NBS-114A (REV. 9-78)

U.S. DEPT. OF COMM. BIBLIOGRAPHIC DATA SHEET	1. PUBLICATION OR REPORT NO. NBSIR 80-2111-7	2. Gov't. Accession No.	PB81-187585

4. TITLE AND SUBTITLE

REVIEW AND REFINEMENT OF ATC 3-06 TENTATIVE SEISMIC PROVISIONS
Report of Technical Committee 7: Wood

5. Publication Date October 1980

6. Performing Organization Code

7. AUTHOR(S)
Charles W. C. Yancey

8. Performing Organ. Report No.

9. PERFORMING ORGANIZATION NAME AND ADDRESS

NATIONAL BUREAU OF STANDARDS
DEPARTMENT OF COMMERCE
WASHINGTON, DC 20234

10. Project/Task/Work Unit No.

11. Contract/Grant No.

12. SPONSORING ORGANIZATION NAME AND COMPLETE ADDRESS *(Street, City, State, ZIP)*

Federal Emergency Management Agency
Washington, D.C. 20472

13. Type of Report & Period Covered Final

14. Sponsoring Agency Code

15. SUPPLEMENTARY NOTES

[ ] Document describes a computer program; SF-185, FIPS Software Summary, is attached.

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 documents 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 the recommendations and records of the commitee charged with review of the provisions for the design and detailing of wood structures. The committee made 14 recommendations for revision to the TENTATIVE PROVISIONS. These recommendations 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.

17. KEY WORDS *(six to twelve entries; alphabetical order; capitalize only the first letter of the first key word unless a proper name; separated by semicolons)*

Building; building codes; building design; earthquakes; engineering; standards; structural engineering; wood

18. AVAILABILITY [X] Unlimited

[ ] For Official Distribution. Do Not Release to NTIS

[ ] Order From Sup. of Doc., U.S. Government Printing Office, Washington, DC 20402, SD Stock No. SN003-003-

[X] Order From National Technical Information Service (NTIS), Springfield, VA. 22161

19. SECURITY CLASS (THIS REPORT) X UNCLASSIFIED

21. NO. OF PRINTED PAGES

20. SECURITY CLASS (THIS PAGE) UNCLASSIFIED

22. Price

USCOMM-DC

NBSIR 80-2111-7

REVIEW AND REFINEMENT OF ATC 3-06 TENTATIVE SEISMIC PROVISIONS

Report of Technical Committee 7: Wood

Daniel H. Brown, Chairman, American Plywood Association
Charles W. C. Yancey, Secretary, National Bureau of Standards
Thomas E. Brassell, American Institute of Timber Construction
Thomas G. Williamson, American Society of Civil Engineering
Marco F. Venturino, Interagency Committee on Seismic Safety in Construction
Roderick B. Buchan, National Forest Products Association
Lawrence A. Soltis, United States Forest Products Laboratory
Edwin G. Zacher, Applied Technology Council
Roy G. Johnston, Building Seismic Safety Council

Prepared for use by the:

Building Seismic Safety Council

Sponsored by:

Federal Emergency Management Agency

Center for Building Technology
National Bureau of Standards
Washington, D.C. 20234
October 1980

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 engineerng 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 documents 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 the recommendations and records of the committee charged with review of the provisions for the design and detailing of wood structures. The committee made 14 recommendations for revisions to the Tentative Provisions. These recommendations 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: Building; building codes; building design; earthquakes; engineering; standards; structural engineering; wood.

TABLE OF CONTENTS

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

Technical Committee 7 held its organizational meeting on Tuesday December 11, 1979 at the National Bureau of Standards. Three of the six designated voting members were in attendence. It should be noted that the American Socity of Civil Engineers - of the six designees - had not named a representative at the time of the meeting. Therefore, only five voting members were expected to be in attendence.

