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# 1950 proposal: structural steel investigations (beams, Connections, Frames) to O.N.R.

L. S. Beedle

B. Johnston

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THE INSTITUTE OF RESEARCH

LEHIGH UNIVERSITY



BETHLEHEM, PENNSYLVANIA

OFFICE OF THE DIRECTOR

March 25, 1949

To: Dr. J. M. Robertson  
Office of Naval Research  
U. S. Navy Department  
Washington 25, D. C.

Via: Mr. Paul H. Kratz  
Resident Representative  
Office of Naval Research  
c/o University of Pennsylvania  
3320 Walnut Street  
Philadelphia 4, Penna.

Subject: Renewal and Extension of Contract N8onr64200 (Structural Steel Investigations, Lehigh University)

Dear Dr. Robertson:

We hereby apply for renewal and extension of the subject contract made between the Office of Naval Research, U. S. Navy, and Lehigh University.

The original sponsorship was based on our two proposals forwarded to your office by letter dated May 7, 1948, as follows:

- (a) "Strength of Simulated Frames and Continuous Beams", (for the Bureau of Yards and Docks), February 13, 1948
- (b) "Strength of Welded Continuous Frames", (for the Bureau of Ships), May 7, 1948.

This project, as you know, is being conducted on a five-year basis, the first year's work being completed on June 14, 1949. You have received our quarterly progress reports, but to summarize them, the following is an outline of the progress made:

- (a) In the continuous beam and simulated frame phase of the program for the Bureau of Yards and Docks, the test apparatus has been constructed and two tests completed ("A" and "B" in Table I of the February 13, 1948, proposal). Test "A1", a control test of a simply-supported beam, has also been completed. Tests of beams C and D will not be completed during the current year unless additional funds can be procured.

- (b) In the investigation of the strength of welded continuous frames for the Bureau of Ships, the apparatus for testing connections has been completed and one connection is to be tested late this month (March). No specific joint tests were recommended in our original proposal covering this work. However, the results of the literature survey indicate few previous tests of this type and therefore some experiments are necessary. The survey mentioned and a review of connection types are contained in our Progress Report "A", furnished to your office under date of November 26, 1948. Referring to Appendix B, Fig. 1 of that report, corner connections 2, 4, a modification of 5, and 7 are to be tested in the initial experimental study. Type 7 is the one to be tested this year.
- (c) Fabrication of frame test apparatus will be practically completed by June 15, 1949, although no tests will be done. It is our opinion that these should await the results of rigid-joint tests.
- (d) Coupon tests have been made for the 8WF40, 14WF30, and 8WF31 material being used in the beam, connection, and frame tests. The more recent studies have included measurements into the region where strain hardening occurs.
- (e) It is planned to complete preliminary technical reports by June 14, 1949, of the results of the first year's work. Reports for publication are expected to follow after the completion of additional continuous beam, simulated frame, and connection tests scheduled for the next fiscal year.

Proposal for research on welded continuous beams and simulated frames

The results of tests and studies completed to date indicate that no change need be made in the original program. It is thus proposed for the next year to complete tests C, D, E, E<sub>1</sub>, and F as outlined in the February 13, 1948, proposal referred to above.

It is also felt that no basic change in objectives or test procedures need be made at this time. The problem of the effect of initial shear yielding has presented itself during the current studies and will be investigated as the opportunity presents itself.

Proposal for research on welded rigid-joint connections and continuous frames

A continuation of the program as outlined in the May 7, 1948, proposal is recommended. Tests of corner connections types 2, 4, and 5 will be completed. The scope may be amplified in the future by tests of built-up corner connections and tests of other tentative types as presented in Progress Report A.

Depending on the results of the connection study, the testing of several frames should be possible. Typical tests have been outlined in the reports and proposals mentioned above.

Budget

The amount of work completed to date has been restricted because of insufficient funds. It has been necessary to draw from other sources to finish the tests here reported as completed. The project is now overexpended and the deficit (about \$1700.00) is being made up by contributions received through the Welding Research Council from the American Iron and Steel Institute.

The budget proposed for next year (commencing June 15, 1949) is \$12,630.00. The distribution of this amount is as follows:

Tests of Continuous Beams and Simulated Frames

Salary (half-time assistant and part-time Research Engineer)	\$2280.00
Wages	1800.00
Overhead (33 1/3% of above)*	1360.00
Miscellaneous and Material	<u>800.00</u>
Total	\$6240.00

Tests of Connections and Frames

Salary (half-time assistant and part-time Research Engineer)	\$2290.00
Wages	1750.00
Overhead (33 1/3% of the above)*	1347.00
Miscellaneous and Material	<u>1003.00</u>
Total	<u>\$6390.00</u>

Total Budget \$12,630.00

\* The cost inspector reports that 25% overhead as charged last year on this project is not in line with actual overhead expenses to Lehigh University. It is thus necessary to raise this figure to 33 1/3%.

Dr. H. M. Robertson

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March 25, 1949

The above budget is based on the completed testing of five continuous beams, five connections and one rigid frame. In addition to Mr. Beedle's services, two half-time research assistants would continue to be employed, one being in charge of each of the two phases. The program will be under the supervision of Dr. Bruce G. Johnston, Director of the Fritz Engineering Laboratory, and Lynn S. Beedle, Research Engineer.

The participation of the Office of Naval Research in this research program is sincerely appreciated.

Very truly yours,

H. A. Neville  
Director  
Institute of Research

CC: Mr. W. Spraragen  
Mr. T. R. Higgins  
Mr. LaMotte Grover