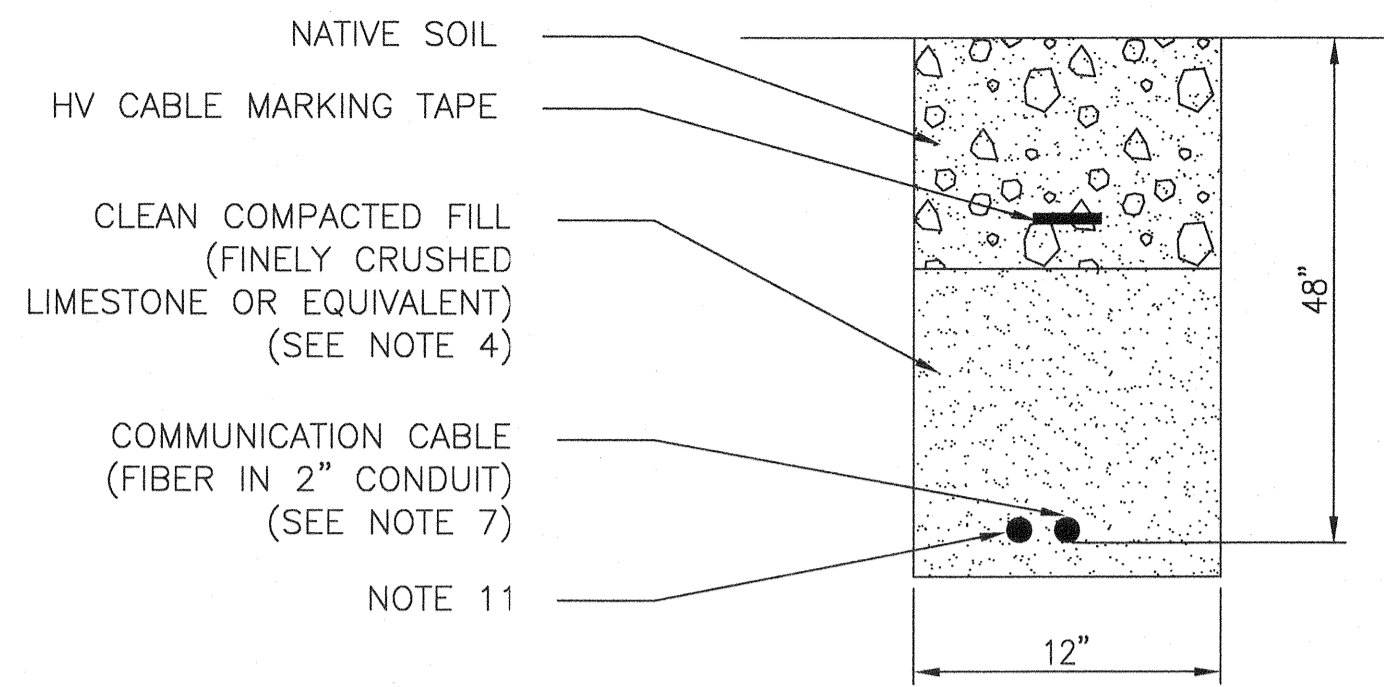


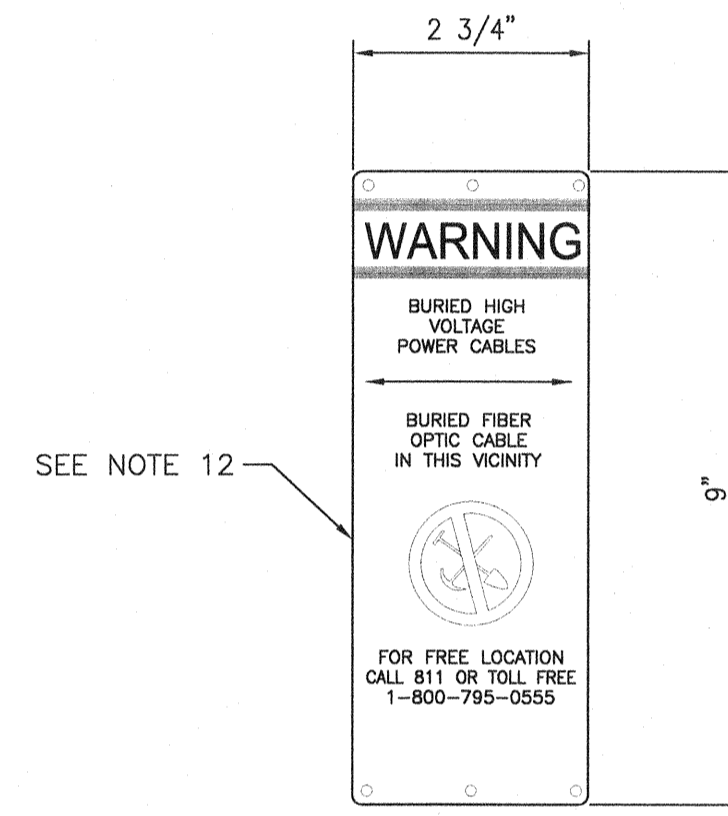
NOTES:

1. BOTTOM OF TRENCH RECEIVING DIRECT BURIAL CABLE SHOULD BE RELATIVELY SMOOTH, UNDISTURBED EARTH; WELL-TAMPED EARTH; OR SAND. WHEN EXCAVATION IS IN ROCK OR ROCKY SOILS, THE CABLE SHOULD BE LAID ON A PROTECTIVE LAYER OF CLEAN COMPACTED FILL OF 3" MINIMUM. BACKFILL WITHIN 6" OF THE POWER CONDUCTORS SHOULD BE FREE OF MATERIALS THAT MAY DAMAGE THE CABLE. ALL BACKFILL SHOULD BE ADEQUATELY COMPACTED TO 90% STANDARD PROCTOR.
2. VIBRATE BEDDING AND SELECT BACKFILL MATERIAL CONTINUOUSLY AND THOROUGHLY THROUGHOUT ITS DEPTH USING VIBRATORY PLATES. DO NOT USE MANUAL TAMPS. MACHINE COMPACTION SHOULD NOT BE USED WITHIN 6" OF THE CABLE.
3. 34.5 KV DIRECT BURIED CONDUCTORS SHALL BE INSTALLED IN TREFOIL CONFIGURATION.
4. CLEAN COMPACTED FILL SHALL PROVIDE A THERMAL RESISTIVITY (RHO) VALUE OF 180 °C-CM/W OR LESS FOR PROPER CONDUCTOR OPERATION. CONTACT ENGINEER IF NEEDED. NATIVE FILL FROM CERTAIN AREAS OF THE SITE HAS BEEN SAMPLED AND MEASURED AND SATISFIES THIS CRITERIA.
5. POWER CONDUCTORS TO BE MAINTAINED AT A MAXIMUM DEPTH OF 4'-0" TO ACHIEVE REQUIRED AMPACITY. IF THE CONTRACTOR DETERMINES THAT A DEPTH OF 4'-0" WILL BE EXCEEDED A THERMAL BACKFILL MAY BE REQUIRED. CONSULT WITH ENGINEER.
6. FIBER OPTIC CABLES SHALL BE INSTALLED FOR SERVICE TO MET TOWER. SEE MET SERVICE DRAWING E-MT-01.
7. COMMUNICATION CABLE SHOULD BE OFFSET IN TRENCH TO ALLOW FOR FUTURE ACCESS TO POWER CONDUCTORS AND PREVENT DAMAGE TO COMMUNICATION CABLE. COMMUNICATION CABLE SHOULD BE SEPARATED FROM THE POWER CONDUCTORS BY A MINIMUM OF 12". BACKFILL WITHIN 3" OF THE COMMUNICATION CABLE SHOULD BE FREE OF MATERIALS THAT MAY DAMAGE THE CABLE.
8. ALL CABLES AND TRENCHES ARE TO BE INSPECTED BEFORE BACKFILLING.
9. EXCAVATED SOIL AND ROCK THAT IS NOT REUSED IN BACKFILLING THE TRENCHES WILL BE SPREAD ACROSS THE SITE TO THE NATURAL GRADE TO BE RESEED WITH NATIVE GRASSES TO CONTROL EROSION BY WATER AND WIND OR DISPOSED OF IN ACCORDANCE WITH LAND OWNER OR LOCAL REPRESENTATIVE. LARGER EXCESS EXCAVATED ROCKS WILL BE DISPOSED OF OFF-SITE. ALL EXCAVATION, TRENCHING AND ELECTRICAL SYSTEM CONSTRUCTION WORK WILL BE DONE IN ACCORDANCE WITH THE FORMAL STORM WATER POLLUTION PREVENTION PLAN (SWPPP) FOR THE PROJECT.
10. BORING MAY BE USED TO INSTALL CABLES IN LIEU OF TRENCHING FOR CERTAIN RUNS. CONTACT ENGINEER.
11. WHERE TWO (2) PARALLEL COMMUNICATION CABLES ARE REQUIRED IN TRENCH, LAY EACH FIBER NEXT TO EACH OTHER WHILE STILL MAINTAINING HORIZONTAL CLEARANCES SHOWN. SEE FIBER LAYOUT DRAWING, E-FL-10.
12. FIBERGLASS COMPOSITE MARKER SHALL BE ULTRAVIOLET (UV) STABILIZED. FIBERGLASS MARKER POLES SHALL BE 3.75 IN. BY 72 IN. WITH A WEIGHT OF 1.8 LBS. PER FOOT AND A MINIMUM TENSILE STRENGTH OF 65,000 PSI AS MEASURED IN ACCORDANCE WITH ASTM D638.
13. MARKER POLES SHALL BE BURIED A MINIMUM OF 18".
14. ROUTE MARKERS SHALL BE PLACED AS DIRECTED BY ENGINEER.



