### FIELD ST. SUBSTATION
### CAPACITOR BANK ADDITION
### ISSUED FOR BID

#### DRAWING INDEX

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#### STRUCTURAL NOTES & DESIGN CRITERIA

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#### THREE LINE DIAGRAM

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#### ELECTRICAL PLAN VIEW

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#### CONTROL BUILDING LAYOUT ELECTRICAL PLAN

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#### INTERCONNECT DIAGRAM

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#### INTERCONNECT DIAGRAM

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#### EARTHWORKS

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#### FOUNDATION DETAILS

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#### FOUNDATION KEY MAP

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</table>
1. INFORMATION WAS OBTAINED FROM PREVIOUS STUDIES, DRAWINGS, SCHEMATICS, UCNSB PERSONNEL, AND ABOVE GROUND FIELD INVESTIGATIONS. EVERY EFFORT, (WITHIN THE ALLOWED SCOPE OF THIS DESIGN) WAS MADE TO VERIFY ACCURACY OF THIS INFORMATION, HOWEVER FW&A NEITHER EXPRESSES OR IMPLIES COMPLETE ACCURACY OF SUPPLIED DATA.

2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE EXISTING PHASE ROTATION AND PHASING OF THE EXISTING ELECTRICAL SYSTEMS, PRIOR TO REMOVAL OF ANY EQUIPMENT OR CONDUCTORS. PROVIDE QUALIFIED PERSONNEL AND THE APPROPRIATE TESTING EQUIPMENT AS REQUIRED TO SAFELY PERFORM THIS PHASING. THE CONTRACTOR SHALL MATCH THE EXISTING PHASE ROTATION AND PHASING WHEN INSTALLING EQUIPMENT OR CONDUCTORS IN EXISTING ELECTRICAL SYSTEMS.

3. WHERE NEW EQUIPMENT TO BE INSTALLED DOES NOT OCCUPY THE SAME PHYSICAL LOCATION AS THE EXISTING EQUIPMENT TO BE REMOVED, THE CONTRACTOR SHALL HAVE ALL NEW SYSTEMS AND EQUIPMENT INSTALLED, TESTED AND PREPARED FOR ENERGIZING BEFORE REMOVING INDICATED EXISTING EQUIPMENT. WHERE THE NEW EQUIPMENT IS TO OCCUPY THE SAME PHYSICAL LOCATION AS THE EXISTING EQUIPMENT, CONTRACTOR SHALL INSTALL AS MUCH OF THE NEW SYSTEM AS PRACTICAL WITHOUT AN OUTAGE. ALL NEW EQUIPMENT SHALL BE ON SITE AND TESTED PRIOR TO AN OUTAGE ON ANY SYSTEM OR EQUIPMENT. COORDINATE ANY REQUIRED OUTAGES WITH UCNSB PRIOR TO THE REMOVAL OF THE EXISTING EQUIPMENT.

4. EQUIPMENT LOCATIONS ARE APPROXIMATE, UNLESS SPECIFIC DIMENSIONED DETAILS ARE PROVIDED. ACTUAL LOCATIONS SHALL BE DETERMINED BY THE CONTRACTOR TO SUIT EXISTING FIELD CONDITIONS. CONFLICTS WITH EXISTING PIPING, DUCTWORK, ETC. SHALL BE BROUGHT TO THE ATTENTION OF THE OWNER.

5. DEBRIS FROM CONSTRUCTION OPERATIONS SHALL BE REMOVED FROM THE SITE AT FREQUENT INTERVALS TO PREVENT MATERIAL FROM ACCUMULATING ON-SITE.

6. ALL EQUIPMENT REMOVED OF VALUE SHALL BE TURNED OVER TO UCNSB.
FIELD ST. SUBSTATION
CAPACITOR BANK ADDITION
SINGLE LINE DIAGRAM
FIELD ST. SUBSTATION
CAPACITOR BANK ADDITION

GROUNDING PLAN

ISSUED FOR BID

NOT FOR CONSTRUCTION

GROUNDING AND FENCE PLAN
FIELD ST. SUBSTATION
CAPACITOR BANK ADDITION
ISSUED FOR BID
NOT FOR CONSTRUCTION
RELAY PANEL NO. 3
BACK VIEW WIRING DIAGRAM
COLOR WORK
PRINT
REMOVAL & ADDITION SHEET
NOTES:
RELAY PANEL, SHORTING TYPE
BREAKER, CIRCUIT SWITCHER, RECLOSER
TERMINAL POINT LEGEND

