

State of Illinois  
DEPARTMENT OF PUBLIC WORKS AND BUILDINGS  
Division of Highways  
Bureau of Research and Development

EVALUATION OF SOIL RETENTION BLANKET IN THE CONTROL  
OF EROSION ON SLOPES AND IN CHANNELS

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The problem of preventing erosion during the establishment of vegetative cover on slopes and in ditch channels has become increasingly difficult as higher fills and deeper cuts have resulted from the upgrading of highway design to the modern primary and Interstate standards. It has been found that the erosion of mild and short slopes can usually be prevented by the judicious use of mulching and temporary seedings; however, where erosive forces are more severe, as on longer slopes and in channels, a more positive treatment is required.

Of the various erosion control materials proposed for the treatment of channels and long slopes, the one most successfully used to date is jute matting. Jute matting has been used for several years by the Illinois Division of Highways, and its use - particularly in channels - has become standard.

Although jute matting has been judged to be an effective erosion control material, its undesirable tendencies to smother new seedlings and to inhibit the establishment of vegetative cover have not been overlooked. For this reason a number of state highway organizations, conservation organizations, and agricultural colleges throughout the United States have been experimenting with new materials developed or adapted for use in the control of erosion.

One of the most promising new materials to be introduced is "Soil Retention Blanket," a wood excelsior blanket reinforced with twisted kraft paper yarn netting developed by the American Excelsior Corporation, Chicago, Illinois. Soil Retention Blanket is claimed to control erosion without inhibiting plant growth, and early testing by North Carolina State University, the United States Forest

Service, and others tends to support this claim. Soil Retention Blanket is competitive with jute matting in cost. Based on the above, the Illinois Highway Development Council, at its May 14, 1965 meeting, recommended that an evaluation of the performance of Soil Retention Blanket on roadside development projects by the Illinois Division of Highways be made.

#### SUMMARY

This report covers the evaluation of Soil Retention Blanket, a wood excelsior blanket reinforced with kraft paper yarn netting, proposed by the American Excelsior Corporation for use in the temporary control of erosion on the Illinois highway system. Included in the investigation were four trial installations at separate points on Interstate Routes 55 and 80. The performance of the trial installations indicate that Soil Retention Blanket is an effective erosion control material and that the establishment of vegetative cover is enhanced by the use of Soil Retention Blanket as compared with jute matting.

#### TEST PROGRAM

This evaluation of Soil Retention Blanket is based on the observed performance of installations of the material at two locations in District 6 on Interstate Route 55, Sangamon County; one in District 2 on Interstate Route 80, Bureau County; and one in District 3 on Interstate Route 80, Kendall County. Two installations were made in the fall of 1964, one in the spring of 1965, and one in the fall of 1965. Three of the test installations were provided with control sections of jute matting, while the fourth had a control section of straw mulch. Inspections were made during the spring, summer, and fall of 1965 and 1966 to ascertain the general condition of the installations and to observe the performance of the test and control materials in preventing erosion. In addition stand counts were made at the Sangamon County installations in the fall of 1966.

TEST INSTALLATIONS

Sangamon County (District 6)

Route FAI 55

Section 84-2-2

Station 476+50

This installation, located in the west ditch just south of the Sangamon River, was made in March 1965 in an effort to check the erosion and to establish cover in a small area where normal seeding procedures had proven unsuccessful. Soil Retention Blanket and jute matting were placed adjacent to each other in a freshly seeded shaped channel as shown in Figure 2. Each material was anchored in the normal manner with wire staples.

The early performance of the test and control materials is shown in Figure 3, taken on May 13, 1965. The tendency for the jute matting to inhibit growth is evident. Both materials were successfully controlling erosion.

In October 1966, near the close of its second growing season, the installation appeared as in Figures 4, 5, 6, and 7. At that time the stand counts shown in Table 1 were made. Figure 4 shows both the test and control areas with the randomly chosen stand count sample areas marked. Figures 5 and 6 are closer views of, respectively, the test section and the control section. Figure 7 illustrates the condition of an adjacent section of ditch, which was shaped and seeded at the same time as the other but which received no protective treatment.

The performance of both materials at this location can be judged as adequate. Both were successful in preventing erosion. The vegetative cover was better in the Soil Retention Blanket section throughout the establishment period.

Sangamon County (District 6)

Route FAI 55

Section 84-3-2

Station 267+50

The second Sangamon County installation, which was made on September 9, 1965, is located between the exit ramp to Route 29 east and the entrance ramp to Interstate 55 south in the southwest quadrant of the Route I 55 - Route Illinois 29 interchange. Three steep gores were treated; one with Soil Retention Blanket, one with jute matting, and one with paper net reinforced straw mulch. Each was shaped with top soil and seeded prior to the placement of the erosion control material.

