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16. ABSTRACT (A 200-word or less factual summary of most significant information. If document includes a significant bibliography or literature survey, mention it here.)  The TENTATIVE PROVISIONS FOR THE DEVELOPMENT OF SEISMIC REGULATIONS FOR BUILDINGS were developed by the Applied Technology Council to present, in one comprehensive document, current state-of-knowledge pertaining to seismic engineering of buildings. The TENTATIVE PROVISIONS are in the process of being assessed by the building community. This report is one of a series of reports that document the deliberations of a group of professionals jointly selected by the Building Seismic Safety Council and the National Bureau of Standards and charged with reviewing the TENTATIVE PROVISIONS prior to the conduct of trial designs. The report contains recommendations and records of the committee charged with the review of the material related to architectural, mechanical and electrical provisions. The committee made seven general recommendations for revision and one recommendation for the addition of a new section on elevator design requirements. These recommendations by Committee 8 were made to the parent group, the Joint Committee on Review and Refinement, and their action on these recommendations is documented in a companion report.  REPRODUCED BY <b>NATIONAL TECHNICAL INFORMATION SERVICE</b> U.S. DEPARTMENT OF COMMERCE SPRINGFIELD, VA. 22161			
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REVIEW AND REFINEMENT OF ATC 3-06 TENTATIVE SEISMIC PROVISIONS

REPORT OF TECHNICAL COMMITTEE 8: ARCHITECTURAL, MECHANICAL AND ELECTRICAL

Robert Sockwell, Chairman, American Institute of Architects  
Mark Swatta, Vice Chairman, Interagency Committee on Seismic Safety in Construction  
Thomas K. Faison, Secretary, National Bureau of Standards  
James R. Shaver, Assistant Secretary, National Bureau of Standards  
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Conditioning Engineers  
Philip Lathrap, American Society of Mechanical Engineers  
Stephen D. Heath, American Society of Plumbing Engineers  
Joseph A. Wintz, Brick Institute of America  
George Gibson, National Elevator Industry, Inc.  
Tom Wosser, Applied Technology Council  
Christopher Arnold, Building Seismic Safety Council

Prepared for use by:

BUILDING SEISMIC SAFETY COUNCIL

Sponsored by:

FEDERAL EMERGENCY MANAGEMENT AGENCY

Center for Building Technology  
National Bureau of Standards  
Washington, D.C. 20234

October 1980

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U.S. DEPARTMENT OF COMMERCE, Phillip M. Klutznick, Secretary  
Luther H. Hodges, Jr., Deputy Secretary  
Jordan J. Baruch, Assistant Secretary for Productivity,  
Technology and Innovation  
NATIONAL BUREAU OF STANDARDS, Ernest Ambler, Director



## Abstract

The TENTATIVE PROVISIONS FOR THE DEVELOPMENT OF SEISMIC REGULATIONS FOR BUILDINGS were developed by the Applied Technology Council to present, in one comprehensive document, current state-of-knowledge pertaining to seismic engineering of buildings. The TENTATIVE PROVISIONS are in the process of being assessed by the building community. This report is one of a series of reports that document the deliberations of a group of professionals jointly selected by the Building Seismic Safety Council and the National Bureau of Standards and charged with reviewing the TENTATIVE PROVISIONS prior to the conduct of trial designs. The report contains recommendations and records of the committee charged with the review of the material related to architectural, mechanical and electrical provisions. The committee made seven general recommendations for revision and one recommendation for the addition of a new section on elevator design requirements. These recommendations by Committee 8 were made to the parent group, the Joint Committee on Review and Refinement, and their action on these recommendations is documented in a companion report.

Keywords: Architectural; electrical; elevators; mechanical; seismic coefficients.

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## 1.0 INTRODUCTION

### 1.1 General

The Tentative Provisions for the Development of Seismic Regulations were developed by the Applied Technology Council (ATC) in an effort that included a wide range of experts in the actual drafting of the provisions. Two external review drafts were circulated to a large portion of the interested and informed community of eventual users. However, because the Tentative Provisions were innovative, doubts about them existed. Consequently, an attempt was made to investigate these doubts and to improve the Tentative Provisions where possible before an expensive assessment of the Tentative Provisions was undertaken by conducting trial designs.

This review and refinement project was planned and conducted by the National Bureau of Standards with the advice and approval of the Building Seismic Safety Council, a private sector organization formed in 1979 for the purpose of enhancing public safety by providing a national forum to foster improved seismic safety provisions for use by the building community.

The assessment of the Tentative Provisions was performed using the committee structure shown in figure 1. Nine Technical Committees were formed with interests that collectively cover the Tentative Provisions. The Joint Committee on Review and Refinement consists of all voting members of the Technical Committees. The chairmen of the Technical Committees form a Coordinating Committee.

Membership of each Technical Committee is made up of representatives of organizations that have particular interest in the Tentative Provisions; the participants are listed in the committee membership section of this report.

In addition to the voting members, each Technical Committee includes a non-voting member from each of the following organizations: The Applied Technology Council (ATC), the Building Seismic Safety Council (BSSC) and the National Bureau of Standards (NBS). The ATC representative served as a technical resource to the committee since he was closely involved with the development of the provisions of interest to the committee. The NBS representative was the technical secretary throughout the effort. The BSSC representative provided a link with the Building Seismic Safety Council, which will be involved in trial designs and evaluations.

### 1.2 Committee Summary

The task of Technical Committee 8 (T.C. 8) was to review the material in Chapter 8 (Architectural, Mechanical and Electrical Components and Systems) of ATC 3-06 and recommend modifications or refinements if felt necessary prior to proceeding to trial designs. The charge to the committee was to consider changes that were technical in nature and would improve the presentation or would assist in carrying out Phase II trial design objectives.

