

MICHIGAN
STATE HIGHWAY DEPARTMENT
LANSING



CHARLES M. ZIEGLER
STATE HIGHWAY COMMISSIONER

INTEROFFICE COMMUNICATION

July 7, 1954

TO: C. B. Laird
Ass't. Construction Engineer

SUBJECT: Tensile Strength Characteristics of Hook Bolts Furnished by
Jones & McKnight, Inc.
Research Project 54 F-35; Report No. 211

At your request, the Research Laboratory tested the effectiveness of hook bolts submitted by the Bethlehem Steel Company for use as tie bars for longitudinal joints. Research Laboratory Report No. 198, dated Nov. 3, 1953, presented the results of this study.

Recently, you requested the Laboratory to test another type of hook bolt, or J-bar, submitted by Jones & McKnight, Inc. This new J-bar was manufactured without the upset threads which the former type had possessed. Test results are presented for the Jones & McKnight, Inc. hook bolts (Type No.2) and comparison is made between this type and the type previously tested from Bethlehem Steel Company (Type No. 1).

Table No. 1 summarizes the tensile strength data for the five specimens of Type No. 2 as well as comparing this data to that of the No. 1 type which were tested as a part of Report No. 198 above-mentioned. It should be pointed out that 4 of the 5 specimens tested failed at a cross-section through the root of the thread and just beyond the sleeve coupling. By shortening the threaded portion of the hook bolts, an improvement in design would be effected, inasmuch as the threaded portion should not extend beyond the sleeve. The attached photographs show the difference in the failure for the two types of hook bolts. All three specimens of the No. 1 type failed in the straight section of the bar away from the threads.

Even though the No.2 type hook bolt has the above-mentioned design weakness, its strength is approximately 30 percent greater than that of the No. 1 type. The greater strength of the No. 2 type appears to be sufficient reason for permitting the use of this type of hook bolt.

A handwritten signature in cursive script that reads "E. A. Finney".

E. A. Finney
Asst. Testing & Research Engineer
in charge of Research

EAF:em
encl.

cc: W. W. McLaughlin

TABLE I.

COMPARISON OF TENSILE STRENGTH OF TWO TYPES OF HOOK BOLTS

Type of J-Bar	Manufacturer	Nominal Diameter, inches	Measured Diameter, inches	Specimen Number	Cross-Sectional Area of Failed Section	Ultimate Load, lbs.	Yield Stress, psi	Ultimate Stress, psi	Remarks
Type No. 1 Bar with upset threads (Tested March, 1953)	Bethlehem Steel Co.	9/16	0.565	Average of three specimens	0.250	15,720	Not known	63,000	All 3 specimens failed in tension through the bar on a section outside of the threaded sleeve.
Type No. 2 Bar without upset threads (Tested June, 1954)	Jones & McKnight, Inc.	1/2	0.536	1	0.202 *	20,700	65,300	102,400	Failed on threaded section just outside sleeve.
				2	0.216	21,000	61,300	97,200	Failed on section about five inches from sleeve
				3	0.202 *	20,600	64,000	102,000	Failed on threaded section just outside sleeve
				4	0.202 *	20,500	64,100	101,500	" " " "
				5	0.202 *	20,500	64,100	101,500	" " " "

* Root diameter of threaded section is 0.507 inch

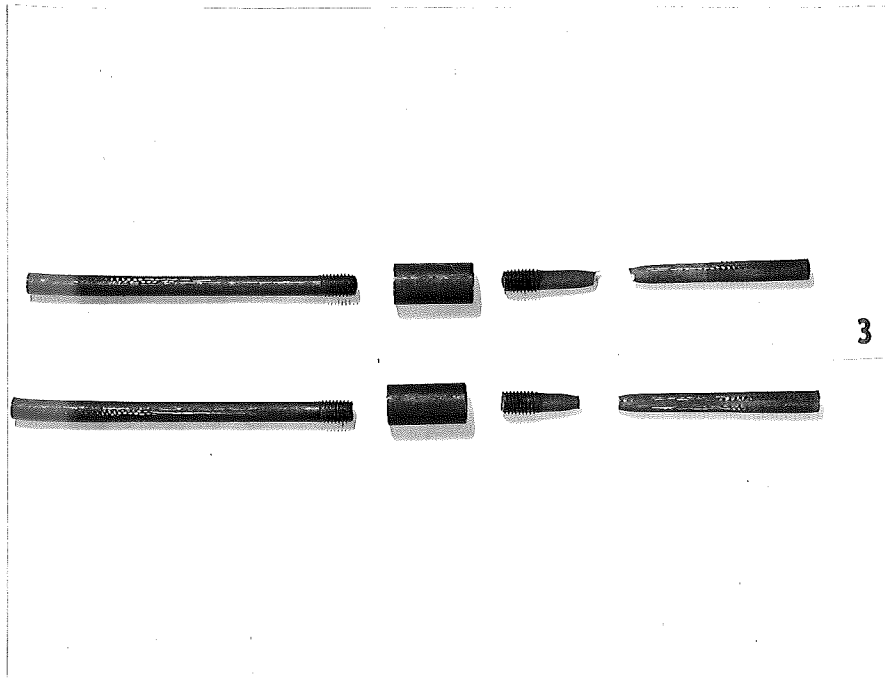


Figure 1. Failure photograph of No. 1 type hook bolt showing failed sections along straight portion of the bar.

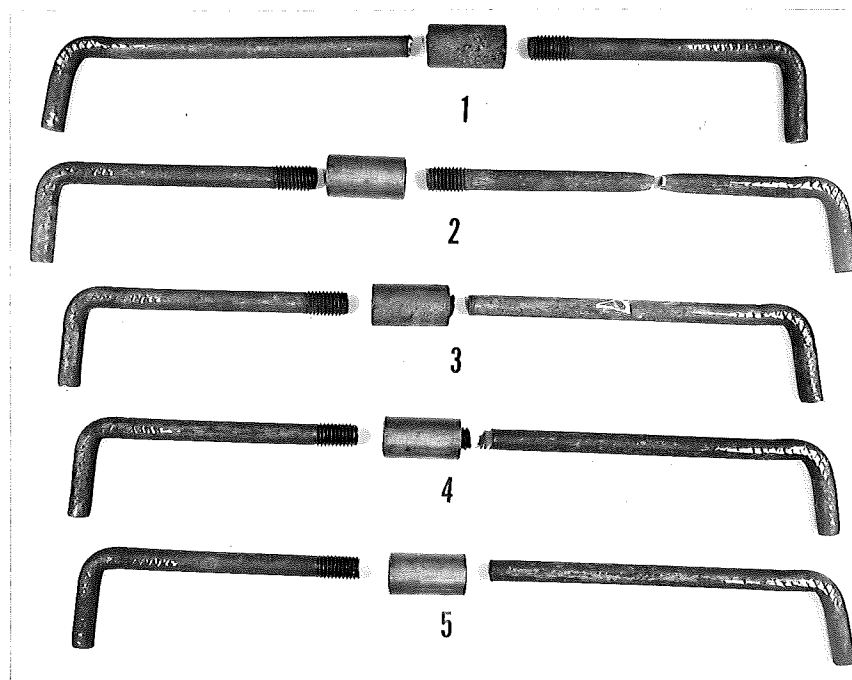


Figure 2. Failure photograph of No. 2 type hook bolts showing that 4 of the 5 specimens failed at a cross-section through the threaded portion of the bar and just outside the coupling sleeve.