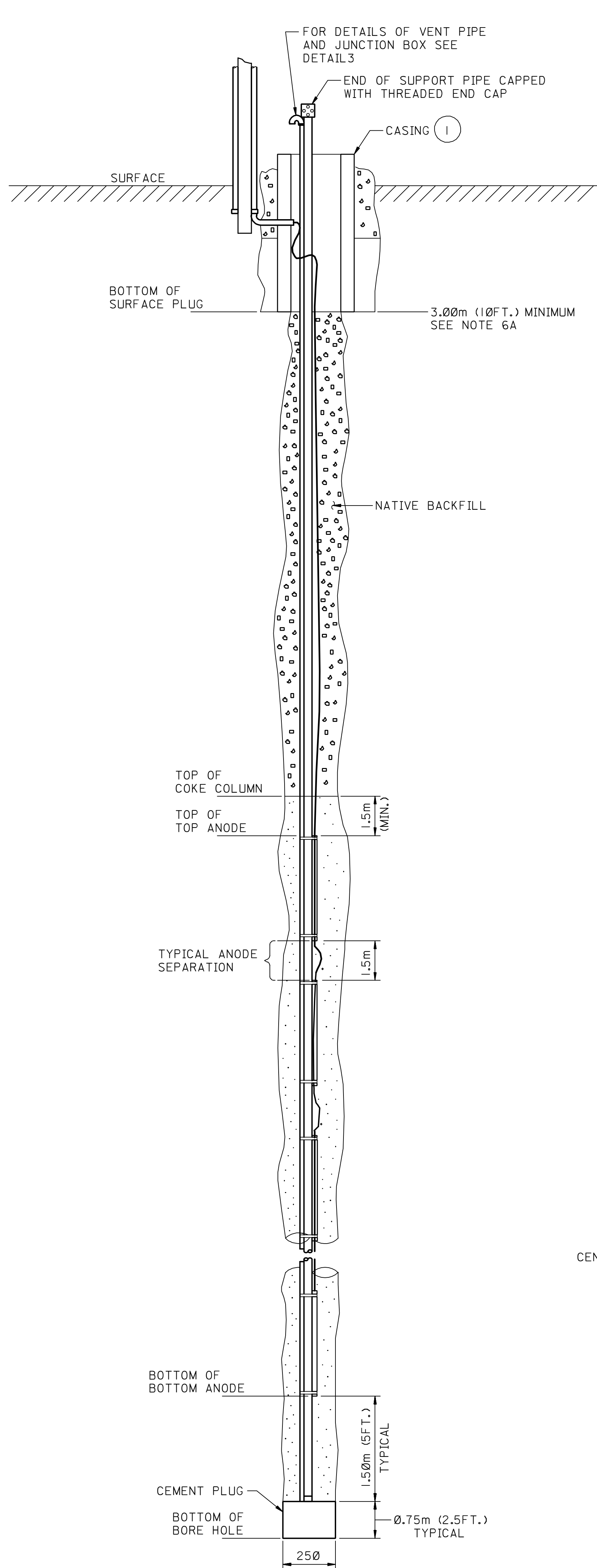