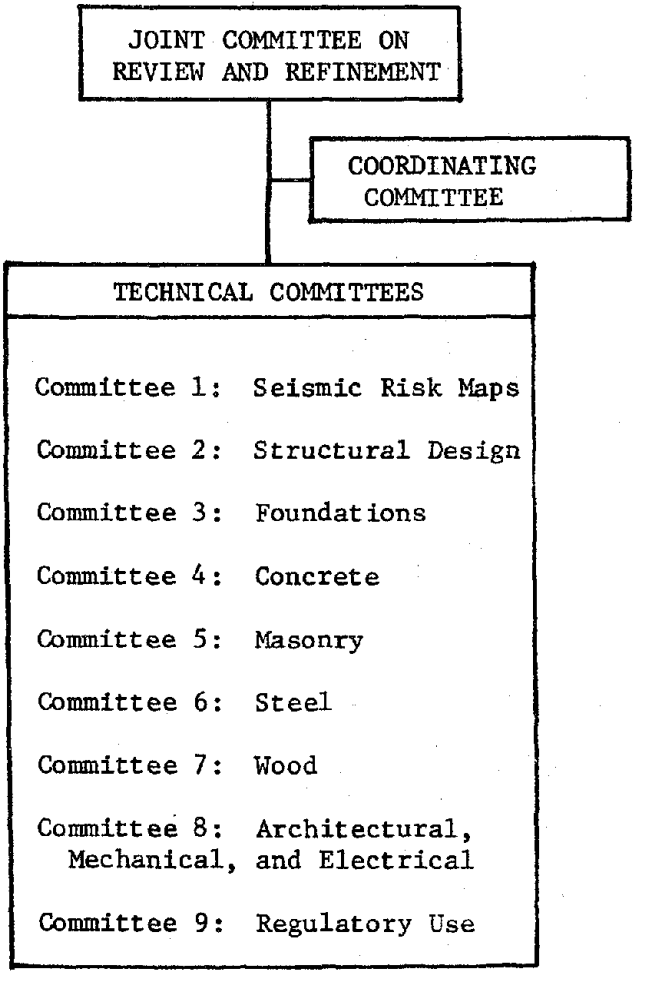

Figure 1: Committee Structure

Mr. Daniel Brown (American Plywood Association) and Mr. Robert Hewett (National Forest Products Association) were elected Chairman and Vice Chairman respectively. Also, Mr. Edwin Zacher (ATC) was selected as the committee's representative to Committee 2 on Structural Design.

The remainder of the day-long meeting was devoted to discussions of some ATC 3-06 provisions of concern to the Committee such as: a) orthogonal connection provisions, b) R and $\emptyset$ factors, and c) computation of the natural period of buildings with relatively flexible diaphragms according to the provisions. Messrs. Brown and Hewett raised a number of prepared questions and comments, and it was expected that some of their concerns would be translated into written proposals for revisions to the ATC 3-06 provisons in Chapter 9.

The one-day Public Meeting scheduled for February 22 in San Diego was cancelled in mid-February for several reasons: 1) the committee had received no response from the public, expressing an interest in attending the meeting; 2) several of the committee members were prohibited by travel limitations from attending; 3) only one set of written comments had been received by the Secretariat; and 4) it was the concensus of the committee that most of the recommendations received from Mr. Daniel Brown could be discussed by phone. No futher meetings were scheduled by the committee.

On 9 January, 1980, a set of written recommendations were received from Mr. Daniel Brown (APA). The transmittal letter was dated 4 January 1980. Concurrently, Mr. Brown sent a copy of his recommendations to the other committee members. Mr. Edwin Zacher (ATC) responded to Mr. Brown's recommendations in a letter dated 1 February 1980. In addition, Mr. Zacher addressed several anticipated comments from other committee members. The Secretariat received no other written recommendations or comments pertaining to Mr. Brown's recommendations. One more sequence of comments by Mr. Brown and response by Mr. Zacher occurred before the evolution of a final set of recommendations for committee ballot.

On 10 March 1980, the Secretariat to Committee 7 received a memorandum from the Secratariat of Committee 9 (Regulatory Use) which contained two review comments from members of Committee 9. One comment was from Mr. David E. Johnson (National Association of Home Builders) who suggested that the guidelines for top plates (para. 9.7.1(B)) be expanded to cover the specific case of studs being located directly beneath the joists. The other comment was from Mr. G. Robert Fuller (Interagency Committee on Seismic Safety in Construction) who suggested that the anchor bolt requirements contained in Section 9.7 be made more stringent. These comments were transmitted to the members of Committee 7 on 24 March 1980 and the members' responses on 31 March. Receiving no other responses to these recommendations, the Secretariat sent a copy of Mr. Zacher's response to each committee member on 6 May 1980 and followed up on the written correspondence with a phone canvass on the dates of May 15 and 16. It was determined from the canvass that the committee members were in agreement with Mr. Zacher's position of not making either of the suggested revisions. This result was conveyed to the Secretariat of Committee 9 in a memorandum dated 29 May 1980, thereby terminating action on the subject recommendations.

A final set of suggested revisions to Chapter 9 and to a couple of other Chapters was prepared by the Secretariat and transmitted to the members of Committee 7 as a letter ballot on 27 May 1980. The recommended revisions stemmed solely from the suggestions of Mr. Daniel Brown and the corresponding responses of Mr. Edwin Zacher. The results of the balloting are indicated beside each ballot item in the set of recommendations included herein.

