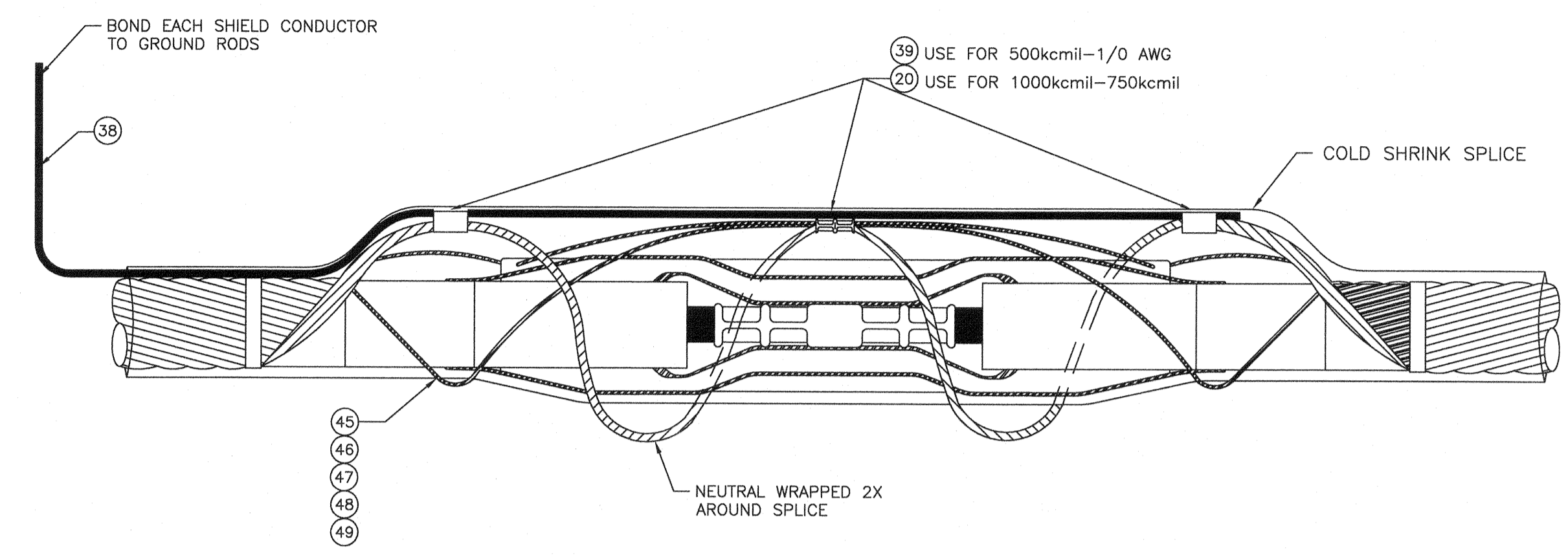
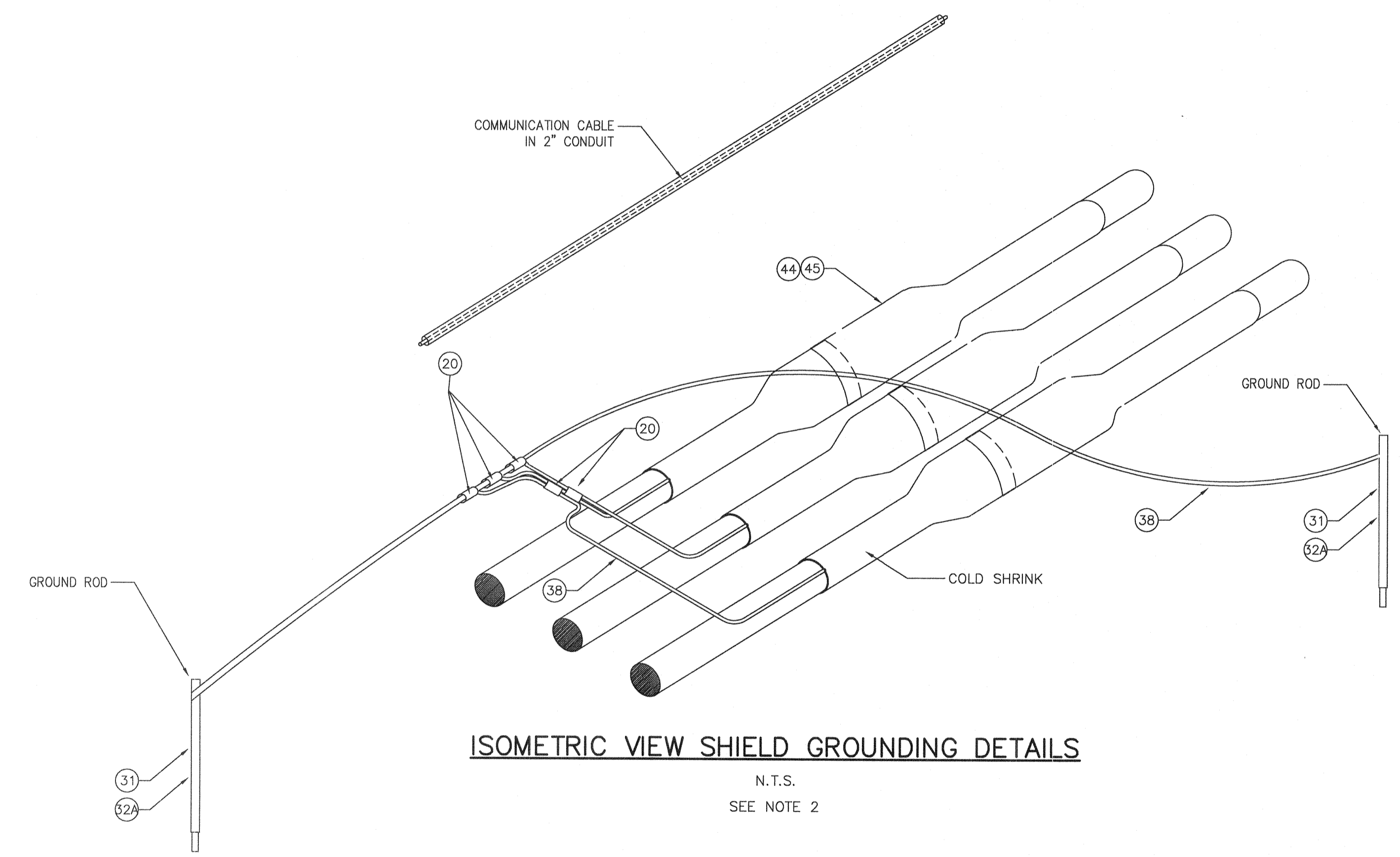


