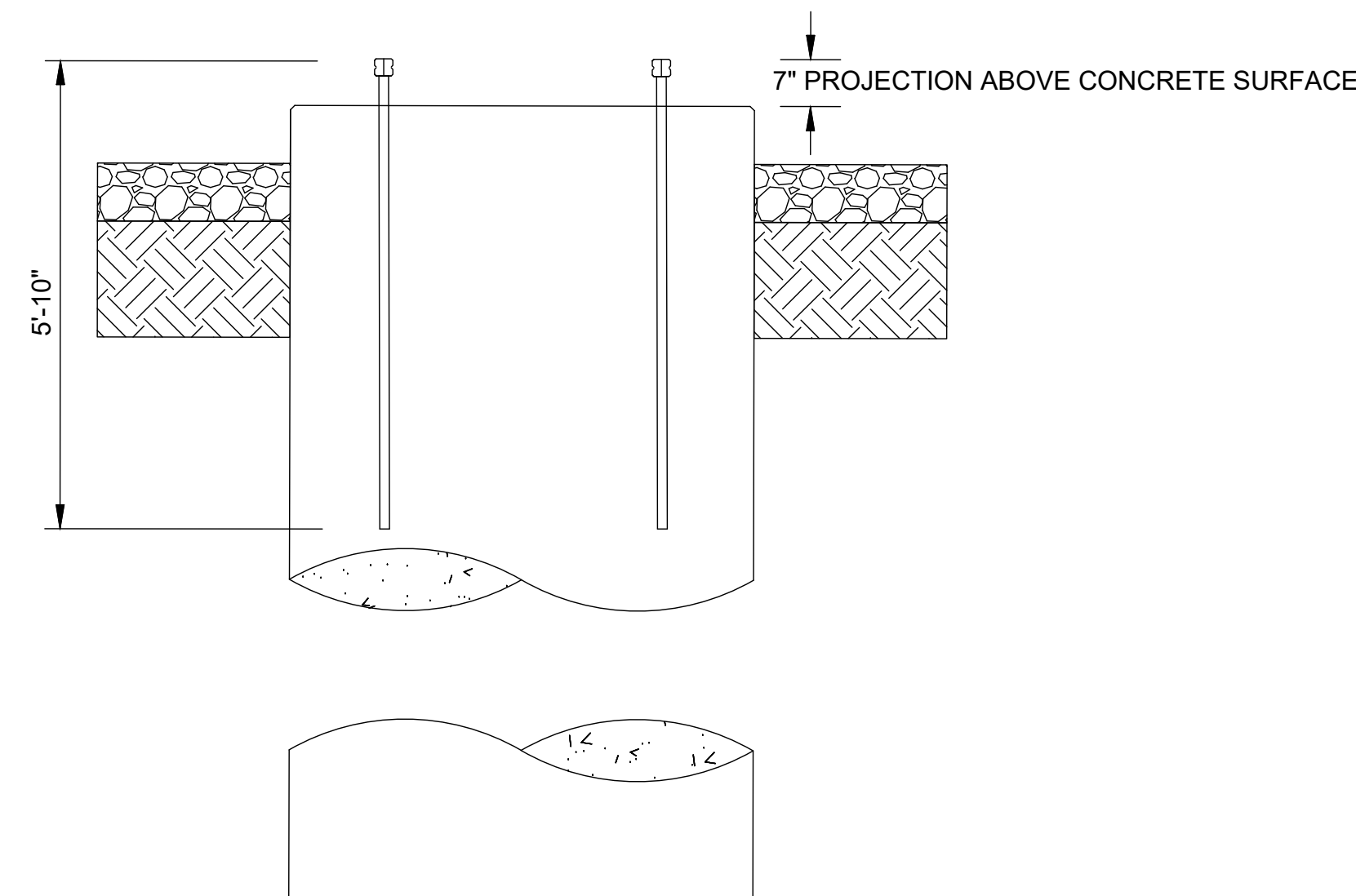
SECTION A-A



PLAN VIEW



ELEVATION



ELEVATION

ANCHOR BOLT CAGE ORIENTATION

DETAIL 'C'

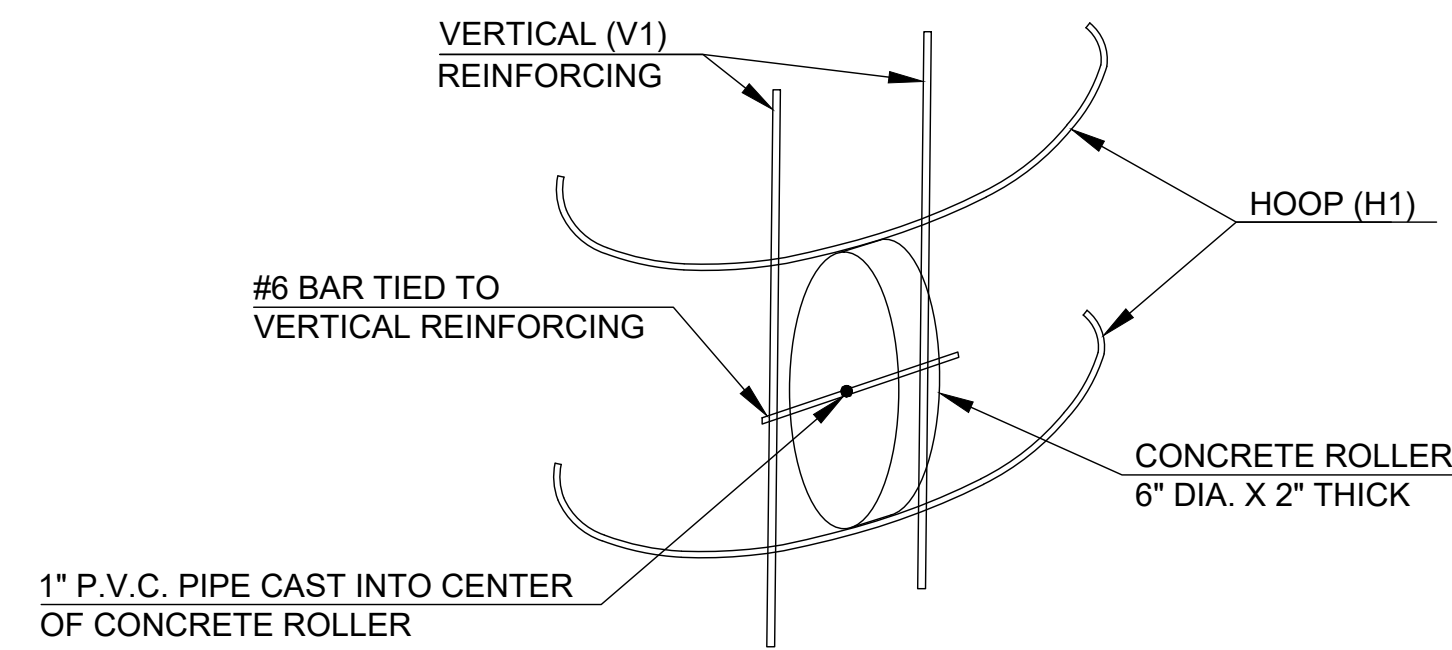


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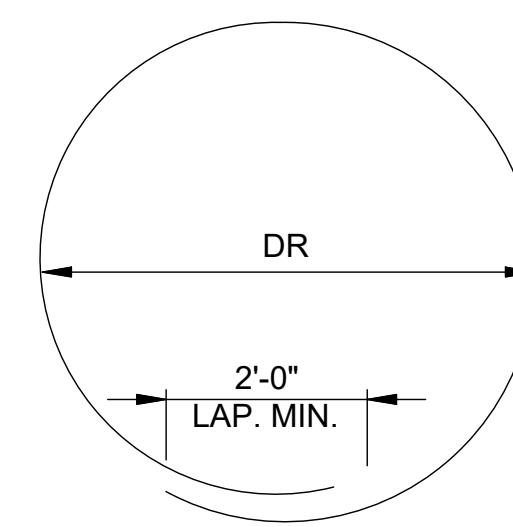


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DESCRIPTION: ISSUE FOR REVIEW						
0	RF022-01145	8/14/2023	CP	BE	JS	-
REV NO.	JOB NO.	DATE	DESIGN ENGR	DFT	DESIGN CHECK	ISSUE APPROV

GRAND RIVER DAM AUTHORITY STILLWATER KINZIE INTERCONNECT S351 STILLWATER, OKLAHOMA 138/69kV			
FOUNDATION DETAILS - 'C' 69kV 3Ø REACTOR SUPPORT			
ENGINEER: -	SCALE: NTS	DATE: 8/14/2023	REV.
DRAWN BY: -	DRAWING NO.	1	
CHECKED BY: -	S351PG35		
APPROVED BY: -	P.O. BOX 669 CHOUTEAU, OK 74337		

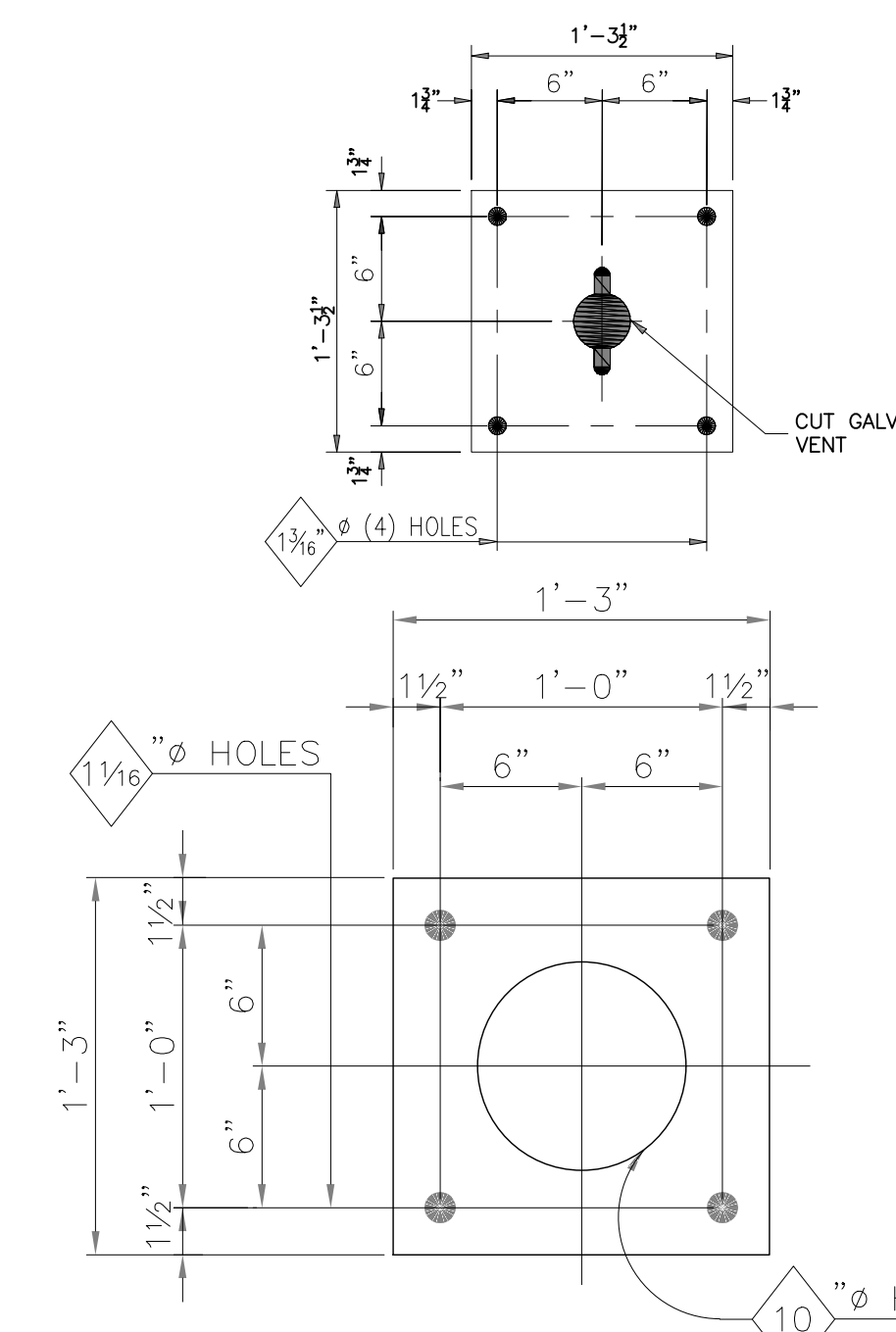


CONCRETE ROLLER DETAIL



H1 BAR BEND DETAIL

NOTE:
ALL REINFORCING STEEL DIMENSIONS
ARE OUT TO OUT



ANCHOR ROD TEMPLATE - 1TP1

ANCHOR ROD DIMENSIONS			
ANCHOR ROD DIAMETER	ANCHOR ROD LENGTH	T1 (THREADS)	T2 (THREADS)
1"Ø	3'-0"	7"	3"

ANCHOR ROD NOTES

- ALL ANCHOR RODS SHALL BE ASTM F1554 GRADE 55 WITH (4) ASTM A563 GRADE A OR C HEAVY HEX NUTS AND (4) ASTM F436 FLAT WASHERS EACH AND SHALL BE GALVANIZED ACCORDING TO ASTM A153 UNLESS NOTED OTHERWISE.
- ALL ANCHOR RODS SHALL BE SET WITH THE AID OF SETTING TEMPLATES.

STRUCTURE BASE PLATE, ANCHOR BOLTS, AND TEMPLATES

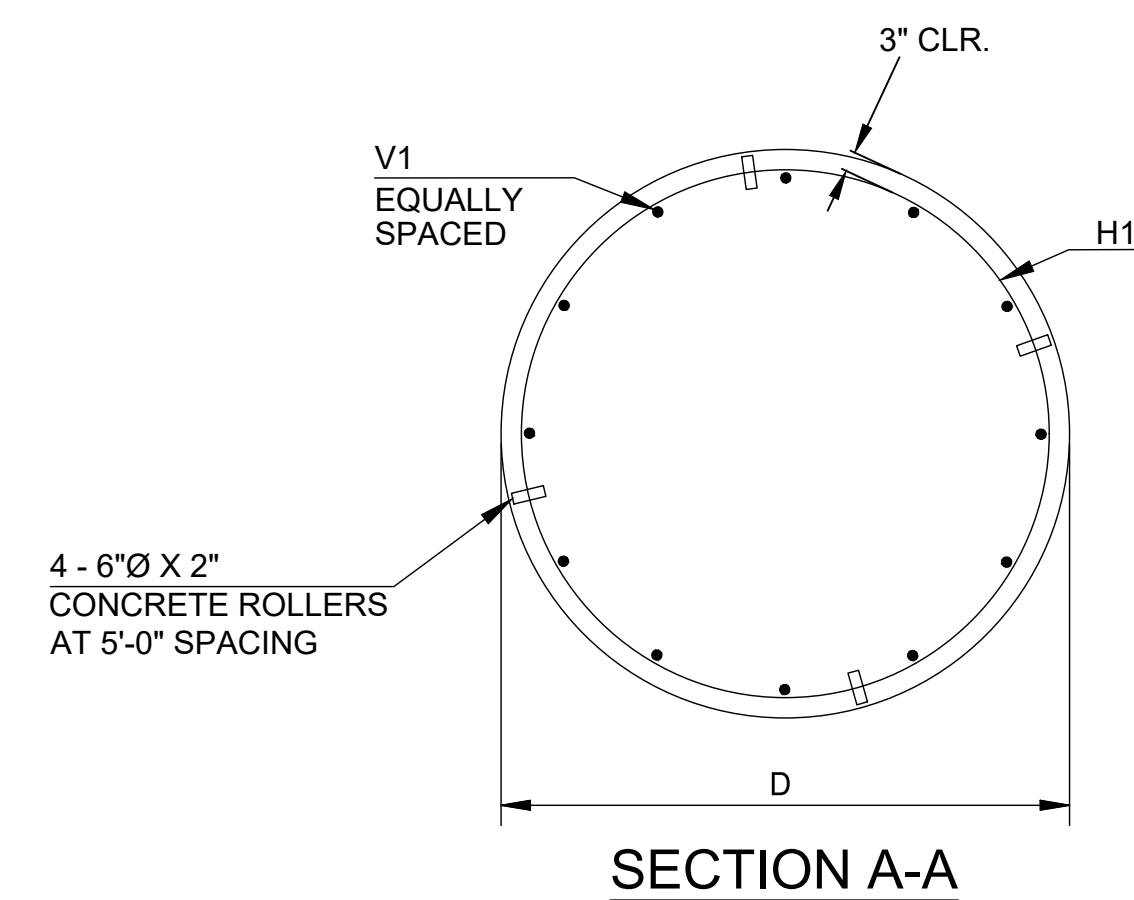
FOUNDATION	PIER QTY	DIAMETER "D" (FT)	LENGTH "L" (FT)	CONCRETE (YD ³ /PIER)	H1			V1			
					SIZE	LENGTH	QTY	DR	SIZE	LENGTH	QTY
A	1	3'-0"	6'-0"	*1.9	#4	9'-11"	8	2'-4"	#8	6'-6"	15

GENERAL NOTES

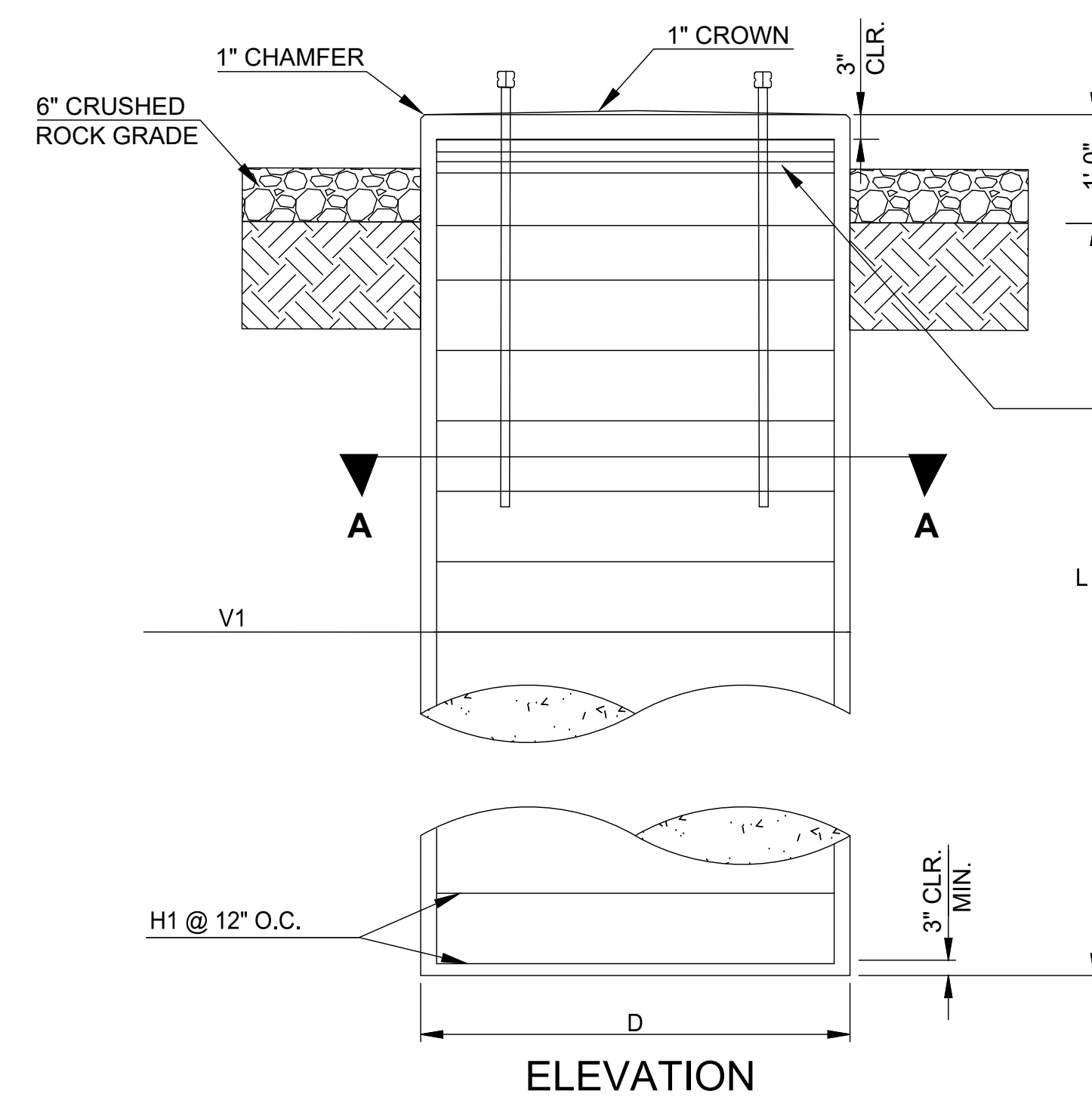
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- SEE HINDERLITER GEOTECHNICAL REPORT JUNE 10, 2022 FOR SOIL BORES, CONDITIONS, AND RECOMMENDATION. GROUNDWATER FOUND AT 17'-4".

REFERENCE DRAWINGS:

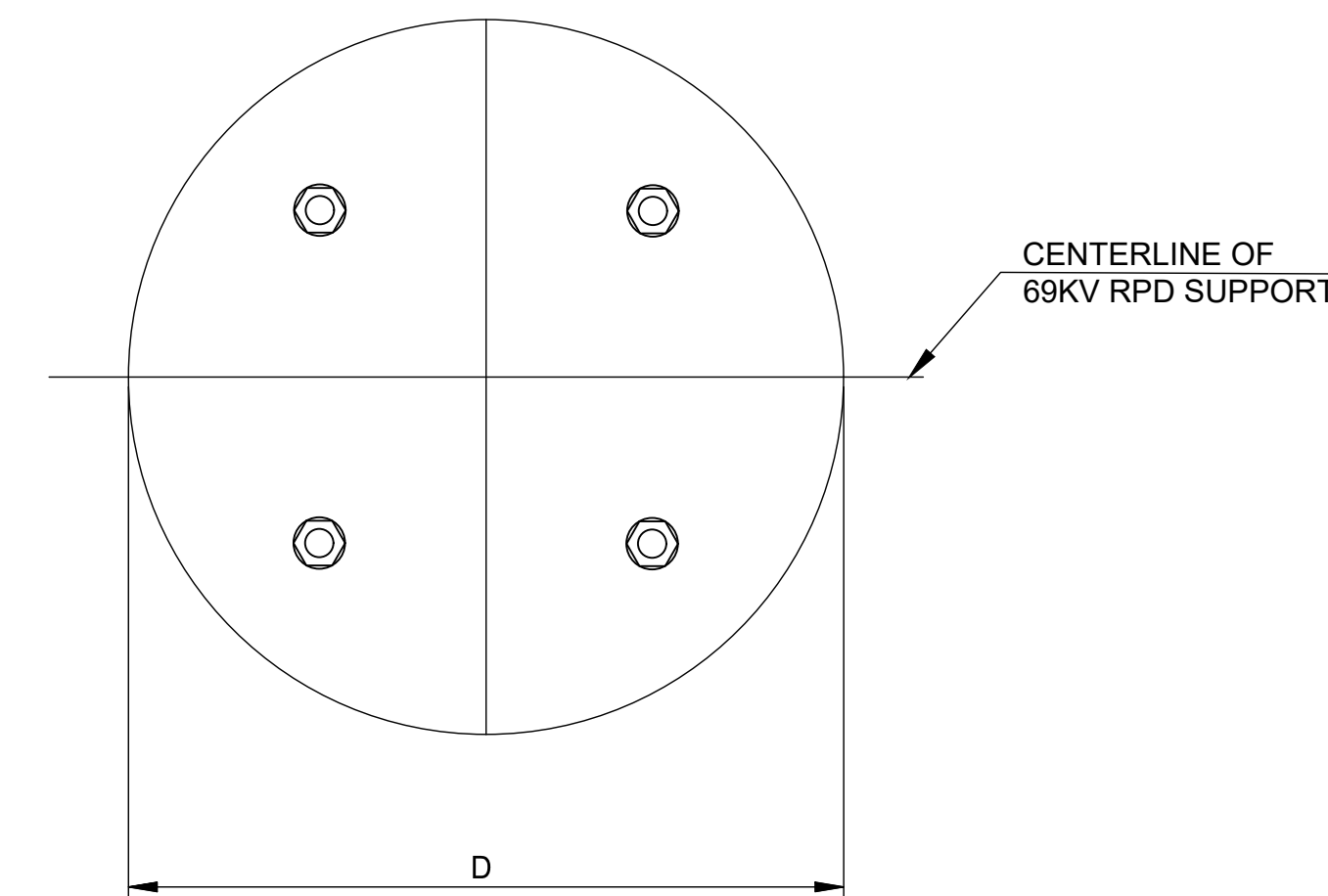
- S351PG30 FOUNDATION PLAN
- S351VS03 REACTOR SUPPORT STRUCTURE (GS-201)



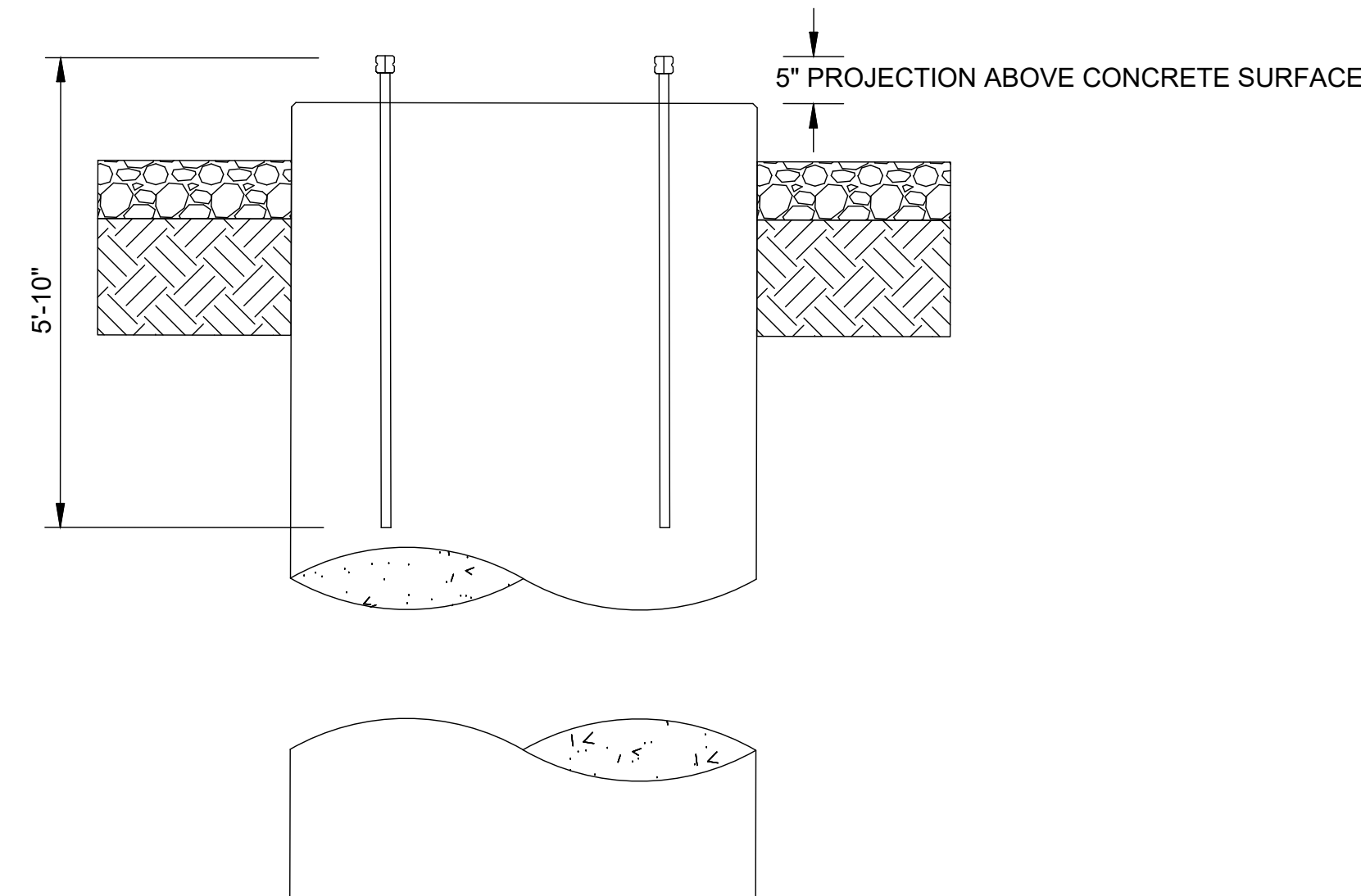
SECTION A-A



ELEVATION



PLAN VIEW



ELEVATION

ANCHOR BOLT CAGE ORIENTATION

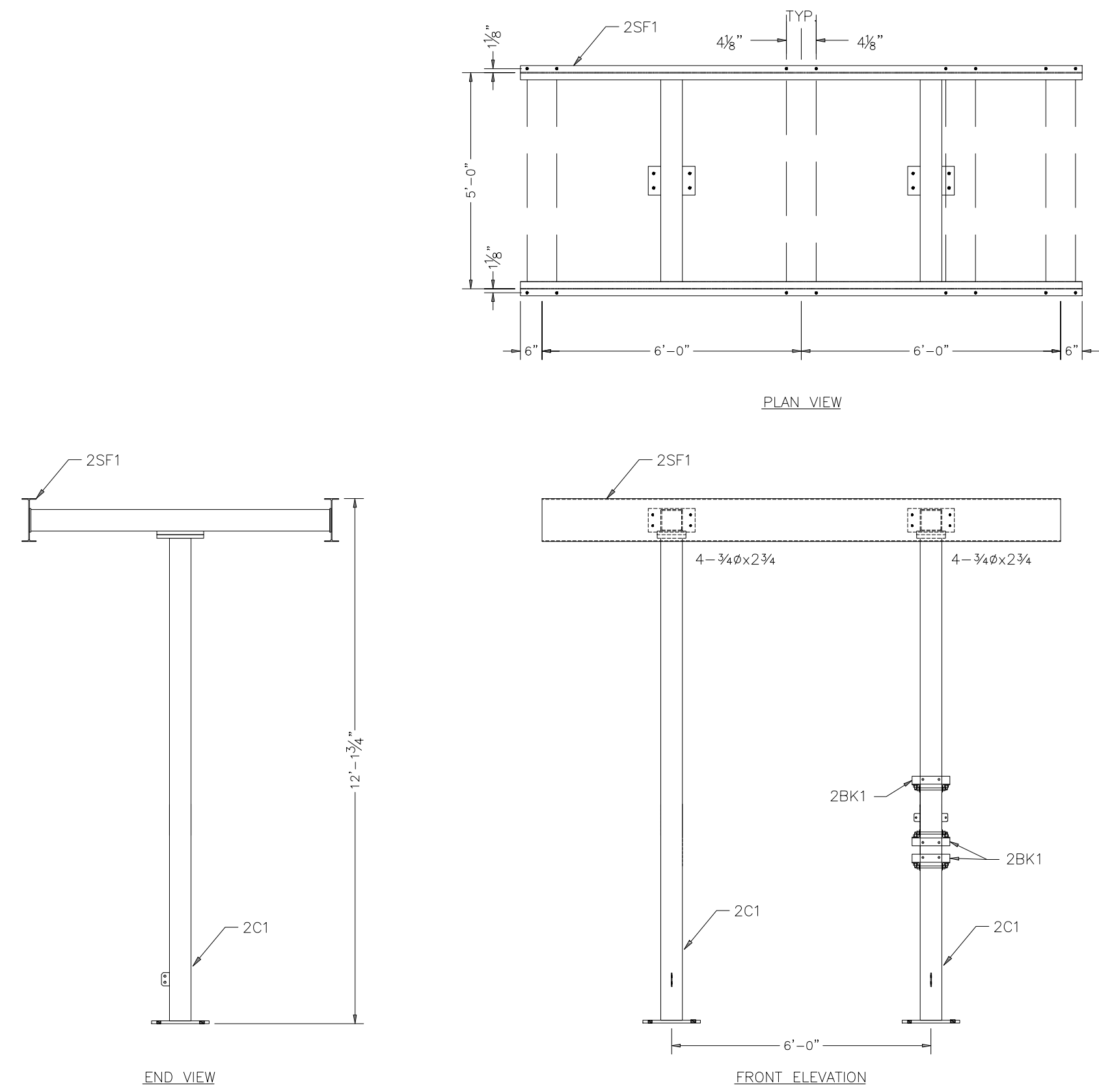
DETAIL 'A'



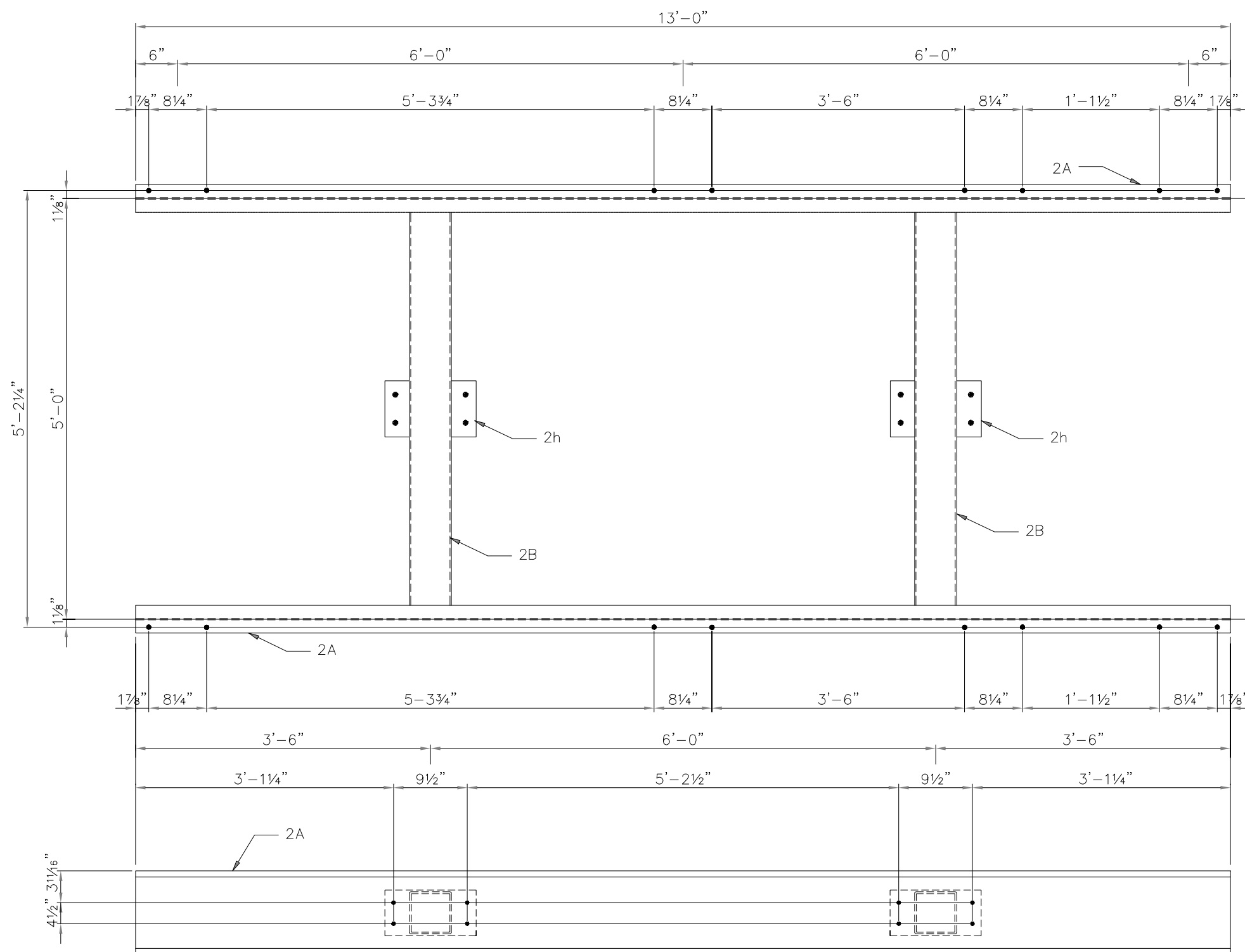
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OKLAHOMA CITY, OK 73142
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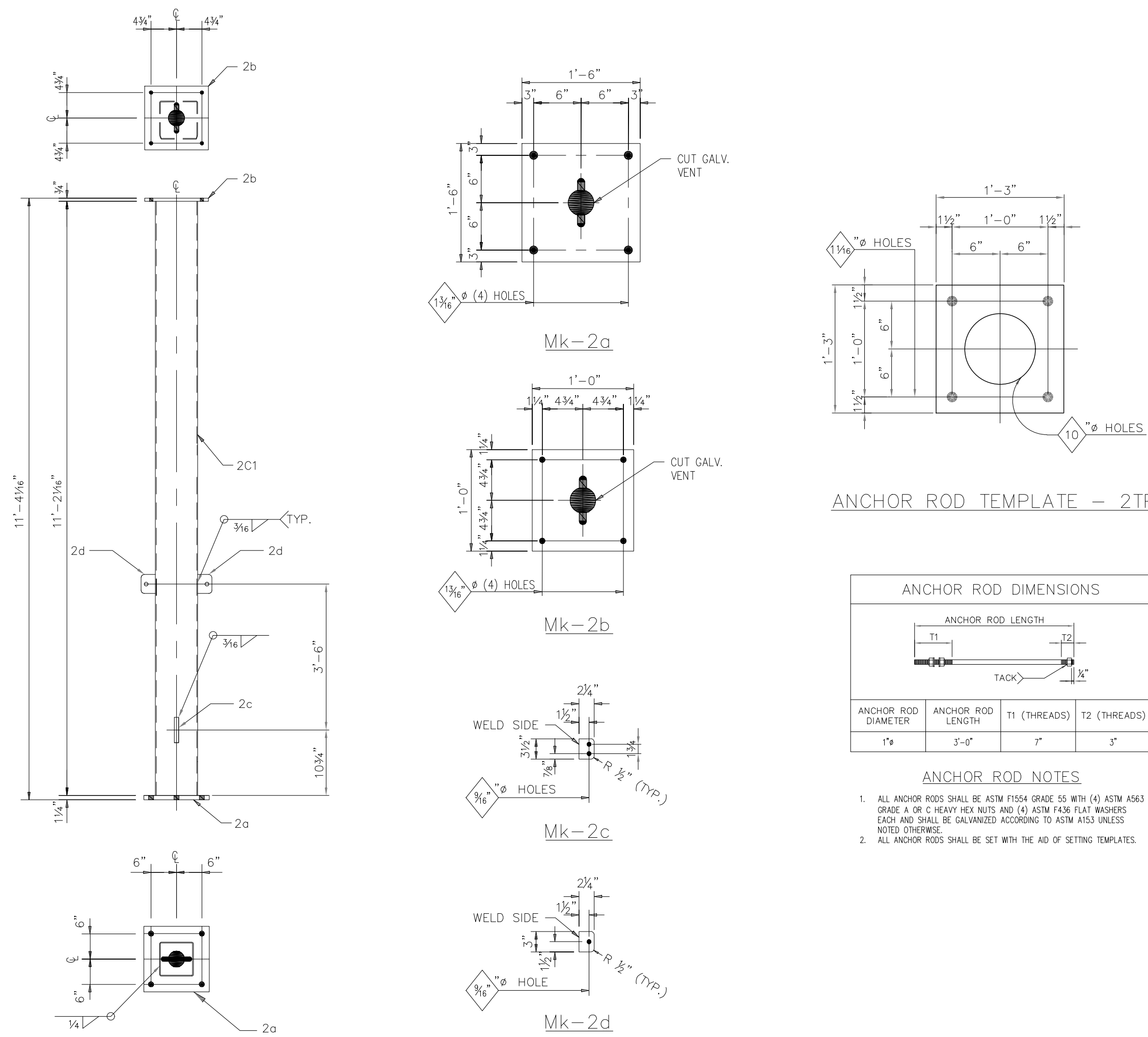
DESCRIPTION: ISSUED FOR CONSTRUCTION						GRAND RIVER DAM AUTHORITY					
1	RF022-01145	8/24/2023	CP	BE	JS	JB	STILLWATER KINZIE INTERCONNECT S351				
DESCRIPTION: ISSUE FOR REVIEW						STILLWATER, OKLAHOMA 138/69kV					
0	RF022-01145	8/14/2023	CP	BE	JS	-	FOUNDATION DETAILS - 'A'				
						69kV RPD SUPPORT					
ENGINEER: -		SCALE: NTS		DATE: 8/14/2023		REV.					
DRAWN BY: -		DRAWING NO.		S351PG36		1					
CHECKED BY: -		P.O. BOX 669		CHOUTEAU, OK 74337		APPROVED BY: -					
REV. NO.	JOB NO.	DATE	DESIGN ENGR	DFT	DESIGN CHECK	ISSUE APPROV					



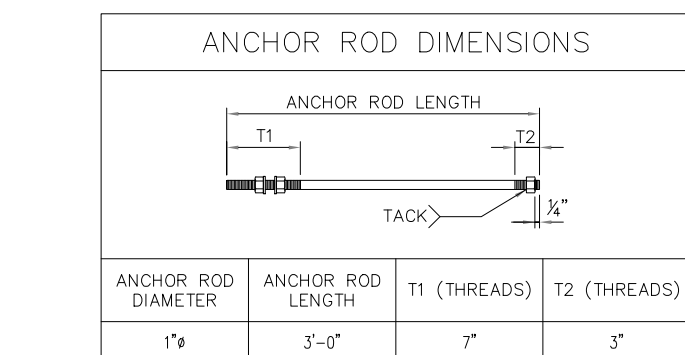
69kV SWITCH STAND 2SS1
STRUCTURE GS-210



SWITCH FRAME - 2SF1

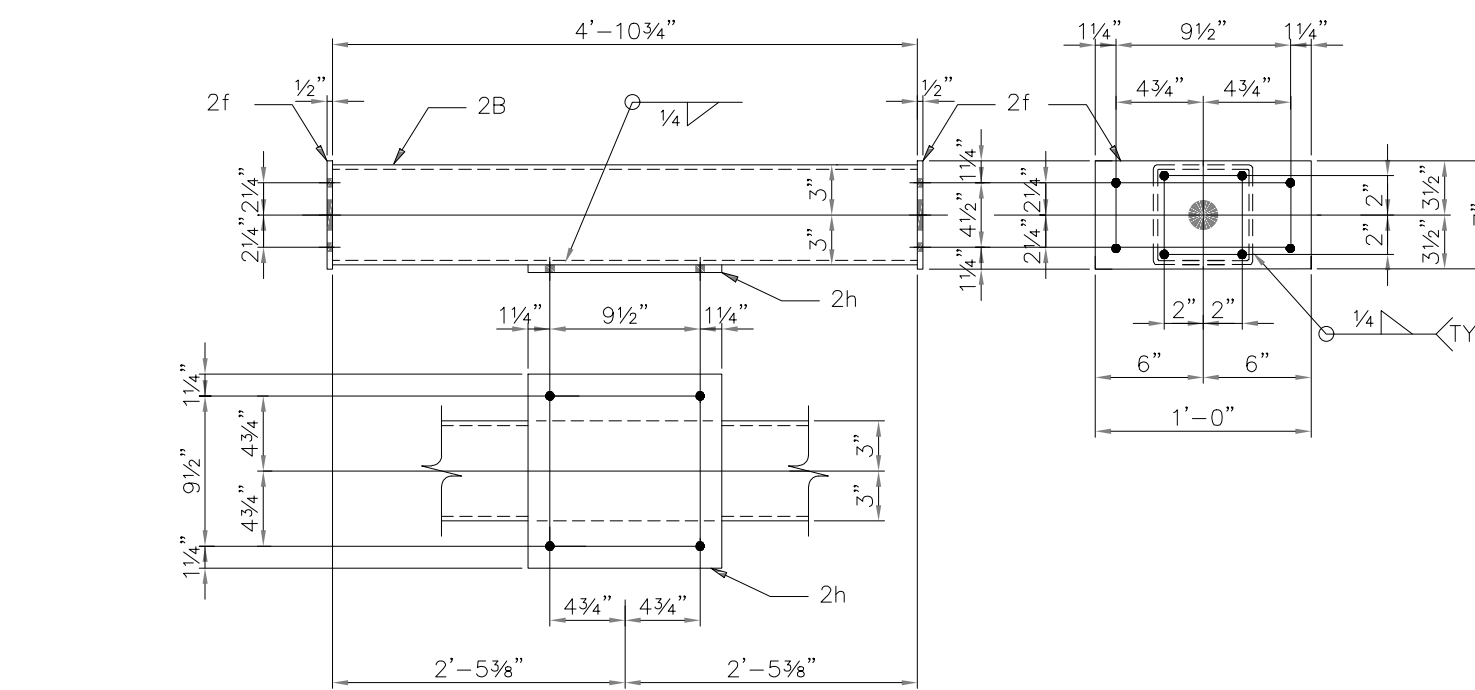


COLUMN - 2C1

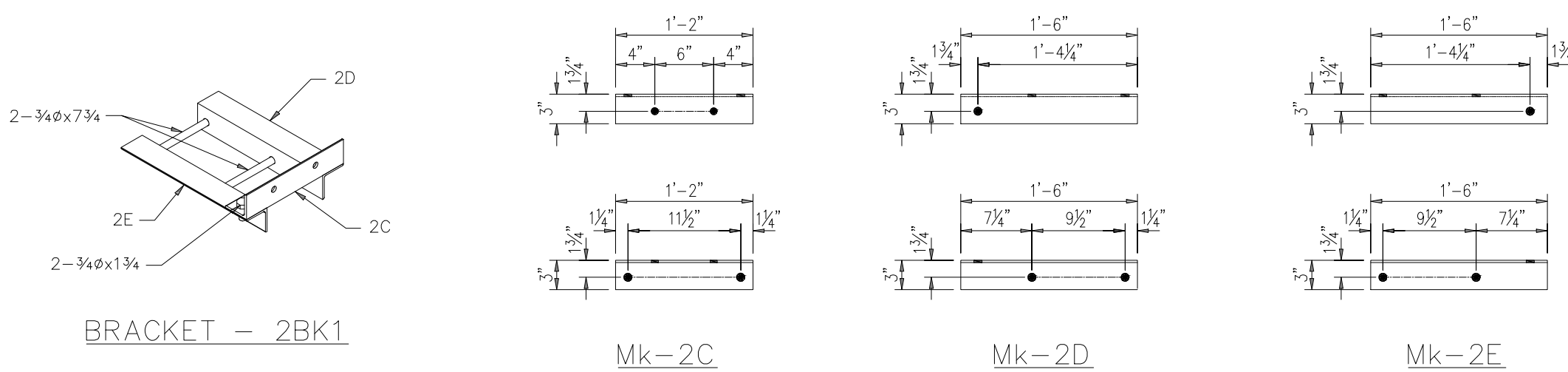


ANCHOR ROD NOTES

- ALL ANCHOR RODS SHALL BE ASTM F1554 GRADE 55 WITH (4) ASTM A563 GRADE A OR C HEAVY HEX NUTS AND (4) ASTM F436 FLAT WASHERS EACH AND SHALL BE GALVANIZED ACCORDING TO ASTM A753 UNLESS NOTED OTHERWISE.
- ALL ANCHOR RODS SHALL BE SET WITH THE AID OF SETTING TEMPLATES.



BRACKET - 2BK1



BILL OF MATERIAL

MARK	QTY.	DESCRIPTION	LENGTH		WT.	REMARKS
			FT.	IN.		
	(2)	FOR (1) COLUMN - 2C1				
2C1	1	HSS 6 x 6 x 1/4	11	2 1/2	212.5	
2a	1	PL 1 1/4 x 18	1	6	114.8	(WELD)
2b	1	PL 3/4 x 12	1	0	30.6	(WELD)
2c	1	PL 1/4 x 2 1/4	0	3 1/2	0.6	(WELD)
2d	2	PL 1/4 x 2 1/4	0	3	1.0	(WELD)
					359.5	(BLACK WGT.)
					372#	(GALV. WGT.)
	(1)	FOR (1) SWITCH FRAME - 2SF1 (SHIP ASSEMBLED)				
2A	2	W 12 x 14	13	0	364.0	
2B	2	HSS 6 x 6 x 1/4	4	10 1/4	186.2	
2f	4	PL 1/2 x 7	1	0	47.6	(WELD)
2h	2	PL 3/4 x 12	1	0	61.2	(WELD)
16		3/4 x 2 SHOP BOLTS			10.5	(WELD)
					669.5	(BLACK WGT.)
					693#	(GALV. WGT.)
						8-3/4 x 2 3/4
	(3)	FOR (1) BRACKET - 2BK1 (SHIP KNOCKED DOWN)				
2C	1	L 3 x 3 x 1/4	1	2	5.7	
2D	1	L 3 x 3 x 1/4	1	6	7.4	
2E	1	L 3 x 3 x 1/4	1	6	7.4	
2		3/4 x 1 1/4 FIELD BOLTS			0.1	
					20.6	(BLACK WGT.)
					21#	(GALV. WGT.)
						6-3/4 x 7/4
		MISC MATERIAL (TOTAL QTY)				
2TP2	2	PL 1/4 x 15	1	3	32#	
8		1 x 3-0 THREADED ANCHOR ROD				
		W/(2) FLAT WASHERS & (3) HEX NUTS EACH				

FABRICATION NOTES:

- ALL STEEL HOT-DIP GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A133.
- PIECE MARK STAMPED INTO METAL WITH NOT LESS THAN 3/8" HIGH CHARACTERS BEFORE GALVANIZING.
- ALL HOLES 1 3/16" Ø FOR 3/4" Ø A325 BOLTS W/ONE H. FLAT WASHER EACH, UNLESS NOTED.
- EDGE DISTANCE 1 1/8" UNLESS NOTED.
- ALL STEEL SHAPES ASTM A36 UNLESS NOTED.
- ALL STRUCTURAL TUBING SHAPES ASTM A500, GR. B.
- ALL WIDE FLANGE STEEL SHAPES TO BE ASTM A572, GR. 50, OR ASTM A992 GR 50
- WELD ELECTRODES SHALL BE E70XX EMPLOYING SMAW OR GMAW WELDING.

0 ISSUED FOR APPROVAL 06/26/23 HVC HVC JDC

REV. DATE DWN. CHK. APPR.

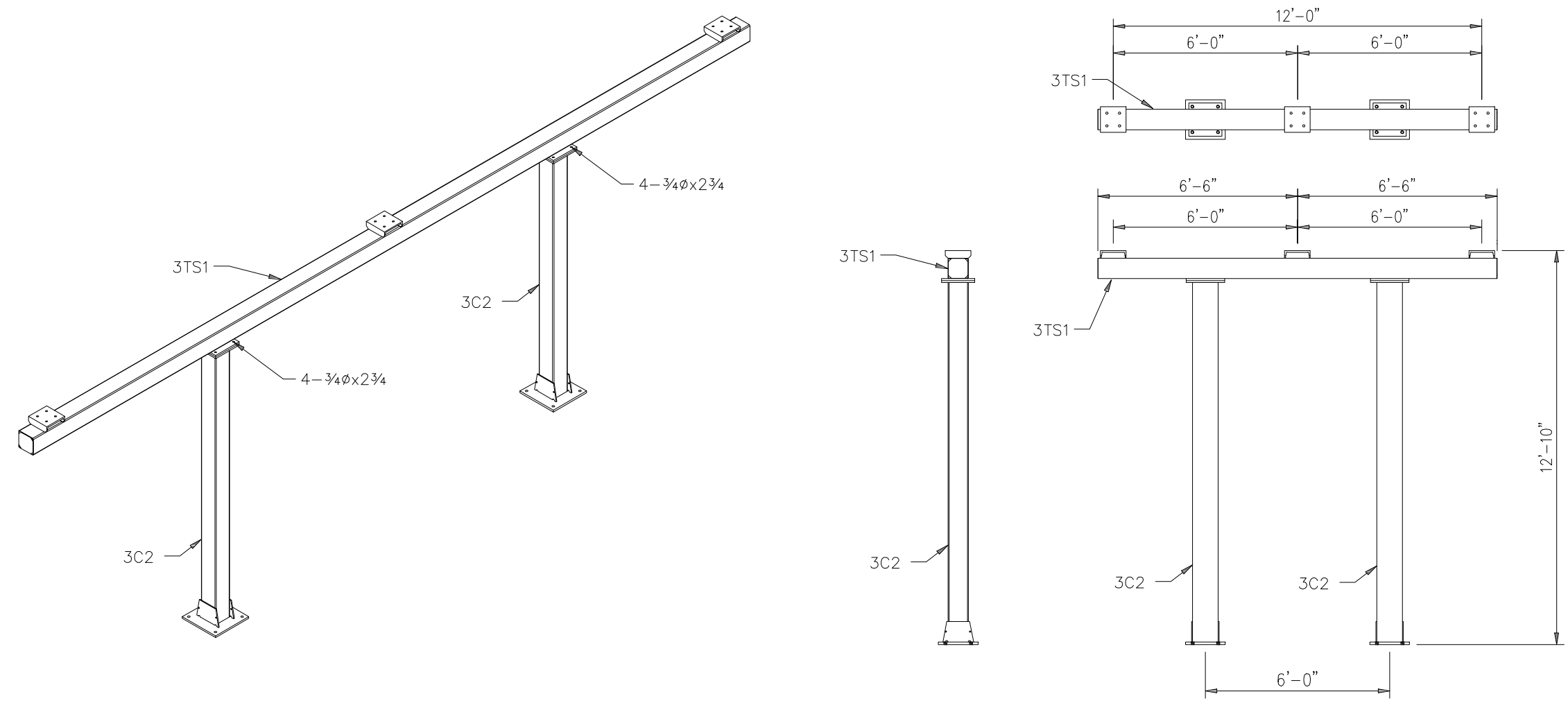
Alum-Elec Structures, Inc.

250 West Grove Street
Kendallville, IN 46755
Phone: (260) 347-9362
Fax: (260) 347-9326

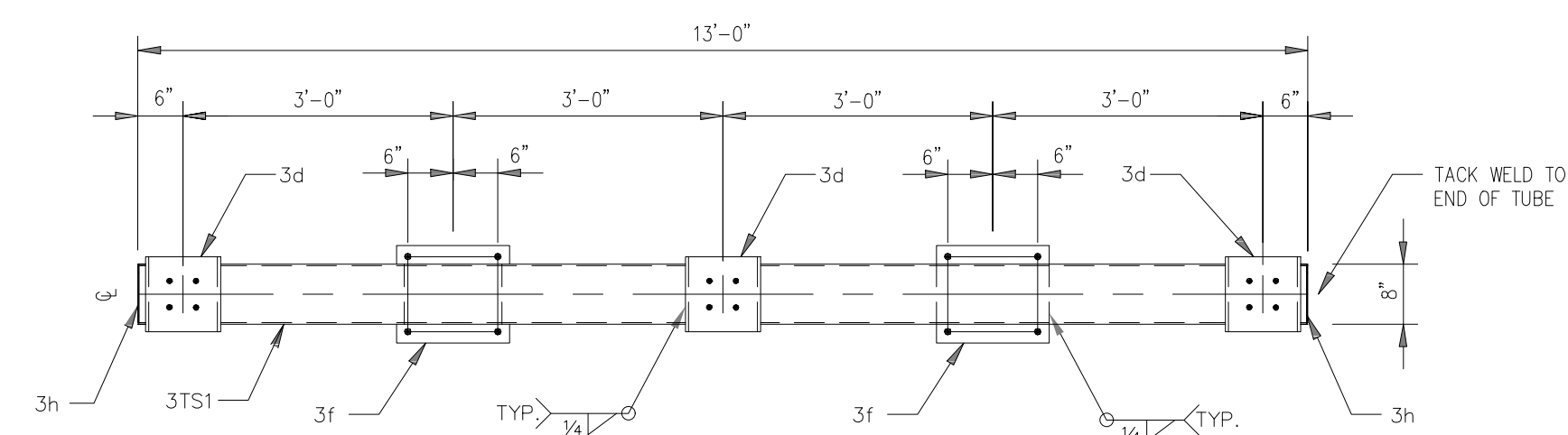
PROJECT STILLWATER KINZIE INTERCONNECT
STILLWATER, OKLAHOMA
69kV 1Ø SWITCH STAND, STRUCTURE GS-210

SCALE N.T.S.	DATE 06/23/23	DWN. HVC	APPR. JDC	JOB NO. 22-139	DRAWING NUMBER SD02	REV. 0
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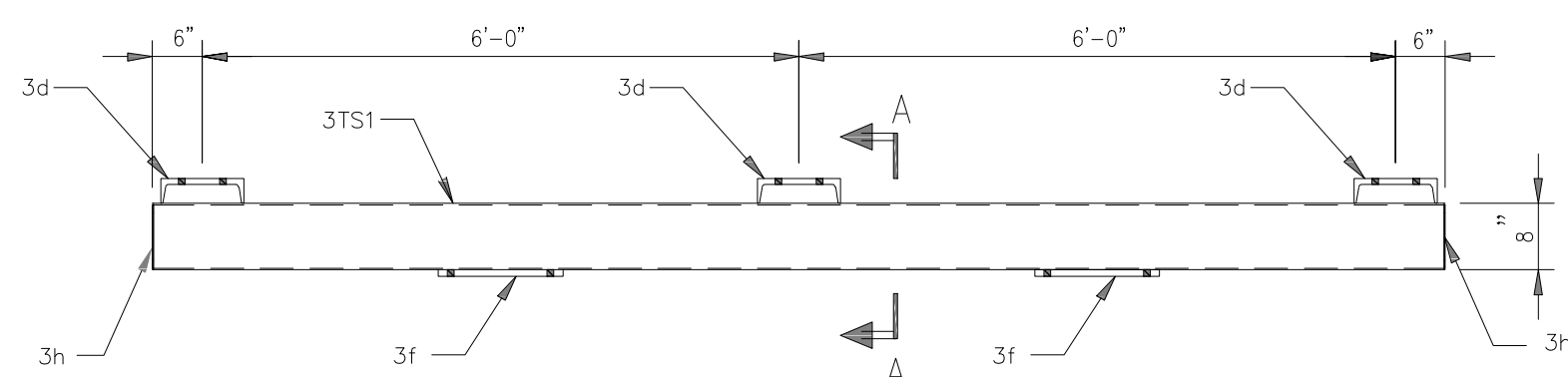
DESCRIPTION: ISSUE FOR REVIEW						GRAND RIVER DAM AUTHORITY							
0	RF022-01145	8/14/2023	CP	BE	JS	STILLWATER KINZIE INTERCONNECT S351							
						STILLWATER, OKLAHOMA 138/69kv							
						69kV 1Ø SWITCH STAND, STRUCTURE (GS-210)							
REV. NO.		JOB NO.		DATE		DESIGN ENGR.		DFT		DESIGN CHECK		ISSUE APPROV'D	
						ENGINEER: --		SCALE: NTS		DATE: 8/14/2023		REV. 0	
						DRAWN BY: --		DRAWING NO.		SHEET 1 OF 1			
						CHECKED BY: --		P.O. BOX 409		VINITA, OK 74301		S351VS01	
						APPROVED BY: --		OLD DRAWING NO.:					



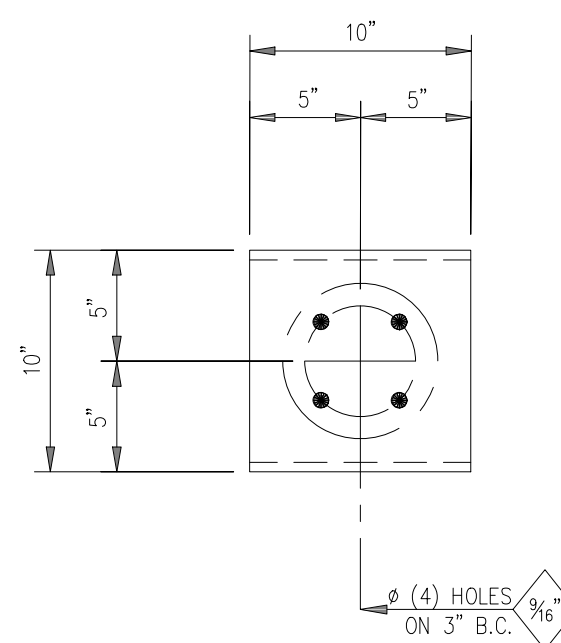
69kV 3Ø REACTOR SUPPORT - 3RS1
STRUCTURE GS-201



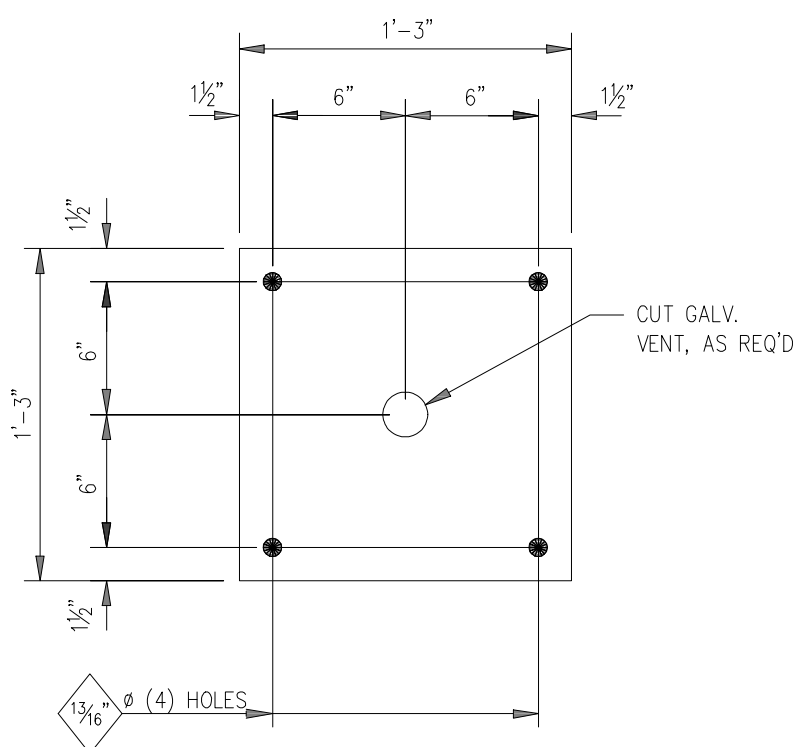
TUBE - 3TS1



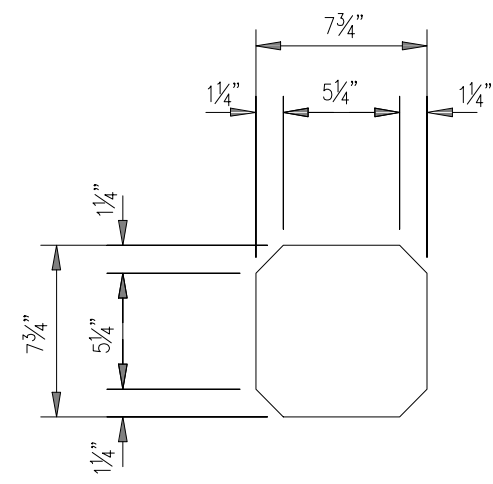
SECTION A-A



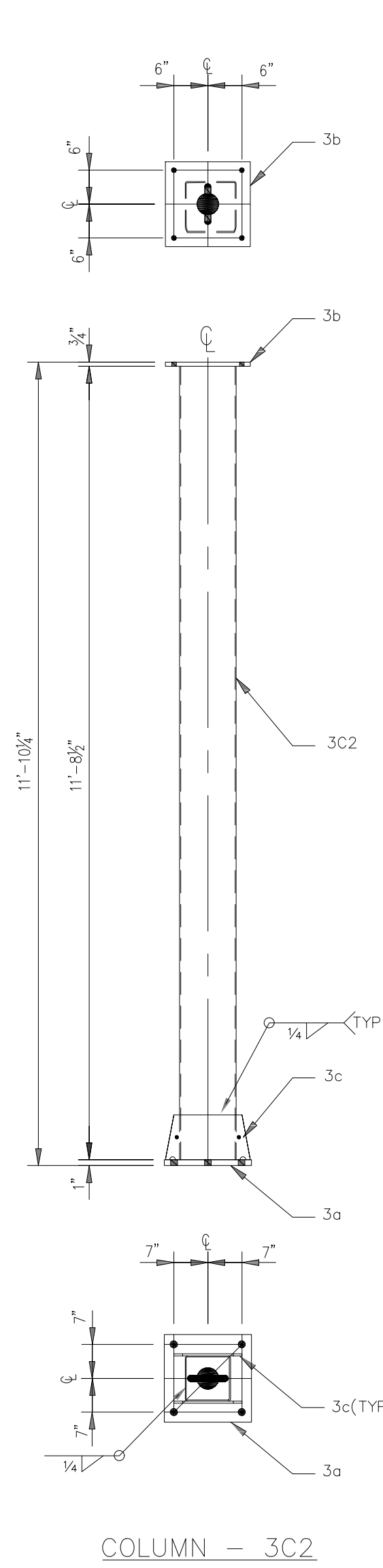
Mk-3d



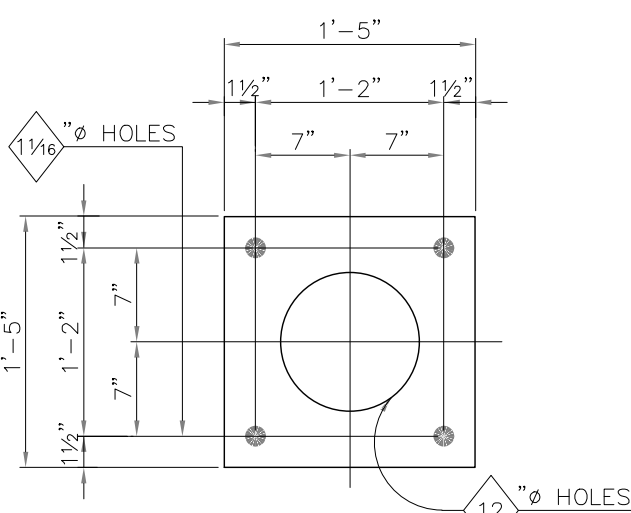
Mk-3f



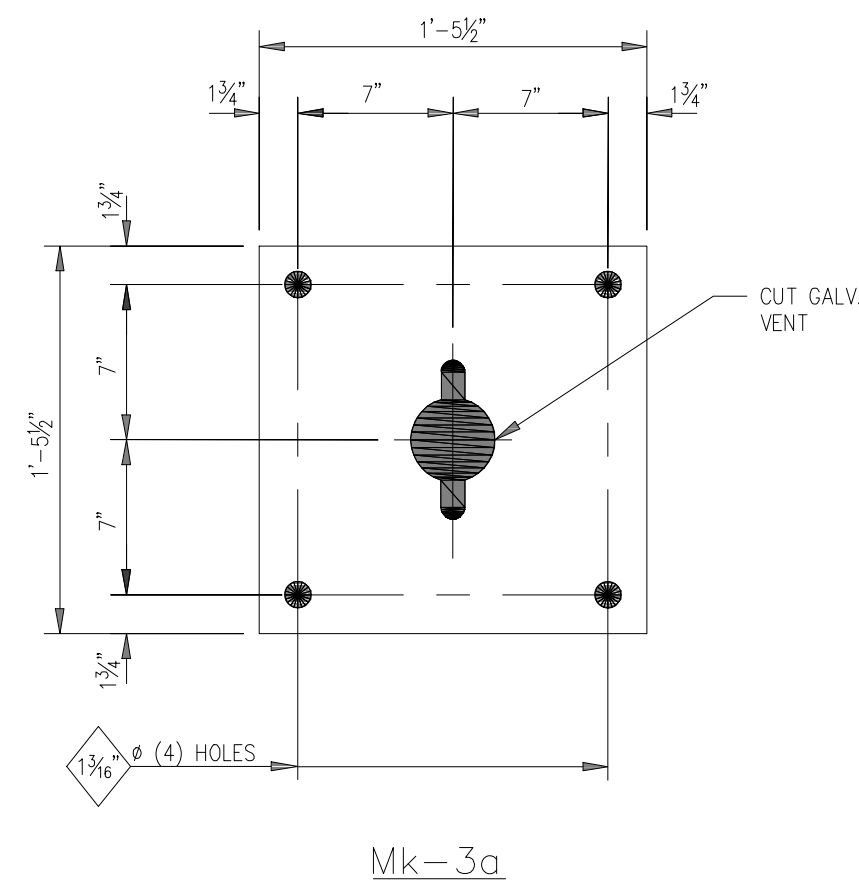
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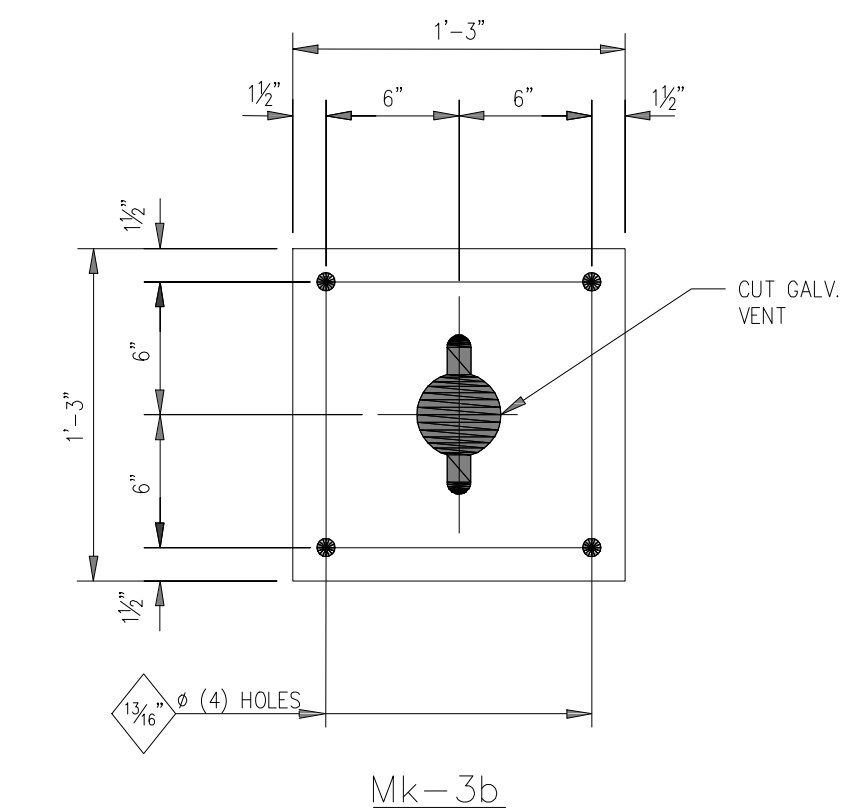
COLUMN - 3C2



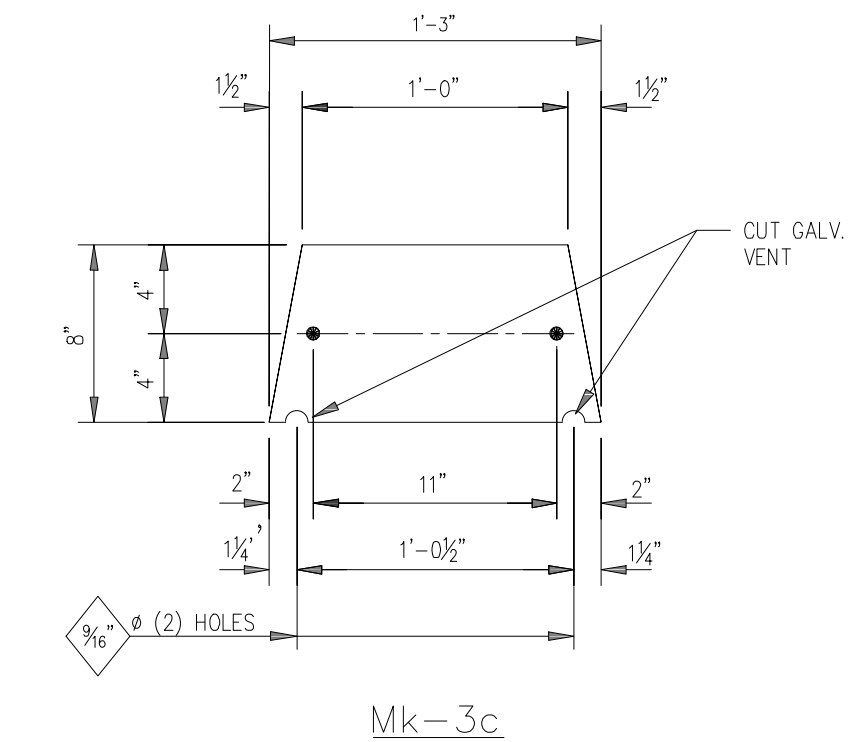
ANCHOR ROD TEMPLATE - 3TP3



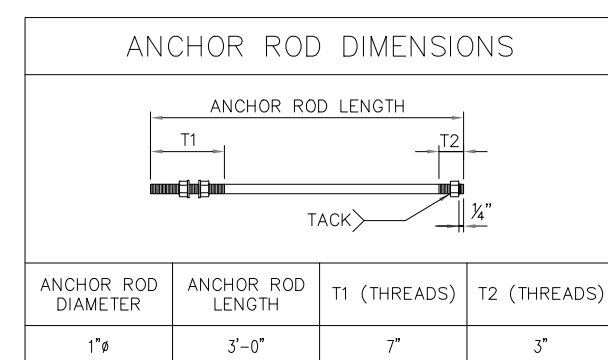
Mk-3a



Mk-3b



Mk-3c



ANCHOR ROD NOTES

- ALL ANCHOR RODS SHALL BE ASTM F1554 GRADE 55 WITH (4) ASTM A563 GRADE 4 OR C HEAVY HEX NUTS AND (4) ASTM F436 FLAT WASHERS EACH AND SHALL BE GALVANIZED ACCORDING TO ASTM A153 UNLESS NOTED OTHERWISE.
- ALL ANCHOR RODS SHALL BE SET WITH THE AID OF SETTING TEMPLATES.

