ATC-58
Development of Performance-based
Seismic Design Guidelines:

Draft Work Plan

December 31, 2002
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1 Introduction

1.1 Purpose

This Work Plan sets forth the objectives, deliverables, and project management plan for the second phase (2002-2003 budget authorization) of the ATC-58 Project. The Federal Emergency Management Agency has funded this project phase as part of a planned multi-year program to develop **Performance-based Seismic Design Guidelines**, following the general approach outlined in *FEMA-349 – Action Plan for Performance Based Seismic Design* (EERI, 2000). As indicated in FEMA-349, the development of Performance-based Seismic Design Guidelines will require a multi-year effort entailing financial and technical participation from the four NEHRP agencies as well as private industry. As funding levels for this project are not certain at this time, implementation of the FEMA-349 *Action Plan* may require a programmatic effort that extends from 5 to 10 years or more.

1.2 Project Title

The project will be known as **ATC-58, Development of Performance-Based Seismic Design Guidelines**. Work performed under the 2002-2003 budget authorization will be called **Phase 2 services**.

1.3 Time of Performance

Authorization to commence work on Phase 2 was received on October 1, 2002. The authorization is for a nominal 12 month work schedule, with potential for a single, 6-month no cost extension.

1.4 Background

All building codes and the design procedures contained therein are essentially performance-based. That is, there is a basic intent that if the design procedures and construction requirements contained in the code are followed, buildings capable of providing reasonable levels of protection to the public, against various hazards, will be obtained. Hazards addressed by the codes include fire, disease, wind storm, snow, flood, earthquake, and even the weight of occupancy-related contents. The level of public protection against each hazard that the codes aspire to provide may be described as a **performance goal** or **performance objective**. In the case of fire, for example, performance goals include assuring that occupants can safely exit a building in the event of fire; that the structure will remain stable while fire fighters respond to and combat the fire; and, that the fire can be contained without spread to adjacent structures. Similar performance objectives exist for all hazards addressed by the codes. For some hazards, the performance objectives are stated with precise quantification of the intent, including establishment of a target maximum probability that life loss or other undesirable behavior may occur.

Although building codes are developed with the intent to assure construction of buildings capable of meeting specific performance goals, the development process has been ad hoc and
empirical, largely relying on the observation of building performance under extreme events. For example, observation of the ability of fires to jump from the roof of one structure to another led to the requirement for parapets on structures to act as fire barriers between adjacent buildings. Later, it was observed that these parapets had a propensity to fall off of buildings in earthquakes, creating a considerable hazard to pedestrians, and so, additional rules were added requiring that parapets be anchored to the structure, and braced against toppling. As a result, current building codes are a complex compendium of rules. These rules are often highly detailed as to the requirements, for example, a requirement to anchor sill plates of single-story wood-frame buildings to foundations with minimum 5/8” diameter bolts, spaced at not more than 48 inches on center. In other cases, the rules may require a complex series of calculations to be performed, for example, a requirement to design the anchors on a parapet with sufficient strength to resist a specific force, computed based on the parapet’s weight, and the intensity of ground shaking predicted for the site. In either case, the rules are highly prescriptive with little direct link between the prescribed requirement and the intended performance. For example, in the case of sill plate anchors, it is unclear what performance would be obtained if the bolts were spaced at 60 inches on center, or if smaller bolts were used. Similarly, it is unclear what performance would be obtained if the parapet anchors provided on a building are either half or twice as strong as prescribed by the code. Designers are often unsure of the basis for the rules contained in the code, the specific poor performance the rule is intended to prevent, or how the rule can be appropriately modified in order to attain other desired performance. The resulting codes are quite complex and often misunderstood and poorly applied, and therefore, sometimes ineffective in achieving the basic intent. Even in those cases in which the code procedures are properly understood and appropriately applied, since they are not rationally based they may be incapable of providing adequate performance. Further, since the prescriptive rules are often quite general, in many cases they may require buildings to incorporate construction features that are not really necessary to achieve the intended performance capability, or that may be inefficient in achieving this performance as compared to other available means. Finally, the default performance objectives the codes intend to achieve may be inappropriate for many buildings and occupancies and there are no clear guidelines on how to adjust the code requirements to alter this performance. In summary, the modern prescriptive building codes are often difficult to apply, occasionally result in needless construction expense, and sometime result in construction incapable of providing the intended performance.