On September 15, 1965 and September 17, 1965, the newly placed materials were subjected to heavy (three-inch) rain storms which resulted in damage to each. The amount of damage appeared to be heaviest in the paper net reinforced straw mulch section, lightest in the jute matting section, and intermediate in the Soil Retention Blanket section. Since jute matting was the only material available, all three sections were repaired with jute matting. No further damage was incurred through October 1966 when the stand counts shown in Table 1 were made.

With the exception of the early damage from two closely spaced heavy rainfalls, the performance of all three materials at this location was satisfactory. However, the relatively more extensive damage suffered by the Soil Retention Blanket and the paper net reinforced straw sections suggests that a more restrictive limitation may exist as to the steepness of channel that can be successfully protected by these erosion control materials.

Bureau County (District 2)

Route FAI 80

Section 06-6

Station 1573+50

The Bureau County installation is located in the median ditch at a point which had been eroding prior to treatment in the fall of 1964 with Soil Retention Blanket and jute matting. Both materials have been effective in controlling erosion.

Although no stand counts were made, the test section was judged to have significantly better cover.

Kendall County (District 3)

Route FAI 80

Section (32-47)-4

Station 1735+00

This installation is located on a cut slope at the Minooka interchange. The control section at this location was treated with straw mulch at the time the test installation was made in the fall of 1964. The Soil Retention Blanket has been completely effective in controlling erosion while the straw mulch section has required minor repairs. Vegetative cover establishment was adequate in both test and control sections; however, the straw mulch section had an objectionably heavy population of weeds - apparently due to weed seeds contained in the straw.

DISCUSSION

In the three test sections where Soil Retention Blanket could be compared directly with jute matting, it was observed that the excelsior of the Soil Retention Blanket tended to cling to and early become a part of the soil surface while the jute matting tended to remain discrete and separate from the soil surface for a much longer period of time. This characteristic of Soil Retention Blanket may explain why it does not inhibit vegetative growth to the extent that jute matting does.

CONCLUSIONS AND RECOMMENDATION

The performance of Soil Retention Blanket in preventing erosion in the four trial installations covered by this investigation has been satisfactory with the exception of the early damage incurred by the Sangamon County Section 84-3-2

installation due to unusually heavy rainfall occurring within a few days after construction. Since the jute matting at the Section 84-3-2 installation was also damaged to a lesser extent, it can only be concluded that each material has a limitation as to the amount of erosive force which it can withstand and that, given the condition of no vegetative cover, jute matting probably can withstand somewhat more erosive force than can the Soil Retention Blanket. The determination of the limiting slope for each erosion control material was beyond the scope of this investigation.

The performance of Soil Retention Blanket in the establishment of vegetative cover was better than that of jute matting in each installation where the latter was used as a control material.

In comparison with straw mulch, Soil Retention Blanket showed somewhat better resistance to erosion. An additional benefit of Soil Retention Blanket as compared to straw mulch is the fact that it does not contain weed seeds, whereas straw is usually more or less contaminated with a variety of weed seeds.

Based on the satisfactory performance of Soil Retention Blanket in the installations covered by this investigation and on the competitiveness of Soil Retention Blanket with jute matting, it is recommended that the material be accepted for general use as an alternate to jute matting.