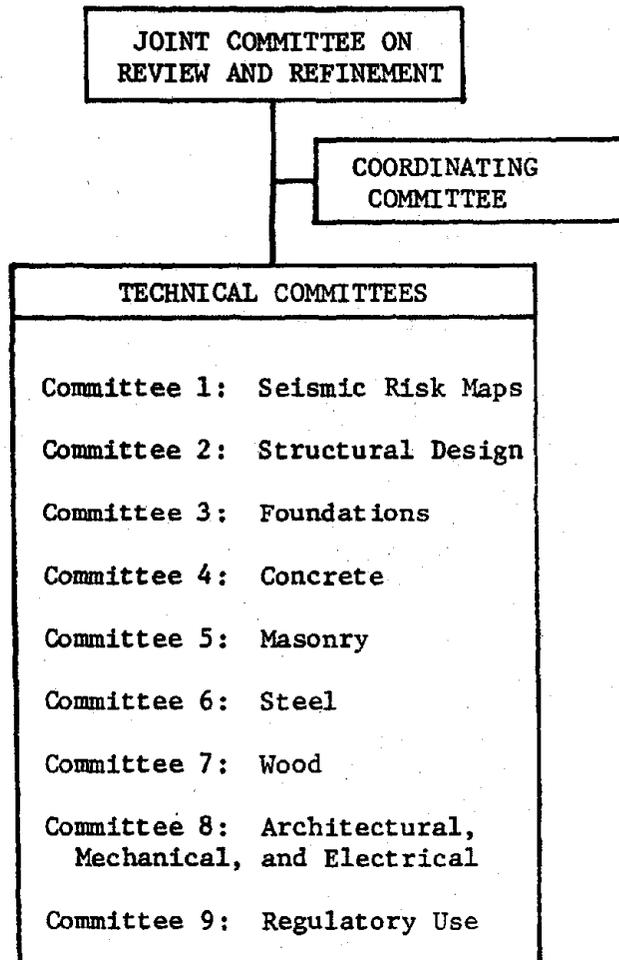


Figure 1: Committee Structure

The first meeting was held on December 11, 1979, in conjunction with the organizational meeting involving all committees. At this meeting, Robert Sockwell of the American Institute of Architects Research Cooperation representing the American Institute of Architects was selected chairman of T.C. 8. Mark Swatta, representing the Interagency Committee on Seismic Safety in Construction and an employee of the Veterans Administration, was elected Vice Chairman. Tom Faison of the National Bureau of Standards was assigned to serve as Secretariat. Three meetings of T.C. 8 were held on December 11, 1979 at NBS in Gaithersburg, Maryland; February 19, 1980 at NBS Boulder Laboratories in Boulder, Colorado; and May 22, 1980 at NBS in Gaithersburg, Maryland.

The major issues addressed through comments from either members of T.C. 8 or the general public were: several items related to brittle materials and/or low flexural strength materials, and elevator design requirements. The issue of serviceability vs life safety and the impact of either philosophy was discussed, but remained an open issue determined to be outside the scope of individual Technical Committees. The Brick Institute of America submitted comments on matters related to brittle materials and/or low flexural strength materials and the serviceability philosophy. The National Elevator Industry submitted comments on elevator design requirements. The Prestressed Concrete Institute also provided several comments which were considered by the Committee, but the action taken in regard to these comments was to retain the existing wording in ATC 3-06.

Because the elevator design requirements were not adequately covered and could not be resolved at the Boulder meeting (Meeting #2), Chairman Sockwell assigned a Task Force to be chaired by George Gibson, and including Philip Lathrap, Christopher Arnold and Tom Wosser to draft a set of requirements to be considered by the full Committee. George Gibson circulated a set of recommendations that were taken from the proposed seismic regulations of ANSI A 17.1, the Elevator Safety Code. These recommendations were considered and acted upon at the third meeting of T.C. 8 on May 22, 1980. A new section of Chapter 8 was developed, along with several modifications of material in other sections of the chapter which allowed the use of common formulas for any of the specified loading conditions.

The Committee acted to recommend to NBS and the Building Seismic Safety Council that Technical Committee 8 be retained through Phase II of the project to act in an advisory capacity on the planning and execution of Phase II.

For exact wording of the proposed changes, the reader is directed to Section 2, "Committee Actions." This report is intended to provide a record of actions taken by Technical Committee 8 during the proceeding of the review process.

2.0 Committee Actions

2.1 Recommendations for Change

TECHNICAL COMMITTEE: #8 ARCHITECTURAL  
MECHANICAL & ELECTRICAL

COMMITTEE ITEM NUMBER: 1/1

ATC-3-06 SECTION REFERENCE: 8.2.5

First Letter Ballot

Item 1

°Section 8.2.5 to read: "Transverse or out-of-plane bending or deformation of a component or system which is subjected to forces as determined in Formula 8-1 shall not exceed the deflection capability of the component or system"

FINAL BALLOT: 8 YES  
--- NO  
--- ABSTAIN  
--- DID NOT VOTE

COMMENT ON PROPOSED CHANGE:

The change is suggested as a more performance approach to cover a broad range of materials.

REVIEW AND REFINEMENT OF TENTATIVE SEISMIC PROVISIONS

PROPOSED CHANGE

TECHNICAL COMMITTEE: #8 ARCHITECTURAL,  
MECHANICAL & ELECTRICAL

COMMITTEE ITEM NUMBER: 1/2

ATC-3-06 SECTION REFERENCE: Commentary 8.2.5

First Letter Ballot  
Item 2

°Commentary 8.2.5, third sentence to read: "This is particularly important for systems composed of brittle materials and/or low flexural strength materials."

FINAL BALLOT: 8 YES  
--- NO  
--- ABSTAIN  
--- DID NOT VOTE

COMMENT ON PROPOSED CHANGE:

This change is editorial and was made for consistency.

