

PAPER SNOW FENCE INSTALLATIONS 1951-1952

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MICHIGAN
STATE HIGHWAY DEPARTMENT

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STATE HIGHWAY COMMISSIONER

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1951 - 1952

Joint Investigation between Maintenance Division
and Testing and Research Division

Snow Fence Material Investigation
Research Project 36 G-3(10)

Research Laboratory
Testing and Research Division
Report No. 178
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PAPER SNOW FENCE INSTALLATIONS
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During the winter of 1949-1950 the Maintenance Division, in cooperation with the Research Laboratory of the Testing and Research Division, experimented in a small way with snow fences made of paper strips as a substitute for the common wood slab type. This experimental work was done on M-100, about four miles south of Grand Ledge.

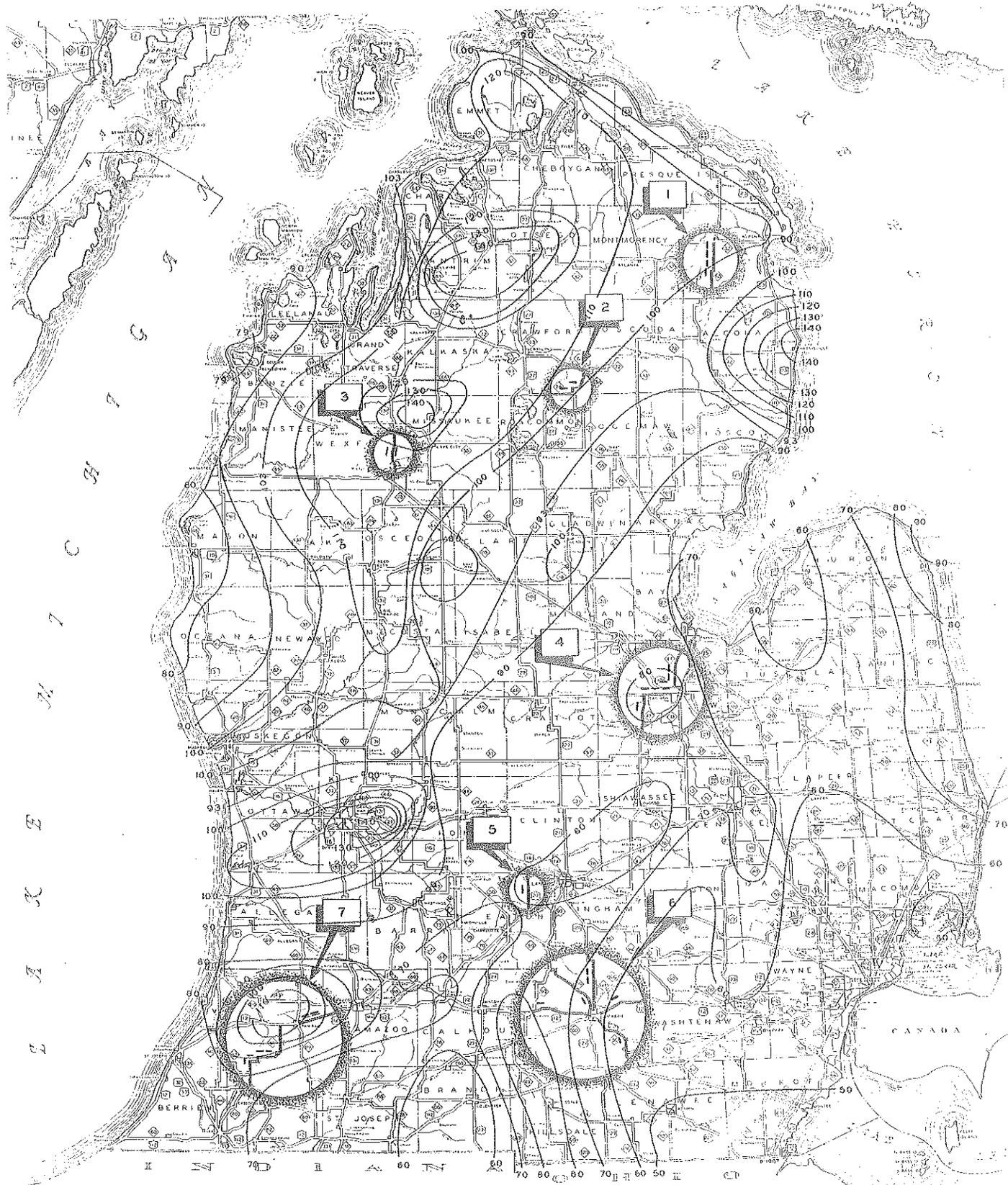
The performance of one type of paper snow fence included in this study was so encouraging that in 1951 the Maintenance Division, at the direction of Mr. B. R. Downey, Maintenance Engineer, authorized the erection of approximately five miles of similar paper snow fence at strategic locations throughout the Lower Peninsula for further study under more natural operating conditions. In all cases the erection of the snow fence was done by local county help.