2.0 Committee Actions

2.1 Recommended Changes

REVIEW AND REFINEMENT OF TENTATIVE SEISMIC PROVISIONS

PROPOSED CHANGE

TECHNICAL COMMITTEE: #7, Wood COMMITTEE ITEM NUMBER: 1

ATC-3-06 SECTION REFERENCE: 9.1

Add new references:

9.15 Plywood Design Specifications, APA, 1978
9.16 Plywood Diaphragm Construction, APA, 1978

FINAL BALLOT: 5 YES
___NO
___ABSTAIN
___DID NOT VOTE

COMMENT ON PROPOSED CHANGE:

Plywood working stresses are included in the Plywood Design Specification. It will be necessary in some cases to check the shear strength of plywood in order to design a plywood diaphragm by the principles of mechanics. This information is not contained in any of the other references in Chapter 9.

REVIEW AND REFINEMENT OF TENTATIVE SEISMIC PROVISIONS

PROPOSED CHANGE

TECHNICAL COMMITTEE: #7, Wood COMMITTEE ITEM NUMBER: 2

ATC-3-06 SECTION REFERENCE: 9.1

Change Reference 9.12 to read:

One- and Two-Family Dwelling Code, 1975*

*One of the affirmative voters made an editorial note that the latest edition of this code is 1979.

FINAL BALLOT: 5 YES
___NO
___ABSTAIN
___DID NOT VOTE

COMMENT ON PROPOSED CHANGE:

As written in 9.12, it appears as though each of the three model codes has a one- and two-family code. The One- and Two-Family Dwelling Code is a single document written by the four model code organizations, the three listed in 9.12 plus the American Insurance Association.

REVIEW AND REFINEMENT OF TENTATIVE SEISMIC PROVISIONS

PROPOSED CHANGE

TECHNICAL COMMITTEE: #7, Wood COMMITTEE ITEM NUMBER: 3(A)

ATC-3-06 SECTION REFERENCE: 9.2

Change the capacity reduction factor, ϕ, for shear on diaphragms and shear walls, from 0.75 to 0.85.

FINAL BALLOT: 5 YES
____NO
____ABSTAIN
____DID NOT VOTE

COMMENT ON PROPOSED CHANGE:

The change was suggested on the basis of the results of a diaphragm test program conducted by the American Plywood Association. It was found that the average load factor against failure was 3.65, which exceeds the product of the multiplying factor, 2, (see Section 9.2) times 0.85 by more than 2. In light of this comparison, the Committee agreed to increase the value of ϕ from 0;75 to 0.85.

REVIEW AND REFINEMENT OF TENTATIVE SEISMIC PROVISIONS

PROPOSED CHANGE

TECHNICAL COMMITTEE: #7, Wood COMMITTEE ITEM NUMBER: 3(B)

ATC-3-06 SECTION REFERENCE: 9.2

Revise the tabulation of strength reduction factors as follows:

All stresses in wood members	$\phi = 1.0$
Bolts and other timber connectors not listed below	$\phi = 1.0$
Shear on carriage bolts not having washers under the head	$\phi = 0.67$
Lag screws and wood screws	$\phi = 0.90$
Shear on diaphragms and shear walls as given in this chapter	$\phi = 0.85$

FINAL BALLOT: 5 YES
____NO
____ABSTAIN
____DID NOT VOTE

COMMENT ON PROPOSED CHANGE:

The change deletes the ϕ values for nails in shear in plywood diaphragms of Group III species members ($\phi = 0.82$) and Group IV species members ($\phi = 0.65$) because these values are included in Tables 9-1 and 9-2 of ATC-3-06. The ϕ value for shear on diaphragms and shear walls was changed from 0.75 to 0.85 per Committee Item No. 3(A). The two previous values of ϕ (0.90 & 3.6/N) for lag screws and wood screws were changed to a single value of $\phi = 0.90$.

REVIEW AND REFINEMENT OF TENTATIVE SEISMIC PROVISIONS

PROPOSED CHANGE

TECHNICAL COMMITTEE: #7, Wood COMMITTEE ITEM NUMBER: 4

ATC-3-06 SECTION REFERENCE: 9.4.1(c)

Delete this subsection.

FINAL BALLOT: 5 YES
____ NO
____ ABSTAIN
____ DID NOT VOTE

COMMENT ON PROPOSED CHANGE:

This change was approved in view of the fact that the 1977 edition of the National Design Specification (Reference 9.1) has covered this requirement.

