

1940

Proposed program american welding society fellowship 1940-1941

Fritz Lab

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LEHIGH UNIVERSITY
BETHLEHEM, PA.

Fritz Engineering Laboratory
July 8, 1940

PROPOSED PROGRAM
AMERICAN WELDING SOCIETY FELLOWSHIP

1940-1941
- - - - -

This program supplements the brief general proposal submitted at the meeting of the Structural Steel Committee of the Welding Research Committee on April 3, 1940. At that time a sub-committee was set up to assist in the details of laying out a program and to correlate all work with the practical problems of fabrication and erection which are involved. A meeting of the sub-committee was held at the Fritz Laboratory on June 19, 1940, with F. H. Dill, Heath Lawson, Carl Kreidler and Bruce Johnston present. The following general program of work is a result of this meeting.

As a foreword, certain conclusions which pertain to the program and which represent the consensus of opinion of the committee are as follows:

- (1) Flexible beam-column connections which allow full simple beam end rotation without developing appreciable moment and without overstressing the material can be designed satisfactorily with existing knowledge. Two types of such connections were investigated at the Fritz Laboratory during the past year and recently were reported under the heading "Flexible Welded Angle Connections".

(2) If a connection has inherent rigidity it must either be designed to resist end moments which will be developed or shown by tests to be satisfactory in spite of partial fixed end moments which arise. A weak connection must be flexible. A semi-rigid or rigid connection must be strong enough to safely carry the partial or full fixed end moments which will be developed.

(3) Certain beam-column and beam-beam connections used in practice do not appear to have a degree of flexibility consistent with their low strength with respect to moment.

(4) The semi-rigid seat and top angle connection previously investigated at Lehigh would be more economical if the size of weld could be reduced.

Proposed Program

On the basis of the preceding conclusions the following program of tests was proposed:

1. Tests will be made on a variety of connections which have been used or proposed for use in practice as flexible connections. The strength, flexibility, and general behavior of these connections will be studied. The general details for these tests are shown on pages 1 and 2 of the attached blueprints. The method of testing will be as shown in the report on flexible angle connections which was recently distributed to the committee. The exact selection of beam and column size, weld sizes, etc., will be made by the Research

Fellow in immediate charge of this project and will conform as nearly as possible to prevailing practice.

2. A new type of bent top plate and seat angle semi-rigid connection as proposed by Heath Lawson will be investigated (see p.3). A series of straight pull tests to study the bent plate will be followed by two pilot tests on beam-column connections.

3. Semi-rigid connections of the seat and top angle type using a weld return on the vertical legs of the top angle as shown on page 3 will be designed and pilot tests carried out.

4. Preceding items 1, 2, and 3, will require the first year to complete. At the end of the first year the best types of connections for both beam-beam and beam-column connections may be selected by the committee. A program of tests to cover the design range of beam sizes will be carried out on these selected types of connections. The results of these tests should determine proper design methods and design limitations.

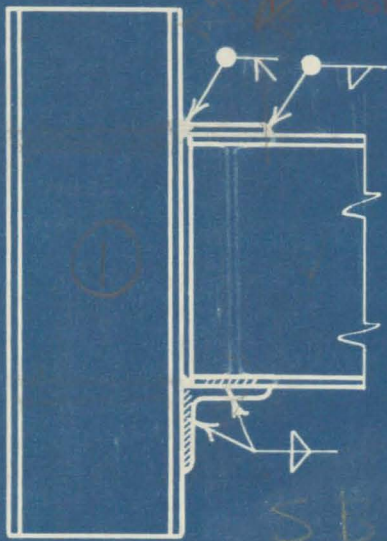
5. In addition to static tests the sub-committee suggests repeated load tests on the connections selected under item 4 as the most suitable. These would not be carried beyond several thousand cycles and would not determine the fatigue limit. The sub-committee did not know whether these tests could properly be carried out under the present program or whether they should be referred to Committee F on Fatigue.

