

9 Apr 84

## CHAPTER 4

## DRAINAGE

4-1. Requirements. Size, strength, and design of all drainage facilities will conform to EM 1110-3-136. The following requirements will also apply.

4-2. Side drainage ditches. The minimum grade for side drainage ditches will be 0.2 percent, so that the design storm will produce channel velocities of 2 feet to 2.5 fps. Paving, riprap, or erosion checks may be required if the grade produces eroding velocities. The lower ends should diverge from the toe of embankment and be extended sufficiently to prevent erosion.

4-3. Intercepting ditches. Intercepting ditches will be used to prevent water from coming over the top of the cut and to prevent erosion of the slopes. The grade of intercepting ditches will be not less than 0.3 percent. The ends should diverge from the toe of the slope to prevent erosion of adjoining embankments. A paved gutter, or pipe, will be required to carry the flow from the intercepting ditch to the drainage ditch.

4-4. Culverts. Culverts under the track will be corrugated metal, reinforced concrete, or cast iron pipe.

4-5. Lateral drains. Lateral subsurface drains will be installed to conduct springs or ground water from the roadbed to the longitudinal pipe drains or open ditches.

4-6. Pipe drains. Pipe drains, parallel to the track, will be installed in wet or narrow cuts where side ditches cannot be maintained. Inlets will be designed to carry off surface water. The size of pipe will be a minimum diameter of 6 inches.