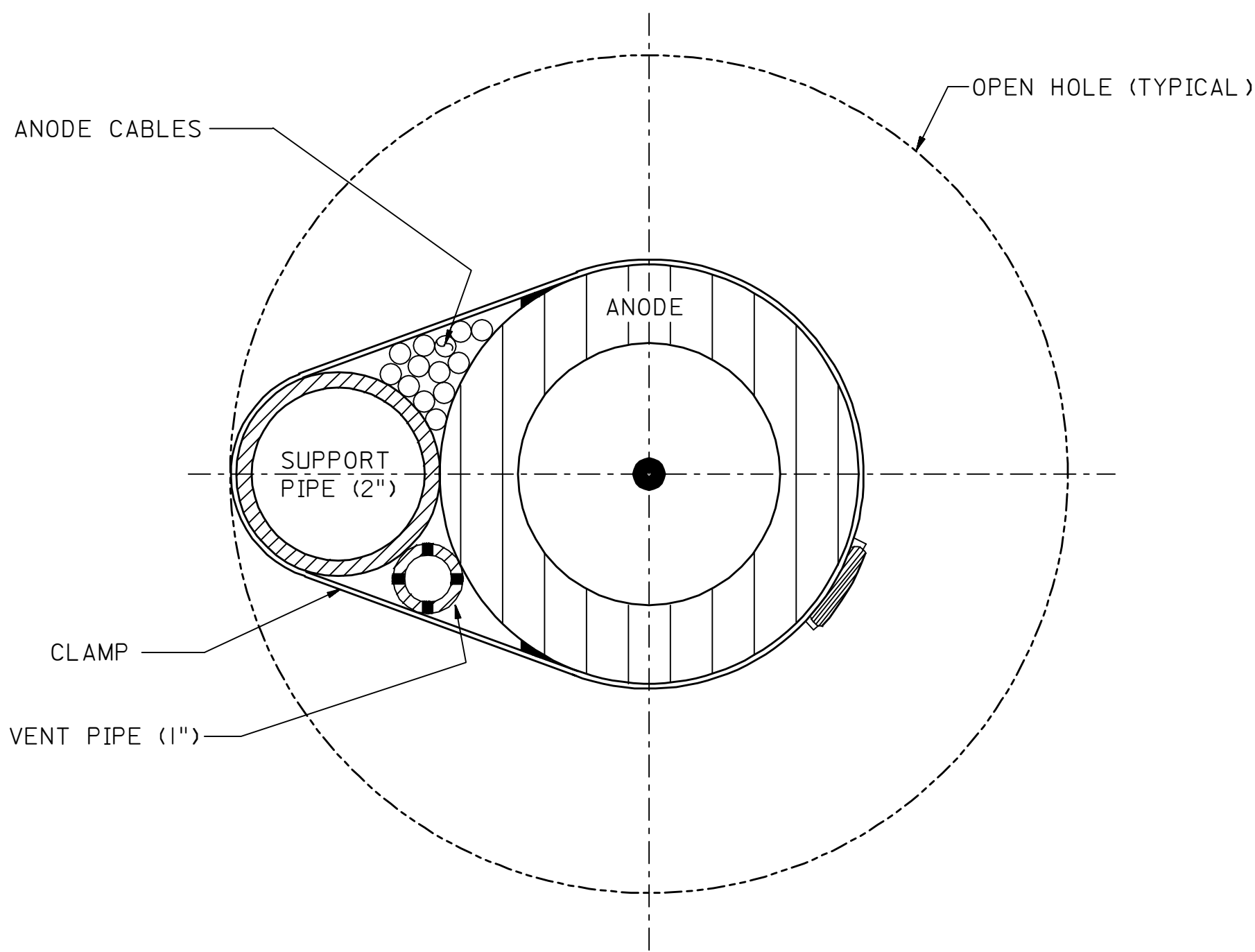
