

OFFICE MEMORANDUM



MICHIGAN
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JOHN C. MACKIE, COMMISSIONER

December 20, 1962
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To: E. A. Finney, Director
Research Laboratory Division

From: Herman C. Brunke

Subject: Laboratory and Field Study of Right-of-Way Fence Wire Splices.
Unclassified Project No. R-9. Report No. R-404.

At the request of R. L. Greenman, laboratory testing and field surveys have been completed on several types of splices used for wire fabric in right-of-way fencing. Current MSHD Standard Specifications for Road and Bridge Construction (Section 6.33.03(d)) give the following details for such splices:

"Splicing will be permitted at posts only. Each horizontal strand of wire shall be wrapped completely around the end, corner or gate post and securely fastened by winding the end about the wire where it leads up to the post."

The intent of the Specifications was splicing of a tightly wrapped wire as shown in Fig. 1. In field inspections, particularly on I 96 near Brighton, two other types of splice were encountered, at points between rather than around posts, and these two seem to have been used as often or more often as the specified tight splice. These are the "Western Union" splice (Fig. 2), loosely wrapped, and what is termed here the "Loop" splice (Fig. 3), which is tighter than the Western Union but looser than the specified tight splice.

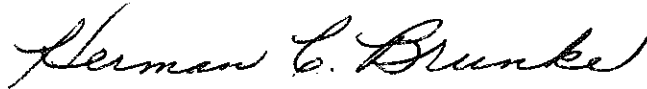
Tensile tests were conducted on laboratory prepared samples of Western Union and Loop splices, of 9 and 11 gage wire of approximately 20 in. lengths, and each type was tested under two construction conditions: the loose wrap condition as generally found during the field inspection and a tight wrap or ideal condition as can be prepared in the laboratory for this rather stiff and hard-to-bend wire. Fig. 4 illustrates the various types of splices tested.

Table 1 gives results of these tests, with three specimens having been loaded for each of the ten sample conditions. The test results indicate that neither type of splice wrapped in either the tight or loose conditions developed more than 52 percent of the strength of the unspliced 9 to 11 gage fence wire, and therefore these splices should not be used.

In addition, three samples of fencing fabric were also tested; a typical sample is shown in Fig. 5. These samples failed with the unwinding of the splice starting at an average of 415 lb and reaching a maximum average of 605 lb or 75 percent of the strength of the unspliced 11 gage fence wire. This was an improvement but the unspliced wire strength is not developed as it is with the Nicopress tubular splice.

It is recommended that the fencing fabric be spliced only at posts as required in the MSHD Specifications, or if spliced at points other than posts, that Nicopress tubular splices be used, developing the strength of the fence wire as reported to you in a letter dated September 15, 1961, and then transmitted to the Committee for the Investigation of New Materials by R. L. Greenman on September 25, 1961.

OFFICE OF TESTING AND RESEARCH



Herman C. Brunke, Civil Engineer
Research Laboratory Division

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Figure 1. Splicing per MSHD specifications, tightly wrapped at post.

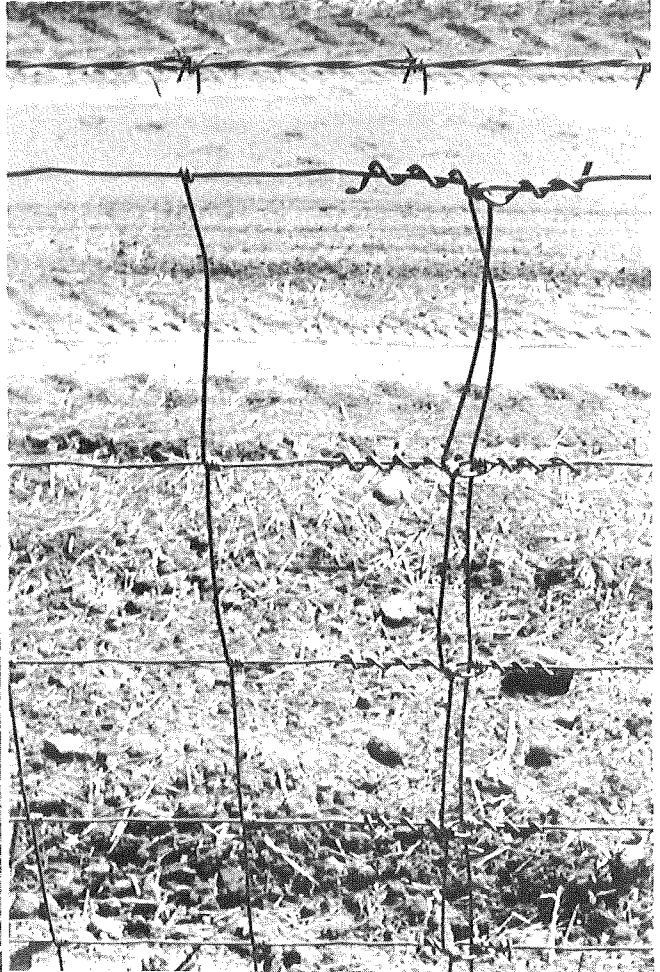


Figure 2. Loose splicing of the "Western Union" type as found in the field.