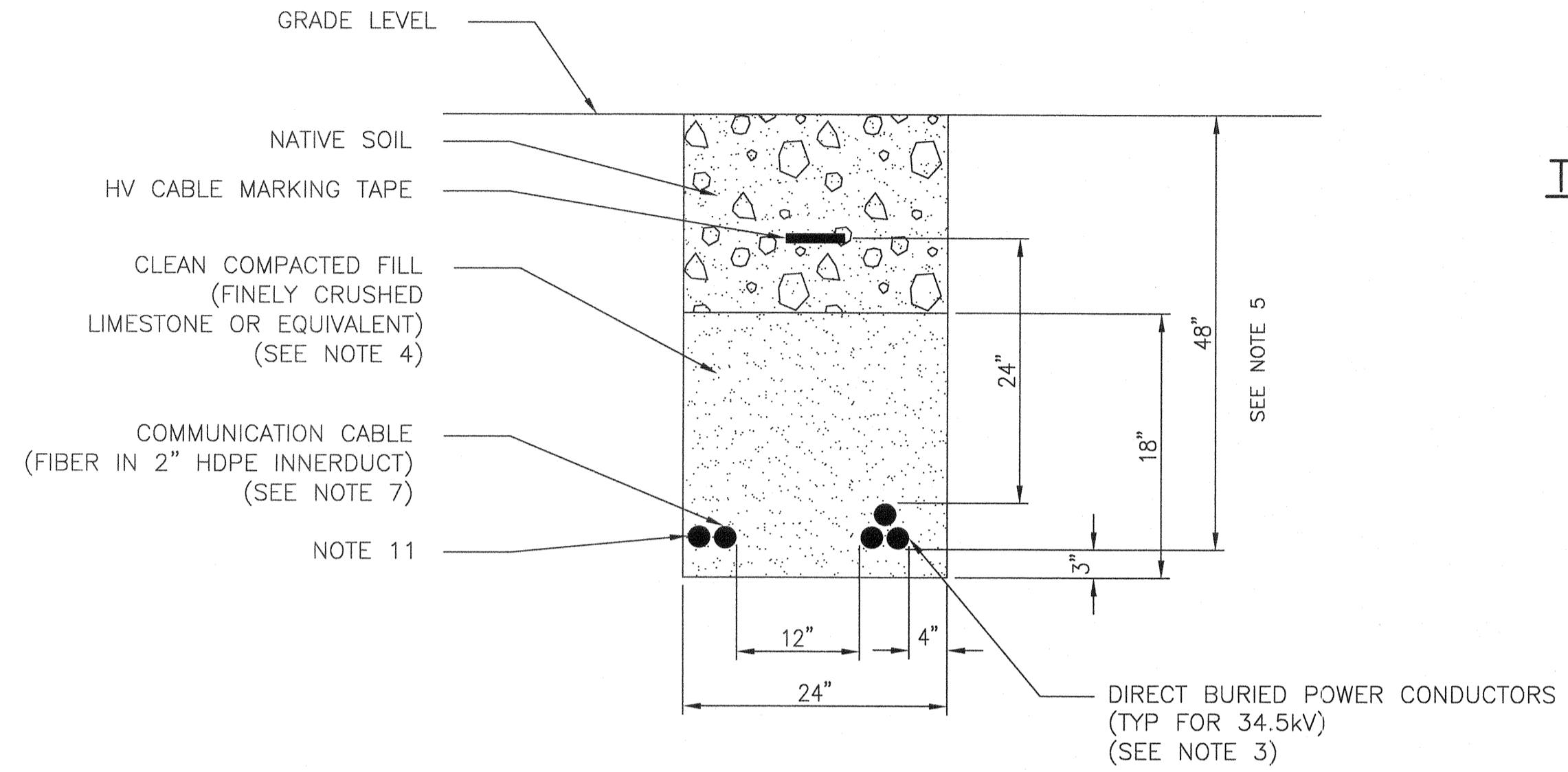
TYPICAL FIBER ONLY TRENCH

N.T.S.