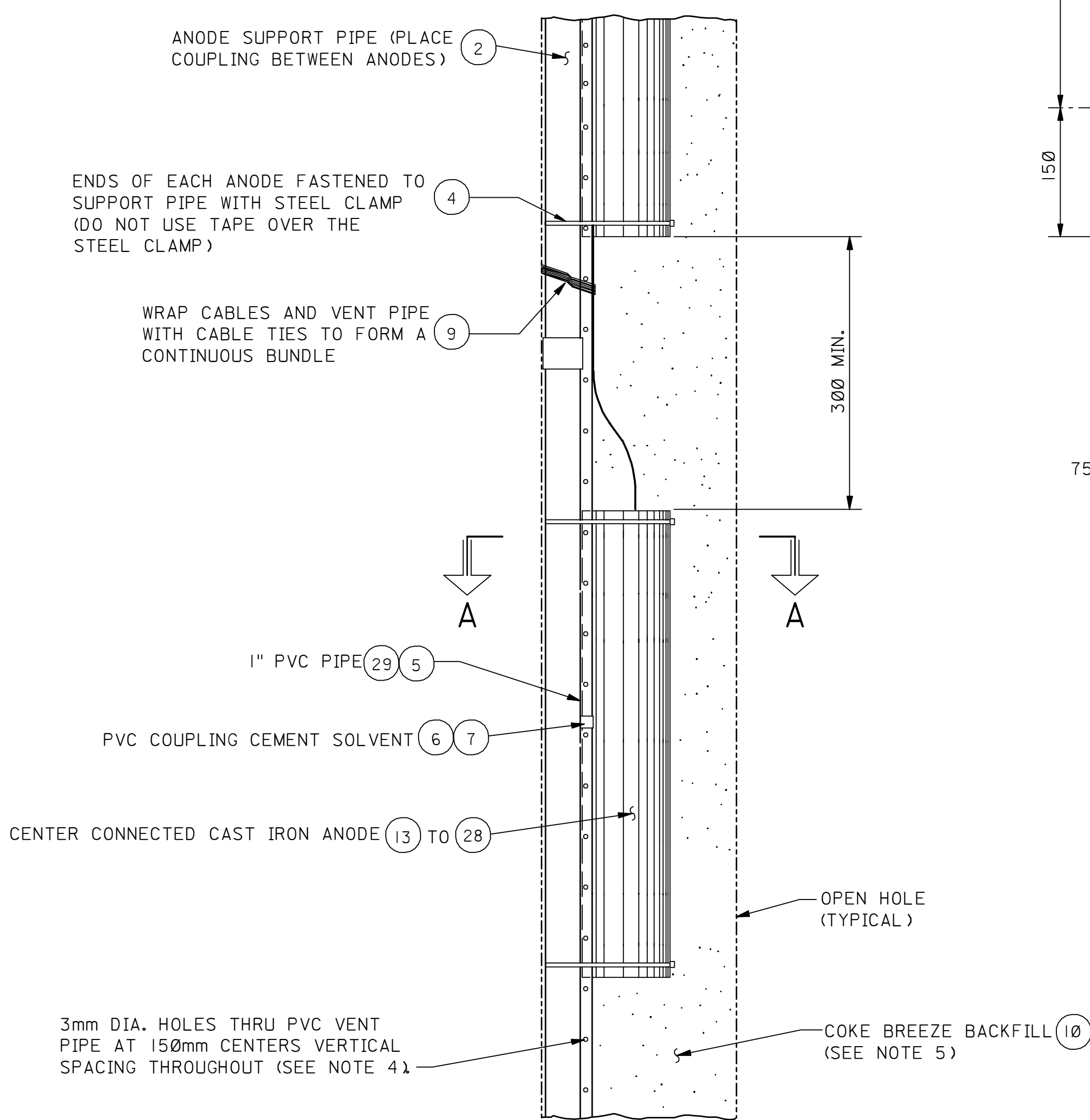