REVIEW AND REFINEMENT OF TENTATIVE SEISMIC PROVISIONS

PROPOSED CHANGE

TECHNICAL COMMITTEE: #8 ARCHITECTURAL  
MECHANICAL & ELECTRICAL

COMMITTEE ITEM NUMBER: 1/3

ATC-3-06 SECTION REFERENCE: TABLE 8-B

First Letter Ballot

Item 3

°Table 8-B Footnote 4 changed to read: "Shall be raised one performance level if the area facing the exterior wall is normally accessible within a distance of 10 feet plus one foot for each floor height."

FINAL BALLOT: 8 YES  
--- NO  
--- ABSTAIN  
--- DID NOT VOTE

COMMENT ON PROPOSED CHANGE:

Footnote 4 changed to be more specific with regard to appendages and accessibility to areas near the appendages.

REVIEW AND REFINEMENT OF TENTATIVE SEISMIC PROVISIONS

PROPOSED CHANGE

TECHNICAL COMMITTEE: #8 ARCHITECTURAL  
MECHANICAL & ELECTRICAL

COMMITTEE ITEM NUMBER: 1/4

ATC-3-06 SECTION REFERENCE: TABLE 8-B

First Letter Ballot

Item 4

°Table 8-B: Change entry "Veneers" to "Veneer Attachments"

FINAL BALLOT: 8 YES  
--- NO  
--- ABSTAIN  
--- DID NOT VOTE

COMMENT ON PROPOSED CHANGE:

Editorial change to better reflect the intent of the entry in Table 8-B which is the "attachments" rather than the veneer.

REVIEW AND REFINEMENT OF TENTATIVE SEISMIC PROVISIONS

PROPOSED CHANGE

TECHNICAL COMMITTEE: #8 ARCHITECTURAL  
MECHANICAL & ELECTRICAL

COMMITTEE ITEM NO.: 2/1

ATC-3-06 SECTION REFERENCE: 8.1

Second Letter Ballot  
Ballot Item 1

(New exception to be added to Section 8.1)

Exceptions:

3. Elevator systems which are in buildings assigned to Seismic Hazard Exposure Group I and are located in areas with a Seismicity Index of 1 or 2 or which are in buildings assigned to Seismic Hazard Exposure Group II and are located in areas with Seismicity Index of 1 are not subject to the provisions of this chapter.

FINAL BALLOT: 7 YES  
--- NO  
--- ABSTAIN  
1 DID NOT VOTE

COMMENT ON PROPOSED CHANGE:

The additional "exception" was appropriately added to Section 8.1 so that the exceptions would be in one place. This new exception could have been placed in the new Section 8.4 but it was decided the better location would be in Section 8.1.

REVIEW AND REFINEMENT OF TENTATIVE SEISMIC PROVISIONS

PROPOSED CHANGE

TECHNICAL COMMITTEE: #8 ARCHITECTURAL,  
MECHANICAL & ELECTRICAL

COMMITTEE ITEM NUMBER: 2/2

ATC-3-06 SECTION REFERENCE: 8.4 (New Section)

Second Letter Ballot  
Ballot Item 2

(New Section to be added to Chapter 8)

8.4 ELEVATOR DESIGN REQUIREMENTS

8.4.1 REFERENCE DOCUMENT

The design and construction of elevators and components shall conform to the requirements of ANSI A17.1, American National Standard Safety Code for Elevators, Dumbwaiters, Escalators and Moving Walks, and the Proposed A17 Seismic Regulations, except as modified by provisions of this chapter.

8.4.2 ELEVATOR AND HOISTWAY STRUCTURAL SYSTEM

Elevators and hoistway structural systems shall be designed to resist seismic forces in accordance with formula 8-1 and Table 8-B.

$W_c$  is defined as follows:

<u>Element</u>	<u><math>W_c</math></u>
<u>Traction Car</u>	<u><math>C + .4L</math></u>
<u>Counterweight</u>	<u><math>W</math></u>
<u>Hydraulic</u>	<u><math>C + .4L + .25P</math></u>

C is weight of car  
L is rated capacity  
W is weight of counterweight  
P is weight of plunger

8.4.3 ELEVATOR MACHINERY AND CONTROLLER ANCHORAGE(S)

Elevator machinery and controller anchorages shall be designed to resist seismic forces in accordance with formula 8-2 and Table 8-C.

BALLOT ITEM 2 CONTINUED

8.4.4 SEISMIC CONTROLS

All elevators with a speed of 150 fpm or greater shall be furnished with signaling devices as follows:

- (a) A seismic switch device to provide an electrical alert or command for the safe automatic emergency operation of the elevator system.
- (b) A counter weight displacement or derailment device to detect lateral motion of the counterweight.

A continuous signal from (b) or a combination of signals from (a) and (b) will initiate automatic emergency shutdown of the elevator system.

8.4.5 RETAINER PLATES

Retainer plates are required top and bottom of the car and counterweight except where safety stopping devices are provided. The depth of engagement with the rail shall not be less than the side running face of the rail.

8.4.6 DEFLECTION CRITERIA

The maximum deflection of guide rails, including supports, shall be limited to prevent total disengagement of the guiding members of retainer plates from the guide rails' contact surface.

FINAL BALLOT:      7   YES  
                  --- NO  
                  --- ABSTAIN  
                    1   DID NOT VOTE

COMMENT ON PROPOSED CHANGE:

Because of the significance of elevator performance and potential cost impact, it was decided that a new section should be developed specific to "Elevator Design Requirements." The material has been developed so that the existing formulas and proposed seismic coefficients can be used in designing to resist seismic forces.