BILL OF MATERIAL						
MARK	QTY.	DESCRIPTION	LENGTH		WT.	REMARKS
			FT.	IN.		
	(2)	FOR (1) COLUMN - 3C2				
3C2	1	HSS 10 x 10 x 3/4	11	8 1/2	289.5	
3a	1	PL 1 x 17 1/2	1	5 1/2	86.8	(WELD)
3b	1	PL 3/4 x 15	1	3	47.8	(WELD)
3c	2	PL 3/8 x 8	1	3	25.5	(WELD)
					449.6	(BLACK WGT.)
					465#	(GALV. WGT.)
	(1)	FOR (1) TUBE - 3TS1				
3TS1	1	HSS 8 x 8 x 3/4	13	0	255.2	
3d	3	C 10 x 30	0	10	75.0	(WELD)
3f	2	PL 3/4 x 15	1	3	95.7	(WELD)
3h	2	PL 3/8 x 7 3/4	0	7 3/4	4.3	(WELD)
					430.2	(BLACK WGT.)
					445#	(GALV. WGT.)
						8-3/4x23/4
MISC MATERIAL (TOTAL QTY)						
3TP3	2	PL 1/4 x 17	1	5	41#	
	8	1Ø x 3-0 THREADED ANCHOR ROD W/(2) FLAT WASHERS & (3) HEX NUTS EACH				

FABRICATION NOTES:

- ALL STEEL HOT-DIP GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A133.
- PIECE MARK STAMPED INTO METAL WITH NOT LESS THAN 3/8" HIGH CHARACTERS BEFORE GALVANIZING.
- ALL HOLES 1 3/16" Ø FOR 3/4" Ø A325 BOLTS W/ONE H. FLAT WASHER EACH, UNLESS NOTED.
- EDGE DISTANCE 1 1/8" UNLESS NOTED.
- ALL STEEL SHAPES ASTM A36 UNLESS NOTED.
- ALL STRUCTURAL TUBING SHAPES ASTM A500, GR. B.
- ALL WIDE FLANGE STEEL SHAPES TO BE ASTM A572, GR. 50, OR ASTM A992 GR 50
- WELD ELECTRODES SHALL BE E70XX EMPLOYING SMAW OR GMAW WELDING.

REV.	DESCRIPTION	DATE	DWN.	CHK.	APPR.
0	ISSUED FOR APPROVAL	06/26/23	HVC	HVC	JDG

Alum-Elec Structures, Inc.

250 West Grove Street
Kendallville, IN 46755
Phone: (260) 347-9362
Fax: (260) 347-9326

PROJECT: STILLWATER KINZIE INTERCONNECT
STILLWATER, OKLAHOMA
69KV 3Ø REACTOR SUPPORT, STRUCTURE GS-201

SCALE	DATE	DWN.	APPR.	JOB NO.	DRAWING NUMBER	REV.
N.T.S.	06/23/23	HVC	JDG	22-139	SD03	0

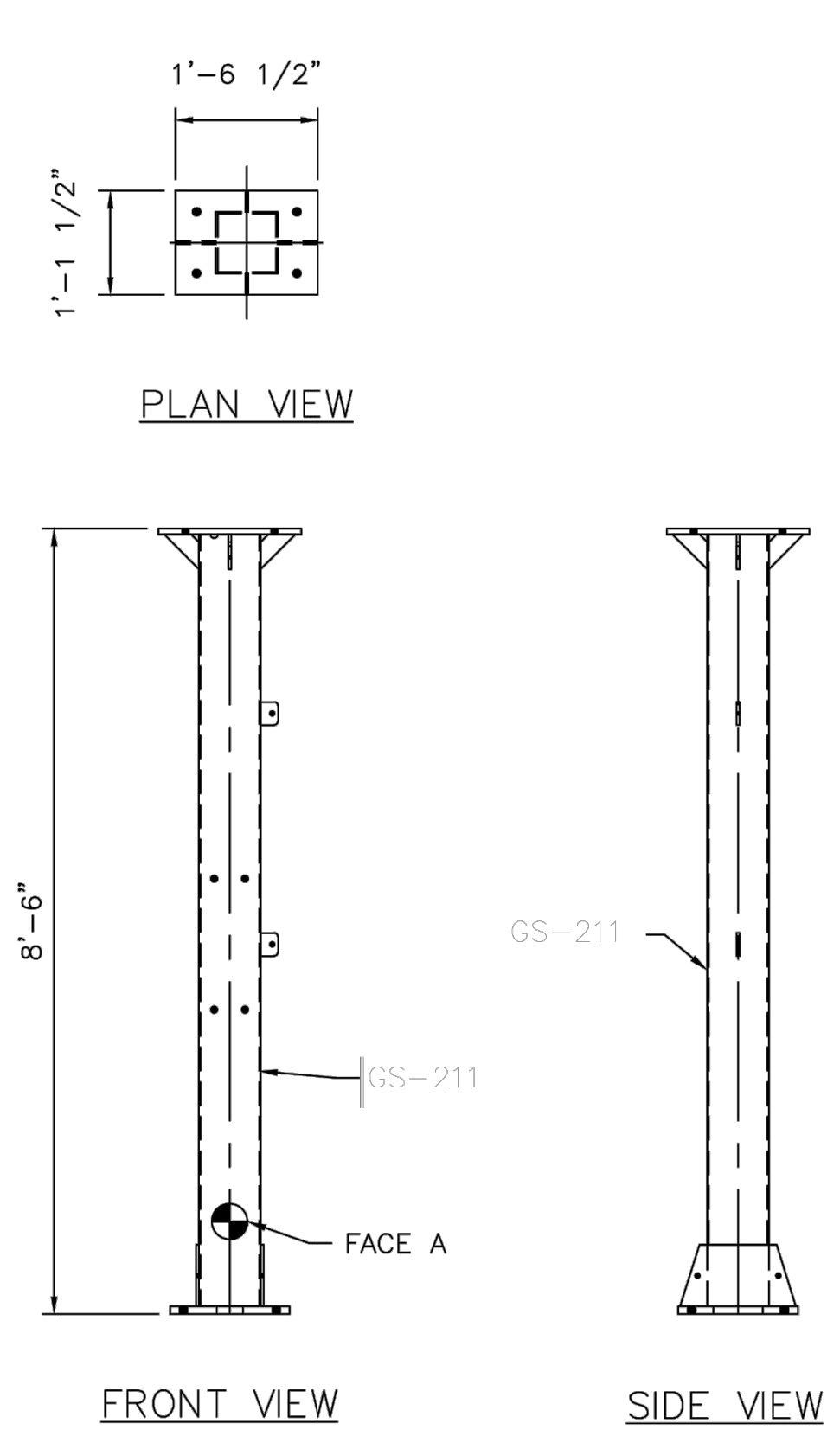
REV. NO.	JOB NO.	DATE	DESIGN ENGR.	DFT	DESIGN CHECK	ISSUE APPROV
0	RF022-01145	8/14/2023	CP	BE	JS	--

GRAND RIVER DAM AUTHORITY
STILLWATER KINZIE INTERCONNECT S351
STILLWATER, OKLAHOMA 138/69kv

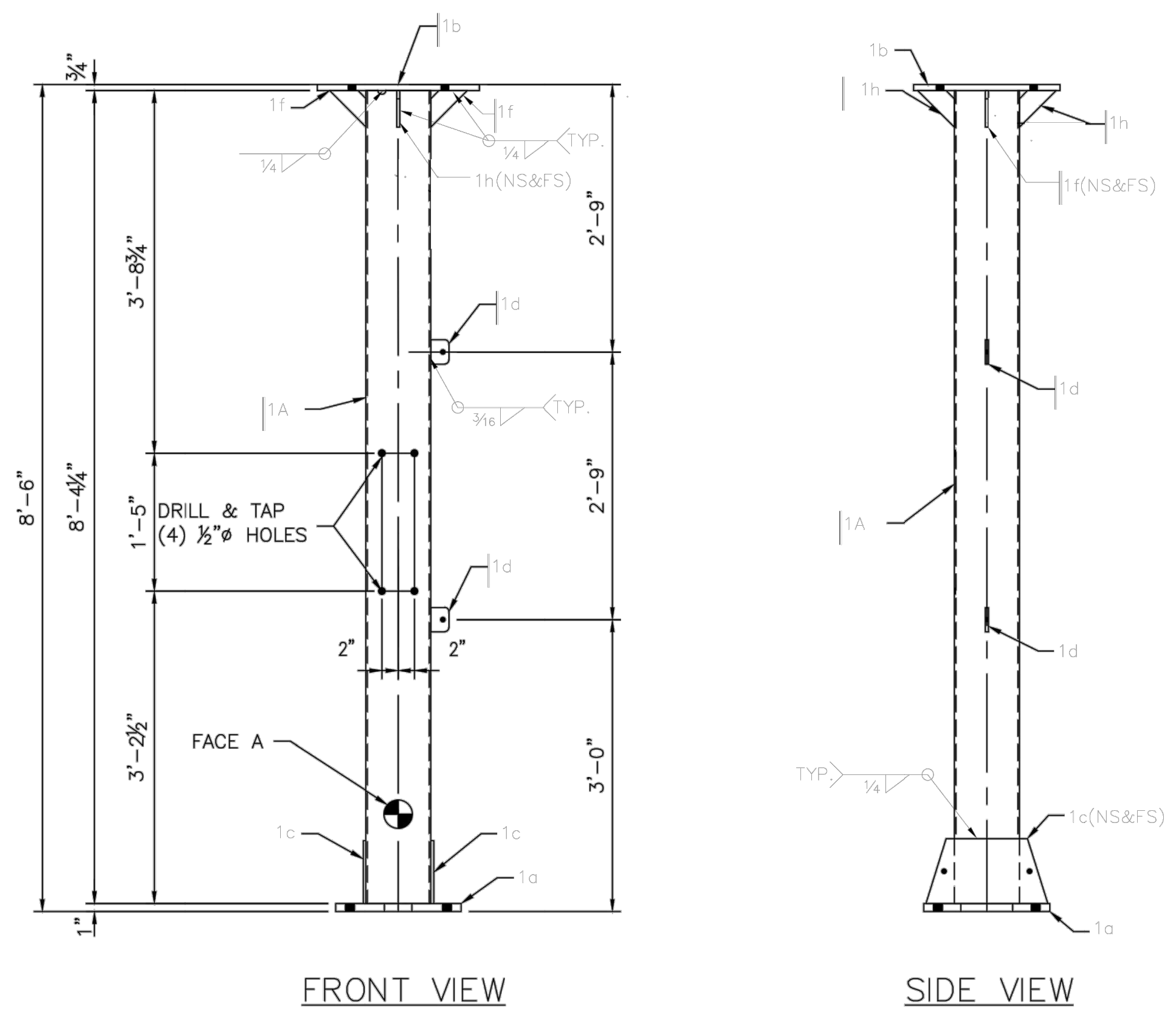
**69kV 3Ø
REACTOR SUPPORT,
STRUCTURE (GS-201)**

ENGINEER: --	SCALE: NTS	DATE: 8/14/2023	REV. 0
DRAWN BY: --	DRAWING NO. S351VS02	SHEET 1 OF 1	
CHECKED BY: --	APPROVED BY: --	OLD DRAWING NO.:	

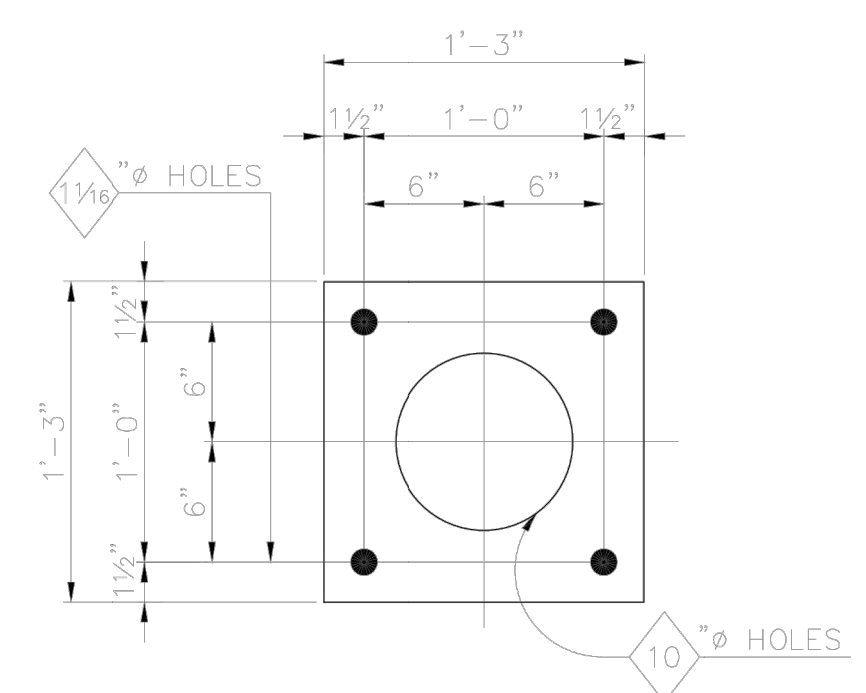
GRDA
P.O. BOX 409
VINITA, OK 74301



69kV 1Ø RPD SUPPORT 1RPD1
STRUCTURE GS-211



RPD SUPPORT - 1RPD1



ANCHOR ROD TEMPLATE - 1TP1

ANCHOR ROD DIMENSIONS

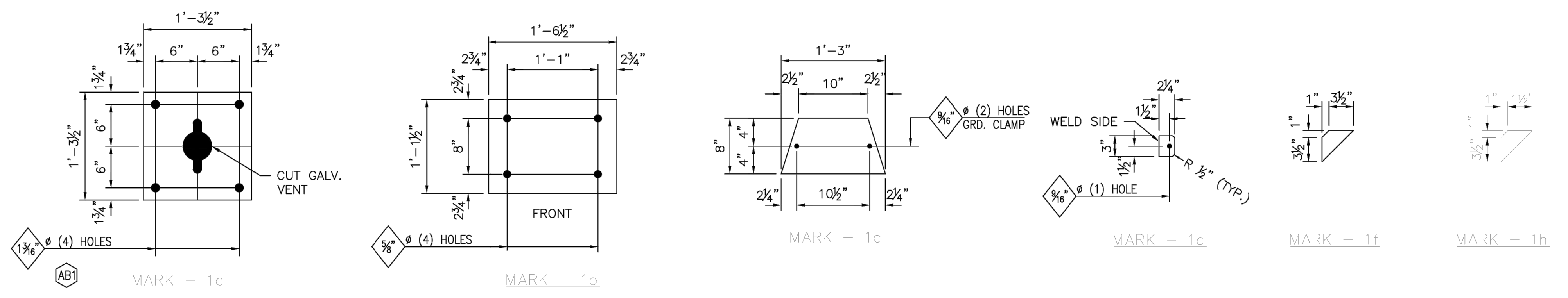
ANCHOR ROD DIAMETER	ANCHOR ROD LENGTH	T1 (THREADS)	T2 (THREADS)
1"	3'-0"	7"	3"

- ANCHOR ROD NOTES
- ALL ANCHOR RODS SHALL BE ASTM F1554 GRADE 55 WITH (4) ASTM A563 GRADE A OR C HEAVY HEX NUTS AND (4) ASTM F436 FLAT WASHERS EACH AND SHALL BE GALVANIZED ACCORDING TO ASTM A153 UNLESS NOTED OTHERWISE.
 - ALL ANCHOR RODS SHALL BE SET WITH THE AID OF SETTING TEMPLATES.

BILL OF MATERIAL

MARK	QTY.	DESCRIPTION	LENGTH	WT.	REMARKS
(1)		FOR (1) RPD SUPPORT - 1RPD1			
1A	1	HSS 8 x 8 x 3/8	8	4.4	632.0
1a	1	PL 1 x 15 1/2	1	3 1/2	68.1 (WELD)
1b	1	PL 3/4 x 13 1/2	1	6 1/2	53.1 (WELD)
1c	2	PL 3/8 x 8	1	3	25.5 (WELD)
1d	2	PL 3/8 x 2 1/2	0	3	1.4 (WELD)
1f	2	PL 3/8 x 4 1/2	0	4 1/2	4.3 (WELD)
1h	2	PL 3/8 x 2 1/2	0	4 1/2	2.4 (WELD)
					786.8 (BLACK WGT.)
					814# (GALV. WGT.)
MISC MATERIAL (TOTAL QTY)					
1TP1	1	PL 1/4 x 15	1	3	16#
4		1Ø x 3'-0" THREADED ANCHOR ROD			
		W/(2) FLAT WASHERS & (3) HEX NUTS EACH			

- FABRICATION NOTES:
- ALL STEEL HOT-DIP GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A133.
 - PIECE MARK STAMPED INTO METAL WITH NOT LESS THAN 3/8" HIGH CHARACTERS BEFORE GALVANIZING.
 - ALL HOLES 1 3/16" Ø FOR 3/4" Ø A325 BOLTS W/ONE H. FLAT WASHER EACH, UNLESS NOTED.
 - EDGE DISTANCE 1 1/8" UNLESS NOTED.
 - ALL STEEL SHAPES ASTM A36 UNLESS NOTED.
 - ALL STRUCTURAL TUBING SHAPES ASTM A500, GR. B.
 - ALL WIDE FLANGE STEEL SHAPES TO BE ASTM A572, GR. 50, OR ASTM A992 GR 50
 - WELD ELECTRODES SHALL BE E70XX EMPLOYING SMAW OR GMAW WELDING.



REV.	DATE	DESCRIPTION	DATE	DWN.	CHK.	APPR.
0	06/26/23	ISSUED FOR APPROVAL		HVC	HVC	JDG

Alum-Elec Structures, Inc.
250 West Grove Street
Kendallville, IN 46755
Phone: (260) 347-9362
Fax: (260) 347-9326

PROJECT: STILLWATER KINZIE INTERCONNECT
STILLWATER, OKLAHOMA
69kV 1Ø RPD SUPPORT, STRUCTURE GS-211

SCALE	DATE	DWN.	APPR.	JOB NO.	DRAWING NUMBER	REV.
N.T.S.	06/23/23	HVC	JDG	22-139	SD01	0



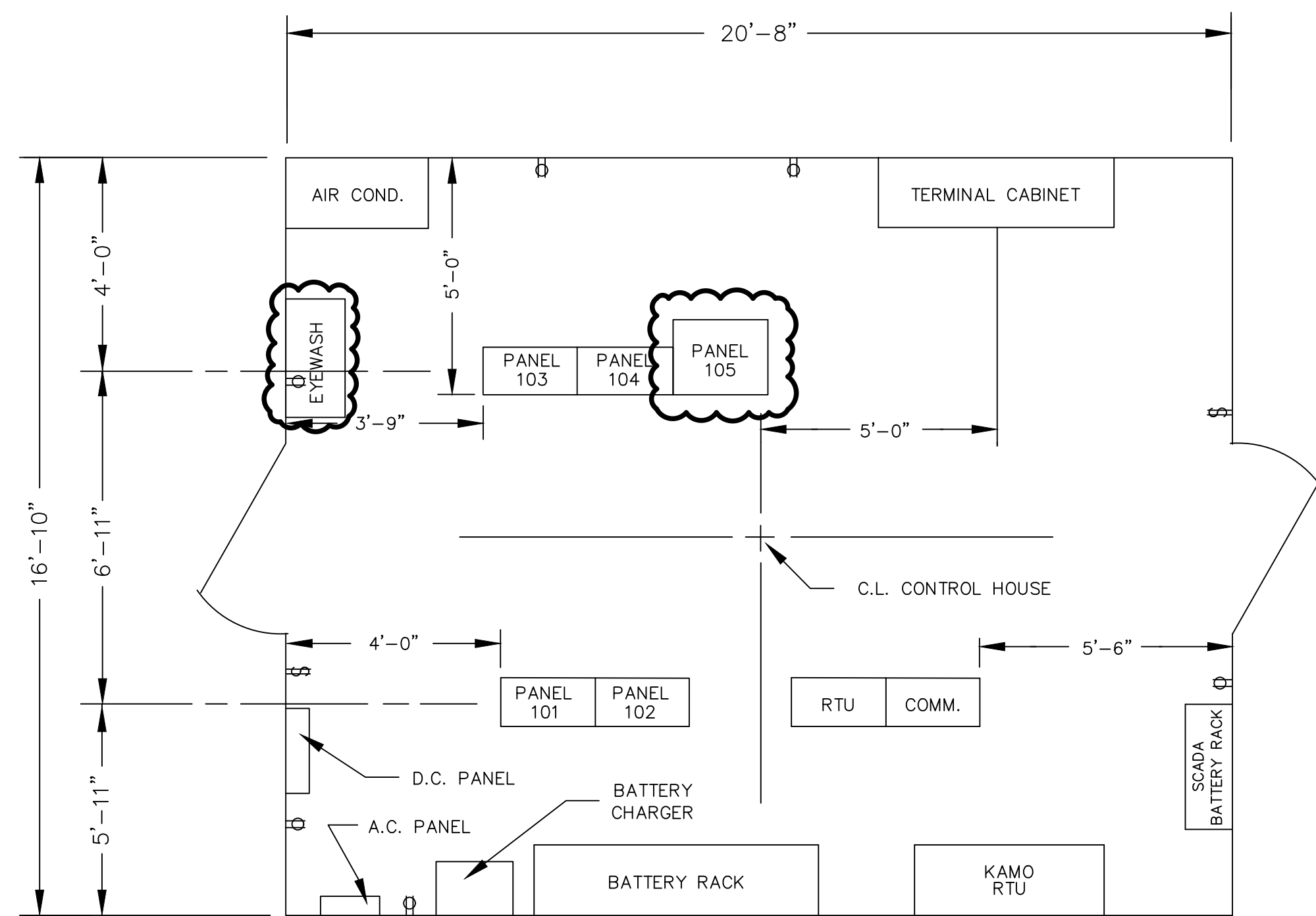
REV. NO.	JOB NO.	DATE	DESIGN ENGR.	DFTG	DESIGN CHECK	ISSUE APPROVD
0	RF022-01145	8/14/2023	CP	BE	JS	-

GRAND RIVER DAM AUTHORITY
STILLWATER KINZIE INTERCONNECT S351
STILLWATER, OKLAHOMA 138/69kV

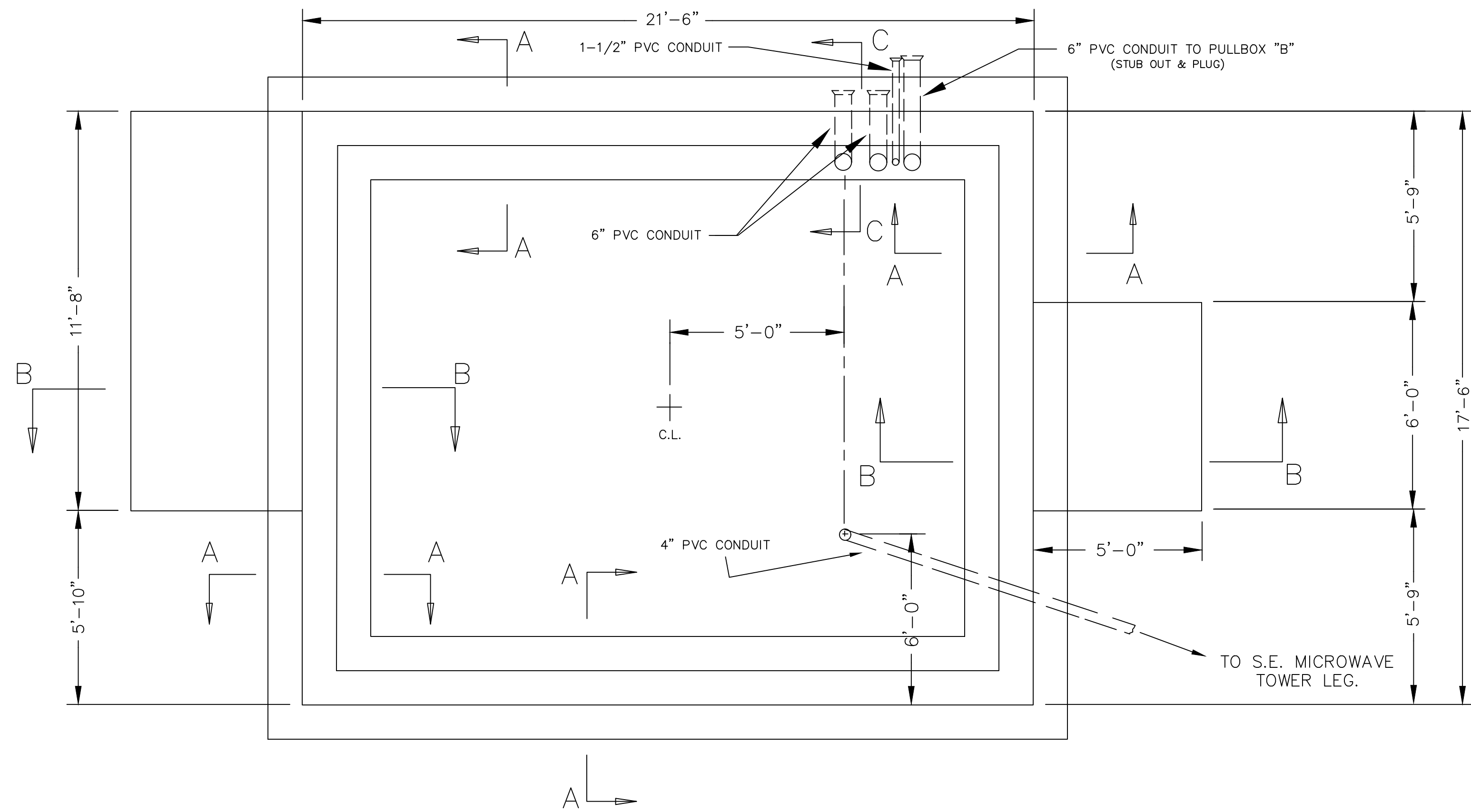
69kV 1Ø RPD SUPPORT,
STRUCTURE (GS-211)

ENGINEER: -- SCALE: NTS DATE: 8/14/2023 REV. 0
DRAWN BY: -- DRAWING NO. SHEET 1 OF 1
CHECKED BY: -- S351VS03
APPROVED BY: -- OLD DRAWING NO.:

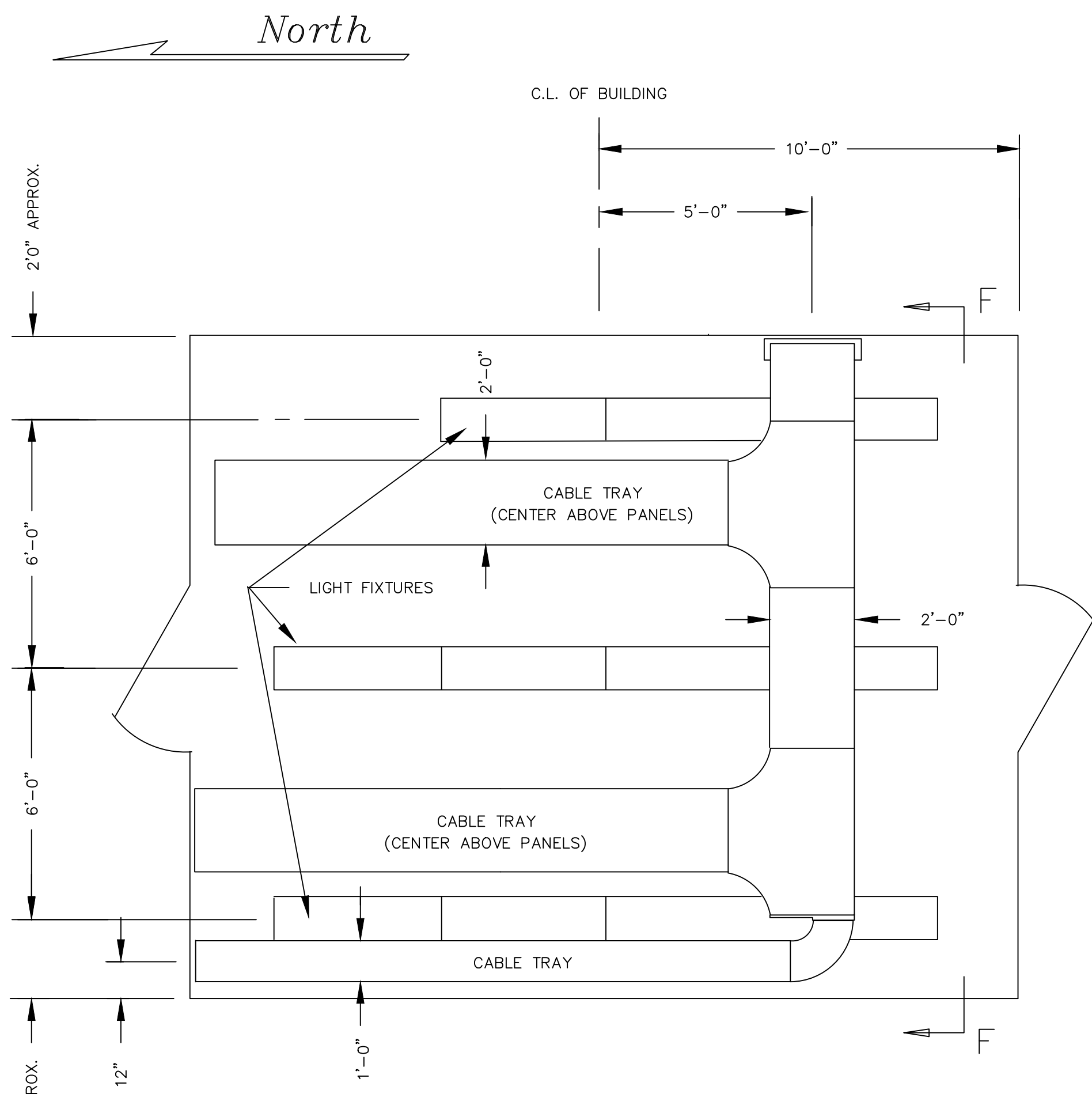
GRDA
P.O. BOX 409
VINITA, OK 74301



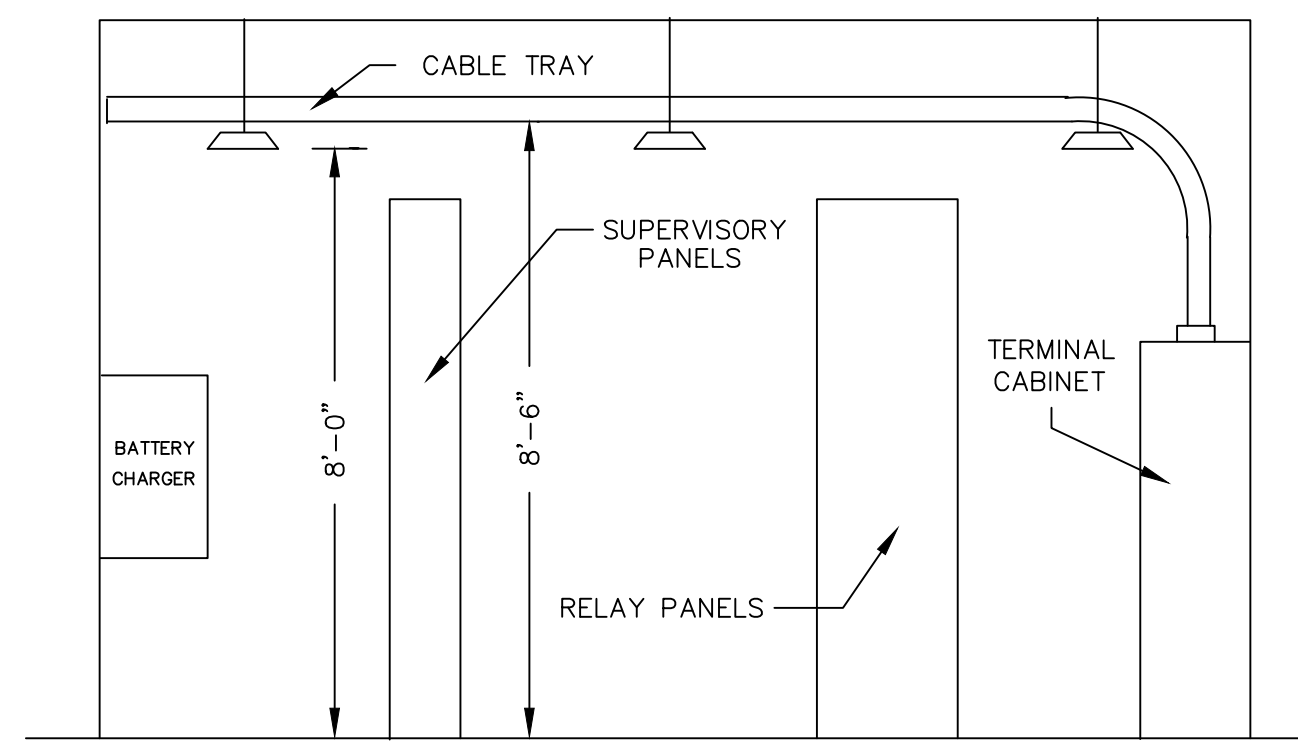
EQUIPMENT LAYOUT
SCALE: 3/8" = 1'-0"



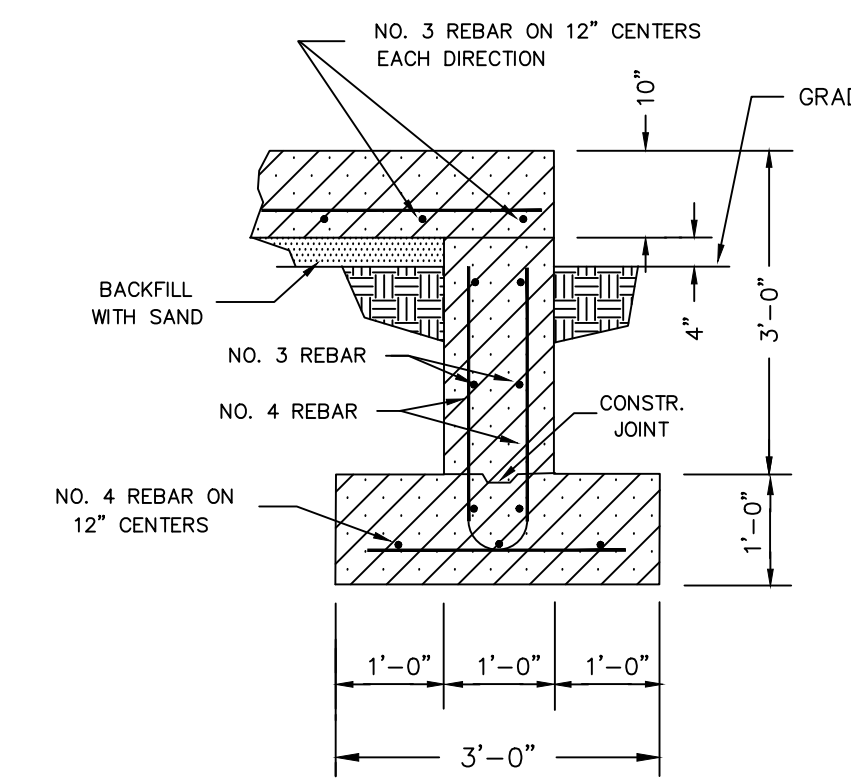
FOUNDATION PLAN
SCALE: 3/8" = 1'-0"



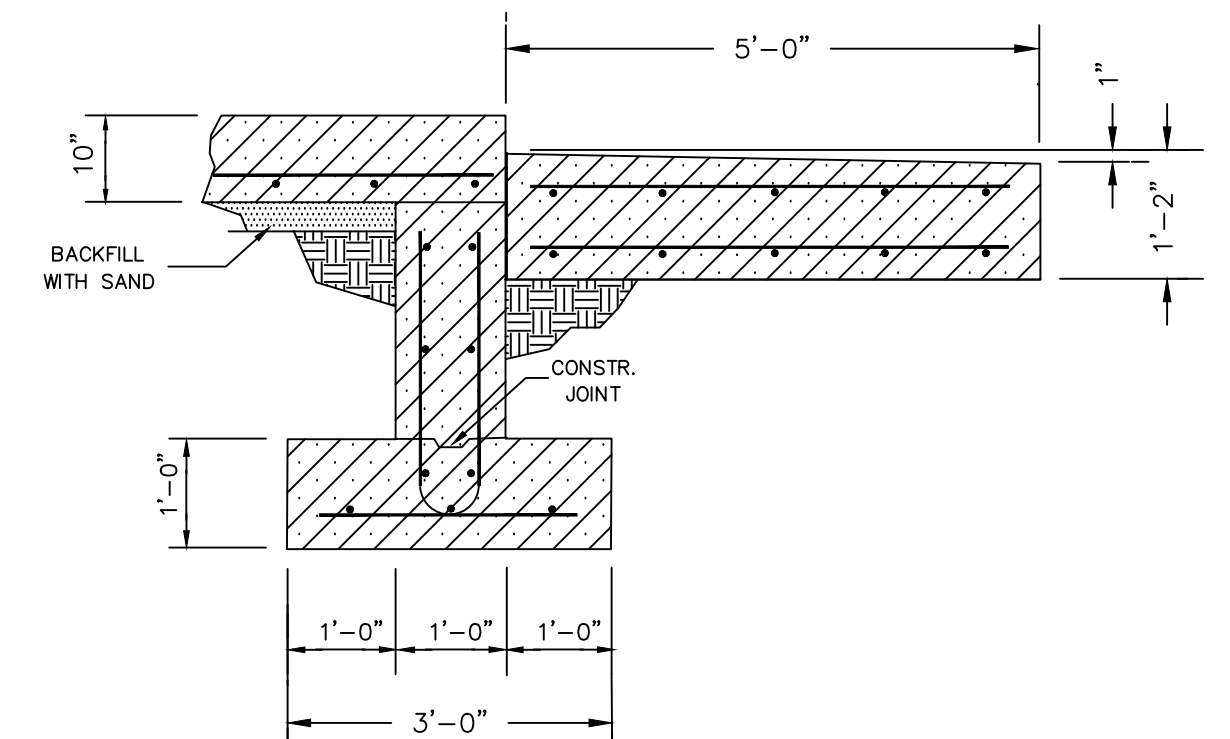
CABLE TRAY LAYOUT
SCALE: 3/8" = 1'-0"



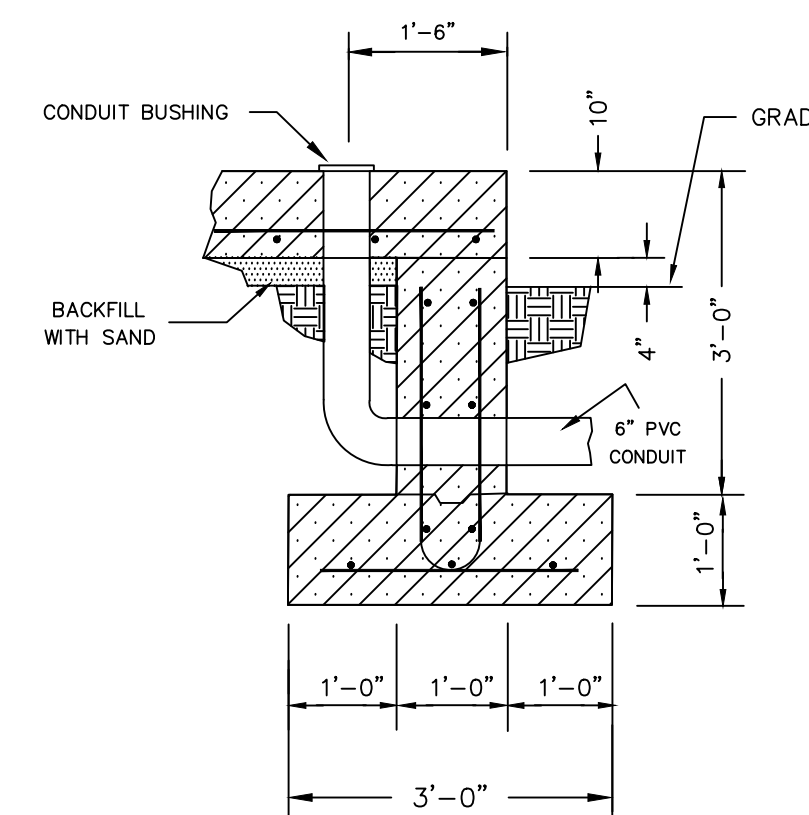
SECTION F-F
SCALE: 3/8" = 1'-0"



SECTION A-A
NO SCALE



SECTION B-B
NO SCALE



SECTION C-C
NO SCALE



DESCRIPTION: F6 PNL REPLACEMENT & CAP BANK BKR ADDITION	2	RF022-01145	5/9/23	NC	RE	LA	NC
DESCRIPTION: AS BUILT	1	-	8/22/88	-	-	-	-
REV. NO.	JOB NO.	DATE	DESIGN ENGR	DFT	DESIGN CHECK	ISSUE APPROV	

ISSUED FOR CONSTRUCTION

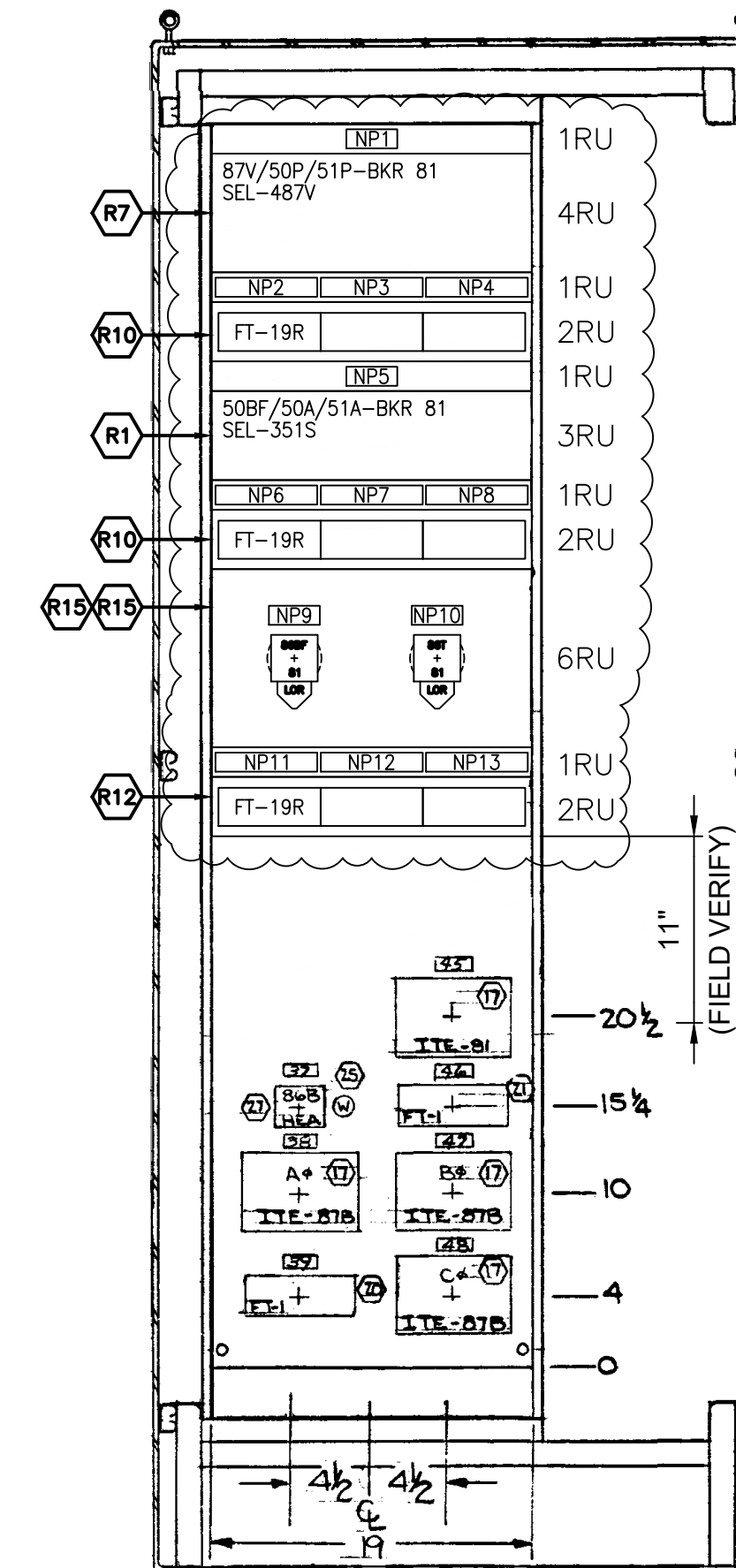
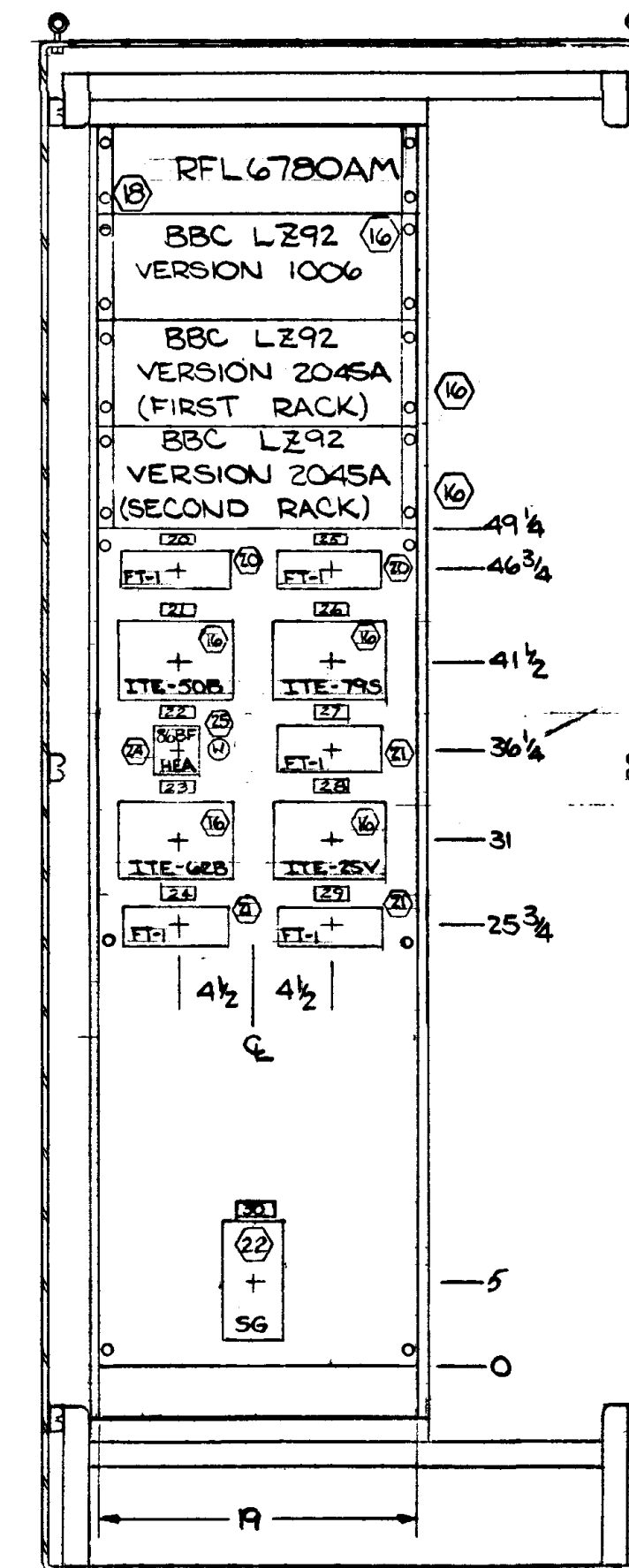
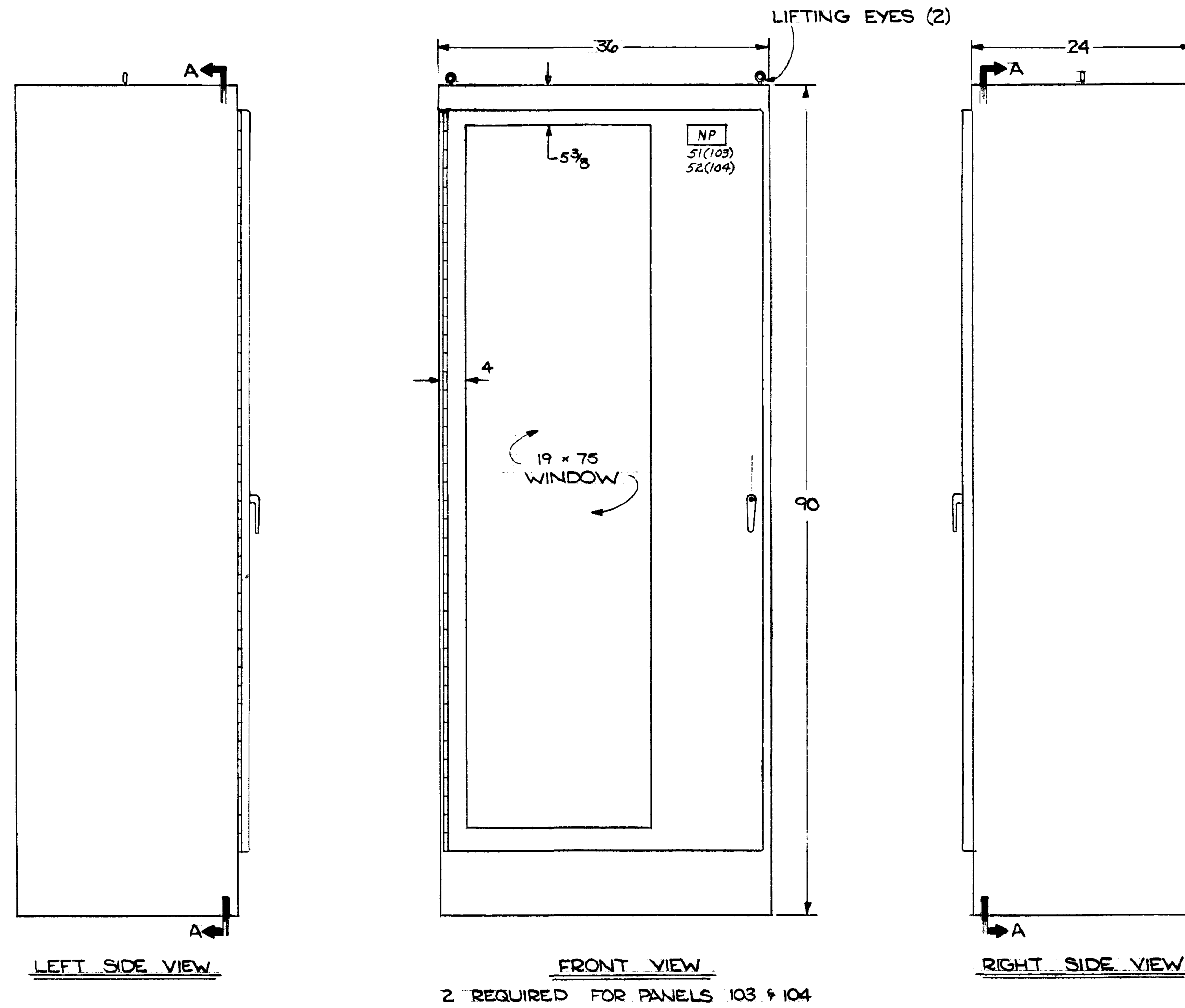
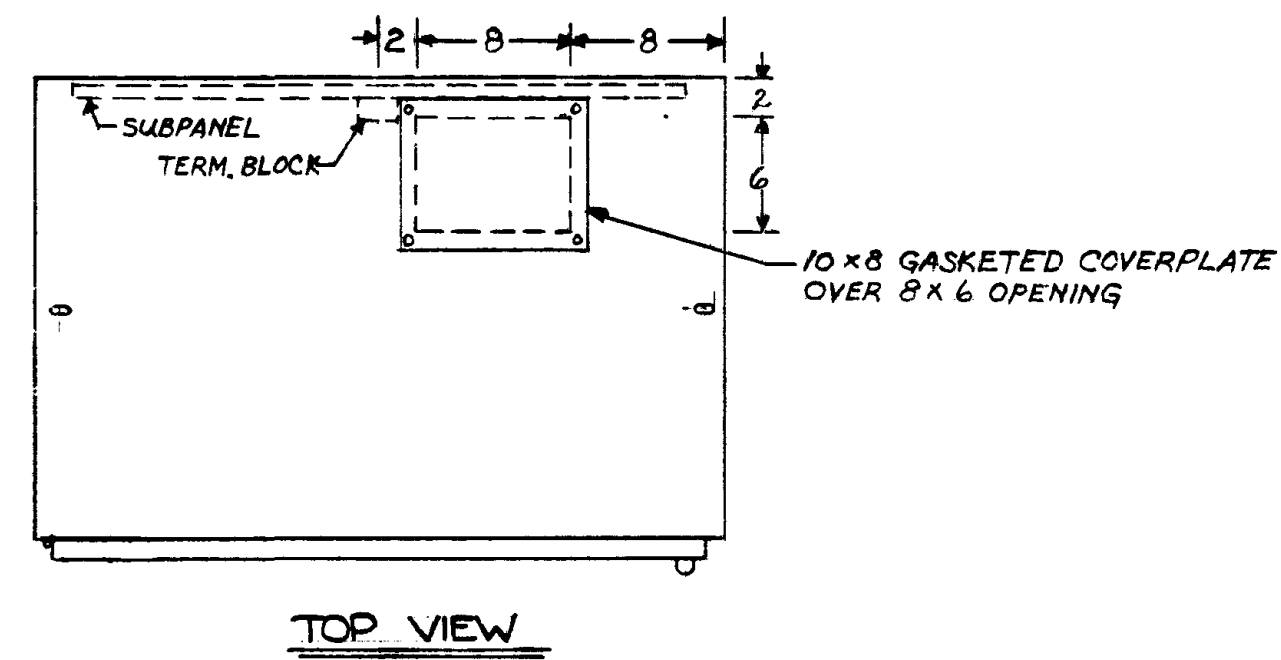
GRAND RIVER DAM AUTHORITY
STILLWATER KINZIE INTERCONNECT S351
STILLWATER, OKLAHOMA 138/69KV

CONTROL HOUSE LAYOUT

ENGINEER:	SCALE: NONE	DATE: 11/19/1986	REV.
DRAWN BY: DA	DRAWING NO.	SHEET 1 OF 1	2
CHECKED BY: XXX	S351PH01		
APPROVED BY: XXX	P.O. BOX 669 CHOUTEAU, OK 74337		
	OLD DRAWING NO.: D-1198		



4555 W Memorial Rd.
Oklahoma City, OK 73142



NOTE

1. STRUCTURES ARE HOFFMAN ENGINEERING NEMA 12 ENCLOSURE, CAT. # A-903624FS WITH SWING-OUT RACK MTG. FRAME, CAT. # A-903650F19

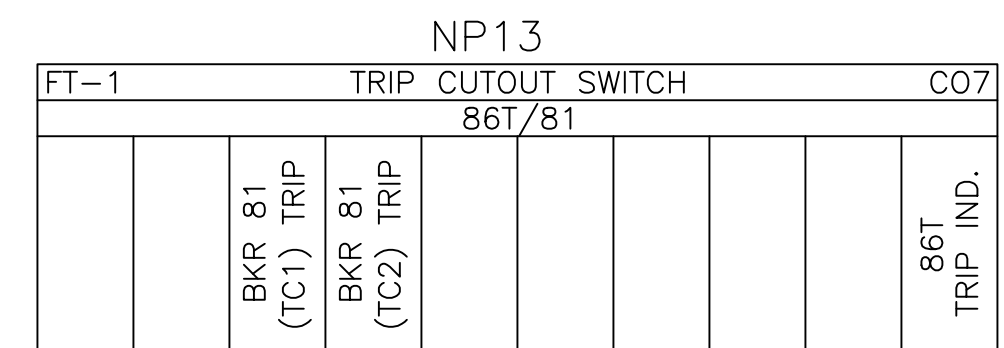
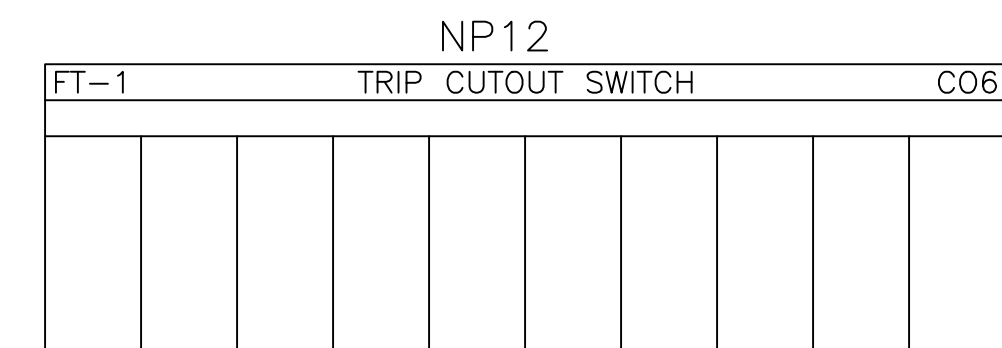
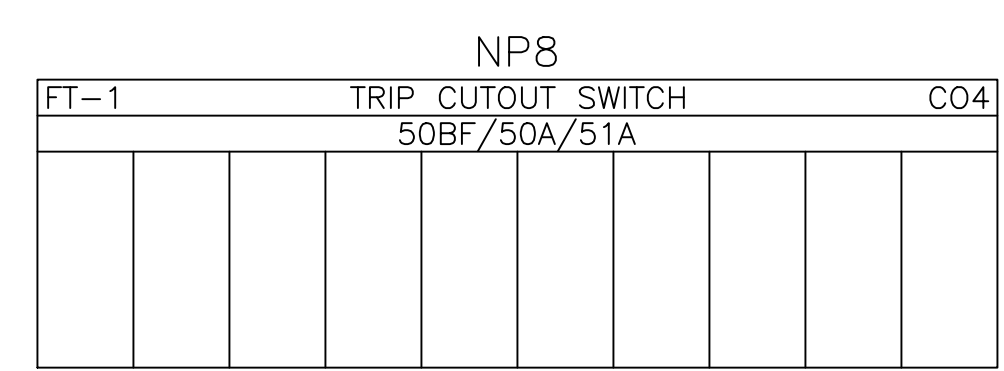
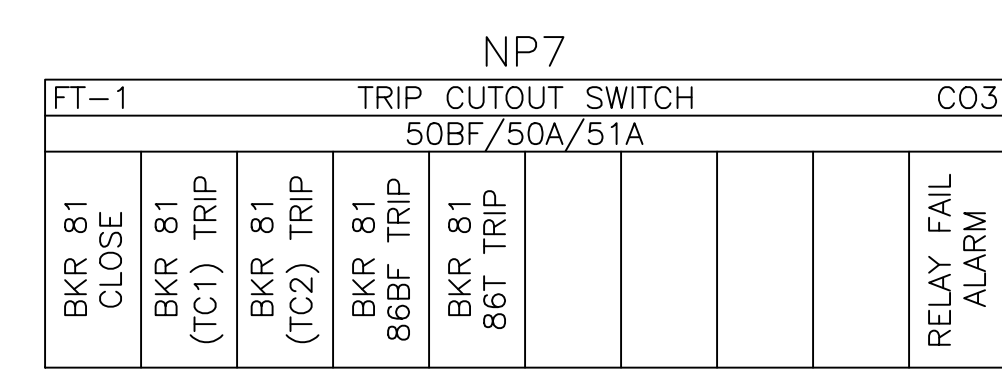
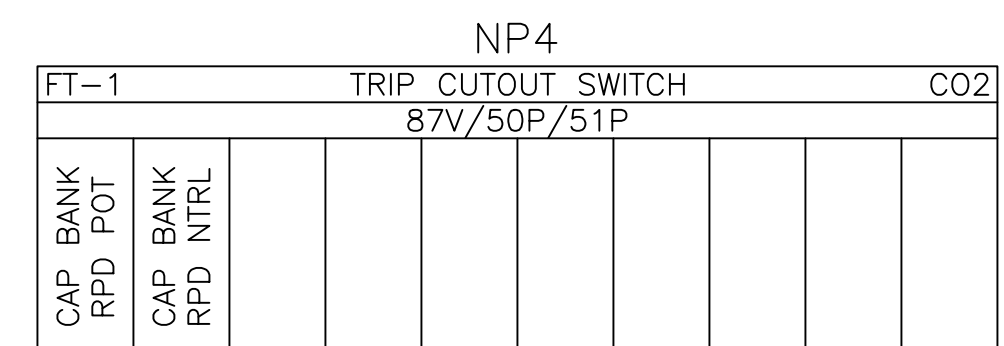
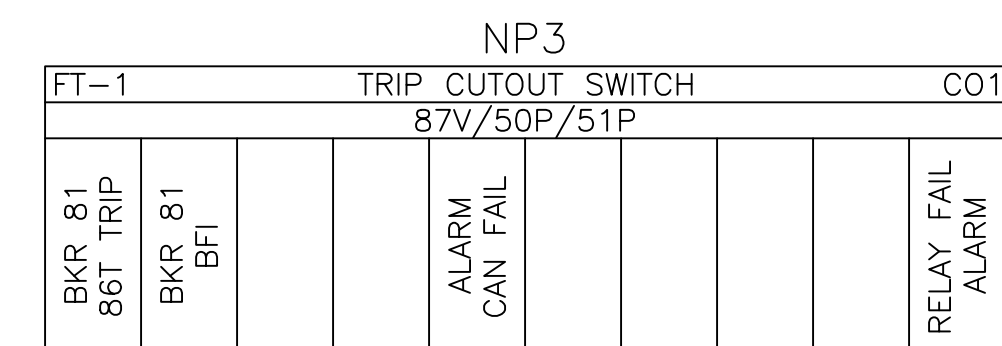
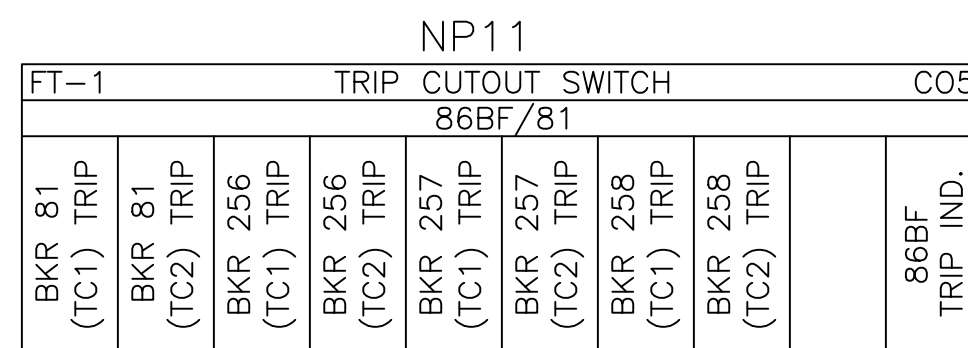
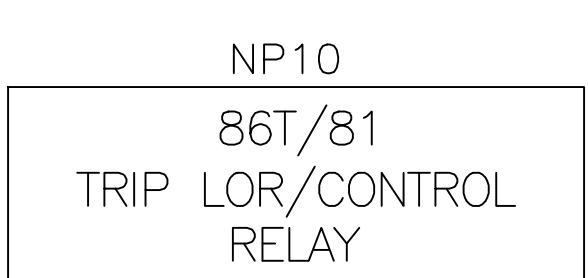
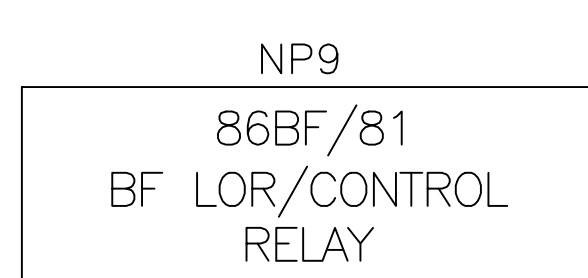
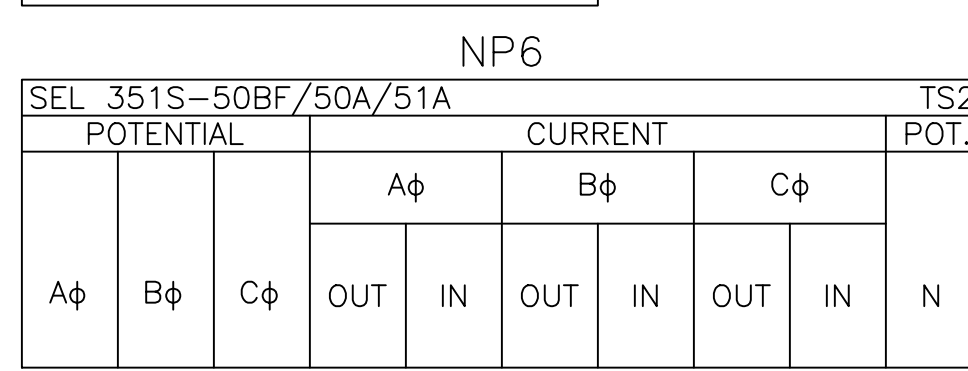
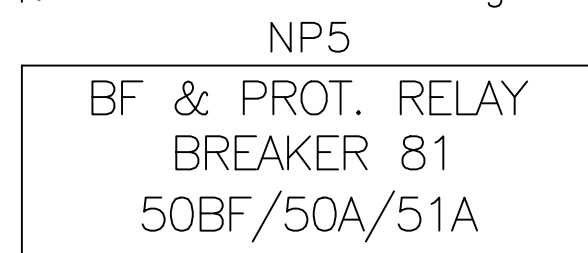
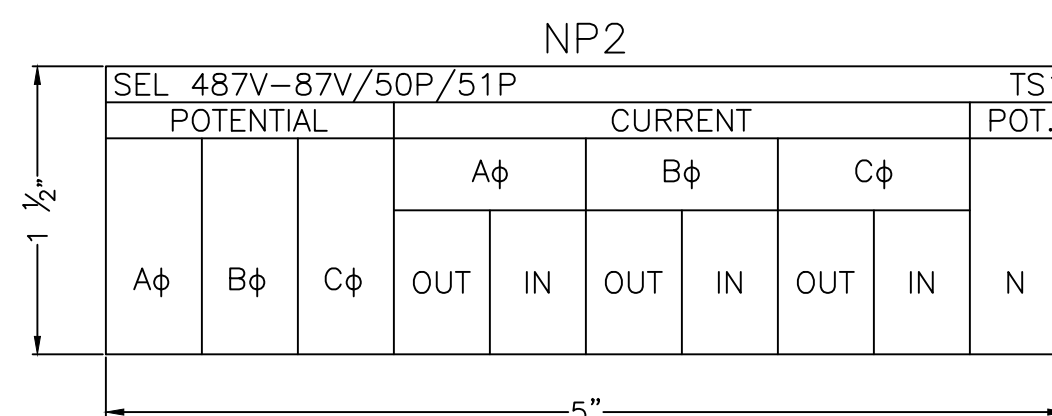
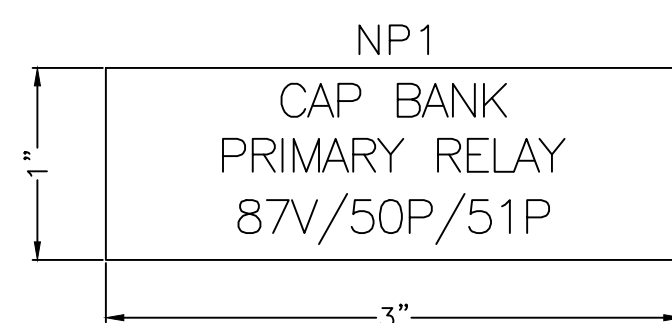
2. STRUCTURES TO BE PAINTED AS FOLLOWS:
 EXTERIOR - ANSI-61 GRAY LACQUER
 INTERIOR - HOFFMAN WHITE ENAMEL

3. ○ - HARLO BILL OF MATERIAL ITEM NO.

