



UNIVERSITY OF ARKANSAS · College of Engineering November 18, 1983

Mr. Carl Brunck  
Engineering Consultants, Inc.  
423 Hall Building  
Little Rock, AR 72201

Dear Mr. Brunck,

Attached please find the results of tests that I performed on six specimens of dolomitic limestone submitted by Mr. Don Underwood from his quarry near Eureka Springs, Arkansas. The specimens were tested on November 8, 1983 in the Materials Laboratory of the Civil Engineering Department of the University of Arkansas. The testing machine used was a Tinius Olsen screw-type machine with a 30,000 pound capacity. It was recently calibrated and indicated an error of +1.5%. This is more than the +1.0 percent recommended by the ASTM but it is the only machine we have with a platen for doing beam tests. Despite this discrepancy I believe the tests are of obvious value. All beams were broken using a center-point loading and a 36-inch span.

The specimens indicated a strong modulus-of rupture greater than most Portland cement concrete mixes. There definitely appeared to be an age factor associated with the results. Specimen #1 was older than Specimen #2. And Specimens #3 through #6 were freshly cut. Specimen #6 had not been trimmed to be square. Consequently there was some torsion applied to the specimen because the loading head met the top of the beam at one side edge first. I believe this accounts for the reduced result for that specimen. I see no evidence of, nor is there sufficient data to establish, a variation of modulus-of-rupture with depth.

The failures on all the specimens did not consist of a crack opening in the bottom tension fiber immediately below the loading point which then propagated directly upward as would be the case in a plain concrete specimen. Rather, the crack started upward as a flexural crack at a point closer to one of the supports. It then "leaned over" toward the points-of-loading as it propagated through the depth of the specimen to the outer compressive fiber. This indicates a "combined-stress" or shear type failure occasioned by some weakness in the grain structure of the beam.

Please call on me again if I may be of some help.

Sincerely,

  
L. G. Pfeimann, P.E., Ph.D.  
Associate Professor

xc: Mr. Fred Griffin  
Mr. Don Underwood

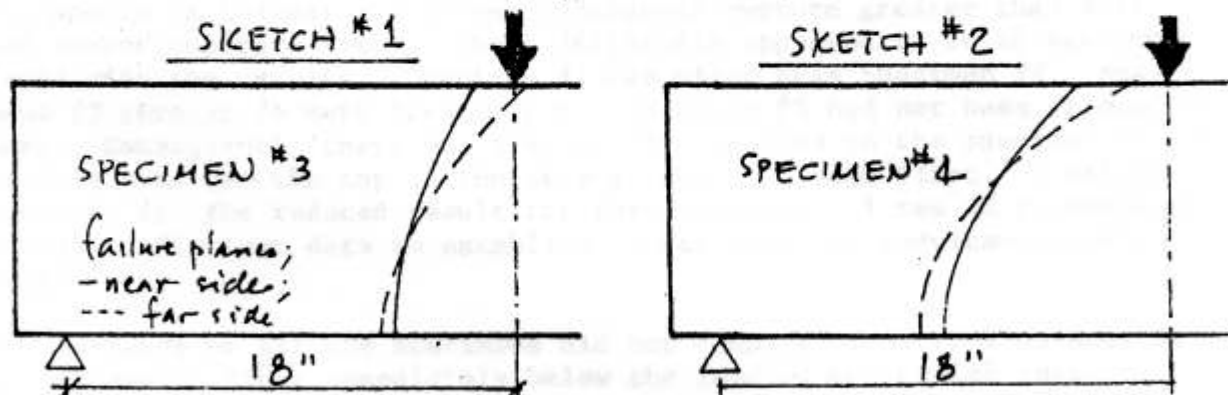
Attachment

CERTIFICATION OF TEST RESULTS  
LIMESTONE BEAM TESTS

Six dolomitic limestone test beam specimens furnished by Eureka Stone Co., of Eureka Springs, Arkansas were tested under center-point loading to failure on November 8, 1983 using a Tinius Olsen Universal Testing Machine, Serial No. 13338, of 30,000 lb. capacity. The machine is located in Room #104 of the Engineering Building, University of Arkansas, Fayetteville, Arkansas.

The specimens were tested in the order indicated. Their dimensions and strengths are given below:

Specimen Mark	Beam Width, ins.	Beam Depth, ins.	Failure Load, lbs.	Modulus-of Rupture, psi.	Remarks
1	3-1/2	7-9/16	3,658	986	oldest specimen
2	3-5/8	8-1/16	5,750	1,318	younger than #1
3	4-13/16	9-3/4	12,505	1,476	fresh, see sketch #1
4	4-7/8	9-15/16	14,075	1,578	fresh, see sketch #2
5	6-1/32	9-3/4	17,250	1,625	fresh
6	6-1/32	9-1/2	13,525	1,324	fresh, torsion present



The typical shape of the fracture planes on all the specimens is illustrated by sketches #1 and #2 above. The shapes indicate a "combined-stress" failure that begins at some point of localized weakness.

Certified true and accurate,

*Larry G. Pfeimann*  
Larry G. Pfeimann, P.E., Ph.D.  
Arkansas Registration No. 4096