Performance-based design represents an alternative approach to these prescriptive procedures. In performance-based design approaches, the performance objectives and goals are clearly and quantitatively stated at the initiation of the design process. Rather than following specific prescriptive rules, the designer is challenged to demonstrate that a design is capable of meeting the intended performance. This may be done by constructing prototypes and subjecting them to physical tests, such as is commonly done in the aircraft industry, or it may be accomplished through analytical simulation that models the behavior of the building and predicts its performance when subjected to a design event. The building codes and design professions are exploring the application of performance-based approaches to a number of hazards including fire, blast, wind, and earthquake.

Interest in performance-based earthquake engineering first developed under initiatives to mitigate seismic hazards in the existing stock of buildings. Since nearly all existing buildings do not meet current code criteria, yet many existing buildings have demonstrated an ability to
survive earthquakes with acceptable levels of damage, lack of compliance with codes for new building construction, by itself, is not a compelling reason to upgrade. Rather, decision-makers are more likely to commit to upgrade buildings when a projection (evaluation) of future earthquake performance has been made that the decision-maker deems unacceptable. Such decision-makers naturally request that buildings be upgraded to provide acceptable performance, which by nature, will vary from decision-maker to decision-maker. In recognition of this, the project team that developed the FEMA-273 Report, *NEHRP Guidelines for Seismic Rehabilitation of Buildings* (ATC, 1997a), developed rudimentary performance-based evaluation and upgrade design procedures that provided the decision-maker and design team with a menu-approach to selection of appropriate performance objectives for individual projects. This approach has been carried forward in the FEMA-356 Report, *Prestandard and Commentary for the Seismic Rehabilitation of Buildings* (ASCE, 2000).

As published in FEMA-273 and FEMA-356, a series of standard performance outcomes, termed performance levels, were established. These performance outcomes related to such things as earthquake-induced building collapse (or collapse avoidance), onset of earthquake-induced building damage that could pose a hazard, and post-earthquake building operability. The decision-maker is asked to select one or more of these performance outcomes, and a ground motion event or hazard level for which this performance is to be achieved. The designer is provided with a procedure that is intended to allow determination as to whether these various performance levels are exceeded, for the selected design hazard. Although the FEMA-273/356 procedures are rational and clearly performance-based, they do have shortcomings. First, the procedures do not directly address control of economic losses, one of the most significant decision-maker concerns. Also, the procedures are focused on assessing the performance of the individual structural and nonstructural components that comprise a building, as opposed to the global performance of the building as a whole. Perhaps most significantly, the reliability of the procedures in delivering the design performance has not been characterized. Many engineers who have applied the procedures believe that they are excessively conservative and that use of the procedures results in unwarranted rehabilitation measures. However, despite this popular belief, because the reliability of the procedures has never been quantitatively and rationally evaluated, it is possible that instead of being too conservative, the procedures do not adequately provide the performance capability expected by the decision makers. It is likely that both outcomes are true for different types of buildings.