DESCRIPTION: F6 PNL REPLACEMENT & CAP BANK BKR ADDITION	1	RF022-01145	5/9/23	NC	RE	LA	NC
DESCRIPTION: CHANGED 270 TO 10870	C		10-05	RLS			
DESCRIPTION: REVISED SECTION A-A AND TOP VIEW	B		7/7/87		EJ		
DESCRIPTION: ADDED WHITE LIGHT FOR HEA RELAYS	A		3/19/87		EJ		
REV. NO.	JOB NO.	DATE	DESIGN ENGR	DFT	DESIGN CHECK	ISSUE APPROV	

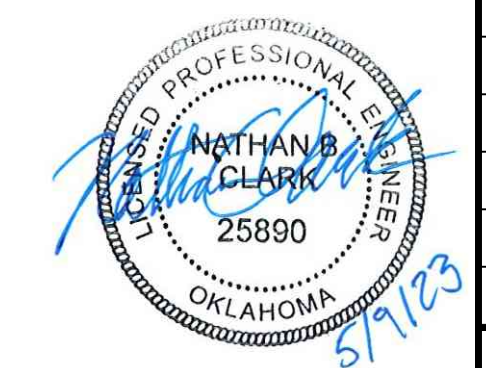
ISSUED FOR CONSTRUCTION			
GRAND RIVER DAM AUTHORITY STILLWATER KINZIE INTERCONNECT S351 STILLWATER, OKLAHOMA 138/69KV			
STEEL DETAILS & ELEVATIONS FOR PANELS 103 & 104			
ENGINEER:	SCALE: NONE	DATE: 2/23/87	REV.
DRAWN BY: JY	DRAWING NO.	SHEET 1 OF 1	1
CHECKED BY: EAJ	S351PP001		
APPROVED BY:	OLD DRAWING NO.: D14591.2		

PANEL 104 BILL OF MATERIAL - 2023 CONSTRUCTION				
ITEM	AMOUNT/QT	DESCRIPTION	MANUFACTURER	GRDA Stock Number
CONTROL EQUIP RELAY				
R-1	1	SEL 351S CIRCUIT BREAKER CONTROL RELAY, RACK MOUNT, EXTRA I/O	SEL	SEL-0351S6XHD3E5421
R-7	1	SEL 487V CAP BANK PROTECTION RELAY	SEL	SEL-0487V1X6151XB44H4A4XXX
R-10	2	ABB TYPE FT-19R TEST SWITCH (2) 10 POLE, (1) 4 POT, 6 CURRENT		S# FR2H-014-001-001A
R-12	1	ABB TYPE FT-19R TEST SWITCH (3) 10 POLE		S# FR2H-001-001-001A
R-15	2	ELECTROSWITCH, SERIES 24 AUXILIARY TRIPPING RELAY, 125VDC, S# 78PB08D, 8 DECK, MANUAL RESET LOR, WITH LIGHTS		S# 78PB08D 031-1121-000-000
R-17	1	MARATHON #F30A2S FUSE BLOCK WITH TYPE NON-6 AMP FUSES		#F30A2S 031-0017-000-000
R-18	2	MARATHON #F30A2S FUSE BLOCK WITH TYPE NON-10 AMP FUSES		#F30A2S
R-19	2	MARATHON #F30A3S FUSE BLOCK, 3 POLE, 30 AMP, 600 VOLT WITH TYPE NON-6 AMP FUSES		#F30A3S
R-28	2	RS232/CABLE SEL C273A TO RTU (25 FEET)		-



NOTES:
 1. NAMEPLATE SIZES 5" x 1 1/2" OR 3" x 1", TEXT SIZE 0.187 UNLESS NOTED OTHERWISE
 2. TEST SWITCHES/CUTOUTS 5" x 1 1/2", TEXT SIZE 0.13

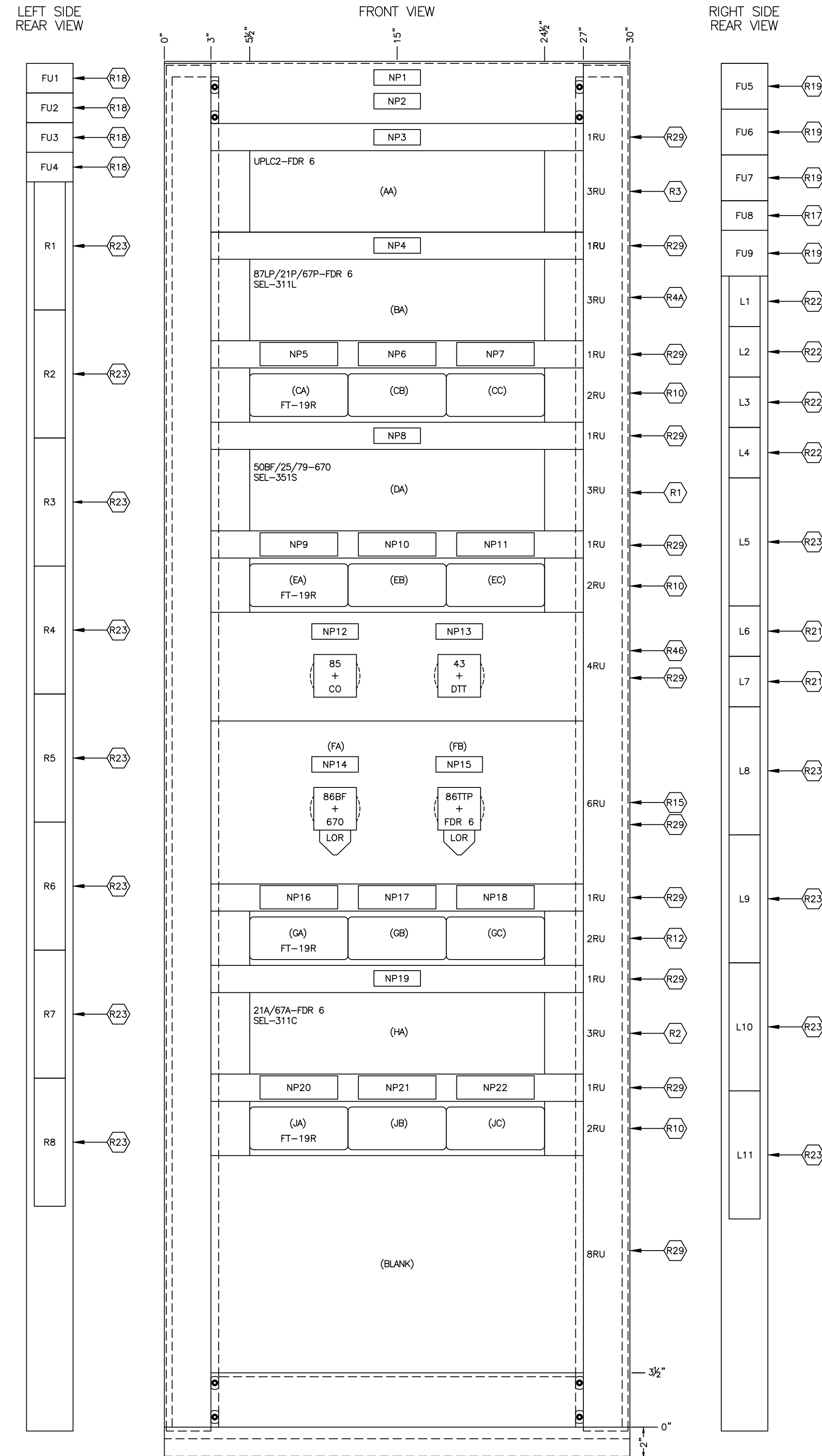
REFERENCE DRAWINGS:
 S351S015 ONE-LINE DIAGRAM METERING AND RELAYING 138KV AND CITY AUTOTRANSFORMER
 S351S017 ONE-LINE DIAGRAM METERING AND RELAYING CAP BANK AND CITY 69KV



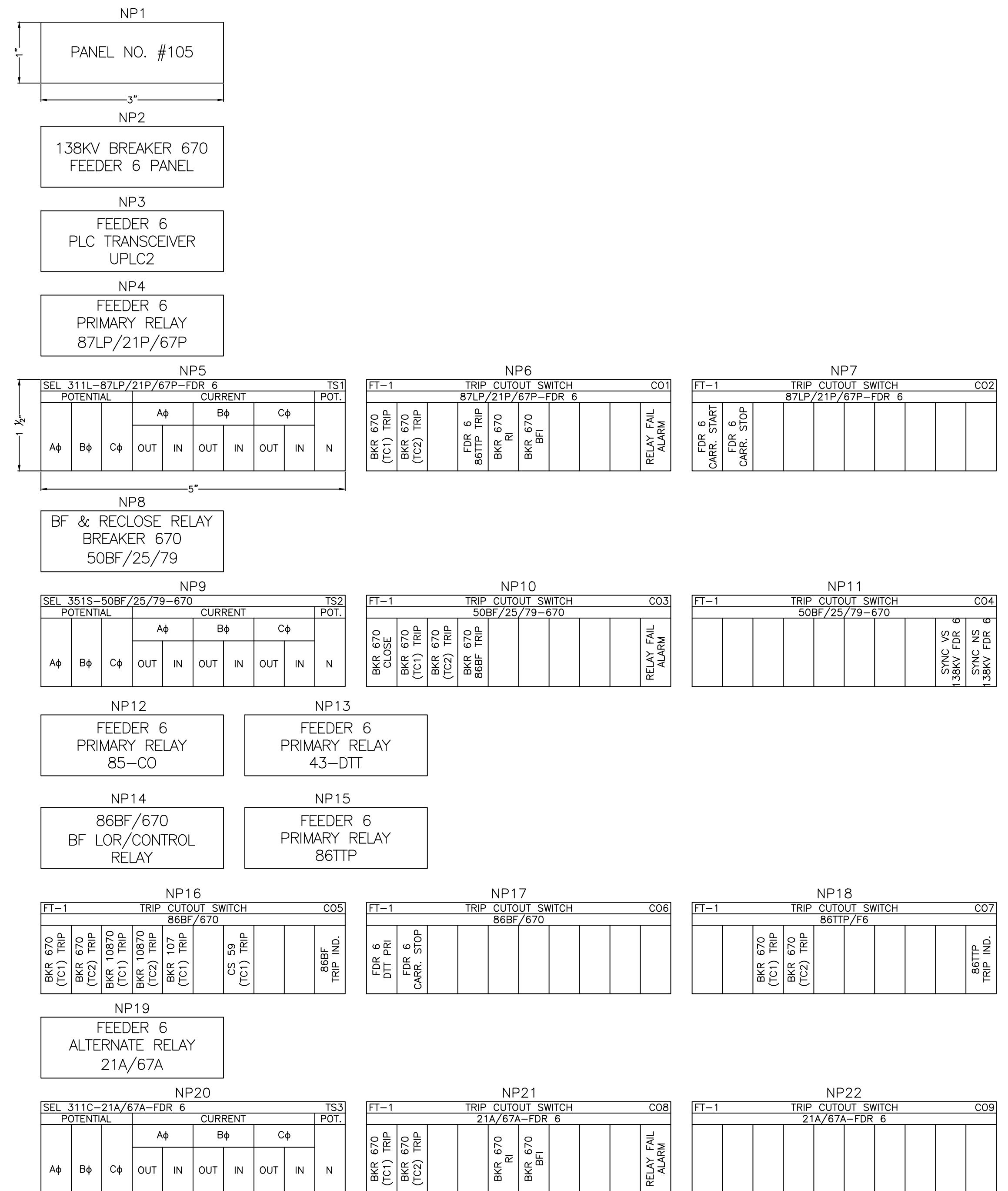
ISSUED FOR CONSTRUCTION

DESCRIPTION: F6 PNL REPLACEMENT & CAP BANK BKR ADDITION		GRAND RIVER DAM AUTHORITY	
0	RF022-01145	5/9/23	NC BE TM NC
		STILLWATER KINZIE INTERCONNECT S351	
		STILLWATER, OKLAHOMA 138/69KV	
PANEL #104 BOM & NAMEPLATES			
ENGINEER: NC	SCALE: NONE	DATE: 5/9/23	REV.
DRAWN BY: BE	CHECKED BY: TM	DRAWING NO. S351PP002	0
APPROVED BY: NC	P.O. BOX 669 CHOUTEAU, OK 74337		





BILL OF MATERIALS PANEL #105			
ITEM	QTY.	DESCRIPTION	DEVICE NAME
R1	1	SEL-351S PROTECTION SYSTEM - CIRCUIT BREAKER CONTROL RELAY S# 035156KH03E5421	50BF/25/79-670
R2	1	SEL-311C TRANSMISSION SYSTEM - LINE PROTECTION RELAY S# 0311C11HH3E5421	21A/67A-FDR 6
R3	1	PULSAR UPLC-II UNIVERSAL POWER LINE CARRIER TRANSCEIVER S# US1NSM7AFSX	UPLC2-FDR 6
R4A	1	SEL-311L TRANSMISSION SYSTEM - LINE PROTECTION RELAY S# 0311L0HDD3254XXXX	87LP/21P/67P-FDR 6
R10	3	ABB TYPE FT-19R FLEXITEST SWITCH ASSEMBLY, [(2) 10 POTENTIAL, (1) 4 POTENTIAL, 6 CURRENT] S# FR2H-014-001-001A	FT-19R
R12	1	ABB TYPE FT-19R FLEXITEST SWITCH ASSEMBLY, [(3) POTENTIAL] S# FR2H-001-001-001A	FT-19R
R15	2	ELECTROSWITCH, SERIES 24 AUXILIARY LOCK-OUT RELAY, 8 DECK, MANUAL RESET LOR WITH LIGHTS S# 78P908D (125V DC)	86BF-670 86TTP-FDR 6
R17	1	MARATHON #F30A2S FUSE BLOCK WITH TYPE NON-6 AMP FUSES	FU
R18	4	MARATHON #F30A2S FUSE BLOCK WITH TYPE NON-10 AMP FUSES	FU
R19	4	MARATHON #F30A3S FUSE BLOCK WITH TYPE NON-6 AMP FUSES	FU
R21	2	GENERAL ELECTRIC TYPE EB-25 TERMINAL BLOCKS 4 CIRCUIT S# EB25B04	L
R22	4	GENERAL ELECTRIC TYPE EB-27 SHORTING TERMINAL BLOCKS 4 CIRCUIT S# EB27B04S	L
R23	13	GENERAL ELECTRIC TYPE EB-25 TERMINAL BLOCKS 12 CIRCUIT S# EB25B12	R/L
R28	3	CABLE, SEL 273A, 25 FEET LONG, EACH	RTU CABLE
R29	12	COVER PLATE (8-1RU, 1-6RU, 1-4RU, 1-8RU)	
R46	2	ELECTROSWITCH CONTROL SWITCH, ENABLE/DISABLE, DOUBLE-THROW (SCREW POSITIONS 1 & 7), 2 DECKS, OVAL HANDLE, ENGRAVING-POS. 1: ENABLE, POS. 2: DISABLE S#24202B	43-87L 43-DTT

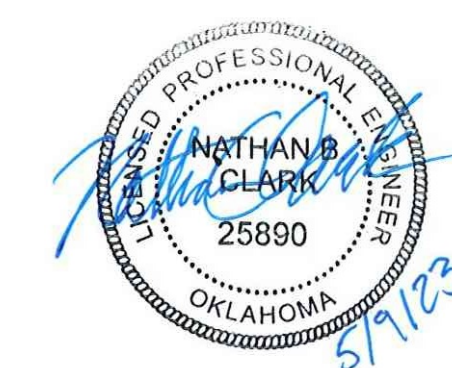


NOTES:

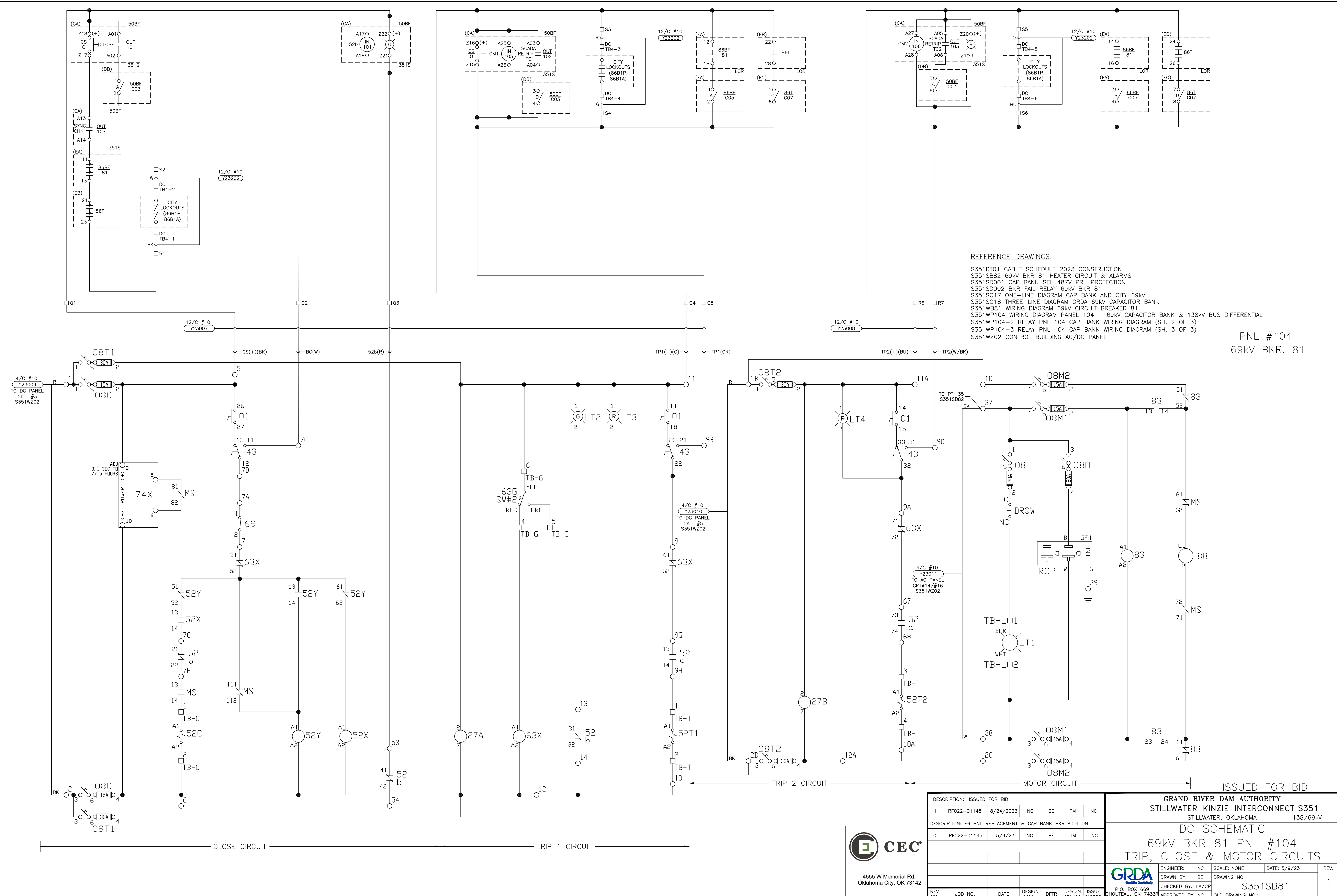
- NAMEPLATE SIZES 5" x 1 1/2" OR 3" x 1", TEXT SIZE 0.187 UNLESS NOTED OTHERWISE
- TEST SWITCHES/CUTOUTS 5" x 1 1/2", TEXT SIZE 0.13

REFERENCE DRAWINGS:

S351S015 ONE-LINE DIAGRAM METERING AND RELAYING 138KV AND CITY AUTOTRANSFORMER
S351S017 ONE-LINE DIAGRAM METERING AND RELAYING CAP BANK AND CITY 69KV



DESCRIPTION: F6 PNL REPLACEMENT & CAP BANK BKR ADDITION				ISSUED FOR CONSTRUCTION			
0	RF022-01145	5/9/23	NC	BE	TM	NC	GRDA GRAND RIVER DAM AUTHORITY STILLWATER KINZIE INTERCONNECT S351 STILLWATER, OKLAHOMA 138/69KV
PNL #105 ELEVATION 138KV FDR 6 & BKR 670							REV. 0
ENGINEER:	NC	SCALE:	NONE	DATE:	5/9/23		
DRAWN BY:	RE	CHECKED BY:	-	DRAWING NO.:	S351PP105		
APPROVED BY:	-	APPROVED BY:	-	P.O. BOX 669 CHOUTEAU, OK 74337			



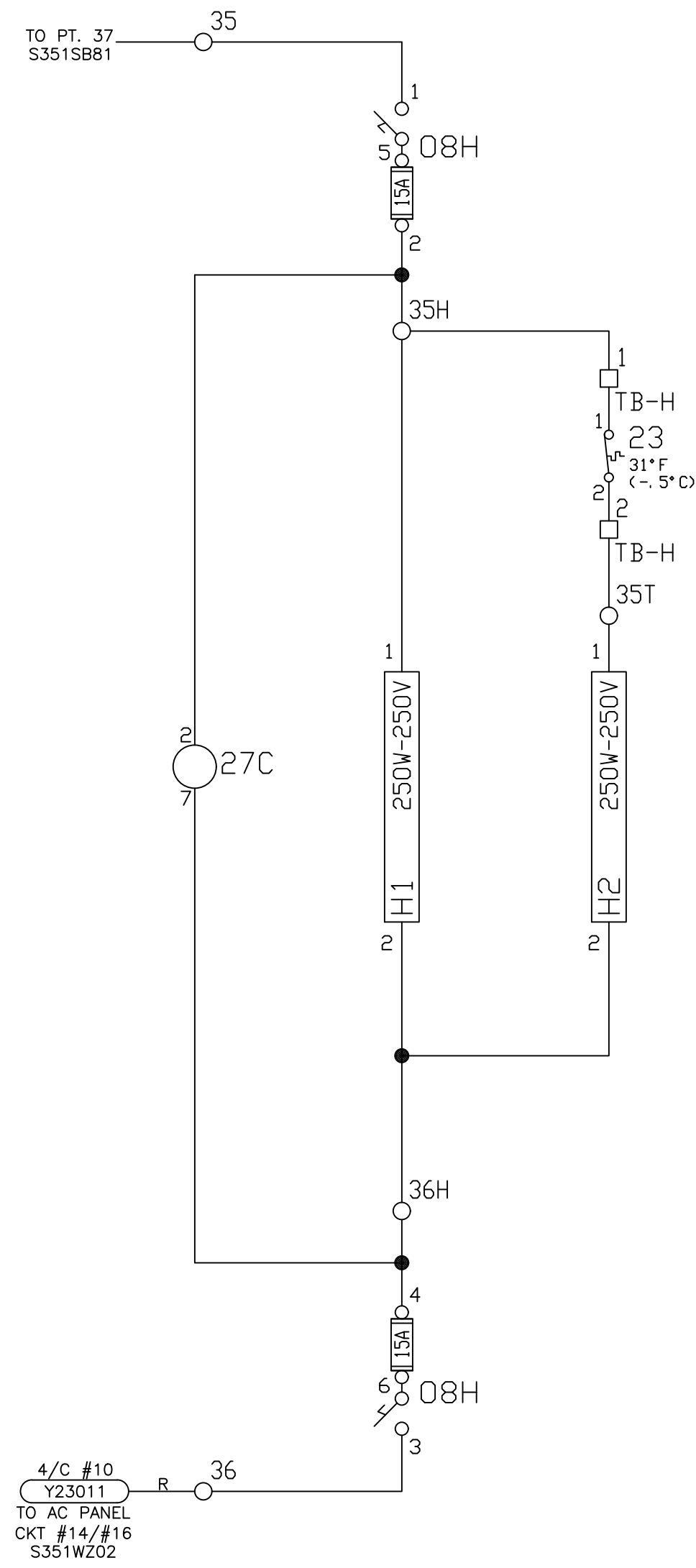
REFERENCE DRAWINGS:
 S351DT01 CABLE SCHEDULE 2023 CONSTRUCTION
 S351SB82 69KV BKR 81 HEATER CIRCUIT & ALARMS
 S351SD001 CAP BANK SEL 487V PRL. PROTECTION
 S351SD002 BKR FAIL RELAY 69KV BKR 81
 S351SO17 ONE-LINE DIAGRAM CAP BANK AND CITY 69KV
 S351SO18 THREE-LINE DIAGRAM GRDA 69KV CAPACITOR BANK
 S351WB81 WIRING DIAGRAM 69KV CIRCUIT BREAKER 81
 S351WP104 WIRING DIAGRAM PNL 104 - 69KV CAPACITOR BANK & 138KV BUS DIFFERENTIAL
 S351WP104-2 RELAY PNL 104 CAP BANK WIRING DIAGRAM (SH. 2 OF 3)
 S351WP104-3 RELAY PNL 104 CAP BANK WIRING DIAGRAM (SH. 3 OF 3)
 S351WZ02 CONTROL BUILDING AC/DC PANEL

PNL #104
 69kV BKR. 81

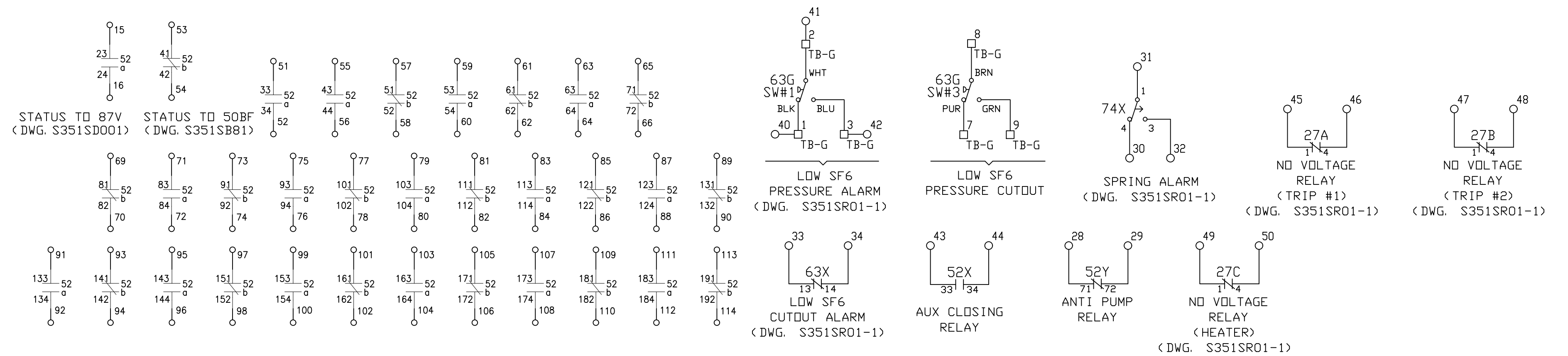
DESCRIPTION: ISSUED FOR BID					
1	RF022-01145	8/24/2023	NC	BE	TM NC
DESCRIPTION: F6 PNL REPLACEMENT & CAP BANK BKR ADDITION					
0	RF022-01145	5/9/23	NC	BE	TM NC
REV NO.	JOB NO.	DATE	DESIGN ENGR	DFT	DESIGN CHECK
					ISSUE APPROV

GRAND RIVER DAM AUTHORITY STILLWATER KINZIE INTERCONNECT S351 STILLWATER, OKLAHOMA 138/69KV			
DC SCHEMATIC 69KV BKR 81 PNL #104 TRIP, CLOSE & MOTOR CIRCUITS			
ENGINEER: NC	SCALE: NONE	DATE: 5/9/23	REV.
DRAWN BY: BE	DRAWING NO. S351SB81		1
CHECKED BY: LA/CP	APPROVED BY: NC	OLD DRAWING NO.:	





AC CIRCUIT



SPARE AUXILIARY SWITCHES

CUSTOMER ALARMS

REFERENCE DRAWINGS:

- S351SB81 69kV BKR 81 TRIP, CLOSE & MOTOR CIRCUITS
- S351SD001 CAP BANK SEL 487V PRI. PROTECTION
- S351SD002 BKR FAIL RELAY 69kV BKR 81
- S351SO17 ONE-LINE DIAGRAM CAP BANK AND CITY 69kV
- S351SO18 THREE-LINE DIAGRAM GRDA 69kV CAPACITOR BANK
- S351SR01-1 ANNUNCIATOR SCHEMATIC (SHEET 1)
- S351WB81 WIRING DIAGRAM 69kV CIRCUIT BREAKER 81
- S351WP104 WIRING DIAGRAM PANEL 104 - 69kV CAPACITOR BANK & 138kV BUS DIFFERENTIAL
- S351WP104-2 RELAY PNL 104 CAP BANK WIRING DIAGRAM (SH. 2 OF 3)
- S351WP104-3 RELAY PNL 104 CAP BANK WIRING DIAGRAM (SH. 3 OF 3)
- S351WZ02 CONTROL BUILDING AC/DC PANEL

ISSUED FOR BID

GRAND RIVER DAM AUTHORITY
STILLWATER KINZIE INTERCONNECT S351
STILLWATER, OKLAHOMA 138/69kV

DC SCHEMATIC
69kV BKR 81 PNL #104
HEATER CIRCUIT & ALARMS

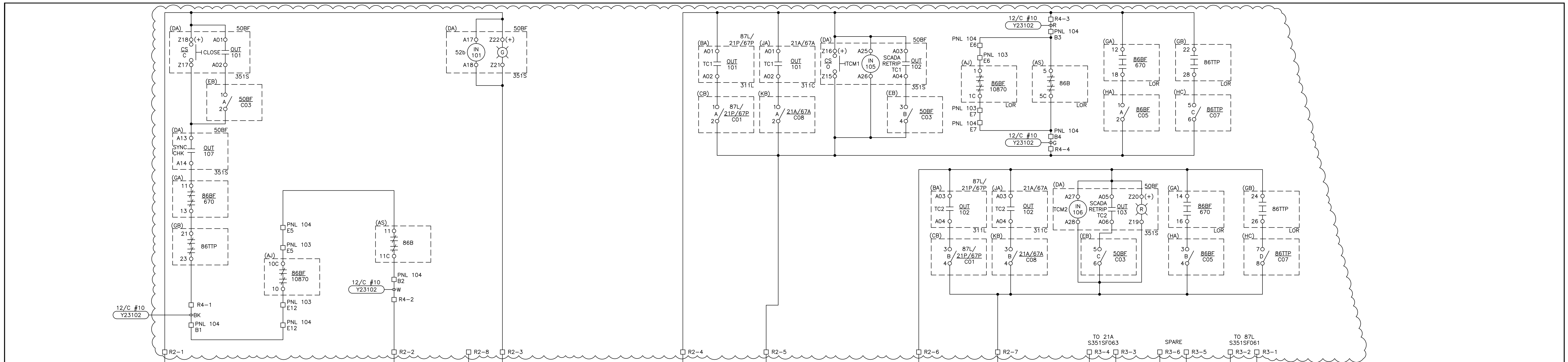
DESCRIPTION: ISSUED FOR BID						
1	RF022-01145	8/24/2023	NC	BE	TM	NC
DESCRIPTION: F6 PNL REPLACEMENT & CAP BANK BKR ADDITION						
0	RF022-01145	5/9/23	NC	BE	TM	NC
REV NO.	JOB NO.	DATE	DESIGN ENGR	DFTR	DESIGN CHECK	ISSUE APPROVD

ENGINEER: NC	SCALE: NONE	DATE: 5/9/23	REV.
DRAWN BY: BE	DRAWING NO.		
CHECKED BY: LA/CP	S351SB82		1
APPROVED BY: NC	OLD DRAWING NO.:		

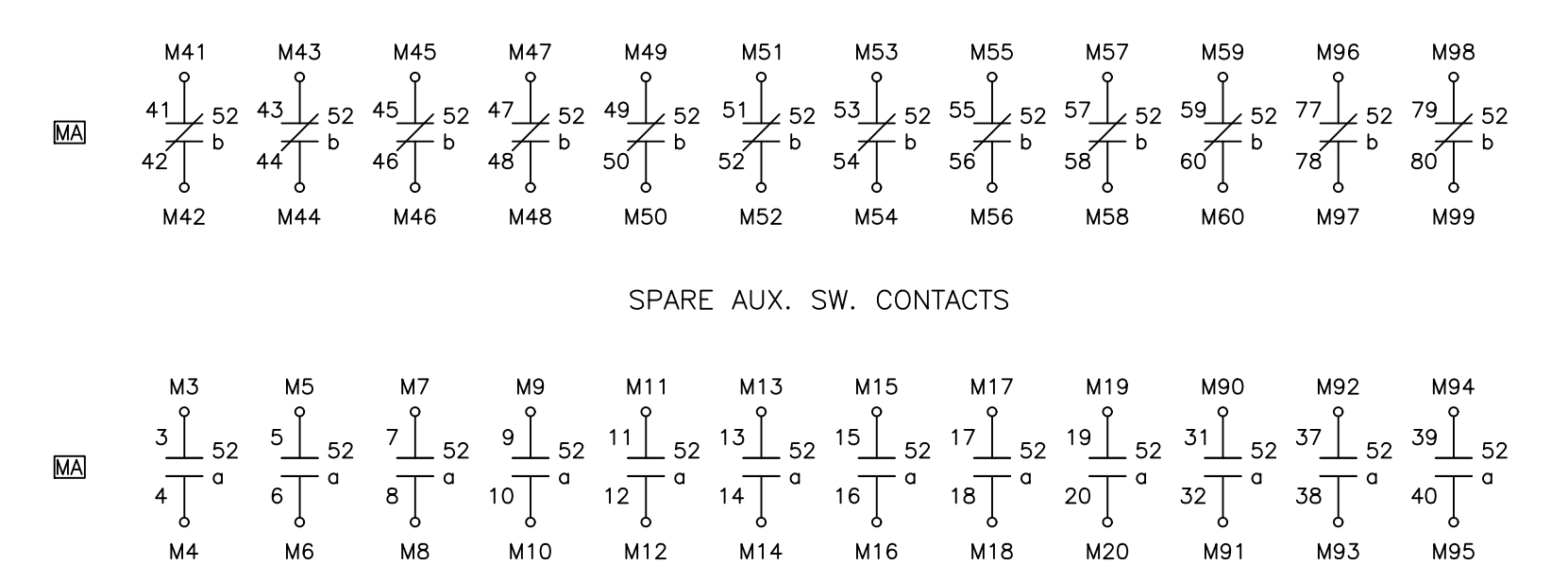
GRDA
P.O. BOX 669
CHOUTEAU, OK 74337



4555 W Memorial Rd.
Oklahoma City, OK 73142



PANEL 105
BREAKER 670



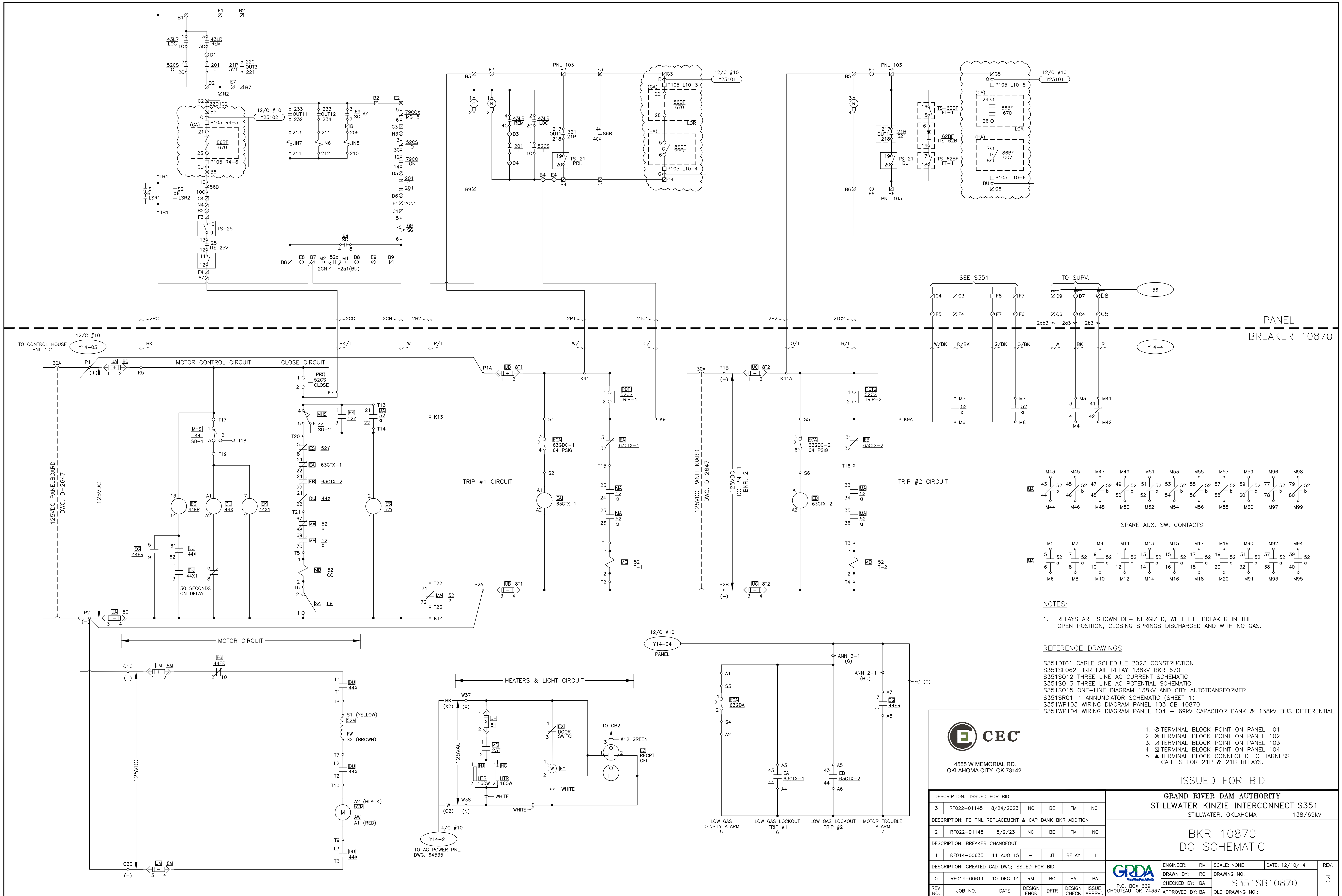
NOTES:
1. RELAYS ARE SHOWN DE-ENERGIZED, WITH THE BREAKER IN THE OPEN POSITION, CLOSING SPRINGS DISCHARGED AND WITH NO GAS.

REFERENCE DRAWINGS
 S351DT01 CABLE SCHEDULE 2023 CONSTRUCTION
 S351SF061 PRIMARY RELAY 138kV FDR 6
 S351SF062 BKR FAIL RELAY 138kV BKR 670
 S351SF063 ALTERNATE RELAY 138kV FDR 6
 S351S012 THREE LINE AC CURRENT SCHEMATIC
 S351S013 THREE LINE AC POTENTIAL SCHEMATIC
 S351S015 ONE-LINE DIAGRAM 138kV AND CITY AUTOTRANSFORMER
 S351SR01-1 ANNUNCIATOR SCHEMATIC (SHEET 1)
 S351WP105-1 WIRING DIAGRAM 138kV FDR 6 & BKR 670 PNL #105 (SH. 1 OF 2)
 S351WP105-2 WIRING DIAGRAM 138kV FDR 6 & BKR 670 PNL #105 (SH. 2 OF 2)



ISSUED FOR BID

DESCRIPTION: ISSUED FOR BID						GRAND RIVER DAM AUTHORITY STILLWATER KINZIE INTERCONNECT S351 STILLWATER, OKLAHOMA 138/69kV			
3	RF022-01145	8/24/2023	NC	BE	TM	NC	BKR 670 DC SCHEMATIC		
DESCRIPTION: F6 PNL REPLACEMENT & CAP BANK BKR ADDITION									
2	RF022-01145	5/9/23	NC	BE	TM	NC	ENGINEER: RM SCALE: NONE DATE: 12/10/14 DRAWN BY: RC DRAWING NO. CHECKED BY: BA S351SB670 P.O. BOX 669 CHOUTEAU, OK 74337 APPROVED BY: BA OLD DRAWING NO.:		
DESCRIPTION: BREAKER CHANGEOUT									
1	RF014-00635	11 AUG 15	-	JT	RELAY	I	3		
DESCRIPTION: CREATED CAD DWG; ISSUED FOR BID									
0	RF014-00611	10 DEC 14	RM	RC	BA	BA			
REV NO.	JOB NO.	DATE	DESIGN ENGR	DFT	DESIGN CHECK	ISSUE APPROV			



- NOTES:**
- RELAYS ARE SHOWN DE-ENERGIZED, WITH THE BREAKER IN THE OPEN POSITION, CLOSING SPRINGS DISCHARGED AND WITH NO GAS.

REFERENCE DRAWINGS

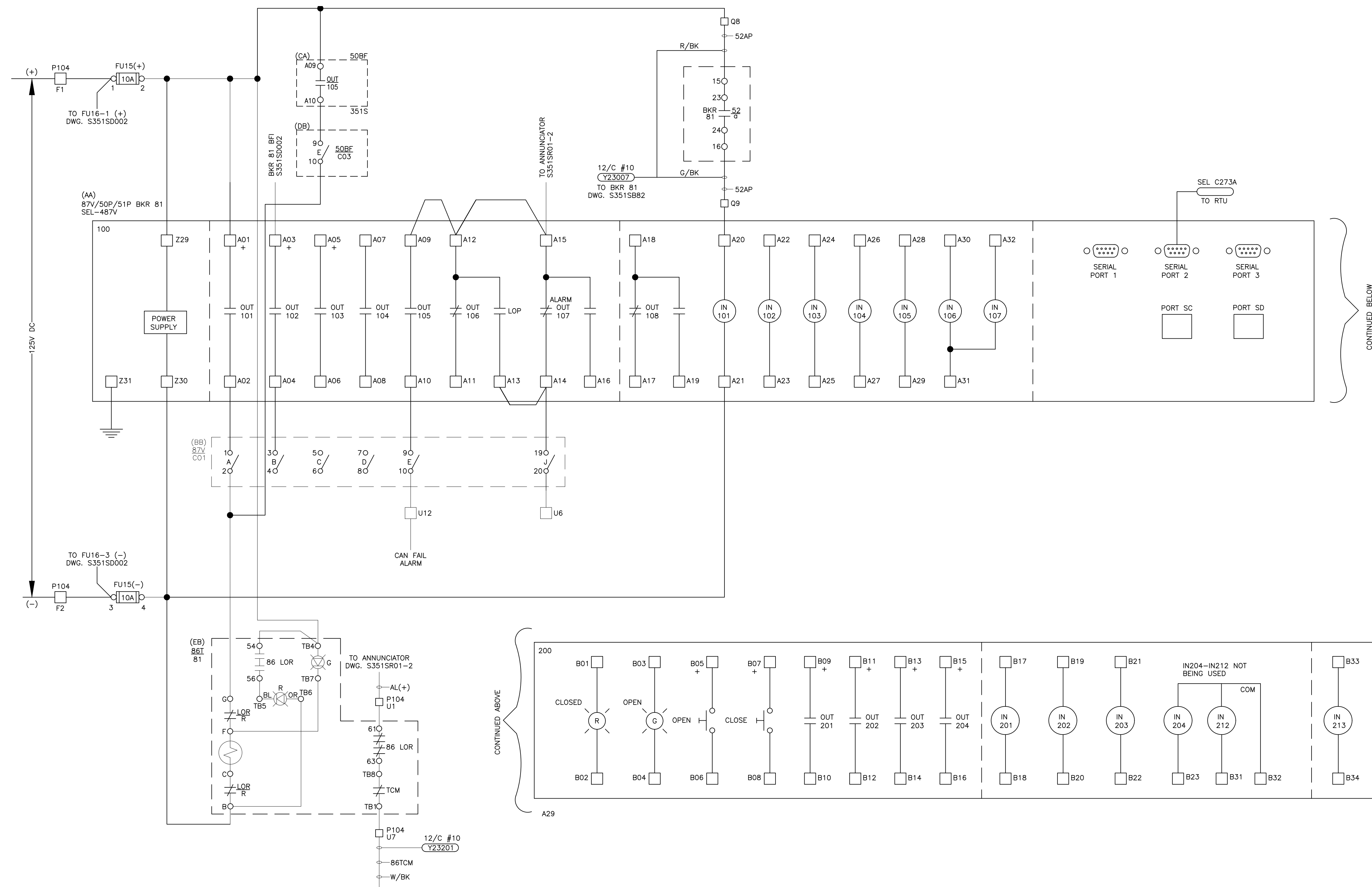
S351D101	CABLE SCHEDULE 2023 CONSTRUCTION
S351SF062	BKR FAIL RELAY 138kV BKR 670
S351SO12	THREE LINE AC CURRENT SCHEMATIC
S351SO13	THREE LINE AC POTENTIAL SCHEMATIC
S351SO15	ONE-LINE DIAGRAM 138kV AND CITY AUTOTRANSFORMER
S351SR01-1	ANNUNCIATOR SCHEMATIC (SHEET 1)
S351WP103	WIRING DIAGRAM PANEL 103 CB 10870
S351WP104	WIRING DIAGRAM PANEL 104 - 69kV CAPACITOR BANK & 138kV BUS DIFFERENTIAL



ISSUED FOR BID

DESCRIPTION: ISSUED FOR BID		3		RF022-01145	8/24/2023	NC	BE	TM	NC
DESCRIPTION: F6 PNL REPLACEMENT & CAP BANK BKR ADDITION		2		RF022-01145	5/9/23	NC	BE	TM	NC
DESCRIPTION: BREAKER CHANGEOUT		1		RF014-00635	11 AUG 15	-	JT	RELAY	I
DESCRIPTION: CREATED CAD DWG; ISSUED FOR BID		0		RF014-00611	10 DEC 14	RM	RC	BA	BA

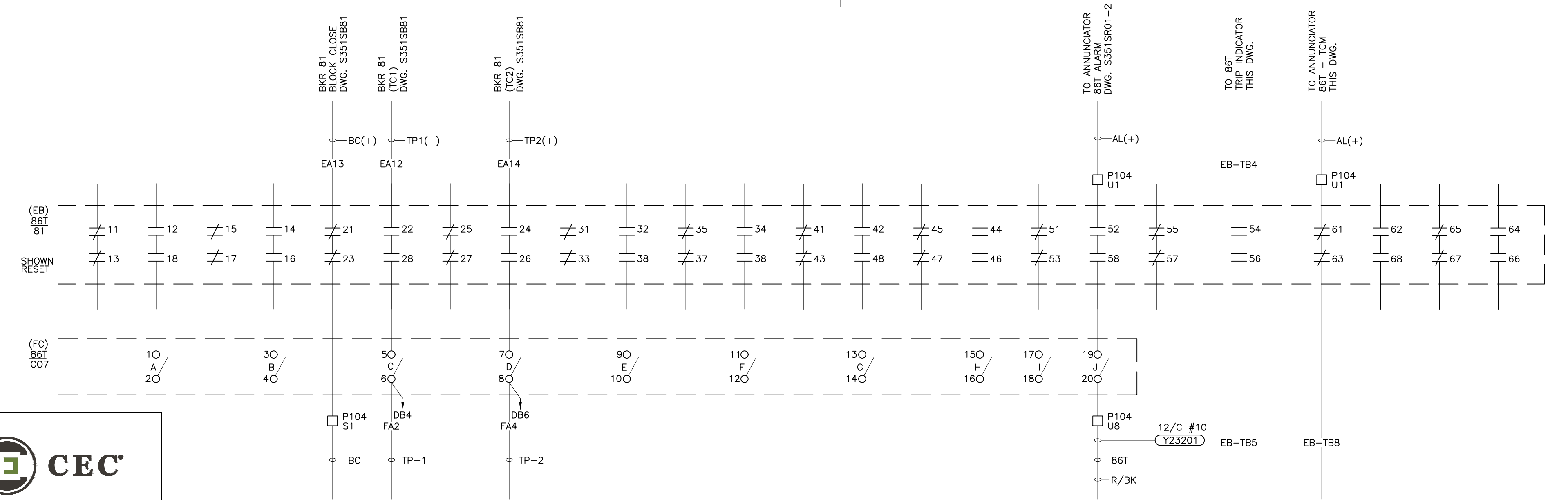
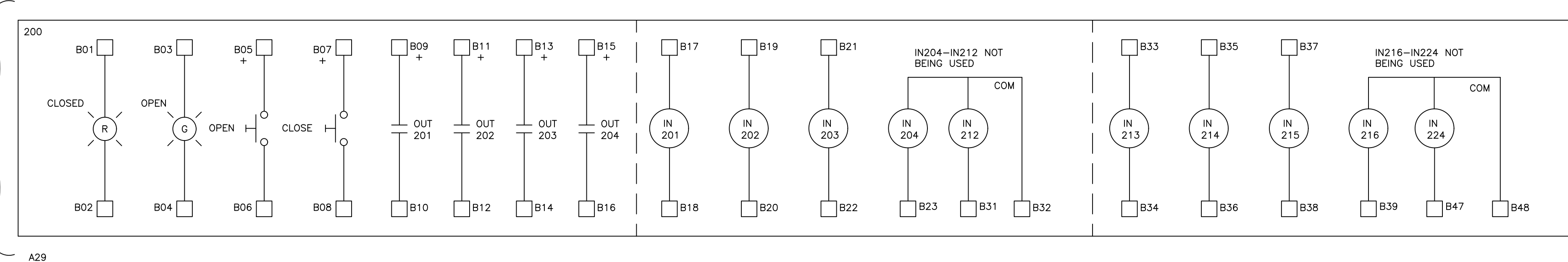
GRAND RIVER DAM AUTHORITY STILLWATER KINZIE INTERCONNECT S351 STILLWATER, OKLAHOMA 138/69kV			
BKR 10870 DC SCHEMATIC			
ENGINEER: RM	SCALE: NONE	DATE: 12/10/14	REV.
DRAWN BY: RC	DRAWING NO.		3
CHECKED BY: BA	S351SB10870		
APPROVED BY: BA	OLD DRAWING NO.:		



(EB) 86T 81

CONTACT DIAGRAM

DECK	CONTACTS	POSITION	TRIP	RESU
1	110H-I1013	X		
	120H-I1018	X		
	150H-I1017	X		
	140H-I1016	X		
2	210H-I1023	X		
	220H-I1028	X		
	250H-I1027	X		
	240H-I1026	X		
3	310H-I1033	X		
	320H-I1038	X		
	350H-I1037	X		
	340H-I1036	X		
4	410H-I1043	X		
	420H-I1048	X		
	450H-I1047	X		
	440H-I1046	X		
5	510H-I1053	X		
	520H-I1058	X		
	550H-I1057	X		
	540H-I1056	X		
6	610H-I1063	X		
	620H-I1068	X		
	650H-I1067	X		
	640H-I1066	X		
7	710H-I1073	X		
	720H-I1078	X		
	750H-I1077	X		
	740H-I1076	X		
8	810H-I1083	X		
	820H-I1088	X		
	850H-I1087	X		
	840H-I1086	X		



NOTES:
1. ALL DEVICES IN PNL 104 UNLESS OTHERWISE NOTED.

- REFERENCE DRAWINGS:
- S351DT01 CABLE SCHEDULE 2023 CONSTRUCTION
 - S351SB81 69kV BKR 81 TRIP, CLOSE & MOTOR CIRCUITS
 - S351SB82 69kV BKR 81 HEATER CIRCUIT & ALARMS
 - S351SD002 BKR FAIL RELAY 69kV BKR 81
 - S351SO17 ONE-LINE DIAGRAM CAP BANK AND CITY 69kV
 - S351SO18 THREE-LINE DIAGRAM GRDA 69kV CAPACITOR BANK
 - S351SR01-1 ANNUNCIATOR SCHEMATIC (SHEET 1)
 - S351SR01-2 ANNUNCIATOR SCHEMATIC (SHEET 2)
 - S351WB81 WIRING DIAGRAM 69kV CIRCUIT BREAKER 81
 - S351WP104 WIRING DIAGRAM PANNEL 104 - 69kV CAPACITOR BANK & 138kV BUS DIFFERENTIAL
 - S351WP104-2 RELAY PNL 104 CAP BANK WIRING DIAGRAM (SH. 2 OF 3)
 - S351WP104-3 RELAY PNL 104 CAP BANK WIRING DIAGRAM (SH. 3 OF 3)

ISSUED FOR BID

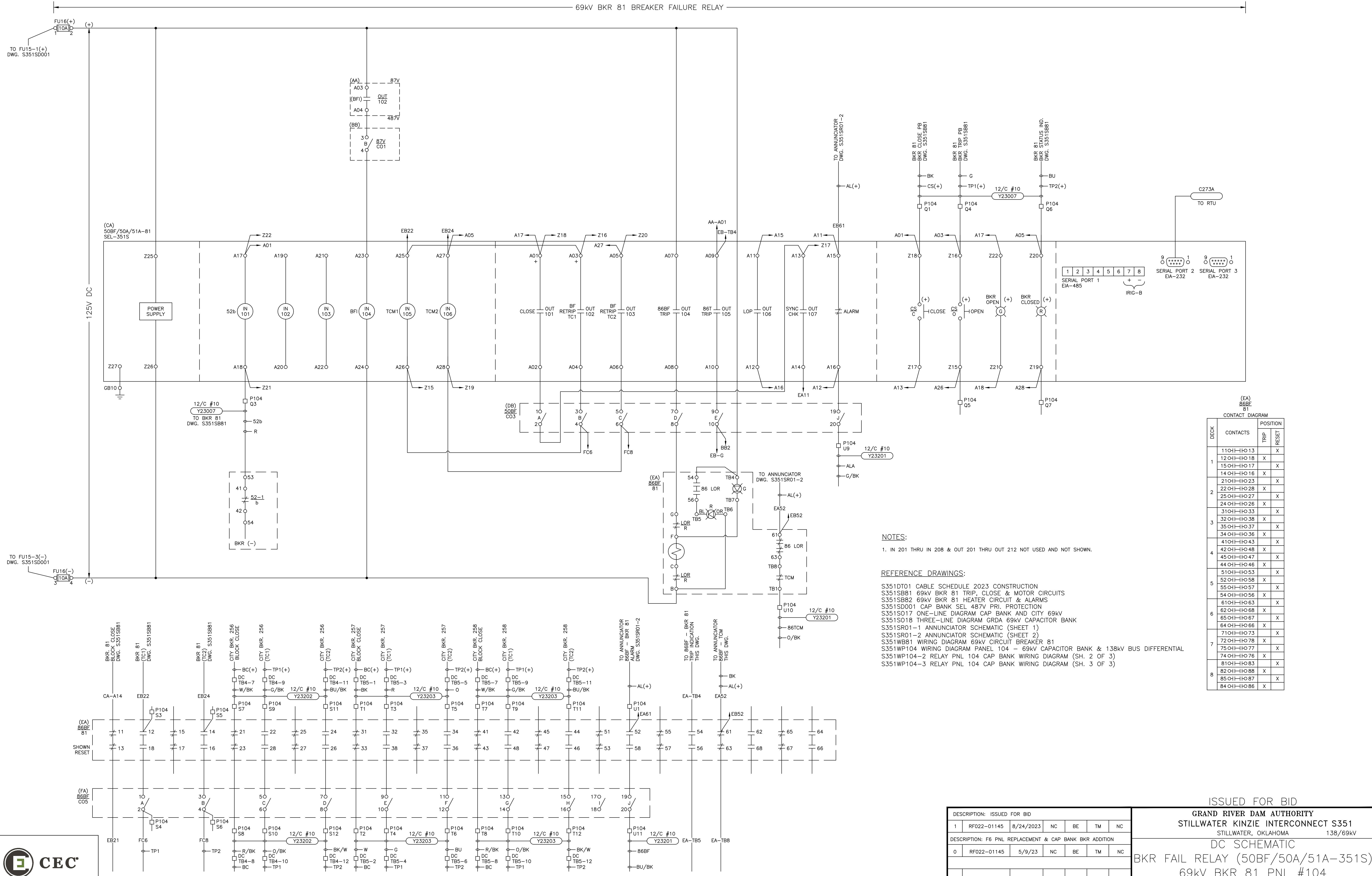
GRAND RIVER DAM AUTHORITY
STILLWATER KINZIE INTERCONNECT S351
STILLWATER, OKLAHOMA 138/69kV

CAP BANK SEL 487V
PRI PROTECTION PNL #104

DESCRIPTION: ISSUED FOR BID						
1	RF022-01145	8/24/2023	NC	BE	TM	NC
DESCRIPTION: F6 PNL REPLACEMENT & CAP BANK BKR ADDITION						
0	RF022-01145	5/9/23	NC	BE	TM	NC
REV NO.	JOB NO.	DATE	DESIGN ENGR	DFT	DESIGN CHECK	ISSUE APPROV

ENGINEER: NC	SCALE: NONE	DATE: 5/9/23	REV.
DRAWN BY: BE	DRAWING NO.		
CHECKED BY: LA/CP			
APPROVED BY: NC			
S351SD001			1





(EA) 86BF 81 CONTACT DIAGRAM

DECK	CONTACTS	POSITION
1	11C H013	X
	12C H018	X
	15C H017	X
	14C H016	X
2	21C H023	X
	22C H028	X
	25C H027	X
	24C H026	X
3	31C H033	X
	32C H038	X
	35C H037	X
	34C H036	X
4	41C H043	X
	42C H048	X
	45C H047	X
	44C H046	X
5	51C H053	X
	52C H058	X
	55C H057	X
	54C H056	X
6	61C H063	X
	62C H068	X
	65C H067	X
	64C H066	X
7	71C H073	X
	72C H078	X
	75C H077	X
	74C H076	X
8	81C H083	X
	82C H088	X
	85C H087	X
	84C H086	X

NOTES:

1. IN 201 THRU IN 208 & OUT 201 THRU OUT 212 NOT USED AND NOT SHOWN.

REFERENCE DRAWINGS:

- S351DT01 CABLE SCHEDULE 2023 CONSTRUCTION
- S351SB81 69kV BKR 81 TRIP, CLOSE & MOTOR CIRCUITS
- S351SB82 69kV BKR 81 HEATER CIRCUIT & ALARMS
- S351SD001 CAP BANK SEL 487V PRI. PROTECTION
- S351SO17 ONE-LINE DIAGRAM CAP BANK AND CITY 69KV
- S351SO18 THREE-LINE DIAGRAM GRDA 69KV CAPACITOR BANK
- S351SR01-1 ANNUNCIATOR SCHEMATIC (SHEET 1)
- S351SR01-2 ANNUNCIATOR SCHEMATIC (SHEET 2)
- S351WBB1 WIRING DIAGRAM 69KV CIRCUIT BREAKER 81
- S351WP104 WIRING DIAGRAM PANEL 104 - 69KV CAPACITOR BANK & 138KV BUS DIFFERENTIAL
- S351WP104-2 RELAY PNL 104 CAP BANK WIRING DIAGRAM (SH. 2 OF 3)
- S351WP104-3 RELAY PNL 104 CAP BANK WIRING DIAGRAM (SH. 3 OF 3)



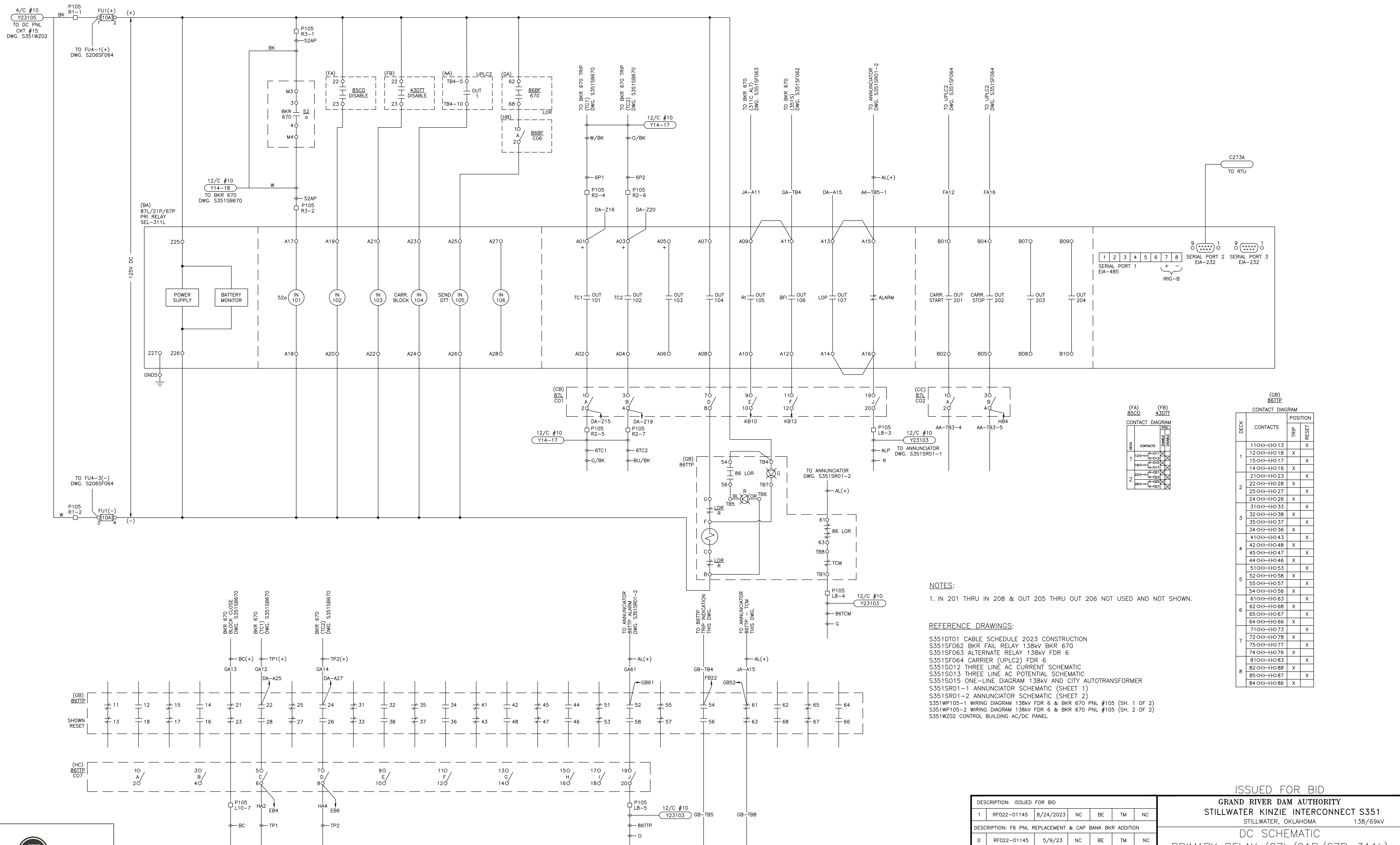
ISSUED FOR BID

GRAND RIVER DAM AUTHORITY
STILLWATER KINZIE INTERCONNECT S351
STILLWATER, OKLAHOMA 138/69KV

DC SCHEMATIC
BKR FAIL RELAY (50BF/50A/51A-351S)
69kV BKR 81 PNL #104

ENGINEER:	NC	SCALE:	NONE	DATE:	5/9/23	REV.	
DRAWN BY:	BE	DRAWING NO.:					
CHECKED BY:	LA/CP	P.O. BOX 669 CHOUTEAU, OK 74337		APPROVED BY: NC			

REV NO.	JOB NO.	DATE	DESIGN ENGR	DFT	DESIGN CHECK	ISSUE APPROV
1	RF022-01145	8/24/2023	NC	BE	TM	NC
0	RF022-01145	5/9/23	NC	BE	TM	NC



(FA) 85CO CONTACT DIAGRAM

CONTACTS	TRIP	RESET
120-H	01	X
120-H	02	X
120-H	03	X
120-H	04	X
120-H	05	X
120-H	06	X
120-H	07	X
120-H	08	X
120-H	09	X
120-H	10	X
120-H	11	X
120-H	12	X
120-H	13	X
120-H	14	X
120-H	15	X
120-H	16	X
120-H	17	X
120-H	18	X
120-H	19	X
120-H	20	X

(GB) 86TTP CONTACT DIAGRAM

DECK	CONTACTS	TRIP	RESET
1	110I-HO13	X	
1	120I-HO18	X	
1	150I-HO17	X	
1	140I-HO16	X	
2	210I-HO23	X	
2	220I-HO28	X	
2	250I-HO27	X	
2	240I-HO26	X	
2	310I-HO33	X	
2	320I-HO38	X	
2	350I-HO37	X	
2	340I-HO36	X	
2	410I-HO43	X	
2	420I-HO48	X	
2	450I-HO47	X	
2	440I-HO46	X	
2	510I-HO53	X	
2	520I-HO58	X	
2	550I-HO57	X	
2	540I-HO56	X	
2	610I-HO63	X	
2	620I-HO68	X	
2	650I-HO67	X	
2	640I-HO66	X	
2	710I-HO73	X	
2	720I-HO78	X	
2	750I-HO77	X	
2	740I-HO76	X	
2	810I-HO83	X	
2	820I-HO88	X	
2	850I-HO87	X	
2	840I-HO86	X	

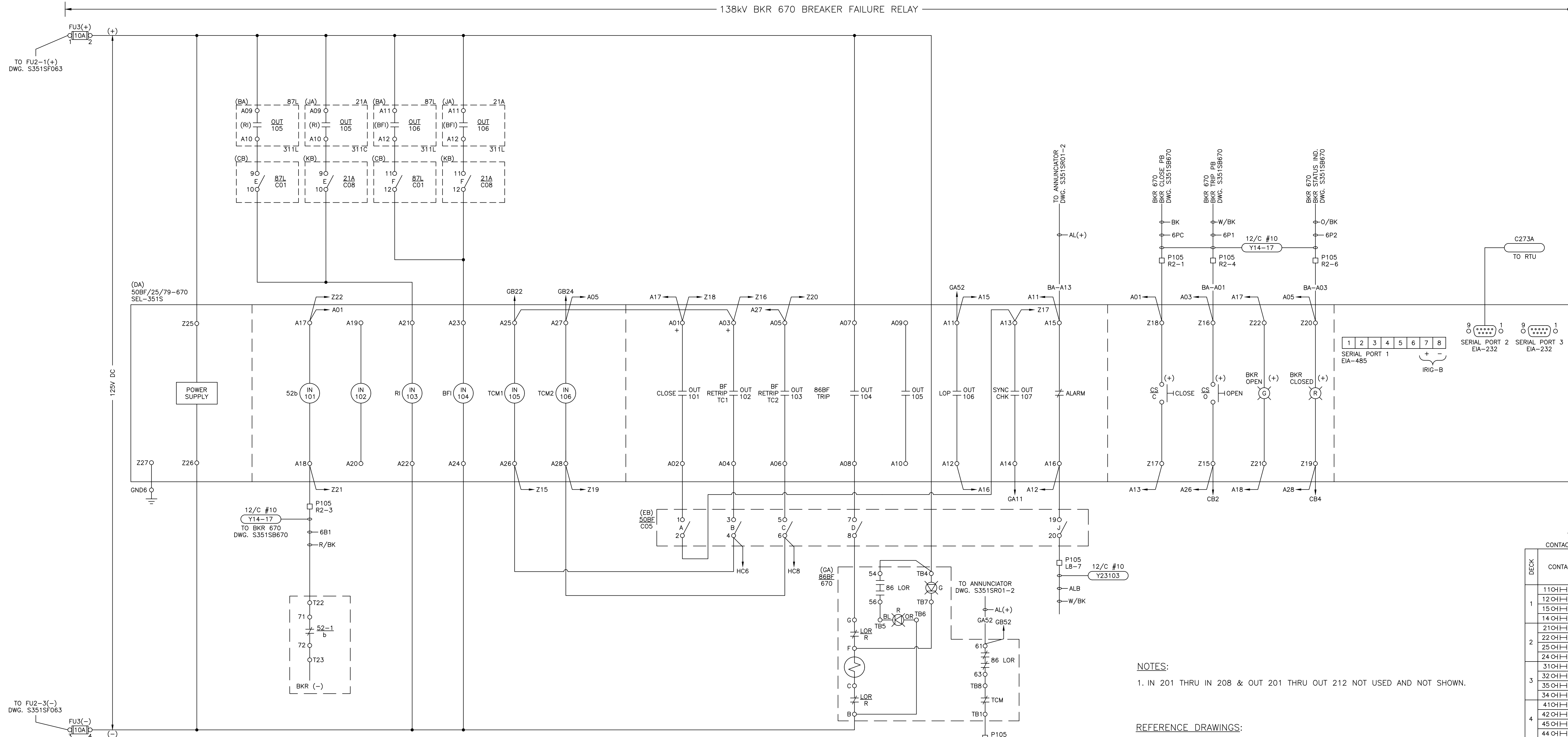
NOTES:
1. IN 201 THRU IN 208 & OUT 205 THRU OUT 206 NOT USED AND NOT SHOWN.