INSTRUMENT TRANSFORMER, RELAY, TEST SW.
POWER TRANSFORMER

X
XX

WIRING DIAGRAM PANEL NUMBER
AND DEVICE DESIGNATOR

CONTINUED
ON DWG 38928B124

7
8
D
8
KB
(-)
8R1-4
48
42
13
14
G
86BF
CB1
8
EC
8
DA
86BF/CB1
STATUS

BREAKER CONTACTS TO BE UPDATED AFTER
AWARD OF BREAKER AND ISSUE OF SHOP
DRAWINGS

1.FOR GENERAL NOTES, ABBREVIATIONS AND LEGEND
SEE DRAWING 38928V103.
1. NOTES:

2. RELAY PANEL, SHORTING TYPE BREAKER, CIRCUIT SWITCHER, RECLOSER

TERMINAL POINT LEGEND

RELAY PANEL

INSTRUMENT TRANSFORMER, RELAY, TEST SW.

POWER TRANSFORMER

X

XX

WIRING DIAGRAM PANEL NUMBER AND DEVICE DESIGNATOR

TO 125V DC PANEL "D2"

CIRCUIT 3

(-)

8R1-12

18

11

52CS

CB1

8

EF

250VDC, 30A

8FU9

1

2

SUMMARY ALARMS TO BE ADDED TO SCHEMATIC AFTER RECEIPT OF APPROVED CIRCUIT BREAKER SHOP DRAWINGS

FOR MORE DETAIL INTERNAL SCHEMATICS, REFER TO DRAWING 38928B133 (TO BE UPDATED UPON RECEIPT OF APPROVED CIRCUIT BREAKER SHOP DRAWINGS)

AUXILIARY CONTACT FROM LOAD BREAKER TO PREVENT AUTOMATIC OPERATION WHEN BREAKER IS OPEN.

(+)

8R1-11

4

3

8FU9

250VDC, 30A

COLOR WORK PRINT ADDITION SHEET

CONTINUED ON DWG 38928B127

A02

A01

451

SCADA OPEN

8

DA

4

3

R

8

EG

58

86B

115KV

7

EB

19

20

J

7

JA

TS-86B

115kV

H4c

H4b

CB-1

TRIP +

BKR

TRIP -

7R8-3

52

7R8-4

8L13-5

8L13-6

CAP BANK CIRCUIT BREAKER CB1 TRIP CIRCUIT 1

2 1

G

8

EG

BKR b

CONTACT

H6a

H6c

V

P3a

P3c

V

GE-C70

50/51/50N/59N

TCM

8

CA

TCM

74UE

8R5-1

TB03-13

8R5-2

TB02-9

8R5-3

TB02-10

FIELD ST. SUBSTATION

CAPACITOR BANK ADDITION

ISSUED FOR BID

NOT FOR CONSTRUCTION

CHECKED

DRAWN

DATE

SHEET

SCALE:

FIELD ST. SUBSTATION

CAPACITOR BANK ADDITION

115kV CAPACITOR BANK CIRCUIT BREAKER CB1 TRIP CIRCUIT 1

DC ELEMENTARY DIAGRAM

JPFVRK

N.T.S.

38928B126

1 OF 1
125 VDC RELAY PANEL, SHORTING TYPE
BREAKER, CIRCUIT SWITCHER, RECLOSER
TERMINAL POINT LEGEND
RELAY PANEL
INSTRUMENT TRANSFORMER, RELAY, TEST SW.
POWER TRANSFORMER

CONTINUED ON DWG 38928B128

(-)
8R1-10 250VDC, 30A 8FU10
(+) 8R1-9 4 3 8FU10

CONTINUED ON DWG 38928B128

(-)
28 22 86CAP FLR 8EA 5 6 C 8 KB TS-8 BKR TRIP -
48 42 86BF 1B 7 HD 15 16 H 7 NC
48 42 86BF 2B 7 HA 13 14 G 7 NA

COLOR WORK PRINT ADDITION SHEET

1. NOTES:
2. SUMMARY ALARMS TO BE ADDED TO SCHEMATIC AFTER RECEIPT OF APPROVED CIRCUIT BREAKER SHOP DRAWINGS
3. FOR MORE DETAIL INTERNAL SCHEMATICS, REFER TO DRAWING 38928B133 (TO BE UPDATED UPON RECEIPT OF APPROVED CIRCUIT BREAKER SHOP DRAWTINGS)
4. FOR GENERAL NOTES, ABBREVIATIONS AND LEGEND SEE DRAWING 38928V103.
1. NOTES:

2. SUMMARY ALARMS TO BE ADDED TO SCHEMATIC AFTER RECEIPT OF APPROVED CIRCUIT BREAKER SHOP DRAWINGS.

3. FOR MORE DETAIL INTERNAL SCHEMATICS, REFER TO DRAWING 38928B133 (TO BE UPDATED UPON RECEIPT OF APPROVED CIRCUIT BREAKER SHOP DRAWINGS).