Concurrent with the development of performance-based design procedures for seismic rehabilitation, the structural engineering community also became interested in the development of performance-based procedures for design of new construction. This was spurred in part by the large economic losses experienced in the 1989 Loma Prieta earthquake. Although that event caused few life threatening hazards in modern buildings, it resulted in an estimated $7 billion of economic loss. Many judged that these losses were excessively high for a relatively moderate and remotely located event, and that design procedures should be developed that would both permit and encourage the construction of facilities that were less vulnerable to economic loss. These interests were intensified by the $30 billion economic loss that occurred in the 1994 Northridge earthquake. Many observed that although building codes appeared to adequately protect life safety, they did not provide sufficient protection of the public’s economic welfare.
In 1993, the Earthquake Engineering Research Center (EERC) at the University of California at Berkeley conducted a project on FEMA’s behalf to suggest the requirements for a program to develop performance-based seismic design guidelines for buildings. EERC developed a panel of leading earthquake engineers and structural researchers, invited a series of white papers on important issues, and held a workshop to obtain input from the community on the appropriate parameters for such a program. On this basis, EERC recommended a six-year program of research and development with an estimated implementation cost of $32 million (1995 dollars). These recommendations were published in as the FEMA-283 report, Performance Based Seismic Design of Buildings (EERC, 1996). Prior to funding such a major initiative, FEMA turned to the Earthquake Engineering Research Institute (EERI) for confirmation that the proposed program was appropriate. EERI followed a process very similar to that undertaken by EERC, though somewhat broader community participation was obtained. The EERI project also culminated in the development of an action plan published in April 2000 as the FEMA-349 report, Action Plan for Performance-Based Seismic Design. The FEMA-349 plan extended over an implementation period of ten years and required funding in amounts ranging from $20 to $27 million (1998 dollars).

In the period since the EERC and EERI efforts were undertaken, work towards development of performance-based procedures has continued. In 1994, using funds provided by FEMA in response to the 1994 Northridge earthquake, the Structural Engineers Association of California (SEAOC) undertook a project to develop a framework for performance-based design procedures for new construction. Known as the Vision 2000 project, this SEAOC effort extended some of the FEMA-273/356 concepts to new building design and also popularized the concept of performance-based design within the design community. This effort was spurred on by a series of international workshops, as well as efforts in other countries to explore the development of performance-based design approaches. The performance objectives recommended by SEAOC (1995) in the Vision 2000 report, Performance Based Seismic Engineering of Buildings, were eventually adopted into the Commentary to the 1997 NEHRP Recommended Provisions for Seismic Regulation for Buildings, as a means of quantifying the performance intent of the building codes. The Japanese revised their Building Standards Law to encompass many of the recommendations contained in Vision 2000 and some corporations began to request designs using the Vision 2000 approach to performance definitions. Unfortunately, Vision 2000, which was largely based on the technology contained in FEMA-273/356, inherently incorporated the same limitations as these documents.

In response to unanticipated damage sustained by moment-resisting steel frames in the Northridge earthquake, FEMA sponsored the SAC Program to Reduce Seismic Hazards in Steel Moment Frame Buildings. This project developed specific design and rehabilitation criteria for steel moment-frame structures that extended the performance-based design techniques contained in FEMA-273/356. The design recommendations from this six-year, $12 million project were published as the FEMA-350 report, Recommended Seismic Design Criteria for New Steel Moment-Frame Buildings (SAC, 2000a), and the FEMA-351 report, Recommended Seismic Evaluation and Upgrade Criteria for Existing Welded Steel Moment-Frame Buildings (SAC, 2000b). These recommended design criteria specifically quantified performance in terms of the global behavior of buildings, as well as the behavior of individual components, and also incorporated a formal structural reliability framework to characterize the confidence associated with meeting intended performance goals. Although the FEMA/SAC criteria represent

In 2000, FEMA provided funding to ATC to evaluate and improve the application of inelastic seismic analysis procedures used in FEMA 273/356, FEMA 306, and the ATC-40, *Seismic Evaluation and Retrofit of Concrete Buildings* (ATC, 1996). Specific anticipated outcomes of the project, known as ATC-55, include: (1) improved understanding of the inherent assumptions and theoretical underpinnings of existing and new procedures; (2) recognition of the applicability, limitations, and reliability of various analysis procedures; (3) guidelines for practicing engineers to apply the procedures to new and existing buildings; and (4) direction for researchers on issues for future improvement of procedures. This activity addresses, in part, some of the issues identified in the FEMA-349 *Action Plan*.