Paper snow fence was installed in the counties of (1) Alpena, (2) Crawford, (3) Wexford, (4) Saginaw, (5) Eaton, (6) Jackson, and (7) Van Buren, at the locations shown in Figure 1.

This report covers the condition of the experimental installations at final inspection, with notes on methods of installation, maintenance, and dismantling as employed by the participating counties. The results of a special test installation located on M-100, 3.2 miles south of M-43, are also reported.

Description of Paper Snow Fence

The paper snow fence consisted of two parallel strips of paper material 12 inches wide, fastened to steel posts spaced eight feet apart. The space between strips varied from four to 12 inches. The bottom strip was placed six to 12 inches above the ground, depending upon vegetative growth at the particular location. In some locations three 12" paper strips were erected for observation.



— = A SECTION OF FENCE

~80~ = TOTAL SNOWFALL, IN INCHES

MAP SHOWING LOCATION
OF PAPER SNOW FENCE INSTALLATIONS

▲ FIGURE 1

WINTER 1951-1952

All of the paper material used in this work conformed to American Society of Testing Materials Designation C 171-49T, Specifications for Waterproof Paper for Curing Concrete.

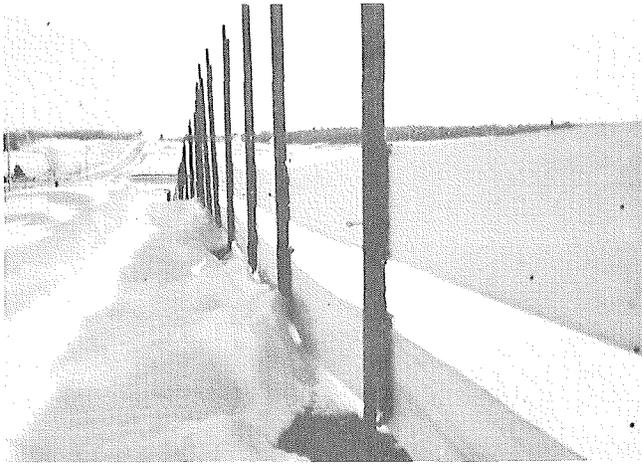
In the erection of the fence, pieces of wood 1- by 2-in. are wired to steel fence posts and the paper strips are fastened in turn to the wooden pieces by means of large staples. A blanket piece, three inches wide, of the same material as used in the snow fence, is slipped over the paper strip at each post to protect the paper and also to furnish a better holding condition for the staples.

