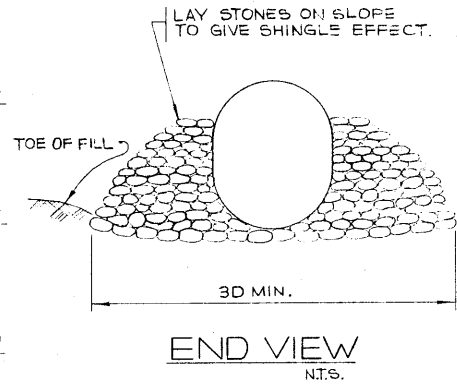


- BACKFILL**
- BACKFILL MATERIAL TO BE AT OPTIMUM MOISTURE CONTENT. WET MATERIAL SHALL NOT BE USED.
 - BACKFILL MATERIAL SHALL BE READILY COMPACTIBLE SOIL OR GRANULAR MATERIAL. NO FROZEN SOIL, BOULDERS OR HIGHLY COMPRESSIBLE MATERIAL SHALL BE USED FOR BACKFILLING IN THE VICINITY OF THE STRUCTURE.
 - ALL MATERIAL GREATER THAN 50 mm SHALL BE REMOVED FROM ADJACENT TO CULVERT.
 - BACKFILL SHALL BE PLACED AND COMPACTED WITH CARE UNDER HAUNCHES OF THE PIPE TO ENSURE THAT IT IS IN FIRM AND INTIMATE CONTACT WITH THE ENTIRE BOTTOM SURFACE OF THE STRUCTURE. RAISE THE FILL EVENLY AND SIMULTANEOUSLY ON BOTH SIDES OF THE CULVERT TO THE MID HEIGHT OF THE CULVERT FOR ITS ENTIRE LENGTH. ROLLING OF THE STRUCTURE MUST BE AVOIDED.
 - MECHANICAL COMPACTION REQUIRED IN ALL AREAS WHERE NORMAL ROAD EQUIPMENT CANNOT WORK.
 - EMBANKMENT WITHIN 1 DIAMETER OF PIPE SHALL BE COMPACTED TO 100% PROCTOR DENSITY.
 - CLAY SEEPAGE CUTOFFS SHALL BE MAINTAINED UP TO MIDHEIGHT OF CULVERT, 2 DIAMETERS IN LENGTH.
 - BECAUSE METAL PIPES ARE FLEXIBLE, THEIR STRENGTH AGAINST SQUASHING DEPENDS ON CAREFUL BACKFILLING. AS THEY DEFLECT UNDER VERTICAL LOAD THEY MUST BUILD UP SIDE SUPPORT, THEREFORE, TO OBTAIN MAXIMUM LOAD BEARING CAPACITY, IT IS NECESSARY THAT THE BACKFILL UNDER AND BESIDE THE PIPE BE OF GOOD MATERIAL, CAREFULLY PLACED AND COMPACTED.
 - HEAVY CONSTRUCTION EQUIPMENT SHOULD NOT BE ALLOWED TO PASS OVER THE STRUCTURE UNTIL 0.60 m OF COMPACTED COVER HAS BEEN PLACED.

GRADING OF ROCK SIZES

80% LARGER THAN 200 mm OR 10 kg
 50% LARGER THAN 300 mm OR 40 kg
 20% LARGER THAN 350 mm OR 70 kg
 MAXIMUM SIZE 450 mm OR 130 kg