Recently FEMA has also provided funding to ATC to update the *Seismic Considerations Series*, a series of reports prepared by the Building Seismic Safety Council about a decade ago to educate owners of various facility types about seismic-design related issues. Under this new project, known as ATC-56, the Applied Technology Council is developing (1) a brief, glossy brochure to educate buildings owners and manages on the merits of performance-based design concepts, and (2) a technical manual to assist design professionals in understanding and applying performance-based concepts.

In addition to these practice-related efforts, significant research into the seismic performance of structures, and prediction of this performance has occurred at the three national earthquake-engineering centers (PEER, MAE, MCEER) funded by the National Science Foundation. This research has included continued evaluation of structural reliability methods and their application to earthquake performance prediction, prediction of economic losses, development of catalogs of data on the force and deformation behaviors of various types of structures and structural components, and development of more reliable simulation techniques for prediction of performance.

At the same time that these extensive developments occurred in the area of earthquake-engineering the design professions and building code development groups also became interested in extending performance-based concepts to other aspects of design. Notably, extensive
development work has been performed in the area of fire protection engineering. Also, building

design practice for resistance of blast effects, a reintroduction of this Cold War field, have

naturally adopted performance-based approaches. Significantly, the International Code Council

has recently published an International Performance Code and the NFPA-5000 Building

Construction and Safety Code also includes extensive performance-based design provisions.

1.5 Technical Approach

The technical approach for the multi-year effort is drawing heavily on the recommendations put

forth in the FEMA-349 Action Plan for Performance-Based Seismic Design, which defines six

products essential to the creation and implementation of comprehensive, acceptable

Performance-Based Seismic Design Guidelines:

1. A Program Management Plan that incorporates a broadly based oversight group (the

Steering Committee) to shepherd and promote the development of the Guidelines (over an

extended period of time, say up to 10 years), and an education and implementation strategy

to facilitate the use of the Guidelines.

2. Structural Performance Products that characterize building performance, specify how to

evaluate a building’s performance capability for a specified level of seismic hazard and with

a defined reliability or level of confidence, and provide guidance on how to design a structure
to provide desired performance (with defined reliability).

3. Nonstructural Performance Products that provide engineers with the capability to evaluate

and design nonstructural components, such as partitions, piping, HVAC (heating, ventilation,

and air conditioning) equipment, with the goal of ensuring that such components will provide
desired performance (with defined reliability).

4. Risk Management Products that provide methodologies for calculating the benefits of

designing to various performance objectives and to make rational economic choices about the

levels of performance desired, the levels of confidence desired, and the comparative costs to
reach those levels.

5. Performance-Based Seismic Design Guidelines that provide methodology and criteria for

design professionals, material suppliers, and equipment manufacturers to implement

performance-based design procedures.

6. A Stakeholders Guide that explains performance-based seismic design to nontechnical

audiences, including building owners, managers, and lending institutions.

1.5.1 Phase 1 – Project Initiation

The phase 1 project had an 18-month schedule that initiated on October 1, 2001. The primary

tasks performed under phase 1 included:

- Establish a Project Management Structure – including appointment of a Project

  Technical Director, Project Management Committee, and Project Steering

  Committee and development of a detailed phase 1 Work Plan
• Empanel a technical team to initiate a first technical task (performance characterization), consisting of the development of a report evaluating the available alternatives for defining and communicating building performance and recommending preferred approaches for performance communication and definition for use by the project, published in a task report.

• Conduct a workshop (Earthquake Risk Communication Workshop), attended by a cross section of public and private building owners, commercial tenants, lenders, insurers and attorneys to obtain input to the first technical task.

• Conduct a workshop (Performance-based Design Programming Workshop) attended by members of the technical community, including practicing engineers, researchers and social scientists, to evaluate the currency and adequacy of the FEMA-349 Action Plan.

• Prepare an update to the FEMA-349 Action Plan, to serve as the global work plan for the remaining phases of the ATC-58 project.

• Prepare a recommended scope and budget for the second project phase.