PROPOSED CHANGE

TECHNICAL COMMITTEE: #7, Wood COMMITTEE ITEM NUMBER: 5

ATC-3-06 SECTION REFERENCE: 9.5.3(A)

Replace the existing language with the following: Reference 9.1 shall be modified as follows: In 8.8.1.4, replace the existing language with "When more than one nail or spike is used in a joint of a frame or similar component, the total design value shall be determined in the same manner as is done in 8.3.2.3." In 8.8.6, change two-thirds to one-half.

FINAL BALLOT: 4 YES (1 with comment)
1 NO
____ ABSTAIN
____ DID NOT VOTE

COMMENT ON PROPOSED CHANGE:

The opinions of the negative voter were that: 1) Section 8.3.2.3 of the National Design Specification (NDS) does not apply to nails; thus the proposed change is inappropriate and is not substantiated, and 2) there is no justification for the suggested change in NDS 8.8.6 since the two-thirds factor has been in the NDS since its inception. The affirmative voter that had comments was of the opinion that Committee 7 should be hesitant to reference the NDS and then to suggest changes in the NDS. He also felt that the modifications suggested for the NDS were based on "gut" feelings rather than fact.

REVIEW AND REFINEMENT OF TENTATIVE SEISMIC PROVISIONS

PROPOSED CHANGE

TECHNICAL COMMITTEE: #7, Wood COMMITTEE ITEM NUMBER: 6

ATC-3-06 SECTION REFERENCE: 9.5.3(B)

Remove this subsection and transfer it to Section 9.6.3.

FINAL BALLOT: 5 YES
____ NO
____ ABSTAIN
____ DID NOT VOTE

COMMENT ON PROPOSED CHANGE:

The Committee agreed with the imposition of special requirements in Category D construction in so far as plywood over gypsum sheathing is concerned. It was felt that prohibiting the use of gypsum sheathing as a part of the seismic resisting system was not justified for Category C construction. This opinion was based on the results of some shear tests on walls using plywood applied over gypsum wallboard. The average load factor obtained in the testing program was greater than 4.5.

REVIEW AND REFINEMENT OF TENTATIVE SEISMIC PROVISIONS

PROPOSED CHANGE

TECHNICAL COMMITTEE: #7, Wood COMMITTEE ITEM NUMBER: 7

ATC-3-06 SECTION REFERENCE: 9.6.3

The existing sentence in subsection 9.5.3(B), without the heading, should become the first sentence in Section 9.6.3.

FINAL BALLOT: 5 YES
____ NO
____ ABSTAIN
____ DID NOT VOTE

COMMENT ON PROPOSED CHANGE:

REVIEW AND REFINEMENT OF TENTATIVE SEISMIC PROVISIONS

PROPOSED CHANGE

TECHNICAL COMMITTEE: #7, Wood COMMITTEE ITEM NUMBER: 8

ATC-3-06 SECTION REFERENCE: 9.7.1(A)

Section 9.7.1 can be modified as follows: ...provided at not over 6 feet on center for buildings two stories, 20 feet, or less in height and at not over 4 feet on center for buildings over this height but three stories, or 35 feet or less in height. Anchor bolts shall have a minimum embedment of 8 diameters.

FINAL BALLOT:
3 YES
2 NO
___ ABSTAIN
___ DID NOT VOTE

COMMENT ON PROPOSED CHANGE:

The proposed change was predicated on the fact that the Uniform Building Code has permitted anchor bolt spacing of 6 feet for many years with no documented detrimental consequences in recent earthquakes including the 1971 San Fernando, California Earthquake. One minority view was that in the Great Alaska Earthquake there were some sill/foundation anchorage failures caused by undefined forces. Until we know what kind of forces are acting, the anchorage requirements should be more, rather than less, conservative. A second view was that bolts should not be less than 5/8 in diameter at 4'0" on center with at least 7 in embedment. The need for strengthening the anchorage provision was also suggested by a member of Technical Committee #9.

REVIEW AND REFINEMENT OF TENTATIVE SEISMIC PROVISIONS

PROPOSED CHANGE

TECHNICAL COMMITTEE: #7, Wood COMMITTEE ITEM NUMBER: 9

ATC-3-06 SECTION REFERENCE: 9.7.1(c)

Delete the word "stud" at the end of the sentence and add the following "...studs unless specifically excepted in Section 9.7.3."

FINAL BALLOT: 4 YES
___ NO
1 ABSTAIN
___ DID NOT VOTE

COMMENT ON PROPOSED CHANGE:

PROPOSED CHANGE

TECHNICAL COMMITTEE: #7, Wood COMMITTEE ITEM NUMBER: 10

ATC-3-06 SECTION REFERENCE: 9.7.3(B)

Add the sentence: "Blocking need not be provided at horizontal joints."