Review of Previous Studies

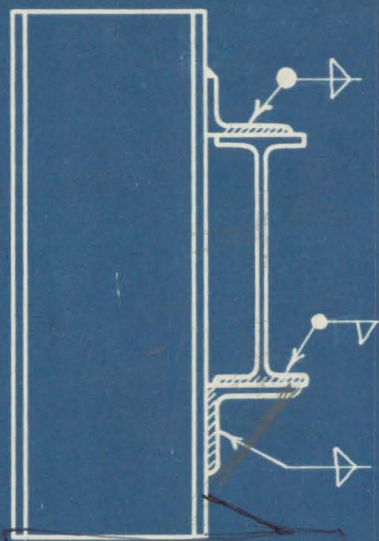
The following bibliography partially covers the field of research in beam-column connections and is appended for use of the committee.

- ✓ 1. H.M.Priest
THE PRACTICAL DESIGN OF WELDED STEEL STRUCTURES
American Welding Society Journal, August 1933
- ✓ 2. C.R.Young and K.B. Jackson
THE RELATIVE RIGIDITY OF WELDED AND RIVETED CONNECTIONS
Canadian Journal of Research, Vol. 11, p.62, 1934
- ✓ 3. Inge Lyse and Norman G. Schreiner
AN INVESTIGATION OF WELDED SEAT ANGLE CONNECTIONS
American Welding Society Journal, Supplement,
pp. 1-15, Vol. 14, No. 2, February 1935
- 4. Heath Lawson
THE DESIGN OF WELDED SEAT ANGLE CONNECTIONS
American Welding Society Journal
p. 23, Vol. 14, No. 6, June 1935
- 5. Wilbur M. Wilson
TESTS TO DETERMINE THE FEASIBILITY OF WELDING THE STEEL FRAMES OF BUILDINGS FOR COMPLETE CONTINUITY
American Welding Society Journal
pp. 28-38, Vol. 15, No. 1, January 1936
- 6. Inge Lyse and G. J. Gibson
WELDED BEAM-COLUMN CONNECTIONS
American Welding Society Journal, Supplement,
pp. 34-40, Vol. 15, No. 10, October 1936
- 7. Inge Lyse and G. J. Gibson
EFFECT OF WELDED TOP ANGLES ON BEAM-COLUMN CONNECTIONS
pp. 2-9, Vol. 16, No. 10, October 1937.
- 8. Inge Lyse and E. H. Mount
EFFECT OF RIGID BEAM-COLUMN CONNECTIONS ON COLUMN STRESSES
American Welding Society Journal, Supplement,
pp. 25-31, Vol. 17, No. 10, October 1938

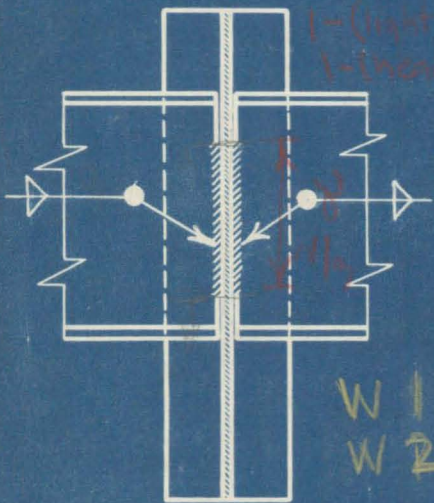
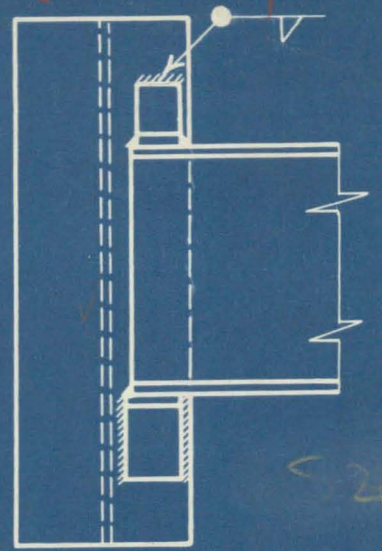
9. First, Second, and Final Reports of the Steel Structures Research Committee of the Department of Scientific and Industrial Research of Great Britain
- ✓ 10. Bruce Johnston and E. H. Mount
DESIGNING WELDED FRAMES FOR CONTINUITY
American Welding Society Journal, Supplement,
pp. 355-375, Vol. 18, No. 10, October 1939
- ✓ 11. Design data in handbooks published by the A.I.S.C.,
the various fabricators, and the American Welding Society
12. C. E. Loos and F. H. Dill
DESIGN AND FABRICATION OF WELDED STRUCTURES
Welding Journal, p. 592, Vol. 18, No. 10,
October 1939
13. Bruce Johnston and Lloyd F. Green
FLEXIBLE WELDED ANGLE CONNECTIONS
distributed in mimeographed form in June 1940