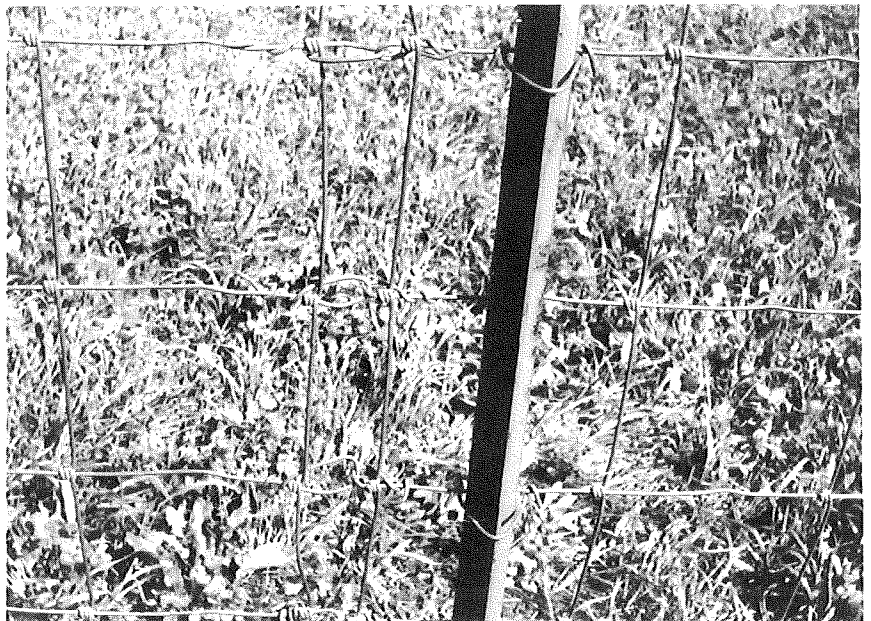


Figure 3. Loose splicing of the "loop type" as found in the field.