FINAL BALLOT: 4 YES
___ NO
1 ABSTAIN
___ DID NOT VOTE

COMMENT ON PROPOSED CHANGE:

It was the view of the proponent of this change that for conventional light-timber construction it is not necessary to block horizontal joints in plywood sheathing. The primary basis for this opinion was the results of four tests on walls which were sheathed with 5/16" cedar panels. The minimum ultimate load obtained for these Group IV species (i.e. the lowest strength group recognized for sheathing applications) was 4400 lb. It is implied that this magnitude is sufficiently high to preclude the failure of the plywood bracing panels.

PROPOSED CHANGE

TECHNICAL COMMITTEE: #7, Wood COMMITTEE ITEM NUMBER: 11

ATC-3-06 SECTION REFERENCE: Table 9-1

- Change the table heading to read: ALLOWABLE SHEAR IN POUNDS PER FOOT FOR HORIZONTAL PLYWOOD DIAPHRAGMS WITH FRAMING OF DOUGLAS FIR-LARCH OR SOUTHERN PINE[1]

- The entry under 10d nails should be corrected from 3/8" to 5/8".

- Revise Footnote 1 as follows: [1]Space nails 10 inches on center for floors and 12 inches on center for roofs along intermediate framing members. Allowable shear values for nails in framing member of other species set forth in Table 8.1A NDS (REF. 1) shall be calculated for all grades by multiplying the values for nails in STRUCTURAL I by the following factors: Group III, 0.82 and Group IV, 0.65.

- Change the wording under the column heading "BLOCK DIAPHRAGMS" to read: Nail spacing at diaphragm boundaries (all cases), at continuous panel edges parallel to load (Cases 3 and 4) and at all panel edges (Cases 5 and 6).

FINAL BALLOT: 5 YES
____ NO
____ ABSTAIN
____ DID NOT VOTE

COMMENT ON PROPOSED CHANGE:

This set of editorial changes is necessary to make Table 9-1 agree with Table No. 25-J of the 1979 Edition of the Uniform Building Code.

REVIEW AND REFINEMENT OF TENTATIVE SEISMIC PROVISIONS

PROPOSED CHANGE

TECHNICAL COMMITTEE: #7, Wood COMMITTEE ITEM NUMBER: 12

ATC-3-06 SECTION REFERENCE: Table 9-2

Revise the table as shown on the attached sheet.

FINAL BALLOT: 5 YES
____NO
____ABSTAIN
____DID NOT VOTE

COMMENT ON PROPOSED CHANGE:

The table was updated to agree with Table No. 25-K of the 1979 Edition of the Uniform Building Code. This is primarily an editorial change involving the re-arrangement of columsn with no changes in the numbers in the table. The previously omitted allowable shear value (200) for siding attached with 8d nails at 4 inches on centers was inserted.

TABLE NO. 9-2 —ALLOWABLE SHEAR FOR WIND OR SEISMIC FORCES IN POUNDS PER FOOT FOR PLYWOOD SHEAR WALLS WITH FRAMING OF DOUGLAS FIR-LARCH OR SOUTHERN PINE[1]

PLYWOOD GRADE	MINIMUM NOMINAL PLYWOOD THICKNESS (Inches)	MINIMUM NAIL PENETRATION IN FRAMING (Inches)	NAIL SIZE (Common or Galvanized Box)	PLYWOOD APPLIED DIRECT TO FRAMING — Nail Spacing at Plywood Panel Edges 6	4	2½	2	NAIL SIZE (Common or Galvanized Box)	PLYWOOD APPLIED OVER ½-INCH GYPSUM SHEATHING — Nail Spacing at Plywood Panel Edges 6	4	2½	2
STRUCTURAL I	5/16	1¼	6d	200	300	450	510	8d	200	300	450	510
	⅜	1½	8d	230[3]	360[3]	530[3]	610[3]	10d	280	430	640[3]	730[3]
	½	1⅝	10d	340	510	770[2]	870[2]	—	—	—	—	—
C-D, C-C, STRUCTURAL II and other grades covered in U.B.C. Standard No. 25-9	5/16[4]	1¼	6d	180	270	400	450	8d	180	270	400	450
	⅜	1½	8d	220[3]	320[3]	470[3]	530[3]	10d	260	380	570[3]	640[3]
	½	1⅝	10d	310	460	690[2]	770[2]	—	—	—	—	—
			NAIL SIZE (Galvanized Casing)					NAIL SIZE (Galvanized Casing)				
Plywood Panel Siding in Grades Covered in U.B.C. Standard No. 25-9	5/16	1¼	6d	140	210	320	360	8d	140	210	320	360
	⅜	1½	8d	130[3]	200[3]	300[3]	340[3]	10d	160	240	410	410

[1]All panel edges backed with 2-inch nominal or wider framing. Plywood installed either horizontally or vertically. Space nails at 6 inches on center along intermediate framing members for ⅜-inch plywood installed with face grain parallel to studs spaced 24 inches on center and 12 inches on center for other conditions and plywood thicknesses.