Performance of Snow Fence Installations

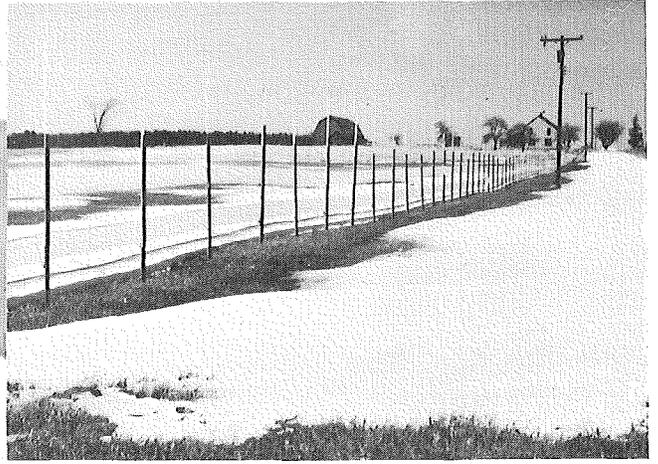
A field survey in April, 1952, revealed without exception that the paper snow fence installations in all counties came through the winter in fine shape, withstanding bad sleeting, heavy rain, and high winds. Of the five miles of fence, approximately 300 feet was found to be damaged. Any damaged panel could have been readily repaired by replacement with new material. See Figures 2 - 6.

It was determined that the majority of the damage was attributable to loose stock and thoughtless persons, especially school children. It is believed that on future installations this difficulty can be overcome to a large extent by providing a gap in the fence at definite intervals to permit passage through the barrier. Other damage resulted from improper installation and snow. See Figures 7 - 10.

Careful workmanship is mandatory in order to realize satisfactory performance. The performance of the various installations show definitely that proper attention was paid to erection details in practically all cases.