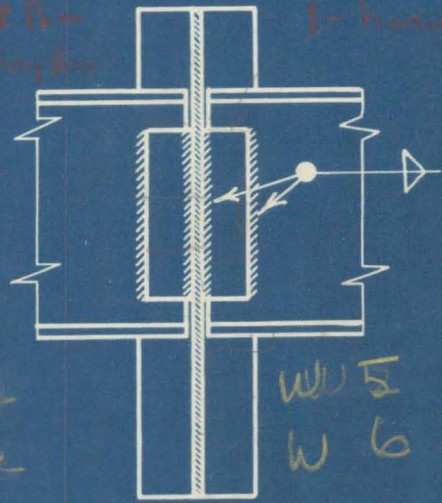
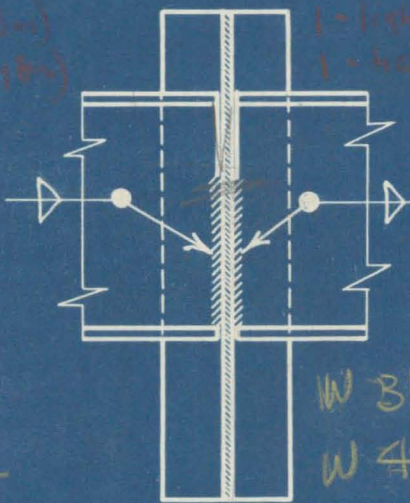
Top Plate and Seat Angle Conn.



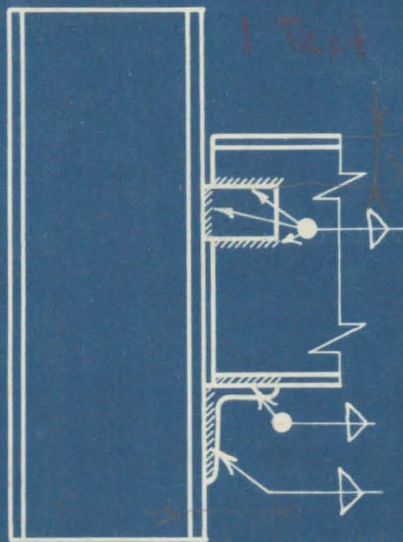
Top and Seat Angle Connection for Offset Beams



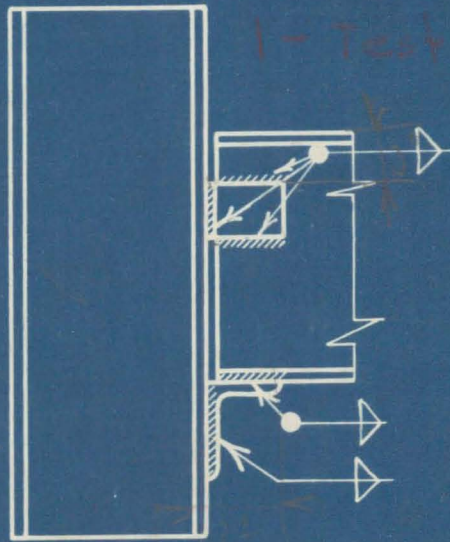
Connections with fillet welds directly between beam web and column or beam