Allowable shear values for nails in framing members of other species set forth in Table No. 8.1A NDS (REF. 1) shall be calculated for all grades by multiplying the values for common and galvanized box nails in STRUCTURAL I and galvanized casing nails in other grades by the following factors: Group III, 0.82 and Group IV, 0.65.

[2]Reduce tabulated allowable shears 10 percent when boundary members provide less than 3-inch nominal nailing surface.

[3]The values for ⅜-inch-thick plywood applied direct to framing may be increased 20 percent, provided studs are spaced a maximum of 16 inches on center or plywood is applied with face grain across studs or if the plywood thickness is increased to ⅜ inch or greater.

REVIEW AND REFINEMENT OF TENTATIVE SEISMIC PROVISIONS

PROPOSED CHANGE

TECHNICAL COMMITTEE: #7, Wood COMMITTEE ITEM NUMBER: 13

ATC-3-06 SECTION REFERENCE: 1.3.1

Modify the last line to read "conventional light timber construction as permitted in Section 9.5."

FINAL BALLOT:
3 YES
1 NO
ABSTAIN
1 DID NOT VOTE

COMMENT ON PROPOSED CHANGE:

The revision subjects one- and two-story wood frame dwellings, not over 35 feet in height and located in areas having Seismicity Index 3 or 4, to the requirements of Seismic Performance Category C (Section 9.5). As was indicated by the person not voting, the intent of the change is not clear. The negative voter was strongly opposed to this change in that he felt the provisions of Section 9.7 as presently required are more than adequate to assure a safe building.

REVIEW AND REFINEMENT OF TENTATIVE SEISMIC PROVISIONS

PROPOSED CHANGE

TECHNICAL COMMITTEE: #7, Wood COMMITTEE ITEM NUMBER: 14

ATC-3-06 SECTION REFERENCE: 14.6

Add to the reference documents: 1) Plywood Design Specification, 1978, APA and 2) Plywood Diaphragm Construction 1978, APA.

FINAL BALLOT: 5 YES
____ NO
____ ABSTAIN
____ DID NOT VOTE

COMMENT ON PROPOSED CHANGE:

This is an editorial change.

3.0 Committee Records

3.1 Minutes of Meetings

The minutes of the only meeting of the committee, held on December 11, 19879, follow this page.

Minutes of First Meeting

Technical Committee 7: Wood

Review and Refinement of Tentative Seismic

Provisions (ATC 3-06)

The first meeting of Technical Committee 7 was held on Tuesday, December 11, 1979 at the National Bureau of Standards. The meeting was called to order at about 12:10 p.m. by Acting Chairman Charles Yancey. The following members were in attendance:

Name	Affiliation
Robert Hewett	National Forest Products Association
Dave Gromala	U. S. Forest Products Laboratory
Daniel H. Brown	American Plywood Association
Edwin G. Zacher	Applied Technology Council
Charles Yancey	National Bureau of Standards
Roy G. Johnston	Building Seismic Safety Council

It was announced that the American Society of Civil Engineers had not yet named a representative to Committee 7. Mr. Thomas Brassell, the committee representative from the American Institute of Timber Construction and Mr. Marco Venturino, the committee representative from the Interagency Committee on Seismic Safety in Construction, were not present. Mr. William Kirkland was a visitor at the meeting.

The first agenda item was the selection of a permanent committee chairman from among the voting members. Mr. Daniel Brown was nominated and unanimously elected as chairman. The committee also elected Mr. Robert Hewett to serve as vice chairman. Mr. Brown chaired the remainder of the meeting.

The next action was the selection of a representative to Technical Committee #2 (Structural Design). Mr. Edwin Zacher was tentatively selected pending confirmation that the selection of a non-voting member on Committee 7 as representative to Committee 2 was permissible. Dr. Edward Pfrang of the National Bureau of Standards was subsequently questioned on this committee action and he indicated that since the wood industry representatives were in agreement on the selection that it would be permitted to stand.

The committee then discussed the projected number of days required for the February Public Meeting. It was the general feeling of the members

that a one-day meeting should be sufficient. The next meeting was scheduled for Friday, February 22 in San Diego, CA. Mr. Hewett volunteered to secure a meeting place and to notify the committee's secretary as to the arrangements.

