

## Description of Work

### *ASSESS PAST PERFORMANCE OF STEEL BUILDINGS*

#### **Subtask 3.1.2 Detailed Data Collection for Selected WSMF Buildings**

**Background:** It is the purpose of Task 3.1.2 to collect detailed data on the performance of selected WSMF buildings in the 1994 Northridge earthquake sufficient to develop damageability models and evaluate and facilitate improvement of the SAC inspection and evaluation procedures. This task is part of Task 3, whose goal is to document and assess the performance of welded steel moment frame buildings (WSMF) in past earthquakes and to provide means to evaluate and predict impacts in future earthquakes.

During SAC Phase I, an extensive data base was developed that characterized the specific inspection results of buildings, focusing on damaged buildings. It was exploratory in nature and thereby incomplete for analysis purposes. Task 3 of SAC Phase 2 will supplement, and in some cases replace, this data set to provide statistically consistent, reliably characterized data that will allow the formulation of predictive models for damageability and economic impact for specific buildings and groups of buildings, evaluation of the efficacy of current procedures for the inspection and evaluation of building conditions, based on Chapter 3 and 4 of the 1995 SAC Guidelines, and assessment of the impacts on the provision of repair related services within a community. The task will collect five distinct types of data: 1) general data for all of the buildings subject to the Los Angeles Municipal Inspection Ordinance; 2) specific engineering data for selected buildings that is as complete as practical; 3) data addressing the nature and reliability of the inspection process; 4) identification and documentation of damage to WSMF connections in other earthquakes; and, 5) documentation and characterization of the impacts of WSMF damage on selected construction service providers, financial institutions, and regulatory agencies.

Task 3.1.2 data will be collected for specific buildings to provide the basis for the evaluation of SAC inspection and evaluation procedures. The buildings will be selected to include those for which there is complete or near complete inspection data, or for which a well-documented repair has been completed. Data will include general data on the building, inspection and damage data, and a summary of repair data. Data will be obtained through interviews with engineers responsible for the building(s), as well as through review and independent evaluation of the specific records. To the extent practical, information collected in SAC Phase I will be utilized after adequate review to assure its reliability.

#### **Objectives**

*Objective 1:* Participate in the overall conduct of the Task as a member of the team on Past Performance of Steel Buildings in Earthquakes. Participate in the formulation of the Task work plan, and contribute to the determination of what questions are to be answered in subsequent Task 3

efforts using the information gathered by Task 3.1 efforts. The investigators will make themselves available for participation in Task 3.2, which will use the data and information collected to formulate impact models and assessment procedures.

*Objective 2: Attend project team meetings.* Review and comment on material prepared by other SAC task team members, responding to review comments in a timely manner. Each task will draw information from, and provide information to each of the other efforts under Task 3.1 as well as other activities outside of the Past Performance area.

*Objective 3: Prepare written documentation of investigation methods and detailed findings for incorporation into the Task report; incorporate review comments from others as appropriate.* Provide timely review of summary Task documents that describe and include results, data, and findings from the work completed under this sub-task. Fully document data collected by providing copies of all interview and record forms, and provide SAC with copies of all computer files and data bases developed. Where so committed to the providers, all data collected will be kept confidential in line with the practice established in SAC Phase 1.

*Objective 4: Prepare a data collection form that organizes and details the information to be collected and how the selection of buildings to be studied is determined.* Three types of data are to be collected: Group I data includes—A) General data on the building, B) damage data, C) inspection data; Group II data—summary of repair data; Group III data—verify damage report interpretation and prepare elevations. Where different for a particular building, the data should be reconciled with that collected in Task 3.1.1, Objective 4.

*Objective 5: Select buildings that will be the subject of intensive investigation and documentation.* These are expected principally to be those for which there is relatively complete inspection information for WSMF connections. Also selected building(s) for which repairs and/or modifications have been completed will be considered. The results of the detailed evaluation of inspection records from the LA City Inspection Ordinance, Task 3.1.1, will also provide candidate buildings. Conduct interviews with selected engineering offices to identify additional candidate buildings for review. A minimum of 8, and no more than 10 offices, will be contacted.

*Objective 6: Conduct interviews with firms and collect sufficient information to complete Group I, II, and III data for all buildings reviewed during the discussions.* The engineering and inspection records will be reviewed and an independent evaluation made of the damage index assignments for each connection. The data will be organized and presented in a manner that facilitates analysis in subsequent studies in Task 3.2. It is expected that Group I data will be collected for about 45 buildings, but no less than 30, Group II for about 33 buildings, but no less than 25, and Group III data for about 20 buildings, but no less than 15. All data will be organized and presented in a manner that will allow easy reference and interpretation in the analysis tasks to be performed in Task 3.2.

**Deliverables:** The primary products of this investigation will be the collected data and associated interpretations, synthesized in a final report. All interview and record forms, as well as all computerized catalogs and databases shall be made available to SAC at the time the draft report is submitted. Any computerized information should be in a format which can be converted to on-line format for distribution on the World Wide Web. The confidentiality of all such information will be

maintained in accordance with procedures adopted in Phase 1 of the SAC project. The final report shall summarize significant findings of the data collection and evaluation process, as well as identifying additional issues which may be addressed in follow-up studies under Task 3.2. Significant results of this study will also be incorporated into the State-of-the-Art Report on the Performance of Steel Buildings in Past Earthquakes. Interim reports will be required to update the Task Coordinator and SAC management on progress.

**Task Management and Review:** This subtask is supervised by James Malley, Project Director for Topical Investigations. The members of the team investigating the Performance of Steel Buildings in Past Earthquakes will provide oversight and an advisory role on the conduct of the research and will review, provide specific comments and evaluate all reports and recommendations. Team Leaders and selected members of the Joining and Inspection TAP, the Connection Performance TAP, the System Performance TAP, the Performance Prediction and Evaluation TAP, and the Social, Economic, and Policy Panel (SEPP) and Connections Performance TAP will also review and evaluate this work. It is expected that the subcontractor/consultant selected for this subtask will be responsive to issues and concerns raised by the Project Director, the Task Coordinator for Performance of Steel Buildings in Past Earthquakes, and other reviewers. The subcontractor shall be responsible for regularly reporting progress and difficulties to the Past Performance Task Coordinator and the Project Director for Topical Investigations.

**Target Audience:** The work products of this subtask will be directly used by the Performance Prediction and Evaluation Team, the SEPP, and the guideline writers working on the SAC Phase 2 project. There will also be a need to integrate these results with the various other investigations throughout the progress of the program. They will also be of interest to Topical Investigation Team Leaders for Joining and Inspection, System Performance and Connection Performance. The results of this sub-task will be used to develop the State of the Art Report on Performance of Steel Buildings in Past Earthquakes. It is expected that the results will also be of great interest to the general profession and research community.