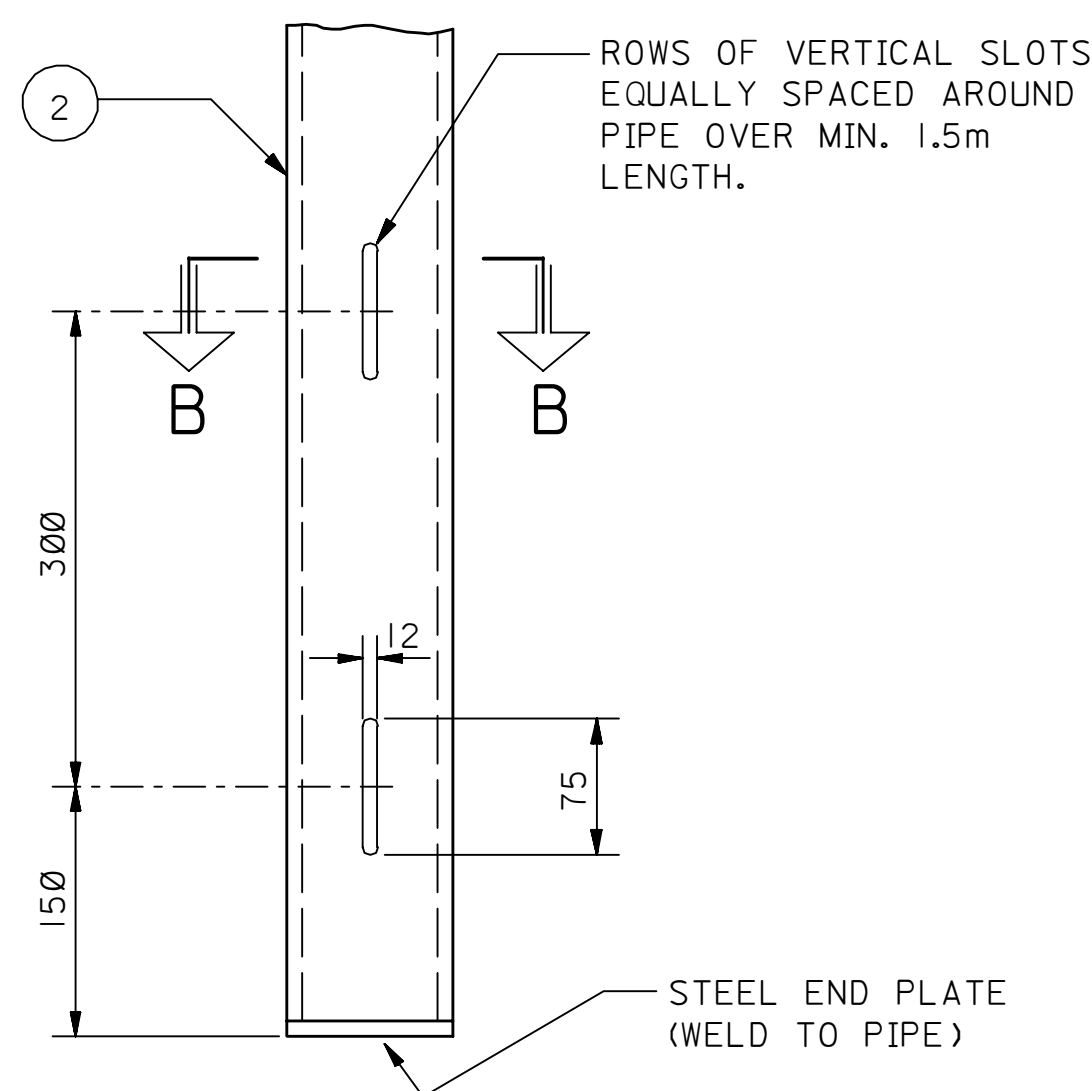
SECTION THRU ANODE BED



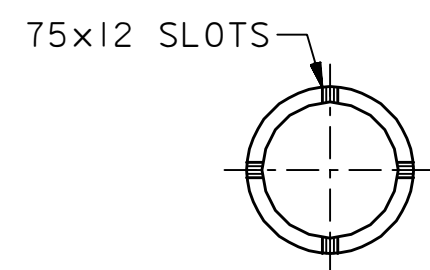
SECTION A-A



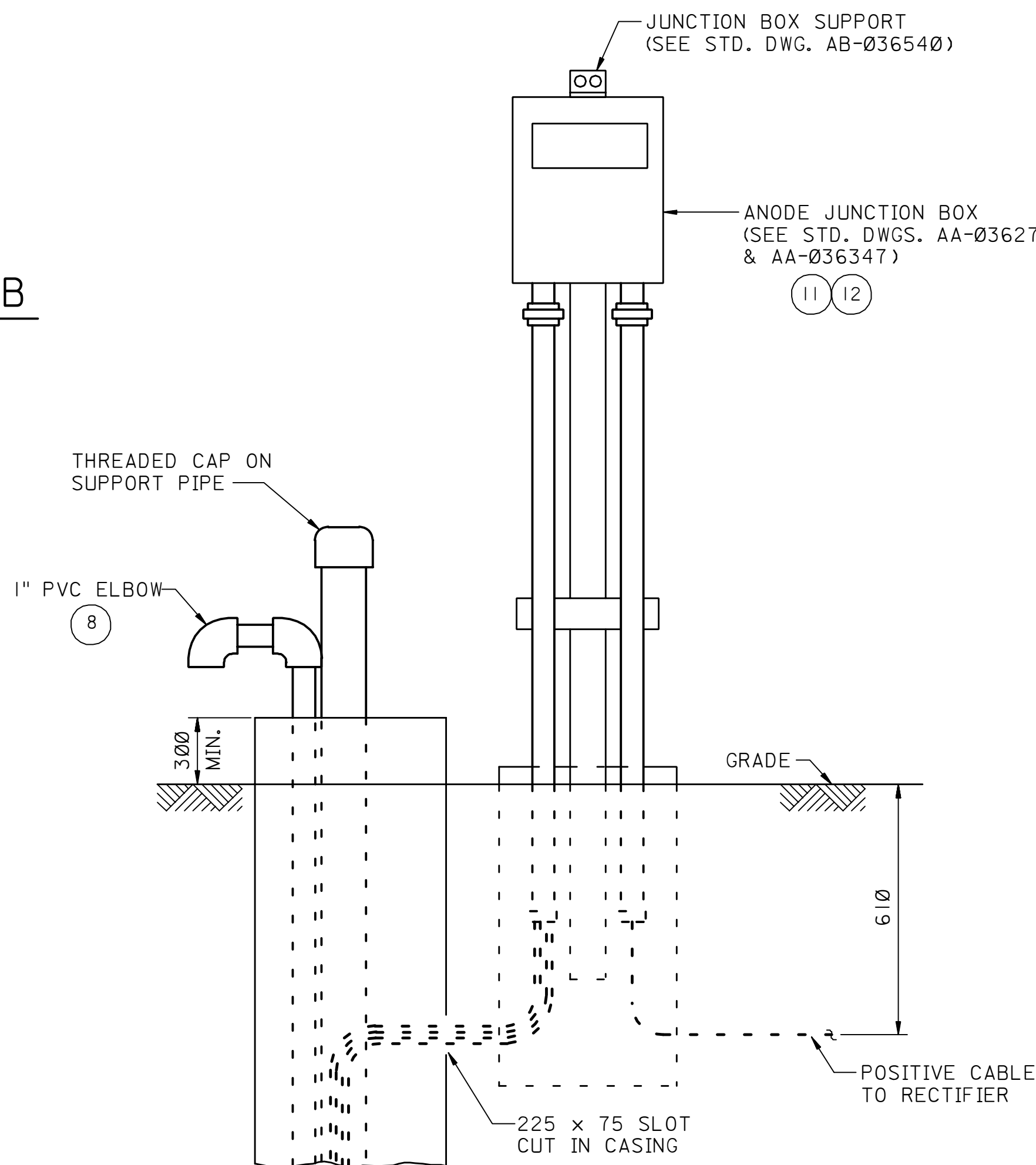
DETAIL-1



DETAIL-2



SECTION B-B



DETAIL-3

MATERIAL LIST		
CODE	SAMS NUMBER	DESCRIPTION
1	CONTRACTOR SUPPLIED	CASING : STEEL OR PVC
2	01-110-040	PIPE : STEEL ANODE SUPPORT PIPE 2" DIA. W/CPLGS.
4	08-748-740	CLAMP: ST.STL. WORM DRIVE TYPE 6 1/8 " TO 7" DIA.
5	01-515-432	PIPE: 1" PVC SCH. 80 PERFORATED.
6		COUPLING: PVC SCH. 40 1".
7	05-505-500	CEMENT: PVC SOLVENT.
8	03-723-515	ELBOW PIPE, PVC,1"
9	15-525-035	CABLE TIE: NYLON 3/16 " x 9" LG.
