SECTION 27-DESIGN OF EMBANKMENTS

0617. Material. The soil used as fill material must be stable and free-draining, and it should have high bearing strength. Sand, gravel, sand-gravel, sand-clay, and sand-silt mixtures are generally suitable.

0618. Economy of effort. To minimize excavation, fill mate-rail should be obtained from adjacent cuts if possible, If such excavated soil is unsuitable, or if its use involves a long haul, borrow pits may have to be used. To determine the most economical method, compare estimates of plant, transport, and labor required:-

a. To transport and deliver material excavated from cuttings.

b. To excavate and deliver material from borrow pits, and to dispose of the unwanted removed from cuttings.

0619. Borrow pits. Limits of approval borrow pit areas must be marked, to avoid extracting unsuitable soil. Digging should not start within 10 ft of the toe of the embankment: depth at the under edge should not exceed 1 ft, but may be increased by 1 ft for every 5 ft of distance outwards.

Drainage may be necessary: in material districts stagnant water must be treated if cannot be removed.

0620. Planning the construction. Allowance must be made for swell (when estimating transport) and for shrinkage and settlement (when setting out and placing material).

Slopes are usually formed at 1 in 1½.
Material is placed and compacted in layers.
If an embankment crosses a side-hill slope, the bottom of the fill should be keyed by benching.

Drainage

0621. Drainage is repaired, first to prevent the embankment forming a jam across the natural area drainage and second to protect the foundation, formation and road surface.

a. Area drainage. Culverts must be provided through the embankment giving sufficient waterway to pass off flood water. Calculations and culvert capacity are dealt with in Chapter 5.

b. Drainage of the structure. Surface water must not be allowed to spill over along the bank but should be taken by channels to selected discharge

outfalls. These are usually sited above culverts, but they sometimes connect with side drains outside the toe of the bank. All outfalls down the slope must be faced to prevent erosion.

0622. If sub grade drainage is necessary e.g., when the road surface is not waterproof, transverse agricultural drains falling to the downhill side of the embankment will usually surface.

0623. The collection and disposal of all discharged water is of vital impotence: size and gradient of run-offs must be designed for the rapid removal of the greatest likely volume of storm water.