PART ONE

GENERAL

CHAPTER 1

PURPOSE AND SCOPE

1-1. Purpose. This manual prescribes the standards to be used for drainage and erosion control for mobilization construction. The maximum use of natural drainage is encouraged; however, positive surface and subsurface drainage systems will be necessary in certain cases to insure protection from saturation of subgrades, damage to slope, erosion, and loss of pavement and slab bearing capacity.

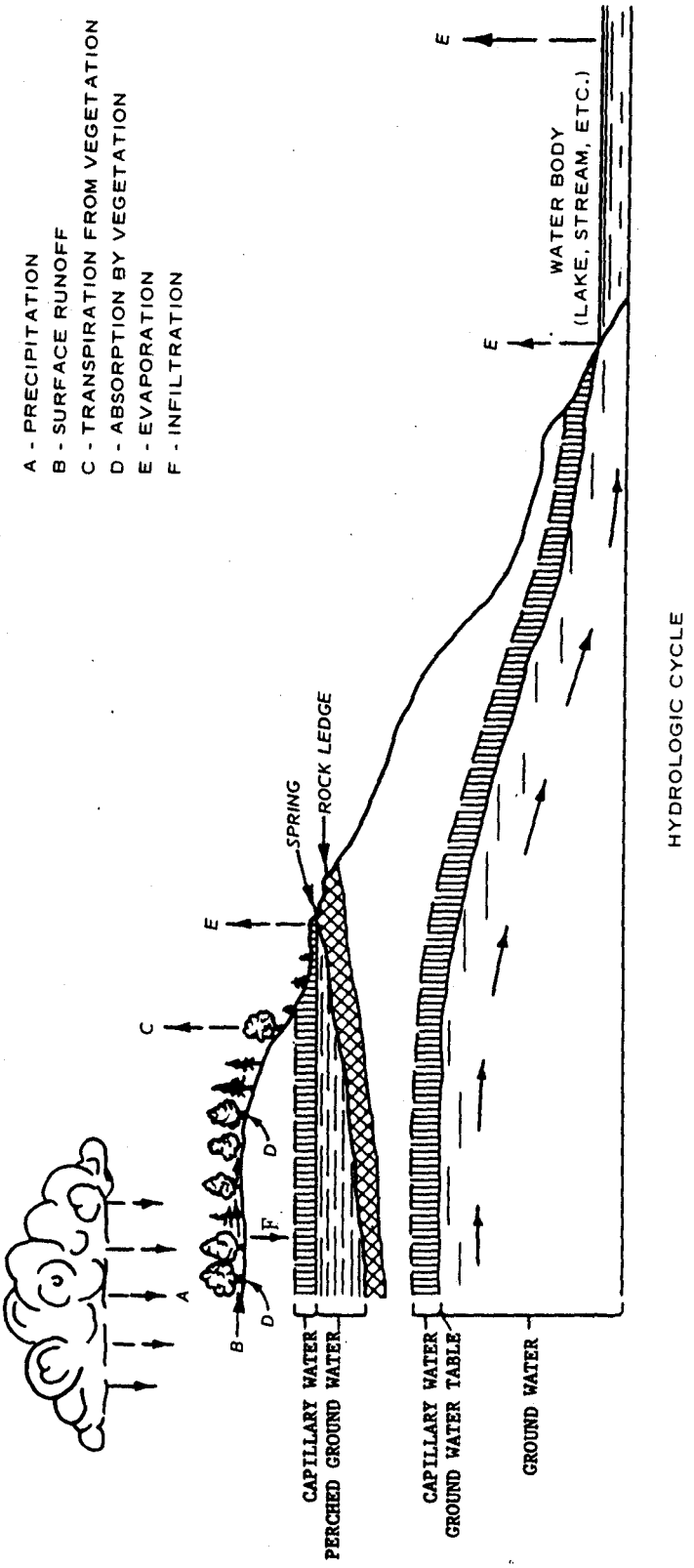
1-2. Scope. This manual provides design criteria for:

- Subsurface water collection systems.
- Surface drainage collection systems.
- Cover requirements for several types of piping with various loading conditions.
- Erosion control structures.
- Protection provisions against freezing in seasonal frost areas.

The criteria are developed for use with concrete slabs or flexible pavement systems placed on grade and exposed to atmospheric conditions. Variations are included in the criteria to allow application to the general areas of airfields, roads, and railroads. Airfield slabs and pavements include runways, overruns, shoulders, taxiways, aprons, hardstands, and wash rack areas. Roads include all classes of roadways, streets, access, and storage areas, both open or shaded which are subject to storm runoff or ground water conditions. Roadways, streets, and accesses considered may be paved or unpaved but are exclusive of bridges. Railroad considerations include utility tracks and spurs. For further information on the uses and requirements of subsurface and storm drainage see EM 1110-3-130, EM 1110-3-131, EM 1110-3-132, EM 1110-3-141, EM 1110-3-142, and EM 1110-3-152.

1-3. Hydrologic cycle.

a. Standard hydrologic cycle. A standard hydrologic cycle illustrating the flow of moisture is shown in figure 1-1. Precipitation in the form of rain or snow either runs off or infiltrates into the soil or rocks.



U.S. ARMY ENGINEER WATERWAYS EXPERIMENT STATION

FIGURE 1-1. OCCURRENCE, SOURCE, AND MOVEMENT OF GROUND WATER

b. Surface runoff. Surface runoff is that portion of the water resulting from rainfall, snow melt, or manmade causes which runs freely across the ground surface to lakes, streams, and rivers. Surface runoff is the major cause of ground erosion.

c. Ground water. The water which infiltrates beneath the surface of the ground is termed subsurface water or ground water. The free surface of this water is referred to as the "ground water table" or "water table." Perched water is ground water trapped in pockets by an impervious stratum, above the natural water table level. Water that saturates the soil before frost has disappeared from lower levels form a temporary perched ground water. Ground water tables rise and fall depending upon the relation between infiltration, absorption, evaporation, and ground water flow. Seasonal fluctuations are at some localities large and fluctuations, because of drought or wet periods of considerable duration, may also be very large. Land drainage ditches, railroad and highway cuts and fills, and other excavations may cause a substantial alteration of the ground water table.

d. Evaporation. Evaporation from water on the ground surface such as lakes and rivers along with transpiration from vegetation complete the hydrologic cycle.