▲ FIGURE 2. ALPENA COUNTY, M-65, 8 MI. SOUTH OF M-32



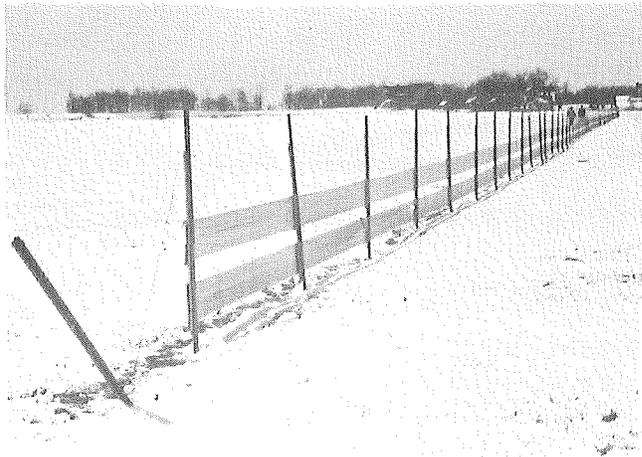
▲ FIGURE 3. ROSCOMMON COUNTY, M-144



▲ FIGURE 4. WEXFORD COUNTY, US-131



▲ FIGURE 5. SAGINAW COUNTY, M-46



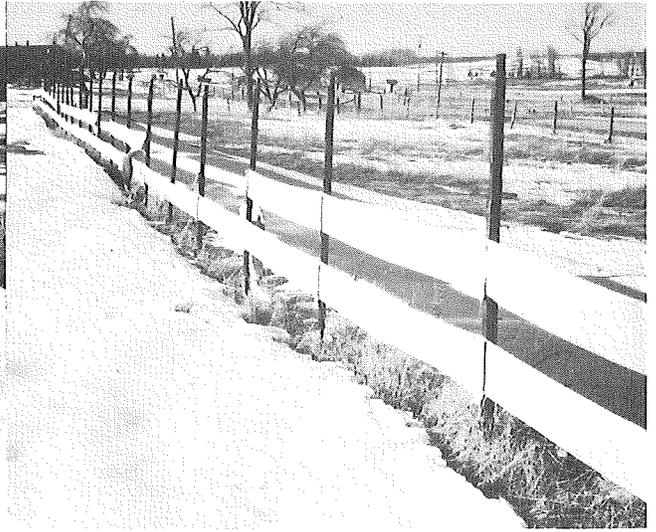
▲ FIGURE 6. JACKSON COUNTY, M-50

PAPER SNOW FENCE INSTALLATIONS

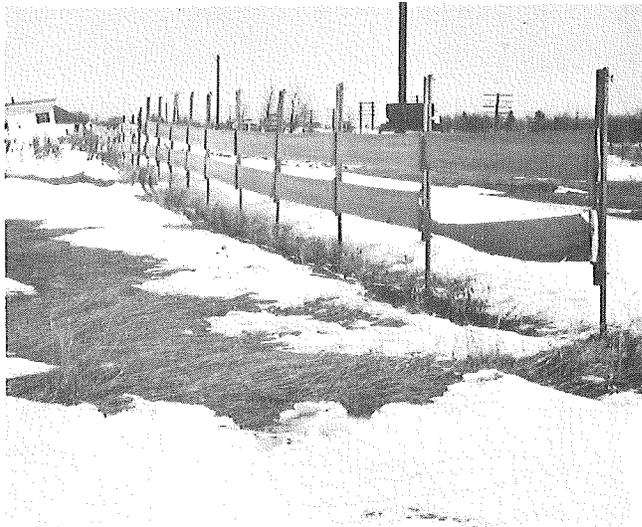
ILLUSTRATING TYPICAL CONDITION OF FENCES
AT END OF WINTER, 1951-1952



▲ FIGURE 7. DAMAGE CAUSED BY PEOPLE CLIMBING OVER FENCE



▲ FIGURE 8. DAMAGE CAUSED BY LIVESTOCK



▲ FIGURE 9. DAMAGE OF LOWER STRIP CAUSED BY RECEDING SNOW DRIFT



▲ FIGURE 10. CONDITION OF FENCE WHEN IMPROPERLY INSTALLED. IN THIS CASE FENCE POSTS WERE SET TOO FAR APART - 8 FEET WOULD BE THE MAXIMUM SPACING

PAPER SNOW FENCE INSTALLATIONS

ILLUSTRATING CHARACTER OF DAMAGED SECTIONS OF FENCE - WINTER, 1951-1952

SPECIAL TEST SECTION ON M-100

Several different experimental sections of paper snow fence were erected on M-100 four miles south of Grand Ledge this winter, to continue the tests run at this location the previous winter. Included was a section of ordinary picket fence set up in the same area location, so that it was possible to use it for comparison with the paper fence sections. The following sections were erected. See Figures 11 - 14.

1. Section with two 12-inch strips.
2. Section with three 12-inch strips.
3. Section with one 16-inch strip.
4. Section with two 16-inch strips.
5. Section with one 16-inch strip at bottom and one 12-inch strip at top.

In all cases the opening between the paper strips was about eight inches.

During the early part of the winter there occurred a series of storms closely following each other, which afforded an excellent opportunity to measure the effectiveness of the various types of fence in stopping moving snow particles.

All of these test sections functioned satisfactorily through the winter, with the exception of the one 16-inch strip section, which was covered in one storm. However, the snow melted away right after this storm, and from then on this section continued to function for the balance of the winter. The only damage that occurred to the various sections was caused by school children playing and breaking one panel out of a section, but this damage was easily repaired by stapling a section of paper between posts.

The effectiveness of the various paper snow fence sections has been presented graphically in Figure 15. Their performance may be compared with that of a regular vertical slat wooden snow fence erected in the same installation.