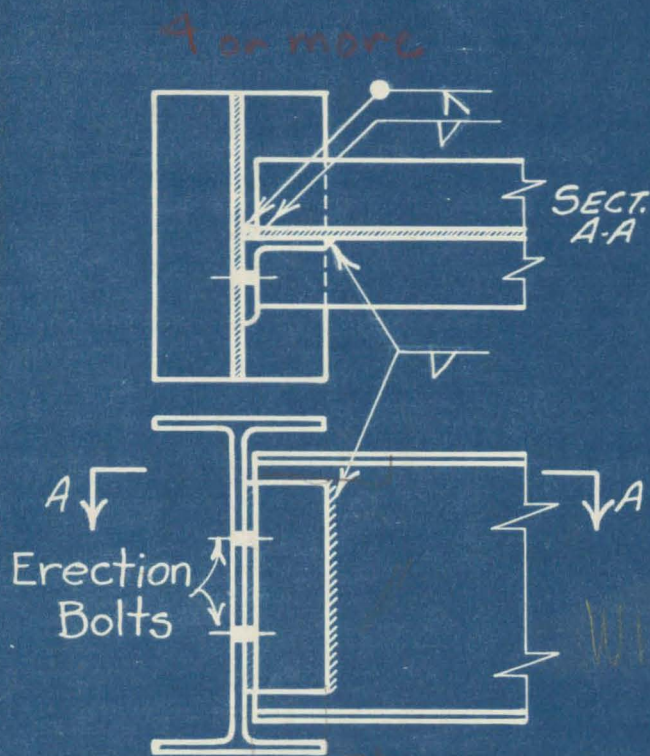
Beam Web Side Plate Conn.