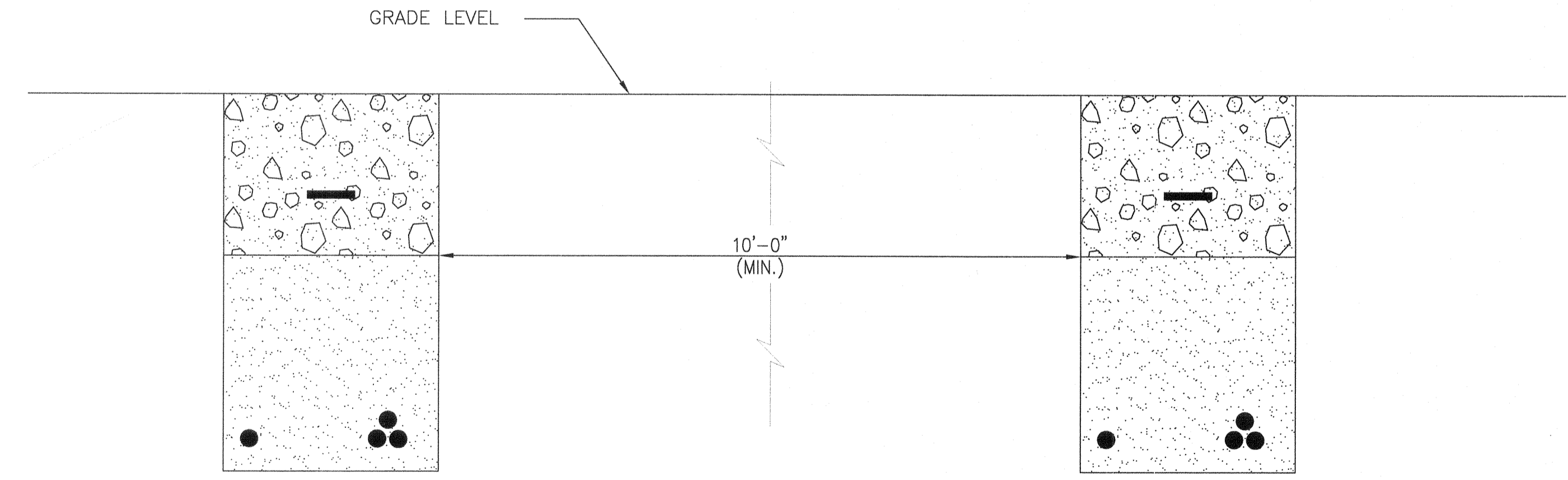
MARKER LABEL DETAIL

N.T.S.



