

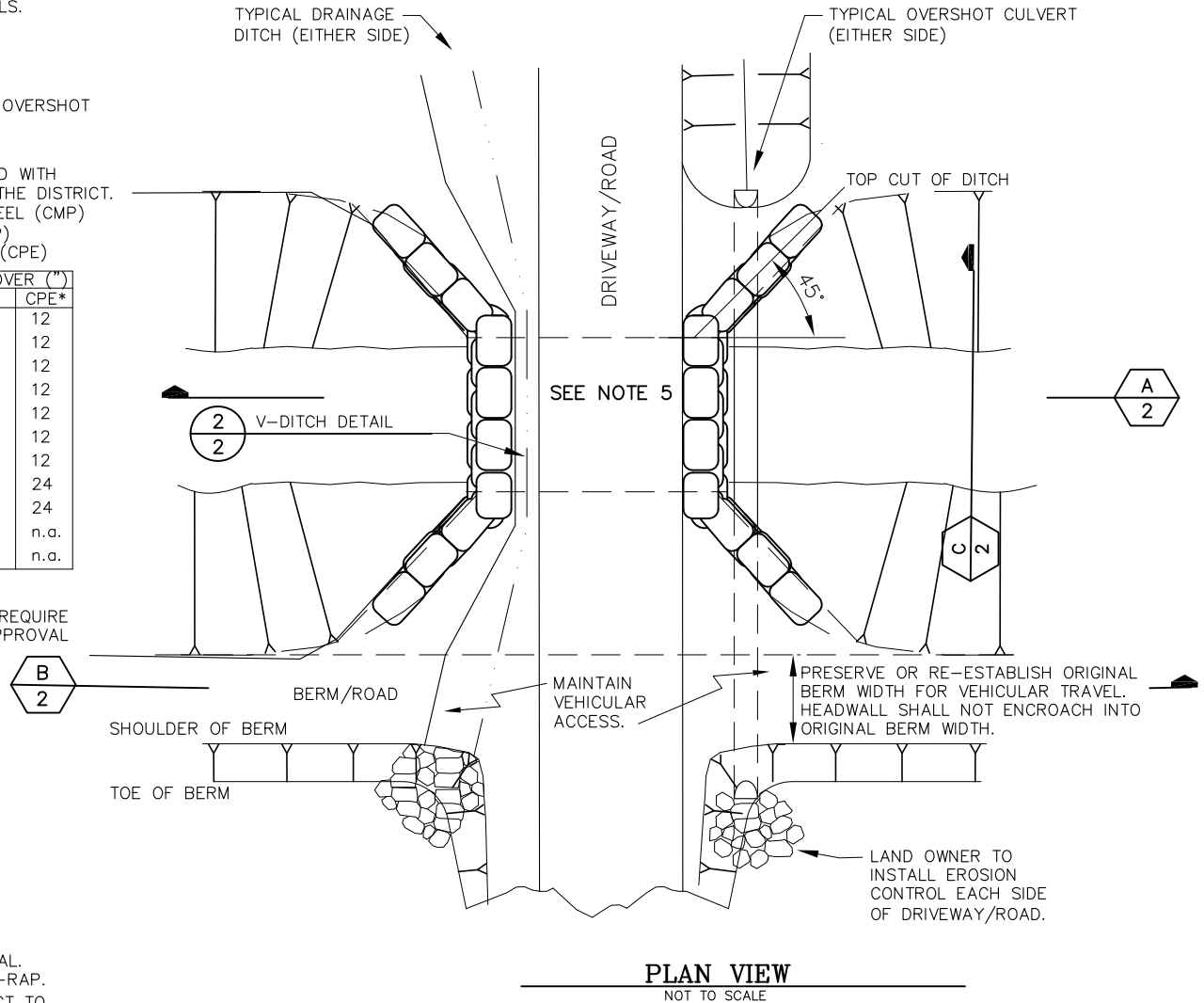
1. ENDWALLS SHALL BE CONSTRUCTED OF **BURLAP SACKS** (NO PAPER SACKS) FILLED WITH CONCRETE OR APPROVED EQUAL SUCH AS REINFORCED CONCRETE WALLS OR CONCRETED ROCK WALLS.
2. ALL CONCRETE SHALL BE A MINIMUM OF FIVE SACK PER YARD MIX.
3. ALL DRAINAGE CREATED BY NEW CONSTRUCTION SHALL BE DIVERTED OVER THE CANAL. DITCHES AND/OR OVERSHOT CULVERTS SHALL BE PLACED AS APPROVED BY DISTRICT. NO DRAINAGE WILL BE ALLOWED IN CANAL.
4. ARCH PIPE IS REQUIRED. ROUND PIPE MAY ONLY BE USED WITH DISTRICT APPROVAL. PIPE SIZE WILL BE DETERMINED BY THE DISTRICT. ALLOWABLE MATERIALS: GALVANIZED CORRUGATED STEEL (CMP)
CORRUGATED ALUMINUM (CMP)
CORRUGATED POLYETHYLENE (CPE)