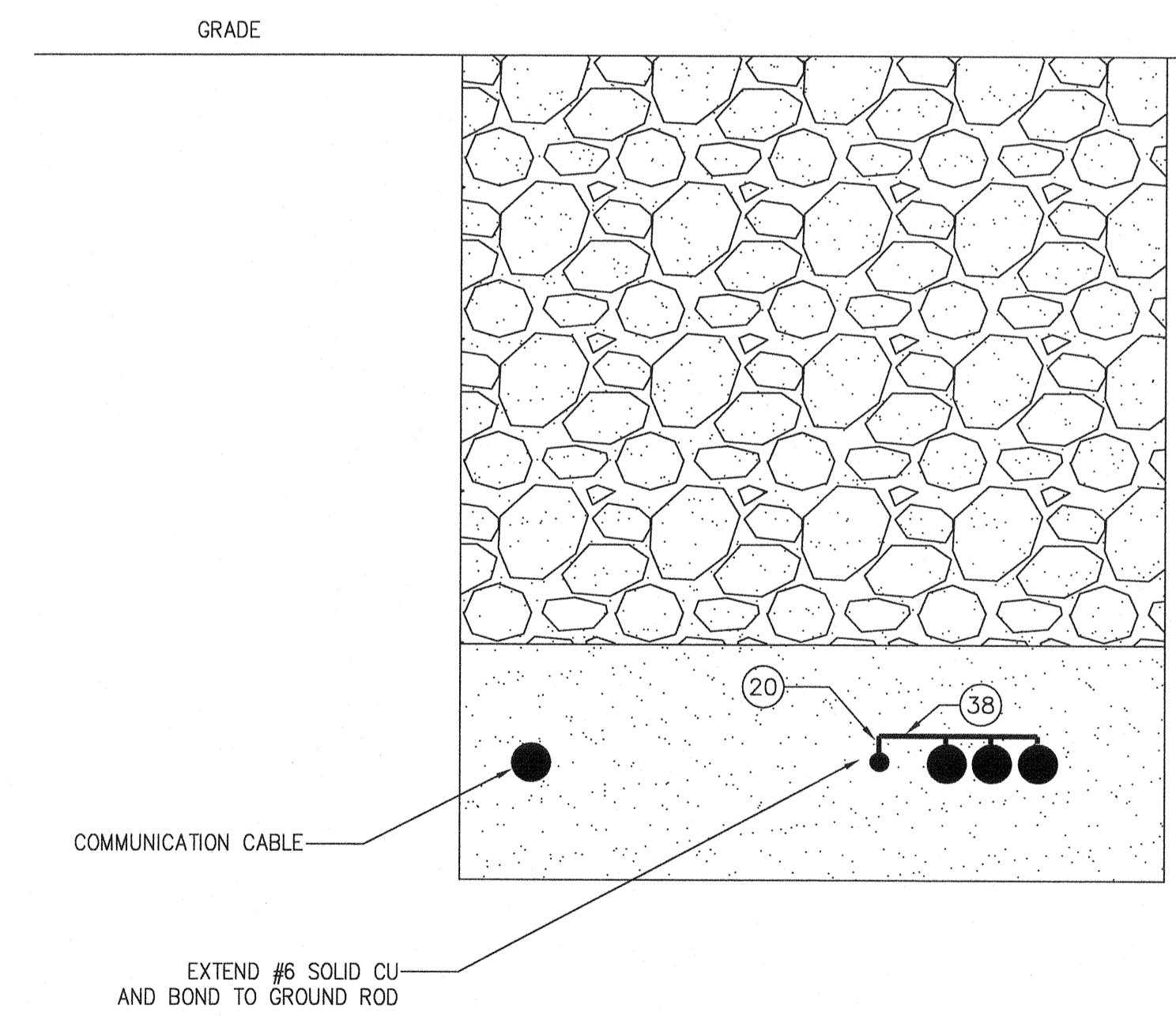
**CABLE SHIELD GROUNDING DETAILS
NO CONDUCTOR SPLICE**
N.T.S.