10	17-855-011	BACKFILL: CALCINED PETROLEUM COKE BREEZE
11	17-855-950	JUNCTION BOX 12 TERMINAL.
12	17-856-080	JUNCTION BOX 20 TERMINAL.
13	17-852-304	ANODE HI SI CAST IRON TA-4 WITH 15m 16mm LEAD WIRE
14	17-852-306	ANODE HI SI CAST IRON TA-4 WITH 23m 16mm LEAD WIRE
15	17-852-308	ANODE HI SI CAST IRON TA-4 WITH 30m 16mm LEAD WIRE
16	17-852-310	ANODE HI SI CAST IRON TA-4 WITH 41m 16mm LEAD WIRE
17	17-852-312	ANODE HI SI CAST IRON TA-4 WITH 52m 16mm LEAD WIRE
18	17-852-350	ANODE HI SI CAST IRON TA-4 WITH 65m 16mm LEAD WIRE
19	17-852-360	ANODE HI SI CAST IRON TA-4 WITH 75m 16mm LEAD WIRE
20	17-852-370	ANODE HI SI CAST IRON TA-4 WITH 85m 16mm LEAD WIRE
21	17-852-380	ANODE HI SI CAST IRON TA-4 WITH 100m 16mm LEAD WIRE
22	17-852-472	ANODE HI SI CAST IRON TA-5A WITH 15m 16mm LEAD WIRE
23	17-852-474	ANODE HI SI CAST IRON TA-5A WITH 23m 16mm LEAD WIRE
24	17-852-512	ANODE HI SI CAST IRON TA-5A WITH 30.5m 16mm LEAD WIRE
25	17-852-476	ANODE HI SI CAST IRON TA-5A WITH 46m 16mm LEAD WIRE
26	17-852-478	ANODE HI SI CAST IRON TA-5A WITH 65m 16mm LEAD WIRE
27	17-852-480	ANODE HI SI CAST IRON TA-5A WITH 100m 16mm LEAD WIRE
28	17-852-517	ANODE HI SI CAST IRON TA-5A WITH 137m 16mm LEAD WIRE
29	17-890-700	PIPE: PVC-25mm ALL VENT