• Prepare a Project Report describing the work performed in the first project phase and the project accomplishments to date.

1.5.2 Phase 2

The primary objective of the Phase 2 project is to develop a detailed work plan for all tasks necessary to develop the Structural Performance Products, Nonstructural Performance Products, Risk Management Products, Performance-based Seismic Design Guidelines and Stakeholders’ Guide(s). In addition work commenced in Phase 1 to define and characterize performance will be continued and the task of quantifying structural and nonstructural performance will be commenced. Phase 2 consists of:

• Managing the project in accordance with the structure defined in Phase 1, including routine guidance and oversight by the Project Steering Committee.

• Developing an updated Action Plan for all phases of project work, including identification of specific project deliverables and the tasks and budgets associated with developing these deliverables.

• Completing the interim development of performance characterization commenced in Phase 1

• Commencing the process of quantifying structural performance.

• Commencing the process of quantifying nonstructural performance.

• Identifying efforts to be undertaken in Phase 3 of the overall project, should FEMA elect to conduct Phase 3.
2 Objectives and Deliverables

This section describes the detailed project work tasks and deliverables.

2.1 Project Tasks

2.1.1 Task 2.0 Project Management and Oversight

The Phase 1 Project Management and Steering Committees will be engaged respectively to continue to manage and provide guidance and oversight to the conduct of the project. The project management structure will be expanded with the retention of Product Development Team Leaders for the Nonstructural Performance Products (NPP) team and Structural Performance Products (SPP) team and both a Team Leader and Associate Team Leader for the Risk Management Products (RMP) team. Additional team members will be selected to bring each product team to approximately 4 persons, including the Team Leaders, to assist the Team Leaders in conducting the project work. Some or all of these team members may be retained in later phases of the project to participate in the product development tasks.

Project Management Committee (PMC)

The Project Management Committee (PMC) will review project activities on a regular basis and be available for immediate consultation as required. The PMC will select consultants and form teams of consultants to carry out the various projects tasks, including product development and review. These consultants will be qualified academic researchers, engineering practitioners, and/or other personnel qualified to perform the desired specific functions. The PMC will be responsible for defining the work to be performed by project consultants and teams and ensuring that work by each consultant or team is produced in a timely manner and has been reviewed for both technical accuracy and for usefulness. The PMC will develop status report formats for each consultant or team to use on a regular basis, will act as a liaison with other related concurrent research and development projects, will hold regular meetings to discuss progress of the project and resolve any conflicts, and will serve as a means to transfer information between consultants and teams, ensuring that the efforts are complimentary and supplementary.

It is anticipated that the PMC will meet 9 times during the duration of the Phase 2 project, at approximately 6-week intervals. Precise scheduling of meetings will be developed to accommodate critical project activities. The Project Executive Director, acting on behalf of the PMC, will prepare monthly financial summaries and quarterly progress reports which will be submitted to FEMA.

Project Steering Committee (PSC)

The Project Steering Committee will serve as an advisory body to the PMC and will provide diverse perspective on key technical issues and conduct of the project, including the making of recommendations pertaining to the identification of needed products, the selection of project personnel, timetables for various activities, and technical and content review of documents produced under the project. It is anticipated that the Project Steering Committee will meet three
times during the duration of the Phase 2 project. The chair of the Project Steering Committee will serve as a non-voting, ex-officio member of the PMC.

**Product Development Team Leaders**

In addition to the PMC and PSC the management structure for the project will be expanded with the addition of a Team Leader for Structural Performance Products, a Team Leader for Nonstructural Performance Products and a Team Leader and Associate Team Leader for Risk Management Products. The Team Leaders will be responsible for developing detailed work plans in each of the three product development areas, recommending project participants for these product development activity areas and leading the work in these areas.

**Product Development Teams**

The NPP, RMP and SPP teams will be expanded to include approximately 4 persons each (including the team leaders), primarily to assist the team leaders in development of detailed project work plans for remaining phases of the project. In selection of these additional team members, emphasis will be on finding individuals with broad technical knowledge in the product development area and an ability to plan major development efforts. Team members retained in this phase of the project may or may not be continued into later phases of the work.