REFERENCE DRAWINGS:
S351DT01 CABLE SCHEDULE 2023 CONSTRUCTION
S351SF062 BKR FAIL RELAY 138kV BKR 670
S351SF063 ALTERNATE RELAY 138kV FDR 6
S351SF064 CARRIER (UPLC2) FDR 6
S351S012 THREE LINE AC CURRENT SCHEMATIC
S351S013 THREE LINE AC POTENTIAL SCHEMATIC
S351S015 ONE-LINE DIAGRAM 138kV AND CITY AUTOTRANSFORMER
S351SR01-1 ANNUNCIATOR SCHEMATIC (SHEET 1)
S351SR01-2 ANNUNCIATOR SCHEMATIC (SHEET 2)
S351WP105-1 WIRING DIAGRAM 138kV FDR 6 & BKR 670 PNL #105 (SH. 1 OF 2)
S351WP105-2 WIRING DIAGRAM 138kV FDR 6 & BKR 670 PNL #105 (SH. 2 OF 2)
S351W202 CONTROL BUILDING AC/DC PANEL



DESCRIPTION: ISSUED FOR BID						ISSUED FOR BID											
1	RF022-01145	8/24/2023	NC	BE	TM	NC	GRAND RIVER DAM AUTHORITY STILLWATER KINZIE INTERCONNECT S351 STILLWATER, OKLAHOMA 138/69kV										
DESCRIPTION: F6 PNL REPLACEMENT & CAP BANK BKR ADDITION						DC SCHEMATIC											
0	RF022-01145	5/9/23	NC	BE	TM	NC	PRIMARY RELAY (87L/21P/67P-311L) 138kV FDR 6 PNL #105										
REV NO.						ENGINEER: NC			SCALE: NONE			DATE: 5/9/23			REV.		
JOB NO.						DRAWN BY: RE			DRAWING NO.			S351SF061			1		
DATE						CHECKED BY: LA/CP			APPROVED BY: NC			P.O. BOX 669 CHOUTEAU, OK 74337					
DESIGN ENGR						DFT			DESIGN CHECK			ISSUE APPROV					

138kV BKR 670 BREAKER FAILURE RELAY



(GA) 86BF 670 CONTACT DIAGRAM

DECK	CONTACTS	POSITION
		TRIP RESET
1	11OH-I13	X
1	12OH-I18	X
1	15OH-I17	X
1	14OH-I16	X
2	21OH-I23	X
2	22OH-I28	X
2	25OH-I27	X
2	24OH-I26	X
3	31OH-I33	X
3	32OH-I38	X
3	35OH-I37	X
3	34OH-I36	X
4	41OH-I43	X
4	42OH-I48	X
4	45OH-I47	X
4	44OH-I46	X
5	51OH-I53	X
5	52OH-I58	X
5	55OH-I57	X
5	54OH-I56	X
6	61OH-I63	X
6	62OH-I68	X
6	65OH-I67	X
6	64OH-I66	X
7	71OH-I73	X
7	72OH-I78	X
7	75OH-I77	X
7	74OH-I76	X
8	81OH-I83	X
8	82OH-I88	X
8	85OH-I87	X
8	84OH-I86	X

NOTES:
1. IN 201 THRU IN 208 & OUT 201 THRU OUT 212 NOT USED AND NOT SHOWN.

- REFERENCE DRAWINGS:
- S351DT01 CABLE SCHEDULE 2023 CONSTRUCTION
 - S351SF061 PRIMARY RELAY 138kV FDR 6
 - S351SF063 ALTERNATE RELAY 138kV FDR 6
 - S351SF064 CARRIER (UPLC2) FDR 6
 - S351SO12 THREE LINE AC CURRENT SCHEMATIC
 - S351SO13 THREE LINE AC POTENTIAL SCHEMATIC
 - S351SO15 ONE-LINE DIAGRAM 138kV AND CITY AUTOTRANSFORMER
 - S351SR01-1 ANNUNCIATOR SCHEMATIC (SHEET 1)
 - S351SR01-2 ANNUNCIATOR SCHEMATIC (SHEET 2)
 - S351WP105-1 WIRING DIAGRAM 138kV FDR 6 & BKR 670 PNL #105 (SH. 1 OF 2)
 - S351WP105-2 WIRING DIAGRAM 138kV FDR 6 & BKR 670 PNL #105 (SH. 2 OF 2)
 - S351WZ02 CONTROL BUILDING AC/DC PANEL



ISSUED FOR BID

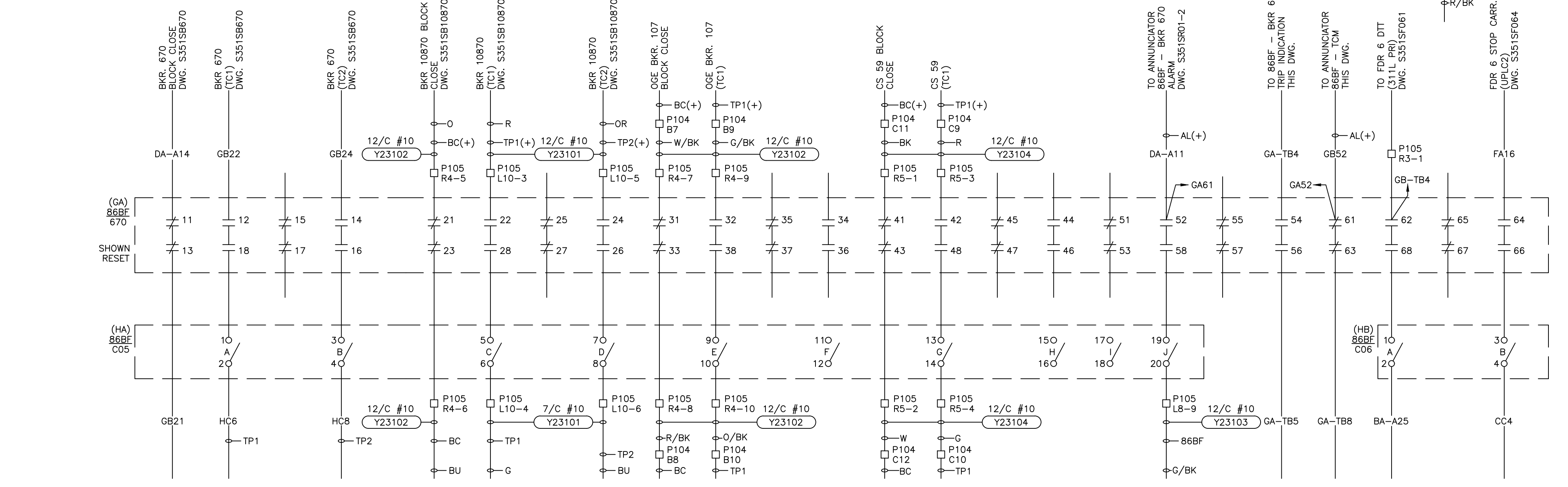
GRAND RIVER DAM AUTHORITY
STILLWATER KINZIE INTERCONNECT S351
STILLWATER, OKLAHOMA 138/69kV

DC SCHEMATIC
BKR FAIL RELAY (50BF/25/79-351S)
138kV BKR 670 PNL #105

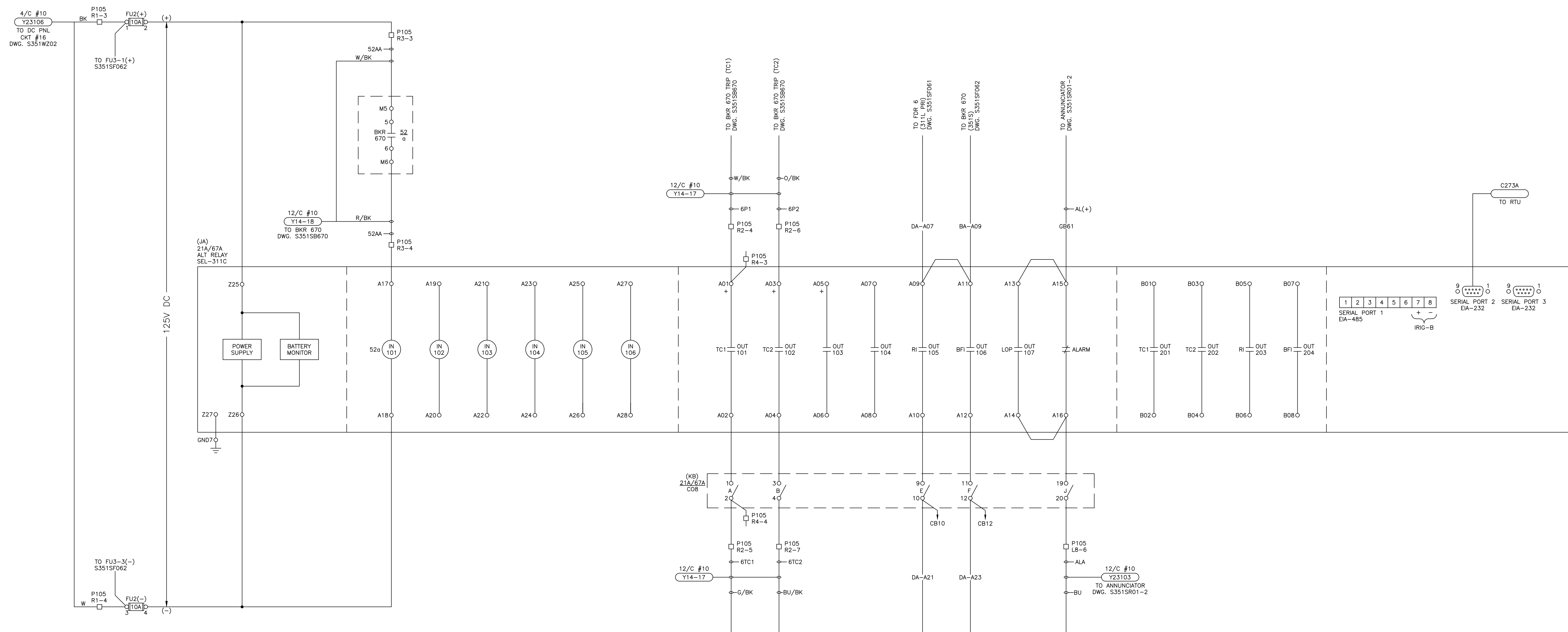
ENGINEER: NC SCALE: NONE DATE: 5/9/23 REV.
DRAWN BY: BE DRAWING NO.
CHECKED BY: LA/CP
P.O. BOX 669 CHOUTEAU, OK 74337 APPROVED BY: NC

S351SF062 1

DESCRIPTION:	ISSUED FOR BID
1	RF022-01145 8/24/2023 NC BE TM NC
DESCRIPTION:	F6 PNL REPLACEMENT & CAP BANK BKR ADDITION
0	RF022-01145 5/9/23 NC BE TM NC
REV. NO.	JOB NO. DATE DESIGN ENGR. DFT. DESIGN CHECK. ISSUE APPROV.



138kV FDR 6 ALTERNATE RELAY



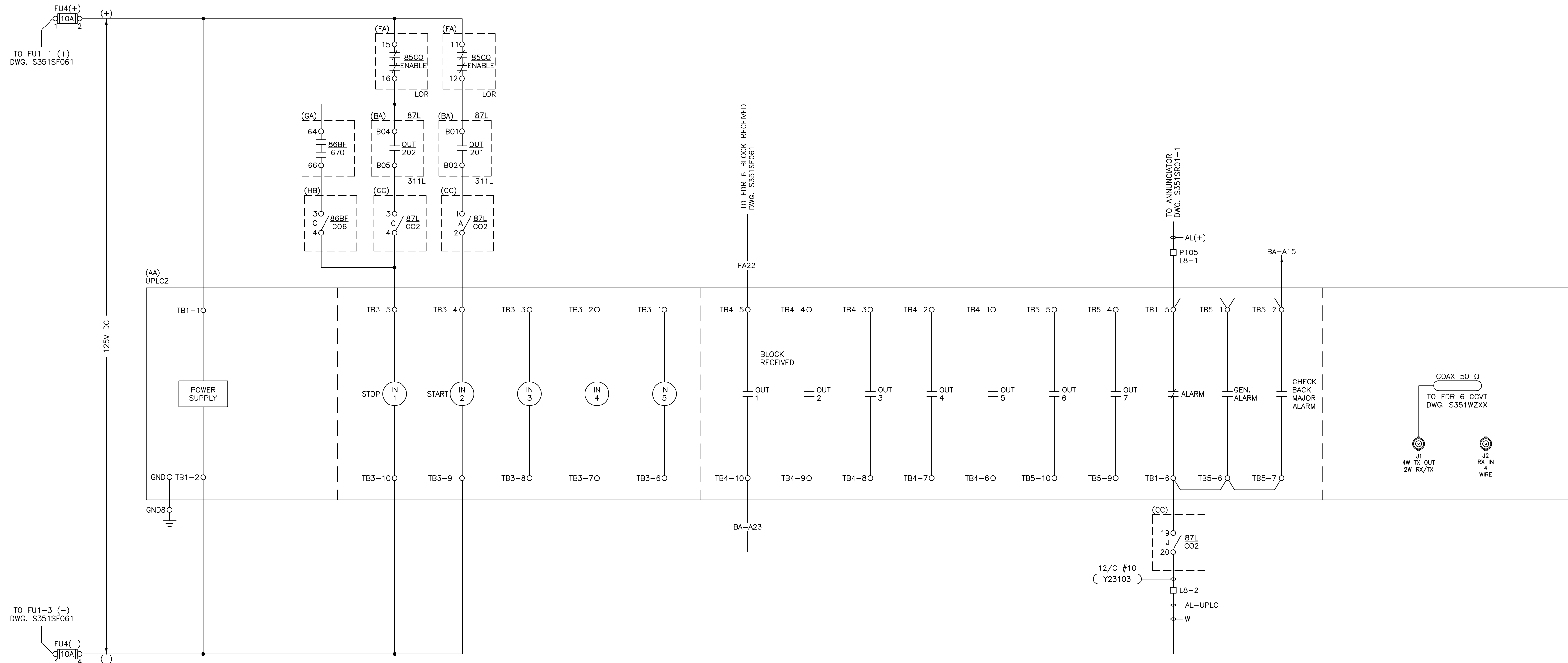
NOTES:
 1. IN 201 THRU IN 208 & OUT 205 THRU OUT 212 NOT USED AND NOT SHOWN.

REFERENCE DRAWINGS:
 S351DT01 CABLE SCHEDULE 2023 CONSTRUCTION
 S351SF061 PRIMARY RELAY 138kV FDR 6
 S351SF062 BKR FAIL RELAY 138kV BKR 670
 S351SO12 THREE LINE AC CURRENT SCHEMATIC
 S351SO13 THREE LINE AC POTENTIAL SCHEMATIC
 S351SO15 ONE-LINE DIAGRAM 138kV AND CITY AUTOTRANSFORMER
 S351SR01-1 ANNUNCIATOR SCHEMATIC (SHEET 1)
 S351SR01-2 ANNUNCIATOR SCHEMATIC (SHEET 2)
 S351WP105-1 WIRING DIAGRAM 138kV FDR 6 & BKR 670 PNL #105 (SH. 1 OF 2)
 S351WP105-2 WIRING DIAGRAM 138kV FDR 6 & BKR 670 PNL #105 (SH. 2 OF 2)
 S351WZ02 CONTROL BUILDING AC/DC PANEL

ISSUED FOR BID



DESCRIPTION: ISSUED FOR BID							GRAND RIVER DAM AUTHORITY STILLWATER KINZIE INTERCONNECT S351 STILLWATER, OKLAHOMA 138/69kV		
1	RF022-01145	8/24/2023	NC	BE	TM	NC	DC SCHEMATIC ALTERNATE RELAY (21A/67A-311C) 138kV FDR 6 PNL #105		
0	RF022-01145	5/9/23	NC	BE	TM	NC	ENGINEER: NC SCALE: NONE DATE: 5/9/23 REV. DRAWN BY: RE DRAWING NO. CHECKED BY: LA/CP P.O. BOX 669 CHOUTEAU, OK 74337 APPROVED BY: NC		
REV. NO.							S351SF063		
JOB NO.							1		
DATE									
DESIGN ENGR									
DFT									
DESIGN CHECK									
ISSUE APPROV									



NOTES:

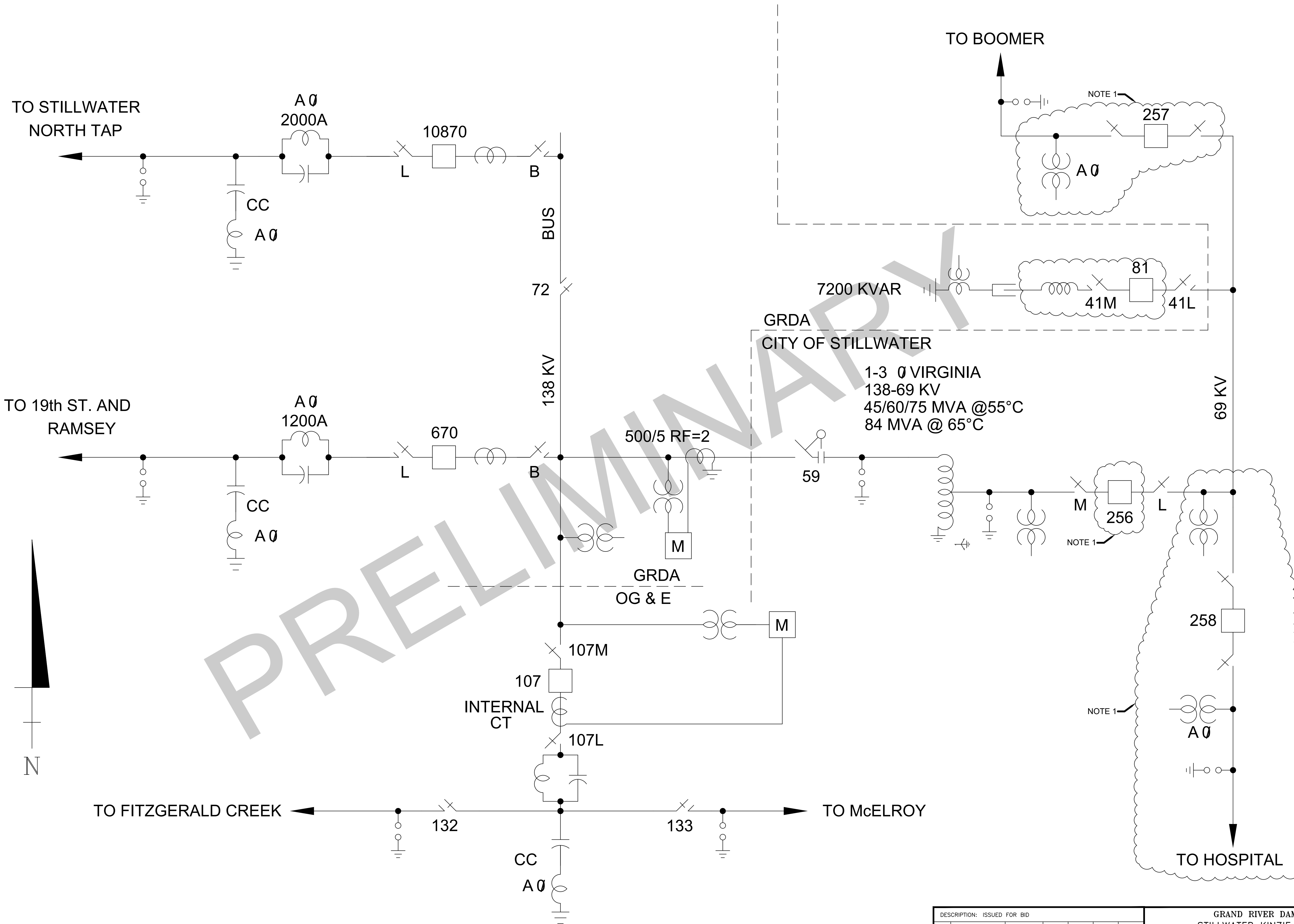
1. ALL EQUIPMENT IS ON PNL #105 UNLESS OTHERWISE NOTED.
2. PULSAR POWER LINE CARRIER MODEL US1NSM7AFSX
3. CARRIER FREQUENCIES TO BE ASSIGNED BY GRDA

REFERENCE DRAWINGS:

- S351DT01 CABLE SCHEDULE 2023 CONSTRUCTION
- S351SF061 PRIMARY RELAY 138kV FDR 6
- S351SF062 BKR FAIL RELAY 138kV BKR 670
- S351SO15 ONE-LINE DIAGRAM 138kV AND CITY AUTOTRANSFORMER
- S351SR01-1 ANNUNCIATOR SCHEMATIC (SHEET 1)
- S351SR01-2 ANNUNCIATOR SCHEMATIC (SHEET 2)
- S351WP105-1 WIRING DIAGRAM 138kV FDR 6 & BKR 670 PNL #105 (SH. 1 OF 2)
- S351WP105-2 WIRING DIAGRAM 138kV FDR 6 & BKR 670 PNL #105 (SH. 2 OF 2)
- S351WZ02 CONTROL BUILDING AC/DC PANEL

ISSUED FOR BID

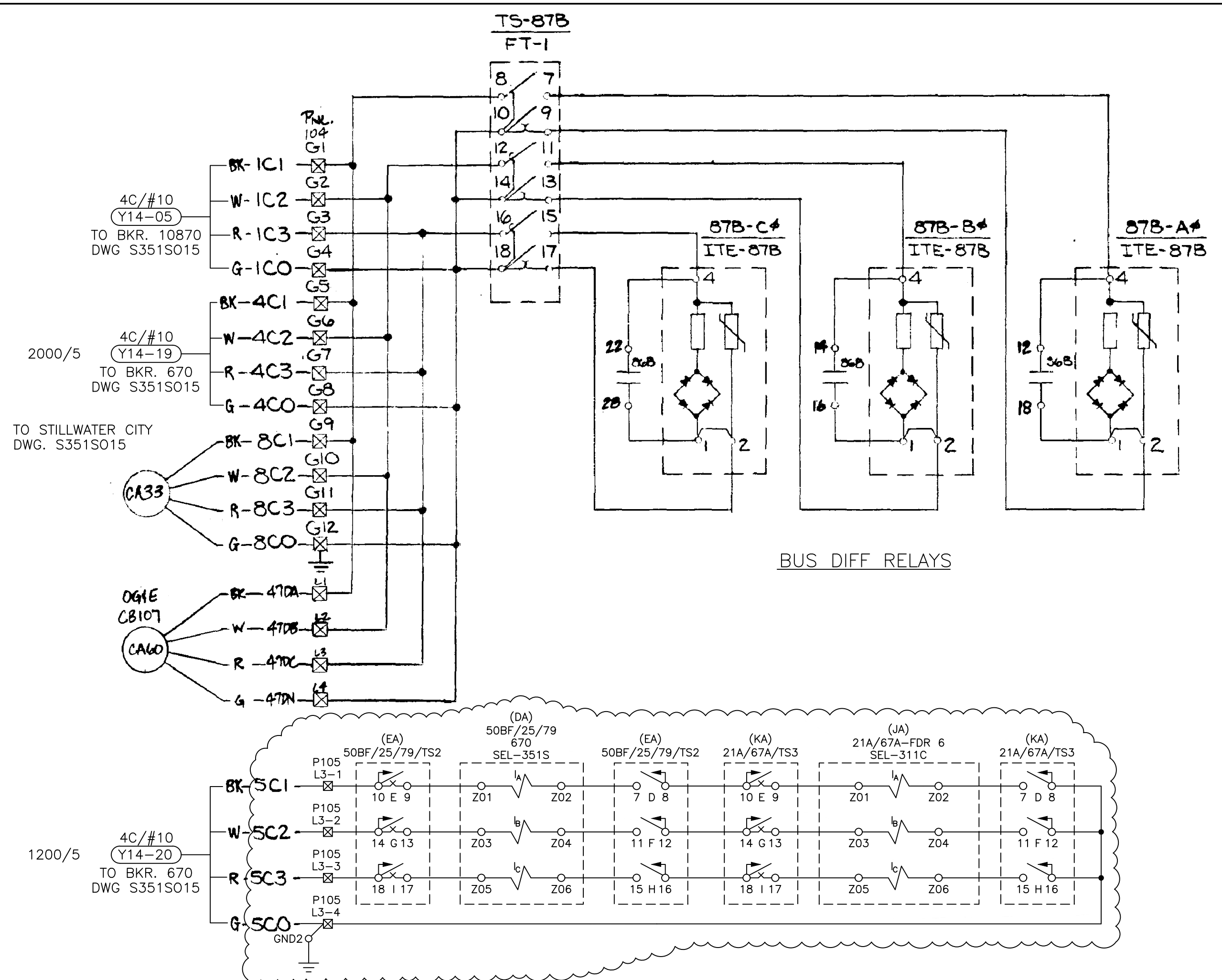
DESCRIPTION: ISSUED FOR BID		GRAND RIVER DAM AUTHORITY		STILLWATER KINZIE INTERCONNECT S351		STILLWATER, OKLAHOMA		138/69kV		
1	RF022-01145	8/24/2023	NC	BE	TM	NC				
DESCRIPTION: F6 PNL REPLACEMENT & CAP BANK BKR ADDITION										
0	RF022-01145	5/9/23	NC	BE	TM	NC				
DC SCHEMATIC CARRIER (UPLC2) PNL #105 FDR 6										
REV. NO.	JOB NO.	DATE	DESIGN ENGR	DFTR	DESIGN CHECK	ISSUE APPROVD	ENGINEER: NC	SCALE: NONE	DATE: 5/9/23	REV. 1
							GRDA	P.O. BOX 669 CHOUTEAU, OK 74337		CHECKED BY: LA/CP APPROVED BY: NC
							DRAWING NO. S351SF064			



NOTES:
 1. 2024 CONSTRUCTION TO BE PERFORMED BY CITY OF STILLWATER

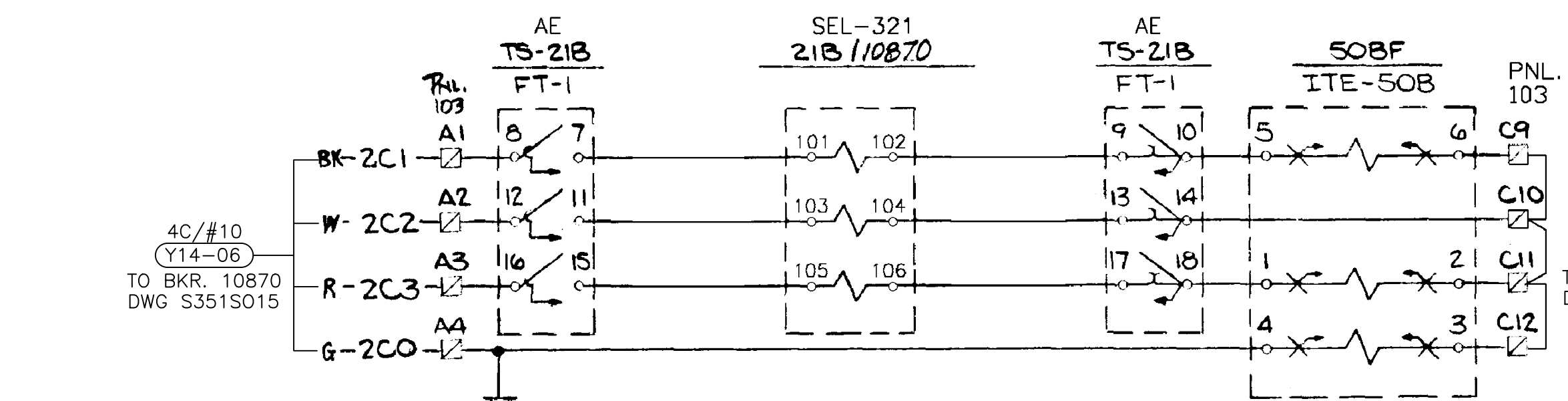
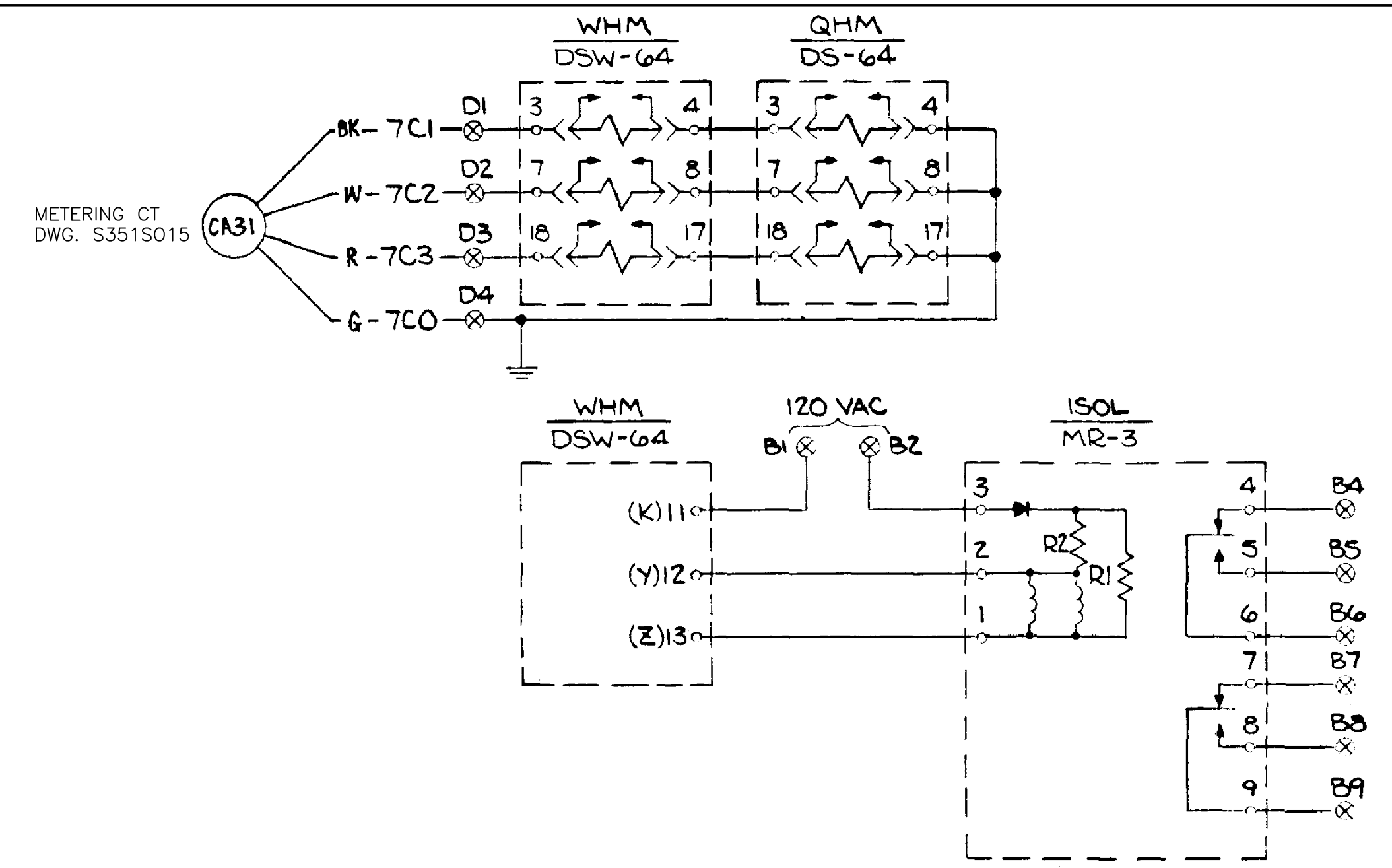
DESCRIPTION: ISSUED FOR BID							GRAND RIVER DAM AUTHORITY STILLWATER KINZIE INTERCONNECT S351 STILLWATER, OKLAHOMA 138/69KV				
11	RF022-01145	8/24/2023	NC	BE	LA	NC	ONE LINE DIAGRAM				
DESCRIPTION: CAPACITOR BANK BREAKER ADDITION											
10	RF022-01145	5/9/23	NC	RE	LA	NC					
DESCRIPTION: REV FDR 108 WAVETRAP AMPS							ENGINEER: -				
9	-	10/16	-	JT	-	CTR	SCALE: NONE		DATE: 3/2004	REV.	
DESCRIPTION: REV REPLACE METER CT/PT							DRAWN BY: JT		DRAWING NO.		SHEET 1 OF 1
8	-	4/16	-	JT	-	CTR	CHECKED BY: XXX		S351S001		
REV NO.	JOB NO.	DATE	DESIGN ENGR	DFTR	DESIGN CHECK	ISSUE APPROVD	P.O. BOX 669 CHOUTEAU, OK 74337		APPROVED BY: CTR OLD DRAWING NO.:		



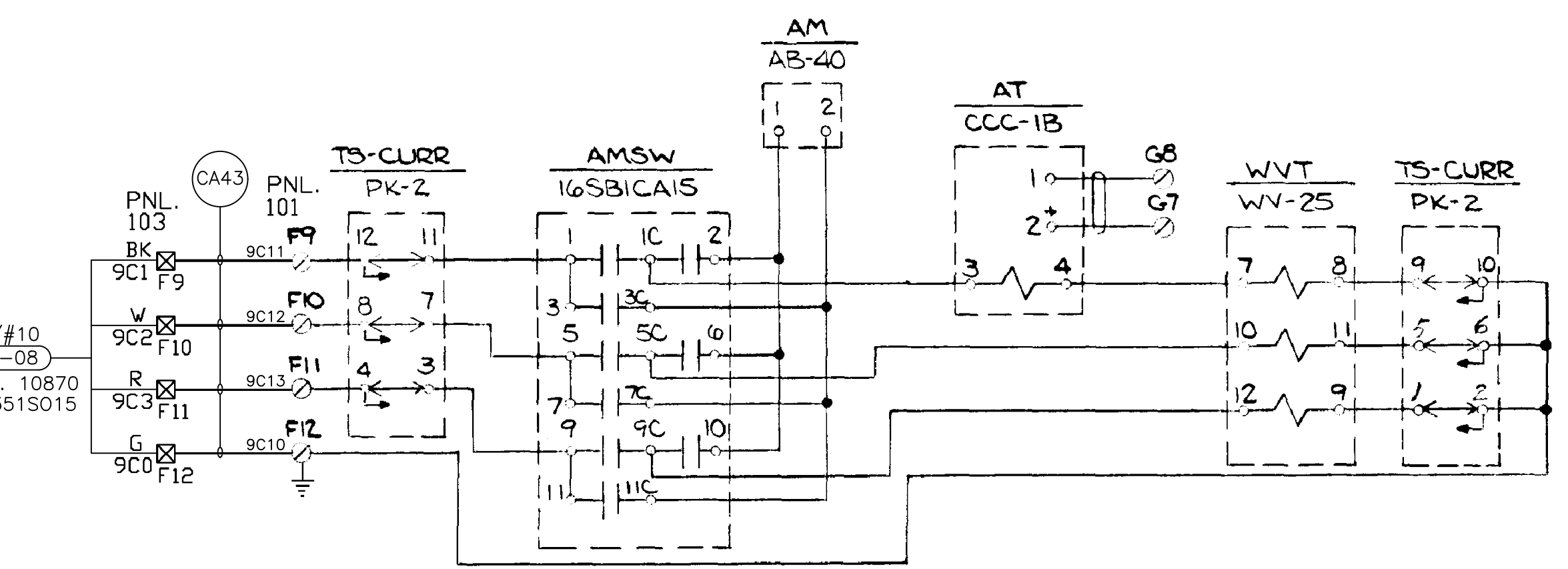


BUS DIFF RELAYS

LINE RELAYING FEEDER 6



LINE RELAYING FEEDER 108



LEGEND - 2023 CONSTRUCTION

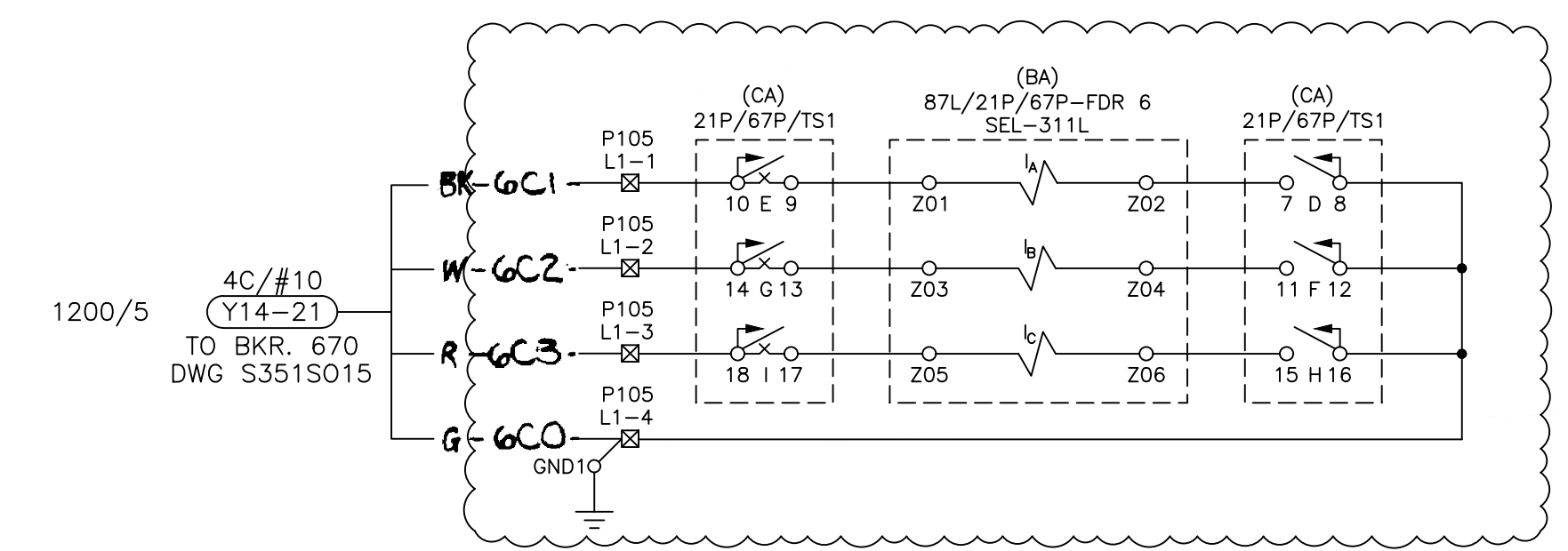
⊗ SHORTING TERMINAL BLOCK, PANEL 105

REFERENCE DRAWINGS

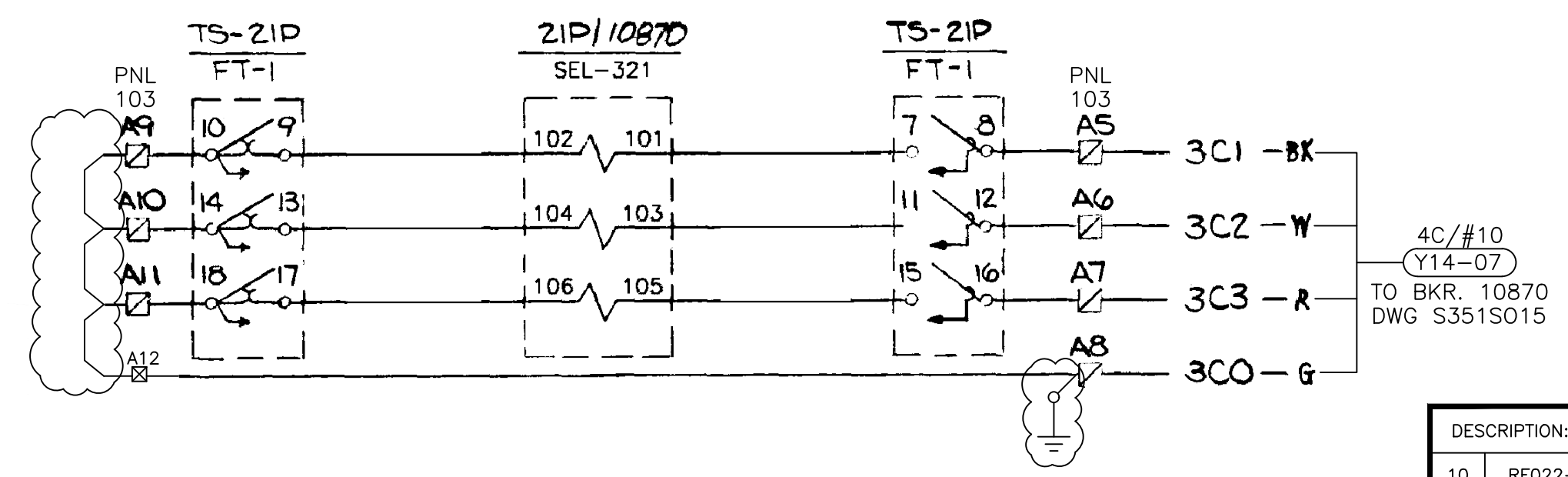
- S351DT01 CABLE SCHEDULE 2023 CONSTRUCTION
- S351SF061 PRIMARY RELAY 138KV FDR 6
- S351SF062 BKR FAIL RELAY 138KV BKR 670
- S351SF063 ALTERNATE RELAY 138KV FDR 6
- S351S013 THREE LINE AC POTENTIAL SCHEMATIC
- S351S015 ONE-LINE DIAGRAM 138KV AND CITY AUTOTRANSFORMER
- S351WP103 WIRING DIAGRAM PANEL 103 CB 10870
- S351WP105-1 WIRING DIAGRAM 138KV FDR 6 & BKR 670 PNL #105 (SH. 1 OF 2)
- S351WP105-2 WIRING DIAGRAM 138KV FDR 6 & BKR 670 PNL #105 (SH. 2 OF 2)

NOTE

1. ⊙ - TERMINAL BLOCK POINT ON PANEL 101
2. ⊗ - TERMINAL BLOCK POINT ON PANEL 102
3. ⊚ - TERMINAL BLOCK POINT ON PANEL 103
4. ⊠ - TERMINAL BLOCK POINT ON PANEL 104
5. ▲ - TERMINAL BLOCK CONNECTED TO HARNESS CABLES FOR Z1P & Z1B RELAYS



LINE RELAYING FEEDER 6



DESCRIPTION:	ISSUED FOR BID					
10	RF022-01145	8/24/2023	NC	BE	TM	NC
DESCRIPTION: F6 PNL REPLACEMENT & CAP BANK BKR ADDITION						
9	RF022-01145	5/9/23	NC	BE	TM	NC
DESCRIPTION: NEW TITLEBLOCK, ADDED REFERENCE DRAWINGS						
8	-	14 JUL 15	-	JT	RELAY	-
REV NO.	JOB NO.	DATE	DESIGN ENGR	DFT	DESIGN CHECK	ISSUE APPROV

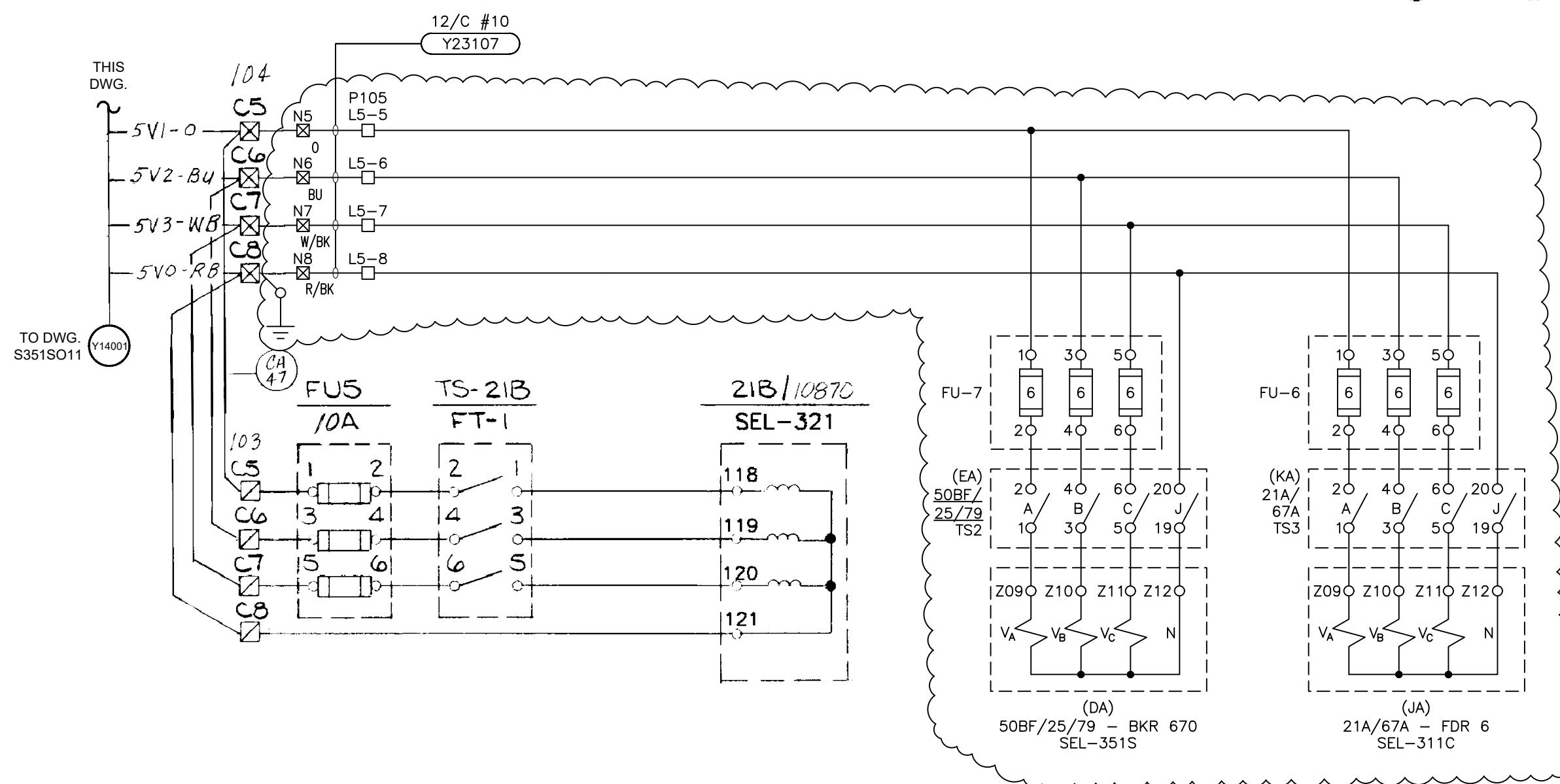
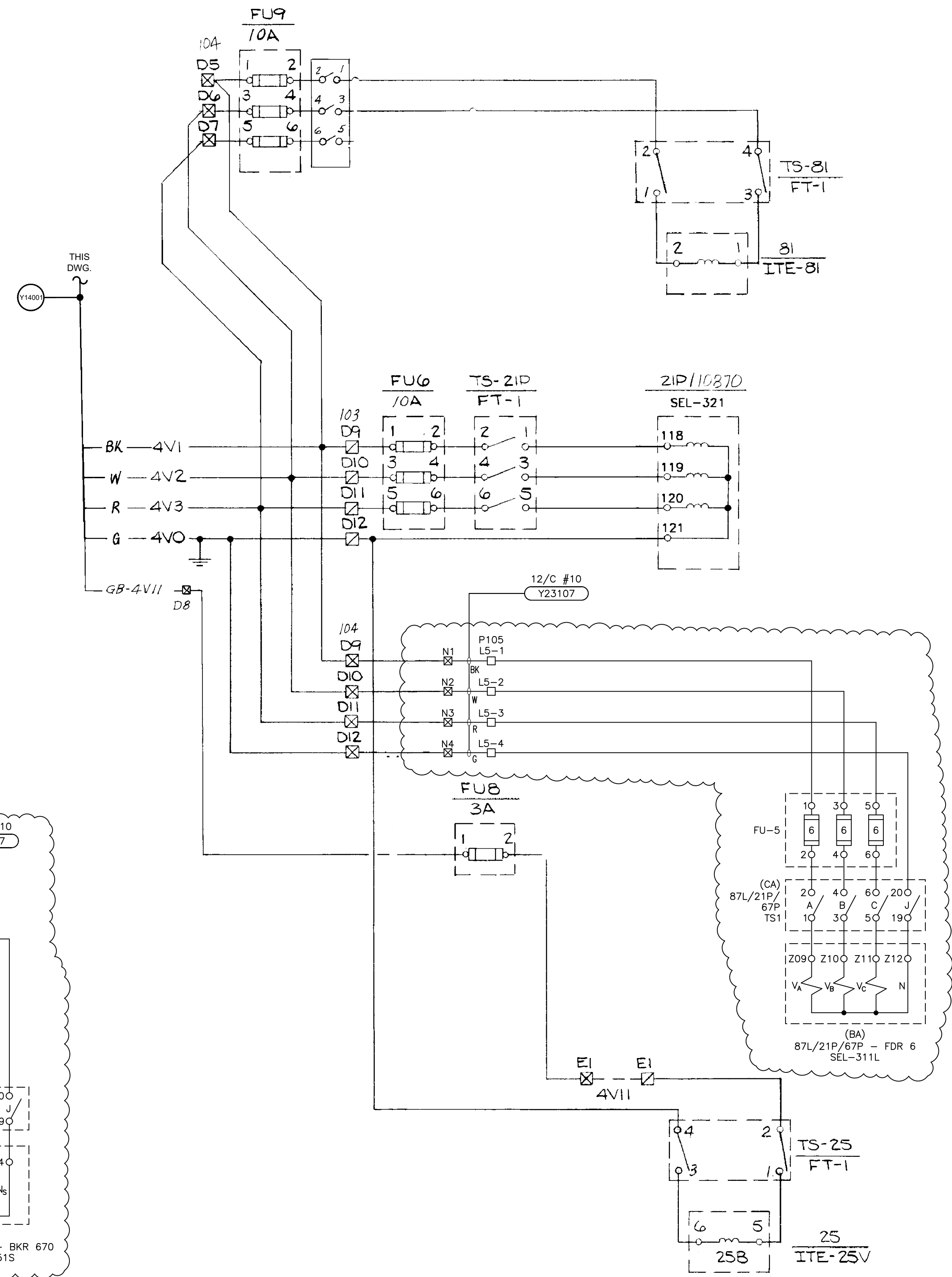
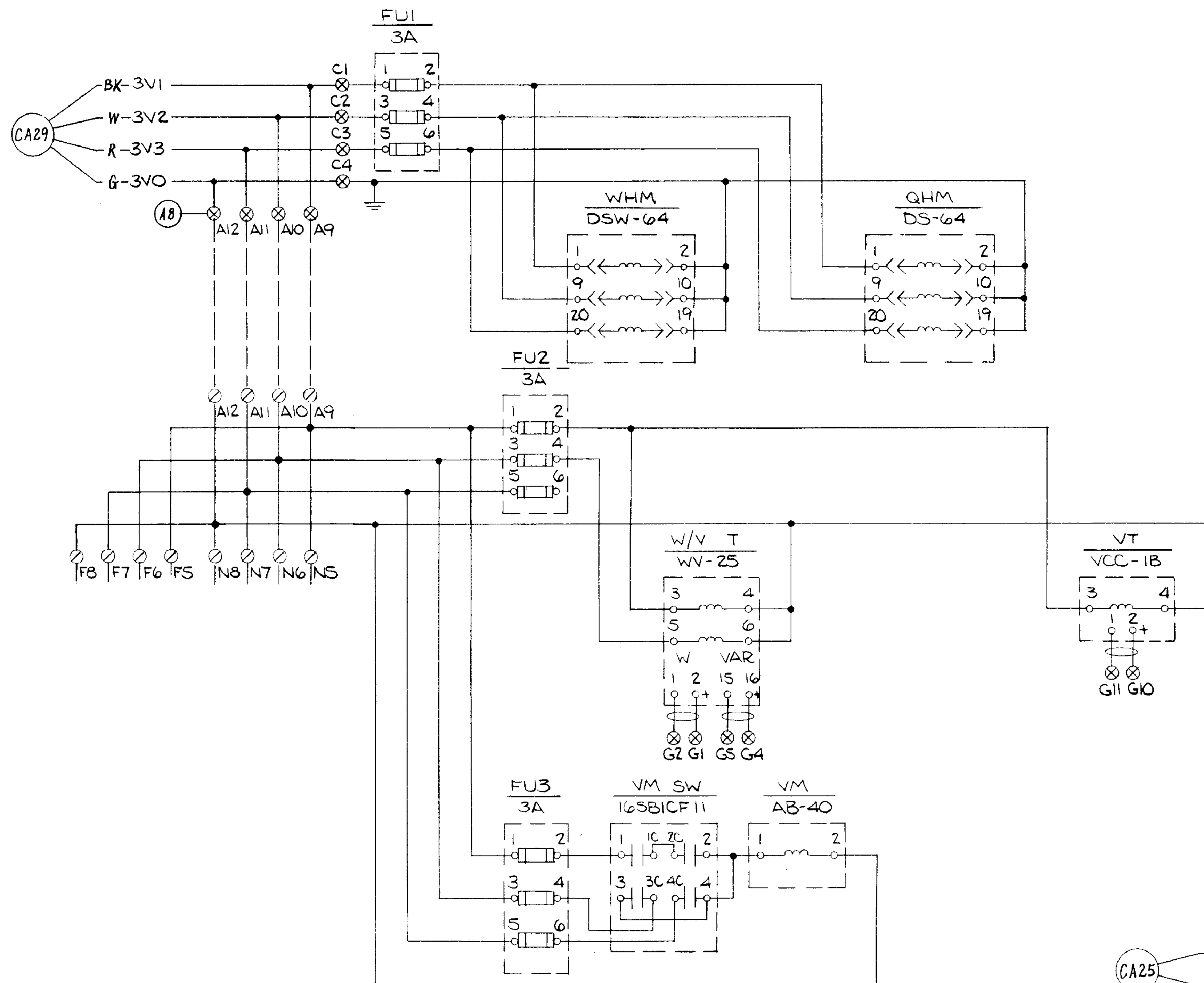
HARLO CORPORATION
 GRAND RIVER DAM AUTHORITY
 STILLWATER, OKLAHOMA 74337
 DR. BY: J. YOB
 CHK. BY: Edg
 DRAWING NO. D:4591 SH. 4

ISSUED FOR BID
 GRAND RIVER DAM AUTHORITY
 STILLWATER, OKLAHOMA 138/69KV

THREE LINE AC CURRENT SCHEMATIC

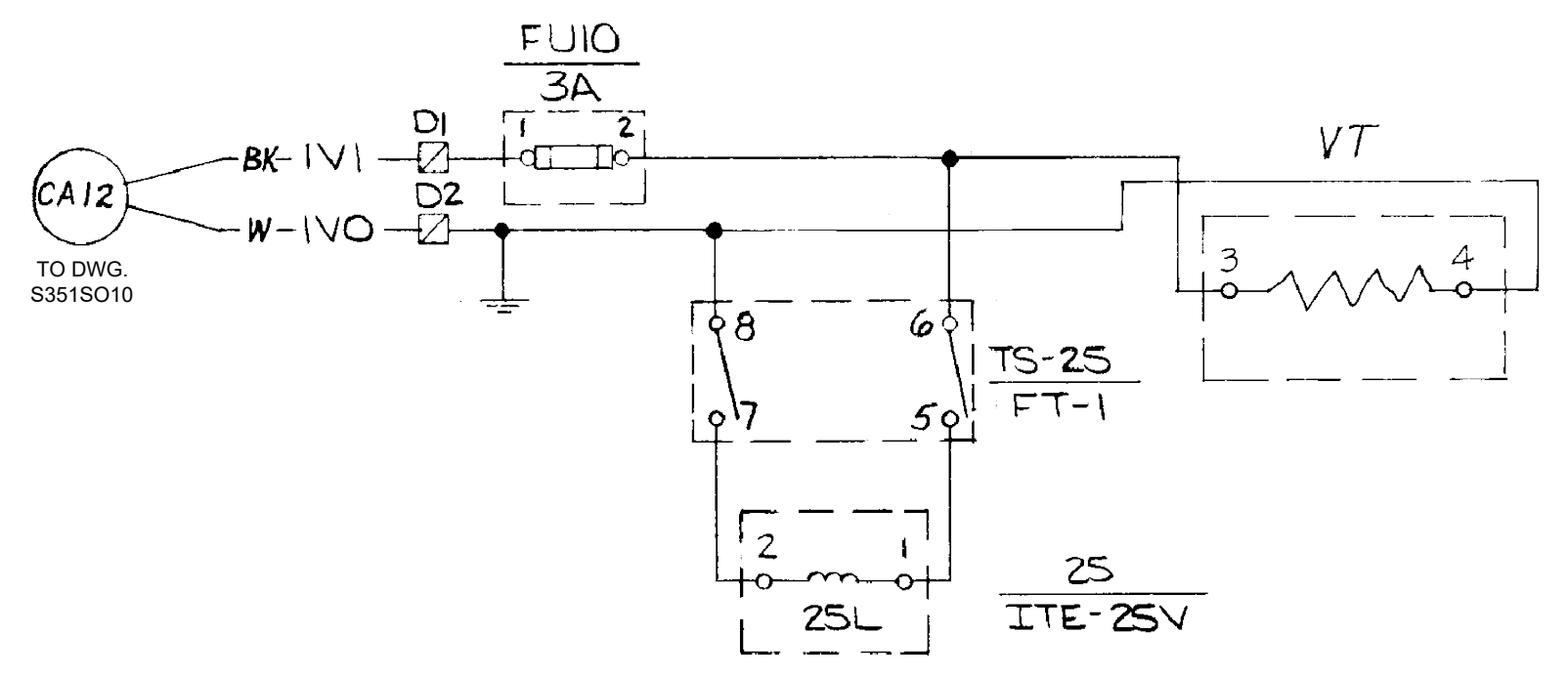
ENGINEER:	SCALE: NONE	DATE: 7/14/15	REV.
DRAWN BY: JT	DRAWING NO.	SHEET 1 OF 1	10
CHECKED BY:	S351S012		
APPROVED BY:	OLD DRAWING NO.:		





LEGEND - 2023 CONSTRUCTION
 □ TERMINAL BLOCK, PANEL 105

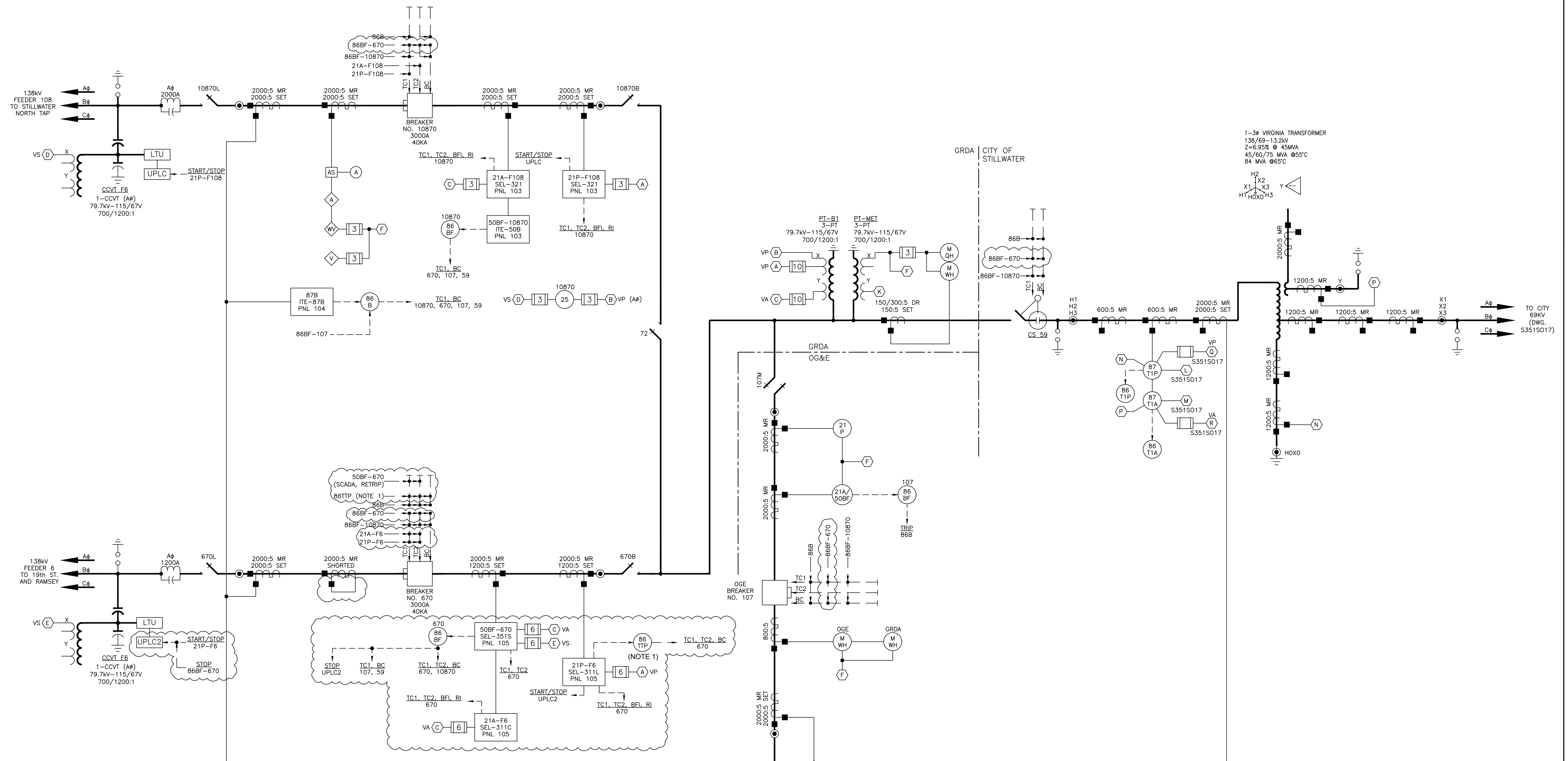
NOTE
 1. ○ - TERMINAL BLOCK POINT ON PANEL 101
 2. ⊗ - TERMINAL BLOCK POINT ON PANEL 102
 3. ⊠ - TERMINAL BLOCK POINT ON PANEL 103
 4. ⊞ - TERMINAL BLOCK POINT ON PANEL 104
 5. ▲ - TERMINAL BLOCK CONNECTED TO HARNESS CABLES FOR 21P & 21B RELAYS



REFERENCE DRAWINGS:
 S351DT01 CABLE SCHEDULE 2023 CONSTRUCTION
 S351SF061 PRIMARY RELAY 138kv FDR 6
 S351SF062 BKR FAIL RELAY 138kv BKR 670
 S351SF063 ALTERNATE RELAY 138kv FDR 6
 S351S012 THREE LINE AC CURRENT SCHEMATIC
 S351S015 ONE-LINE DIAGRAM 138kv AND CITY AUTOTRANSFORMER
 S351WP104 WIRING DIAGRAM PANEL 104 - 69kv CAPACITOR BANK & 138kv BUS DIFFERENTIAL
 S351WP105-1 WIRING DIAGRAM 138kv FDR 6 & BKR 670 PNL #105 (SH. 1 OF 2)
 S351WP105-2 WIRING DIAGRAM 138kv FDR 6 & BKR 670 PNL #105 (SH. 2 OF 2)

DESCRIPTION: ISSUED FOR BID						ISSUED FOR BID			
9	RF022-01145	8/24/2023	NC	BE	TM	NC	GRAND RIVER DAM AUTHORITY STILLWATER KINZIE INTERCONNECT S351 STILLWATER, OKLAHOMA 138/69kv		
DESCRIPTION: F6 PNL REPLACEMENT & CAP BANK BKR ADDITION						THREE LINE AC POTENTIAL SCHEMATIC			
8	RF022-01145	5/9/23	NC	BE	TM	NC	ENGINEER: EJ SCALE: NONE DATE: 4/6/87 REV. DRAWN BY: JY DRAWING NO. SHEET 1 OF 1 CHECKED BY: EJ S351S013 APPROVED BY: EJ OLD DRAWING NO.:		
DESCRIPTION: NEW LOCATION FOR CCVT'S, NEW CABLE TO DIST. RELAYS						GRDA P.O. BOX 669 CHOUTEAU, OK 74337			
7	RF MAINTENANCE	26JAN15	RELAY	RC	BA	-	REV. NO. JOB NO. DATE DESIGN ENGR DFTS DESIGN CHECK ISSUE APPROVD		
DESCRIPTION: UPDATED						6			
7/07						JT			

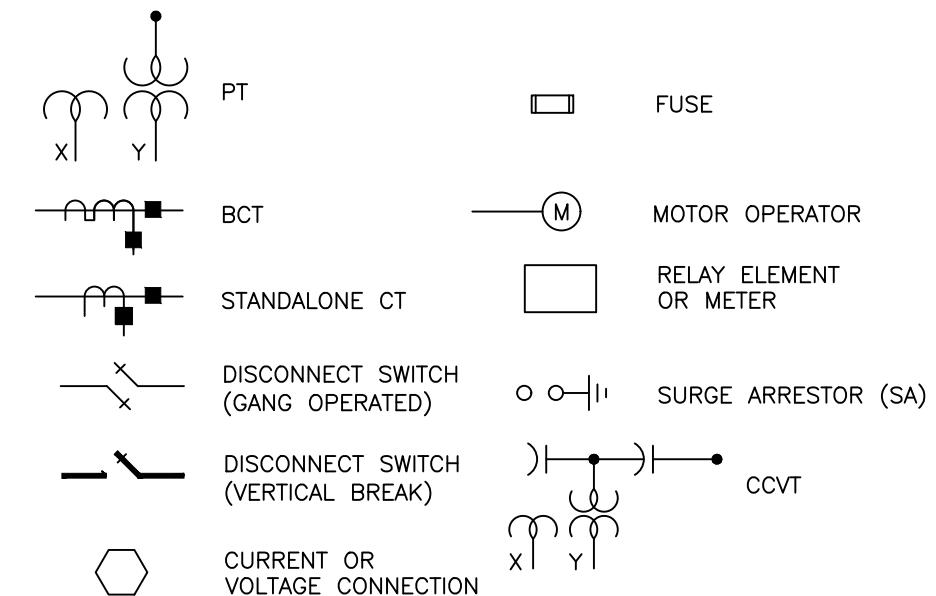




DEVICE LEGEND

A	ALTERNATE	V _A	ALTERNATE VOLTAGE (3 PH)	86BF	BREAKER FAILURE TRIPPING LOCKOUT RELAY
BC	BLOCK CLOSE	V ₆	PRIMARY VOLTAGE (3 PH)	86B	BUS DIFFERENTIAL TRIPPING LOCKOUT RELAY
BF	BREAKER FAILURE	V _s	SYNC VOLTAGE (A#)	86T _x	TRANSFORMER DIFFERENTIAL TRIPPING LOCKOUT RELAY
P	PRIMARY	21A	ALTERNATE LINE RELAY	87B	BUS DIFFERENTIAL RELAY
BF1	BREAKER FAILURE INITIATE	21P	PRIMARY LINE RELAY	87T _x	TRANSFORMER DIFFERENTIAL RELAY
BFT	BREAKER FAILURE TRIP	25	SYNC CHECK RELAY	87VP	CAPACITOR BANK VOLTAGE DIFFERENTIAL RELAY
BFI	BREAKER FAILURE INITIATE	50BF	BREAKER FAILURE OVERCURRENT RELAY	86TTP	DIRECT TRANSFER TRIP LOCKOUT RELAY
TC1	TRIP COIL 1	51P	PHASE OVERCURRENT		
TC2	TRIP COIL 2	67	DIRECTIONAL OVERCURRENT		
VN	NEUTRAL VOLTAGE	79	RECLOSE		

SYMBOL LEGEND



NOTES:

- 86TTP LOCKOUT WIRED BUT WILL REMAIN OUT OF SERVICE UNTIL FIBER CAN BE INSTALLED ON FEEDER 6.