▲ FIGURE 11. TWO 12-INCH STRIPS



▲ FIGURE 12. THREE 12-INCH STRIPS



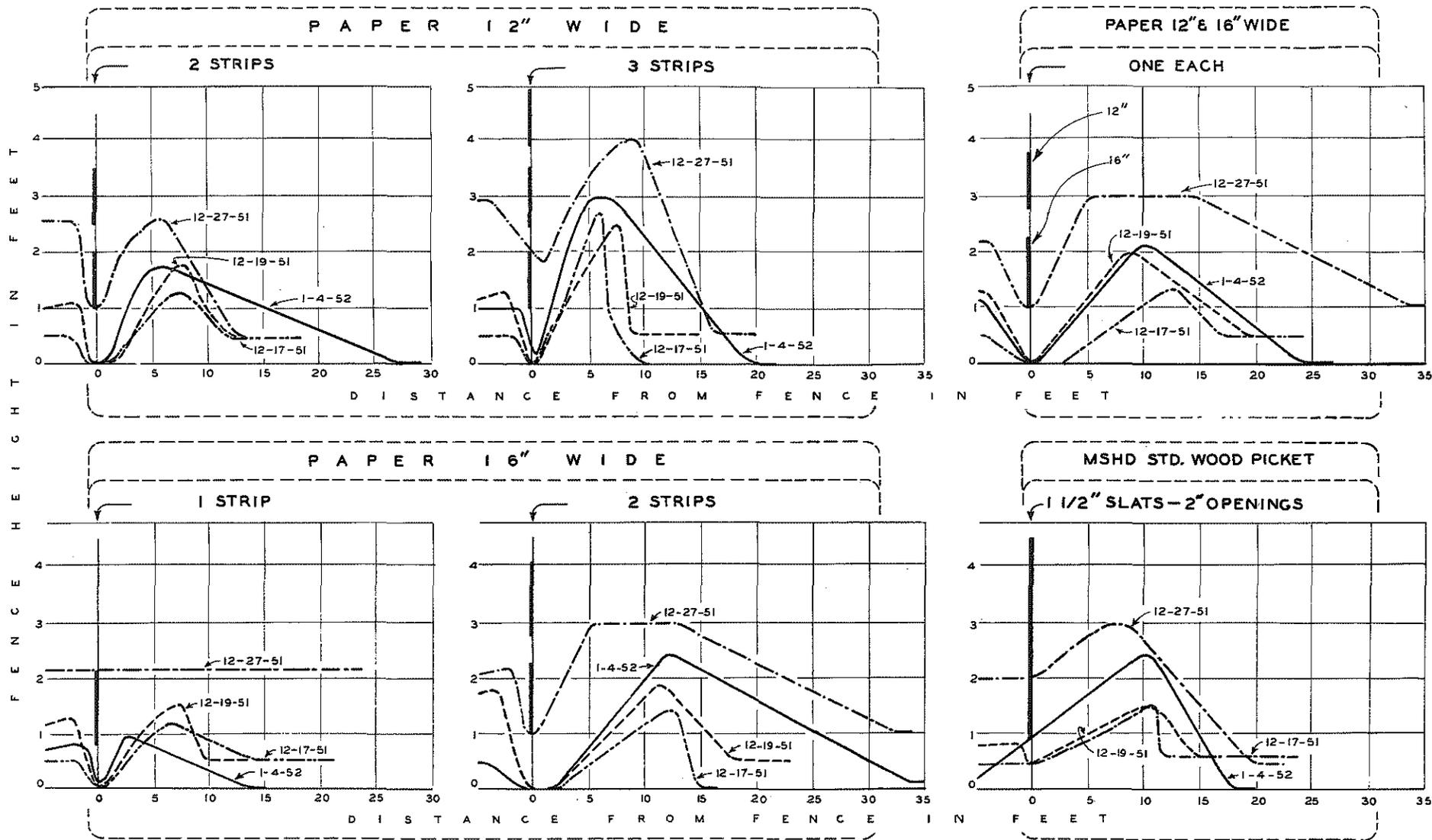
▲ FIGURE 13. TWO 16-INCH STRIPS



▲ FIGURE 14. ONE 16-INCH STRIP - DAMAGE BY SCHOOL CHILDREN

SPECIAL INSTALLATION ON M-100

GENERAL VIEWS OF INSTALLATION AT END OF WINTER, 1951-1952



CURVES SHOWING DRIFTING CHARACTERISTICS OF PAPER AND WOOD SNOW FENCE INSTALLATIONS
EXPERIMENTAL SECTION-M 100

CURVES REPRESENTING CHARACTERISTICS OF SNOW DEPOSITION ON DATE SHOWN

FIGURE 15

INSTALLATION, MAINTENANCE, AND DISMANTLING

Installation

From experience it has been found that the fence posts must be spaced evenly at distances not greater than eight feet. They must also be firmly placed, and end posts must be anchored to prevent movement.