REVIEW AND REFINEMENT OF TENTATIVE SEISMIC PROVISIONS

PROPOSED CHANGE

TECHNICAL COMMITTEE: #8 ARCHITECTURAL  
MECHANICAL & ELECTRICAL

COMMITTEE ITEM NUMBER: 2/3

ATC-3-06 SECTION REFERENCE: TABLE 8-B

Second Letter Ballot  
Ballot Item 3

1. Change entry under Partitions - "Elevators and Shafts" to Elevator Shafts. (Editorial)
2. Add the following new entry:

<u>Architectural Components</u>	<u>C<sub>c</sub></u> <u>Factor</u>	<u>III</u>	<u>II</u>	<u>I</u>
Elevator and Hoistway Structural Systems				
- Structural frame providing the supports for guide rail brackets	1.25	S	G	G
- Guiderails and brackets	1.25	S	G	G
- Car and counterweight guiding members	1.25	S	G	G

FINAL BALLOT: 7 YES  
--- NO  
--- ABSTAIN  
1 DID NOT VOTE

COMMENTS ON PROPOSED CHANGE:

These new entries to Table 8-B allow general usage of equation 8-1.

REVIEW AND REFINEMENT OF TENTATIVE SEISMIC PROVISIONS

PROPOSED CHANGE

TECHNICAL COMMITTEE: #8 ARCHITECTURAL  
MECHANICAL & ELECTRICAL

COMMITTEE ITEM NUMBER: 2/4

ATC-3-06 SECTION REFERENCE: TABLE 8-C

Second Letter Ballot  
Ballot Item 4

1. Add the following new entry:

<u>Mechanical/Electrical Components</u>	<u><math>C_c</math> Factor</u>	<u>III</u>	<u>II</u>	<u>I</u>
Elevator Machinery and Controller Anchorage	1.25	S	G	G

FINAL BALLOT: 7 YES  
--- NO  
--- ABSTAIN  
1 DID NOT VOTE

COMMENT ON PROPOSED CHANGE:

This new entry to Table 8-C allows the general usage of equation 8-2.

**2.2 Recommendations for Trial Design**

None

**2.3 Recommendations for Commentary**

None

**2.4 Other Recommendations**

None

### 3.0 Committee Records

#### 3.1 Minutes of Meetings

Meetings of the Technical Committee 8 were held on December 11, 1979 in Gaithersburg, Maryland, on February 19, 1980 in Boulder Colorado and on May 22, 1980 at Gaithersburg, Maryland. Minutes of these meetings are presented below.

Minutes of Meeting No. 1 Committee 8  
Architectural, Mechanical and Electrical  
Tentative Seismic Provisions Project  
National Bureau of Standards  
Gaithersburg, Md.

December 11, 1979

Members in attendance:

<u>Name</u>	<u>Representative of</u>
Robert Sockwell, Chairman	American Institute of Architects
Bruce Olsen	American Society of Civil Engineers
Shigeki Hiratsuka	American Society of Heating, Refrigerating and Air Conditioning Engineers
Philip Lathrap	American Society of Mechanical Engineering
Stephen Heath	American Society of Plumbing Engineers
Joseph Wintz	Brick Institute of America
Mark Swatta, Vice Chairman	Interagency Committee on Seismic Safety in Construction
George Gibson	National Elevator Industry, Inc.
Tom Wosser	Applied Technology Council
Christopher Arnold	Building Seismic Safety Council
Tom Faison, Secretariat	National Bureau of Standards
Jim Shaver	National Bureau of Standards
Visitors	None

Tom Faison, as Secretariat, opened the meeting of Committee 8 by asking that members introduce themselves, give their affiliation and some background material regarding professional interests. The first order of business was the election of a chairman. After a short discussion,

Mr. Sockwell, the AIA representative, was nominated and elected without opposition. Mr. Sockwell requested that a vice chairman be selected. Mr. Swatta, the ICSSC representative, was approved to serve as vice chairman.

#### Future Meeting Location

After considerable discussion, the Denver, Colorado area was selected as the site for the next meeting. The dates of February 19-20, 1980 were chosen. A two-day session is anticipated and an attendance of 25-50 is projected. NBS will make arrangements for the meeting at the NBS Boulder site in Boulder, Colorado. If space is not available at the Boulder site, the meeting will be held at the Denver Airport. Notification of the meeting with details on time and location will be sent out at a later date.

#### Resource Material

Members requesting copies of ATC 3-06 and NBS Task Note 1100 were given copies of these reports at the meeting.

#### Action Items

There were several issues discussed that required action.

#### Action by NBS

As a source of potential candidates to receive announcements of the upcoming public meeting February 19-20, 1980, it was suggested that the ATC file be searched to make sure that individuals or organizations which made comments on the first generations of the ATC Provisions are made aware of the upcoming meeting.

Response: This information will be useful in developing a distribution list.

#### Action by NBS

It was requested that comments be assembled which were submitted during the earlier cycles of the ATC Provisions and which relate to Committee 8 activities. These comments should be circulated to Committee 8 members.

Response: Because of the large number of comments and the significant change in the document from earlier drafts to its present form it was decided that not all comments would be circulated. A number of comments have been chosen that are felt to be representative.

Note: The committee resolved that the comments on earlier drafts are to be reviewed for information only and it is not the intent that the committee resolve or try to answer these comments.

Action by NBS

Prepare a complete listing of the membership list of Committee 8 giving addresses and telephone numbers. Membership list of the Coordinating Committee was also requested.

Response: Membership list will be sent to members.

Action by NBS

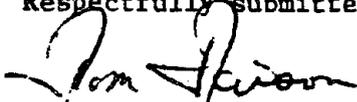
Clarification is needed on voting procedures. Can members of the committee abstain from voting?

Response: Yes, but everyone is encouraged to vote.

Is the simple majority determined based upon the membership or those voting?

Response: The simple majority is based upon those voting, thus it is important that all members participate in voting upon issues.

Respectfully submitted,



Tom Faison, Secretary

Minutes of Meeting No. 2 Committee 8  
Architectural, Mechanical and Electrical  
Tentative Seismic Provisions Project  
National Bureau of Standards  
Boulder, Colorado  
February 19, 1980

Members Present:

Robert Sockwell, Chairman  
Mark Swatta, Vice Chairman  
Joseph Wintz  
Bruce Olsen  
Stephen Heath  
Tom Wosser  
Christopher Arnold  
Jim Shaver  
Tom Faison

Members Absent:

Shigeki Hiratsuka  
Philip Lathrap  
George Gibson

Visitors:

None

The Meeting was opened by Chairman Sockwell at 9:07 a.m.