ISSUED FOR BID

GRAND RIVER DAM AUTHORITY
STILLWATER KINZIE INTERCONNECT S351
STILLWATER, OKLAHOMA 138/69kV

ONE-LINE DIAGRAM
METERING & RELAYING
138kV AND CITY AUTOTRANSFORMER

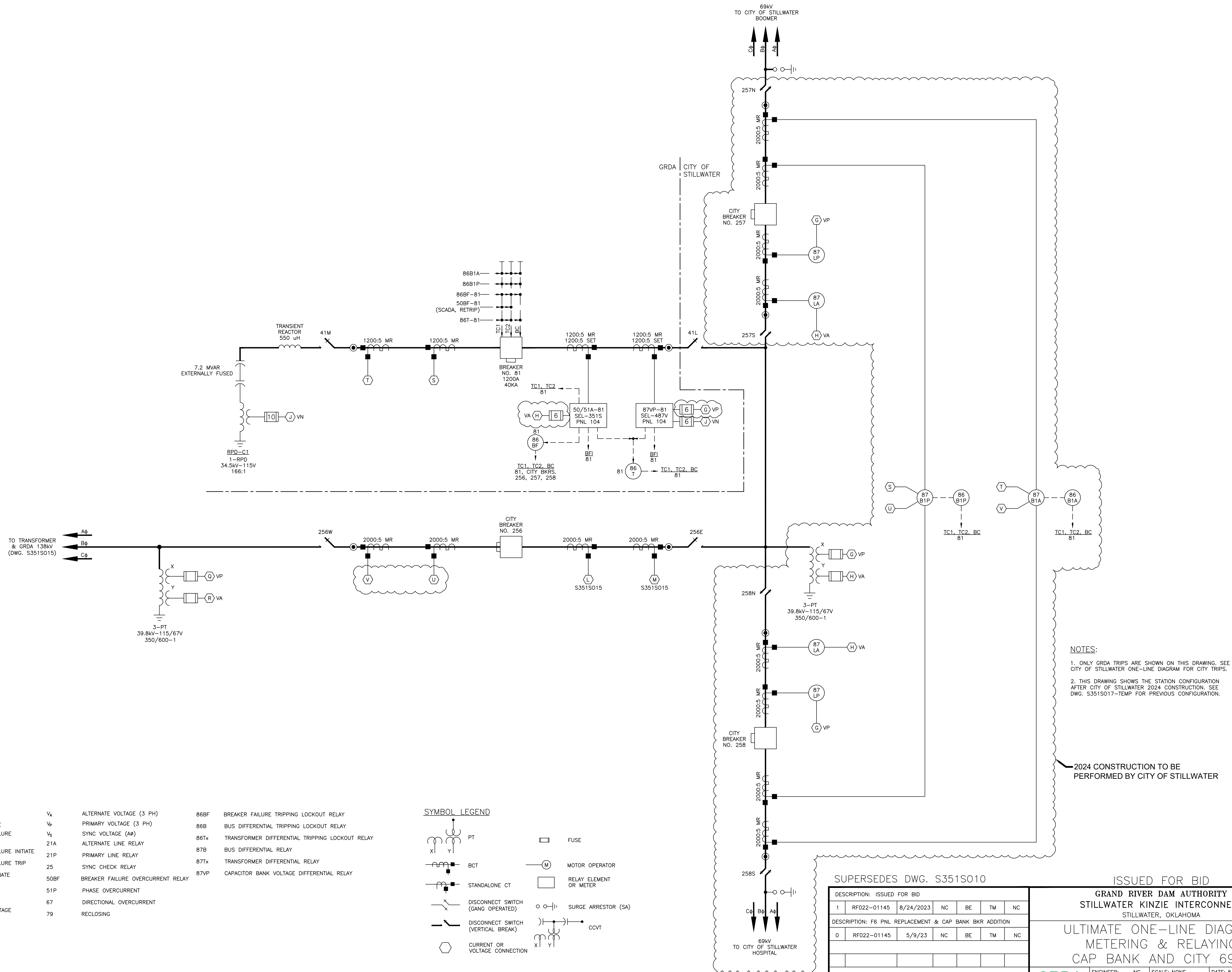
DESCRIPTION: ISSUED FOR BID						
5	RF022-01145	8/24/2023	NC	BE	TM	NC
DESCRIPTION: F6 PNL REPLACEMENT & CAP BANK BKR ADDITION						
4	RF022-01145	5/9/23	NC	BE	TM	NC
DESCRIPTION: MISC. CORRECTIONS, NEW TITLEBLOCK						
3		7/13/15		JT		
DESCRIPTION: R/P 138kV PCB 10870						
2		1/14				
REV NO.	JOB NO.	DATE	DESIGN ENGR	DFT	DESIGN CHECK	ISSUE APPROV

ENGINEER: NC	SCALE: NONE	DATE: 10/10/22	REV.
DRAWN BY: RE	DRAWING NO.	SHEET 1 OF 1	5
CHECKED BY:	S351S015		
APPROVED BY:	OLD DRAWING NO.:		



4555 W Memorial Rd.
Oklahoma City, OK 73142

GRDA
P.O. BOX 669
CHOUTEAU, OK 74337



NOTES:
 1. ONLY GRDA TRIPS ARE SHOWN ON THIS DRAWING. SEE CITY OF STILLWATER ONE-LINE DIAGRAM FOR CITY TRIPS.
 2. THIS DRAWING SHOWS THE STATION CONFIGURATION AFTER CITY OF STILLWATER 2024 CONSTRUCTION. SEE DWG. S351S017-TEMP FOR PREVIOUS CONFIGURATION.

2024 CONSTRUCTION TO BE PERFORMED BY CITY OF STILLWATER

DEVICE LEGEND

A	ALTERNATE	V _a	ALTERNATE VOLTAGE (3 PH)
BC	BLOCK CLOSE	V _p	PRIMARY VOLTAGE (3 PH)
BF	BREAKER FAILURE	V _s	SYNC VOLTAGE (A#)
P	PRIMARY	21A	ALTERNATE LINE RELAY
BFI	BREAKER FAILURE INITIATE	21P	PRIMARY LINE RELAY
BFT	BREAKER FAILURE TRIP	25	SYNC CHECK RELAY
Ri	RECLOSE INITIATE	50BF	BREAKER FAILURE OVERCURRENT RELAY
TC1	TRIP COIL 1	51P	PHASE OVERCURRENT
TC2	TRIP COIL 2	67	DIRECTIONAL OVERCURRENT
VN	NEUTRAL VOLTAGE	79	RECLOSE

SYMBOL LEGEND

	PT		FUSE
	BCT		MOTOR OPERATOR
	STANDALONE CT		RELAY ELEMENT OR METER
	DISCONNECT SWITCH (GANG OPERATED)		SURGE ARRESTOR (SA)
	DISCONNECT SWITCH (VERTICAL BREAK)		CCVT
	CURRENT OR VOLTAGE CONNECTION		

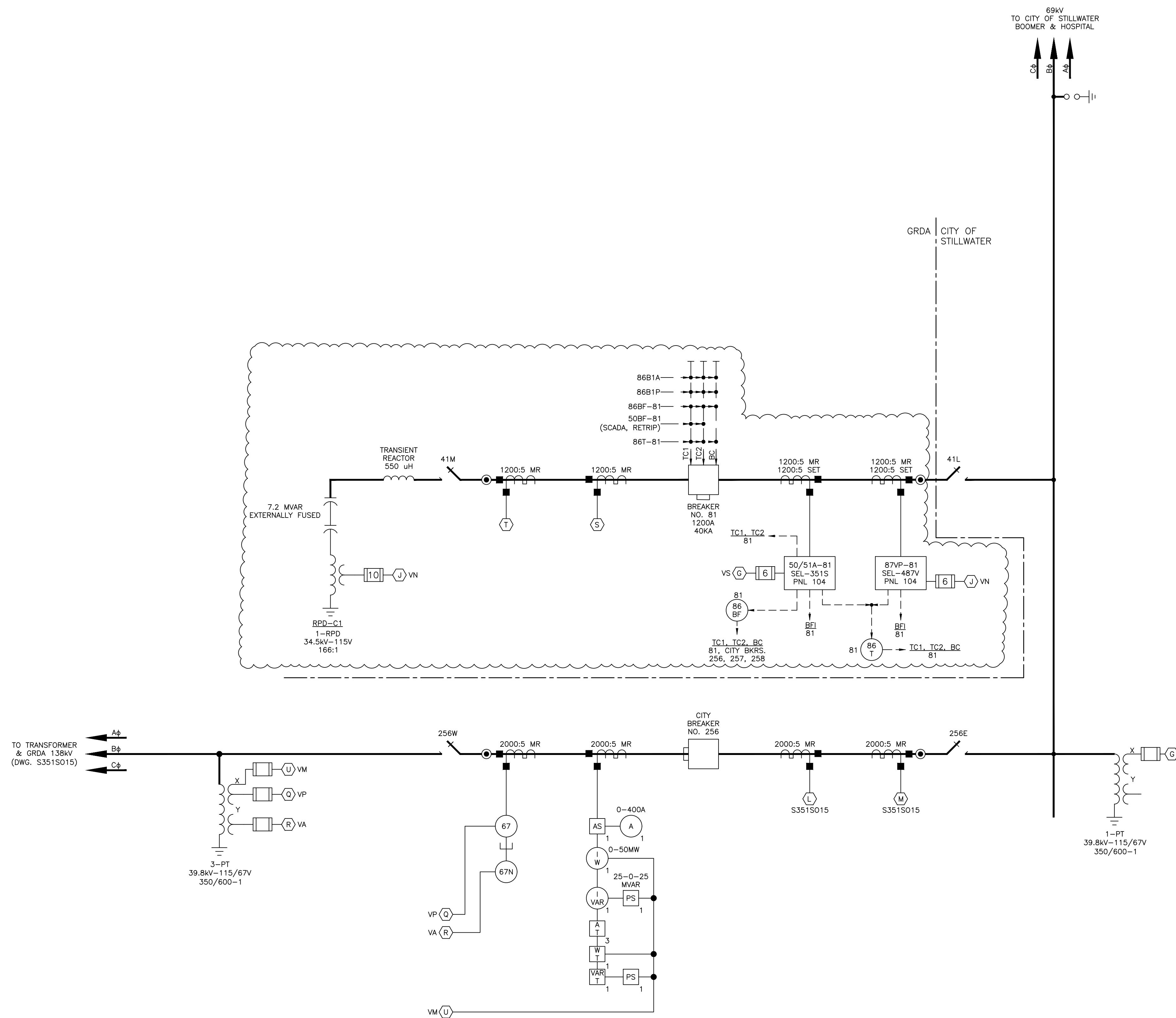
SUPERSEDES DWG. S351S010

DESCRIPTION: ISSUED FOR BID						
1	RF022-01145	8/24/2023	NC	BE	TM	NC
DESCRIPTION: F6 PNL REPLACEMENT & CAP BANK BKR ADDITION						
0	RF022-01145	5/9/23	NC	BE	TM	NC
REV NO.	JOB NO.	DATE	DESIGN ENGR	DFT	DESIGN CHECK	ISSUE APPROV

ISSUED FOR BID

GRAND RIVER DAM AUTHORITY STILLWATER KINZIE INTERCONNECT S351 STILLWATER, OKLAHOMA 138/69kV		
ULTIMATE ONE-LINE DIAGRAM METERING & RELAYING CAP BANK AND CITY 69kV		
ENGINEER: NC	SCALE: NONE	DATE: 5/9/23
DRAWN BY: RE	DRAWING NO.	SHEET - OF -
CHECKED BY: LA	S351S017	
APPROVED BY: NC	OLD DRAWING NO.:	



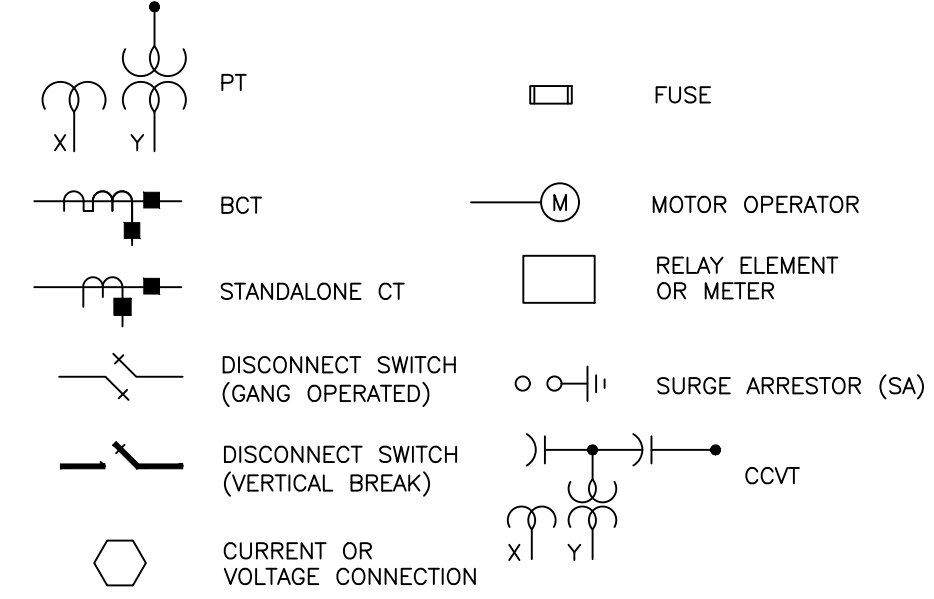


- NOTES:**
1. ONLY GRDA TRIPS ARE SHOWN ON THIS DRAWING. SEE CITY OF STILLWATER ONE-LINE DIAGRAM FOR CITY TRIPS.
 2. THIS DRAWING SHOWS THE STATION CONFIGURATION PRIOR TO CITY OF STILLWATER 2024 CONSTRUCTION. SEE DWG. S351S017 FOR ULTIMATE CONFIGURATION.

DEVICE LEGEND

A	ALTERNATE	V _a	ALTERNATE VOLTAGE (3 PH)
BC	BLOCK CLOSE	V _p	PRIMARY VOLTAGE (3 PH)
BF	BREAKER FAILURE	V _s	SYNC VOLTAGE (A#)
P	PRIMARY	21A	ALTERNATE LINE RELAY
BFI	BREAKER FAILURE INITIATE	21P	PRIMARY LINE RELAY
BFT	BREAKER FAILURE TRIP	25	SYNC CHECK RELAY
Ri	RECLOSE INITIATE	50BF	BREAKER FAILURE OVERCURRENT RELAY
TC1	TRIP COIL 1	51P	PHASE OVERCURRENT
TC2	TRIP COIL 2	67	DIRECTIONAL OVERCURRENT
VN	NEUTRAL VOLTAGE	79	RECLOSEING

SYMBOL LEGEND



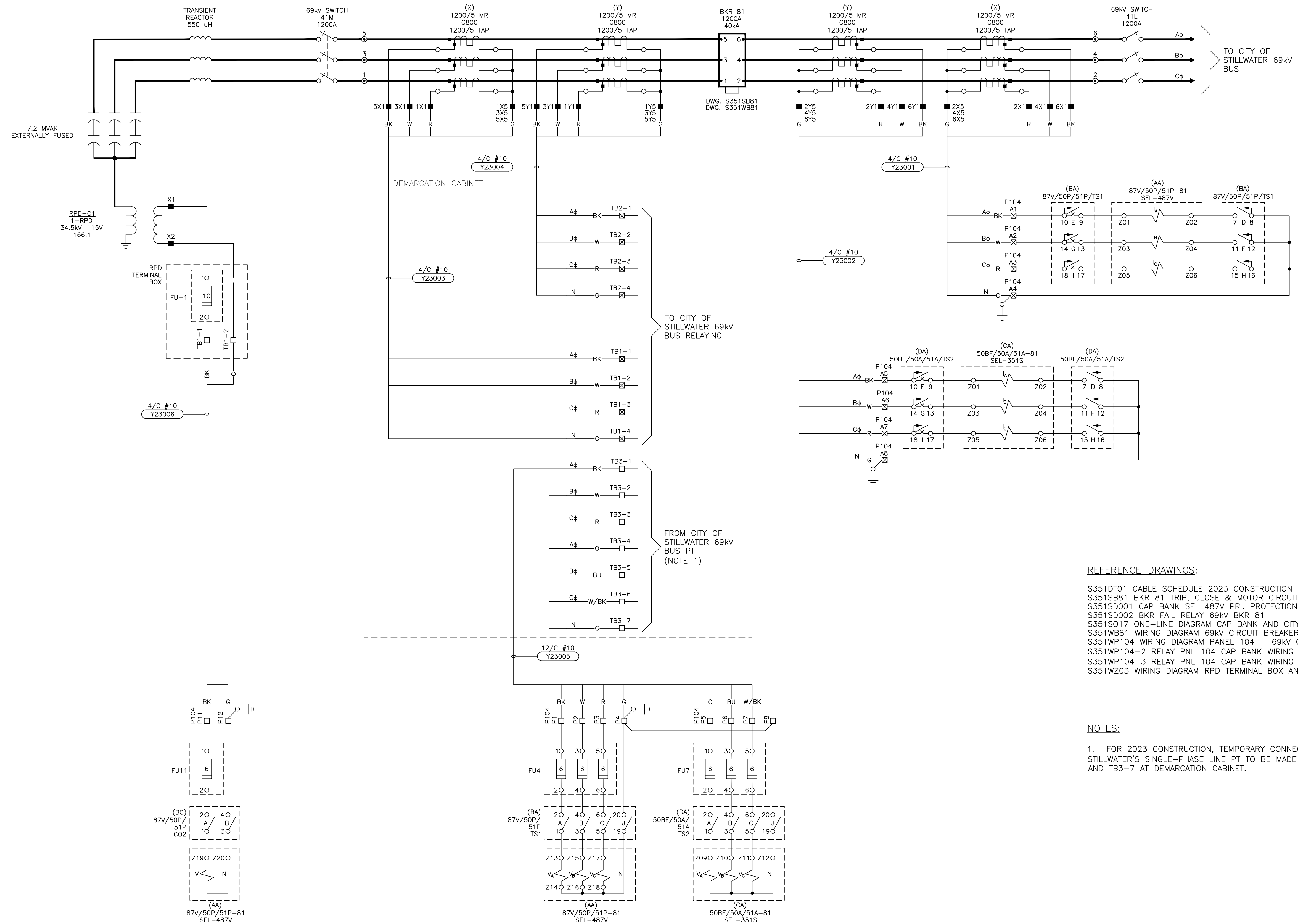
SUPERSEDES DWG. S351S010

ISSUED FOR BID

DESCRIPTION: ISSUED FOR BID						
1	RF022-01145	8/24/2023	NC	BE	TM	NC
DESCRIPTION: F6 PNL REPLACEMENT & CAP BANK BKR ADDITION						
0	RF022-01145	5/9/23	NC	BE	TM	NC
REV NO.	JOB NO.	DATE	DESIGN ENGR	DFT	DESIGN CHECK	ISSUE APPROVD

GRAND RIVER DAM AUTHORITY STILLWATER KINZIE INTERCONNECT S351 STILLWATER, OKLAHOMA 138/69kV			
ONE-LINE DIAGRAM METERING & RELAYING CAP BANK AND CITY 69kV			
ENGINEER: NC	SCALE: NONE	DATE: 5/9/23	REV.
DRAWN BY: RE	DRAWING NO.	SHEET - OF -	1
CHECKED BY: LA	S351S017-TEMP		
APPROVED BY: NC	OLD DRAWING NO.:		





REFERENCE DRAWINGS:

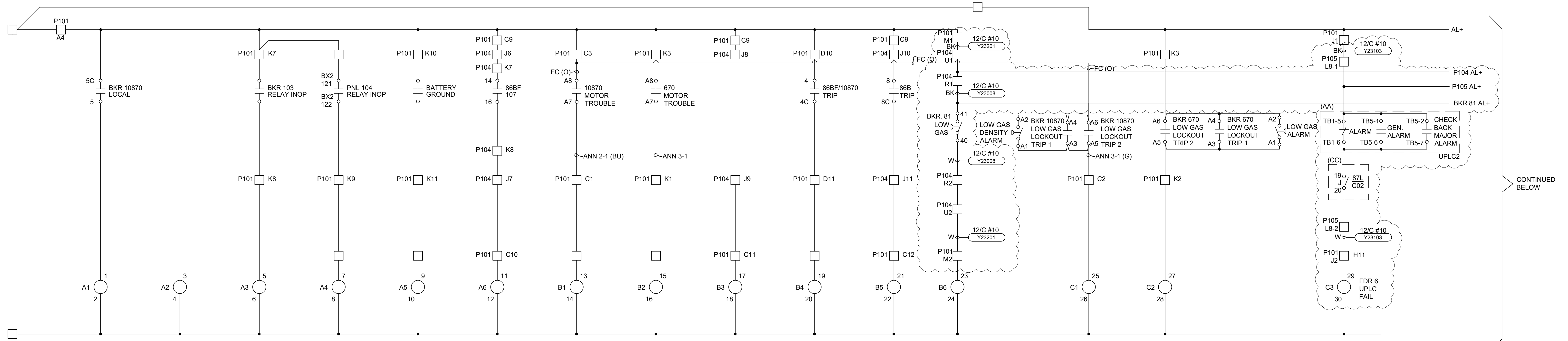
- S351DT01 CABLE SCHEDULE 2023 CONSTRUCTION
- S351SB81 BKR 81 TRIP, CLOSE & MOTOR CIRCUITS
- S351SD001 CAP BANK SEL 487V PRI. PROTECTION
- S351SD002 BKR FAIL RELAY 69kV BKR 81
- S351SO17 ONE-LINE DIAGRAM CAP BANK AND CITY 69kV
- S351WB81 WIRING DIAGRAM 69kV CIRCUIT BREAKER 81
- S351WP104 WIRING DIAGRAM PANEL 104 - 69kV CAPACITOR BANK & 138kV BUS DIFFERENTIAL
- S351WP104-2 RELAY PNL 104 CAP BANK WIRING DIAGRAM (SH. 2 OF 3)
- S351WP104-3 RELAY PNL 104 CAP BANK WIRING DIAGRAM (SH. 3 OF 3)
- S351WZ03 WIRING DIAGRAM RPD TERMINAL BOX AND DEMARCATON CABINET

NOTES:

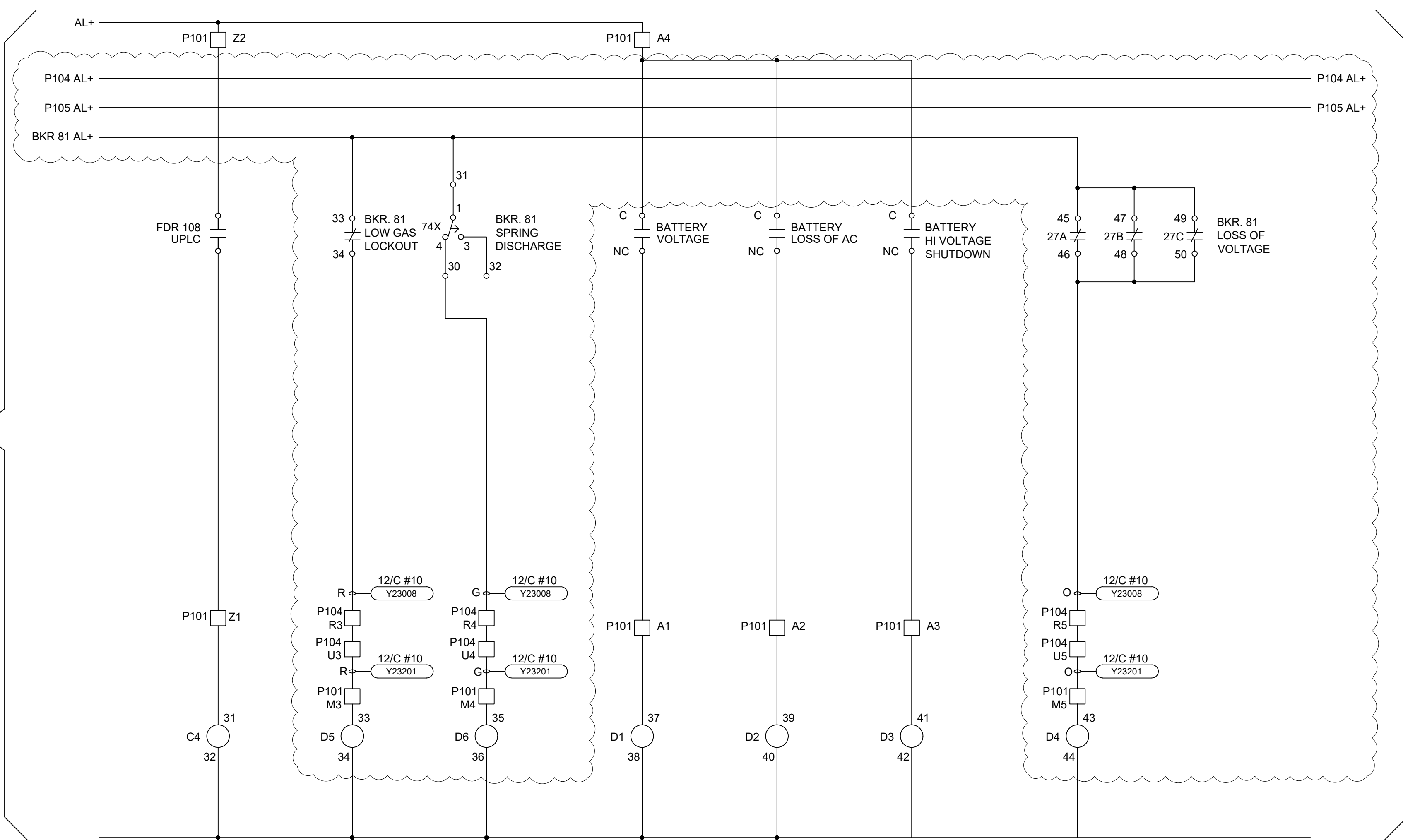
1. FOR 2023 CONSTRUCTION, TEMPORARY CONNECTION TO CITY OF STILLWATER'S SINGLE-PHASE LINE PT TO BE MADE AT POINTS TB3-4 AND TB3-7 AT DEMARCATON CABINET.



DESCRIPTION: ISSUED FOR BID						ISSUED FOR BID				
1	RF022-01145	8/24/2023	NC	BE	TM	NC	GRDA GRAND RIVER DAM AUTHORITY STILLWATER KINZIE INTERCONNECT S351 STILLWATER, OKLAHOMA 138/69kV			
DESCRIPTION: F6 PNL REPLACEMENT & CAP BANK BKR ADDITION						THREE-LINE DIAGRAM GRDA 69kV CAPACITOR BANK				
0	RF022-01145	5/9/23	NC	BE	TM	NC	ENGINEER: NC SCALE: NONE DATE: 5/9/23 REV. DRAWN BY: BE DRAWING NO. CHECKED BY: LA/CP S351S018 APPROVED BY: NC OLD DRAWING NO.: 1			
REV. NO.	JOB NO.	DATE	DESIGN ENGR	DFT	DESIGN CHECK	ISSUE APPROVD	P.O. BOX 669 CHOUTEAU, OK 74337			



CONTINUED BELOW



CONTINUED ABOVE

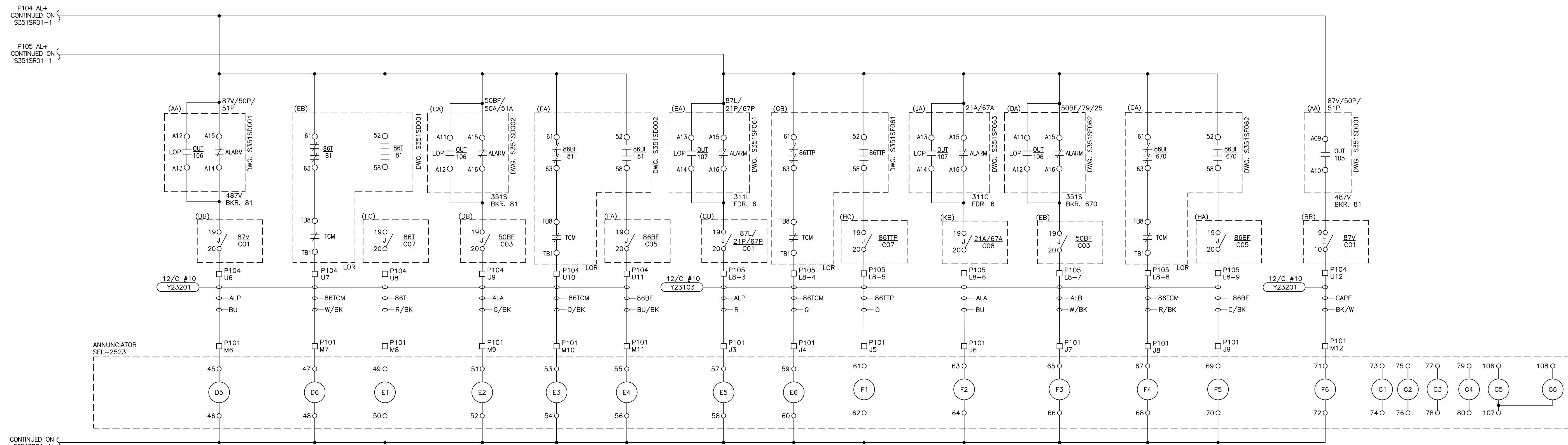
CONTINUED ON DWG. S351SR01-2

REFERENCE DRAWINGS:

- S351DT01 CABLE SCHEDULE 2023 CONSTRUCTION
- S351SB82 69kV BKR 81 HEATER CIRCUIT & ALARMS
- S351SF064 CARRIER (UPLC2) FDR 6
- S351WB81 WIRING DIAGRAM 69kV CIRCUIT BREAKER 81
- S351WP101 TERMINAL BLOCK WIRING DIAGRAM PANEL 101
- S351WP101-2 WIRING DIAGRAM PANEL 101
- S351WP104 WIRING DIAGRAM PANEL 104 - 69kV CAPACITOR BANK & 138kV BUS DIFFERENTIAL
- S351WP104-2 RELAY PNL 104 CAP BANK WIRING DIAGRAM (SH. 2 OF 3)
- S351WP104-3 RELAY PNL 104 CAP BANK WIRING DIAGRAM (SH. 3 OF 3)
- S351WP105-1 WIRING DIAGRAM 138kV FDR 6 & BKR 670 PNL #105 (SH. 1 OF 2)
- S351WP105-2 WIRING DIAGRAM 138kV FDR 6 & BKR 670 PNL #105 (SH. 2 OF 2)



DESCRIPTION: ISSUED FOR BID						ISSUED FOR BID			
S	RF022-01145	8/24/2023	NC	BE	TM	NC	GRAND RIVER DAM AUTHORITY STILLWATER KINZIE INTERCONNECT S351 STILLWATER, OKLAHOMA 138/69kV		
DESCRIPTION: F6 PNL REPLACEMENT & CAP BANK BKR ADDITION						ANNUNCIATOR SCHEMATIC (SHEET 1) PNL 101			
4	RF022-01145	5/9/23	NC	BE	TM	NC	ENGINEER: L SWIFT SCALE: NONE DATE: 15OCT13 REV.		
DESCRIPTION: REVISED PER RELAY NOTES						DRAWN BY: AS DRAWING NO.			
3	-	15 NOV 16	-	JT	RELAY	-	S351SR01-1		
DESCRIPTION: REVISED PER RELAY NOTES						CHECKED BY:			
2	-	16 AUG 16	-	JT	RELAY	-	APPROVED BY:		
REV NO.	JOB NO.	DATE	DESIGN ENGR	DFT	DESIGN CHECK	ISSUE APPROVD	P.O. BOX 669 CHOUTEAU, OK 74337		



NOTES:
 1. ALARMS G1 THRU G6 ARE NOT DISPLAYED ON PANEL FRONT.

REFERENCE DRAWINGS:
 S351D01 CABLE SCHEDULE 2023 CONSTRUCTION
 S351SD001 CAP BANK SEL 487V PRL PROTECTION
 S351SD002 BKR FAIL RELAY 69kv BKR 81
 S351SF061 PRIMARY RELAY 138kv FDR 6
 S351SF062 BKR FAIL RELAY 138kv BKR 670
 S351SF063 ALTERNATE RELAY 138kv FDR 6
 S351SR01-1 ANNUNCIATOR SCHEMATIC (SHEET 1)
 S351WP101 TERMINAL BLOCK WIRING DIAGRAM PANEL 101
 S351WP102-2 WIRING DIAGRAM PANEL 101
 S351WP104 WIRING DIAGRAM PANEL 104 - 69kv CAPACITOR BANK & 138kv BUS DIFFERENTIAL
 S351WP104-2 RELAY PNL 104 CAP BANK WIRING DIAGRAM (SH. 2 OF 3)
 S351WP104-3 RELAY PNL 104 CAP BANK WIRING DIAGRAM (SH. 3 OF 3)
 S351WP105-1 WIRING DIAGRAM 138kv FDR 6 & BKR 670 PNL #105 (SH. 1 OF 2)
 S351WP105-2 WIRING DIAGRAM 138kv FDR 6 & BKR 670 PNL #105 (SH. 2 OF 2)

DESCRIPTION: ISSUED FOR BID						ISSUED FOR BID			
1	RF022-01145	8/24/2023	NC	BE	TM	NC	GRDA GRAND RIVER DAM AUTHORITY STILLWATER KINZIE INTERCONNECT S351 STILLWATER, OKLAHOMA 138/69kv		
DESCRIPTION: F6 PNL REPLACEMENT & CAP BANK BKR ADDITION						ANNUNCIATOR SCHEMATIC (SHEET 2) PNL 101			
0	RF022-01145	5/9/23	NC	BE	TM	NC	ENGINEER: NC SCALE: NONE DATE: 5/9/23 REV. DRAWN BY: BE DRAWING NO. CHECKED BY: LA/CP P.O. BOX 669 CHOUTEAU, OK 74337 S351SR01-2 APPROVED BY: NC		
REV. NO.	JOB NO.	DATE	DESIGN ENGR	DFTR	DESIGN CHECK	ISSUE APPROVD			



	1	2	3	4	5	6
A	BKR 10870 LOCAL CONTROL		PNL 103 RELAY INOPERATIVE	PNL 104 RELAY INOPERATIVE	BATTERY GROUND	BKR 107 86BF LOCKOUT TRIP
B	BKR 10870 MOTOR TROUBLE	BKR 670 MOTOR TROUBLE		BKR 10870 86BF LOCKOUT TRIP	BUS DIFFERENTIAL LOCKOUT TRIP	BREAKER 81 LOW GAS
C	BKR 10870 LOW SF6 GAS/LO	BKR 670 LOW SF6 GAS/LO	FDR 6 UPLC ALARM	FDR 108 UPLC ALARM	BREAKER 81 LOW GAS LOCKOUT	BREAKER 81 SPRING DISCHARGE
D	BATTERY LOW VOLTAGE	BATTERY LOSS OF AC	BATTERY HIGH VOLTAGE SHUTDOWN	BREAKER 81 LOSS OF VOLTAGE	86V/50P/51P-BKR 81 RELAY INOPERATIVE PNL 104	86T-81 LOR TCM PNL 104
E	86T-81 LOR TRIP PNL 104	50BF/50A/51A-BKR 81 RELAY INOPERATIVE PNL 104	86BF-81 LOR TCM PNL 104	86BF-81 LOR TRIP PNL 104	87L/21P/67P-FDR 6 RELAY INOPERATIVE PNL 105	86TTP-FDR 6 LOR TCM PNL 105
F	86TTP-FDR 6 LOR TRIP PNL 105	21A/67A-FDR 6 RELAY INOPERATIVE PNL 105	50BF/25/79-BKR 670 RELAY INOPERATIVE PNL 105	86BF-670 LOR TCM PNL 105	86BF-670 LOR TRIP PNL 105	CAPACITOR BANK CAN FAILURE

ANNUNCIATOR SEL-2523



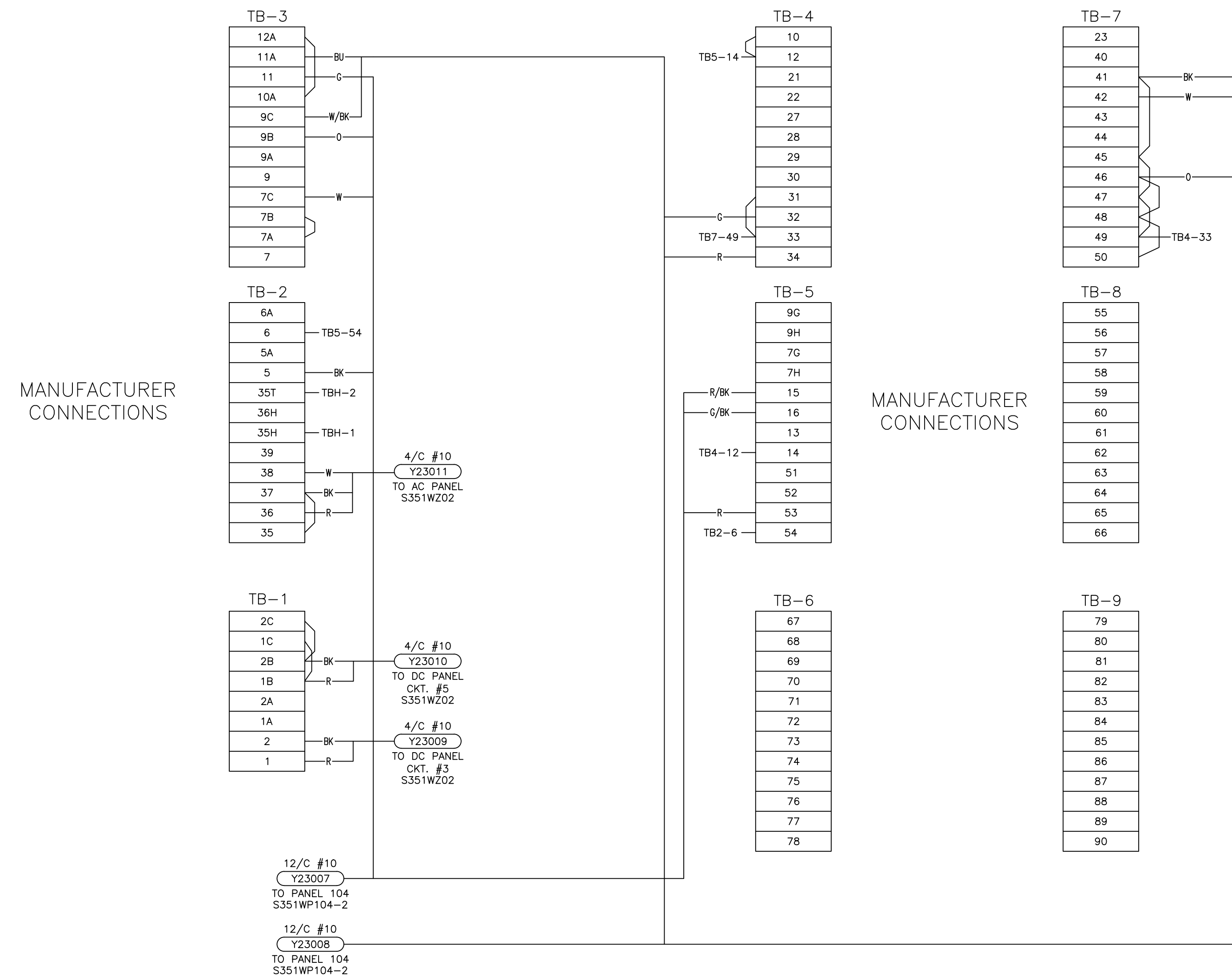
4555 W MEMORIAL RD.
OKLAHOMA CITY, OK 73142

ISSUED FOR CONSTRUCTION

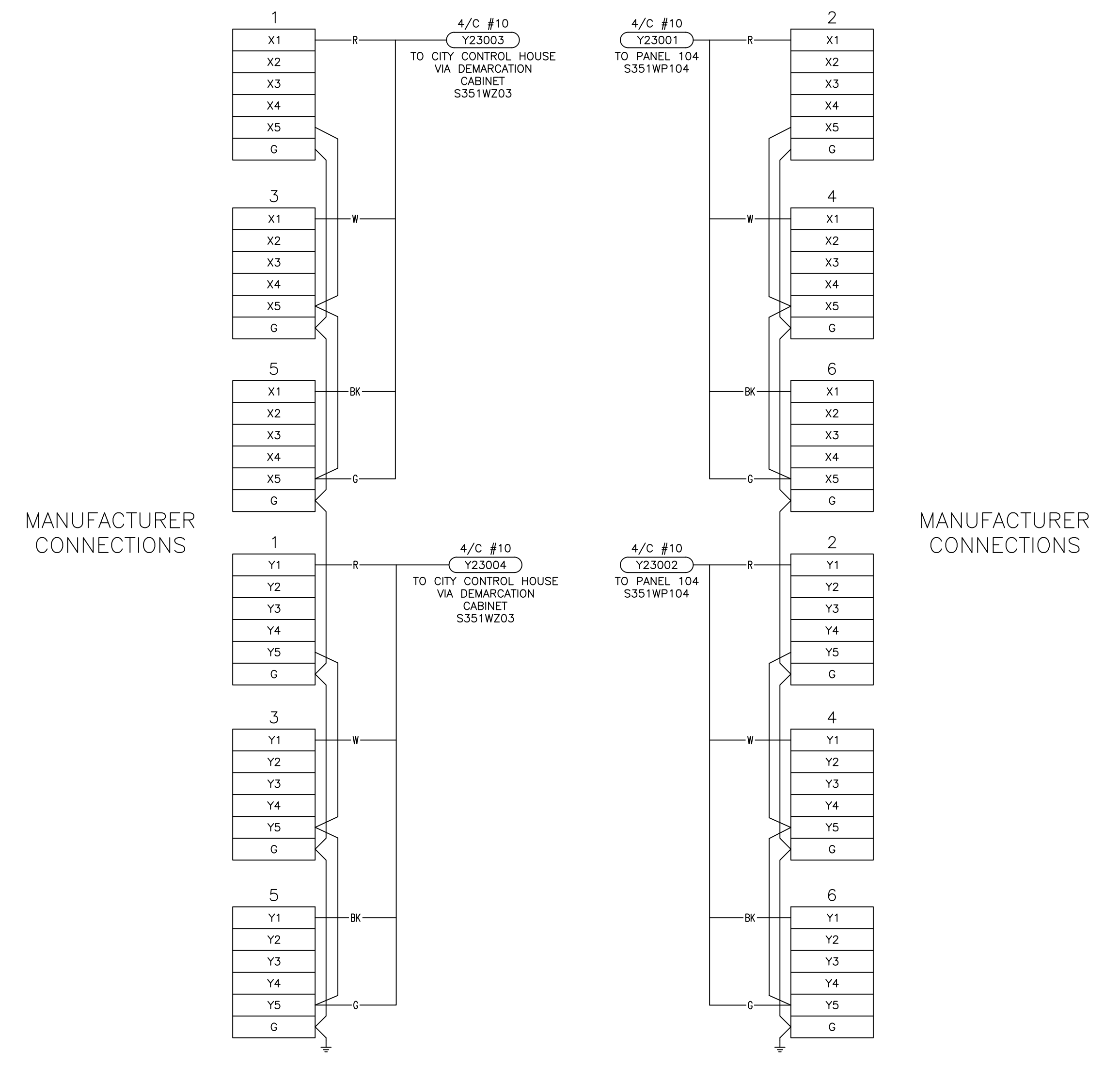
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7	RF022-01145	8/24/2023	NC	BE	TM	NC	STILLWATER KINZIE INTERCONNECT S351				
DESCRIPTION: F6 PNL REPLACEMENT & CAP BANK BKR ADDITION							STILLWATER, OKLAHOMA 138/69kV				
6	RF022-01145	5/9/23	NC	BE	TM	NC	ANNUNCIATOR NAMEPLATE				
DESCRIPTION: REVISED "B6", "C5", "C6"											
5	-	15 NOV 16	-	JT	RELAY	-					
DESCRIPTION: REVISED "C4"											
4	-	16 AUG 16	-	JT	RELAY	-					
REV NO.	JOB NO.	DATE	DESIGN ENGR	DFTR	DESIGN CHECK	ISSUE APPROVD					
							ENGINEER:		SCALE: NONE	DATE: 7/16/13	REV.
							DRAWN BY:		DRAWING NO.		7
							CHECKED BY:		S351SR01		
							APPROVED BY:				



P.O. BOX 669
CHOUTEAU, OK 74337



MANUFACTURER CONNECTIONS

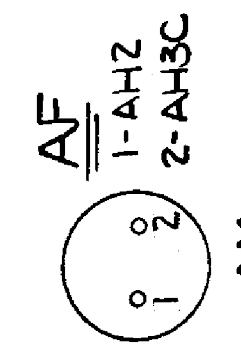
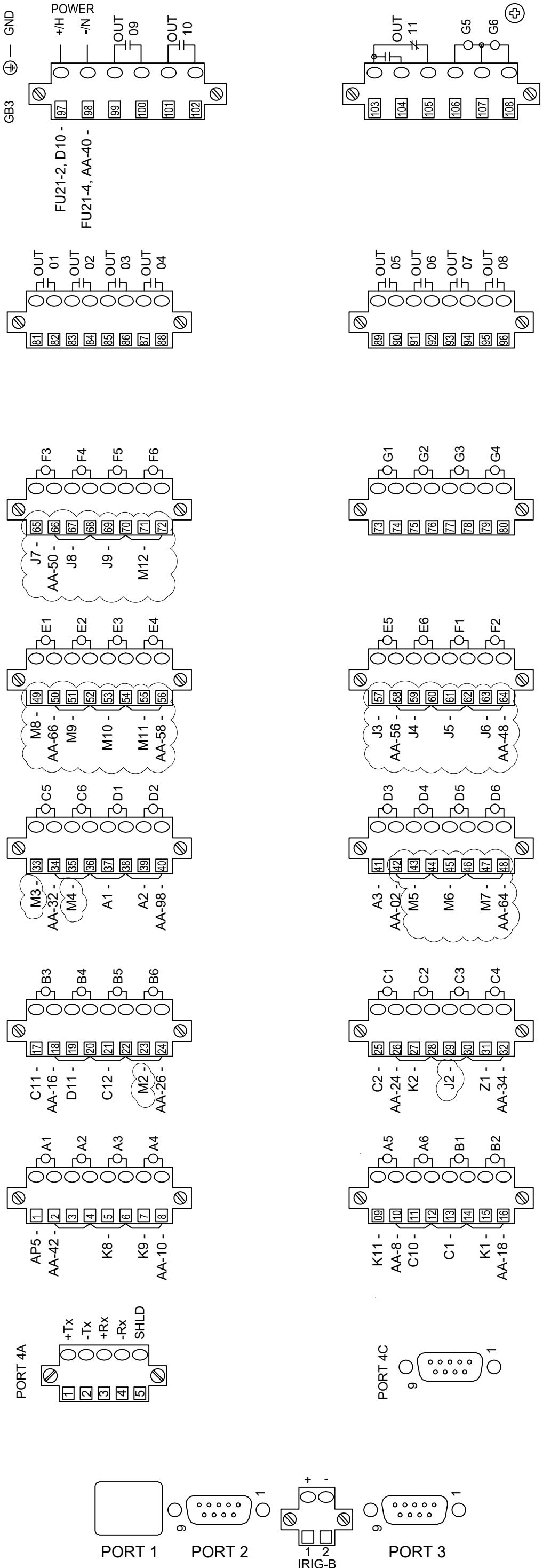


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1	RF022-01145	8/24/2023	NC	BE	TM	NC	GRAND RIVER DAM AUTHORITY STILLWATER KINZIE INTERCONNECT S351 STILLWATER, OKLAHOMA 138/69kV			
DESCRIPTION: F6 PNL REPLACEMENT & CAP BANK BKR ADDITION							WIRING DIAGRAM 69kV CIRCUIT BREAKER 81			
0	RF022-01145	5/9/23	NC	BE	TM	NC	ENGINEER: NC SCALE: NONE DATE: 5/9/23 REV. DRAWN BY: BE DRAWING NO. S351WB81 CHECKED BY: TM P.O. BOX 669 CHOUTEAU, OK 74337 APPROVED BY: NC			
REV. NO.	JOB NO.	DATE	DESIGN ENGR	DFT	DESIGN CHECK	ISSUE APPROV				

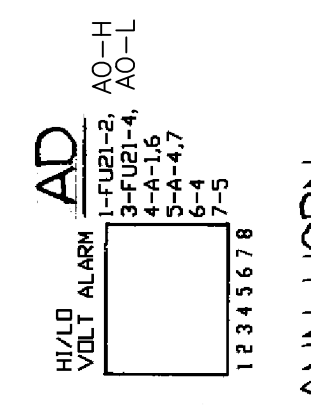
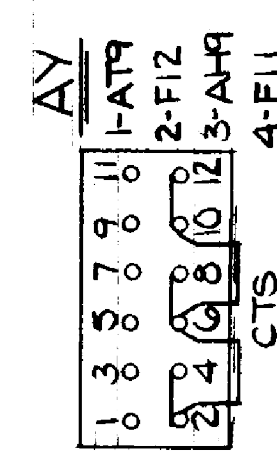
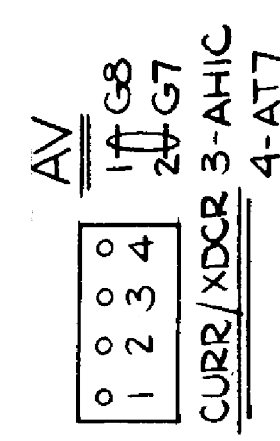
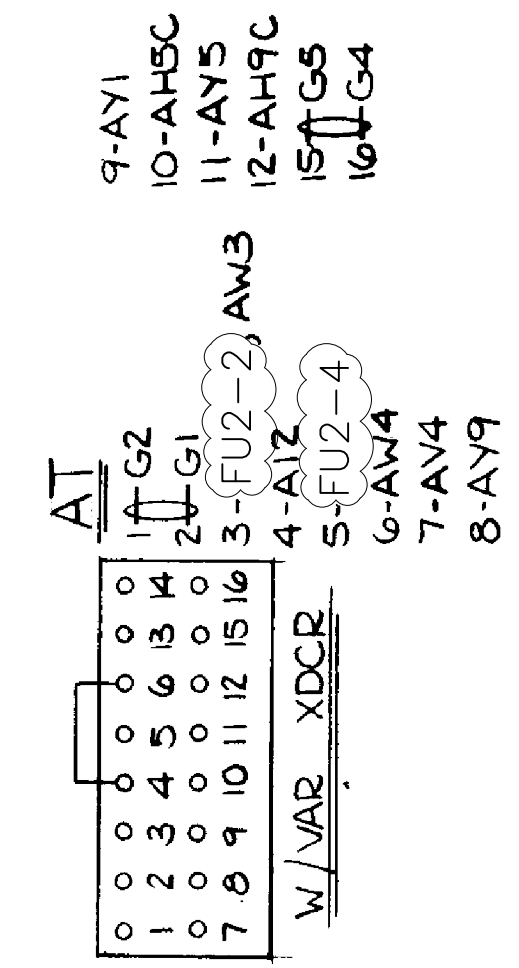
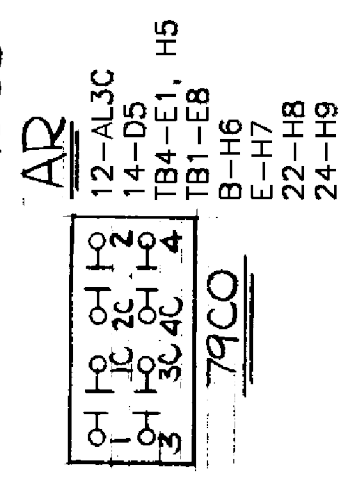
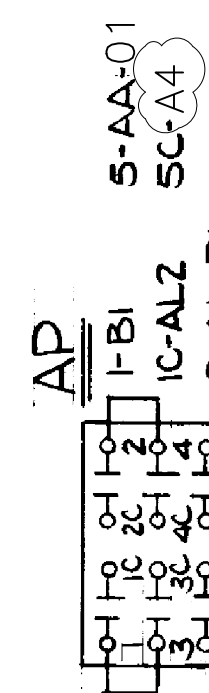
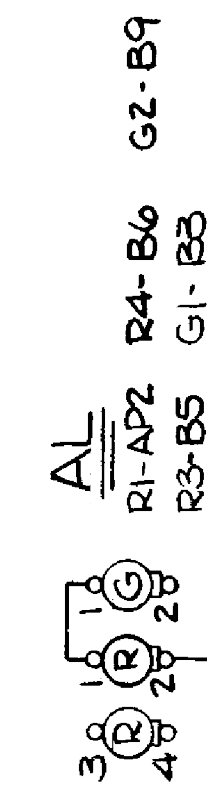
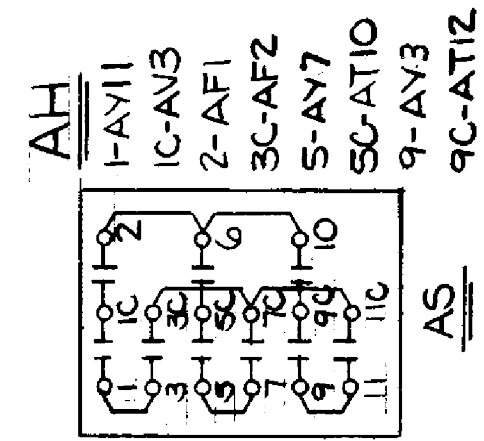


4555 W MEMORIAL RD.
OKLAHOMA CITY, OK 73142

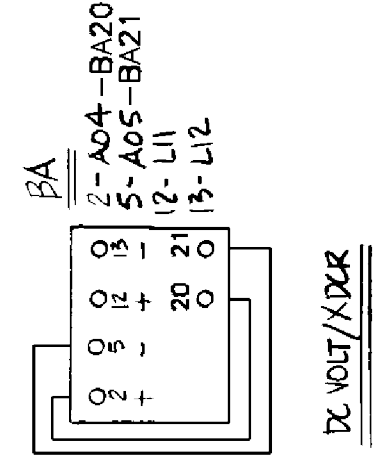
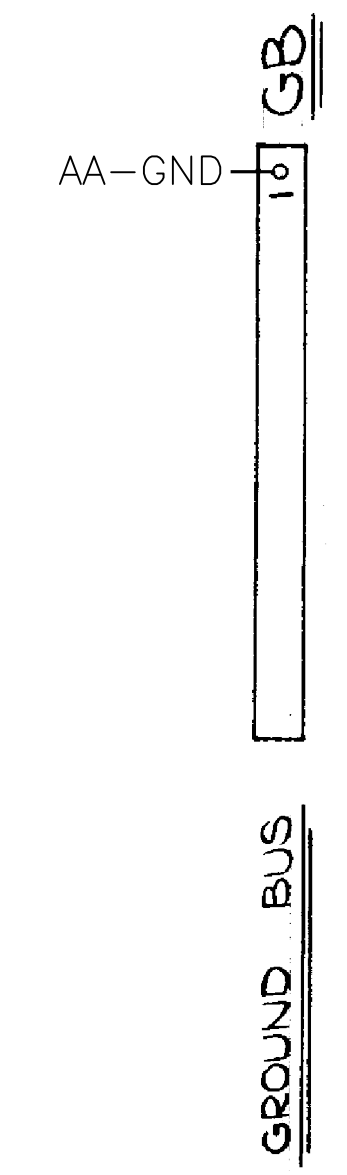
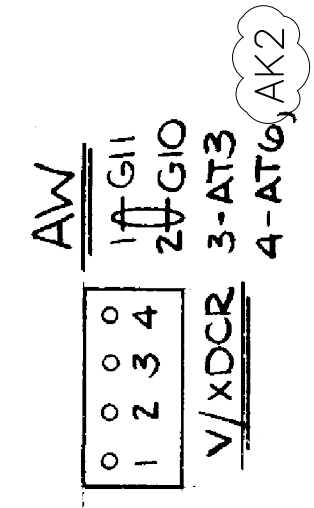
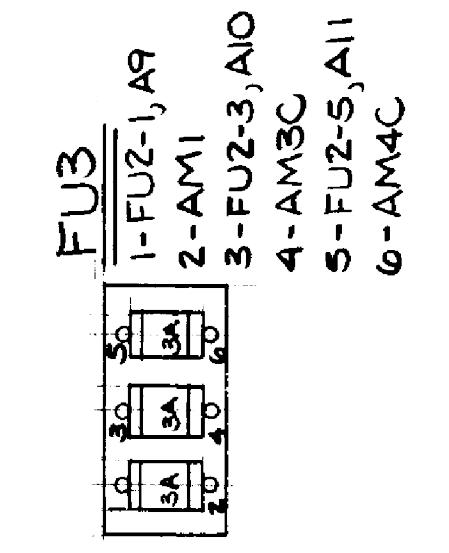
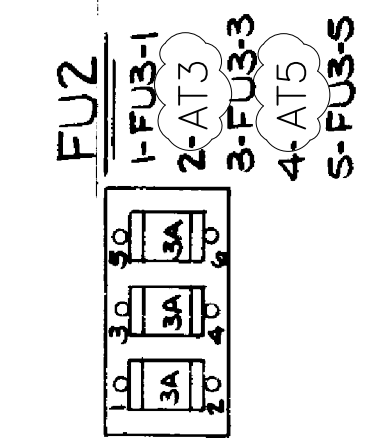
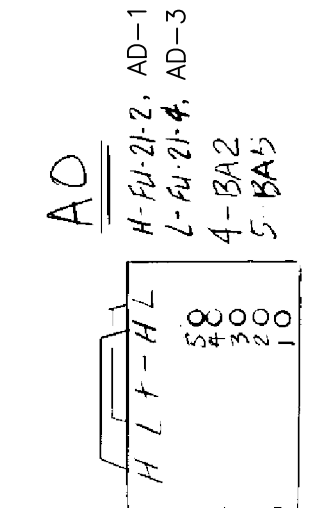
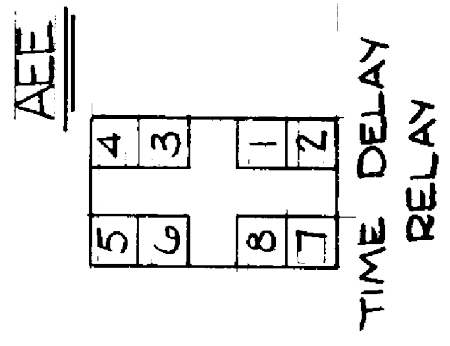
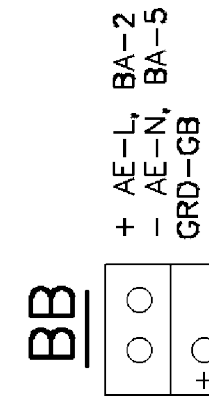
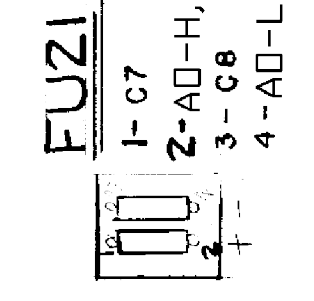
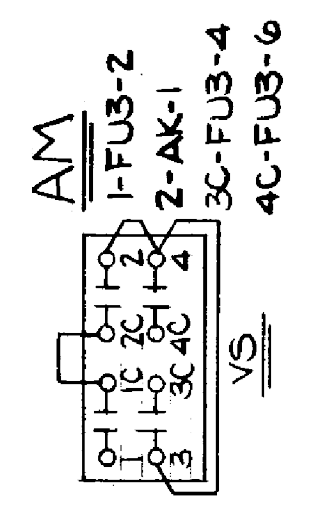
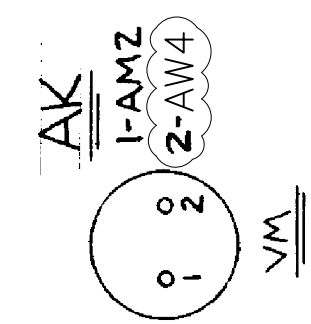
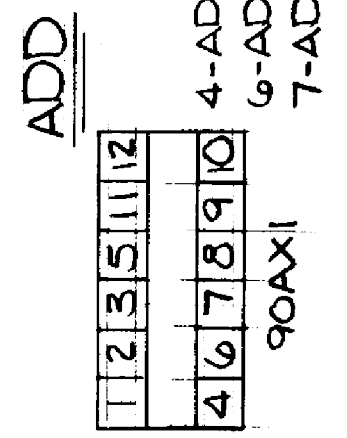
AA
SEL 2323



AM



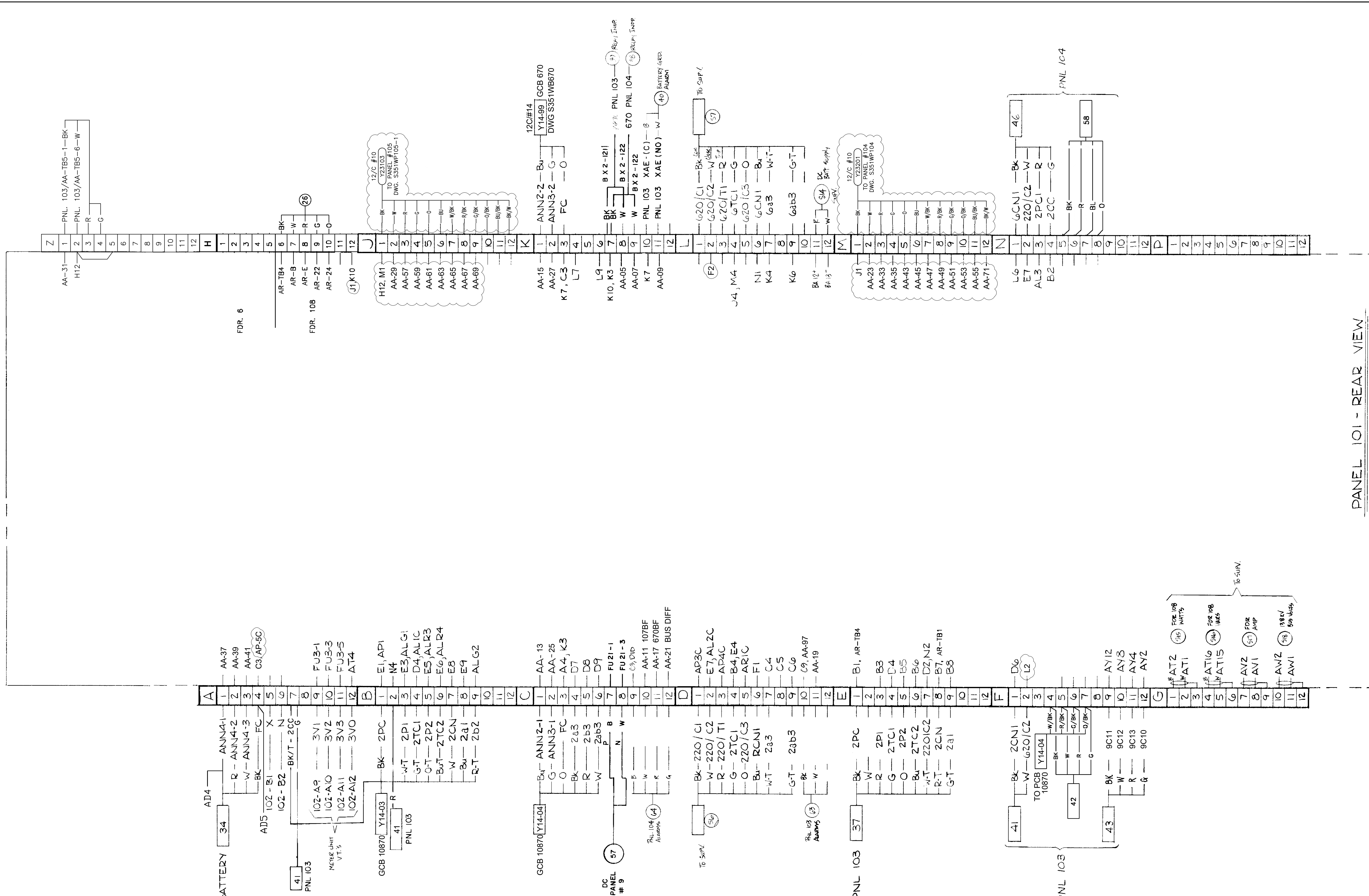
ANUN HORN



DESCRIPTION: ISSUED FOR BID						ISSUED FOR BID			
2	RF022-01145	8/24/2023	NC	BE	TM	NC	GRAND RIVER DAM AUTHORITY STILLWATER KINZIE INTERCONNECT S351 STILLWATER, OKLAHOMA 138/69KV		
DESCRIPTION: F6 PNL REPLACEMENT & CAP BANK BKR ADDITION						WIRING DIAGRAM PANEL 101			
1	RF022-01145	5/9/23	NC	BE	TM				NC
DESCRIPTION: REVISED "AA"						ENGINEER: SCALE: NONE DATE: 4/27/87 DRAWN BY: DRAWING NO. CHECKED BY: S351WP101-2 APPROVED BY: OLD DRAWING NO: 014591_9			
H		8/16/16		JT	RELAY				
DESCRIPTION: REPLACED ANNUNCIATOR						P.O. BOX 669 CHOUTEAU, OK 74337			
G	RF: 570-S351	10/15/13	RELAY	AS	LS				LS
REV NO.	JOB NO.	DATE	DESIGN ENGR	DFT	DESIGN CHECK	ISSUE APPROV	REV. 2		