**Project Work Plan (Subtask 2.0.1)**

This task consists of development of the detailed Work Plan that specifies how each of the project tasks will be performed and the schedule for performance. The Work Plan will be reviewed by FEMA and will be revised as required to obtain FEMA approval.

2.1.2 **Task 2.1: Complete Performance Characterization**

This task consists of completion of the task initiated as Product 1, in phase 1 of the project. This task will be performed by the RMP team. The team leader for the Product 1 task team will be retained as a Consultant to provide insight into the thought processes and intent of the Product 1 development team, as embodied in the Product 1 report. The results from this task shall be documented in a task report submitted to the Project Officer within nine months after commencement of Phase 2. The recommendations contained in this report will form the basis for forming design performance objectives, reporting the results of performance evaluations, and communicating performance issues throughout the balance of the project. This task corresponds to existing Task 2.2.1 of FEMA-349.

2.1.3 **Task 2.2: Commence Process of Quantifying Structural Performance Levels**

This task initiates the process of developing a basic performance prediction tool that can be used to quantify the performance of building structures, subjected to earthquake hazards. This initial effort will consist of performing a brief survey of the Engineering Demand Parameters (EDPs) that have been suggested by various researchers and engineers as appropriate to characterize the performance of different types of building structures. These EDPs may include strength demand,
This task will be performed by the Team Leader for Structural Performance Products with the assistance of the Structural Performance Product Team Members. As part of this task, the SPP team will perform an informal literature survey on EDPs that have been proposed by various guidelines and researchers as performance predictors for both individual structural components and global structural response. This work will be extended in future phases of the project during which recommendations will be made for the preferred EDPs for use in performance-based engineering analysis of building structures. The results of this initial task will be documented in a brief task report. This work initiated in this task corresponds to work contained in Tasks 2.2.2 and 2.2.4 of *FEMA-349*.

2.1.4 **Task 2.3: Commence Process of Quantifying Nonstructural Performance Levels**

This task initiates the process of developing a basic performance prediction tool that can be used to quantify the performance of nonstructural building components, subjected to earthquake hazards. This initial effort will consist of performing a brief survey of the Engineering Demand Parameters (EDPs) that have been suggested by various researchers and engineers as appropriate to characterize the performance of different types of building components. These EDPs may include floor acceleration, interstory drift, ductility demand, cumulative dissipated energy demand, floor response spectra, standardized floor response time histories, or other similar parameters and may be different for the several types of nonstructural components.

This task will be performed by the Team Leader for Non-Structural Performance Products with the assistance of the Non-Structural Performance Product Team Members. As part of this task, the NPP team will perform an informal literature survey on EDPs that have been proposed by various guidelines and researchers as performance predictors for both individual structural components and global structural response. This work will be extended in future phases of the project during which recommendations will be made for the preferred EDPs for use in performance-based engineering analysis of building components and nonstructural systems. This work initiated in this task corresponds to work contained in Task 3.2.1 of *FEMA-349*.

2.1.5 **Task 2.4: Review and Revise Action Plan for all Project Phases**

This task will be performed in parallel with the update of FEMA-349 conducted under the phase 1 project scope. Under this task, each of the Product Development Teams will identify the specific work products and deliverables in their area of responsibility and those work tasks necessary to develop these deliverables, together with estimated budgets, task durations and task interdependencies. The Project Technical Director, assisted by the Product Team Leaders, will review this material, supplement it with additional material and compile the recommendations of the product teams into a comprehensive *Action Plan* for the project, considering current knowledge. This updated *Action Plan* will serve as the basic project work plan for succeeding phases of the project, but will also be a living document that is altered during succeeding phases as appropriate to reflect new knowledge and technology, including products and information developed during later project phases.
2.1.6 Task 2.5: Identify Work to be Performed in Phase 3.