The minutes of the December 11, 1979 meeting were accepted as distributed.

An issue was raised for discussion regarding those organizations that were listed as potential members of Committee 8 but had not sent representatives. The discussion dealt specifically with the status of participation for: IEEE, NEMA and NFPA. The Secretary was directed to determine if the organizations had submitted a letter declining to participate.

1. Consideration of comments from the Brick Institute of America.

Comments were presented by Joseph Wintz.

Issue 1 Section 8.2.4 Component Deformation - Exception

ATC recommendation was accepted by BIA thus comment was withdrawn.

Issue 2 Section 8.2.5 Out-of-Plane Bending

Motion made by Wintz, seconded by Swatta.

Change 8.2.5 to read, "Transverse or out of plane bending or deformation of a component or system which is subjected to forces as determined in Formula 8.1 shall not exceed the deflection capability of the component or system."

Change Commentary 8.2.5 third sentence to read "This is particularly important for systems composed of brittle materials and/or low flexural strength materials." Motion passed 5-0.

Issue 3 Table 8.B Seismic Coefficient and Performance Characteristic Levels Required for Architectural Systems or Components.

Several motions were proposed.

Motion was made to eliminate Footnote 4. Failed to pass.

Motion was made to retain current wording in Footnote 4. Failed to pass.

Motion was made to revise Table 8.B so that the L for Exterior Nonbearing Walls and Wall Attachments be changed to G and eliminate Footnote 4 and substitute Footnote 1 in place of 4. Failed to pass.

Motion made by Olsen, seconded by Heath as follows, "Footnote 4 - Shall be raised one performance level if the area facing the exterior wall is normally accessible within a distance of 10 feet plus one foot for each floor height."

Motion passed 5-0.

Issue 4 Table 8.B Veneers

Motion by Wintz, seconded by Swatta.

Change "Veneers" to "Veneer Attachments."

Motion passed 5-0.

A suggestion was made that Committee 12 "Masonry" be made aware of the need for seismic design standards for veneers.

Prestressed Concrete Institute Comments

Issue 1 Section 8.2.3 Exterior Wall Panel Attachment

A motion was made by Swatta, seconded by Wintz that the ATC recommendation for no changes be accepted. Motion passed 5-0.

Issue 2 Section 8.2.2 Forces

Motion made by Swatta and seconded by Wintz, passed 5-0, to accept ATC recommendation for no changes. The argument was nonpersuasive as no specific reference was given for UBC-79 practice.

Elevator Industry comments

It was agreed by Committee 8 that greater consideration of elevator requirements should be given. Chairman Sockwell appointed a task force to develop draft requirements. The task force is comprised of Mr. George Gibson, Chairman, along with Mr. Philip Lathrap, Mr. Christopher Arnold and Mr. Tom Wosser. The draft requirements are to be circulated to the committee prior to the next scheduled meeting which is tentatively scheduled for Boulder, Colorado the last week of April 1980.

Action Items

1. Determine the official action taken with regard to IEEE, NEMA and NFPA participation on Committee 8. Have these organizations declined to participate?
2. Prepare responses to the three sets of comments. Responses will include the ATC recommendation along with the action taken at the Boulder meetings.

Respectfully submitted,



Tom Faison, Secretary

cc: Roland Sharpe  
E.V. Leyendecker  
E.O. Pfrang

Minutes of Meeting No. 3 Committee 8  
Architectural, Mechanical and Electrical  
Tentative Seismic Provisions Project  
National Bureau of Standards  
Gaithersburg, MD  
May 22, 1980

Members Present:

Robert Sockwell  
Mark Swatta  
Shigeki Hiratsuka  
George Gibson  
Joseph A. Wintz, III  
Tom Wosser  
James Shaver  
Tom Faison

Members Absent:

Bruce Olsen  
Steven Heath  
Philip Lathrap  
Christopher Arnold

Visitors:

None

The Vice Chairman Mark Swatta opened the meeting as Chairman Sockwell was delayed in arriving. The draft requirements prepared by George Gibson were distributed and studied since most members had insufficient time to prepare comments on the draft material on Elevator Design Requirements prior to the May 22 meeting. Mr. Gibson explained that the draft requirements, Tentative Seismic Provisions for Elevator Equipment, were summarized from the ANSI-A 17.1 Elevator Safety Code Proposed A 17 Seismic Regulations (copy attached).\* Mr. Swatta raised issues related to the Tentative Seismic Provisions for Elevator Equipment, such as: how to deal with references; the application of provisions for different earthquake zones; the need to present the provisions in ATC format; and the extent of coverage needed for elevator design.

Through group discussion, it was decided that the elevator systems not subject to the ATC Tentative Provisions could be adequately described through the use of an additional exception which could be located in Section 8.1 of Chapter 8. Reference can be made to attached Ballot Item (1) for exact wording.

It was proposed that a new Section 8.4 on Elevator Design Requirements be developed in the ATC format which would make use of the formulas the tables of Chapter 8. New material was developed from the ANSI A 17 Seismic Regulations which specifies "Wc" for various elements or components of elevators so that the existing relationship (Formula 8-1) can be used. New material is also proposed on: Seismic Controls; Retainer Plates; and Deflection Criteria. The attachment designated Ballot Item (2) presents the wording for the new proposed Section 8.4.

Tables 8-B and 8-C were modified through slight changes in wording and the addition of new material for two entries, "Elevator and Hoistway Structural Systems" for Table 8-B and "Elevator Machinery Controller Anchorages" for Table 8-C. See attached Ballot Items (3) and (4) for detailed wording.