4555 W MEMORIAL RD.
OKLAHOMA CITY, OK 73142



PANEL 101 - REAR VIEW

ISSUED FOR BID

DESCRIPTION: ISSUED FOR BID		2		RF022-01145	8/24/2023	NC	BE	TM	NC
DESCRIPTION: REVISED PER RELAY NOTES		1		RF022-01145	5/9/23	NC	BE	TM	NC
DESCRIPTION: REVISED PER RELAY NOTES		J		-	16 AUG 16	-	JT	RELAY	-
DESCRIPTION: REVISED PER RELAY NOTES		I		-	03 AUG 15	-	JT	RELAY	-
REV NO.	JOB NO.	DATE	DESIGN ENGR	DFT	DESIGN CHECK	ISSUE APPROV			

HARLO
CORPORATION
SMALL BUSINESS

DR. BY: J. YOB
CHK. BY: [Signature]

DRAWING NO. 14591 SH. 10
REV H

GRAND RIVER DAM AUTHORITY
STILLWATER KINZIE INTERCONNECT S351
STILLWATER, OKLAHOMA 138/69K

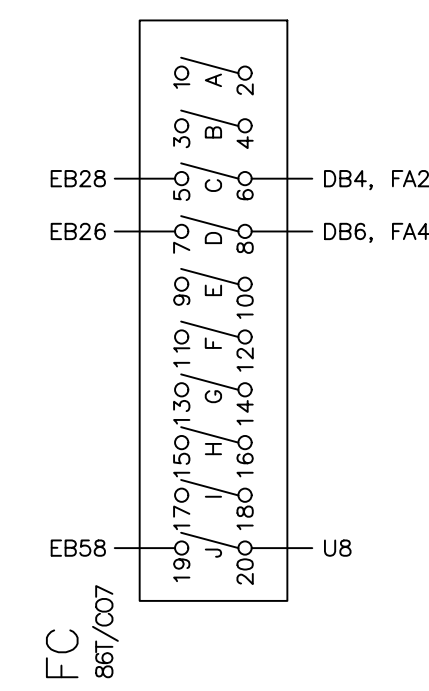
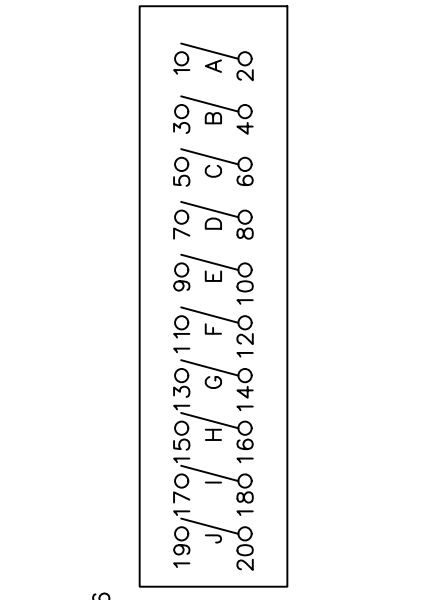
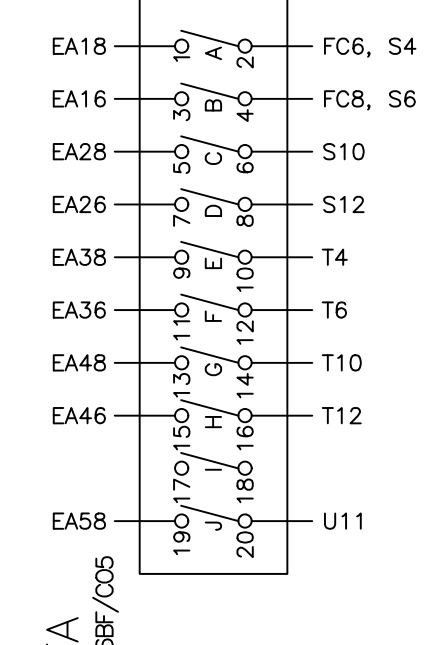
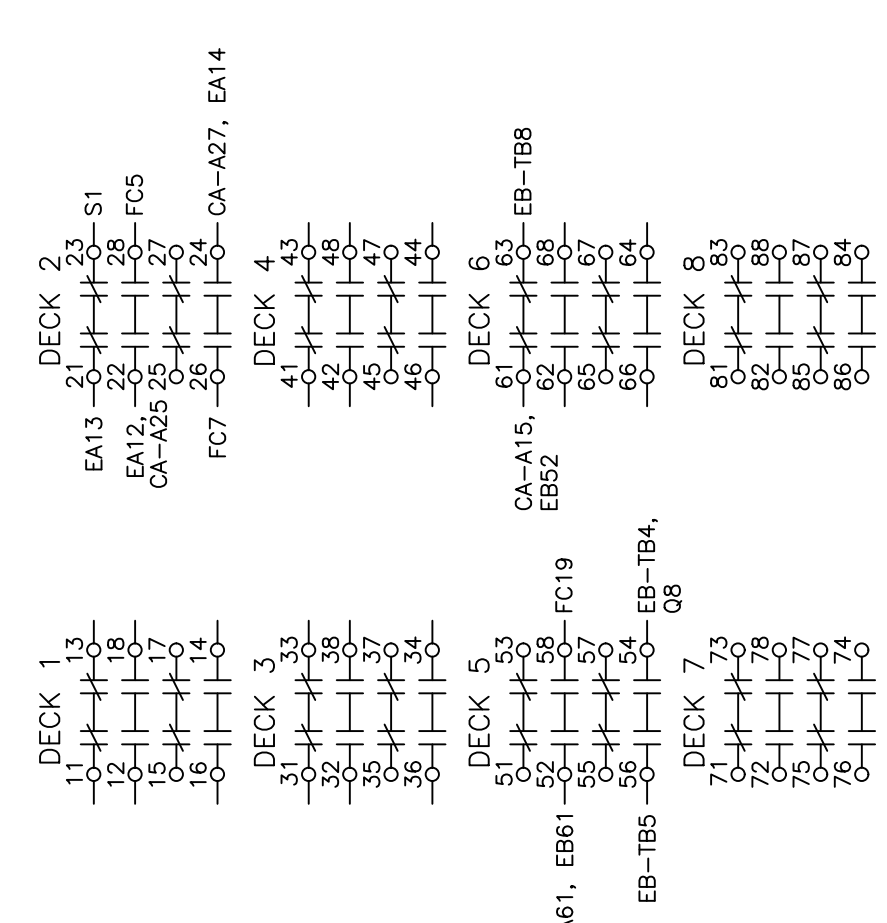
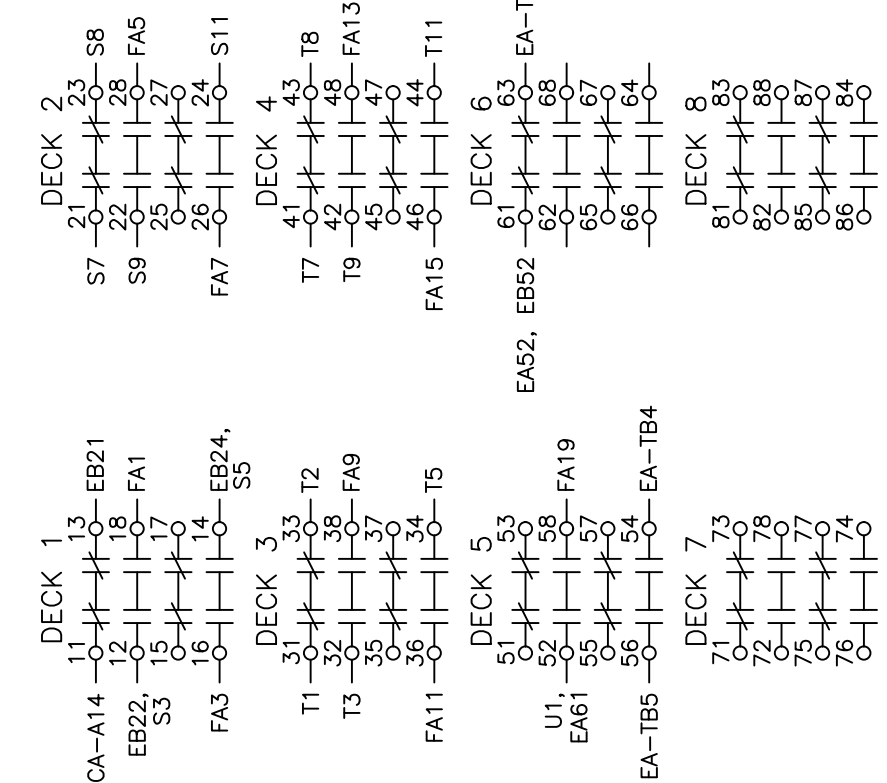
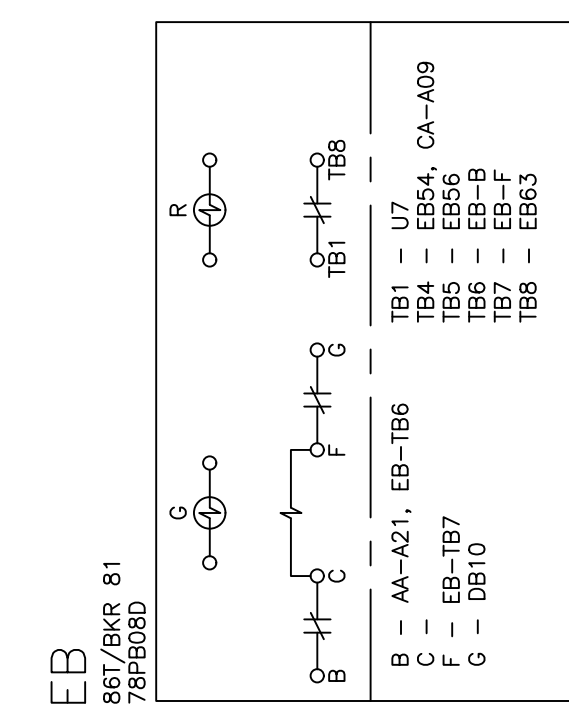
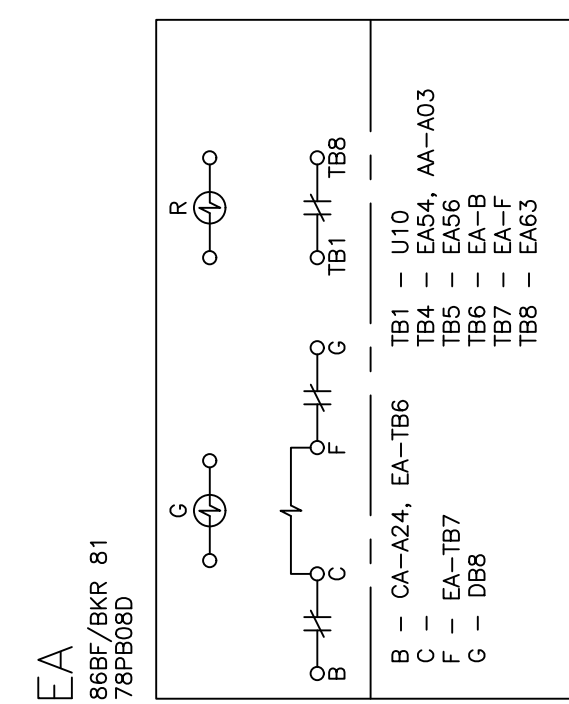
**TERMINAL BLOCK WIRING DIAGRAM
PANEL 101**

GRDA
P.O. BOX 669
CHOUTEAU, OK 74337

ENGINEER: [Signature]
DRAWN BY: [Signature]
CHECKED BY: [Signature]
APPROVED BY: [Signature]

SCALE: NONE
DATE: 4/27/87
DRAWING NO. S351WP101
REV. 2

CONTINUED ON SHEET 2



FT-19R
FRPH-001-001-001A

REFERENCE DRAWINGS:

- S351DT01 CABLE SCHEDULE 2023 CONSTRUCTION
- S351SD001 CAP BANK SEL-487V PRI. PROTECTION PANEL 104
- S351SD002 DC SCHEMATIC BKR FAIL RELAY (50BF/50A/51A-351S) 69kV BKR 81 PNL #104
- S351SO15 ONE-LINE DIAGRAM 138kV AND CITY AUTOTRANSFORMER
- S351SO18 THREE-LINE DIAGRAM GRDA 69kV CAPACITOR BANK
- S351SR01-1 ANNUNCIATOR SCHEMATIC (SHEET 1)
- S351SR01-2 ANNUNCIATOR SCHEMATIC (SHEET 2)
- S351WP101 TERMINAL BLOCK WIRING DIAGRAM PANEL 101
- S351WP101-2 WIRING DIAGRAM PANEL 101
- S351WP104 WIRING DIAGRAM PANEL 104 - 69kV CAPACITOR BANK & 138kV BUS DIFFERENTIAL
- S351WP104-2 RELAY PNL 104 CAP BANK WIRING DIAGRAM (SH. 2 OF 3)
- S351WP105-1 WIRING DIAGRAM 138kV FDR 6 & BKR 670 PNL #105 (SH. 1 OF 2)
- S351WP105-2 WIRING DIAGRAM 138kV FDR 6 & BKR 670 PNL #105 (SH. 2 OF 2)
- S351WZ02 CONTROL BUILDING AC/DC PANEL



4555 W MEMORIAL RD.
OKLAHOMA CITY, OK 73142

ISSUED FOR BID

GRAND RIVER DAM AUTHORITY
STILLWATER KINZIE INTERCONNECT S351
STILLWATER, OKLAHOMA 138/69kV

RELAY PNL 104 CAP BANK
WIRING DIAGRAM (SH. 3 OF 3)

REV	JOB NO.	DATE	DESIGN ENGR	DFTR	DESIGN CHECK	ISSUE APPROVD
1	RF022-01145	8/24/2023	NC	BE	TM	NC
0	RF022-01145	5/9/23	NC	BE	TM	NC

GRDA
P.O. BOX 669
CHOUTEAU, OK 74337

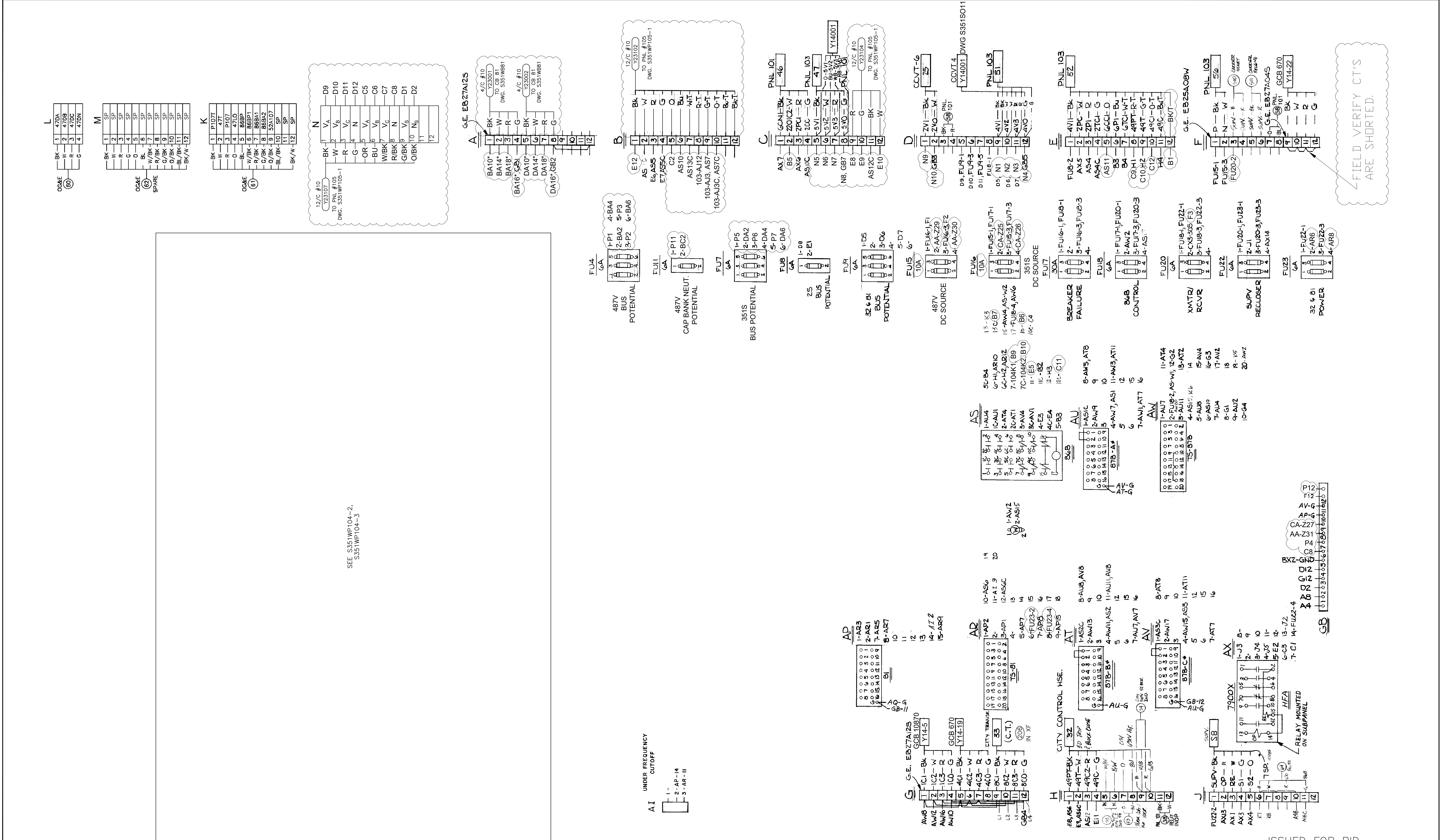
ENGINEER: NC	SCALE: NONE	DATE: 5/9/23	REV.
DRAWN BY: BE	CHECKED BY: TM	APPROVED BY: NC	1
DRAWING NO. S351WP104-3			

REFERENCE DRAWINGS
 S351SO12 THREE LINE AC CURRENT SCHEMATIC
 S351SO15 OGE INTERCONNECT ONLINE DIAGRAM METERING & RELAYING
 S351WP101 WIRING DIAGRAM PANEL 101

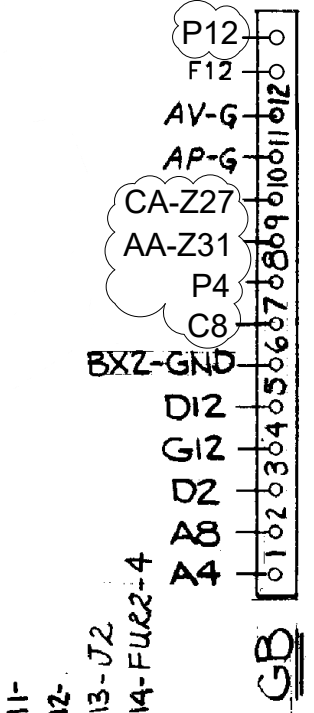
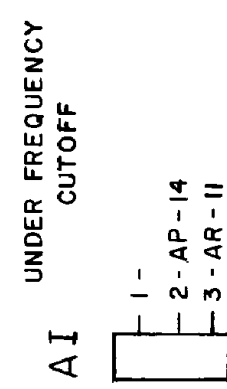
HARLO CORPORATION		
DR. BY: J. YOB	DRAWING NO. D4591	REV. 13
CHK. BY: E.A.J.		

DESCRIPTION: ISSUED FOR BID	2	RF022-01145	8/24/2023	NC	BE	TM	NC
DESCRIPTION: F6 PNL REPLACEMENT & CAP BANK BKR ADDITION	1	RF022-01145	5/9/23	NC	BE	TM	NC
DESCRIPTION: REVISED "AA"	L	-	16 AUG 16	-	JT	RELAY	-
DESCRIPTION: BREAKER CHANGEOUT	K	-	03 AUG 15	-	JT	RELAY	-
REV. NO.	JOB NO.	DATE	DESIGN ENGR	DFTF	DESIGN CHECK	ISSUE APPROV	

ISSUED FOR BID			
GRAND RIVER DAM AUTHORITY STILLWATER KINZIE INTERCONNECT S351 STILLWATER, OKLAHOMA 138/69KV			
WIRING DIAGRAM PANEL 104 - 69KV CAPACITOR BANK & 138KV BUS DIFFERENTIAL			
ENGINEER: GRDA	SCALE: NONE	DATE: 5/11/87	REV. 2
DRAWN BY:	DRAWING NO. S351WP104		
CHECKED BY:			
APPROVED BY:			



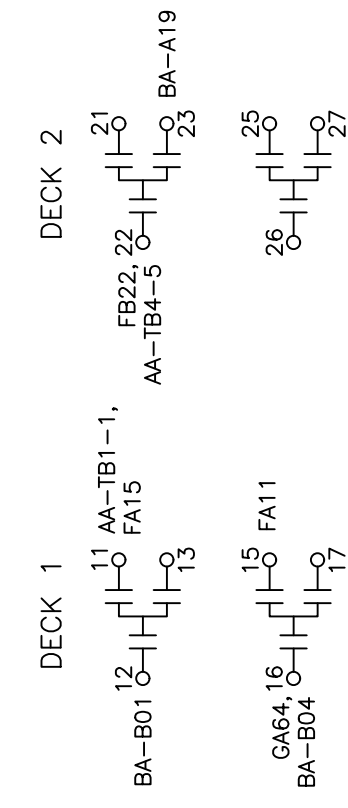
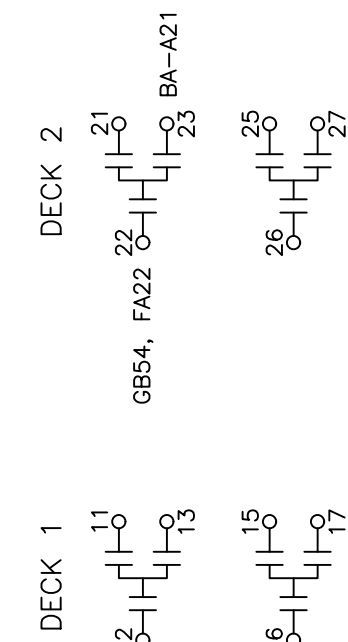
SEE S351WP104-2,
S351WP104-3



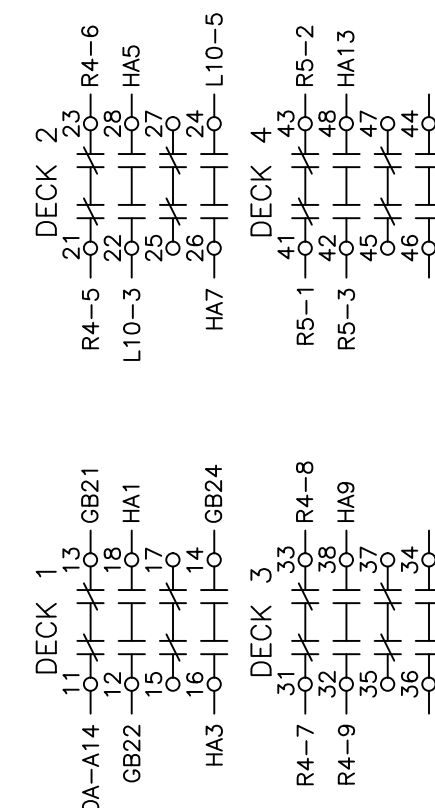
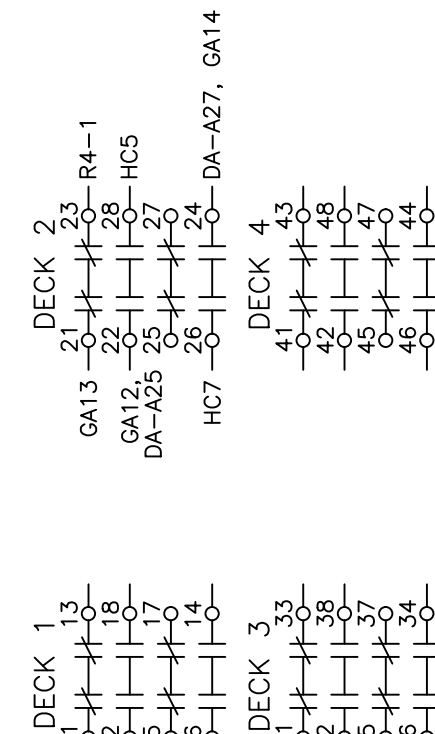
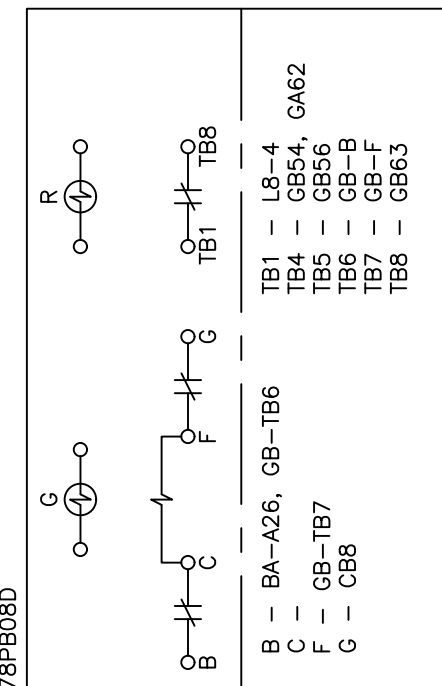
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FB
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24202B

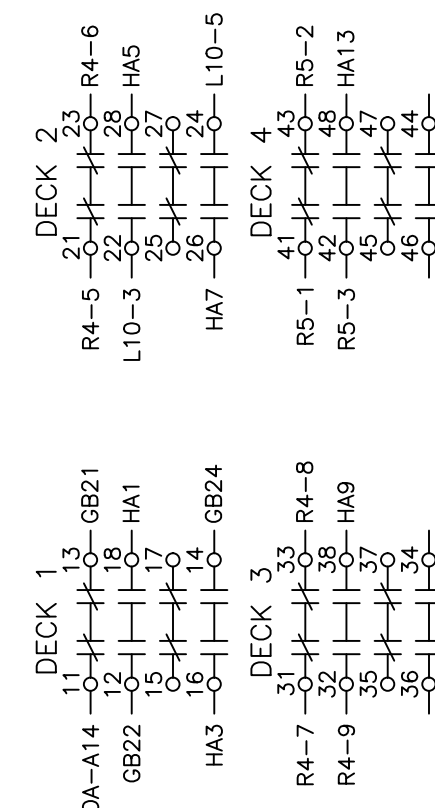
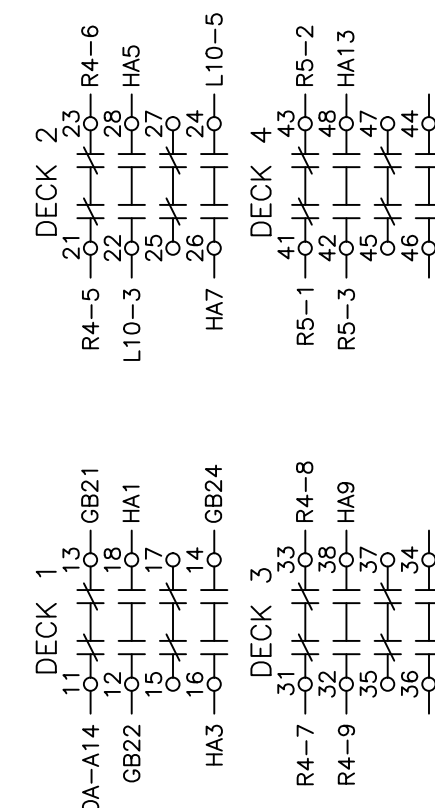
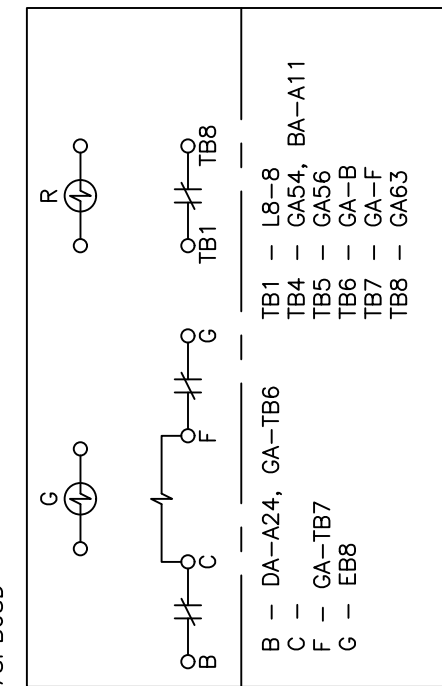
FA
85CO/FDR 6
24202B



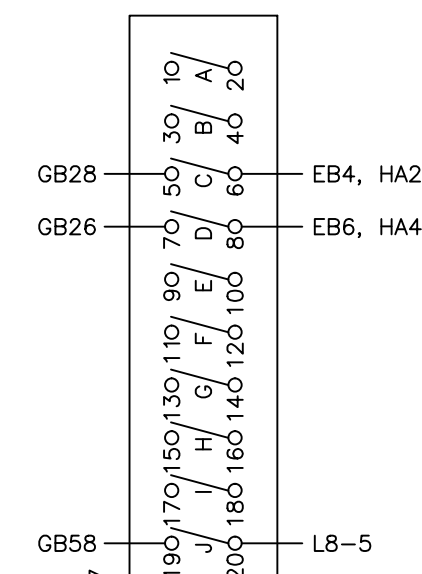
GB
86TTP/FDR 6
78F606D



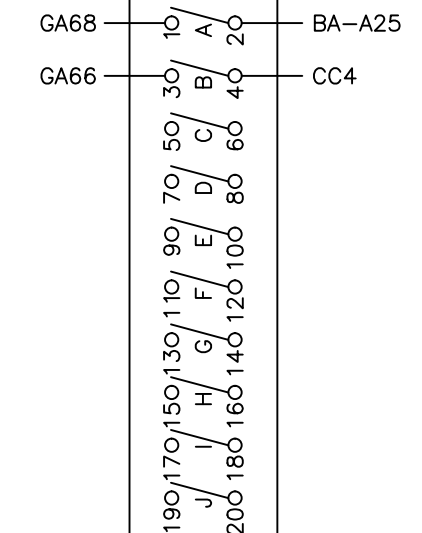
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86BF/670
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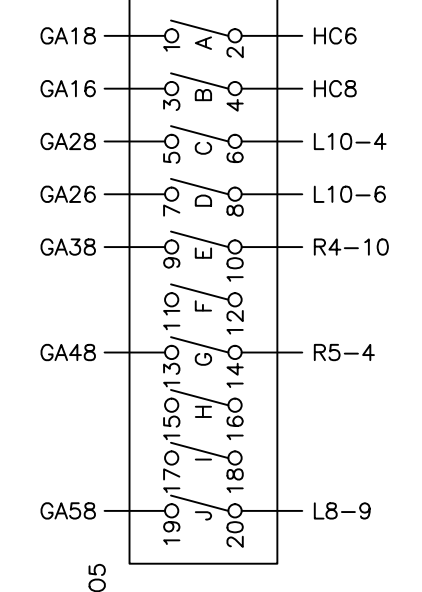
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86TTP/CO7



HB
86BF/CO6

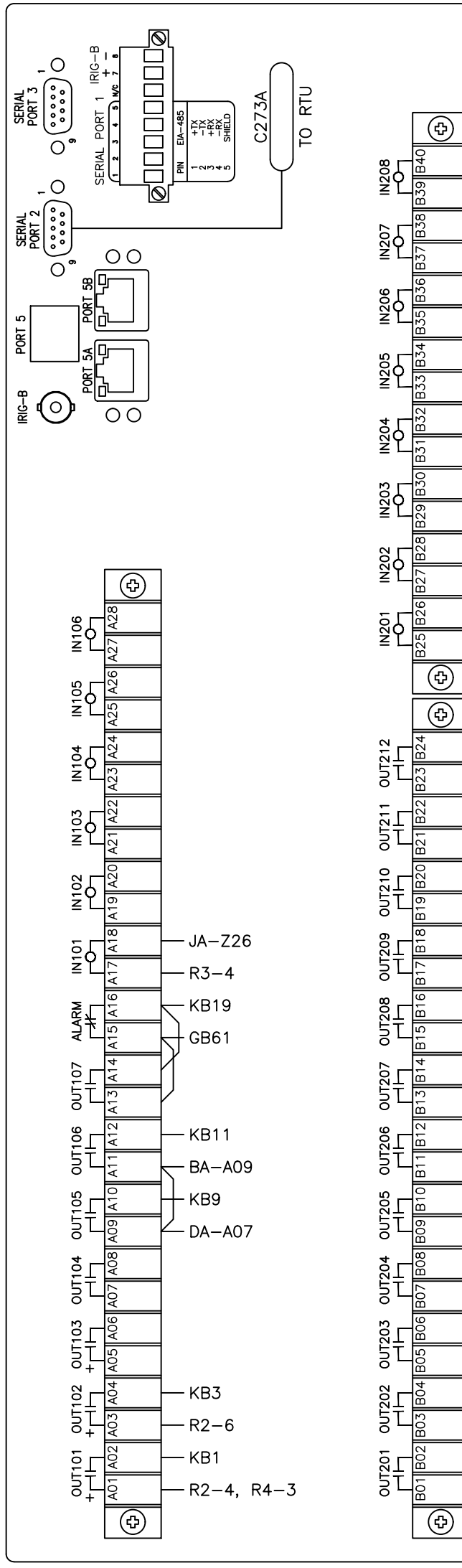


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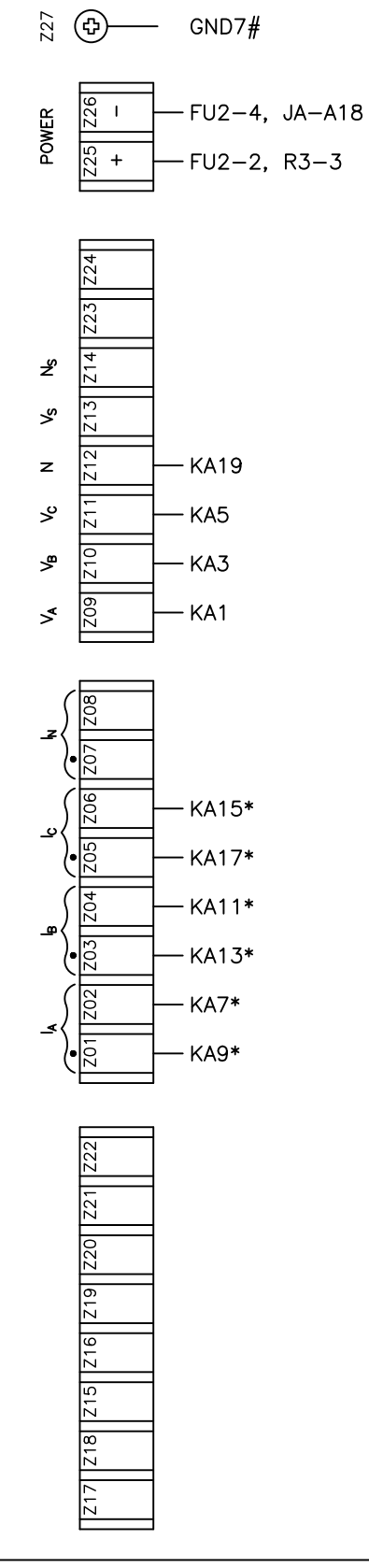


FT-19R
FR2H-001-001-001A

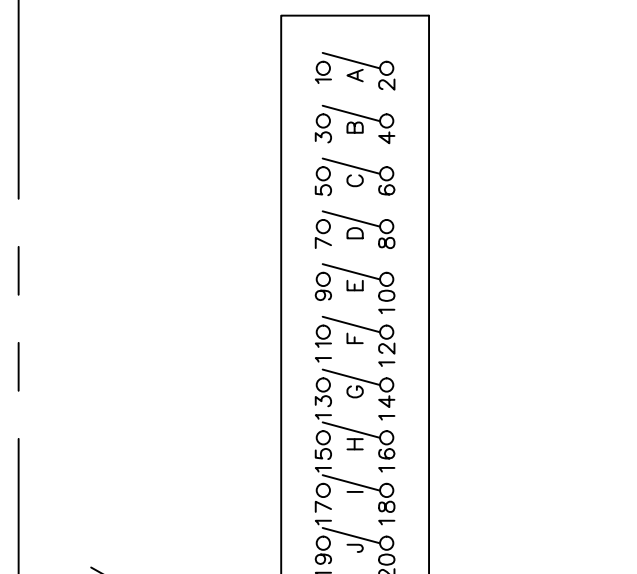
JA
21A/67A/FDR 6
SEL-311C



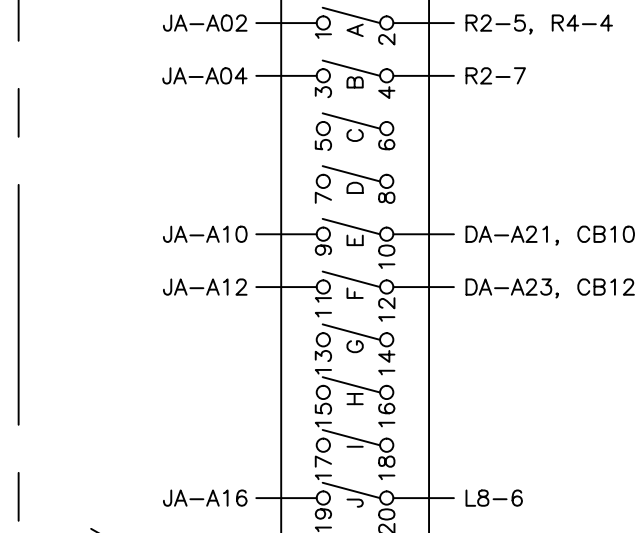
PORT Z EA-232
PORT Z EA-232



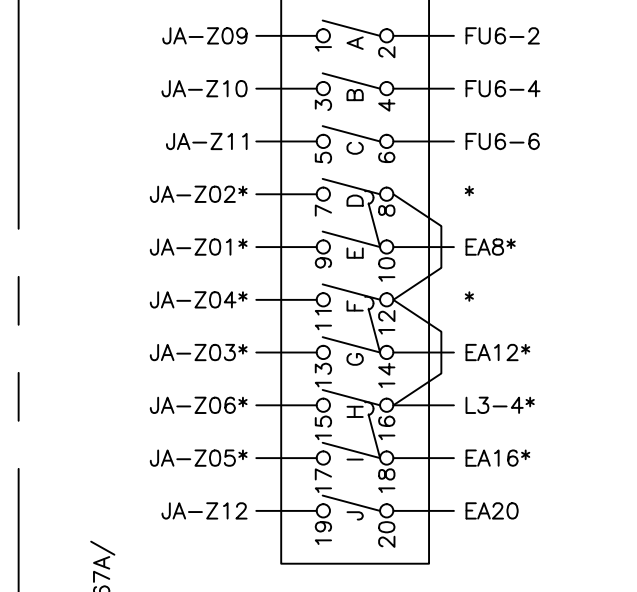
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21A/67A/
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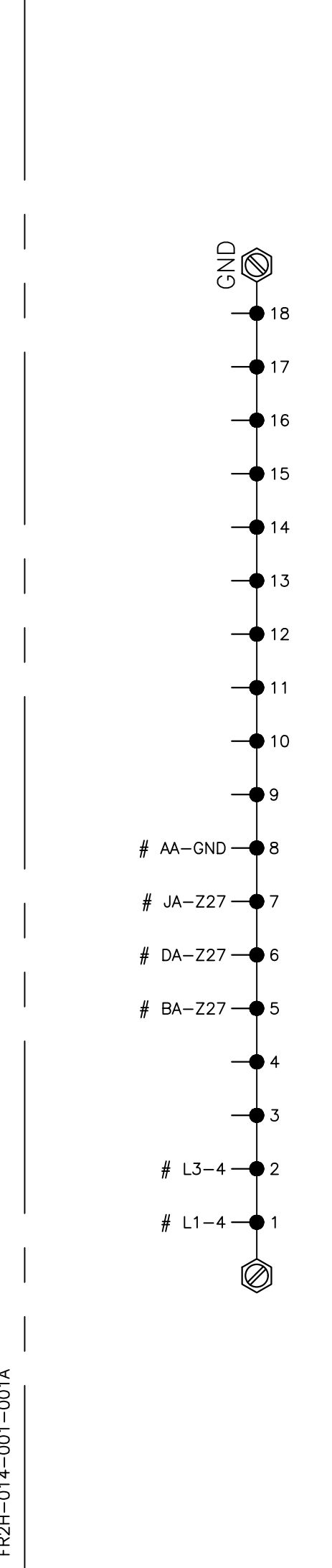
KB
21A/67A/
CO8



KA
21A/67A/
TS3



FT-19R
FR2H-014-001-001A



REFERENCE DRAWINGS:

- S351DT01 CABLE SCHEDULE 2023 CONSTRUCTION
- S351SF061 PRIMARY RELAY 138kV FDR 6
- S351SF062 BKR FAIL RELAY 138kV BKR 670
- S351SF063 ALTERNATE RELAY 138kV FDR 6
- S351SF064 CARRIER (UPLC2) FDR 6
- S351SO12 THREE LINE AC CURRENT SCHEMATIC
- S351SO13 THREE LINE AC POTENTIAL SCHEMATIC
- S351SO15 ONE-LINE DIAGRAM 138kV AND CITY AUTOTRANSFORMER
- S351SR01-1 ANNUNCIATOR SCHEMATIC (SHEET 1)
- S351SR01-2 ANNUNCIATOR SCHEMATIC (SHEET 2)
- S351WP101 TERMINAL BLOCK WIRING DIAGRAM PANEL 101
- S351WP101-2 WIRING DIAGRAM PANEL 101
- S351WP103 WIRING DIAGRAM PANEL 103 CB 10870
- S351WP104 WIRING DIAGRAM PANEL 104 - 69kV CAPACITOR BANK & 138kV BUS DIFFERENTIAL
- S351WP104-2 RELAY PNL 104 CAP BANK WIRING DIAGRAM (SH. 2 OF 3)
- S351WP104-3 RELAY PNL 104 CAP BANK WIRING DIAGRAM (SH. 3 OF 3)
- S351WP105-1 WIRING DIAGRAM 138kV FDR 6 & BKR 670 PNL #105 (SH. 1 OF 2)
- S351WZ02 CONTROL BUILDING AC/DC PANEL



4555 W MEMORIAL RD.
OKLAHOMA CITY, OK 73142

REV NO.	JOB NO.	DATE	DESIGN ENGR	DFT	DESIGN CHECK	ISSUE APPROV

DESCRIPTION: ISSUED FOR BID		1		RF022-01145	8/24/2023	NC	BE	TM	NC
DESCRIPTION: F6 PNL REPLACEMENT & CAP BANK BKR ADDITION		0		RF022-01145	5/9/23	NC	BE	TM	NC
ENGINEER: NC		SCALE: NONE		DATE: 5/9/23		REV.			
DRAWN BY: BE		DRAWING NO.		SHEET 2 OF 2					
CHECKED BY: TM									
APPROVED BY: NC									

ISSUED FOR BID

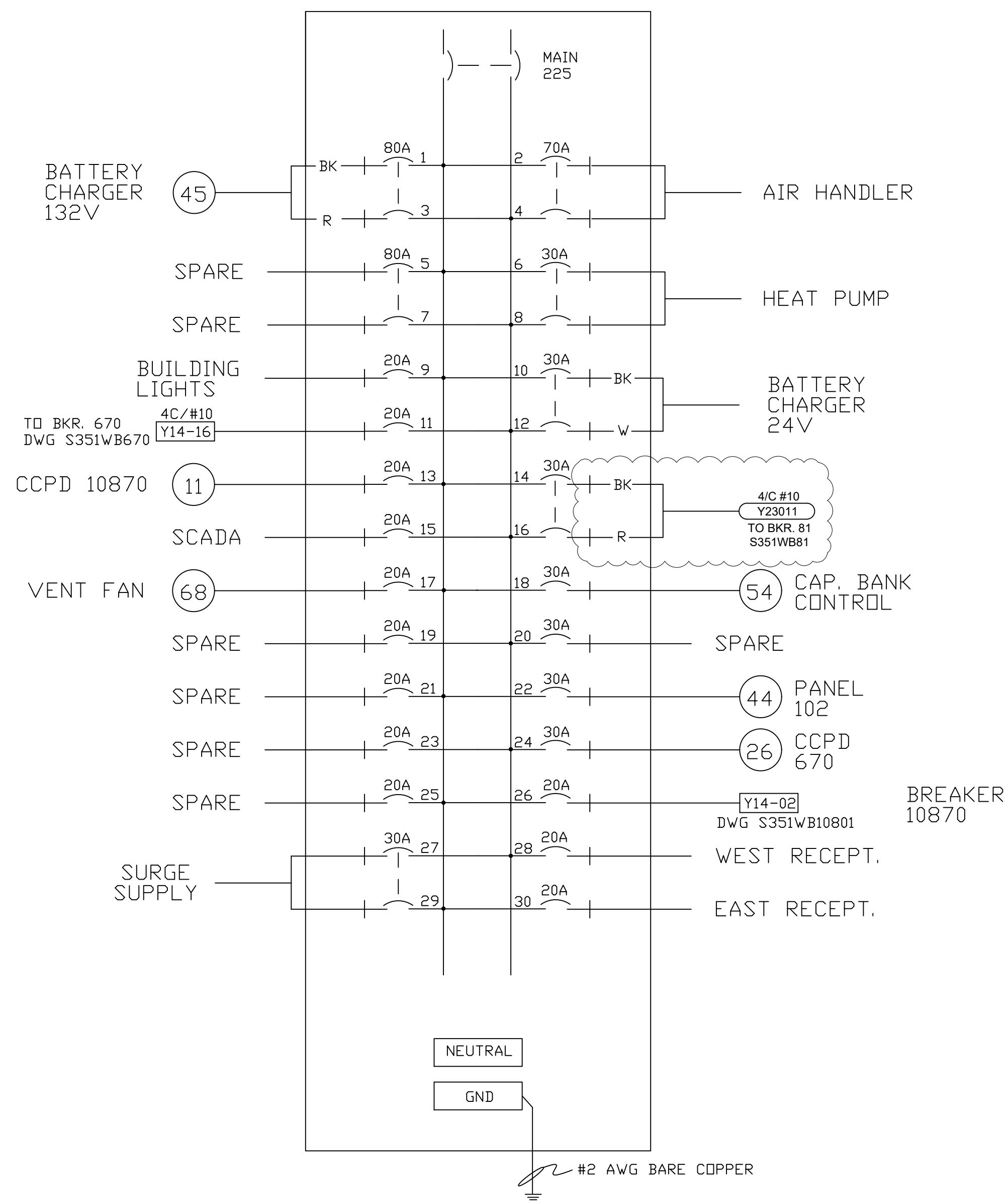
GRAND RIVER DAM AUTHORITY
STILLWATER KINZIE INTERCONNECT S351
STILLWATER, OKLAHOMA 138/69kV

WIRING DIAGRAM
161kV FDR 6 & BKR 670
PNL #105 (SHEET 2 OF 2)



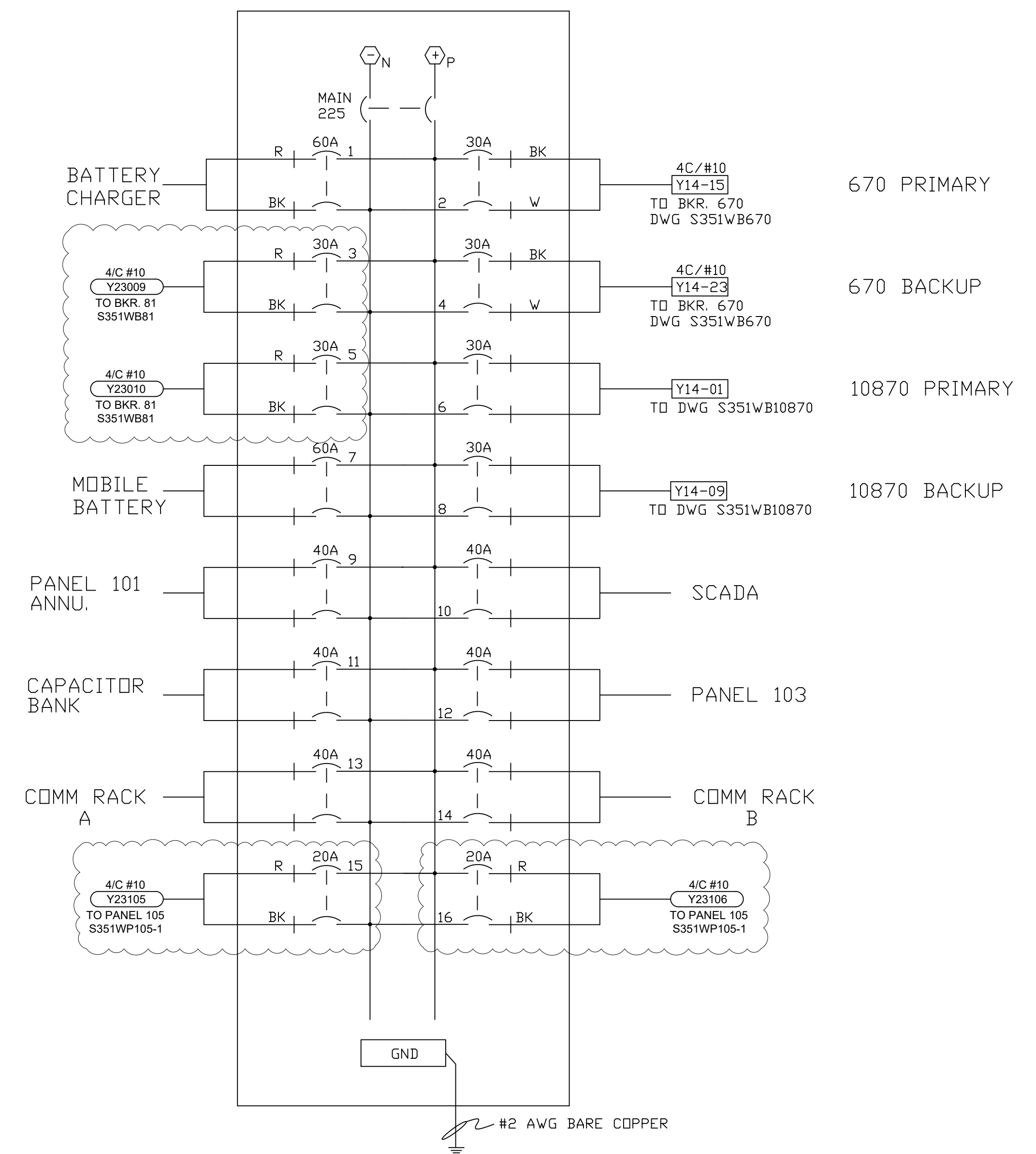
P.O. BOX 669
CHOUTEAU, OK 74337

ALL WIRING SHALL BE GRAY SIS
AWG-14 WIRING SPECIFICATION
* GRAY SIS AWG-12-CURRENT
GREEN SIS AWG-12 GROUND



120/240VAC 1-PHASE PANELBOARD AC4

AC4



125VDC PANELBOARD

DC1



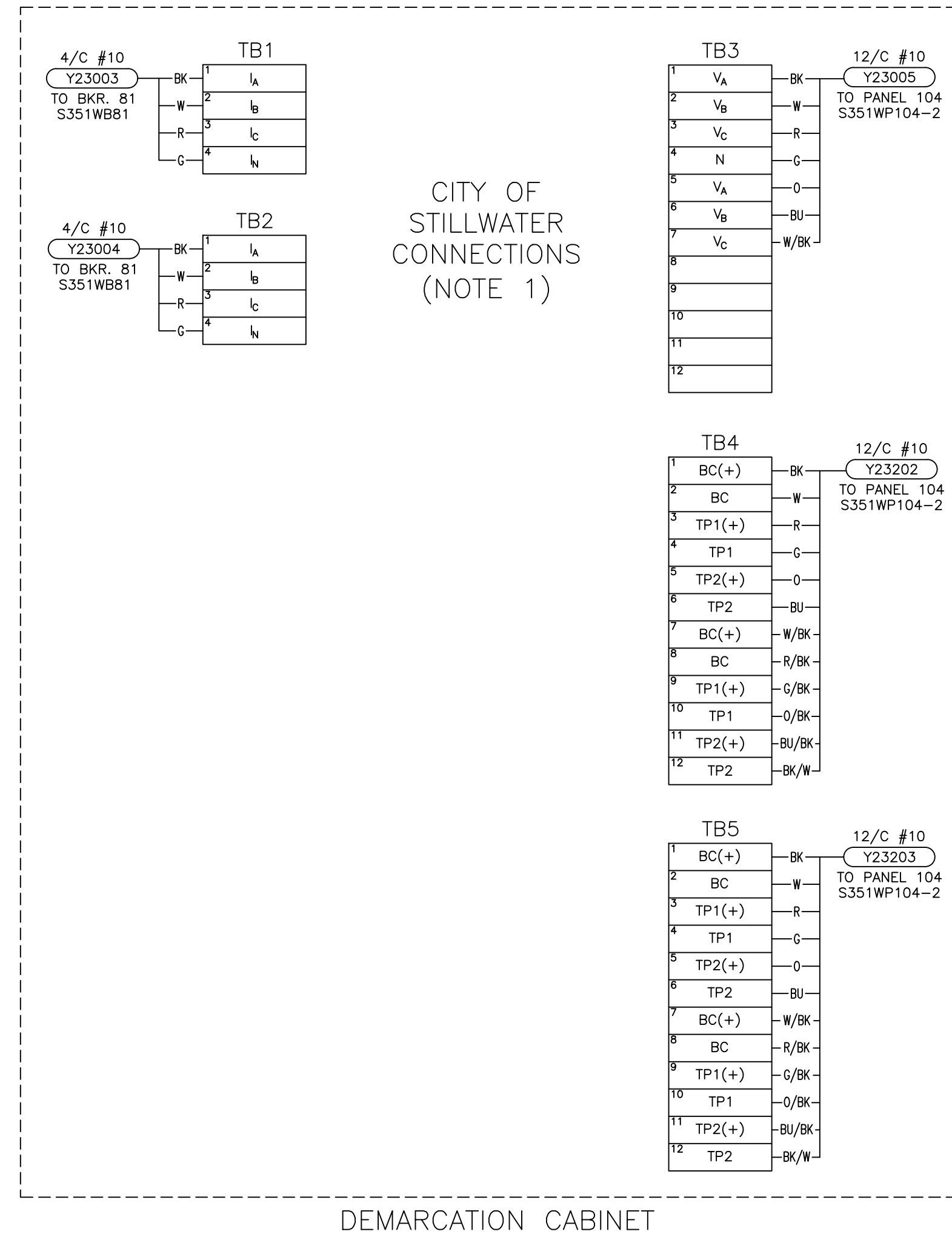
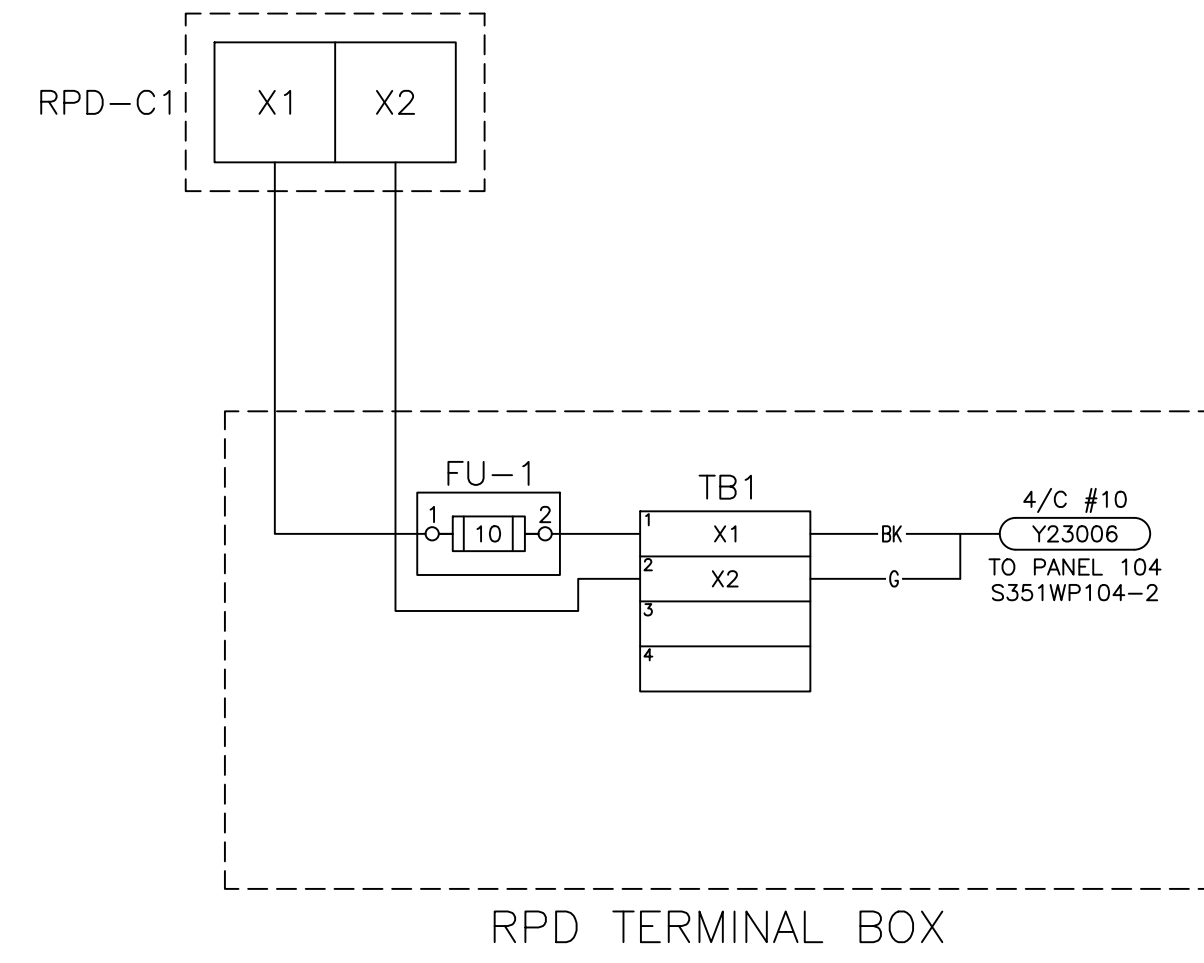
4555 W MEMORIAL RD.
OKLAHOMA CITY, OK 73142

DESCRIPTION: ISSUED FOR BID						
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DESCRIPTION: F6 PNL REPLACEMENT & CAP BANK BKR ADDITION						
3	RF022-01145	5/9/23	NC	BE	TM	NC
BREAKER CHANGEOUT						
2	RF014-00635	04 AUG 15	-	JT	RELAY	-
ASBUILT						
1	-	1/5/05	-	RLS	-	-
REV NO.	JOB NO.	DATE	DESIGN ENGR	DFTR	DESIGN CHECK	ISSUE APPROVD

ISSUED FOR BID			
GRAND RIVER DAM AUTHORITY STILLWATER KINZIE INTERCONNECT S351 STILLWATER, OKLAHOMA 138/69KV			
CONTROL BUILDING AC/DC PANEL			
ENGINEER:	SCALE: NONE	DATE: 1/5/05	REV.
DRAWN BY: RLS	DRAWING NO.		4
CHECKED BY:	S351WZ02		
APPROVED BY:	OLD DRAWING NO: D-2647		



P.O. BOX 669
CHOUTEAU, OK 74337

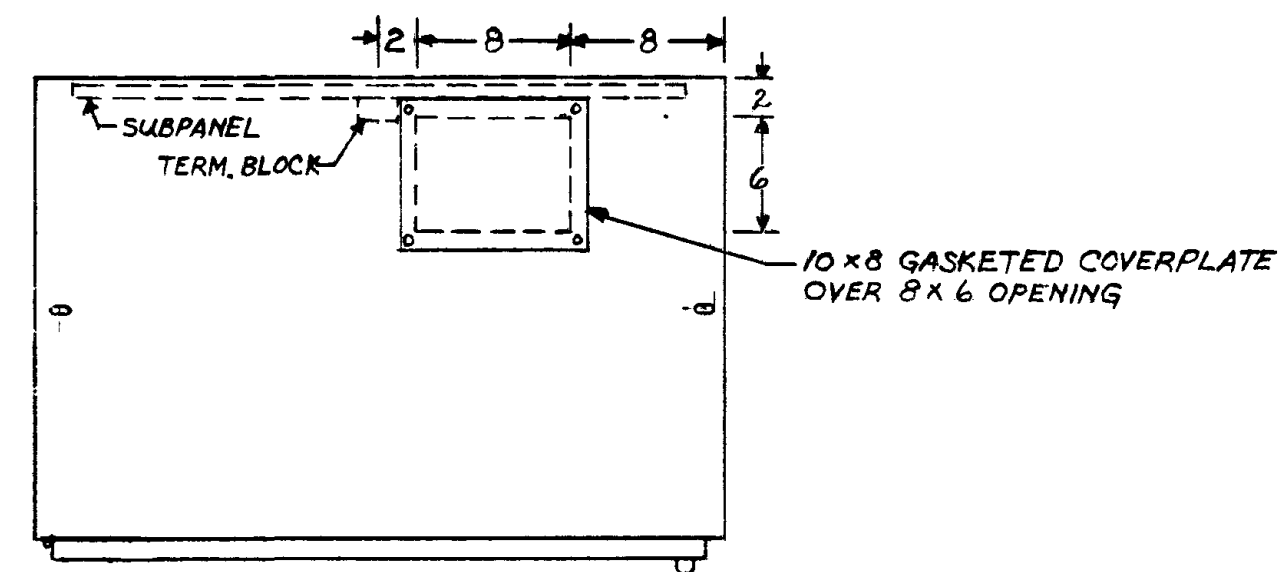


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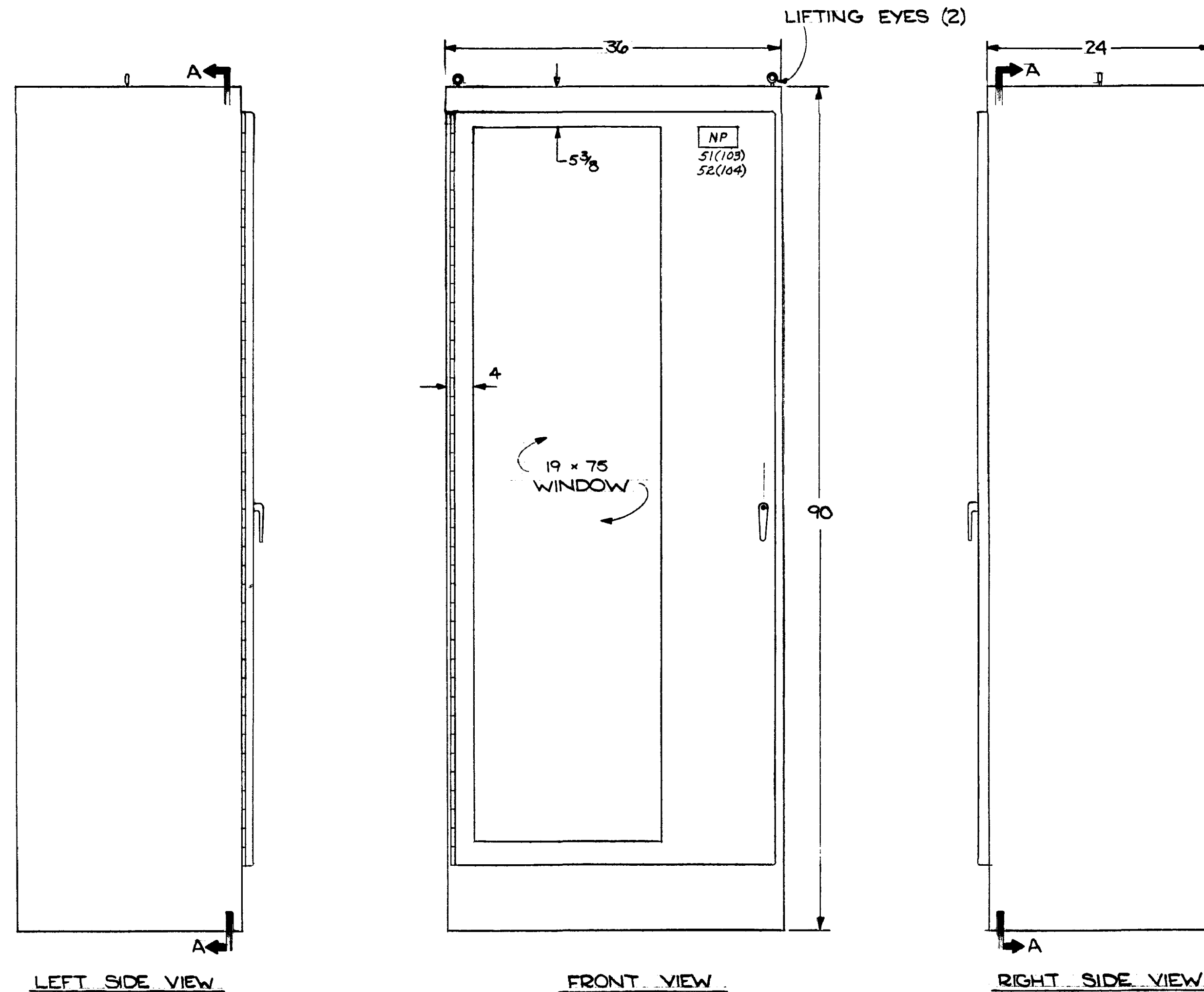
1. FOR 2023 CONSTRUCTION, TEMPORARY CONNECTION TO CITY OF STILLWATER'S SINGLE-PHASE LINE PT TO BE MADE AT POINTS TB3-4 AND TB3-7 AT DEMARCATION CABINET.



