

Description of Work

CATALOG TEST RESULTS

Subtask 4.03, part I - Develop Database for Sorting and Summarizing Test Results

Background: Since the Northridge earthquake, there has been a substantial increase in the number of steel moment frame connection tests. This increase has resulted from funding by FEMA, NSF, NIST and other federal agencies, AISC, as well as substantial input from private interests. In the aftermath of uncovering the damage to the pre-Northridge standard connection, the UBC emergency code change in late 1994 called for the use of full scale connection testing to demonstrate the levels of ductility that these connections are expected to need in the event of a major earthquake. This approach was continued in FEMA 267 and the most recent editions of the UBC, NEHRP Provisions and AISC Seismic Provisions. As a result, a significant number of "qualification" tests have been performed in recent years. While these tests have generated a great deal of new information, it is expected that a substantial number of connection tests will be conducted in the foreseeable future, as new ideas are considered and economic solutions are sought.

While the volume of tests has grown significantly since the Northridge earthquake, the systematic distribution of the test results to the practicing engineering community has been sporadic. Test results conducted as part of research projects are often contained within large reports that would require substantial effort to review and assimilate. Qualification testing reports for private projects have not been made available to the community at-large. It has been difficult, then, for practicing engineers to make full use of the available data in making informed decisions about the configuration and design of their steel moment resisting frame connections.

At the end of Phase 1 of the SAC Steel Project, an attempt was made to develop a standard report format that would succinctly provide the pertinent information from various connection tests. The four page format developed was used in summarizing the thirty SAC Phase 1 tests. This document will be published by FEMA and distributed to all holders of FEMA 267 in mid-1997. This document should become a valuable reference to practicing engineers.

The Phase 2 Project intends to continue this effort to include as many tests as possible, not limited to SAC tests. These tests are to include tests performed prior to the Northridge earthquake in addition to those since the event. It is expected that well over 200 connection tests may be available to include in subsequent compilations. It was found that the portions of the format and data required in the Phase 1 effort in this area made it difficult to efficiently produce the brief reports. In order to consistently report the data on this large number of available tests, a new, more streamlined format is required.

Objectives: The first objective of Task 4.03 part I is to assist practicing engineers with the design or retrofit of steel moment frame connections. Because new details are evolving slowly from a variety of research programs, some of which are privately funded, engineers have the following questions, which the products of this Task will help to address:

- 1) Where can basic test results on certain connection types or member sizes be found?
- 2) Which connections details are demonstrating good performance? Which are not?
- 3) What are the success rates relative to the FEMA 267 and 267A acceptance criteria?
- 4) Is there enough comparable data to justify a proposed detail without additional testing?

A second goal of Task 4.03 part I is to facilitate the work of SAC Topical Team Leaders and Guidelines Writers. The products of this task will anticipate and attempt to answer questions such as:

- 1) Which conditions (member sizes, details, etc.) have not been sufficiently tested?
- 2) Are the FEMA 267 acceptance criteria proving useful and appropriate?
- 3) Given a proposed detail, what constitutes a "comparable" test?
- 4) Are one-sided, non-composite, quasi-static tests sufficient to assess performance?

Task 4.03 part I is envisioned as a short-term project to meet the most pressing current needs of the engineering community. Task 4.03 part II is anticipated as completion, enhancement, and maintenance of products developed in part I.

Task Description: For a detailed list of subtasks and milestones, refer to the project Schedule below.

Task 4.03 part I will produce a computerized database of available test descriptions and results. It will serve practicing engineers as a single, centralized source of data, sortable by member size, connection type, etc., with consistent terminology and links to an annotated reference list. A hard-copy catalog of one-page test summaries will be generated from the database (see attached sample). Engineers and researchers questions will be anticipated and addressed in a written report. The report will include summaries as appropriate and as requested by the Project Management Committee. These may include sorts or counts of data matching certain criteria regarding member size, connection type, material strength, etc. For part I, the database will not include graphics (details, photographs, load histories, hysteresis plots, etc.), but details and hysteresis characteristics will be described with consistent terminology linked to generic sketches provided by others.

The data itself will be collected from primary sources (original research reports) wherever possible and from secondary sources (articles, conference papers, etc.) where necessary. Contacts with principal researchers, engineers, steel fabricators, and testing labs will be established in an effort to stay abreast of as many ongoing and planned test programs as possible. About 240 tests are anticipated by July, 1997.

The scope of the database will be limited to full scale steel tests of connection details suitable for use in the United States. Privately funded tests will be included where possible, but publication of identifying details and references may be limited by the funder. Data from

proprietary details will be collected in order to support anticipated future research, but proprietary information will not be published or distributed by SAC.

Task Management and Review: This subtask will be supervised by James Malley, Project Director for Topical Investigations. Format and content of computer files and written reports will be reviewed by Ron Hamburger, Project Director for Product Development. Because of the short-term schedule, and because the task involves mostly compilation of original work by others, a Technical Advisory Panel for task 4.03 part I will not be convened. The Topical Team Leaders for Connection Performance and Performance Prediction and Evaluation and the Guidelines Writers for New Construction will review the proposed format for the database and single page reports.

The subcontractor shall be responsible for regularly reporting progress and difficulties to the Project Director for Topical Investigations. It is expected that the subcontractor will be responsive to issues and comments raised by the Project Directors and other reviewers.

Target Audience: Refer to Objectives, above. It is anticipated that the computerized database and some data summaries from the final report will be posted on the SAC website for free public access. The catalog of one-page test summaries will be available for purchase from SAC.

Deliverables: Refer to Task Description, above. The following deliverables and their formats are anticipated:

Database files	Quattro Pro for Windows 6.0 or Paradox for Windows 5.0
Database notes	WordPerfect for Windows 6.1 and hardcopy
Reference list	WordPerfect for Windows 6.1 and hardcopy
Report with summary tables	WordPerfect for Windows 6.1 and hardcopy