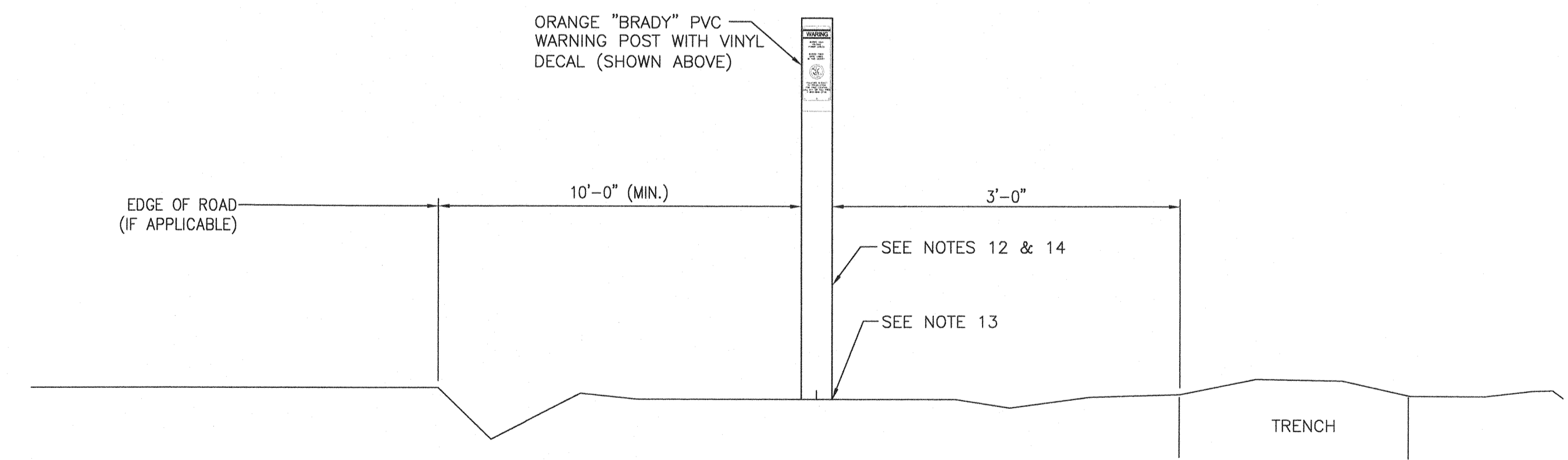
TYPICAL CABLE TRENCH, CROSS SECTION

N.T.S.  
(TYPICAL OF ALL)



PARALLEL TRENCH SEPARATION

N.T.S.

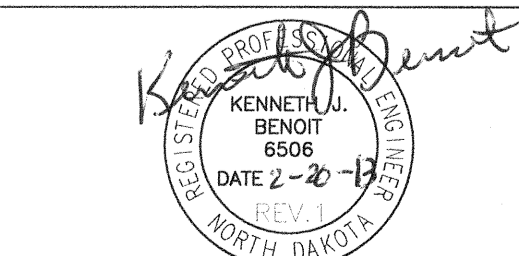


MARKER PLACEMENT ALONG TRENCH

N.T.S.

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

A	RJG	SGP	CSF	5/27/11	60% DELIVERABLE
B	BNK	RJG	CSF	7/1/11	90% DELIVERABLE
C	BNK	RJG	CSF	7/12/11	NOTE REVISIONS
D	BNK	RJG	CSF	7/21/11	REVISED PER CLIENTS COMMENTS
O	BNK	RJG	CSF	8/4/11	ISSUED FOR CONSTRUCTION
1	NJG	APP	APP	11/16/12	CONSTRUCTION REVISIONS
NO.	BY	CHK.	APP.	DATE	REVISION DESCRIPTION



CLIENT	7/1/11	12/12/11	7/21/11	11/8/4/11				
BID								
CONSTRUCTION								
PERMITTING								
RELEASED TO/FOR	B	C	D	0	1	2	3	
	DATE RELEASED							

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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 TRENCH CROSS SECTION

BARR PROJECT No.	34/33-1007
CLIENT PROJECT No.	
DWG. No.	E-CA-01
REV. No.	1

Images in Drawing