- NOTES:
- THE ANODE BED INSTALLATION SHALL COMPLY WITH ALL SAUDI ARAMCO STANDARDS.
 - THE ANODE BED DEPTH, AND THE PLACEMENT OF THE ANODES SHALL BE DETERMINED DURING INSTALLATION. THE BORE HOLE DEPTH SHALL BE DETERMINED BY MEASUREMENT OF THE DRILL STEM RESISTANCE. THE ANODE PLACEMENT SHALL BE OPTIMIZED BY A TEST ANODE MEASUREMENT TAKEN AT 3.0 METER INTERVALS.
 - THE MAXIMUM BORE HOLE DEPTH SHALL BE DETERMINED BY THE SAUDI ARAMCO HYDROLOGY DEPARTMENT. THE AS-BUILT BORE HOLE DEPTH SHALL BE REPORTED TO SAUDI ARAMCO HYDROLOGY DEPARTMENT BY THE SAUDI ARAMCO PROJECT ENGINEER WITHIN 7 DAYS OF ANODE BED COMPLETION.
 - THE 25mm DIAMETER RIGID PLASTIC VENT PIPE SHALL HAVE 3mm DIAMETER HOLES DRILLED COMPLETELY THROUGH BOTH SIDES OF THE PIPE SPACED 150mm APART VERTICALLY, AND 90 DEGREE HORIZONTALLY. THE HOLES SHALL BE DRILLED ONLY IN THE SECTION OF THE PIPE THAT IS TO BE WITHIN THE COKE BREEZE COLUMN. THE SLOTTED VENT PIPE (17-890-500) SHALL BE INSTALLED IN THE ENTIRE LENGTH OF THE COKE BREEZE COLUMN.
 - THE COKE BREEZE BACKFILL SHALL BE FLUIDIZED WITH WATER TO FORM A SLURRY AND SHALL BE PUMPED INTO THE ANODE BED HOLE FROM THE BOTTOM UP. SUFFICIENT COKE BREEZE SHALL BE INSTALLED TO ENSURE A MINIMUM OF 1.5 METERS OF COKE BREEZE ABOVE THE TOP ANODE, AFTER SETTLING.
 - CASING AND CEMENT PLUGS:
A) A SURFACE CASING CEMENTED INTERNALLY AND EXTERNALLY SHALL BE INSTALLED. THE SURFACE CASING SHALL BE INSTALLED TO A MINIMUM DEPTH OF 3.0 METERS.
B) DOWNHOLE CEMENT PLUGS WILL BE USED TO SEAL ALL LOST CIRCULATION ZONES AND SHALL BE 3.0 METERS MINIMUM LENGTH.
C) WHEN CASING IS USED WITH A DOWNHOLE PLUG, CEMENT SHALL BE PLACED ON THE INSIDE AND OUTSIDE OF THE CASING.
D) CEMENT FOR ALL PLUGS SHALL BE MIXED IN A RATIO OF 50 KG. PORTLAND CEMENT TO 19 LITERS OF WATER. THE CEMENT MIX SHALL BE PUMPED FROM THE BOTTOM SECTION OF THE PLUG THROUGH A STAND PIPE.
E) A LOST CIRCULATION ZONE WITHIN THE AREA OF THE PROPOSED ANODE COLUMN SHALL BE SEALED WITH CEMENT AND REDRILLED. MUD SHALL NOT BE USED TO SEAL A LOST CIRCULATION ZONE WITHIN THE ANODE COLUMN AREA.
 - ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.

LEGEND:

- NATIVE BACKFILL
- STEEL CASING
- CONCRETE PLUG
- COKE BREEZE

REFERENCE DRAWINGS

MOUNTING SUPPORT DETAILS FOR JUNCTION BOXES	AB-036540
20 TERMINAL JUNCTION BOX	AA-036347
DIRECT BURIED DC CATHODIC PROTECTION POSITIVE OR NEGATIVE CABLE	AA-036675
12 TERMINAL JUNCTION BOX	AB-036275

MANDATORY DRAWING

08	AUG99	ESSD CAB	REVISED NOTE-4 & ADDED ITEM 29 OF MATERIAL LIST.			
07	FEB94	ESSD RCR	GENERAL REVISION.	ORIG. SIGNED	ORIG. SIGNED	ORIG. SIGNED
06	04-14-91	MNL	REDRAWN FOR CLARITY, CHANGED INDEX FROM P TO X & ADDED MANDATORY DRAWING(SIGNED)	ORIG. SIGNED	ORIG. SIGNED	ORIG. SIGNED
REV. NO.	DATE	BY	JO/EWO	DESCRIPTION	CHKD.	CERT. APPD.

SAUDI ARABIAN OIL COMPANY

DRAWN BY RM CHECKED BY WR SCALE: NONE
DATE STARTED 26 MARCH 84 DATE COMPLETED 30 MARCH 84
OPR'G. DEPT. ENG. DEPT.
APP'D. FOR CONST.

THIS DRAWING IS NOT TO BE USED FOR CONSTRUCTION OR FOR ORDERING MATERIAL UNTIL CERTIFIED AND DATED
CERTIFIED BY DATE

CATHODIC PROTECTION DEEP ANODE BED DETAILS
AQUIFER PENETRATING

STD. DWG.			
PLANT NO.	INDEX	DRAWING NUMBER	SHT. NO. REV. NO.
990	X	AA-036356	001 08