4. AUXILIARY CONTACT FROM LOAD BREAKER TO PREVENT AUTOMATIC OPERATION WHEN BREAKER IS OPEN.

5. FOR GENERAL NOTES, ABBREVIATIONS AND LEGEND SEE DRAWING 38928V103.
NOTES:

1. CONTRACTOR SHALL SURVEY THE EXISTING RELAY PANEL CONSTRUCTION IN THE CONTROL BUILDING AND PROVIDE THE NEW RELAY PANEL 8 TO MATCH THE DESIGN OF THE EXISTING PANELS. NO MANUFACTURER DRAWINGS OF THE EXISTING PANELS ARE AVAILABLE, BUT THEY WERE MANUFACTURED BY KEMCO.
4) Wire markers required (Origin: Destination).
Drawing and screws are to be placed in all unused holes.
Indicates SIS No. #18/30 Wire.
LEFT AND RIGHT SIDE VIEWS

RELAY PANEL NO. 8

AB8

1. 8L9-1
2. 8L9-5
3. 8L9-6
4. GB-4
5. 8K9-7
6. GB-6
7. HB-2
8. FU2
9. FU1

3) CONNECTIONS TO GROUND BUS TO BE IN ORDER INDICATED ON

INDICATES 16-GA., SHIELDED CABLE.
INDICATES SIS NO. #18/30 WIRE.
INDICATES SIS NO. #10/105 WIRE.

10. 10L10-7
11. 7L16-10
12. 1R4-10
13. 5R14-6
14. 5R14-2
15. 7R7-12
16. 7R14-2
17. 7R14-1
18. 7L16-6
19. GC-4
20. GC-16
21. FU1-6
22. FU2-4
23. FU1-2
24. 1R4-8
25. 7R7-8
26. 7R8-5
27. 7R8-3
28. 7L7-7
29. 1R4-3
30. 1R4-2
31. 7R7-7
32. 7R8-7
33. 7R8-5
34. 7R8-3
35. 7L7-7
36. 1R4-3
37. 1R4-2
38. 1R4-1
39. 10L10-11
40. 10L10-8
41. 10L10-7
42. 10L10-6
43. 10L10-5
44. 10L10-4
45. 10L10-3
46. 10L10-2
47. 10L10-1
48. 10L10-0
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<td>PANEL 3</td>
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<td>PANEL 8</td>
<td>600</td>
<td>CONTROL</td>
<td>6000V</td>
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**Cable Schedule**

1. All cables shall be run in accordance with the NEC.
2. Contractor is responsible for providing all necessary splices, terminations, and markings.
3. All cables shall be marked with proper identification.

**Cable Legend**

- B = 1/0 CU LITEL CABLE
- C = CAT5E CABLE
- D = CONTROL CABLE
- E = MULTI-PURPOSE CABLE
- F = FIBER OPTIC CABLE
- G = GROUND CABLE
- H = HARDWIRE CABLE
- I = LIKED CABLE
- J = MULTI-PURPOSE CABLE
- K = MULTI-PURPOSE CABLE, TO KITE
**LOADS & DESIGN CRITERIA:**

- **HORIZONTAL AND VERTICAL CONTROL:**
  - The general contractor shall coordinate the drawings for all disciplines for anchored structures.
  - The engineer shall be notified prior to construction if a shaft is proposed to be in a sloped area.
  - The grade differential between the top of shaft and adjacent finished grade shall not exceed 4".

- **SOILS & FOUNDATIONS:**
  - All work shall be in accordance with ACI 336.1-01, project geotechnical report (incl. addenda), and the construction documents.
  - All structures require periodic maintenance to extend lifespan and to ensure structural integrity.
  - All concrete shall be normal weight with a 28-day compressive strength of 4,000 psi.
  - All reinforcing steel shall be ASTM A615 Grade 60.
  - All steel and fasteners shall be hot-dipped galvanized per:
    - ASME Section VIII, Division 1
    - AWS D1.1 Structural Welding Code
  - All supplementary founda base reactions are to be developed by the structural foundation plan for the stability of the structure.