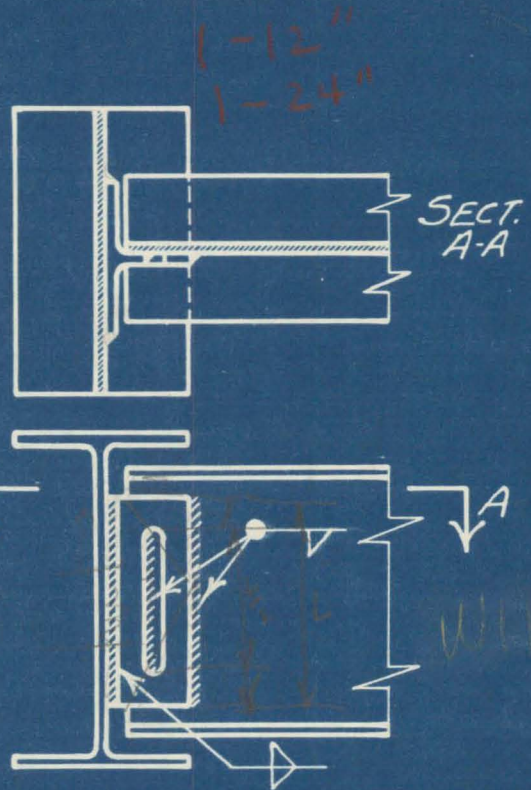
Seat Angle and Side Plates



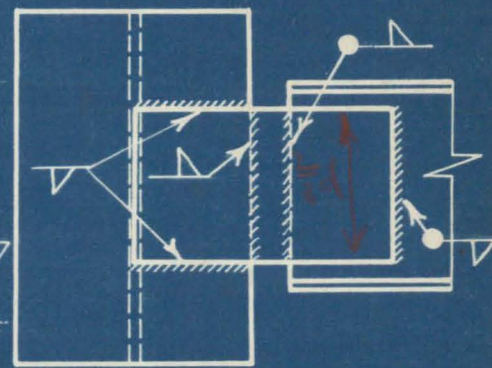
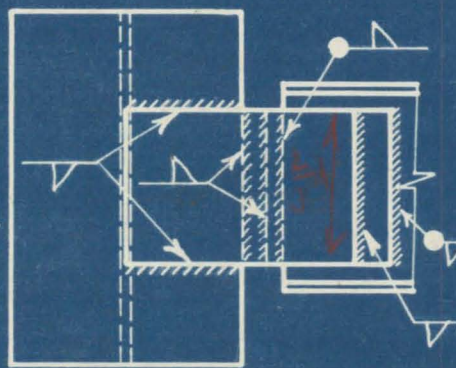
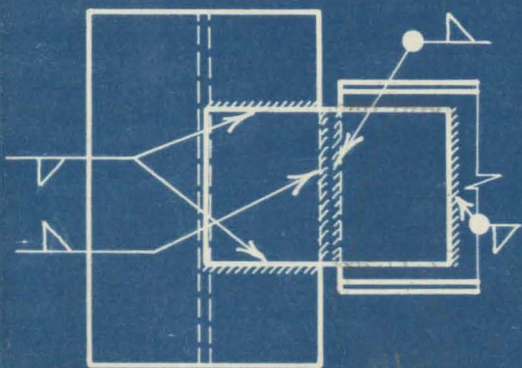
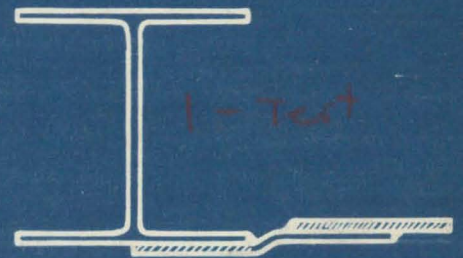
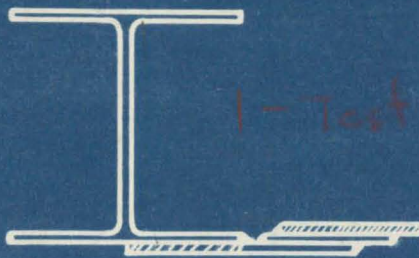
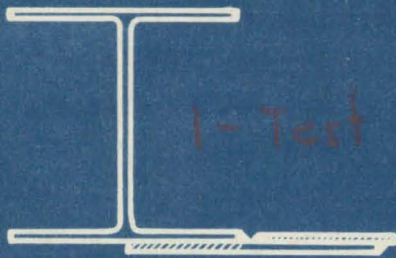
Seat Angle and Side Angles