During Phase 2 the Project Executive Director and Project Technical Director will develop a recommended scope of work to be carried out in Phase 3 of the project, should FEMA elect to conduct Phase 3. These recommendations will be developed in consideration of the Action Plan, as revised in Task 2.4, and in accordance with directions provided by the Project Management Committee and with the overview and guidance of the Project Steering Committee. These recommendations will be articulated in a letter report to the FEMA Project Officer mid-way in the Phase 2 project.

2.1.7 Task 2.6: Prepare Phase 2 Project Report

At the completion of this project phase, the Project Executive Director and Technical Director will prepare a Project Report that specifies the work accomplished in Tasks 2.2, 2.3 and 2.4. This Project Report will be submitted to the Project Officer prior to the conclusion of this contract.

2.2 Project Deliverables

Project Deliverables are as indicated in Table 2-1 below.

<table>
<thead>
<tr>
<th>Deliverable</th>
<th>Description</th>
<th>Date Due</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Work Plan</td>
<td>Detailed statement of work, management plan, budget and schedule</td>
<td>12/30/02</td>
</tr>
<tr>
<td>Performance Characterization Report</td>
<td>Task 2.1 task report.</td>
<td>5/30/03</td>
</tr>
<tr>
<td>Preliminary Structural EDP Report</td>
<td>Task 2.2 task report</td>
<td>12/26/03</td>
</tr>
<tr>
<td>Preliminary Nonstructural EDP Report</td>
<td>Task 2.3 task report</td>
<td>12/26/03</td>
</tr>
<tr>
<td>Updated Action Plan</td>
<td>Task 2.4 task report</td>
<td>12/26/03</td>
</tr>
<tr>
<td>Phase 3 Task Recommendations</td>
<td>Recommended work scope for phase 3</td>
<td>6/30/03</td>
</tr>
<tr>
<td>Phase 2 Report</td>
<td>Project summary report</td>
<td>3/31/04</td>
</tr>
</tbody>
</table>
3 Organization

3.1 General

The Applied Technology Council, under contract to FEMA, has responsibility for the administration and management of the project. A project organization chart is provided in Figure 3-1. The remaining sections identify the various project positions, their roles and responsibilities, and the identified individuals.

Figure 3-1 Organization Chart.

3.2 Client Oversight and Management

The Federal Emergency Management Agency is the client for this project. FEMA has two direct representatives for this work: (1) the FEMA Project Officer; and (2) the FEMA Technical Monitor. In addition, project deliverables and other contract-required reports are also provided to the FEMA Contracting Officer. The FEMA Project Officer (Michael Mahoney) provides overall project management on behalf of the client organization and is responsible for approval of work plans, work product, budgets and schedules. The FEMA Project Officer will be notified of all project activities and will be afforded the opportunity to attend all project meetings. The FEMA Technical Monitor (Robert Hanson) acts as a technical consultant to the FEMA Project Officer. The FEMA Technical Monitor may perform technical review of all products prepared by the project and will be afforded the opportunity to attend all project meetings.
3.3 ATC Project Management and Organization

Applied Technology Council policy is to operate with a small in-house staff and to utilize the services of highly qualified individuals in diversified areas who serve as consultants, or subcontractors on specific projects. This enables ATC to obtain the services of experts from private practice, the academic community, and government organizations who otherwise would not be available through any one organization.

The project will be organized and managed by a Project Management Committee led by the Project Executive Director and Project Technical Director. Technical overview and guidance for the project will be provided by an advisory Project Steering Committee, consisting of leading available specialists in performance-based design, including researchers, building design professionals, and building regulators, as well as representatives from stakeholder groups that have a direct interest in performance-based design. Detailed project work, including planning of the project workshops, documentation of the workshop findings, and preparation of the final project report will be carried out with the assistance of ATC staff and technical consultants engaged by ATC.

