

TRENCH EARTH

Stone Fill & Julet
 $(3.5m(L) \times 5m(W) \times 0.7m(D)) + (1.8m(L) \times 5m(W) \times 1.5m(D)) = 25.8cm$

HEADWALL
 $1.63m(W) \times 2.95m(L) \times 1.5m(D) = 7.2cm$

CULVERT - 0-1.5m
 $\left[(0.1 \times 3.5) + \left(\frac{0.1 \times 3.5}{2} \times 1 \right) + \left(\frac{0.3 \times 1.5}{2} \times 1.4 \right) + (1.5 \times 1.9) + \left(\frac{1.5 \times 0.4}{2} \times 3.2 \right) + (0.4 \times 1) \right] \times 1.88 = 37.8cm$

CULVERT OVER 1.5m
 $\left(\frac{0.0 \times 1.4}{2} \times 5.6 \right) + \left(\frac{0.1 \times 0.5}{2} \times 2.9 \right) + \left(\frac{0.5 \times 0.6}{2} \times 1.3 \right) \times 1.88 = 5.17cm \times 1.5 = 7.8cm$

Stone Fill & DRAIN
 $6m \times 2m \times 1.13m = 13.6cm$

$(1m \times 1.4m \times 1.8m) \text{ MINUS TRENCH RICK} = 92.2cm - 2.5cm = 89.7cm$

Granular Backfill for Structures

Ex. Stone Culvert - New Culvert
 $\left[\left(\frac{0.1 \times 0.4}{2} \times 1.5 \right) + (2.14 \times 1.88) \right] \times 1.88m = 42.4cm$

Earth Backfill

Existing Roadway Width & Height
 $10m(L) \times 0.85m(H) \times 1.88m = 16.0cm \times 1.15 = 18.4cm$

REF JWS
 12 18 06 1-23-7
 T. B. ZA, P. 114