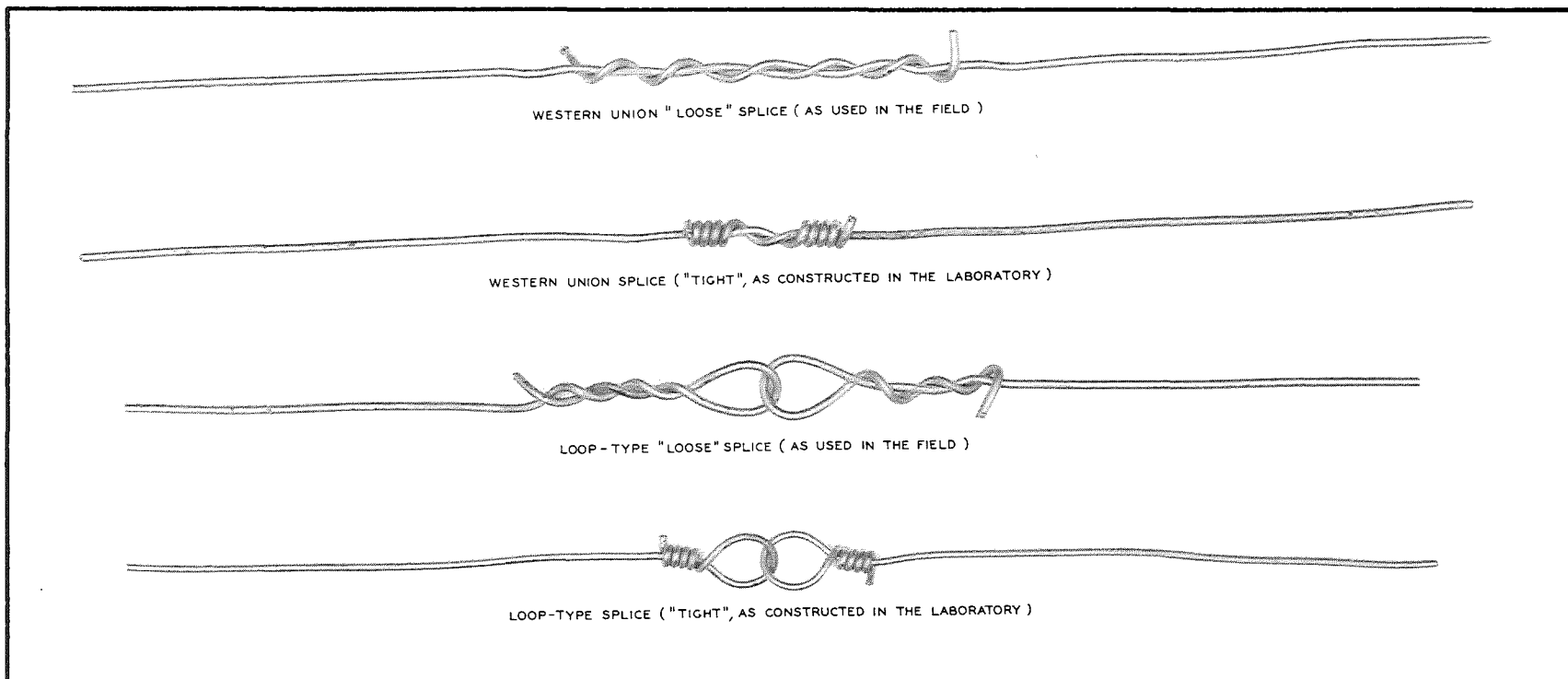


Figure 4. Typical Western Union and loop type splices.

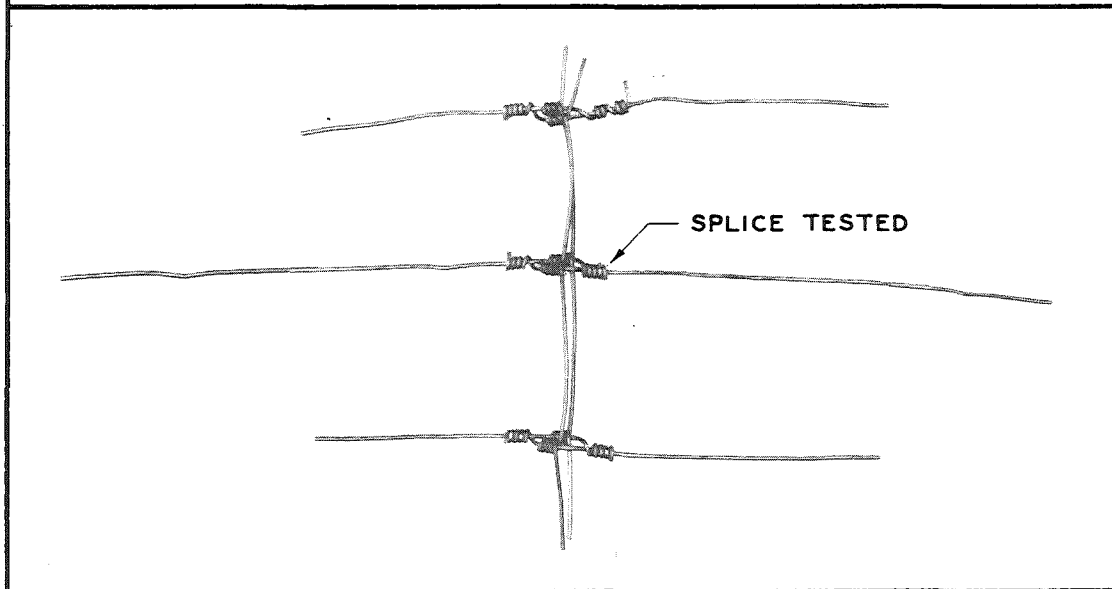


Figure 5. Typical fabric sample (only center splice tested).

TABLE 1
LABORATORY TESTS OF FENCE SPLICES

Sample Description	Wire Gage	Avg. Ultimate Load, lb	Failure Details
Unspliced wire	11	930	
Western Union, loose wrap	11	380	Splice unwound
Western Union, tight wrap	11	430	Splice unwound with eventual failure at mid-splice
Loop Type, loose wrap	11	455	Wire failed in loop area
Loop Type, tight wrap	11	480	Wire failed in loop area
Unspliced wire	9	1190	
Western Union, loose wrap	9	500	Splice unwound
Western Union, tight wrap	9	560	Splice unwound with eventual failure at mid-splice
Loop Type, loose wrap	9	565	Wire failed in loop area
Loop Type, tight wrap	9	600	Wire failed in loop area