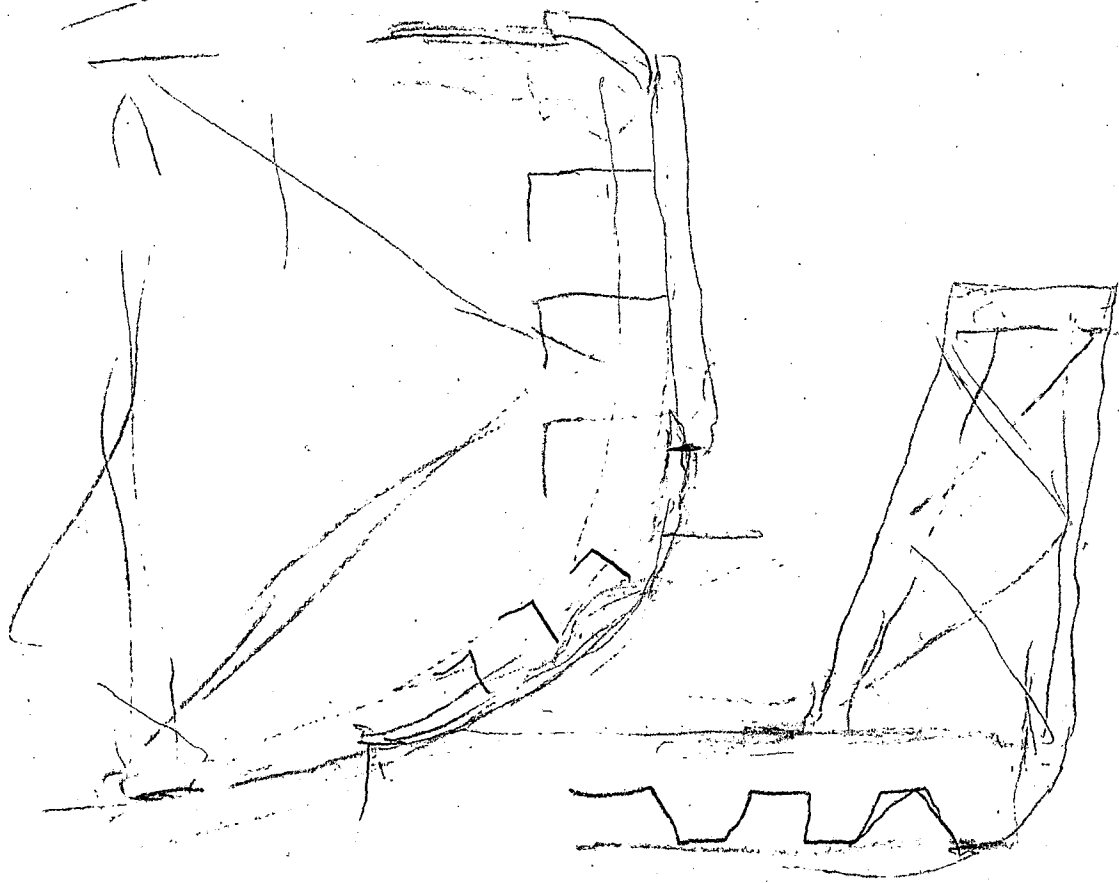
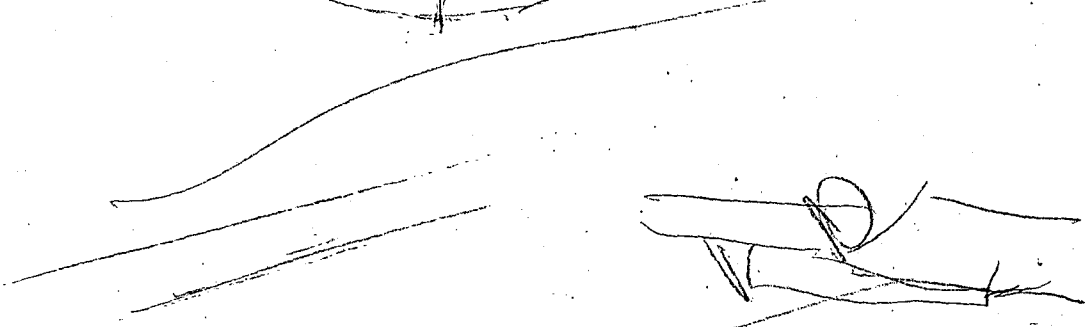
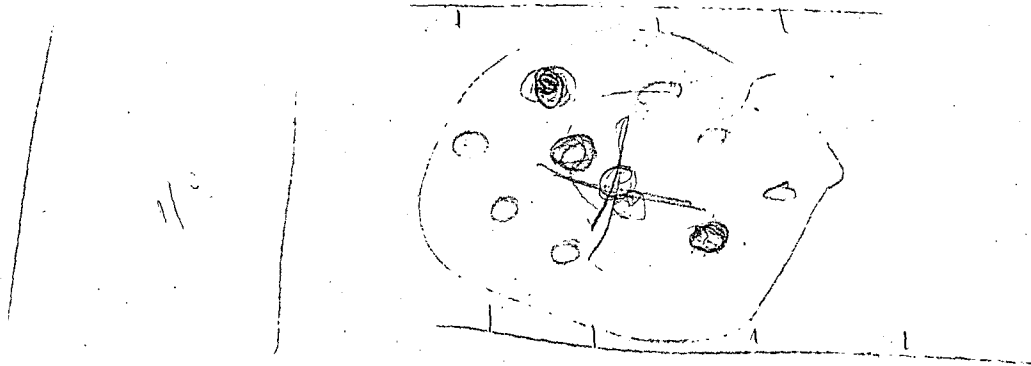
Beam Web Butt Weld Connection

