CHAPTER 5

FLEXIBLE PAVEMENT SELECT MATERIALS AND SUBBASE COURSES

5-1. General.

It is common practice in pavement design to use locally available or other readily available materials between the subgrade and base course for economy. These layers are designated in this manual as select materials or subbases. Those with design CBR values equal to or less than 20 are designated select materials, and those with CBR values above 20 are designated subbases. Minimum thicknesses of pavement and base have been established to eliminate the need for subbases with design CBR values above 50. Where the design CBR value of the subgrade without processing is in the range of 20 to 50, select materials and subbases may not be needed. However, the subgrade cannot be assigned design CBR values of 20 or higher unless it meets the gradation and plasticity requirements for subbases.

5-2. Materials.

The investigations described in chapter 2 will be used to determine the location and characteristics of suitable soils for select material and subbase construction.

a. Select materials. Select materials will normally be locally available coarse-grained soils (prefix G or S), although fine-grained soils in the ML and CL groups may be used in certain cases. Limerock, coral, shell, ashes, cinders, caliche, disintegrated granite, and other such materials should be considered when they are economical. Recommended plasticity requirements are listed in table 5-1. A maximum aggregate size of 3 inches is suggested to aid in meeting grading requirements.

Table 5-1. Maximum Permissible Design Values for Subbases and Select Materials.

Material	Design CBR	Size in.	Gradation requirements,* % passing		Liquid Limit	Plasticity Index
			No. 10	No. 200		
Subbase	50	3	50	15	25	5
Subbase	40	3	80	15	25	5
Subbase	30	3	100	15	25	5
Select material	20	*3	.....	**25	**35	**12

* Cases may occur in which certain natural materials that do not meet the gradation requirements may develop satisfactory CBR values in the prototype. Exceptions to the gradation requirements are permissible when supported by adequate in-place CBR tests on construction that has been in service for several years. The CBR test is not applicable for use in evaluating materials stabilized with additives.

** Suggested limits.

b. Subbase materials. Subbase materials may consist of naturally occurring coarse-grained soils or blended and processed soils. Materials such as limerock, coral, shell, ashes, cinders, caliche, and disintegrated granite may be used as subbases when they meet the requirements described in table 54. The existing subgrade may meet the requirements for a subbase course or it may be possible to treat the existing subgrade to produce a subbase. However, admixing native or processed materials will be done only when the unmixed subgrade meets the liquid limit and plasticity index requirements for subbases. It has been found that "cutting" plasticity in this way is not satisfactory. Material stabilized with commercial additives may be economical as a subbase. Portland cement, lime, flyash, or bitumen and combinations thereof are commonly employed for this purpose. Also, it may be possible to decrease the plasticity of some materials by use of lime or portland cement in sufficient amounts to make them suitable as subbases.

5-3. Compaction.

These materials can be processed and compacted with normal procedures. Compaction of subbases will be 100 percent of ASTM D 1557 density

except where it is known that a higher density can be obtained practically, in which case the higher density should be required. Compaction of select materials will be as shown in table 4-1 except that in no case will cohesionless fill be placed at less than 95 percent or cohesive fill at less than 90 percent.

5-4. Drainage.

Subbase drainage is an important aspect of design and should be accomplished in accordance with TM 5-820-2/AFM 88-5, Chap. 2.

5-5. Selection of Design CBR Values.

The select material or subbase will generally be uniform, and the problem of selecting a limiting condition, as described for the subgrade, does not ordinarily exist. Tests are usually made on remolded samples; however, where existing similar construction is available, CBR tests may be made in place on material when it has attained its maximum expected water content or on undisturbed soaked samples. The procedures for selecting CBR design values described for subgrades apply to select materials and subbases. CBR tests on gravelly materials in the laboratory tend to give CBR values higher than those obtained in the field. The difference is attributed to the processing necessary to test the sample in the 6-inch mold, and to the confining effect of the mold. Therefore, the CBR test is supplemented by gradation and Atterberg limits requirements for subbases, as shown in table 5-1. Suggested limits for select materials are also indicated. In addition to these requirements, the material must also show in the laboratory tests a CBR equal to or higher than the CBR assigned to the material for design purposes.