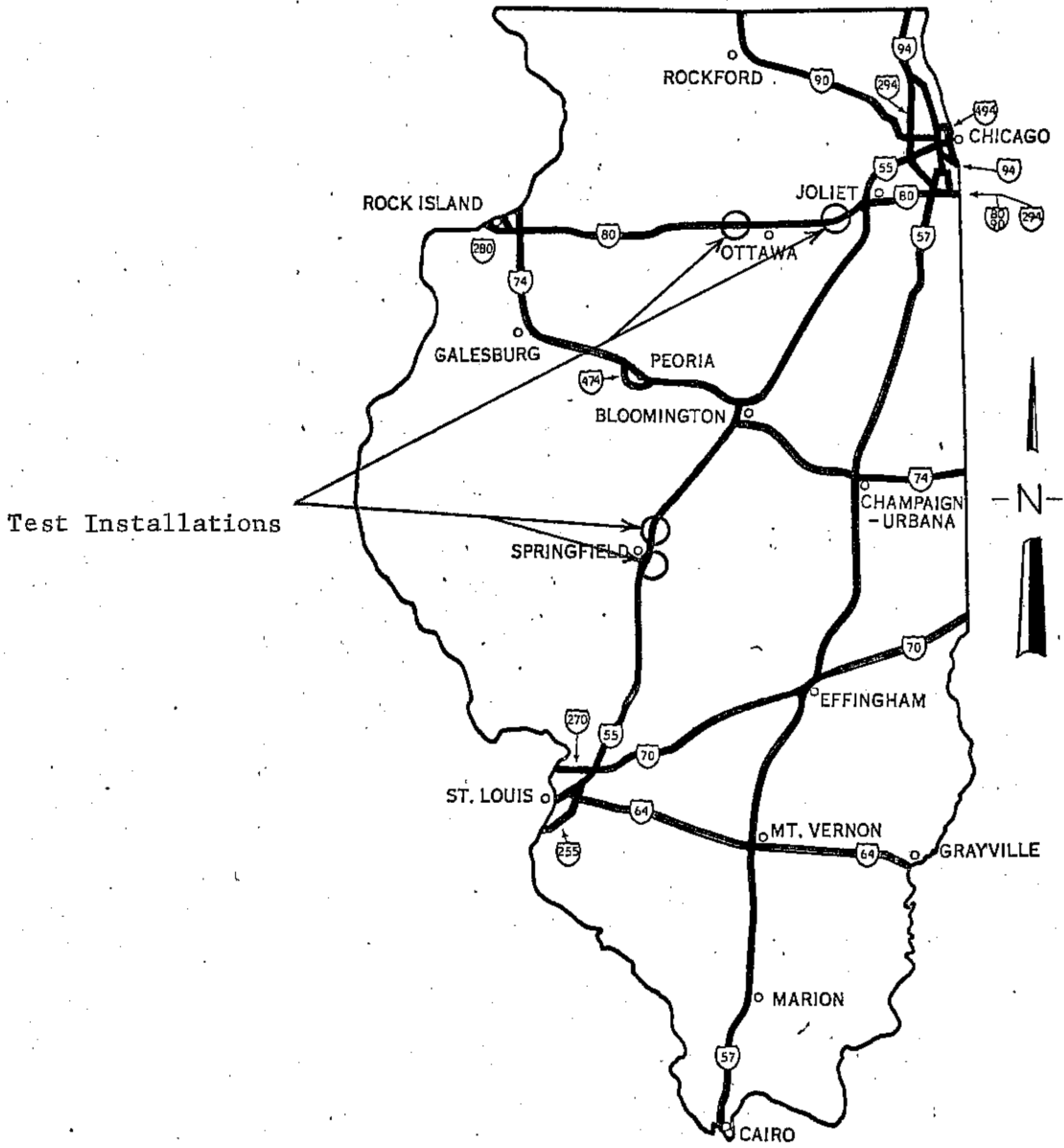


Figure 1. General location of test installations.



Figure 2.

New installation of erosion control materials in side ditch. The two light colored strips in the center of the photograph are Soil Retention Blanket. The darker strip to the immediate left is jute matting. The channel bottom has been shaped and seeded.

Figure 3.

Same installation at the age of two months. Note that the vegetative growth is greater in the Soil Retention Blanket than in the jute matting. Both materials have been effective in preventing erosion.

Figure 4.

Same installation near the close of its second growing season. Note the 3-foot square stand count sample areas marked. The Soil Retention Blanket is to the right. The jute matting is to the left. Both materials have been successful in preventing erosion.

Figure 5.

Close up of the Soil Retention Blanket stand count sample area. Note the tight cover of perennial fescue sod. The tracks are ruts caused by mowing tractors operating in the center of the ditch during wet weather.

Figure 6.

Close up of jute matting stand count area. Note that there is more brown colored sod than in the preceding photograph indicating a preponderance of annual crabgrass.

Figure 7.

Same installation from a point further up the channel. The protected area can be seen about 2/3 of the way up from the bottom of the picture. Note that the unprotected channel in the foreground has experienced erosion.

TABLE I.

OCTOBER 1966 STAND COUNTS ON GRASSED AREAS PROTECTED BY SOIL RETENTION BLANKET,  
 JUTE MATTING, AND PAPER NET REINFORCED STRAW MULCH  
 FAI 55 (SANGAMON COUNTY)

Location	Clumps of Grass or Legume		Weeds		Notes
	Species	Clump Size	Species	No.	
Section 84-2-2	Fescue	10	Misc.	2	Constructed March 1965. No trace of blanket remains. 65% green cover 20% brown cover 15% bare
	Bluegrass	-			
	Misc. (wild)	10			
	White clover	7			
Section 84-2-2 Jute Matting	Fescue	6	Misc.	4	Constructed March 1965. Matt disintegrated to trace. 50% green cover 30% brown cover 20% bare
	Bluegrass	-			
	Misc. (wild)	12			
	White clover	2			
Section 84-3-2 Soil Retention Blanket	Fescue	-	Ragweed	6	Constructed September 1965. 65% green cover
	Bluegrass	2	Field daisy	2	
	Misc. (wild)	-			
	Vetch clumps	-			
Section 84-3-2 Jute Matting	Fescue	-	Ragweed	4	Constructed September 1965. 65% green cover
	Bluegrass	-	Milkweed		
	Misc.	-			
	Sweet clover	2			
Section 84-3-2 Paper Net Reinforced Straw Mulch	Fescue	4	Ragweed	5	Constructed September 1965. 50% green cover
	Bluegrass	-			
	Misc.	-			
	Sweet clover	5			