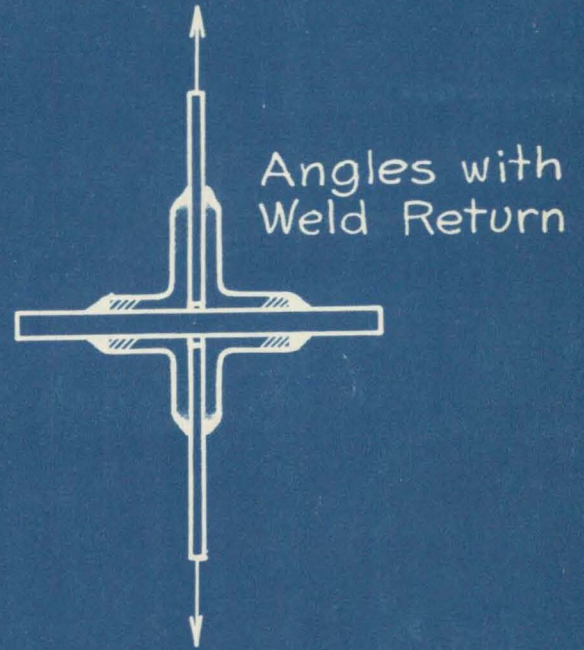
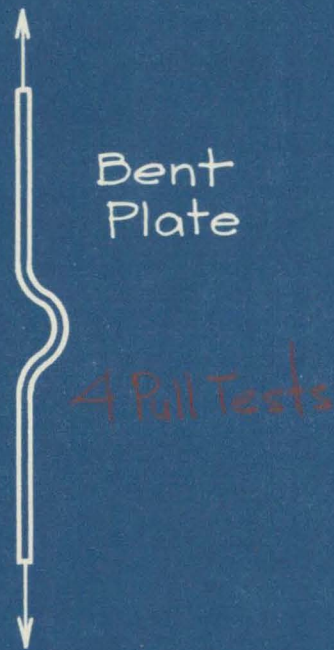


Tee Connection

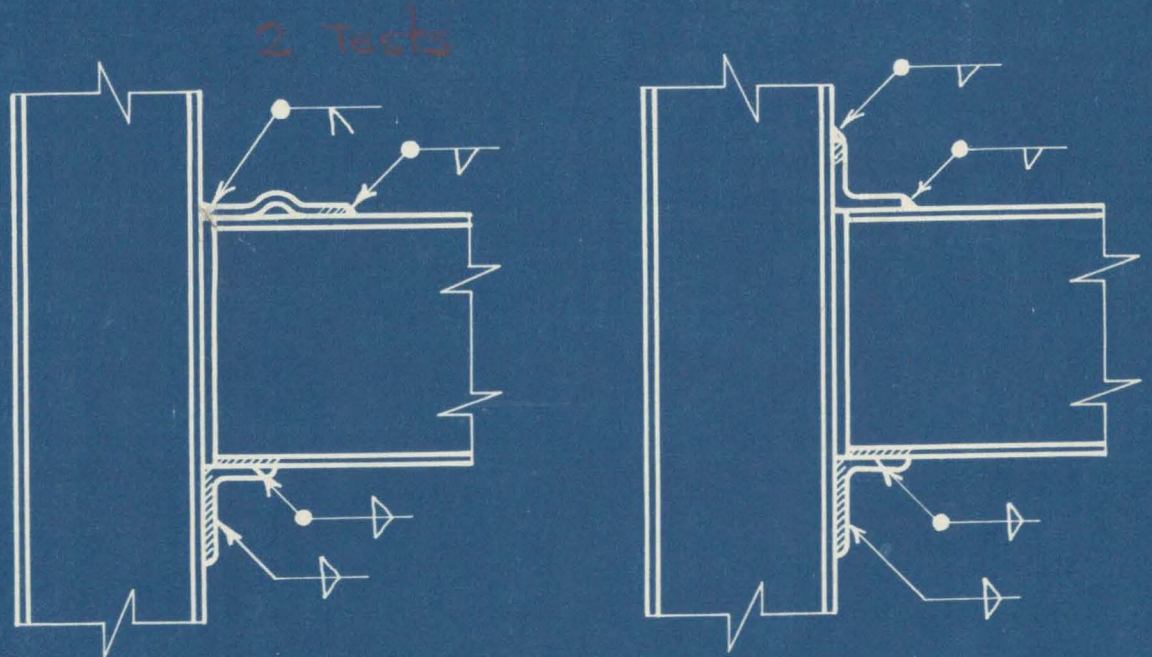


Various Connections with Beam Web Nearly in Plane of Column Flange





Pilot Series of Direct Pull Tests
with Varying Proportions



Pilot Series Beam Connections (Semi-Rigid)
Design Based on Direct Pull Tests