PIPE DIA. (")	ARCH EQUIVALENT SPAN x RISE	GAUGE **		MIN. COVER (")	
		STEEL	ALUMINUM	CMP	CPE*
18	21" x 15"	12	12	12	12
21	24" x 18"	12	12	12	12
24	28" x 20"	12	12	12	12
30	35" x 24"	12	12	12	12
36	42" x 29"	12	12	12	12
42	49" x 33"	12	10	12	12
48	57" x 38"	12	10	18	12
54	64" x 43"	12	10	18	24
60	71" x 47"	10	8	18	24
66	77" x 52"	10	8	18	n.a.
72	83" x 57"	10	8	18	n.a.

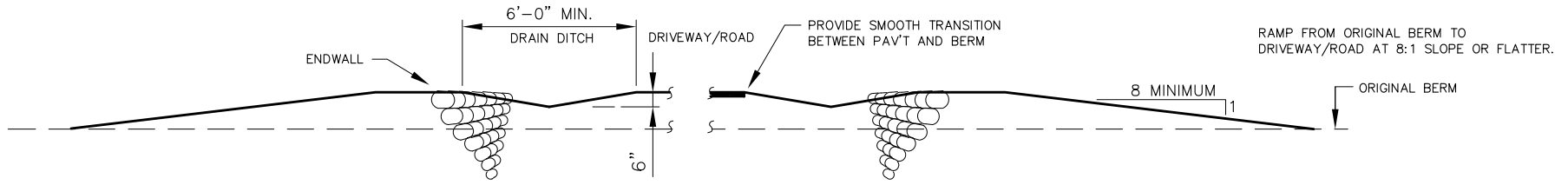
* TOP OF PIPE TO BOTTOM OF FLEXIBLE PAVEMENT
TOP OF PIPE TO TOP OF RIGID PAVEMENT

** CULVERTS INSTALLED WITH LESS THAN MINIMUM COVER REQUIRE STEEL PIPE WITH NEXT HEAVIER GAUGE, SUBJECT TO APPROVAL OF CHIEF ENGINEER.

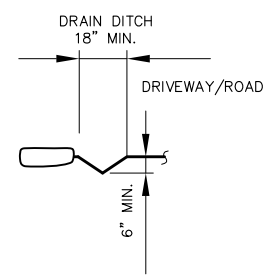
5. IF THIS IS A REPLACEMENT, THE LENGTH OF CULVERT REPLACEMENT WILL BE AGREED UPON BETWEEN NID AND THE LAND OWNER.
6. EXCEPT FOR REPLACEMENTS, CULVERT LENGTH WILL BE DETERMINED BY OWNER. THE FOLLOWING FORMULA CAN BE USED:
$$L = W + 3 + 2(H \times 1/4)$$
 WHERE
L=LENGTH OF CULVERT
W=DESIRED ROAD WIDTH PLUS DRAINAGE DITCHES
H=HEIGHT OF ROAD SURFACE FROM BOTTOM OF PIPE (RISE OF PIPE PLUS COVER OVER PIPE)
7. USE OF MANUFACTURED FLARED END SECTION IS OPTIONAL. FLARED END SECTION WILL NOT REPLACE REQ'T FOR RIP-RAP.
8. MINOR MODIFICATIONS TO MEET FIELD CONDITIONS SUBJECT TO APPROVAL BY CHIEF ENGINEER.