- **GROUT SHALL NOT BE USED TO FILL SPACE BETWEEN TOP OF CONCRETE AND STRUCTURE BASEPLATE.**

- **INSPECT EARTHWORK OPERATION AND TEST COMPACTED TO SOILS TO INSURE AND CERTIFY THAT THE SOILS FOR REVIEW AND APPROVAL PRIOR TO CONSTRUCTION AND WILL INCLUDE AT A MINIMUM:**
  - Prepare a work plan detailing the proposed means and methods for the drilled shaft.
  - Prior to construction the contractor shall visit the site, review soil & groundwater conditions, recommend suggestions in the geotechnical report.
  - File no. 19-6325 dated March 27, 2019.
  - Proposed construction including construction de-watering permitting is the responsibility of the contractor unless otherwise shown on drawings.
  - Minimum cover for reinforcing shall be the following:
    - Exposure class: C1
    - Required the structural engineer should be notified prior to construction.
  - Unless otherwise shown on drawings, minimum cover for reinforcing shall be the following:
    - Exposure category C
    - Risk category II
  - Net allowable soil bearing pressure 1,500 PSF
  - Basic wind speed, V (ultimatum) 140 MPH
  - Foundation designs have been based on reactions provided by structure manufacturer where appropriate.
  - Permits construction including construction de-watering permitting is the responsibility of the contractor unless otherwise shown on drawings.
  - Foundation designs have been based on reactions provided by the structure manufacturer in the absence of provided structure reactions; the foundation structural engineer shall verify with equipment purchased before proceeding with structural work.
  - The foundation structural engineer shall be notified prior to construction if structure reactions are not as noted.
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- **ognition, and other project parameters:**
  - The general contractor shall coordinate the drawings for all disciplines for anchored structures.
  - The engineer shall be notified prior to construction if a shaft is proposed to be in a sloped area.
  - The grade differential between the top of shaft and adjacent finished grade shall not exceed 4".

- **SUCTION & MECHANICAL PARTS SHALL BE IN BUTTONS ONLY IF NEEDED.**

- **RISK CATEGORY II**

- **MISCELLANEOUS NOTES:**
  - **HORIZONTAL AND VERTICAL CONTROL:**
    - The general contractor shall coordinate the drawings for all disciplines for anchored structures.
    - The engineer shall be notified prior to construction if a shaft is proposed to be in a sloped area.
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- **SOILS & FOUNDATIONS:**
  - All work shall be in accordance with ACI 336.1-01, project geotechnical report (incl. addenda), and the construction documents.
  - All structures require periodic maintenance to extend lifespan and to ensure structural integrity.
  - All concrete shall be normal weight with a 28-day compressive strength of 4,000 psi.
  - All reinforcing steel shall be ASTM A615 Grade 60.
  - All steel and fasteners shall be hot-dipped galvanized per:
    - ASME Section VIII, Division 1
    - AWS D1.1 Structural Welding Code
  - All supplementary foundation reactions are to be developed by the structural foundation plan for the stability of the structure.
  - Minimum cover for reinforcing shall be the following:
    - Exposure class: C1
    - Required the structural engineer should be notified prior to construction.
  - Unless otherwise shown on drawings, minimum cover for reinforcing shall be the following:
    - Exposure category C
    - Risk category II
  - Net allowable soil bearing pressure 1,500 PSF
  - Basic wind speed, V (ultimatum) 140 MPH
  - Foundation designs have been based on reactions provided by structure manufacturer where appropriate.
  - Permits construction including construction de-watering permitting is the responsibility of the contractor unless otherwise shown on drawings.
  - Foundation designs have been based on reactions provided by the structure manufacturer in the absence of provided structure reactions; the foundation structural engineer shall verify with equipment purchased before proceeding with structural work.
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**TOP OF SHAFT REINFORCEMENT**

- Top of shaft reinforcement schedule: View the top of the shaft with reinforcement details.

**TYPICAL SHAFT SECTION**

- Typical shaft section: View the typical cross-section of the shaft with reinforcement and structural details.

**ANCHOR REINFORCEMENT DETAIL**

- Anchor reinforcement detail: View the anchor reinforcement details with specific reinforcement sizes and locations.

**ANCHOR RODS**

- Anchor rods: View the anchor rods schedule with specific rod sizes and projections.