CABLE SPLICE AND SHIELD GROUNDING DETAILS
N.T.S.



ISOMETRIC VIEW SHIELD GROUNDING DETAILS
N.T.S.
SEE NOTE 2

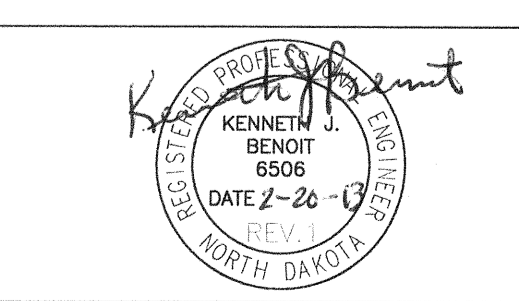


**SECTION VIEW
CABLES IN TRENCH**
N.T.S.
SEE NOTE 2

- NOTE:**
1. CABLE SHIELDS SHALL BE CONTINUOUSLY OR MULTIPOINT GROUNDED NO LESS THAN FOUR TIMES PER MILE AND AT EVERY CABLE SPLICE/JOINT
 2. ISOMETRIC AND SECTION VIEWS SHOW 34.5KV CABLES IN FLAT CONFIGURATION FOR CLARITY. CABLES SHALL BE INSTALLED IN TREFOIL CONFIGURATION PER DWG. E-CA-01.
 3. SPLICE COUNTS REQUIRED WILL BE BASED ON REEL LENGTHS UTILIZED.
 4. GROUND RODS MUST BE INSTALLED FLUSH WITH TRENCH BOTTOM.
 5. FOUR (4) NEUTRAL GROUNDS MUST BE INSTALLED EVERY ROLLING MILE. IF SPLICE POINTS, JUNCTION BOXES, AND THE SUBSTATION NEUTRAL GROUNDS DO NOT MEET THE 4 PER ROLLING MILE REQUIREMENT, NEUTRAL GROUNDING MUST BE INSTALLED.