The letter which was circulated to the committee by Mark Swatta was discussed and it was recommended that Chairman Sockwell prepare a response to be directed to Dr. E. V. Leyendecker requesting that Technical Committee 8 be retained for use in an advisory capacity to react to proposed procedures and plans for carrying out Phase II of the project.

\* Material not included as part of this report.

Ballot Item 1

(New exception to be added to Section 8.1)

Section 8.1 GENERAL REQUIREMENTS

Exceptions:

3. Elevator systems which are in buildings assigned to Seismic Hazard Exposure Group I and are located in areas with a Seismicity Index of 1 or 2 or which are in buildings assigned to Seismic Hazard Exposure Group II and are located in areas with Seismicity Index of 1 are not subject to the provisions of this chapter.

Ballot Item 2

(New Section to be added to Chapter 8)

8.4 ELEVATOR DESIGN REQUIREMENTS

8.4.1 REFERENCE DOCUMENT

The design and construction of elevators and components shall conform to the requirements of ANSI A17.1, American National Standard Safety Code for Elevators, Dumbwaiters, Escalators and Moving Walks, and the Proposed A17 Seismic Regulations, except as modified by provisions of this chapter.

8.4.2 ELEVATOR AND HOISTWAY STRUCTURAL SYSTEM

Elevators and hoistway structural systems shall be designed to resist seismic forces in accordance with formula 8-1 and Table 8-B.

$W_c$  is defined as follows:

Element	$W_c$
Traction Car	$C + .4L$
Counterweight	$W$
Hydraulic	$C + .4L + .25P$

C is weight of car

L is rated capacity

W is weight of counterweight

P is weight of plunger

8.4.3 ELEVATOR MACHINERY AND CONTROLLER ANCHORAGE

Elevator machinery and controller anchorage shall be designed to resist seismic forces in accordance with formula 8-2 and Table 8-C.

8.4.4 SEISMIC CONTROLS

All elevators with a speed of 150 fpm or greater shall be furnished with signaling devices as follows

- (a) A seismic switch device to provide an electrical alert or command for the safe automatic emergency operation of the elevator system.
- (b) A counter weight displacement or derailment device to detect lateral motion of the counterweight. A continuous signal from this device or a combination of signals from (a) and (b) will initiate automatic emergency shutdown of the elevator system.

8.4.5 RETAINER PLATES

Retainer plates are required top and bottom of the car and counterweight except where safety stopping devices are provided. The depth of engagement with the rail shall be not less than the side running face of the rail.

8.4.6 DEFLECTION CRITERIA

The maximum deflection of guide rails, including supports, shall be limited to prevent total disengagement of the guiding members or retainer plates from the guide rails' contact surface.

Ballot Item 3

Changes to Table 8-B

1. Change entry under Partitions - "Elevators and Shafts" to Elevator Shafts.

2. Add the following new entry:

<u>Architectural Components</u>	<u>Cc Factor</u>	<u>III</u>	<u>II</u>	<u>I</u>
<u>Elevator and Hoistway Structural Systems</u>				
- Structural frame	1.25	S	G	G
- Guiderails and brackets	1.25	S	G	G
- Car and counterweights	1.25	S	G	G

25

Ballot Item 4

Changes to Table 8-C

1. Add the following new entry:

<u>Mechanical/Electrical Components</u>	<u>C<sub>c</sub> Factor</u>	<u>III</u>	<u>II</u>	<u>I</u>
Elevator Machinery Controller Anchorage	1.25	S	G	G

### 3.2 Roster

#### COMMITTEE 8: Architectural, Mechanical, and Electrical

##### American Institute of Architects

Mr. Robert Sockwell (Chairman)  
AIA Research Corp.  
1735 New York Ave., N.W.  
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##### American Society of Heating, Refrigerating and Air Conditioning Engineers

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##### American Society of Mechanical Engineering

Mr. Philip Lathrap  
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Committee 8 (continued)

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Interagency Committee on Seismic Safety in Construction

Mr. Mark Swatta  
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National Elevator Industry, Inc.

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Mr. Christopher Arnold  
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Committee 8 (continued)

National Bureau of Standards

Mr. Tom Faison  
Secretariat  
Tentative Seismic Provision Project  
Committee 8, Architectural, Mechanical and Electrical  
National Bureau of Standards  
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Washington, D.C. 20234

Phone: 301-921-3293

Dr. James R. Shaver  
Tentative Seismic Provision Project  
Committee 8, Architectural, Mechanical and Electrical  
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Phone: 301-921-2186

### 3.3 Selected Committee Correspondence and Applied Technology Council Comments

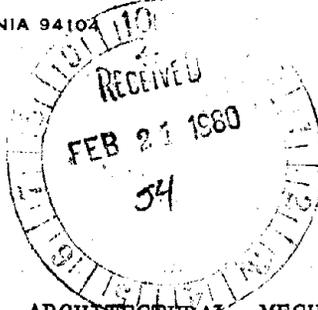
Presented below are several correspondences transmitted or received during the course of the Committee's actions.

1. ATC Comments on Chapter 8, ATC 3-06, Tom Wosser (recommendations related to comments received, Attachment A, not included)
2. Trial Design Issue for Technical Committee 8,
  - 2a. - Swatta's letter of May 14, 1980
  - 2b. - Olsen's letter of May 19, 1980
  - 2c. - Kirkland's letter of June 23, 1980

**H. J. DEGENKOLB & ASSOCIATES, ENGINEERS**

350 SANSOME STREET SAN FRANCISCO, CALIFORNIA 94104

TELEPHONE 392-6952



HENRY J. DEGENKOLB  
R. GORDON DEAN  
GEORGES E. BASSETT  
THOMAS D. WOSSER  
LORING A. WYLLIE, JR.  
TED J. CANON  
GEORGE E. GREENWOOD  
CHRIS D. POLANO

February 11, 1980

To: MEMBERS OF COMMITTEE 8 - ARCHITECTURAL, MECHANICAL AND ELECTRICAL  
OF THE NBS TENTATIVE SEISMIC PROVISION PROJECT

✓ Tom Faison, Secretary  
Robert Sockwell, Chairman  
Bruce Olsen  
Shigeki Hiratsuka  
Philip Lathrap  
Stephen Heath

Joseph Wintz  
Mark Swatta  
Christopher Arnold  
James Shaver  
George Gibson

From: Tom Wosser, ATC Representative

Reference: COMMENTS ON CHAPTER 8, ATC 3-06

Gentlemen:

We have received only three sets of comments, those from Brick Institute of America, Otis Elevator and the Prestressed Concrete Institute. You have all received copies of the comments, so I will not repeat them here except to refer to the organization, section number and section title.