Wherever long stretches of fences are required, it is desirable to provide gaps at regular intervals to permit passage of livestock and people through the barrier, thus avoiding possible damage to the fence.

The bottom of the lower strip of paper may be placed as much as 12 inches from the ground and still produce satisfactory results. The space between the strips should also be approximately 12 inches. Further, it is very important that the paper be stretched taut so no sagging can occur.

Soft wood stakes are better than hard wood stakes for facing the metal posts, because of the metal staples.

Paper cushion strips are necessary to make the fence perform satisfactorily. They must be of the proper length and width and installed properly. See Figures 16 and 17.

If it should be necessary to provide for snow fence height greater than four feet, this can be accomplished by attaching wood nailing strips made of two- by two-inch stakes of the length desired to the metal posts. Additional strips of paper may be fastened to the wood strips as snow drift conditions warrant.

Maintenance

Breaks in the paper panels may be easily repaired by simply stapling another strip of paper in place. Small tears in the paper may be controlled by taking a knife and cutting around the tear, as shown in Figure 18.

Dismantling

If the fence has been properly installed, it will be possible to take it down and salvage a large part of the paper for future use. In this case the cushion material should extend slightly beyond the paper strip, so that it is possible to catch the ends with a large wide-jawed pliers. It is then a simple matter to pull the paper strip off of the post and roll it up with the cushion strip and staples intact. See Figure 19.

It is possible to pull the posts with nailing strips attached, when the strips do not extend to the ground. See Figure 20.