| ITEM | QUANTITY | UNIT | DESCRIPTION | MANUFACTURER | CATALOG |
|------|----------|------|--|-------------------|---------------|
| 20 | 6 | EA | CONNECTOR, COPPER COMPRESSION #6-1/0 TO #6-1/0 | | |
| 31 | 2 | EA | GROUND ROD, 5/8" x 8' | | |
| 32A | 2 | EA | CONNECTOR, COPPER, 1/2"-5/8" ROD TO #6-1/0 | HUBBELL/ ANDERSON | GC103-01 |
| 38 | 9 | FT | WIRE, #6 COPPER BARE, SOLID | | |
| 39 | 6 | EA | CONNECTOR, COPPER COMPRESSION, #2-2/0 TO #2-#4 | | |
| 43 | 7 | EA | 1/0-500 kcmil, NEUTRAL GROUNDING KIT (KIT OF 3) | RAYCHEM | JGK-MS-2 |
| 44 | * | EA | 750-1500kcmil, NEUTRAL GROUNDING KIT (KIT OF 3) | RAYCHEM | JGK-MS-3 |
| 45 | * | EA | SPLICE ASSEMBLY, 35 kV, 1/0 AWG AL, COLD SHRINK | 3M | 5467A-1/0-AL |
| 46 | * | EA | SPLICE ASSEMBLY, 35 kV, 4/0 AWG AL, COLD SHRINK | 3M | 5467A-4/0-AL |
| 47 | * | EA | SPLICE ASSEMBLY, 35 kV, 350 kcmil AL, COLD SHRINK | 3M | 5467A-350-AL |
| 48 | * | EA | SPLICE ASSEMBLY, 35 kV, 750 kcmil AL, COLD SHRINK | 3M | 5468A-750-AL |
| 49 | * | EA | SPLICE ASSEMBLY, 35 kV, 1000 kcmil AL, COLD SHRINK | 3M | 5468A-1000-AL |

| NO. | BY | CHK. | APP. | DATE | REVISION DESCRIPTION |
|-----|-----|------|------|----------|------------------------------------|
| 1 | RJG | SGP | CSF | 5/27/11 | 60% DELIVERABLE |
| 2 | BNK | RJG | CSF | 7/1/11 | 90% DELIVERABLE |
| 3 | RJG | RJG | CSF | 7/8/11 | REVISED PER CLIENT COMMENTS |
| 4 | BNK | RJG | CSF | 7/21/11 | REVISED PER CLIENTS COMMENTS |
| 5 | BNK | RJG | CSF | 8/4/11 | ISSUED FOR CONSTRUCTION |
| 6 | NJG | RJG | CSF | 10/31/12 | CONSTRUCTION REVISIONS, NO CHANGES |



| CLIENT | 7/1/11 | 7/8/11 | 7/21/11 | 8/4/11 | 10/31/12 |
|-----------------|---------------|--------|---------|--------|----------|
| BID | | | | | |
| CONSTRUCTION | | | | | |
| PERMITTING | | | | | |
| RELEASED TO/FOR | B | C | D | O | 1 2 3 |
| | DATE RELEASED | | | | |

BARR
Project Office:
BARR ENGINEERING CO.
4700 WEST 77TH STREET
MINNEAPOLIS, MN.
55435-4803
Ph: 1-800-632-2277
Fax: (952) 832-2601
www.barr.com

| Scale | N.T.S. |
|----------|----------|
| Date | 05/27/11 |
| Drawn | RJG |
| Checked | CEG |
| Designed | RJG |
| Approved | JLM |

minnesota power
AN ALLETE COMPANY

BISON
A WIND ENERGY INITIATIVE OF MINNESOTA POWER IN NORTH DAKOTA

BISON 2 WIND PROJECT
MORTON & OLIVER COUNTIES, NORTH DAKOTA

COLLECTOR SYSTEM
CABLE GROUNDING DETAIL

PIKE
ENERGY SOLUTIONS
PIKE ENERGY SOLUTIONS, LLC.
10101 Claude Freeman Drive, Suite 100W
Charlotte, NC 28262
ND License No. 954PE

| | |
|--------------------|------------|
| BARR PROJECT No. | 34/33-1007 |
| CLIENT PROJECT No. | |
| DWG. No. | E-CA-02 |
| REV. No. | 1 |