- FOUNDATION PREPARATION**
- ESTABLISH LOCATION OF CULVERT AS PER INSTRUCTIONS OF BRIDGE AUTHORIZATION. LOCATE CULVERT SO THAT WATER HAS REASONABLY STRAIGHT ENTRANCE AND EXIT FROM CULVERT.
 - THE EXCAVATION FOR PLACING THE PIPE SHALL GENERALLY HAVE A WIDTH AT THE BOTTOM OF NOT LESS THAN ONE SCRAPER WIDTH CLEAR ON EACH SIDE OF THE PIPE. WHEN A FIRM FOUNDATION AT THE GRADE OF THE PIPE IS NOT ENCOUNTERED, THE EXCAVATION SHALL BE DEEPENED AND BACKFILLED WITH SUITABLE MATERIAL TO GIVE A FIRM FOUNDATION FOR THE BEDDING. IF EXCAVATION RESULTS IN A FIRM BED THEN ONLY A 0.15 m LAYER OF FILL MATERIAL (CLAY OR SAND) SUFFICIENT TO UNIFORMLY BED THE CULVERT IS REQUIRED. A BED THAT CAN ADEQUATELY SUPPORT CONSTRUCTION EQUIPMENT IS CONSIDERED ADEQUATE TO MAINTAIN THE CULVERT. IF THE CULVERT FOUNDATION INCORPORATES THE STREAMBED, THEN ALL POOR MATERIAL FROM THE STREAMBED SHALL BE REMOVED AND GOOD BACKFILL IMPORTED.
 - WHATEVER THE PROCEDURE NECESSARY TO GIVE A FIRM FOUNDATION, THE COMPACTION OF THE ENTIRE BOTTOM OF THE EXCAVATION SHALL BE UNIFORM AND TO THE EXACT GRADE REQUIRED.
 - BOTTOM OF CULVERT TO BE PLACED 1/4 DIAMETER BELOW MEAN STREAMBED ELEVATION, OR AS INSTRUCTED ON BRIDGE AUTHORIZATION.
 - IMPERVIOUS CLAY MATERIAL SHALL BE USED FOR FOUNDATION. GRANULAR MATERIAL MAY BE USED FOR FOUNDATION BENEATH CENTRE OF CULVERT IF CLAY IS UNWORKABLE. CLAY SEEPAGE CUT-OFFS AT ENDS MUST BE INSTALLED.
 - AFTER A FIRM FOUNDATION HAS BEEN OBTAINED, PLACE A MAXIMUM 0.15 m LIFT OF LOOSE CUSHION CLAY (SAND IN CENTER ACCEPTABLE) ON BED. (THIS MATERIAL WILL BE FORCED INTO CORRUGATIONS.)
- CULVERT ASSEMBLY**
- DETAILED CULVERT ASSEMBLY DRAWINGS SHOWING THE POSITION OF EACH PLACE AND METHOD OF LAP WILL BE SUPPLIED BY THE SUPPLIER WITH EACH STRUCTURAL PLATE CULVERT. NO DRAWING SUPPLIED FOR CMP CULVERTS.
 - STRUCTURAL PLATE PIPE AND PIPE ARCHES SHALL BE ASSEMBLED IN ACCORDANCE WITH THE PLANS AND DETAILED ASSEMBLY INSTRUCTIONS PROVIDED.
 - AFTER FOUR RINGS HAVE BEEN ASSEMBLED, TIGHTENING MAY PROCEED ON FIRST RING AFTER THE VERTICAL AND HORIZONTAL DIMENSIONS HAVE BEEN CHECKED AND ADJUSTED AS REQUIRED TO CONFORM TO DESIGN SHAPE. TEMPORARY PROPS MAY BE HELPFUL TO OBTAIN REQUIRED SHAPE IN FIRST FEW RINGS.
 - TIGHTENING MAY PROCEED ABOUT 3 RINGS BEHIND ASSEMBLY.
 - BOLTS TO BE TIGHTENED TO 200 Nm - 270 Nm.
 - THE VERTICAL AND HORIZONTAL DIMENSIONS OF THE TIGHTENED SECTION OF CULVERT BARREL SHOULD BE CHECKED EVERY 6.0 m TO ENSURE THAT THE DESIGN SHAPE IS MAINTAINED.
 - IN NO INSTANCE SHALL TIGHTENING PROCEED IF LAPS ARE NOT FULLY NESTED. STRUTTING OR OTHER MEANS SHALL BE USED TO PRODUCE CORRECT DIMENSIONS SO THAT ALL LAPS NEST PROPERLY.
 - ALL BOLTS SHALL BE TIGHTENED AGAIN AFTER ASSEMBLY COMPLETED.
 - TIGHTENING TO START AT BOTTOM AND TO PROCEED UP ON BOTH SIDES SIMULTANEOUSLY.
 - METAL PIPE MATERIAL SHALL BE HANDLED SO AS NOT TO BRUISE OR DAMAGE THE SHELTER COATING. IT SHALL NOT BE DRAGGED ON THE GROUND OR MANIPULATED WITH HEAVY EQUIPMENT WITHOUT PROPER PRECAUTIONS TO PROTECT THE SURFACE.
 - GOOD TIGHTENING PRACTICE WOULD BE TO OPERATE POWER WRENCHES IN PAIRS, ONE ON EACH SIDE OF SEAM. LESS RE-TIGHTENING MAY BE REQUIRED IF BOTH SIDES OF SEAM WORKED SIMULTANEOUSLY.
 - IF STRUCTURE ASSEMBLED AWAY FROM SITE, TIGHTENING SHOULD BE CHECKED AFTER STRUCTURE IS IN FINAL POSITION.
 - IMPROPER NESTING OF PLATES MAY BE INDICATION OF:
 - WRONG PLATE AT A SPECIFIC LOCATION.
 - INCOMPLETE ASSEMBLY, OR CULVERT HAS NOT BEEN ASSEMBLED TO DESIGN SHAPE. (SEE ITEM #3).
 - IMPROPER CURVATURE OF PLATES. (CONTACT BRIDGE BRANCH OFFICE).

ROCK RIP - RAP

VOLUME (CUBIC METERS OF CLASS I MATERIAL)

PIPE DIAMETER (mm)		INLET (m ³)	OUTLET (m ³)
CSP	SPCSP		
1600	1500	3	8
1800	1800	6	12
2200	2150	8	16
2400	2450	8	19
2700	2750	12	23

SUPERSEDED
SUPERSEDED

APPROVED		Alberta TRANSPORTATION BRIDGE BRANCH		METRIC	
82 08 12		CLAY SEAL		T.B.	
79 02 14		METRIC DIAMETERS		J.O'B.	
NO.	DATE	DESCRIPTION	BY	DATE	
				Sept 21, 1977	
REVISIONS					
DESIGNED	DRAWN BY	DATE	CHECKED BY	DATE	STREAM
	A. PHILLIPS				LOCATION
					HWY. NO.
					SCALE
					FILE NO.
					SHEET
					DWG. NO.
					5-1418