3.3.1 Project Management Committee

The Project Management Committee is responsible for overall management of the technical and administrative aspects of the project, on behalf of the Applied Technology Council. The Project Management Committee is constituted of 6 persons, including the Project Executive Director, who serves as chair, the Project Technical Director, who serves as co-chair, a representative of the ATC Board of Directors, and three at-large members. Management of the project will be performed on a consensual basis with all member of the Project Management Committee provided an opportunity to identify issues, suggest solutions and vote on appropriate courses of action. The PMC will meet at approximately 6-8 week intervals throughout the project, with more intense activity occurring during the active selection of project participants and the production of project products and deliverables.

The Project Executive Director (Christopher Rojahn) has responsibility for overall project management on behalf of ATC, including contract administration and financial management, and serves as the principal interface with the client, including the responsibility for reporting progress on the project. The Project Technical Director (Ronald Hamburger) is responsible for managing the technical progress and conduct of the project with the support and consent of the Project Management Committee. The other members of the Project Management Committee consist of Peter May, Jack Moehle, Maryann Phipps (ATC Board representative), and John Traw.

3.3.2 Project Steering Committee

The Project Steering Committee will include approximately 12-to-14 persons representing various stakeholder groups, including building regulation, building development, corporate risk management, commercial lending, property insurance, and the design professions. This group will serve as an advisory body to the PMC and will provide diverse perspective on key technical issues and conduct of the project, including the making of recommendations pertaining to the
identification of needed products, the selection of project personnel, timetables for various activities, and technical and content review of documents produced under the project.

The Project Steering Committee consists of:

- William Holmes (Chair), Rutherford & Chekene, Oakland, California;
- Daniel Abrams, Mid-America Earthquake Engineering Research Center, University of Illinois, Urbana, Illinois;
- Debra Beck, Building Owners and Managers Association, New York, New York
- Randall Berdine, Fannie Mae, Washington, DC
- Roger Borcherdt, U. S. Geological Survey, Menlo Park, Calif.;
- Michelle Bruneau, Multidisciplinary Center for Earthquake Engineering Research, University at Buffalo, New York;
- Mohammed Ettouney, Weidlinger Associates, New York, New York;
- John Gillengerten, California Office of Statewide Health Planning and Development, Sacramento, California;
- Henry Green, Bureau of Construction Codes, State of Michigan, Lansing
- William Petak, School of Policy Planning and Development, University of Southern California, Los Angeles
- Joe Sanders, Charles Pankow Builders, Altadena, California;
- Randy Schreitmueller, FM Global, Johnston, Rhode Island;
- Jim Sealy, Architect, Dallas, Texas

The Chair of the Project Steering Committee will work closely with the PMC in determining how the PSC can best monitor the progress of the project and provide meaningful and timely advice to the project team. The Chair will moderate PSC meetings and will coordinate reports of the PSC to the PMC and FEMA as well as other PSC functions.

3.3.3 Project Consultants

Consultants will be selected from time to time throughout the course of the project to perform specific technical tasks. In the second phase of work, the following consultants have been identified:

**Risk Management Team**

Craig Comartin, Team Leader
Brian Meacham, Associate Team Leader
Ronald Mayes, Consultant (Product 1 team chair)
2 Consultant to be named
Structural Performance Products Team
Andrew Whittaker, Team Leader
3 Consultants to be named

Nonstructural Performance Products Team
Robert Bachman, Team Leader
3 Consultants to be named
4 References

FEMA Reports:


FEMA-350, 2000, Recommended Seismic Design Criteria for New Steel Moment-Frame Buildings, prepared by the SAC Joint Venture, a partnership of the Structural Engineers Association of California, the Applied Technology Council, and Universities for Research in Earthquake Engineering; published by the Federal Emergency Management Agency, Washington, DC.

FEMA-351, 2000, Recommended Seismic Evaluation and Upgrade Criteria for Existing Welded Steel Moment-Frame Buildings, prepared by the SAC Joint Venture, a partnership of the Structural Engineers Association of California, the Applied Technology Council, and
Universities for Research in Earthquake Engineering; published by the Federal Emergency Management Agency, Washington, DC.


*Other Citations:*