**ANCHOR PLATE SCHEDULE**

- Anchor plate schedule: View the anchor plate schedule with specific dimensions and materials.

**TYPICAL MAXIMUM HOOP TIE SPACING**

- Typical maximum hoop tie spacing: View the typical maximum spacing of hoop ties within the shaft.

**SUBSTATION FOUNDATION DETAILS**

- Substation foundation details: View the foundation details for the substation with specific structural and reinforcement details.

**FIELD STATION**

- Field station: View the field station details with specific dimensions and configuration.

**ANCHOR PLATE REMARKS**

- Anchor plate remarks: View the anchor plate remarks with specific notes on installation and桁接.

**ANCHOR ROD SCHEDULE**

- Anchor rod schedule: View the anchor rod schedule with specific rod sizes and details.

**ANCHOR SPIRAL TIE REMARKS**

- Anchor spiral tie remarks: View the anchor spiral tie remarks with specific notations on tie placement and alignment.

**CONTRACTOR TO VERIFY ALL BASEPLATE AND ANCHOR SPACING ARE CORRECT PRIOR TO CONSTRUCTION TO MINIMIZE COST CONTACT TO THE ENGINEER WITH ANY DISCREPANCIES.**

**NOT FOR CONSTRUCTION**

- Not for construction: View the not for construction section with specific notes on usage and limitations.

**FIELD STATION SUBSTATION CAPACITOR BANK ADDITION**

- Field station substation capacitor bank addition: View the substation capacitor bank addition details with specific configurations and materials.

**DRILLED SHAFT FOUNDATION DETAILS**

- Drilled shaft foundation details: View the drilled shaft foundation details with specific structural and reinforcement details.

**SCALE: N.T.S.**

- Scale: North true south: View the scale details for orientation and positioning.

**ANCHOR ROD DIAMETER (IN)**

- Anchor rod diameter (in): View the anchor rod diameter specifications for specific materials and dimensions.

**ANCHOR REINFORCEMENT SCHEDULE**

- Anchor reinforcement schedule: View the anchor reinforcement schedule with specific details on reinforcement sizes and materials.

**ANCHOR PLATE SCHEDULE**

- Anchor plate schedule: View the anchor plate schedule with specific dimensions and materials.

**ANCHOR SPIRAL SIZE**

- Anchor spiral size: View the anchor spiral size specifications for specific materials and dimensions.

**ANCHOR HOOKED TIE SIZE**

- Anchor hooked tie size: View the anchor hooked tie size specifications for specific materials and dimensions.

**ANCHOR HOOKED TIE QUANTITY**

- Anchor hooked tie quantity: View the anchor hooked tie quantity specifications for specific materials and dimensions.

**ANCHOR SPIRAL PITCH (IN CONTACT)**

- Anchor spiral pitch (in contact): View the anchor spiral pitch specifications for specific materials and dimensions.

**TYPICAL TIE SIDE COVER (IN)**

- Typical tie side cover (in): View the typical tie side cover specifications for specific materials and dimensions.

**TYPICAL TIE HOOP COVER**

- Typical tie hoop cover: View the typical tie hoop cover specifications for specific materials and dimensions.

**SCHEDULE THIS SHEET FOR ANCHOR RODS**

- Schedule this sheet for anchor rods: View the schedule for anchor rods with specific details on rod sizes and materials.

**SCHEDULE THIS SHEET FOR TYPICAL TIE HOOP TIES**

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PREPARE SITE IN ACCORDANCE WITH GEOTECHNICAL RECOMMENDATIONS. BEARING LEVELS SOILS, AFTER COMPACTION, SHOULD EXHIBIT DENSITIES EQUIVALENT TO 98% OF THE MODIFIED PROCTOR MAXIMUM DRY DENSITY (ASTM D-1557) TO A DEPTH OF AT LEAST TWO FOOT BELOW THE FOUNDATION BEARING LEVELS.

#6 REBAR 10" O.C. TOP & BOTTOM BOTH WAYS

#5 SUBSTATION ROCK

1" CHAMFER

2" CLR COV

1" DIA. ANCHOR ROD

ASTM GR. 55

12" EMBEDMENT

TYPICAL ANCHOR ROD DETAIL

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#6 REBAR 10" O.C. TOP & BOTTOM BOTH WAYS

#5 SUBSTATION ROCK

1" CHAMFER

2" CLR COV

3/4" DIA. ANCHOR ROD

ASTM GR. 55

12" EMBEDMENT

TYPICAL ANCHOR ROD DETAIL