In the remaining time before lunch, discussion was initiated on some of the concerns of the Wood Committee. Mr. Zacher led the discussion by identifying the following items of concern: a) orthogonal connection provisions, b) R and ϕ factors and c) computation of the period of buildings with relatively flexible diaphragms according to the ATC 3-06 provisions. It was felt that the last item will impact on the deliberations of Technical Committee 2.

The committee broke for lunch at 1:00 p.m. and reconvened at 2:00 p.m.

Discussion continued on the previously-mentioned areas. Mr. Brown indicated that he had sent to Mr. Zacher some comparative diaphragm designs, generated by his interpretation of some of the wood provisions in ATC 3-06. Mr. Zacher commented on Mr. Brown's analyses and also circulated copies of some comparisons of shear wall design that he had prepared while reviewing both the Uniform Building Code (1973 and 1976 editions) and the ATC 3-06 provisions. Mr. Hewett raised a number of prepared questions with Mr. Zacher and in so doing generated a good deal of discussion on ϕ factors and on the interpretation of the provisions as they apply to conventional light frame construction. Mr. Hewett indicated that some of his questions and concerns would be translated into proposals for revisions. All individual proposals for revision are to be sent to the secretary, Charles Yancey, and they will be immediately transmitted to Mr. Zacher, the ATC representative.

Regarding the announcement of the February Public Working Session, it was suggested that there should be some provision for obtaining a written reply from the people who intend to attend a given session.

There being no further business, the committee adjourned at about 3:45 p.m.

Respectfully submitted,

Charles Yancey

Charles Yancey

3.2 Roster

COMMITTEE 7: Wood

American Institute of Timber Construction

Mr. Thomas E. Brassell
Vice President of Technical Services
American Institute of Timber Construction
333 West Hampden Avenue
Englewood, CO 80110

Phone: 303-761-3212

American Plywood Association

Mr. Daniel H. Brown (Chairman)
American Plywood Association
P. O. Box 11700
Tacoma, Washington 98411

Phone: 206-565-6600

Interagency Committee on Seismic Safety in Construction

Mr. Marco F. Venturino
Supervisor, Structural Engineering
Western Division
Naval Facilities Engineering Command
P. O. Box 727
San Bruno, CA 94066

Phone: 415-877-7340

National Forest Products Association

Roderick B. Buchan
National Forest Products Association
Forest Industries Building
1619 Massachusetts Avenue, N.W.
Washington, D.C. 20036

Phone: 202-797-5882

Committee 7 (continued)

United States Forest Products Laboratory

Mr. Lawrence A. Soltis, Engineer
U.S. Forest Products Laboratory
P. O. Box 5130
Madison, WI 53705

Phone: 608-264-5600

Applied Technology Council

Mr. Edwin G. Zacher (representative to Committee 2: Structural Design)
H.J. Brunier Associates
55 New Montgomery
Suite 608
San Francisco, CA 94105

Phone: 415-781-0370

Building Seismic Safety Council

Mr. Roy G. Johnston
Brandow & Johnston Associates
1660 W. 3rd Street
Los Angeles, CA 90017

Phone: 213-484-8950

National Bureau of Standards

Mr. Charles Yancey
Secretariat
Tentative Seismic Provision Project
Committee 7: Wood
National Bureau of Standards
Rm. B-168, Bldg. 226
Washington, D.C. 20234

Phone: 301-921-2137

3.3 Selected Committee Correspondence and Applied Technology Council Comments

Exhibit A: Jan. 18 memorandum to committee from secretariat.

Exhibit B: March 31 ATC response to comments from TC 9.

Exhibit C: May 6 memorandum announcing telephone canvass.

Exhibit D: May 6 memorandum to secretariat of TC 9.

Exhibit E: May 7 ATC response to comments from Dan Brown.

Exhibit F: May 27 transmittal of letter ballot.

Exhibit G: May 29 memorandum to secretariat of TC 9.

Exhibit A

UNITED STATES DEPARTMENT OF COMMERCE
National Bureau of Standards
Washington, D.C. 20234

January 18, 1980

To Members of Technical Committee 7: Wood

Thomas E. Brassell
Daniel H. Brown (Chairman)
Marco F. Venturino
Robert Hewett
Dave Gromala
Edwin G. Zacher
Roy G. Johnston

Dear Member:

This is to inform you that the only comment I have received so far on the chapter pertaining to Wood in ATC 3-06 was submitted by Daniel H. Brown of the American Plywood Association in his letter dated January 4, 1980. This material has already been distributed. I will keep you informed as additional comments come in.

