SECTION 106- SOIL CEMENT

General

2364. Soil cement is particular form of soil stabilization, in which from 5 to 15 percent of ordinary Portland cement is thoroughly mixed with soil. Adequate compaction at correct moisture content is essential achieved maximum compressive strength and durability.

2365. In temperate climates the method is successful with mist types of soil containing not more than 30 per cent clay or not more than 2 percent organic matter. In arid conditions the process may be impracticable.

2366. Crushing strength should be approximately 250 lb/sq in at 7 days. Strength greatly trouble due to excess movement, as with concrete. The surface will not stand up to abrasion for any length of time. For long-term use a wearing surface should be super-imposed: for light traffic bituminous surface dressing is adequate design.

Figure 23-26: Soil Cementing by Spraying Grouting

2367. To achieve the best results, laboratory tests are essential:-

a. To assess the suitability of the soil.
b. To specify the optimum cement content.

Laboratory tests take at least 7 days. Urgent work can be put in hand by rule of thumb methods.

2368. Design based on laboratory tests.

a. "Accurate" method:- This permits variation of cement content to suit changes in moisture content and in the compaction density achieved. I can be used only by trained laboratory staffs.

b. "Simplified" method.

(1) Using a 10 per cent cement/soil mixture , optimum moisture content and in the compacted dry density to be used are decided from the proctor test.

(2) Specimens of soil cement, at the chosen moisture content and dry density, are made up, using three different cement content (6,9 and 12 [percent for gravels and stands: 9. 12 and 15 percent for soil with appreciable clay content).

(3) After curing for 7 days, the average crushing strength of each combination is determined, and the cement content required for a crushing strength of 250 lb/sq in is found graphically.

2369. Rule of thumb method:-

a. Determine the casagrande classification of the soil (see RESPB No. 5 D, Table 6).
b. From Table 79 decide the appropriate percentage of cement.
c. With the soil as dry as possible, mix in this proportion of cement.
d. Add water by sprinkling until the mixture will ball in the hand, but will then crumble readily.
e. Compact with the type of roller recommended for the particular soil type (see table 13.2)

TABLE 23.9 – GUIDE TO CEMENT CONTENT WHEN STABILIZING VARIOUS SOIL TYPES*

Serial No	Group symbol	Range of compressive strength after 7 days, obtained with 10 per cent (lb/sq in)	Minimum cement content for stabilization (percent)
(a)	(b)	(c)	(d)
1.	GW	1,000-3,000	6
2.	GC	750-2,000	6
3.	GP	350-1,000	6
4.	GF	500-1,000	6
5.	SW	350-1,000	8
6.	SC	250-750	8
7.	SP	100-500	10
8.	SF	2500-500	10
9.	ML	200-500	10
10.	CL	150-500	10
11.	OL	Unsuitable for stabilization	-
12.	MH	150-500	12
13.	CH	Unsuitable for stabilization	-
14.	OH	Unsuitable for stabilization	-
15.	Pt	Unsuitable for stabilization	-

***** This table is only a guide to the amount of cement which should be used in hasty work.

Construction

2370. Mixing. Sill stabilization machines, now being developed, can produce soil cement pavements in one pass. In the absence of special plant, any method applicable to soil stabilization can be use (see para 453).

2371. Special conditions.

a. Dry mixing must continue until the mixture is of even color throughout.

b. Spraying and wet mixing must not take more than 3 hours.

c. Compaction to specified density must be completed within 5 hours of starting wet mixing.

d. If compacting in more than one layer, each must be roughed up by harrow or spiked drag before the next layer is spread, so as to eliminate compaction planes.

e. Soil cement must be cured for 7 days. Spraying with bitumen is not recommended as a curing method.

f. Joints between sections laid on different days must be made with extreme care (see Figure 23.27).

2372. Control tests. To ensure success, the following should be rested regularly:

a. Pulverization of raw soil, 80 percent should pass the $\frac{3}{16}$ inch sieve.

b Moisture content. As a minimum, tests should be made:-

(1) At the start of each day's work.

(2) When starting work using a different mix.

(3) During and after rainfall.

c. Intimacy of soil/cement mix.

d. Evenness of spraying.

e. Depth of construction.

f. Density of compacted material.

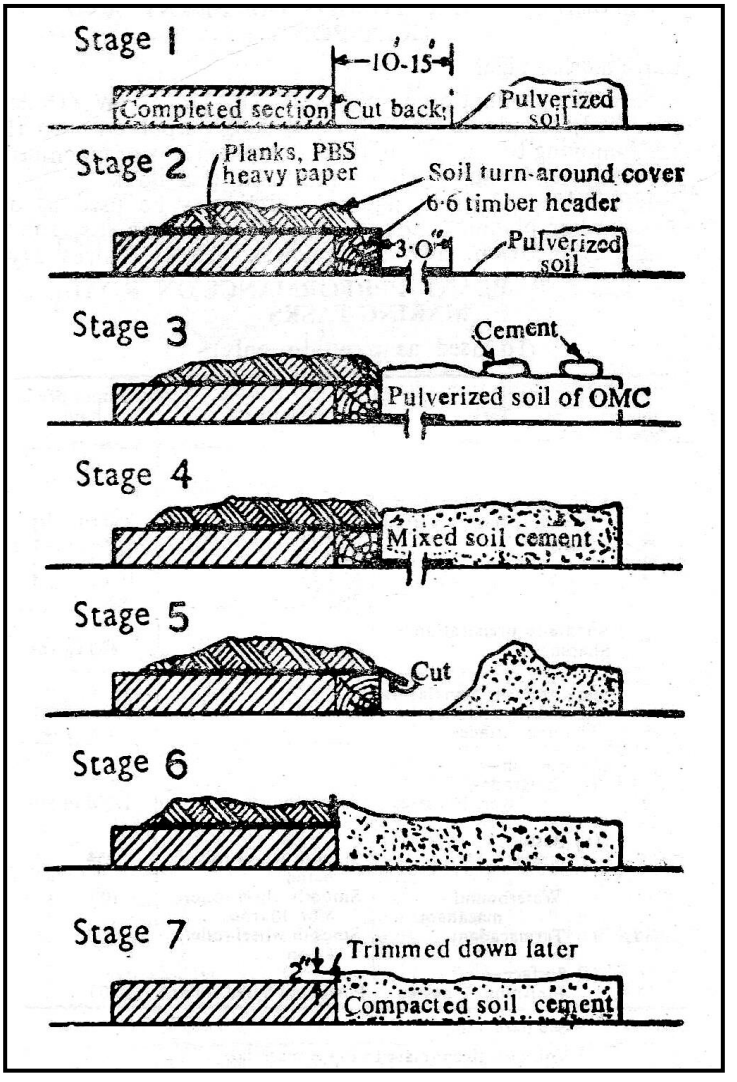

Figure 23-27: Stages in Formation of Construction Joints in Soil Cement