DESCRIPTION: ISSUED FOR BID							ISSUED FOR BID			
1	RF022-01145	8/24/2023	NC	BE	TM	NC	GRAND RIVER DAM AUTHORITY STILLWATER KINZIE INTERCONNECT S351 STILLWATER, OKLAHOMA 138/69kV			
DESCRIPTION: F6 PNL REPLACEMENT & CAP BANK BKR ADDITION							WIRING DIAGRAM RPD TERMINAL BOX AND DEMARCATION CABINET			
0	RF022-01145	5/9/23	NC	BE	TM	NC	ENGINEER: NC SCALE: NONE DATE: 5/9/23 REV.			
							DRAWN BY: BE DRAWING NO.			
							P.O. BOX 669 CHOUTEAU, OK 74337			
							S351WZ03			
							APPROVED BY: NC			
REV. NO.	JOB NO.	DATE	DESIGN ENGR	DFTR	DESIGN CHECK	ISSUE APPROVD				



TOP VIEW

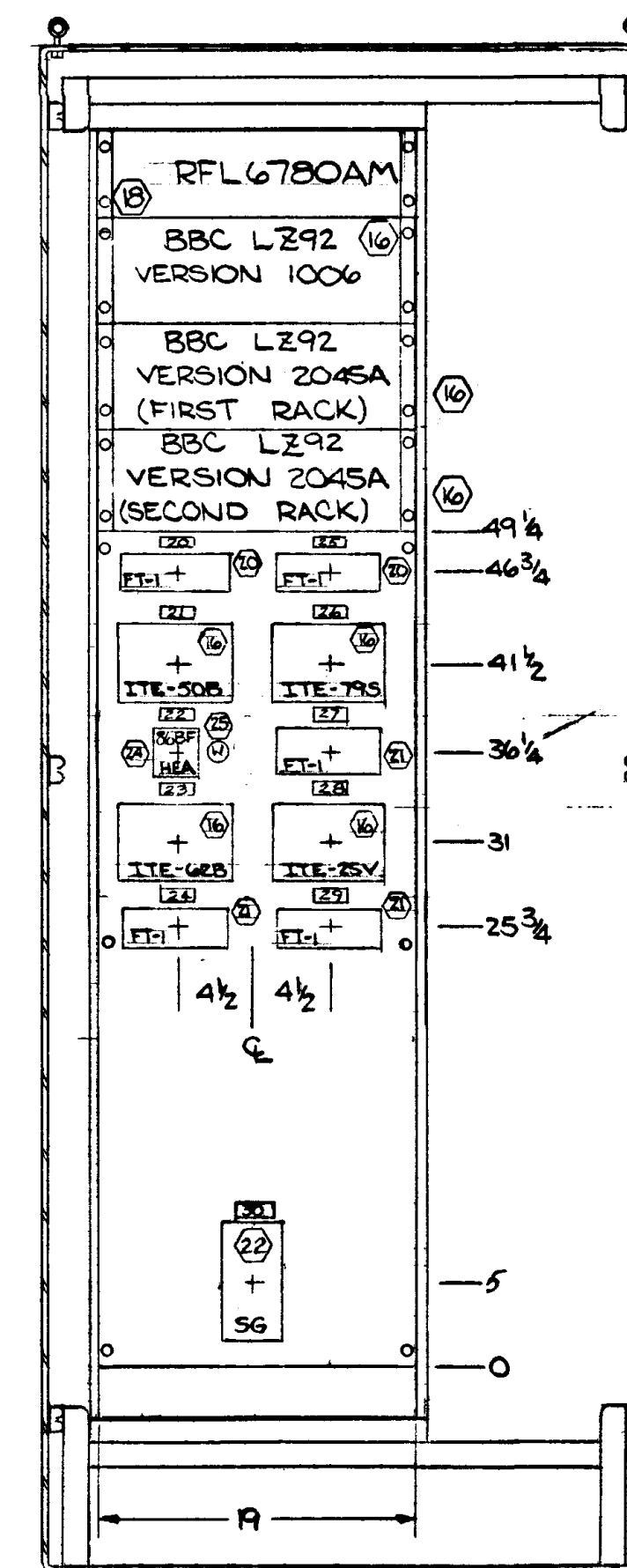


LEFT SIDE VIEW

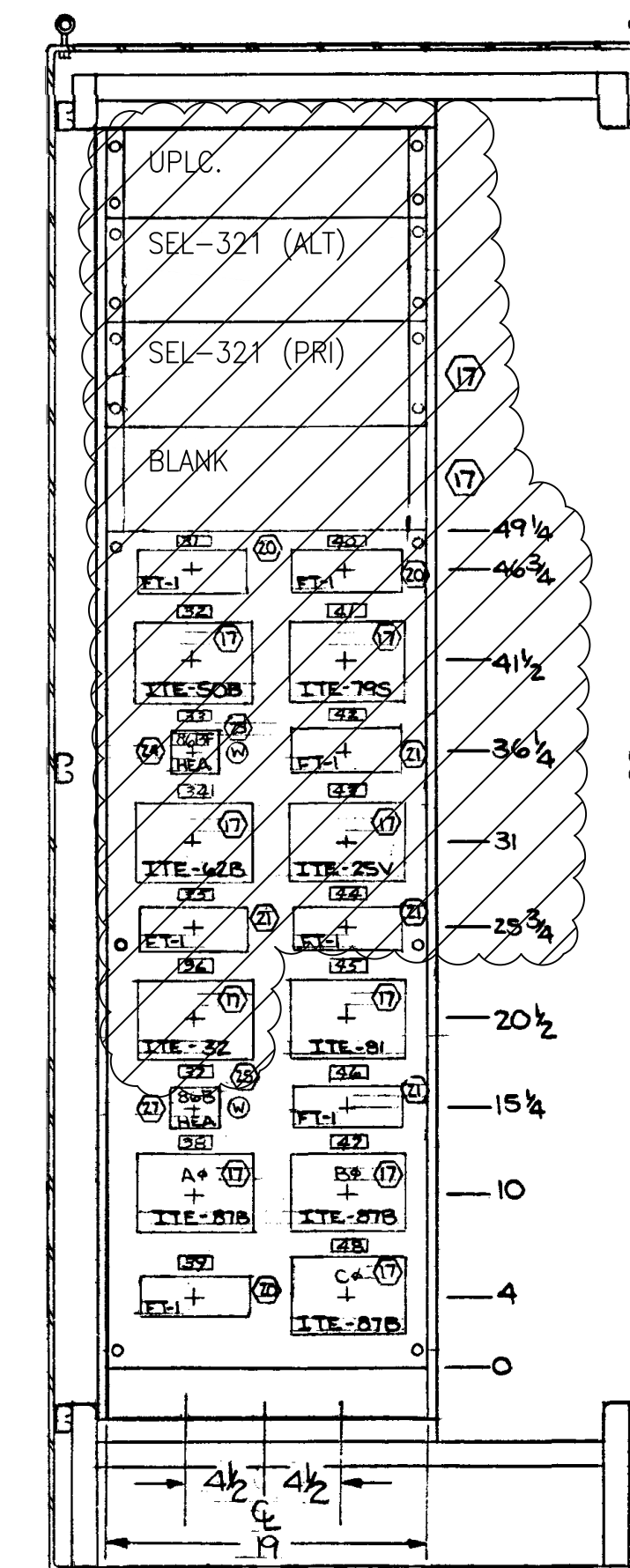
FRONT VIEW

RIGHT SIDE VIEW

Z REQUIRED FOR PANELS 103 & 104



OCB 10870
SECTION A-A
PANEL 103



OCB 670
SECTION A-A
PANEL 104

NOTE

- 1. STRUCTURES ARE HOFFMAN ENGINEERING NEMA 12 ENCLOSURE, CAT. # A-903624FS WITH SWING-OUT RACK MTG. FRAME, CAT. # A-903650F19
- 2. STRUCTURES TO BE PAINTED AS FOLLOWS:
EXTERIOR - ANSI-61 GRAY LACQUER
INTERIOR - HOFFMAN WHITE ENAMEL
- 3. ○ - HARLO BILL OF MATERIAL ITEM NO.



4555 W MEMORIAL RD.
OKLAHOMA CITY, OK 73142

ISSUED FOR CONSTRUCTION

GRAND RIVER DAM AUTHORITY
STILLWATER KINZIE INTERCONNECT S351
STILLWATER, OKLAHOMA 138/69KV

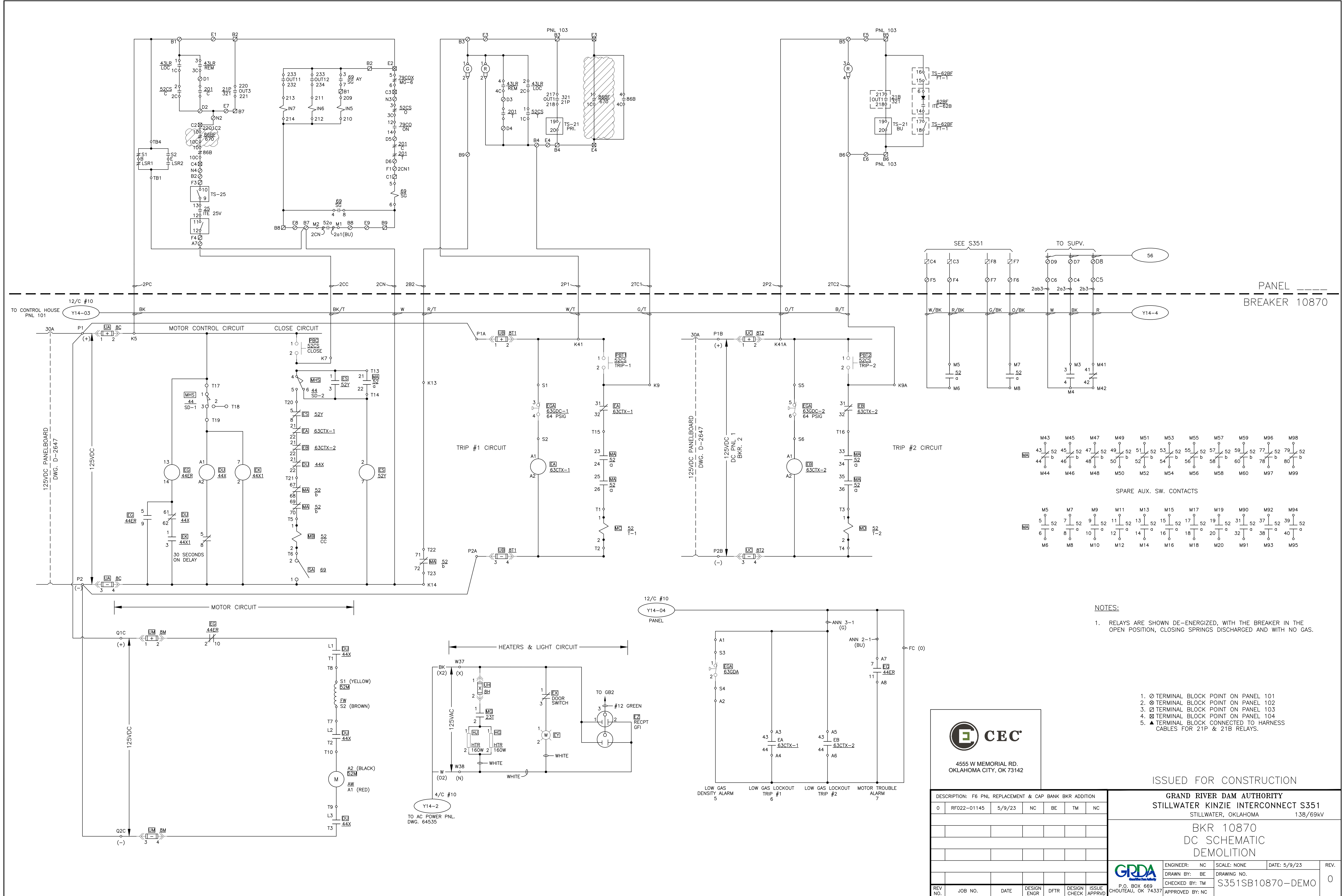
STEEL DETAILS & ELEVATIONS FOR
PANELS 103 & 104
DEMOLITION

REV NO.	JOB NO.	DATE	DESIGN ENGR.	DFTG	DESIGN CHECK	ISSUE APPROVD
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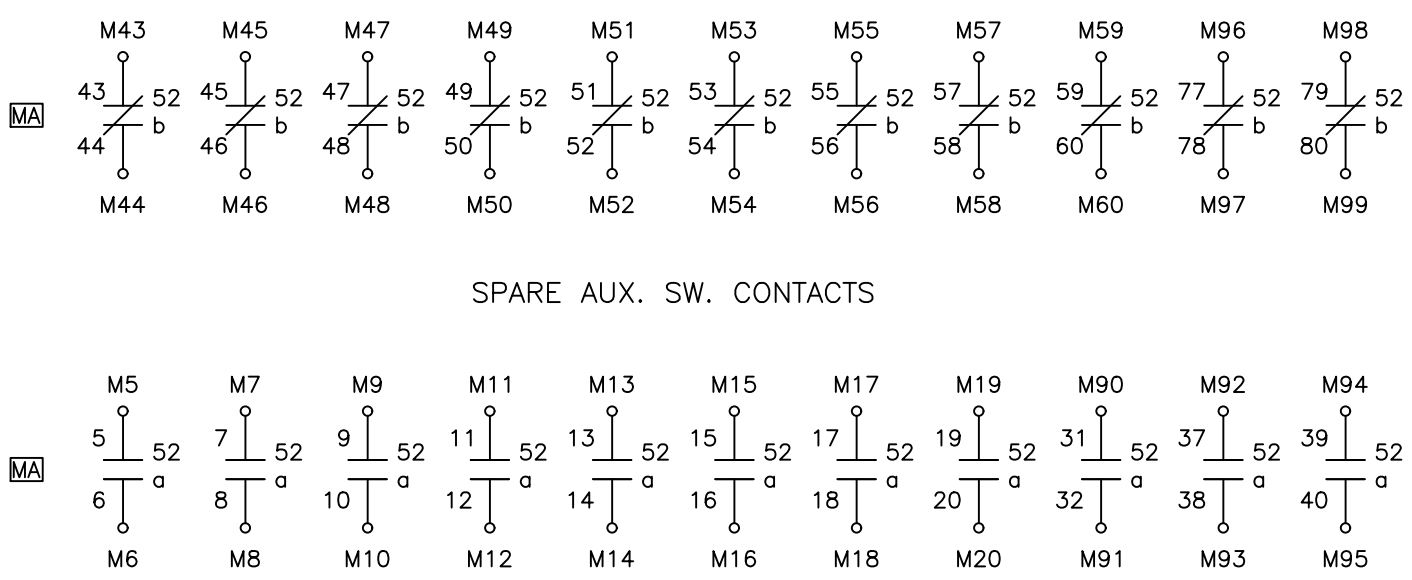
ENGINEER:	NC	SCALE:	NONE	DATE:	5/9/23	REV.	
DRAWN BY:	RE	CHECKED BY:	TM	DRAWING NO.:	S351PP001-DEMO		0
APPROVED BY:	NC						



P.O. BOX 669
CHOUTEAU, OK 74337



PANEL _____
BREAKER 10870



NOTES:
1. RELAYS ARE SHOWN DE-ENERGIZED, WITH THE BREAKER IN THE OPEN POSITION, CLOSING SPRINGS DISCHARGED AND WITH NO GAS.

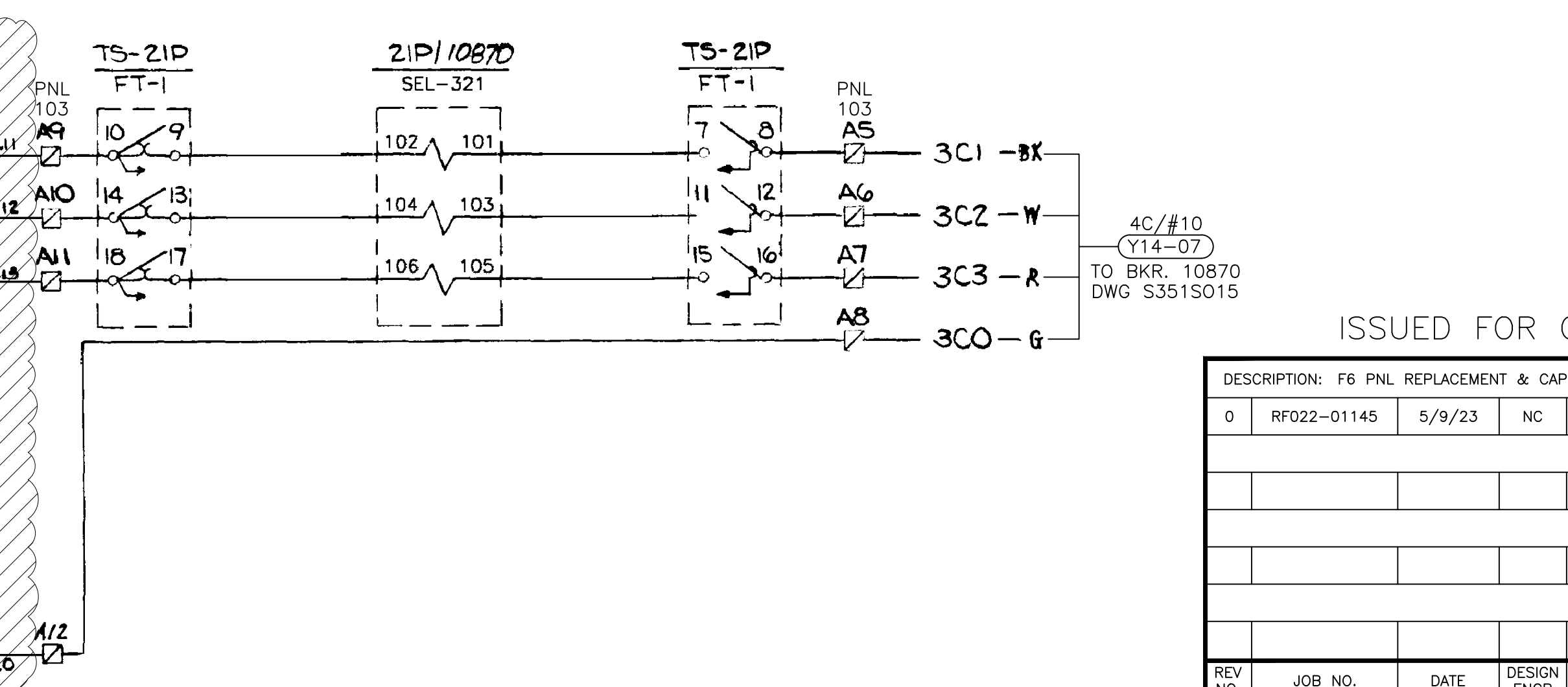
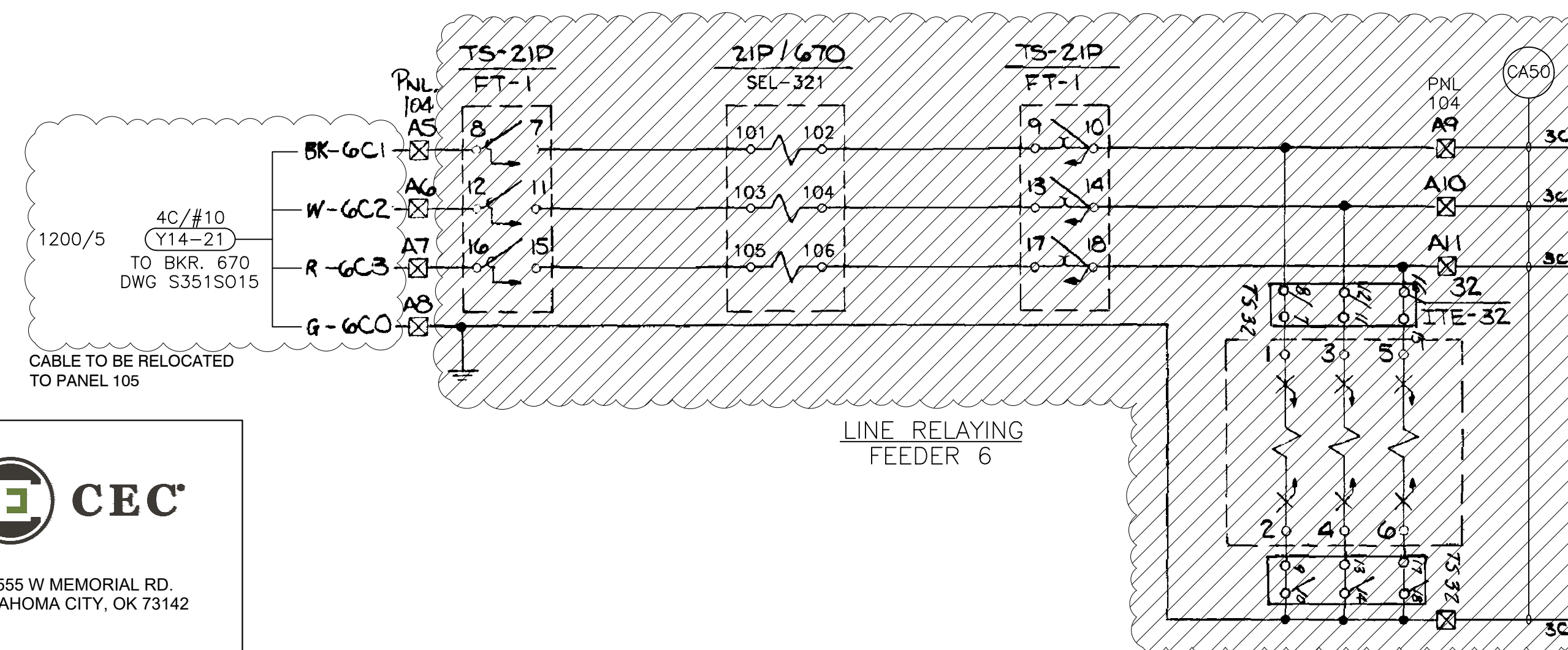
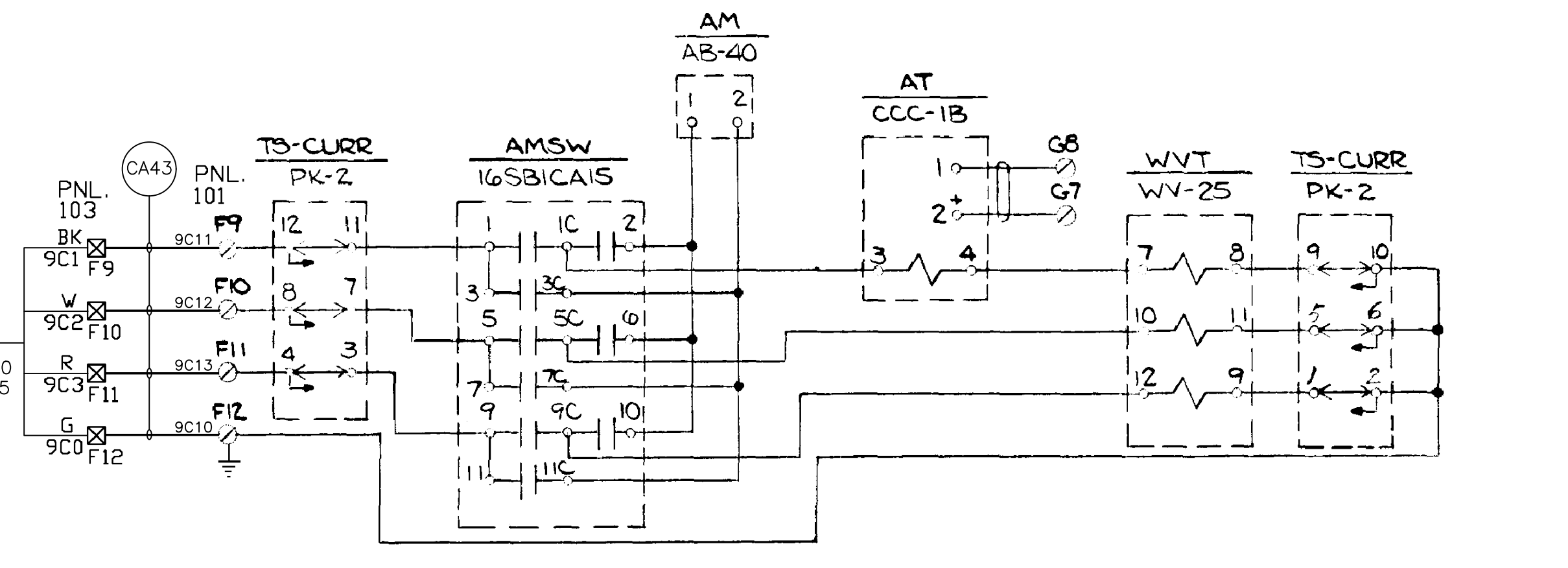
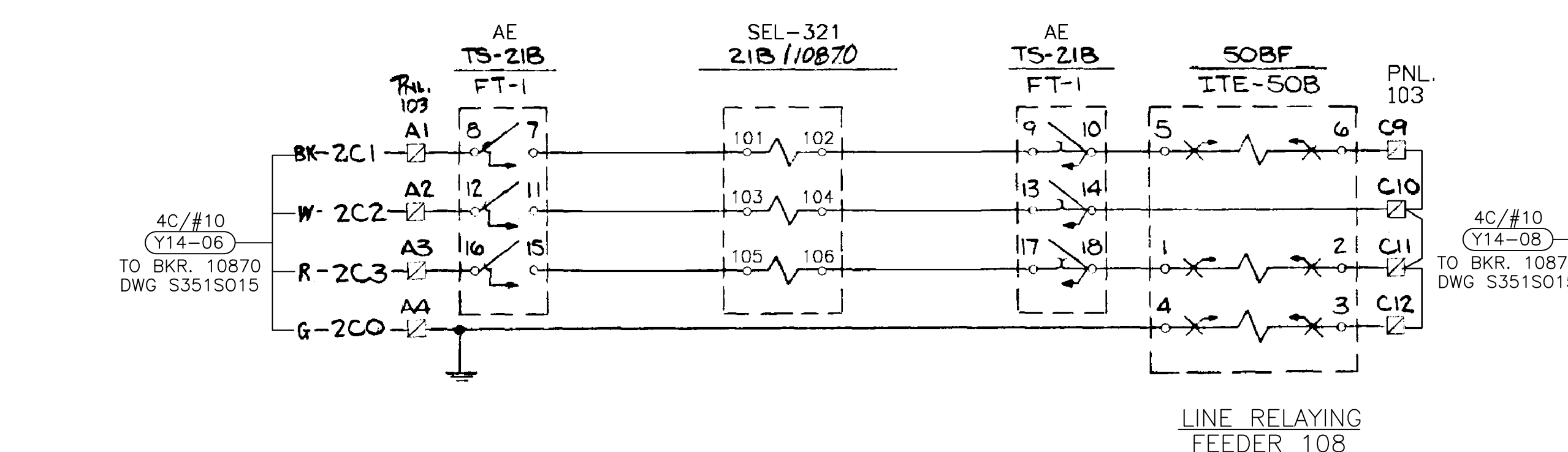
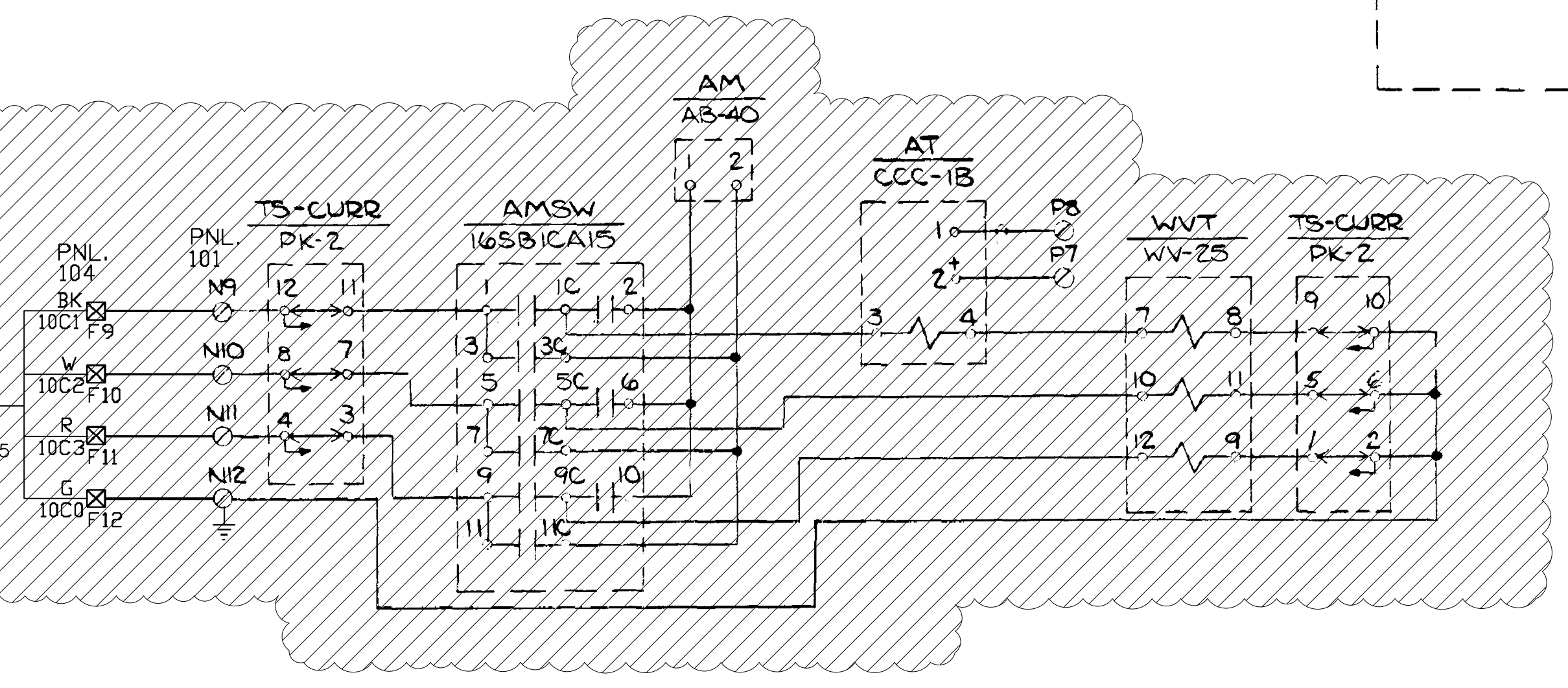
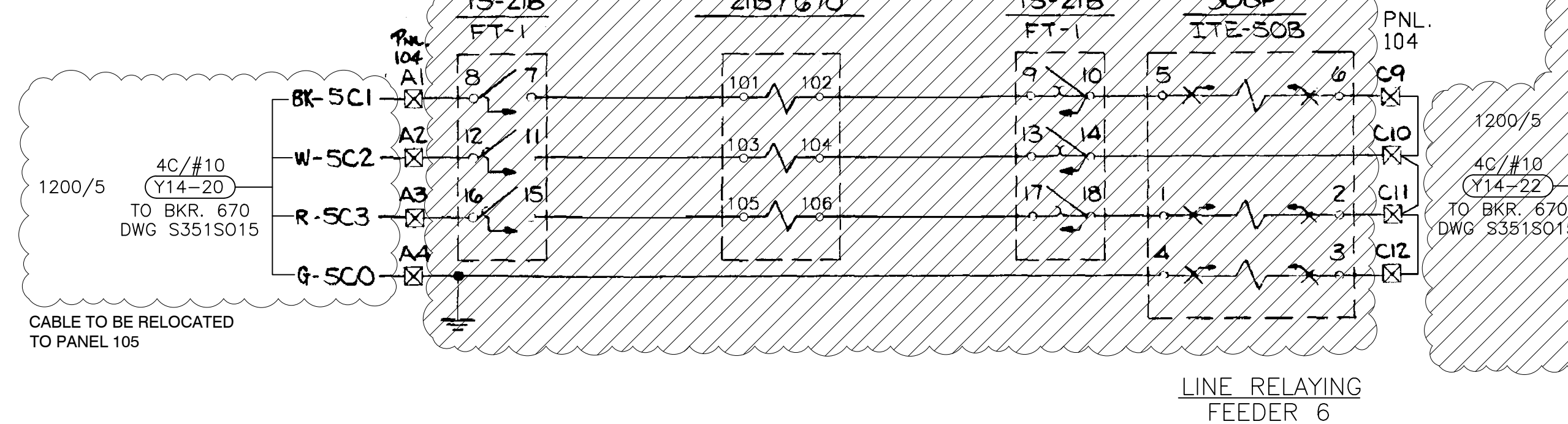
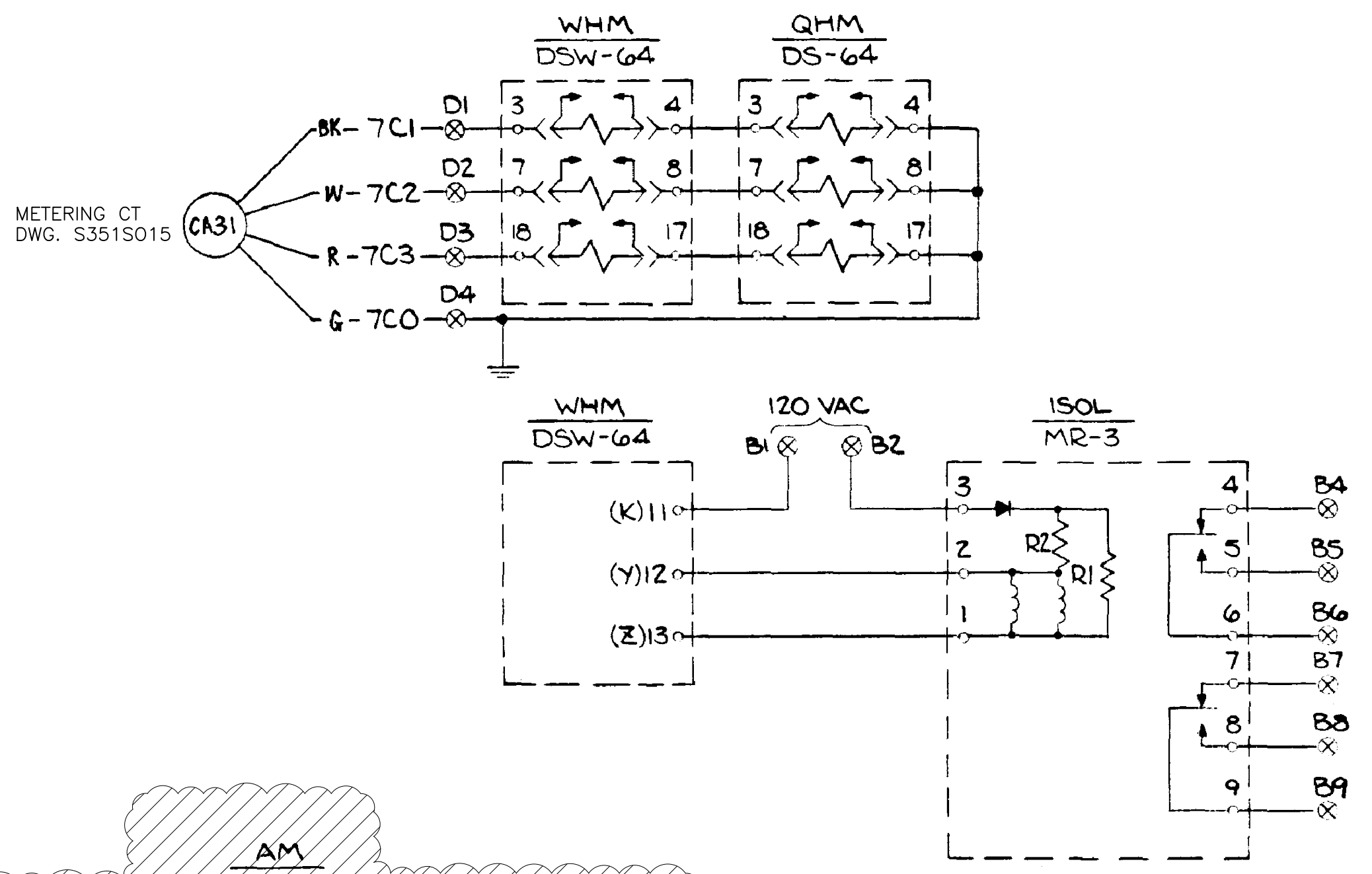
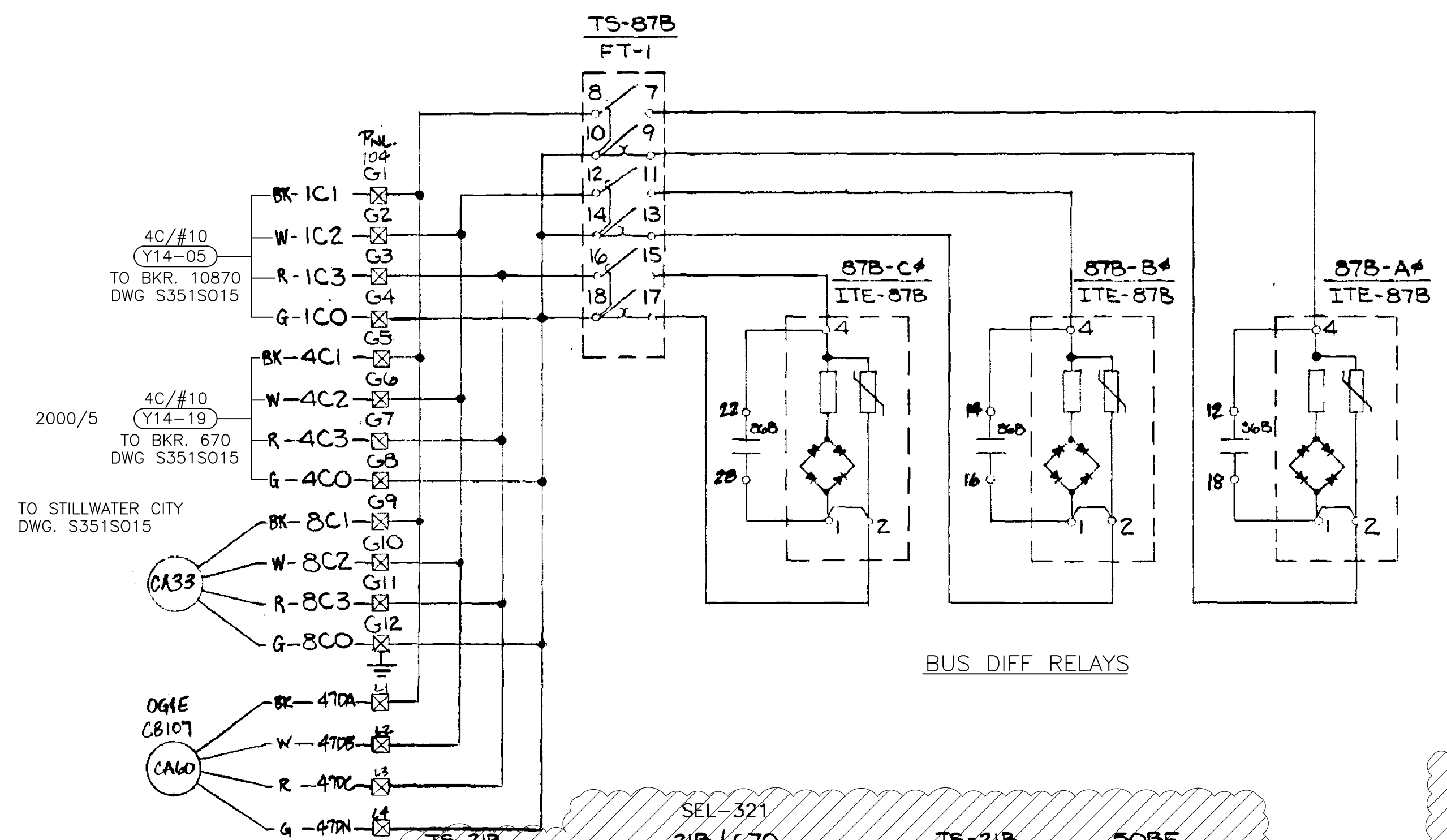
- 1. ○ TERMINAL BLOCK POINT ON PANEL 101
- 2. ⊗ TERMINAL BLOCK POINT ON PANEL 102
- 3. ⊠ TERMINAL BLOCK POINT ON PANEL 103
- 4. ⊞ TERMINAL BLOCK POINT ON PANEL 104
- 5. ▲ TERMINAL BLOCK CONNECTED TO HARNESS CABLES FOR 21P & 21B RELAYS.



ISSUED FOR CONSTRUCTION

DESCRIPTION: F6 PNL REPLACEMENT & CAP BANK BKR ADDITION						GRAND RIVER DAM AUTHORITY STILLWATER, OKLAHOMA 138/69kv				
0	RF022-01145	5/9/23	NC	BE	TM	NC	BKR 10870 DC SCHEMATIC DEMOLITION			
REV NO.	JOB NO.	DATE	DESIGN ENGR	DFT	DESIGN CHECK	ISSUE APPROV	ENGINEER: NC	SCALE: NONE	DATE: 5/9/23	REV. 0
							DRAWN BY: BE	DRAWING NO.		
							CHECKED BY: TM	S351SB10870-DEMO		
							APPROVED BY: NC			





REFERENCE DRAWINGS
 S351S015 OGE INTERCONNECT ONE-LINE DIAGRAM METERING & RELAYING
 S351S014 AC SCHEMATIC DIAGRAM

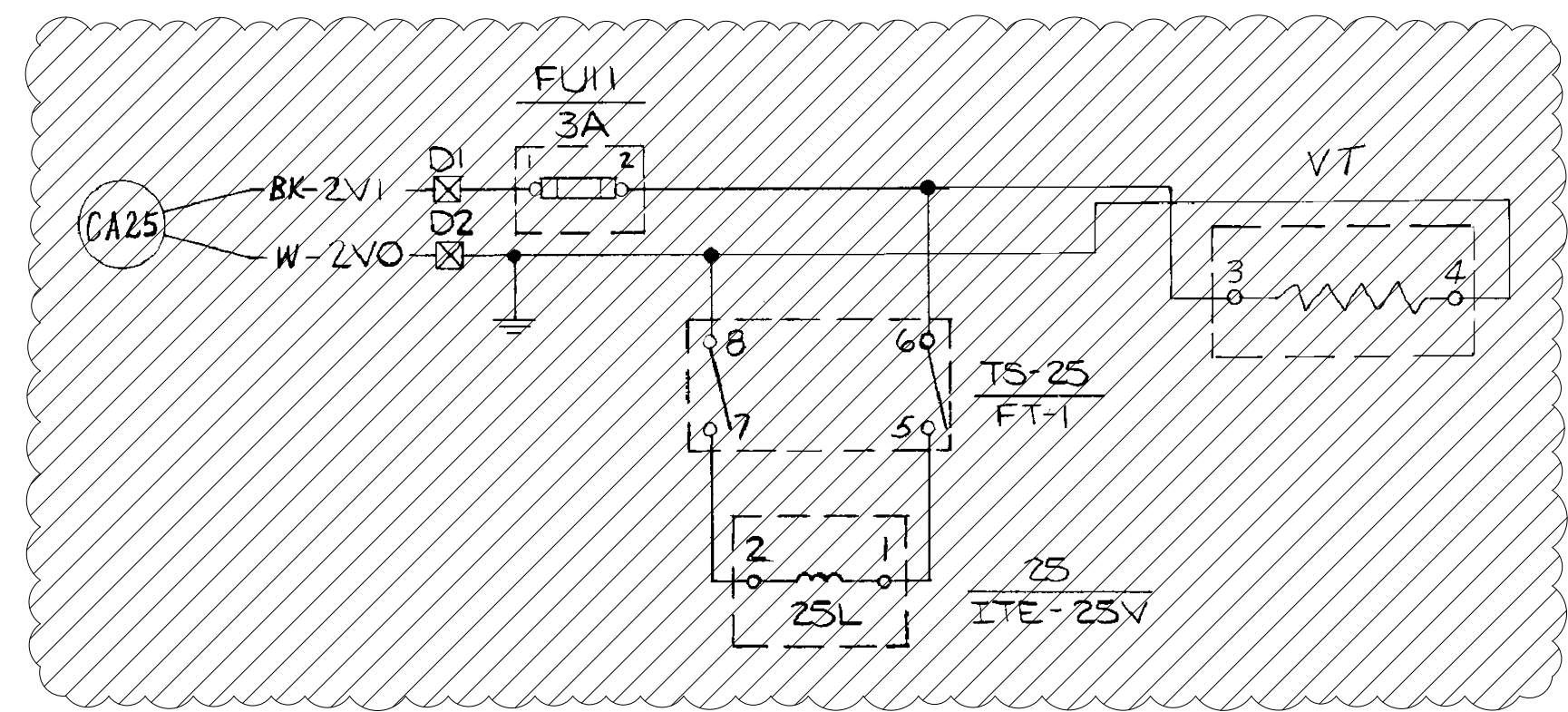
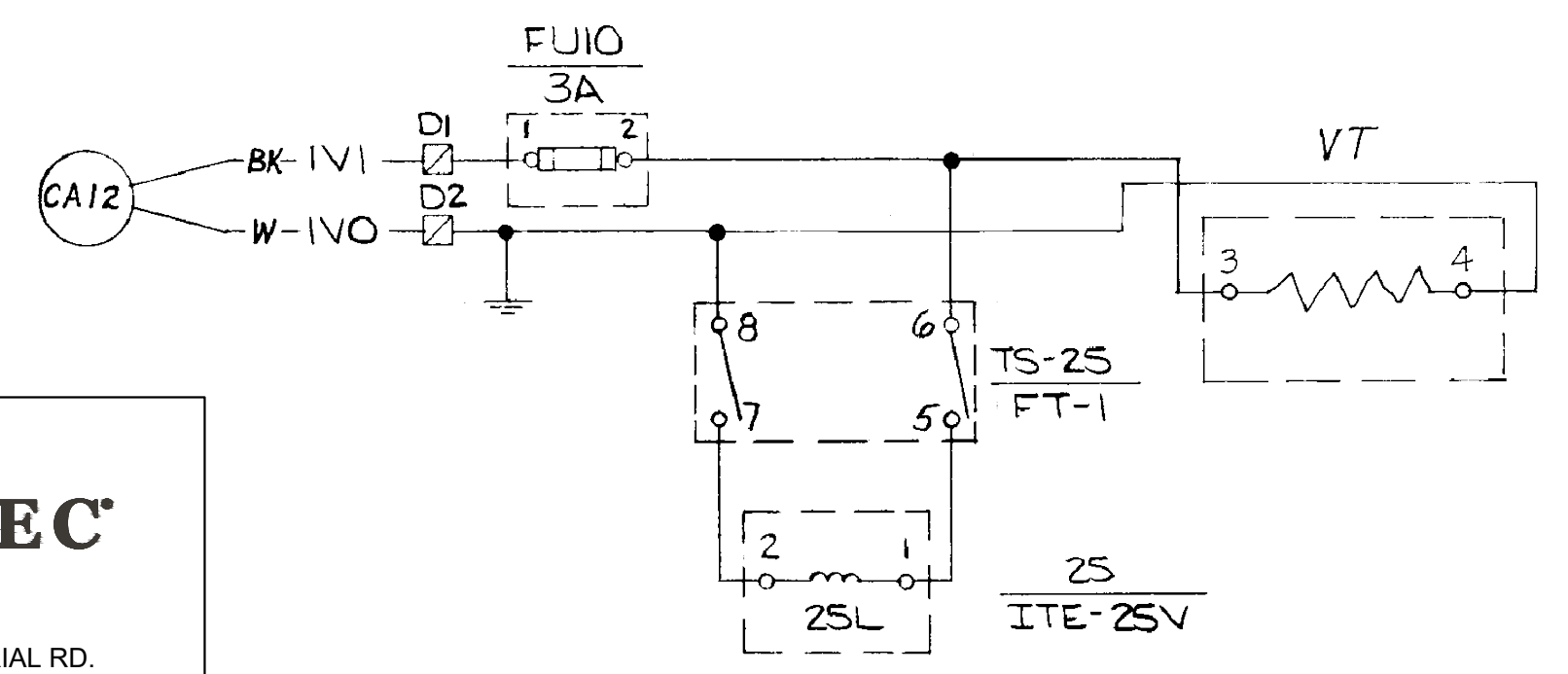
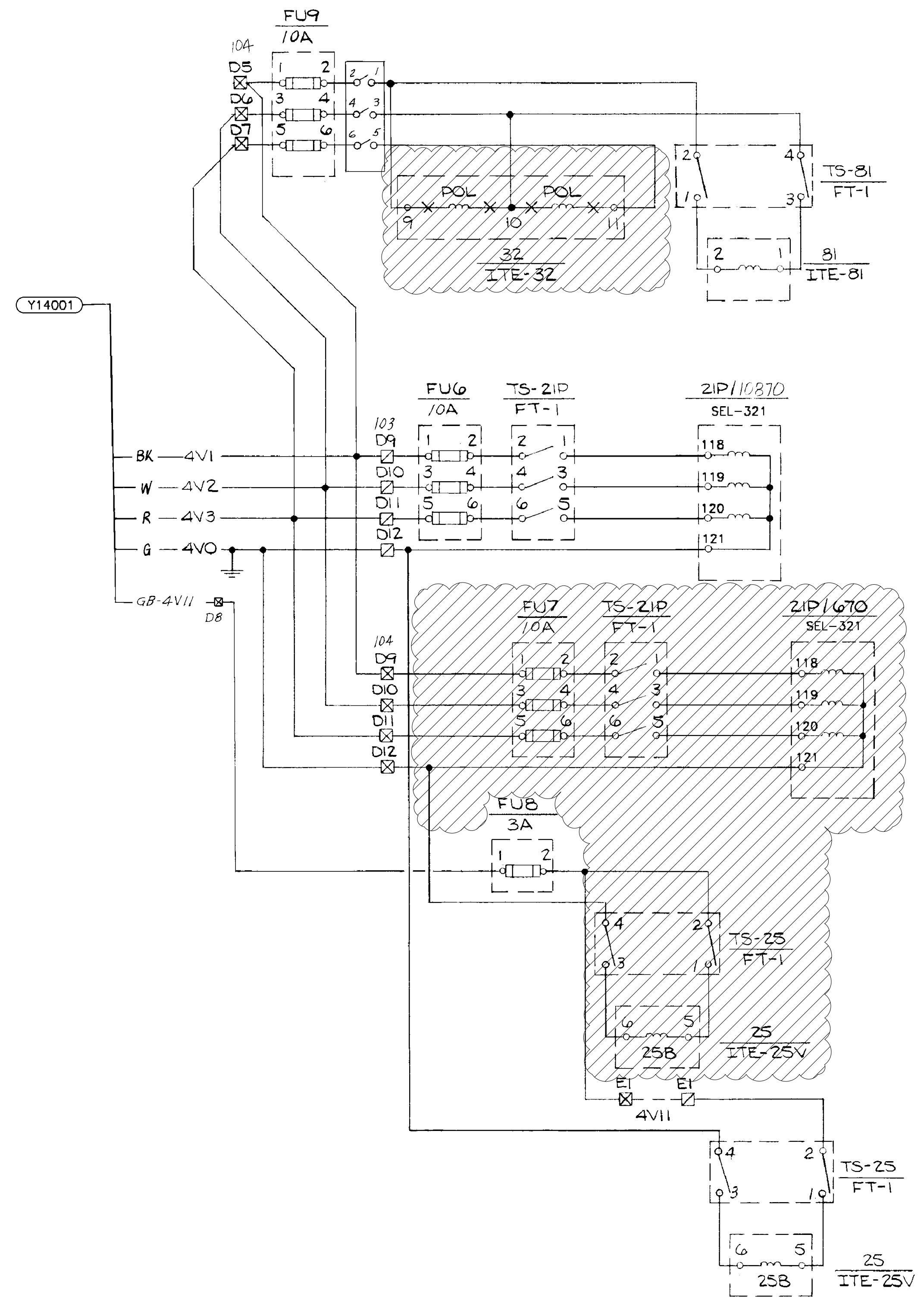
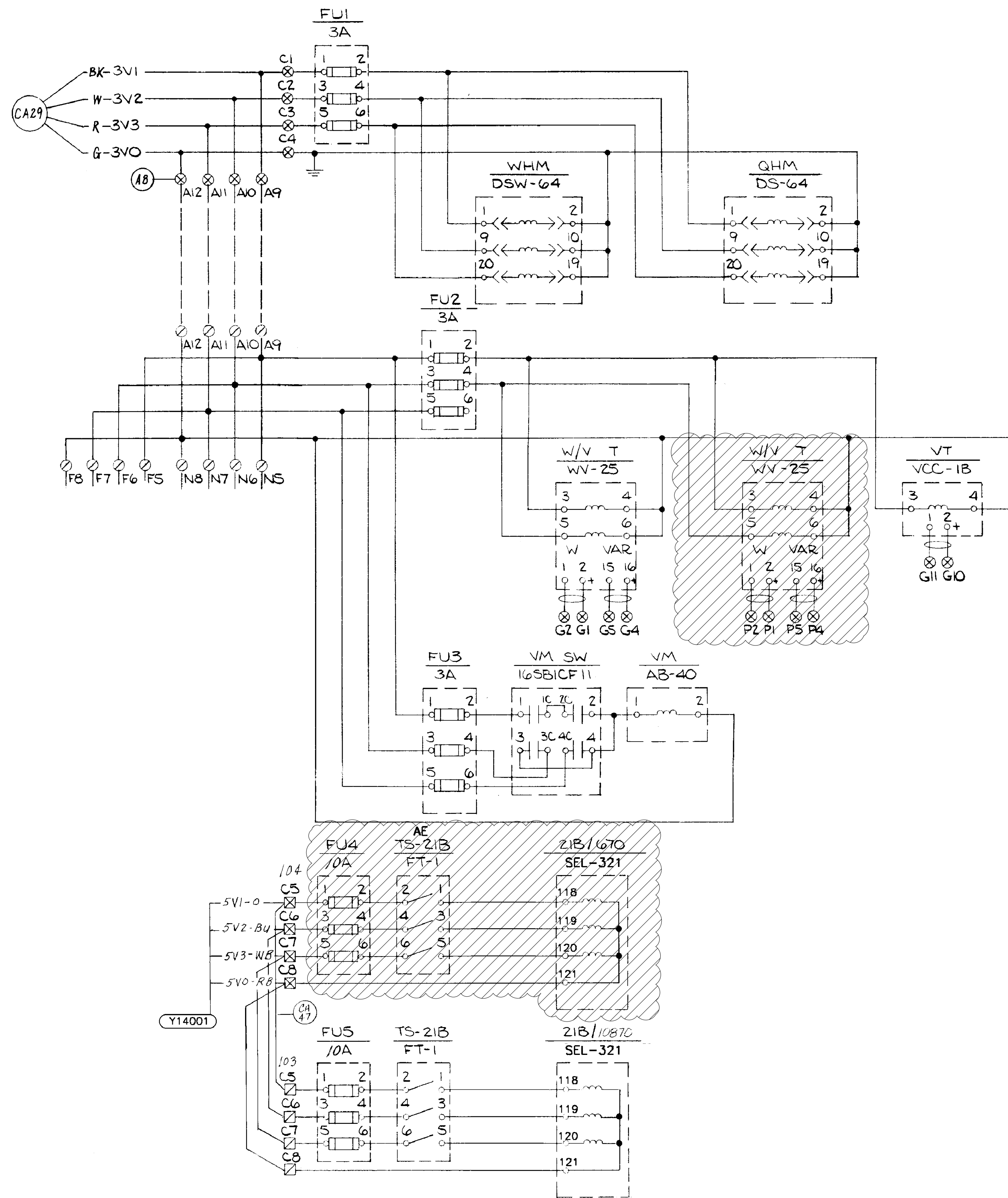
- NOTE**
- ⊙ - TERMINAL BLOCK POINT ON PANEL 101
 - ⊗ - TERMINAL BLOCK POINT ON PANEL 102
 - ⊠ - TERMINAL BLOCK POINT ON PANEL 103
 - ⊡ - TERMINAL BLOCK POINT ON PANEL 104
 - ⊞ - TERMINAL BLOCK CONNECTED TO HARNESS CABLES FOR 21P & 21B RELAYS

HARLO
 CORPORATION
 DR. BY: J. JOE
 CHK. BY: S. J. [Signature]
 DRAWING NO. D-4591 SH. 4

ISSUED FOR CONSTRUCTION

DESCRIPTION: F6 PNL REPLACEMENT & CAP BANK BKR ADDITION						GRAND RIVER DAM AUTHORITY STILLWATER KINZIE INTERCONNECT S351 STILLWATER, OKLAHOMA 138/69KV		
0	RF022-01145	5/9/23	NC	BE	TM	NC	THREE LINE AC CURRENT SCHEMATIC DEMOLITION	
ENGINEER: NC		SCALE: NONE		DATE: 5/9/23		REV. 0		
DRAWN BY: BE		DRAWING NO. S351S012-DEMO		P.O. BOX 669 CHOUTEAU, OK 74337		APPROVED BY: NC		
REV. NO.	JOB NO.	DATE	DESIGN ENGR	DFT	DESIGN CHECK	ISSUE APPROV		





NOTE

- ⊙-TERMINAL BLOCK POINT ON PANEL 101
- ⊗-TERMINAL BLOCK POINT ON PANEL 102
- ⊠-TERMINAL BLOCK POINT ON PANEL 103
- ⊡-TERMINAL BLOCK POINT ON PANEL 104
- ▲-TERMINAL BLOCK CONNECTED TO HARNESS CABLES FOR 21P & 21B RELAYS

REFERENCE DRAWINGS:

S351S010 THREE PHASE AC SCHEMATIC
 S351S011 THREE-LINE BUS CCVT'S

LEGEND:

▨ NEW CONSTRUCTION
 ▩ REMOVALS

WAS HARLO DWG. D14591_5 ISSUED FOR CONSTRUCTION

DESCRIPTION: F6 PNL REPLACEMENT & CAP BANK BKR ADDITION				GRAND RIVER DAM AUTHORITY STILLWATER KINZIE INTERCONNECT S351 STILLWATER, OKLAHOMA 138/69KV			
0	RF022-01145	5/9/23	NC	BE	TM	NC	
THREE LINE AC POTENTIAL SCHEMATIC DEMOLITION							ENGINEER: NC DRAWN BY: BE CHECKED BY: TM APPROVED BY: NC
SCALE: NONE DATE: 5/9/23 REV. 0							
P.O. BOX 669 CHOUTEAU, OK 74337							



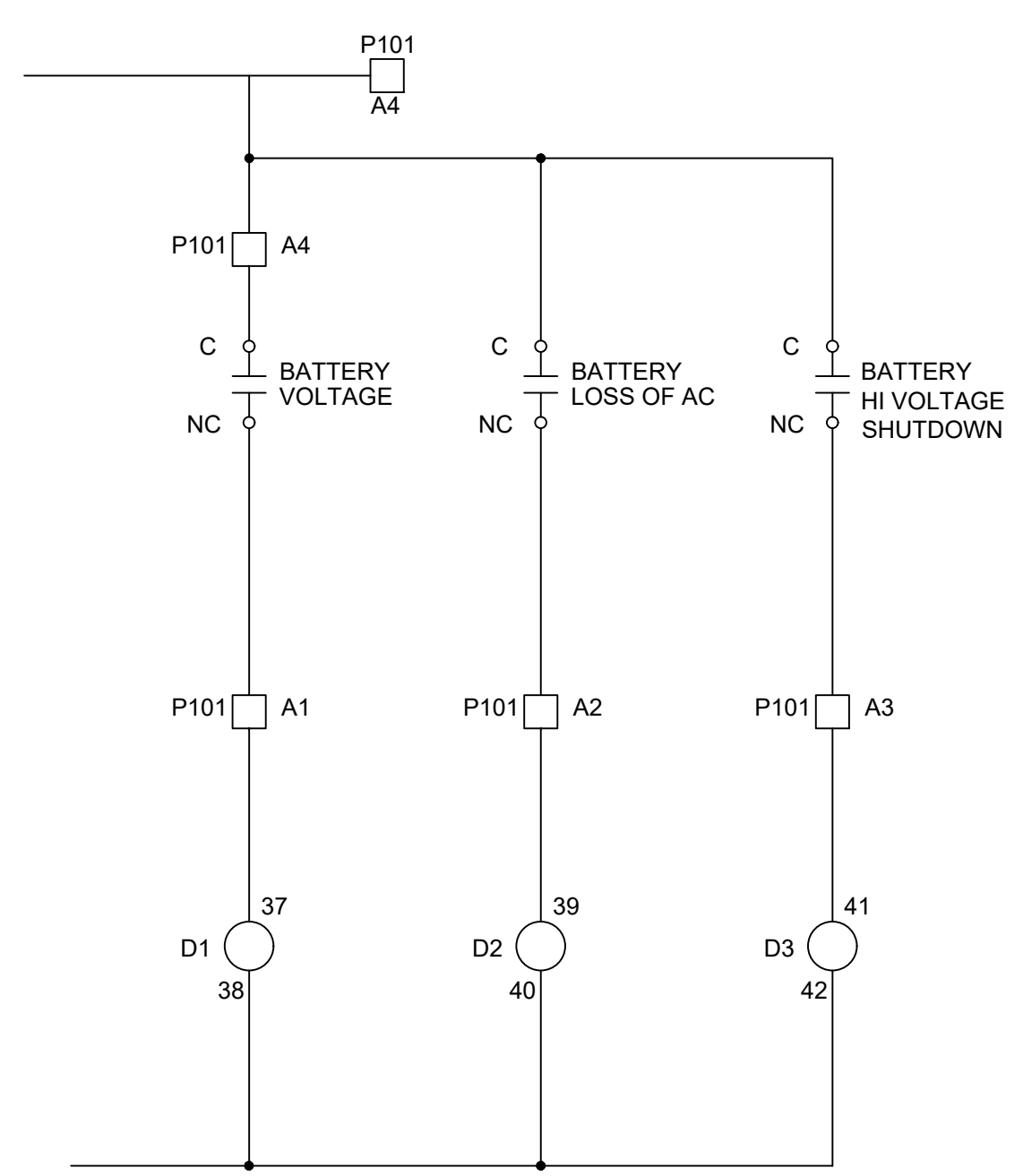
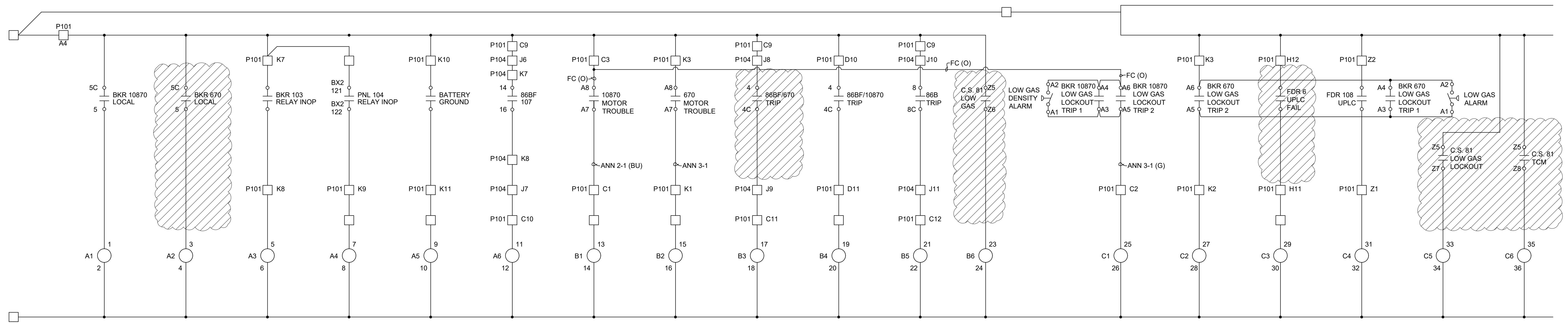
	1	2	3	4	5	6
A	BKR 10870 LOCAL CONTROL	BKR 670 LOCAL CONTROL	PNL 103 RELAY INOPERATIVE	PNL 104 RELAY INOPERATIVE	BATTERY GROUND	BKR 107 86BF LOCKOUT TRIP
B	BKR 10870 MOTOR TROUBLE	BKR 670 MOTOR TROUBLE	BKR 670 86BF LOCKOUT TRIP	BKR 10870 86BF LOCKOUT TRIP	BUS DIFFERENTIAL LOCKOUT TRIP	C.S. 81 LOW GAS
C	BKR 10870 LOW SF6 GAS/LO	BKR 670 LOW SF6 GAS/LO	FDR 6 UPLC ALARM	FDR 108 UPLC ALARM	C.S. 81 LOW GAS LOCKOUT	C.S. 81 TCM
D	BATTERY LOW VOLTAGE	BATTERY LOSS OF AC	BATTERY HIGH VOLTAGE SHUTDOWN			
E						
F						

ANNUNCIATOR SEL-2523



ISSUED FOR CONSTRUCTION

DESCRIPTION: F6 PNL REPLACEMENT & CAP BANK BKR ADDITION							GRAND RIVER DAM AUTHORITY			
0	RF022-01145	5/9/23	NC	BE	TM	NC	STILLWATER KINZIE INTERCONNECT S351			
							STILLWATER, OKLAHOMA 138/69kV			
							ANNUNCIATOR NAMEPLATE DEMOLITION			
							ENGINEER: NC	SCALE: NONE	DATE: 5/9/23	REV.
							DRAWN BY: BE	DRAWING NO.		0
							P.O. BOX 669 CHOUTEAU, OK 74337		S351SR01-DEMO	
REV. NO.	JOB NO.	DATE	DESIGN ENGR	DFTR	DESIGN CHECK	ISSUE APPROVD	APPROVED BY: NC			