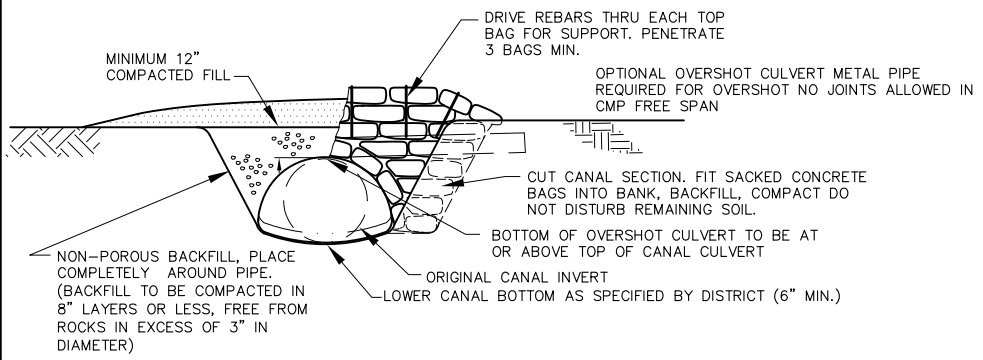
APPROVED: 3-10-10



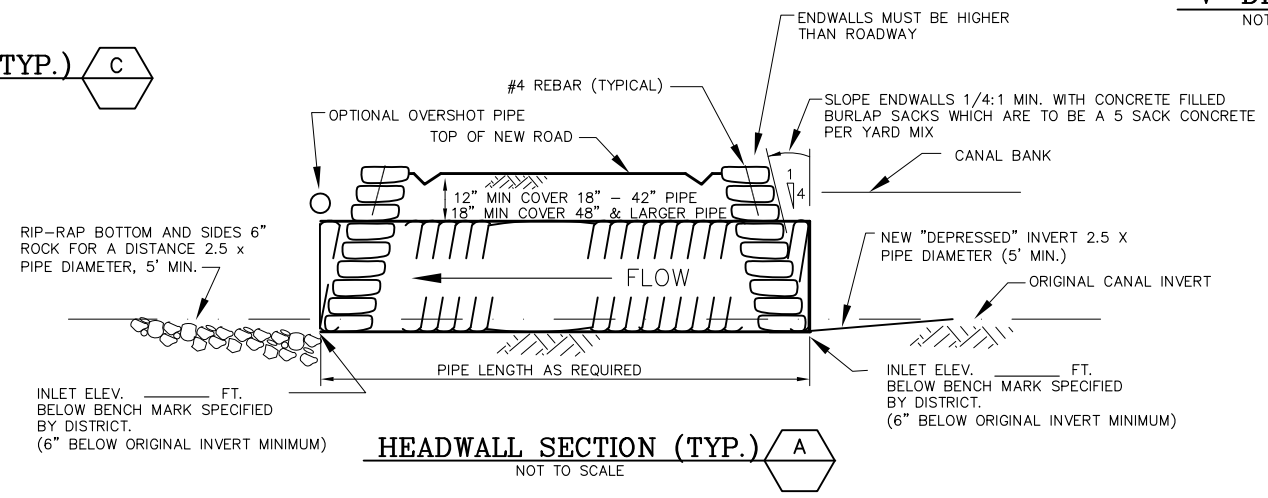
CROSS SECTION AT CANAL BERM
'V' DITCH SECTION B
 NOT TO SCALE



CROSS SECTION AT DRIVEWAY/ROAD
'V' DITCH DETAIL 2
 NOT TO SCALE



CULVERT HEADWALL (TYP.) C
 NOT TO SCALE



HEADWALL SECTION (TYP.) A
 NOT TO SCALE

APPROVED: 3-10-10