BRICK INSTITUTE OF AMERICA

. Section 8.2.4 COMPONENT DEFORMATION - EXCEPTION

I disagree with the comment. Exception 1 in Section 8.1 does not except all "L" performance level components.

. Section 8.25 OUT-OF-PLANE BENDING

This section was an attempt to apply deflection limitations to wall framing systems, for out-of-plane bending. Although the commentary refers to "conventional limits based upon deflections as a proportion of the span", the Provisions themselves do not include any design criteria. In my opinion, Section 8.2.5 does not add anything to Section 8.2. It is merely a "flag".

The comment refers to a masonry veneer system. Certainly, if the veneer is properly attached to the framing elements of the system, it is the framing elements themselves that would have to meet the design requirements. I do not believe the recommended change accomplishes anything particularly significant.

Perhaps a better solution is to include a specific section such as that proposed for the new State of California Title 24:

TABLE NO. 2 23-L

Maximum Allowable Deflection Normal to the Surface  
 of Wall Element Under Lateral Force Loading

Wall Element	Loading Condition	Max. Allow. Deflection*
Exterior Walls-brittle construction.....	Seismic or Wind	L/240
Exterior Walls-flexible construction.....	Seismic or Wind	L/180
Veneered Stud Walls (Wood or Metal Studs):		
Anchored Veneers.....	Seismic	L/600

\*L is the span between vertical or horizontal supports.

Table 8-B

(a) Performance Level of Exterior Nonbearing Walls

For Seismic Hazard Exposure Group I, the committee intended a higher performance characteristic for exterior nonbearing walls as well as for wall attachments if the building is located in an urban area. I recommend that the footnote should remain.

(b) Veneers

The  $C_c$  factor for veneers was based on the traditional 100% G at working stress design for UBC Zone 4 conditions. Considering the workmanship factors, exposure to weather conditions and occasional unfortunate experience observed in building facade performance, I recommend that the  $C_c$  factor remain at 3.0.

Perhaps the Masonry section should include some specific veneer requirements such as those contained in UBC.

OTIS ELEVATOR COMPANY

. General

It was not the intent of ATC 3-06 to increase design requirements for elevator systems beyond those normally in use in California today. The points discussed by Otis Elevator are well taken and serve to point out that elevators "fell between the cracks" or perhaps "down the shaft" in the sometimes conflicting efforts of the architectural subcommittee and the mechanical and electrical subcommittee. This oversight will require a significant change to ATC 3-06 requirements for elevators.

In the State of California, the controlling requirements are contained in "Title 8 Elevator Safety Orders". These requirements are repeated in Part 7 of Title 24. The proposed new Title 24 contains specific recommendations for elevators. (See Attachment A.) I suggest that these be modified as required to suit the format for incorporation into ATC 3-06. The  $C_c$  factors can be adjusted accordingly and the requirements for "Earthquake Emergency Operation" needs to be considered for the various performance characteristic levels.

I would certainly agree that any certification of any mechanical, electrical, or elevator "components" should be at the operating unit assembly level, rather than each individual part.

. Section 8.3.2 FORCES

The requirements should be modified to conform to California Elevator Safety Orders.

. Section 8.3.2 FORCES

These factors are all defined. "hx" refers to the level under consideration and hn refers to the top level.

There should not be any variation with height for guiderail or guiderail connection design.

. Section 8.3.2 FORCES

Yes, horizontal and vertical forces are assumed to be simultaneous.

. Section 10.2 STRENGTH OF MEMBERS

- (a)  $\phi$  for elevator framing beams would be 0.90, yielding  $f_b = F_y$ .
- (b) The allowable shearing stresses for bolts might be covered under special elevator design requirements.

PRESTRESSED CONCRETE INSTITUTE

. Section 8.2.3 EXTERIOR WALL PANEL ATTACHMENT

I disagree with this comment.  $C_c$  value for wall attachment is already high and beyond this, detailing ductility is the important requirement.

Page 4  
February 11, 1980

. Section 8.2.2 FORCES

I disagree with this comment. The  $F_p$ , on parts of structures, is normally considered as a horizontal force, from any direction.

Very truly yours,



Thomas D. Wosser

TDW/dq

cc: Roland Sharpe

**Veterans  
Administration**

May 14, 1980



To Members of Technical Committee 8, Architectural,  
Mechanical & Electrical - Tentative Seismic Provisions

Robert Sockwell  
Bruce C. Olsen  
Shigeki Hiratsuka  
Stephen D. Heath  
Joseph A. Wintz, III  
Philip Lathrap

George Gibson  
Tom Wosser  
Christopher Arnold  
James R. Shaver  
Tom Faison

Dear Member:

SUBJECT: Trial Design Issues for Technical Committee 8

The representatives of the Interagency Committee on Seismic Safety in Construction met on May 6, to discuss the ATC-3-06 design provisions. An extension of Technical Committee 8 scope was discussed as outlined in paragraph #1 on the attached sheet. We ask that you consider this suggestion as a topic for discussion at our next meeting on May 22, 1980.