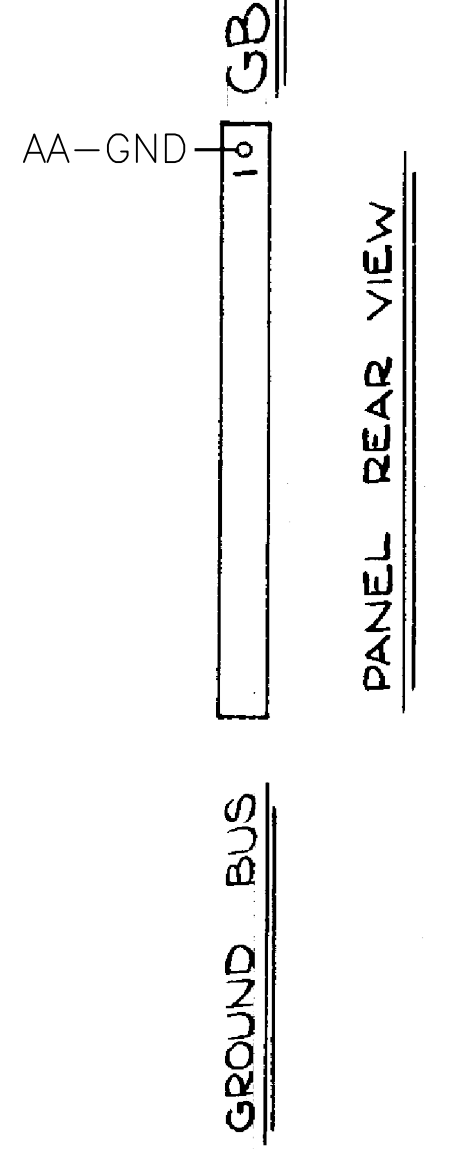
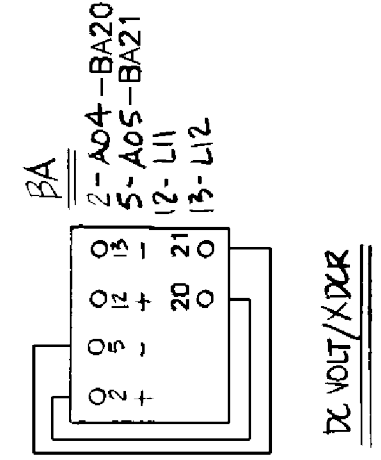
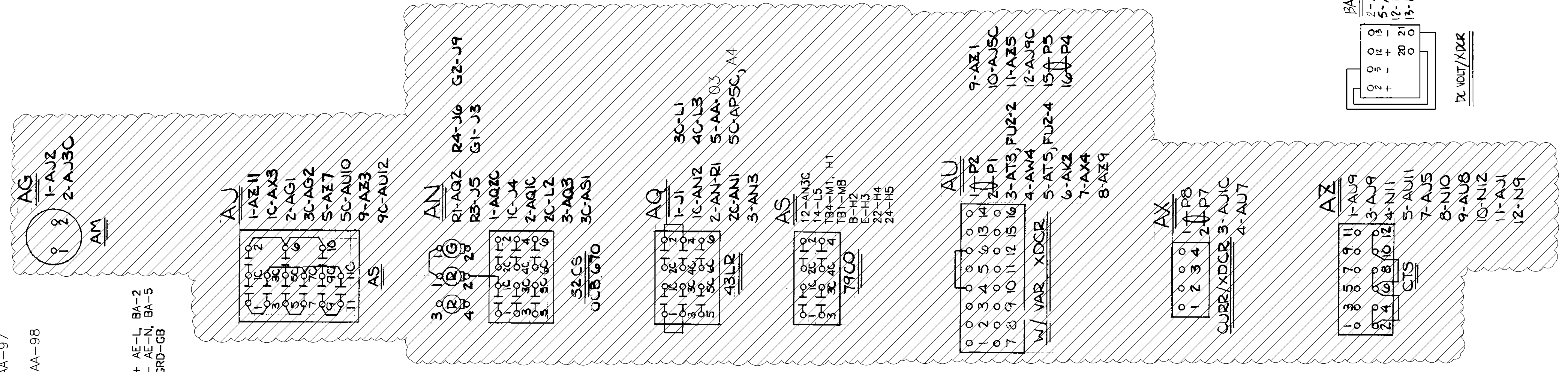
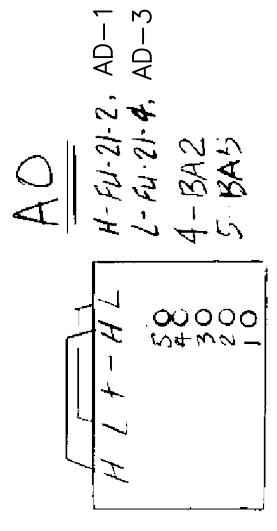
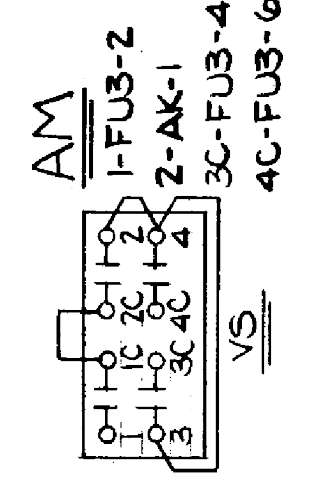
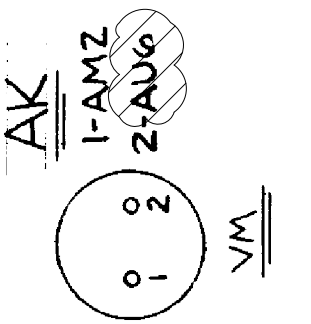
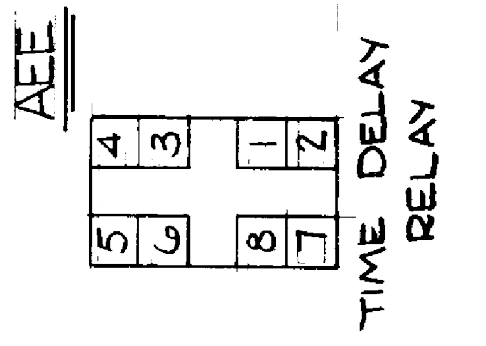
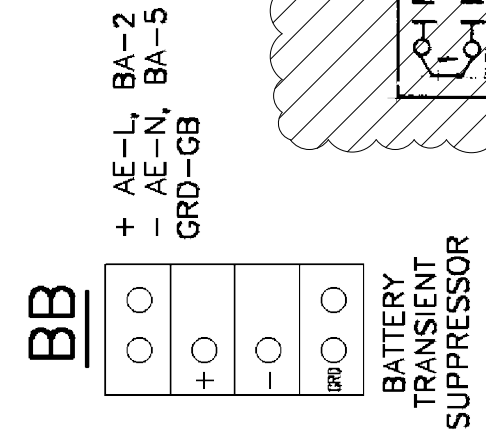
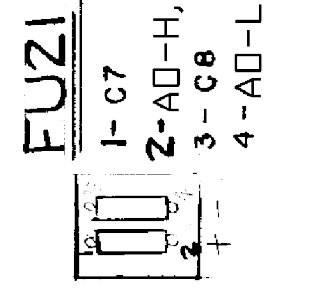
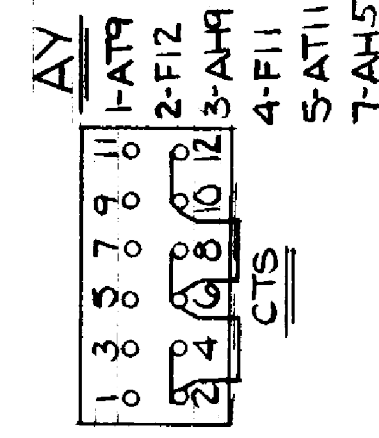
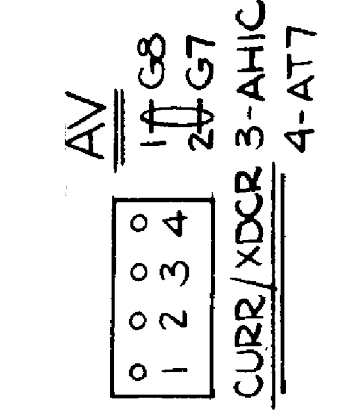
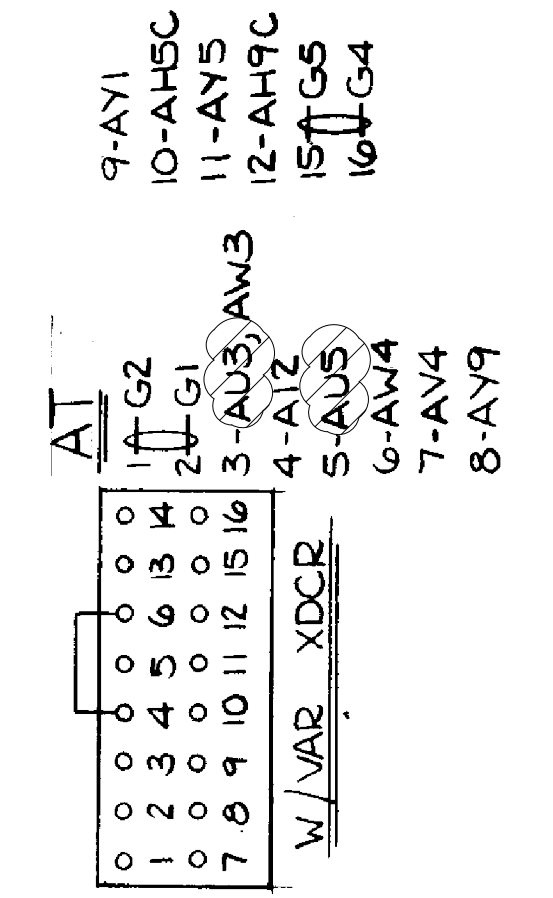
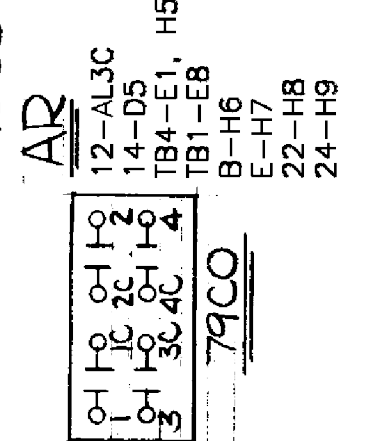
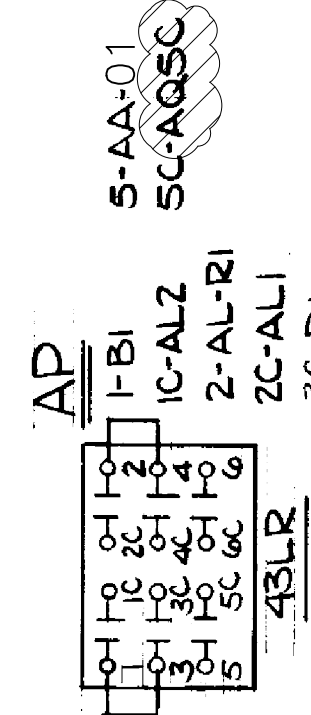
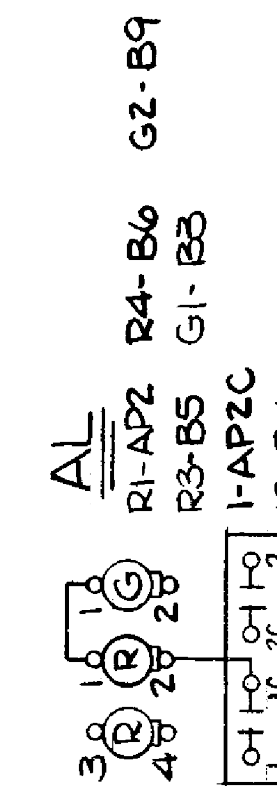
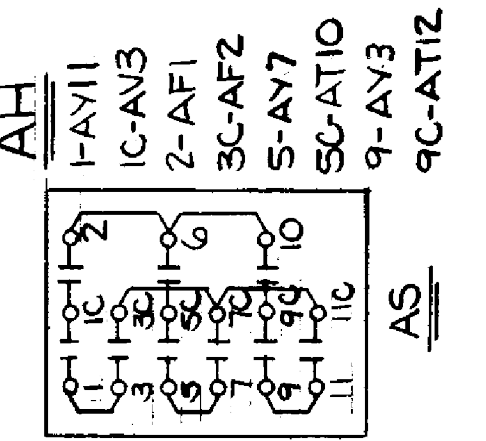
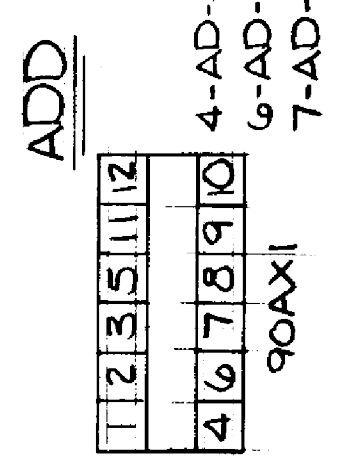
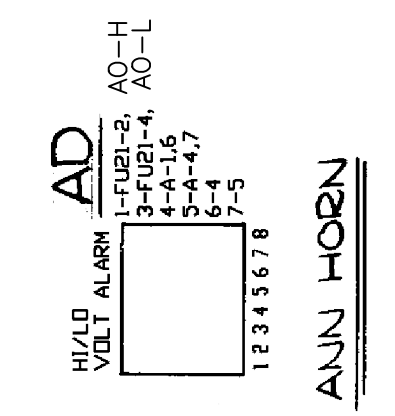
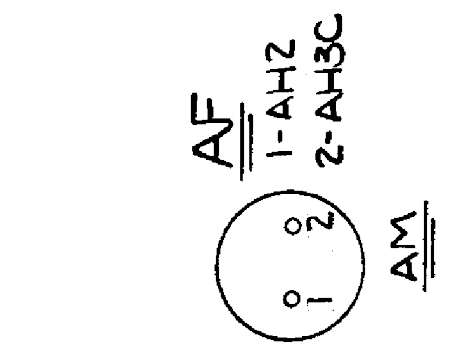
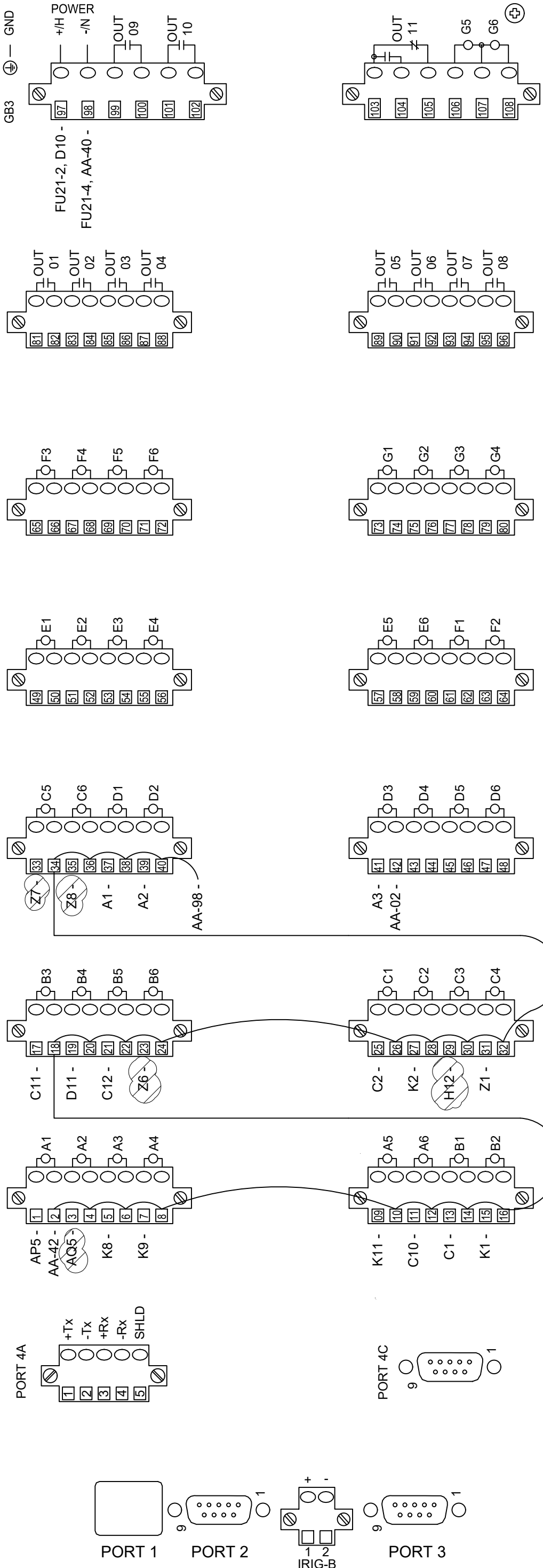


DESCRIPTION: F6 PNL REPLACEMENT & CAP BANK BKR ADDITION							ISSUED FOR CONSTRUCTION			
0	RF022-01145	5/9/23	NC	BE	TM	NC	GRAND RIVER DAM AUTHORITY STILLWATER KINZIE INTERCONNECT S351 STILLWATER, OKLAHOMA 138/69kV			
							ANNUNCIATOR SCHEMATIC PNL 101 DEMOLITION			
							ENGINEER: NC	SCALE: NONE	DATE: 5/9/23	REV.
							DRAWN BY: BE	DRAWING NO.		0
							CHECKED BY: TM		S351SR01-1-DEMO	
							APPROVED BY: NC			
REV. NO.	JOB NO.	DATE	DESIGN ENGR	DFTR	DESIGN CHECK	ISSUE APPROVD	P.O. BOX 669 CHOUTEAU, OK 74337			



4555 W MEMORIAL RD.
OKLAHOMA CITY, OK 73142

AA
SEL 2323



ISSUED FOR CONSTRUCTION

DESCRIPTION: F6 PNL REPLACEMENT & CAP BANK BKR ADDITION						GRAND RIVER DAM AUTHORITY STILLWATER KINZIE INTERCONNECT S351 STILLWATER, OKLAHOMA 138/69KV		
0	RF022-01145	5/9/23	NC	BE	TM	NC	WIRING DIAGRAM PANEL 101 DEMOLITION	
REV NO.	JOB NO.	DATE	DESIGN ENGR	DFT	DESIGN CHECK	ISSUE APPROV	ENGINEER: NC	SCALE: NONE
							DRAWN BY: BE	DATE: 5/9/23
							CHECKED BY: TM	REV. 0
							APPROVED BY: NC	
P.O. BOX 669 CHOUTEAU, OK 74337							S351WP101-2-DEMO	





4555 W MEMORIAL RD.
OKLAHOMA CITY, OK 73142

REFERENCE DRAWINGS

S351S012 THREE LINE AC CURRENT SCHEMATIC
S351S015 OGE INTERCONNECT ON-LINE DIAGRAM METERING & RELAYING
S351WP101 WIRING DIAGRAM PANEL 101

HARLO CORPORATION		
DR. BY: J. YOB	DRAWING NO.:	REV.
CHK. BY: E.A.J.	D44591 SH. 13	

DESCRIPTION: F6 PNL REPLACEMENT & CAP BANK BKR ADDITION						
0	RF022-01145	5/9/23	NC	BE	TM	NC
REV. NO.	JOB NO.	DATE	DESIGN ENGR	DFT	DESIGN CHECK	ISSUE APPROV

ISSUED FOR CONSTRUCTION

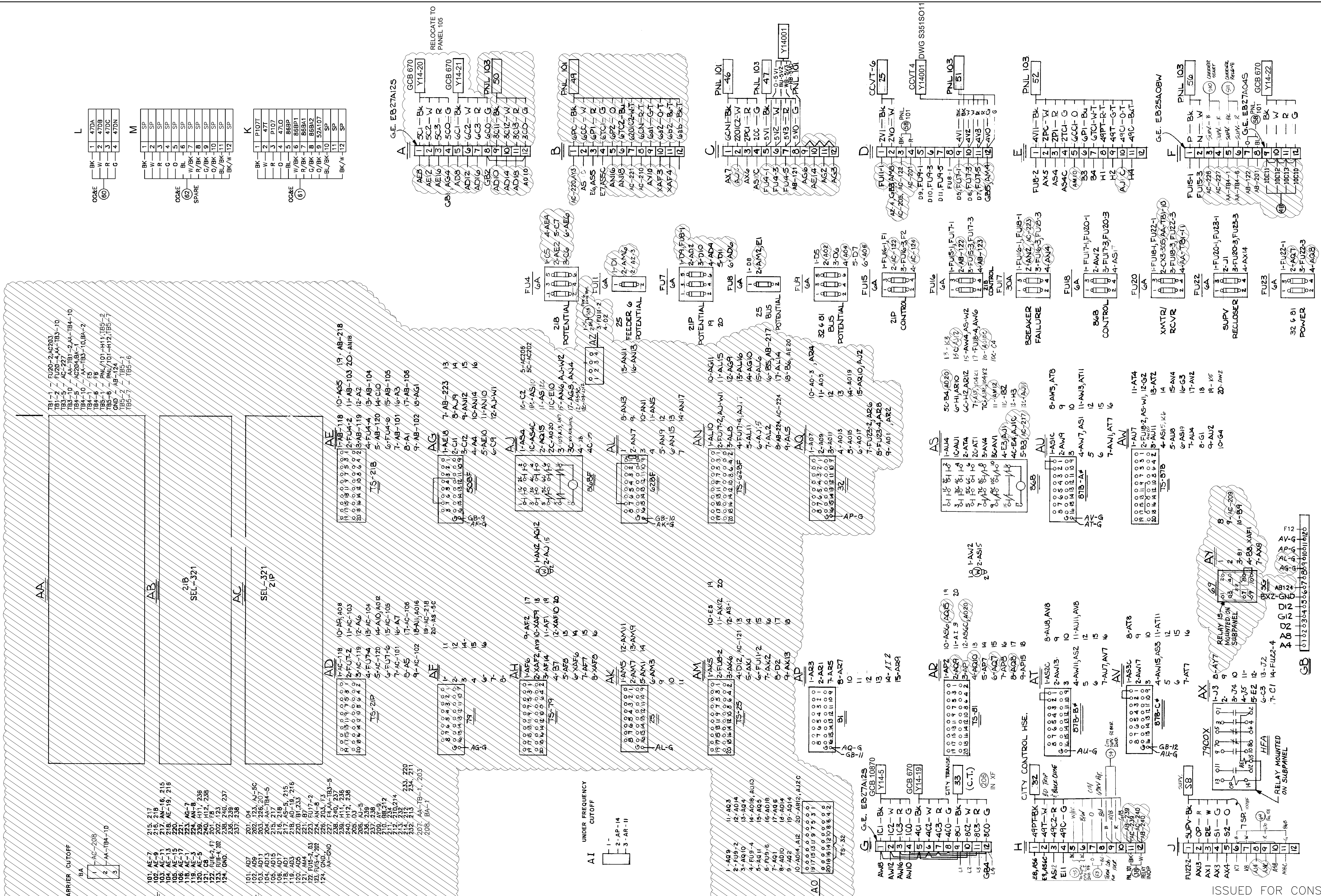
GRAND RIVER DAM AUTHORITY
STILLWATER KINZIE INTERCONNECT S351
STILLWATER, OKLAHOMA 138/69KV

WIRING SCHEMATIC
PANEL 104 - CB 670
DEMOLITION

ENGINEER: NC	SCALE: NONE	DATE: 5/9/23	REV.
DRAWN BY: BE	DRAWING NO.		
CHECKED BY: TM	S351WP104-DEMO		0
APPROVED BY: NC			



P.O. BOX 669
CHOUTEAU, OK 74337



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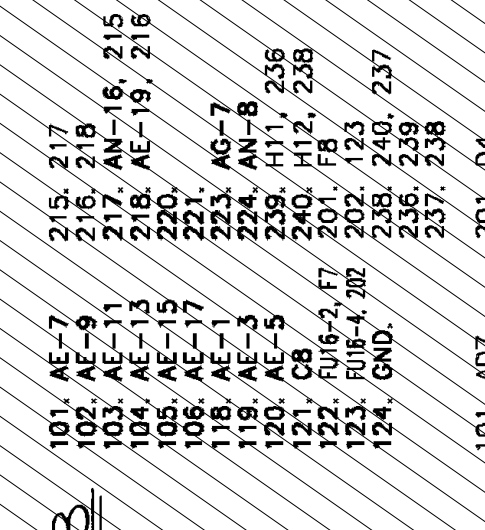
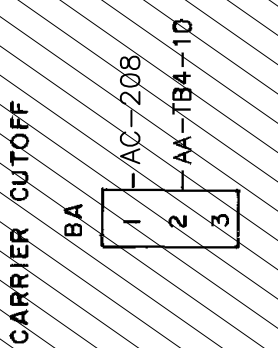
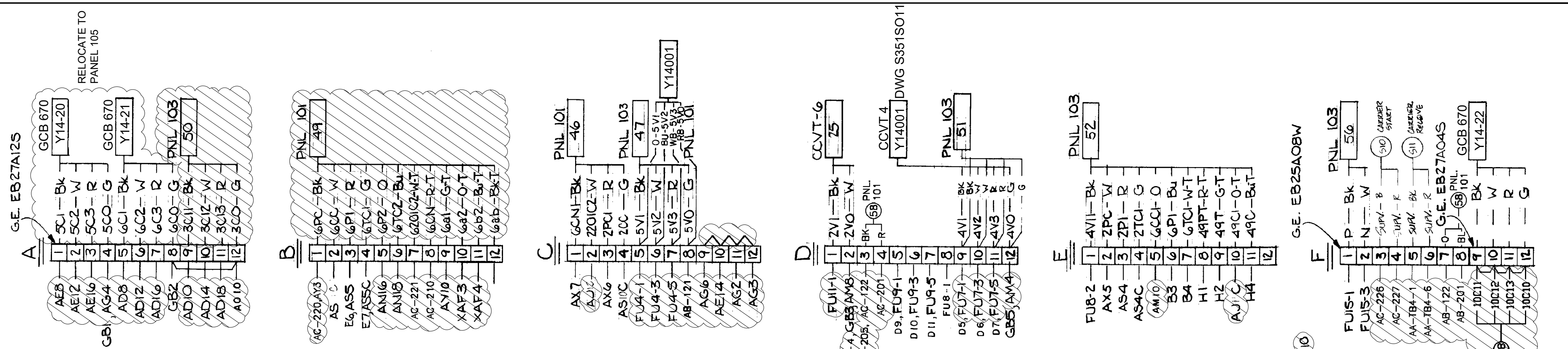
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C	3	47DC
R	4	47DD
G	5	47DE

M

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R	4	SP
G	5	SP
BL	6	SP
W/BK	7	SP
R/BK	8	SP
G/BK	9	SP
BL/BK	10	SP
W/BK	11	SP
R/BK	12	SP

K

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R	3	P107
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BL	5	86BP
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G/BK	8	86BK2
BL/BK	9	86BK3
W/BK	10	86BK4
R/BK	11	86BK5
BL/BK	12	86BK6



**ATTACHMENT N: PRO FORMA CONTRACT
Solicitation 1382**

(The Contract is attached in the following pages.)



CONTRACT No. TBD

BETWEEN

THE GRAND RIVER DAM AUTHORITY

&

[CONTRACTOR]

FOR

STILLWATER-KINZIE INTERCONNECT SUBSTATION
UPGRADE

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APPENDIX

EXHIBIT A – CERTIFICATE OF CONTRACT COMPLETION

EXHIBIT B – CHANGE ORDER REQUEST

EXHIBIT C – INVOICE AFFIDAVIT CERTIFICATION FOR PAYMENT

EXHIBIT D – GRDA'S REQUEST FOR PROPOSAL WITH TECHNICAL SPECIFICATIONS FOR CONTRACT

EXHIBIT E – CONTRACTOR'S BID PROPOSAL

This Contract is entered into on September ____, 2023 between the Grand River Dam Authority (“GRDA”), an agency of the State of Oklahoma, and _____ (“Contractor”), together, the “Parties.”

In consideration of the mutual terms, covenants, and conditions set forth below, the Parties agree as follows:

1. RECITALS.

1.1 Bid Description. GRDA has called for bids for:

Contract Number: _____

Contract Title: Stillwater-Kinzie Interconnect Substation Upgrade

(the "Project"). The Parties agree that the Project must be completed in accordance with the following terms and conditions, plans and technical specifications, blueprints, drawings and any addenda made a part of this Contract.

1.2 Entire Agreement. This Contract constitutes the entire agreement between the Parties and supersedes any oral or written representations, understandings, proposals, or communications previously entered into by or on account of the parties regarding this subject matter. In the event of any conflict between this contract document and any of the Exhibits hereto, the terms and provisions of this Contract will control, followed by the GRDA Request for Proposal and Technical Specifications, followed by Contractor’s Bid Proposal.

1.3 Contractor’s Initial Representations. By executing this Contract, Contractor represents that Contractor:

- (a) has examined and carefully studied the Contract Documents, Request for Proposal, and Technical Specifications;
- (b) 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 Project;
- (c) has carefully evaluated the local economy, available labor, weather, and other conditions which will influence its productivity in performing the Project;
- (d) is fully aware of all conditions that exist or difficulties that may be encountered arising from or related to the execution of the Project;
- (e) warrants that the specified times for completion of the Project are reasonable times for its completion;
- (f) will complete the Project within the specified times; and

- (g) must fulfill all the requirements in the Contract without claiming any additional compensation, except as otherwise permitted in this Contract.

1.4 Definitions. GRDA and Contractor agree that the following definitions will be applicable to this Contract:

Bid Proposal – the proposal submitted by Contractor related to the Project.

Certificate of Contract Completion – the certificate issued by GRDA to Contractor stating that the Project has been completed according to the terms and conditions of the Contract.

Completion of the Project – the date when GRDA issues the Certificate of Contract Completion stating that the Project has been completed and is ready for acceptance under the terms and conditions contained therein.

Contract Documents – (1) this Contract and Technical Specifications together with all Attachments (2) all plans and drawings submitted in association with the Project, and (3) any other document(s) related to this Contract to which both Parties have agreed in writing.

Contract Term – the date and time for performance as set forth in the Contract Documents.

Contractor – the party entering into this Contract for the performance of the required work. The person authorized to represent Contractor in connection with the Project is _____.

Designated GRDA Representative – the employees authorized to represent GRDA in connection with the Project. For the Project, the Designated GRDA Representatives is Kyle Birkenfeld.

GRDA – the Grand River Dam Authority, an agency of the State of Oklahoma, pursuant to 82 O.S. § 861, *et seq.*

OSHA – the Occupational Safety and Health Administration.

Procurement Administrator – the GRDA employee with direct supervisory capacity of the procurement unit.

Project – as set forth in Article 1.1, the services to be performed, authorized, and necessary for the fulfillment of this Contract.

Request for Proposal – all documents published by GRDA to potential bidders related to the Project, including instructions to bidders, Technical Specifications, and a pro forma contract.

Schedule for Contract Work – the schedule for the completion of all Contract Work is more particularly described by the Technical Specifications and Contract Documents.

Site – the Stillwater-Kinzie Interconnect Substation where the Project is to be performed, as more particularly described in the Technical Specifications.

Subcontractor – a person, firm, or corporation to whom any part of the Project has been sublet by or supplied to Contractor.

Technical Specifications – collectively, all of the terms and stipulations contained in this Contract and in each of the specifications appended thereto, including the Construction Specification included with the Request for Proposal.

Work – The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents to complete the Project. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction; furnishing, installing, and incorporating all materials and equipment into such construction; and may include related services such as testing, start-up, and commissioning, all as required by the Contract Documents.

2. SCOPE OF WORK.

The scope of Work to be performed by Contractor is more particularly described in the Request for Proposal and the Technical Specifications.

3. CONTRACT PRICE AND PAYMENT.

3.1 Contract Price. The Contract Price for the Completion of the Project in accordance with the terms of the Contract is a combination of lump sum prices for mobilization, demobilization, and material handling activities and unit prices as described in the following Unit and Task Price Schedule:

Task	Qty	Units	Unit Bid Price	Task Price
Mobilization	-	LS	\$	\$
Material Hauling	-	LS	\$	\$
Install Foundation: 69kV Circuit Breaker (SL10X11)	1	CY	\$	\$
Install Foundation: Capacitor Bank (SL13X4)	3	CY	\$	\$
Install Foundation: 69kV Reactor (GS-201)	2	CY	\$	\$
Install Foundation: 69kV Switch Stand (GS-210)	2	CY	\$	\$
Install Foundation: Capacitor Bank RPD (GS-211)	1	CY	\$	\$
Install Below Grade Conduit	-	LS	\$	\$
Install Below Grade Grounding	-	LS	\$	\$
Steel Erection	-	LS	\$	\$
Bus, Bus Fittings, Jumpers Installation	-	LS	\$	\$
Install Electrical Equipment	-	LS	\$	\$
Install Above Grade Enclosures	-	LS	\$	\$

Install Control Cable	-	LS	\$	\$
Install Above Grade Conduit	-	LS	\$	\$
Install Above Grade Grounding	-	LS	\$	\$
Install Relay Panel #105	1	EA	\$	\$
Removal of Existing Structures and Equipment	-	LS	\$	\$
Surplus Material Return	-	LS	\$	\$
Station Rock	30	CY	\$	\$
Clean-up	-	LS	\$	\$
De-Mobilization	-	LS	\$	\$
Total Contract Price				\$

UNIT LEGEND:
LS = LUMP SUM
LF=LINEAR FEET
CY= CUBIC YARD
EA= EACH

3.2 Partial Payments.

- a) Upon completion of a task or a group of tasks, Contractor may submit to the Designated GRDA Representative an invoice requesting payment of the portion of the Contract Price associated with the completion of those tasks. Upon receipt of this invoice, the Designated GRDA Representative will, in his or her sole discretion, evaluate Contractor's invoice, documentation, and performance, and determine whether the invoice, documentation, and performance is sufficient to demonstrate that the task has been completed.
- b) If the Designated GRDA Representative approves an invoice, GRDA will pay the invoice within forty-five (45) days from the date on which it was approved. Ten percent (10%) of each partial payment will be withheld as retainage, unless waived by GRDA.
- c) All invoices must: (i) be completed, executed, and notarized by Contractor, using the Invoice Affidavit form attached to this Contract; and (ii) comply with applicable law and regulation. GRDA will approve no more than one invoice per month.

3.3 Final Payment.

- a) Upon completion of the Project, Contractor will submit a fully completed Certificate of Contract Completion form to the Designated GRDA Representative. Contractor must submit evidence satisfactory to GRDA

that all material bills, sums due to subcontractors, and all other indebtedness, liabilities and/or obligations of any sort whatsoever arising from or related to the Project have been fully paid.

- b) Upon receipt of the Certificate of Contract Completion and all supporting documentation, GRDA will inspect the Project. If GRDA determines, in GRDA's sole discretion, that any portion of the Project has not been completed in accordance with the Specifications or is otherwise defective, Contractor will, at its expense, complete the Project in accordance with the Contract Documents.
- c) If GRDA determines, in GRDA's sole discretion, that the Project has been fully completed in accordance with each of the terms of the Contract Documents, GRDA will execute the Certificate of Contract Completion that has been submitted by Contractor. All submittals, operating manuals, brochures, as-built drawings, keys related to the Project, warranties, excess materials provided by or billed to GRDA, and all other requirements of the Contract Documents must be submitted to GRDA before final payment is made.
- d) Upon receipt of the fully executed Certificate of Contract Completion form from GRDA, Contractor will invoice GRDA for the remaining balance due to Contractor from GRDA, including any applicable retainage amounts. All invoices must: (i) be completed, executed, and notarized by Contractor, using the Invoice Affidavit form attached to this Contract; and (ii) comply with applicable law and regulation. After receipt and approval of Contractor's invoice, GRDA will deliver payment to Contractor within forty-five (45) days from the date on which the invoice was approved by GRDA. No interest or penalty will be charged by Contractor for late payment until forty-five (45) days after GRDA's approval of a valid invoice, and the maximum interest or penalty charged by Contractor will not exceed the maximum interest rate permissible under Oklahoma law.

3.4 No GRDA Waiver by Approval. GRDA's approval of the Certificate of Contract Completion will not of itself constitute an approval or acceptance of any faulty work or defective materials, whether latent or patent, nor will any payment, whether partial payment or final payment by GRDA, or release of retainage, constitute a waiver and/or acceptance of any defective or faulty workmanship or materials.

3.5 No Additional Compensation Authorized. Contractor will not be entitled to any claim for additional compensation related to the performance of additional work beyond the scope of the original Contract unless the claim for additional compensation is approved and authorized in writing by the appropriate GRDA personnel, which may require approval by the GRDA Board of Directors. Contractor will not proceed with any such work unless specifically authorized in writing by GRDA.

4. CONTRACTOR'S OBLIGATIONS.

4.1 Written Work Authorization Required. Contractor will not commence performing Work unless it receives written authorization from the Designated GRDA Representative.

4.2 Contractor's Means and Methods of Construction. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of the Work.

4.3 Supervision. Contractor shall supervise, inspect, 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 assign a competent resident superintendent who will not be replaced without written notice to the Designated GRDA Representative.

4.4 Labor. Contractor shall provide competent and qualified personnel to perform the Work as required by the Contract Documents. Contractor shall maintain good discipline and order at the Site.

4.5 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 must be new and of good quality. All special warranties and guarantees required by the Specifications will expressly run to the benefit of Owner. If requested by the Designated GRDA Representative, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.
- c) All materials and equipment must 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.

4.6 Compliance with Drawings and Specifications. Contractor will complete the Project in strict accordance with all contract drawings and Technical Specifications. If Contractor proposes to deviate from the drawings or Technical Specifications, Contractor must have approval in writing from the Designated GRDA Representative before commencing the work. The Project must be completed to the satisfaction of the Designated GRDA Representative, who will, in all cases, determine the amount, quality acceptability, and fitness of all work arising from or related to the completion of the Project. The decision of the Designated GRDA Representative will be final and conclusive.

4.7 Permits, Standards, and Legal Compliance. Contractor will obtain all applicable permits, certificates and licenses, and Contractor agrees to fully comply with such permits. Where not otherwise specified, all materials and installation will meet the latest standard requirements of applicable specifications of the American National Standards Institute, Inc. (ANSI), the Institute of Electrical and Electronics Engineers (IEEE), American Concrete Institute (ACI), American Society for Testing and Materials (ASTM), the National Electrical Manufacturers Association (NEMA), and manufacturer's specifications relating to stress, clearances, pressure and precision measurements, all as provided in manufacturer's plans and drawings for assembly and disassembly of equipment.

4.8 Field Measurements and Examination. Contractor will take field measurements and verify field conditions and will carefully compare such field measurements and conditions and other information known to Contractor with the Contract Documents before commencing activities. If Contractor discovers errors, inconsistencies or omissions between the field measurements and conditions and the Contract Documents, Contractor will report them to the Designated GRDA Representative immediately. Provided, no such report will relieve Contractor of Contractor's obligations under this Contract.

4.9 Timely Completion. Contractor will, in a good and workmanlike manner, complete the Project as required by this Contract by January 31, 2024.

4.10 Liquidated Damages. If Contractor fails to complete the Project on or before the date specified in the Contract, Contractor must pay to GRDA \$1,000.00 per day not as a penalty, but as liquidated damages for each calendar day beyond the required project completion date, until the Certificate of Contract Completion. The liquidated damages are fixed and agreed upon by the Parties because of the impracticability and extreme difficulty of fixing and ascertaining the actual damages GRDA would sustain in such event. Provided, the liquidated damages do not limit the damages that GRDA may recover for any other cause of action arising from or related to this Contract.

4.11 TIME IS OF THE ESSENCE FOR EACH AND EVERY PORTION OF THIS CONTRACT.

4.12 Personnel Risk Assessment. At least fifteen (15) days prior to any on-site activity, Contractor will provide a full legal name and valid working email address for each of Contractor's employees, agents, or representatives (including subcontractors and any of subcontractor's employees) who will perform work on Site so that GRDA may complete a background check for each such individual. GRDA's Manager of Physical Security will send a link to each of those email addresses to allow each of those individuals to complete a Personnel Risk Assessment. Only those persons successfully completing the Personnel Risk Assessment and approved by the Designated GRDA Representative may enter onto the Site. Contractor, at no additional cost to GRDA, will immediately remove or cause to be removed from the Site any personnel considered by GRDA to be incompetent or unfit, whenever requested to do so by GRDA. Such person may not again be employed at the Site. Contractor, at Contractor's expense, will provide a replacement for any personnel removed.

5. INSURANCE.

5.1 Insurance. Contractor, at its own expense, will carry, with reliable insurance companies that are acceptable to GRDA, the following types of insurance with limits not less than shown in the respective amounts:

- a) Commercial General Liability Insurance. Contractor will maintain for the duration of this Contract a commercial general liability insurance policy covering all work and operations by or on behalf of Contractor, including but not limited to coverage for bodily injury, wrongful death, personal injury, property damage, premises and/or operations hazards, products and completed operations, and contractual liability insuring the obligations assumed by Contractor in this Contract. The commercial general liability insurance policy cannot exclude the perils of explosion, collapse, and underground hazards. The commercial general liability insurance policy will be written on an occurrence basis. The limits of liability will not be less than One Million Dollars (\$1,000,000) per occurrence and Two Million Dollars (\$2,000,000) aggregate. If defense costs are included in the limits of liability, then the required limits on each of the limits of liability referenced above will be increased by One Million Dollars (\$1,000,000). If the commercial general liability insurance policy utilizes a general aggregate limit, then the general aggregate limit will apply separately to the work and operations performed by or on behalf of Contractor, or alternatively Contractor may obtain separate insurance to provide the required limits which will not be subject to depletion because of claims arising out of any other project or activity of Contractor.

GRDA, its officers, directors, employees, representatives and agents will be expressly named as additional insureds on the commercial general liability insurance policy with respect to liability arising out of work and operations performed by or on behalf of Contractor. The commercial general liability insurance policy will stipulate that the insurance afforded to the additional insureds will apply on a primary and non-contributory basis and that any other insurance carried by the additional insureds will be excess only and will not contribute with this insurance.

- b) Automobile Liability Insurance. Contractor will maintain for the duration of this Contract an automobile liability insurance policy insuring against claims for bodily injury and property damage and covering liability arising out of all motor vehicles, including owned, leased/hired, and non-owned motor vehicles. The limit of liability will not be less than One Million Dollars (\$1,000,000) per accident for bodily injury and property damages. The automobile liability insurance policy will be written on an occurrence basis.
- c) Workers' Compensation and Employer's Liability Insurance. For the duration of this Contract, Contractor will provide workers' compensation insurance sufficient to meet its obligations under the laws of the State of Oklahoma. Further, Contractor will provide employer liability insurance covering its legal obligation to pay damages because of bodily injury or

occupational disease (including resulting death) sustained by an employee. The employer liability insurance will contain a liability limit of no less than One Million Dollars (\$1,000,000) per accident for bodily injury or disease.

- d) Excess/Umbrella Insurance. Contractor will provide Excess/Umbrella insurance coverage of not less than Three Million Dollars (\$3,000,000) to follow form on the employer's liability, general liability and auto insurance heretofore described in this Article.

5.2 Waiver of Subrogation. Contractor grants to GRDA a waiver of Contractor's rights to subrogation against GRDA. Further, Contractor grants to GRDA a waiver of all rights to subrogation which any insurer of Contractor may acquire against the GRDA by virtue of the payment of any loss. Contractor agrees to obtain any endorsement that may be necessary to effect this waiver of subrogation. Contractor understands and acknowledges that this waiver of subrogation provision applies regardless of whether Contractor has received a waiver of subrogation endorsement from its insurer.

5.3 Certificates of Insurance. Contractor must mail a certificate of all such insurance to the Legal Department, Grand River Dam Authority, 9933 East 16th Street, Tulsa, Oklahoma 74128. The certificate(s) must show the name and address of the insured, particular work covered, limits of coverage, policy number, effective and expiration dates and cancellation requirements. If Contractor changes insurers during Contractor's performance of this Contract, Contractor will ensure that there are no lapses in coverage and will notify GRDA prior to any modification to the above-described policies. In the event that Contractor fails to maintain insurance as provided by this paragraph, Contractor is in default under this Contract.

5.4 Subcontractor Insurance. Contractor must require all subcontractors to maintain insurance coverage covering workers' compensation and liability coverage as suitable for their role in the Project.

6. CONTRACT TERM AND TERMINATION.

6.1 Effective Date. This Contract will become effective upon the later of the date of execution by both parties or the date of approval by the GRDA Board of Directors.

6.2 Termination for Convenience. GRDA may terminate this Contract for any reason upon thirty (30) days prior written notice to Contractor. If GRDA terminates the Contract under this paragraph, GRDA will pay Contractor a portion of the Contract amount reflecting the amount of work successfully completed and approved by GRDA at the time of termination. All termination charges will be due and payable thirty (30) days from the date of receipt of Contractor's final invoice, which will be delivered to GRDA no more than thirty (30) days after GRDA delivers Contractor such notice of termination.

6.3 Termination for Cause. If Contractor fails, at any time during the performance of the Project, to provide the necessary crews, tools, and equipment for the performance of the Project, or fails to perform any of its obligations described in the Contract, and in either case, fails to substantially cure the non-conforming action within five (5) days of receiving notice, GRDA

may, at its election, and without prejudice to other remedies it may have, either: (i) terminate this Contract in its entirety and pay to Contractor a portion of the Contract amount reflecting the amount of work successfully completed and approved by GRDA prior to the time of cancellation; or (ii) utilize another contractor to perform any portion of the work, at the expense of Contractor. GRDA's remedies in the event of termination for cause, as described in this paragraph, will not be construed as a waiver of any other rights or remedies available to GRDA under applicable law.

6.4 Release upon Termination. Upon termination of the Contract by GRDA, GRDA will be released from further liability to Contractor or surety company, if any. If Contractor cannot be located, the payment for any amount owed to Contractor for work performed will be held in GRDA funds for Contractor for a period not to exceed thirty-six (36) months, at which time the payment will be deemed to be donated to GRDA by Contractor and deposited in the GRDA Revenue Fund. This will release GRDA from any further liability to Contractor or surety company, if any.

6.5 Suspension of Project. Contractor may not suspend performance of any part of the Project except as directed and authorized by GRDA. GRDA may, at any time and in its sole discretion, suspend performance of all or part of the Project, using the following procedure:

- a) GRDA will notify Contractor about any Project suspension, and identify the scope and effective date of the suspension. Contractor will suspend performance of the Project in accordance with GRDA's notice, but will continue to perform the portion of the Project not suspended. Upon receipt of GRDA's notice, Contractor will protect and preserve items committed to or purchased for the suspended portion of the Project and will minimize the financial consequences of the suspension.
- b) If the suspension is unrelated to Contractor's failure to comply with this Contract, GRDA will adjust the schedule to reflect the reasonable delay due to the suspension and will reimburse Contractor for the reasonable and direct additional costs incurred by Contractor due solely to the safeguarding or storage of Project materials in accordance with GRDA's instructions. Provided, the aggregate sum of such costs may not exceed the Contract Price. This schedule adjustment and reimbursement will be Contractor's sole and exclusive remedies for a GRDA-directed suspension.
- c) Contractor will promptly resume performance of the suspended portion of the Project when so directed by GRDA. In order to receive a schedule adjustment and/or reimbursement of expenses, Contractor must present all claims for schedule adjustment and/or reimbursement, including any supporting materials, within ten calendar days after GRDA instructs Contractor to resume the suspended Project. If Contractor does not present a schedule adjustment and/or reimbursement claim within this ten-day period, Contractor will not receive a schedule adjustment and/or reimbursement related to the suspension.

6.6 Obligations Surviving Termination. Contractor's contractual obligations pertaining to warranty, indemnification, confidentiality, insurance, choice of law, jurisdiction, and audit rights will survive termination.

7. SUBCONTRACTING.

7.1 No Subcontractors without GRDA Consent. Except as provided in Contractor's Bid Proposal, Contractor will not subcontract any portion of the Project without first obtaining GRDA's written consent. Provided, if GRDA approves a Subcontractor, that approval will not constitute a waiver of any of GRDA's rights arising under or related to this Contract.

7.2 Subcontractors Bound by Contractual Requirements. Each Subcontractor (and each subcontractor of a Subcontractor) will be bound by, and must comply with, each of the requirements in this Contract.

7.3 Contractor Remains Liable for Subcontractor Performance, Payment, and Management. Contractor will be fully and principally liable for: (1) all of the acts and omissions of its subcontractors; and (2) each duty arising under or related to this Contract. Nothing in this Contract will be construed to create any contractual relationship between GRDA and any Subcontractor, nor any obligation on the part of GRDA to pay or to see to the payment of any money due any subcontractor of Contractor, except as may be otherwise required by law. Contractor will directly manage each of its Subcontractors in the performance of the Project.

7.4 Subcontractor Inspection. Contractor will inspect and promptly report to GRDA any defects associated with any such subcontracted work that would render it unsuitable for proper performance under this Contract.

7.5 Contractor's Prompt Payment of Subcontractors. Contractor will promptly pay the Subcontractors the amounts to which they are entitled. Upon GRDA's request, Contractor shall provide GRDA written evidence that Contractor has properly paid each Subcontractors. If Contractor fails to furnish such evidence, then: (i) GRDA may contact any Subcontractor to determine whether the subcontractor has been properly paid; and (ii) GRDA may suspend all payments under the Contract; and (iii) Contractor will be in default of this Contract.

7.6 GRDA Payment of Subcontractors. GRDA has no obligation to pay Subcontractors or ensure that the Subcontractors are properly paid by Contractor. If GRDA determines that a Subcontractor has not received payment for its portion of the work, then GRDA may, at GRDA's sole discretion, directly pay the Subcontractor the amount that it is owed and may deduct that amount from any future payment to Contractor, or issue a separate invoice to Contractor for the amount paid to the subcontractor, plus a reasonable administrative fee.

8. INDEMNITY AND LIABILITY.

8.1 Tort Claims Liability. Contractor will be responsible for any damages or injuries caused by the acts or omissions to act of its officers, employees, or agents. Contractor agrees to hold harmless GRDA of any claims, demands and liabilities resulting from any act or omission on the part of Contractor and/or its officers, employees, or agents arising from or related to the performance of the Contract.

8.2 No Partnership or Joint Venture. This Contract will not be construed as, nor given the effect of, creating a joint venture, partnership, affiliation, or association that would otherwise render the Parties liable as partners, agents, or employer-employee or otherwise create any joint and several liability.

8.3 No Special Damages. To the fullest extent allowed by applicable law, in no event will GRDA be liable for any special, indirect, or consequential damages including, without limitation, damages, or losses in the nature of increased Project costs, loss of revenue or profit, lost production, or governmental fines or penalties.

8.4 Contractor Representation and Knowledge. Contractor is, or has the opportunity to be, adequately represented by counsel. Contractor has taken all steps to fully inform itself of the current status of Oklahoma law on the issue of limitation of liability, indemnification, and GRDA.

9. WARRANTIES.

9.1 General Warranty. For a period of one (1) year from the Completion of the Project Contractor warrants and guarantees that the Work on the Project, including all equipment and services to be provided, will conform to all Specifications which are part of the Contract Documents, will be free of defects in workmanship or material, and will be designed for the purposes stated in the Contract Documents.

9.2 Warranty Claims and Corrections. If GRDA discovers that the Work on the Project, including all equipment and services to be provided, do not conform to all Specifications which are part of the Contract Documents, are not free of defects in workmanship or material, and/or are not designed for the purposes stated in the Contract Documents, GRDA will provide Contractor written notice within sixty (60) days of the discovery, then Contractor will promptly correct such nonconformity and/or defect at Contractor's sole cost and expense.

9.3 GRDA's Correction of Warranty Claims. If Contractor fails to correct any defective or non-conforming portion of the Project within a reasonable time, GRDA may, upon written notice to Contractor, perform or cause to have performed the redesign, repair, rework or replacement of the non-conforming portion of the Project in GRDA's discretion, and charge Contractor for all costs arising from or related to such redesign, repair, rework, or replacement. This cost may include labor, materials, and other direct costs. GRDA may, at GRDA's discretion, separately invoice or deduct from payments otherwise due to Contractor the costs as provided herein. GRDA's right to charge Contractor these costs is in addition to any and all other rights and remedies available to GRDA.

10. FORCE MAJEURE.

10.1 Force Majeure Excuses Delay. Contractor will not be liable for failure to perform any obligation or for delay in performance resulting from or contributed to by any cause beyond the control of Contractor or its suppliers if such cause was not reasonably foreseeable, or from any act of God; act of civil or military authority; declared act of war; insurrection or riot; sabotage; terrorist activities; fire; earthquake; flood; embargo; declared national fuel or energy shortage; or unpreventable delay or accident in shipping or transportation. Force Majeure may not be claimed

due to economic factors, including, but not limited to, changes in the cost of materials or labor, tariffs, taxes, or governmental regulations.

10.2 Mandatory Procedures for Claiming Force Majeure. If Contractor claims Force Majeure, Contractor must immediately notify GRDA in writing regarding the Force Majeure event, the anticipated duration of delay, and Contractor's strategy to mitigate the delay. GRDA will approve or deny the Force Majeure claim using its reasonable discretion. If such a claim is approved, the date of delivery or time for completion of the Project will be extended by a period of time reasonably necessary to overcome the effect of the delay. Provided, Contractor will not receive any additional compensation for a Force Majeure event. If Contractor's Work on the Project is delayed for a period in excess of ninety (90) days due to a force majeure condition, GRDA may, at its election, and without prejudice to other remedies it may have, terminate this Contract in its entirety and pay to Contractor a portion of the Contract amount reflecting the amount of work successfully completed and approved by GRDA prior to the time of cancellation.

11. TITLE AND RISK OF LOSS.

Title to all materials furnished by Contractor hereunder will pass to GRDA, free and clear of any liens, encumbrances, qualifications, or defects of any nature, upon affixment of such materials to GRDA property. Notwithstanding the terms of any agency appointment agreement entered into by the Parties, Contractor will retain all liability for, and risk of loss or injury to all materials and Work to be furnished by Contractor until final approval and acceptance of complete performance of this Contract.

12. NO ASSIGNMENT.

Contractor will not assign or otherwise transfer any duties to be performed under this Contract without the prior written consent of GRDA. Even if agreed to by GRDA, any assignment by Contractor will not relieve Contractor of its obligations under this Contract.

13. CHANGES ORDERS.

The following procedure will apply to additional work beyond the original scope of the Contract:

- a) If a change is needed to the scope of the Project and the Designated GRDA Representative has approved the change, the Designated GRDA Representative and Contractor will complete applicable portions of the Change Order Request form attached to this Contract. The Change Order Request will fully describe the revised scope of work, explaining completely what each item entails and the cost, credit, and time extension involved. Contractor will provide a detailed breakdown of cost, showing quantities and sizes of materials, unit cost, labor, equipment, profit and overhead, and other expense items. Provided, Contractor must perform each task described in the Contract Documents, and Contractor will not be entitled to a Change Order for any such task described in the Contract Documents or listed within an itemized table of tasks included in the Contract.

- b) Before any change order is binding, it must be approved by the GRDA Board of Directors or the GRDA CEO.
- c) GRDA will determine whether a change order is of sufficient size and scope to require re-advertising for bids. Upon such a determination, GRDA has the option to terminate the Contract under Article 6.2.
- d) If the Contractor is not awarded the contract for the readvertised project, the Contractor must demobilize from the work site within 30 days of receipt of notice from GRDA. The Contractor shall not remove any GRDA-supplied materials or equipment from the Site. Any Contractor-owned equipment, materials, debris, or trash remaining on the site after 30 days shall become the property of GRDA. Any trash or debris that must be removed by GRDA will be charged to the Contractor and the cost deducted from any final payment made to the Contractor.

14. GRDA NOT LIABLE FOR TAXES.

The prices herein are inclusive of all costs, including any applicable taxes. GRDA will have no liability to Contractor to pay taxes incurred by Contractor.

15. INTELLECTUAL PROPERTY

15.1 Intellectual Property Indemnification. Contractor will, at its own expense, defend, indemnify, and hold harmless GRDA from and against any claim that any equipment, work, material, or process furnished and/or used by Contractor arising from or related to the Project constitutes an infringement of any patent, copyright, trade secret, or other intellectual property. If GRDA receives notice of any such claim, GRDA will promptly notify Contractor in writing, and will provide other information that is reasonably necessary in order for Contractor to defend such claim. Contractor will notify GRDA regarding Contractor's choice of intended legal counsel to defend the claim. Legal counsel must be approved in advance by GRDA, at GRDA's sole discretion. Contractor will pay all damages and costs awarded in any suit or proceeding so defended. In case the equipment, work, material, or process, as a result of any suit or proceeding so defended, is held to constitute infringement of any patent, copyright, or trade secret, or its use by GRDA is enjoined, Contractor will, at its option and its own expense, either (i) procure for GRDA the right to continue using said equipment, work, material, or process; (ii) replace it with a substantially equivalent non-infringing equipment, work, material, or process, subject to pre-approval by GRDA; or (iii) modify the equipment, work, material, or process so it becomes non-infringing, subject to pre-approval by GRDA.

15.2 License. Contractor hereby grants to GRDA a nonexclusive, royalty-free license to use any of Contractor's intellectual property used in the performance of the Project, including, but not limited to, the design and construction related documents, blueprints, drawings, and computer programs including, but not limited to, machine readable object code, flow charts, logic diagrams, listings, and any listing generated therefrom (referred to herein as the "Software"), for use by GRDA in operating or in connection with the equipment. Any Software updates will also be covered by the provisions of this Contract.

16. COMPLIANCE WITH LAWS.

16.1 Contractor's Compliance with Laws. In the performance of any work under this Contract, Contractor and its subcontractors will comply with all applicable provisions and requirements of the Civil Rights Act of 1991 and any amendments thereto, the Fair Labor Standards Act of 1938 and amendments thereto, the Occupational Safety and Health Act of 1970, and all other federal, state, and local laws, including but not limited to environmental laws. The Contract Price, as contained in Contractor's Bid Proposal, is based on full compliance by Contractor with these laws and requirements. If Contractor or any subcontractor fails to comply with such laws, regulations, or enactments, and Contractor is assessed a fine, penalty, cost, charge, and/or expense due to the noncompliance, Contractor will fully pay any such fine, penalty, cost, charge, or expense, and hold GRDA harmless regarding the same. In the event that any such fine, penalty, cost, charge, and/or expense is assessed against GRDA, Contractor will indemnify GRDA as provided paragraph 8.1.

16.2 Status Verification System. Contractor certifies that it and all proposed subcontractors, whether known or unknown at the time this Contract is executed or awarded, are in compliance with 25 O.S. § 1313 and participate in the Status Verification System. The Status Verification System is defined in 25 O.S. § 1312 and includes, but is not limited to the free Employee Verification Program (E-Verify) available at www.dhs.gov/E-Verify.

17. ACCESS TO WORK AND RIGHT OF INSPECTION BY GRDA.

GRDA will have reasonable access to the areas where the work under this Contract is being performed to enable GRDA to observe the work. Contractor, if requested, will inform GRDA of those tests and procedures which can be witnessed at Contractor's facilities, and the schedule for those test and procedures. If GRDA wishes to witness a test or procedure, GRDA will notify Contractor of its intent. No rescheduling of tests or delays in manufacturing or shipment will be made to accommodate GRDA's attendance to witness a test or procedure. Contractor will exercise reasonable efforts to secure similar rights with respect to the inspection of the work at Contractor's premises. Any tests conducted at the Site will likewise contain the same rights.

18. ACCOUNTING AND AUDIT RIGHTS.

18.1 Statements, Books, and Records. Contractor agrees to furnish GRDA, in such form as will be reasonably satisfactory to GRDA, such detailed statements pertaining to the cost of material and labor as may be necessary for GRDA to comply with the requirements of its internal purchasing and accounting policies or any governmental regulatory authority having jurisdiction over GRDA. In determining the amount of compensation payable to Contractor, Contractor will, during the period of performance of work invoiced on a time and material basis, maintain books, records, documents, and other supporting data relating to the amounts invoiced.

18.2 Record Retention and Audits. Contractor will, at all times during the term of this Contract and for a period of five (5) years after the completion of this Contract, maintain and make available for inspection and audit by GRDA and/or the Oklahoma State Auditor, all books, supporting documents, accounting procedures, practices, and all other items relevant to the Contract.

19. WAIVERS.

The failure of either party to enforce, at any time, any of the provisions of this Contract or to require, at any time, performance by the other party of any of such provisions, will in no way be construed to be a waiver of such provision, nor in any way to affect the validity of this Contract, or any parts thereof, or the right of either party thereafter to enforce each and every provision.

20. ENVIRONMENTAL COMPLIANCE.

20.1 Hazardous Waste. Contractor recognizes that the performance of the work at the Site may involve the generation of hazardous waste as such term is defined in the Resource Conservation and Recovery Act (42 U.S.C. § 6901, *et seq.*), the laws of the State of Oklahoma, and the applicable rules or regulations. GRDA will designate an area for hazardous waste storage at the Site where waste containers are to be placed by Contractor. Contractor will, at its expense, furnish containers appropriate for hazardous waste storage and be responsible for the transportation and disposal of such waste. Contractor agrees to store, transport, and dispose of such hazardous waste in accordance with all applicable federal, state, and local laws, rules, regulations, and ordinances. GRDA will pre-approve any waste contractor and disposal facility proposed to be utilized by Contractor prior to the waste leaving the Site. Further, Contractor will employ procedures to minimize the generation of hazardous waste during the performance of its work hereunder. If Contractor generates, stores, transports, or disposes of any hazardous waste, Contractor will provide GRDA with written documentation identifying the type and quantity of all hazardous waste generated, stored, transported, and/or disposed during the performance of the Contract.

20.2 Non-Hazardous Waste. Contractor further recognizes that the performance of the work at the Site may involve the generation of non-hazardous waste as such term is defined in the Resource Conservation and Recovery Act (42 U.S.C. § 6901, *et seq.*), the laws of the State of Oklahoma, and the applicable rules or regulations. GRDA will designate an area for non-hazardous waste storage at the Site where waste containers are to be placed by Contractor. Contractor will, at its expense, furnish containers appropriate for non-hazardous waste storage and be responsible for the transportation and disposal of such waste. Contractor agrees to store, transport, and dispose of such non-hazardous waste in accordance with all applicable federal, state, and local laws, rules, regulations and ordinances. GRDA will pre-approve any waste contractor and disposal facility proposed to be utilized by Contractor prior to the waste leaving the Site. Further, Contractor will employ procedures to minimize the generation of non-hazardous waste during the performance of its work hereunder.

21. CONFIDENTIALITY.

21.1 Contractor agrees to accept and hold drawings, specifications, identified computer software, materials, and information furnished by GRDA in complete confidence, and further agrees not to divulge such to any third party or use the same for its own benefit. Contractor agrees to return all originals and copies of such data and all ancillary information derived therefrom to GRDA promptly upon its request or termination of this Contract, whichever occurs first.

21.2 OKLAHOMA OPEN RECORDS ACT: Contractor understands and acknowledges that GRDA is an agency of the State of Oklahoma and is subject to the Oklahoma Open Records Act, 51 O.S. § 24A.1, et seq. Contractor understands and acknowledges that Client’s duties under the Oklahoma Open Records Act may require GRDA to disclose information which is considered by Contractor as proprietary and confidential. If GRDA receives a request to disclose information which is considered by Engineer to be confidential or proprietary, before disclosing the information, GRDA will use reasonable efforts to provide Contractor with advance notice of the information requested and GRDA’s intent to disclose.

22. APPLICABLE LAW.

The words and phrases of this Contract will be given their ordinary English meaning and this Contract will be interpreted and construed in accordance with the laws of the State of Oklahoma. The District Courts of Tulsa County, Oklahoma, shall have exclusive jurisdiction and venue to adjudicate any such disputes.

23. NOTICES.

Except as otherwise provided, all notices required or permitted to be given will be in writing and will be deemed properly given when delivered in person to the other party to be notified or when mailed by registered or certified United States mail, postage prepaid to the proper individual(s), or when sent by email to the party to be notified at its address set forth below, or such other address as the party to be notified may have previously designated by written notice to the other:

Designated GRDA Representative:

Steven Kroll
Senior Engineering Manager
Grand River Dam Authority
Post Office Box 1128
Pryor, Oklahoma 74362-1125
Email: steven.kroll@grda.com

GRDA Procurement Administrator or Designee:

Paul Proctor
Grand River Dam Authority

Email: paul.proctor@grda.com

Contractor:

Email:

24. CERTIFICATION REQUIRED BY 74 O.S. § 85.42(B).

Contractor certifies that no person who has been involved in any manner in the development of this Contract while employed by the State of Oklahoma will be employed by Contractor to fulfill any of the services provided for under this Contract.

25. CERTIFICATION REQUIRED BY 74 O.S. § 582(B).

Contractor certifies that it is not currently engaged in a boycott of goods or services from Israel that constitutes an integral part of business conducted or sought to be conducted with the State.

26. SAFETY.

26.1 Contractor Responsibility for Safety. Contractor has complete and sole responsibility for safety at the Site during the Project. Contractor must strictly comply with all applicable OSHA standards and regulations. Contractor must cooperate with officials of OSHA and any other federal or state agencies which have authority to enforce the Occupational Safety and Health Act. Contractor must appoint an individual employed in a supervisory position who is responsible for safety at the Site. This individual must be present on the Site while the Work is being performed and must be empowered to take corrective action.

26.2 Contractor Safety Program. Contractor must have a comprehensive safety program covering all of Contractor's activities at the Site that is designed to prevent injury to all persons and damage to all property that are on, about, or adjacent to the Site. The safety program must be in writing in the form of a written safety manual that must be submitted to GRDA before the commencement of any Work. Contractor's safety manual must, at a minimum, (a) meet or exceed the standard of care for such programs as established by nationally recognized firms which provide goods and services of a similar nature, (b) include health, first aid, fire safety and emergency policies and procedures to be implemented at the Site, (c) identify the personal protective equipment that will be required to be worn and/or used while working on the Site, and (d) strictly comply with all OSHA regulations and any permits that are required to be obtained or maintained in connection with the Project. If GRDA determines that Contractor's safety manual does not meet the foregoing standards, it shall notify Contractor of such deficiencies in writing. Contractor shall immediately correct such deficiencies in the safety manual and implement the corrections into the performance of the Work. Contractor will initiate and maintain all reasonable safety precautions and programs in connection with the performance of the Work in accordance with the safety manual, OSHA regulations, and any permits that are required to be obtained or maintained in connection with the Project. Contractor will take all reasonable precautions for the protection and safety of, and will provide all reasonable protection to prevent harm, damage, injury or loss to: (i) all persons employed by Contractor or any Subcontractors in connection with the Project and all other members of the public who may be affected thereby; (ii) all materials and equipment or other personal property on the Site or in the vicinity thereof; and (iii) the real property comprising the Site and any real property in the vicinity thereof.

26.3 Emergency or Hazardous Condition. In the event of an emergency or hazardous condition affecting the safety or health of the public or endangering the Site or other property located at the Site, Contractor will take action in an effort to prevent, or to mitigate as much as practicable, such threatened damage, injury, or loss. Upon obtaining knowledge thereof,

Contractor will immediately notify GRDA verbally (with written notice to follow within twenty-four (24) hours) of any such emergency or hazardous condition or occurrence of which Contractor becomes aware that in any way affects, or could affect, the safe completion of the Project and the safety of the public. To the extent Contractor is not responsible for such unsafe condition, Contractor shall be entitled to a Change Order for additional costs and expenses of and/or delay resulting from such action that are not included in the Work.

26.4 Suspension of Work Due to Unsafe Condition. Whenever, in the sole opinion of GRDA, Contractor has failed to take sufficient precautions for the safety of the public, the protection of the Site, or the protection of structures or property on or adjacent to the Site, then GRDA, after having given prior notice to Contractor, may: immediately suspend all activities until safe conditions are reinstated. The suspension of activities will be at the expense of Contractor and no time will be added to the completion of the Project.

26.5 Accidents. Contractor will immediately report verbally to the Designated GRDA Representative (and in writing within 24 hours) the details of any accident that occurs on or about the Site.

27. CERTIFICATION REQUIRED BY 74 O.S. § 12005.

Contractor certifies that it is not engaged in a boycott of energy companies, nor will it engage in a boycott of energy companies during the term of this Contract.

The Parties agree to the terms of this Contract.

GRAND RIVER DAM AUTHORITY

By _____
Daniel S. Sullivan, Chief Executive Officer

Date: _____

GRDA Board Approved -----

CONTRACTOR

By _____

Date: _____

Exhibit A

**State of Oklahoma
Grand River Dam Authority**

Certificate of Contract Completion

Project Name	
Contract Number	
Contractor	
Contract Date	
Contract Amount	

CONTRACTOR'S AFFIDAVIT

I DO SOLEMNLY SWEAR AND AFFIRM: That the work under the above named contract and all amendments thereto have been completed in accordance with the requirements of said contract; that all costs incurred for equipment, materials, labor, and services against the project have been paid; that no liens have been attached against the project; that all Workmen's Compensation claims are covered by Workmen's Compensation Insurance as required by law; that all public liability claims are adequately covered by insurance; that I, acting for the Contractor, shall save, protect, defend, indemnify, and hold the Grand River Dam Authority harmless from and against all claims which arise as a direct or indirect result of any transaction, event or occurrence related to performance of the work included under said contract.

Contractor: _____

By: _____

Title: _____

Date: _____

State of _____, County of _____.

Personally appeared before me this _____ day of _____, 20____.

_____, known (or made known) to me to be the _____

[Owner, partner, title] of the above named Contractor, who being by me duly sworn, subscribed in the foregoing affidavit in my presence.

Notary Officer: _____

Typed Name: _____

My Commission expires: _____

Commission No: _____

Certificate of Acceptance

THIS IS TO CERTIFY: That the work under the above described contract has been completed under the terms of the contract; that based on inspection and upon the statements made in the above affidavit, the project is hereby accepted as completed.

FOR GRAND RIVER DAM AUTHORITY

By: _____

Date: _____

Title: _____

Distribution:

- GRDA Legal Department
- GRDA Finance Department
- Responsible GRDA EVP
- Contractor

Exhibit B

**State of Oklahoma
Grand River Dam Authority**

Change Order Request

DO NOT PROCEED WITH WORK DESCRIBED HEREIN UNTIL ALL ENTITIES LISTED BELOW HAVE SIGNED THIS DOCUMENT.
This request for modification shall be prepared by the Contractor. This form is required to be submitted. All costs must be broken down.
THIS WORK IS NOT AUTHORIZED UNTIL ALL ENTITIES HAVE SIGNED THIS DOCUMENT.

Date of Request	
Project Name	
Contractor Number	
Contractor	
Contract Date	

DESCRIPTION OF CHANGE (Write a description of scope and reasons for change):

BREAKDOWN OF ADDITIONAL CONTRACT COSTS FOR CHANGE ORDER REQUEST (Show details of materials, labor, equipment, subcontractors, overhead, and profit:

Contractor Representative (Printed)

Signature of Contractor Representative

Date

Change Order Reviewed and Recommended By:

Designated GRDA Representative _____ Date _____

GRDA Procurement Administrator _____ Date _____

Responsible GRDA EVP _____ Date _____

Change Order Approved By:

GRDA CEO _____ Date _____

ATTEST:

(Seal) _____ Date _____
Secretary

GRDA Board of Directors _____ Date _____

Exhibit C

Invoice Affidavit

State of Oklahoma) Project Name: _____
) ss
County of _____) Project No.: _____

Contractor certifies under oath, subject to penalty of perjury, that, to the best of Contractor's knowledge, information and belief:

- (1) the work and materials described in this invoice have been fully completed, provided, and delivered in compliance with the Contract Documents;
- (2) Contractor has completed all duties, and tendered all payments (including all invoices provided to Contractor by GRDA), as required by the Contract Documents;
- (3) Contractor has paid for all materials and labor (including Subcontractors) related to this invoice;
- (4) payment on this invoice is due and payable by GRDA;
- (5) all charges, descriptions, items, and other information included on the invoice is true and correct;

Contractor: _____
By: _____
Title: _____
Date: _____

State of _____, County of _____.

Personally appeared before me this _____ day of _____, 202____.

_____, known (or made known) to me to be the _____ [Owner, partner, title] of the above named Contractor, who being by me duly sworn, subscribed in the foregoing affidavit in my presence.

Notary Officer: _____
Typed Name: _____
My Commission expires: _____
Commission No: _____

Approved by: _____
Printed Name Title
Signature Date

Exhibit D

GRDA's Request for Proposal with Technical Specifications is attached, included and incorporated by reference into this Contract.

Exhibit E

Contractor's Bid proposal is attached, included and incorporated by reference into this Contract.