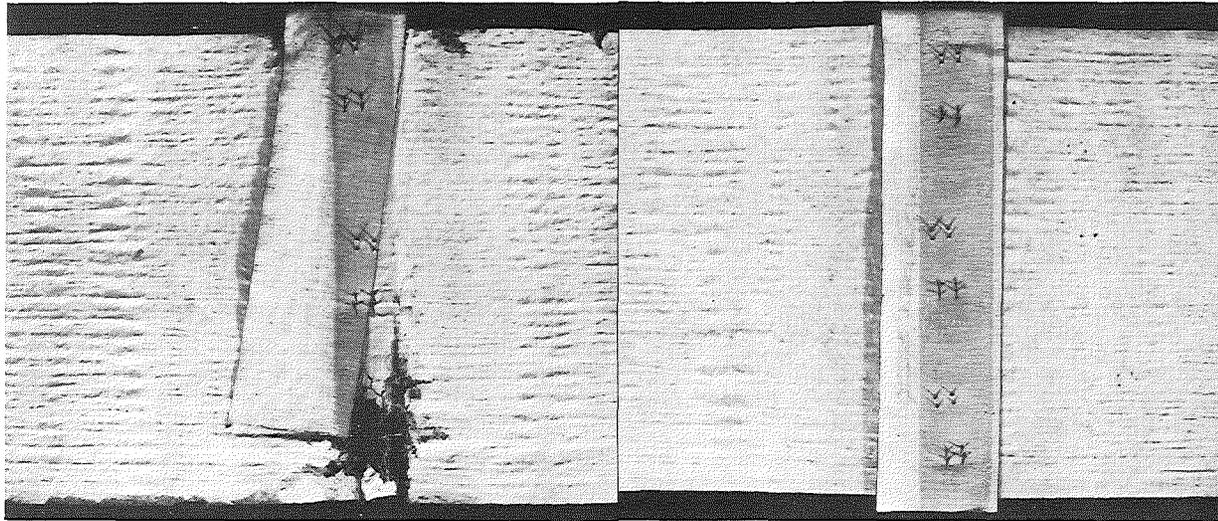


FIGURE 16. POOR INSTALLATION OF CUSHION STRIP—NOTE TEARING OF PAPER STRIP

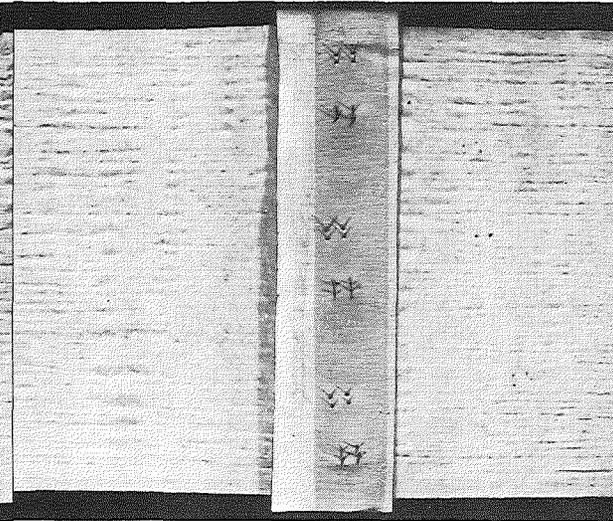


FIGURE 17. PROPER INSTALLATION OF CUSHION STRIP

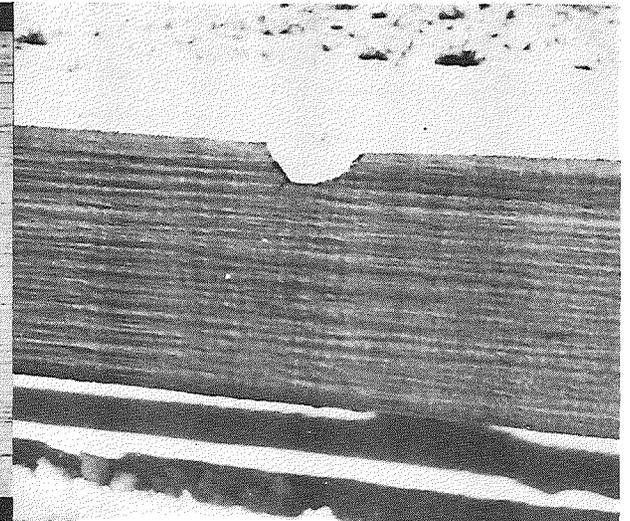


FIGURE 18. SHOWING METHOD OF CONTROLLING TEAR IN PAPER STRIP

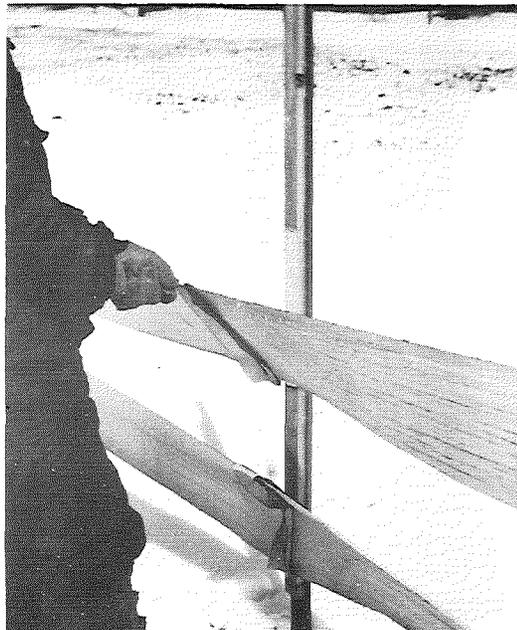


FIGURE 19. METHOD OF STRIPPING PAPER FROM POSTS

INSTALLATION, MAINTENANCE AND DISMANTLING

FIGURE 20. METHOD OF PULLING FENCE POSTS WITH WOODEN NAILING STRIPS IN PLACE