Sincerely,

*Mark Swatta*  
Mark Swatta

Attachment

cc: Dr. Charles C. Thiel



# FEDERAL EMERGENCY MANAGEMENT AGENCY

Washington, D.C. 20472

May 6, 1980

Mr. William Moore  
Chairman, Building Seismic  
Safety in Construction Council  
1015 15th Street, N.W.  
Washington, D.C. 20005

Dear Bill:

On May 6 the Interagency Committee on Seismic Safety in Construction representatives met to discuss our participation in the nine subcommittees currently considering the ATC 3-06 design provisions. We reiterate the points made in our March 27 letter and ask that the recommendations contained therein be reviewed at the earliest possible time. We believe these points should be made to the subcommittees prior to their recommendations being balloted. We have three additional points to make:



1. Subcommittee 8 on Architectural, Mechanical and Electrical systems has apparently not considered how trial designs may be useful in judging the efficacy of their recommendations. To the best of our knowledge, ATC's proposed trial design program will only deal with structural systems. The incorporation into these design provisions architectural, mechanical and electrical considerations is a major innovation. Thus, we strongly recommend that the subcommittee give consideration to the trial design issue and make such recommendations, as appropriate, to the Coordination Committee.

2. Our representative to Subcommittee 9, Regulatory Use, has left us with a concern about whether the Subcommittee will resolve the issues before it in a timely manner. There appears to be a large number of issues still before the Committee. We urge that the Council encourage the Subcommittee to complete its work at the same time that the other Subcommittee's are completing theirs.

3. We have some concern that Subcommittee 4, Concrete, is proposing to expand Chapter 11 to include precast and prestressed concrete. Yet the design provisions are not fully developed nor have they been experimentally validated. We are concerned that this potentially represents a significant departure from the original intent of review and refinement of the ATC Design Provisions for which we can not make legitimate technical arguments.

In net, we believe that the Subcommittees are working well and expect them to recommend a thoughtful, technically competent set of provisions for consideration by the Council membership.

Sincerely yours,

Charles C. Thiel  
Chairman, Interagency  
Committee on Seismic Safety  
in Construction

CC: ICSSC Representatives on Subcommittees  
E. Pfrang/R. Wright/E. Leyendecker/R. Johnson

BRUCE C. OLSEN  
*Consulting Engineer*



1411 FOURTH AVENUE

SEATTLE, WASHINGTON 98101

(206) 624-7045

May 19, 1980

Mr. Tom Faison, Secretary  
Technical Committee 8 - Tentative Seismic Provisions  
National Bureau of Standards  
Room B168, Building 226  
Washington, D. C. 20234

Subject: Trial Design Issues for Technical Committee 8

Dear Tom:

I have just received a letter dated May 14, 1980, from Mark Swatta, accompanied by an enclosure making reference to trial designs relating to architectural mechanical and electrical systems. You have received a copy of the same material.

The ATC proposal for the trial design program is basically aimed at the structural systems it is true. At the same time, incorporated in the proposal there has been a segment relating to investigation of architectural, mechanical and electrical systems in conjunction with at least a part of the structures undergoing the trial design. While these "non-structural" systems are nominally separate from the basic structural supporting and resisting system, the response to the requirements is ordinarily ultimately referred back to a structural engineer. This may not necessarily be the original design engineer for the building, but it will be a structural design function. In view of the fact that the fundamental data concerning the trial design structures will be developed by the contractor performing the trial design, such information as fundamental period, higher modes, and related information will be developed by the basic contractor, it would appear that an extension of that work could conveniently incorporate questions raised through Subcommittee 8.

While I sit on this committee as a representative of ASCE, I must also admit to being a member of the Board of Directors of the Applied Technology Council at the present time. If the Committee will overlook this potential for bias, they may accept the suggestion that the response to "non-structural" problems can very well be handled within the ATC proposal. I am sure that any suggestions relative to specific problems

Mr. Tom Faison  
May 19, 1980  
Page Two

which might be submitted by the Committee to the Coordination Committee, if also directed to the Applied Technology Council, would be gratefully received and carefully considered by that body in administering the evaluation program.

Very truly yours,



Bruce C. Olsen

BCO:br

cc: Roland L. Sharpe  
Applied Technology Council

BUILDING SEISMIC SAFETY COUNCIL

1015 15th Street, N.W., Suite 700  
Washington, D.C. 20005  
(202) 347-5710

June 23, 1980

To: NBS Technical Committees for the Review and  
Refinement of Tentative Seismic Provisions  
for Buildings

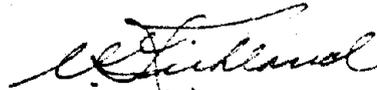
Committee #1 - Seismic Risk Maps  
Committee #2 - Structural Design  
Committee #3 - Foundations  
Committee #4 - Concrete  
Committee #5 - Masonry  
Committee #6 - Steel  
Committee #7 - Wood  
Committee #8 - Architectural, Mechanical,  
and Electrical  
Committee #9 - Regulatory Use

Enclosed is a copy of the first Building Seismic Safety Council newsletter. You will note that on page 3 under "Work Plan Committee" that the NBS Technical Committees 1 through 9 have been retained as Building Seismic Safety Council committees.

A new ad hoc Committee 10-A, comprised of members of the existing Coordinating Committee #10 and the Structural Design Committee #2, with several additional organizational representatives, has been established. Your committees will continue their duties through the completion of the trial designs and development of suitable and appropriate design provisions.

The funding for the trial design phases of the committee work will be included in the FY '81 proposal to the Federal Emergency Management Agency (FEMA).

Sincerely,



Wm. G. Kirkland,  
Acting Executive Director

WGK:lb  
Enclosure

cc: BSSC Board of Direction - no enclosure  
BSSC Work Plan Committee- no enclosure  
BSSC Overview Committee - no enclosure  
Gene C. Brewer  
Edward O. Pfrang  
Charles C. Thiel  
E. V. Leyendecker