Sincerely,

Charles Yancey

Charles Yancey, Secretary
Committee 7: Wood

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

Exhibit B

H. J. BRUNNIER ASSOCIATES
STRUCTURAL ENGINEERS
55 NEW MONTGOMERY STREET - SUITE 608 - SAN FRANCISCO, CALIFORNIA 94105 - 415 781-0370

H. J. BRUNNIER 1882 - 1971

H. C. POWERS
H. L. LYELL
C. D. DE MARIA
S. E. TEIXEIRA
A. P. STEVENS

March 31, 1980

Mr. Charles Yancey, Secretary
Technical Committee No. 7
Tentative Seismic Provisions Project
Room B-168, Building 226
National Bureau of Standards
Washington, D.C. 20234

Dear Charles;

This is in response to the memorandum from Patrick W. Cooke.

1. The double plate requirement applies only to conventional light timber construction "which require no engineering analysis". A single plate could be used in an engineered construction. The control necessary to align horizontal and vertical members implies that the system is engineered and, therefore, single top plates could be used and splice details to provide adequate continuity or continiuty equivalent to a four foot lap splice of a double plate should be provided.

2. This stance is the opposite of the stance taken by industry members of Group 7 who wanted to reduce the requirement. My previous response on this problem adequately answers this comment.

I have not sent this response to the committee.

Very truly yours,

Edwin G. Zacher

Edwin G. Zacher
Structural Engineer

Exhibit C

UNITED STATES DEPARTMENT OF COMMERCE
National Bureau of Standards
Washington, D.C. 20234

May 6, 1980

To Members of **Technical Committee 7: Wood**
Tentative Seismic Provisions Project

Daniel H. Brown, **Chairman**
Marco F. Venturino
Thomas E. Brassell
David Gromala

Dear Member:

In a letter dated 24 March 1980, I sent you a package containing two recommendations from Technical Committee 9. To facilitate the resolution of the comments by Messrs. Johnson and Fuller in time for the June 5-6 meeting of the Coordinating Committee, I will be conducting a telephone canvass of the members of Technical Committee 7. In this regard I am enclosing a copy of the response of Mr. Edwin Zacher to the comments in question. Please review Mr. Zacher's response as well as the original comments and formulate an opinion as to what changes, if any, to Chapter 9 of ATC 3-06 are warranted. I will then call you in about a week from the date of this letter to record your position. The results of this poll will be forwarded to Mr. Daniel Brown, Chairman of Technical Committee 7.

Thank you for your cooperation.

Charles W. C. Yancey

Charles W. C. Yancey, Secretary
Technical Committee 7: Wood

Attachment

cc: Edwin G. Zacher
William Kirkland
E. V. Leyendecker
Edward O. Pfrang

Exhibit D

May 6, 1980

Memorandum for Patrick W. Cooke, Project Leader
Building Rehabilitation Technology

From: Charles W. C. Yancey
Structures and Materials Division

Subject: Review Comments of ATC Technical Committee 9 Relative To Technical Committee 7

Attached is a copy of the response of Mr. Edwin G. Zacher to the two comments by members of Technical Committee 9, as cited in your memorandum to me dated 10 March 1980. Mr. Zacher is the ATC representative on TC 7 and as such is quite familiar with the background to and intent of the ATC provisions in Chapter 9 (Wood). Whereas I have sent a copy of your memorandum (with attachment) to each member of TC 7, I have neither sent them a copy of Mr. Zacher's letter dated 31 March 1980 nor polled their response. Therefore, I cannot now inform you of the final disposition of these comments. Technical Committee 9 will be notified as to the decisions reached by TC 7, prior to the June 5-6 meeting of the Coordinating Committee.

Attachment

Exhibit E

H. J. BRUNNIER ASSOCIATES
STRUCTURAL ENGINEERS
55 NEW MONTGOMERY STREET - SUITE 608 - SAN FRANCISCO, CALIFORNIA 94105 - 415 781-0370

H. J. BRUNNIER 1882 - 1971

H. C. POWERS
H. L. LYELL
C. D. DE MARIA
S. E. TEIXEIRA
A. P. STEVENS

May 7, 1980

Mr. Charles Yancey, Secretary
Technical Committee No. 7
Tentative Seismic Provisions Project
Room B-168, Building 226
National Bureau of Standards
Washington, D.C. 20234

Dear Charles:

This is in response to the comments from Dan Brown under his cover letter of April 25, 1980. The item numbers coincide with those on his list.

1.3 As noted in my original comment the ϕ factor charge was dependent on possible actions in other committees, especially Committee 2. At this point there seems to be no move to change the design force sections and the 0.85 ϕ is appropriate.

1.4 The existing sentence of 9.5.3, without the heading, should be made the new first sentence of 9.6.3.

1.5 Section 9.7.1 can be modified as follows: --- provided at not over 6 feet on center for buildings two stories, or 20 feet, or less in height and at not over 4 feet on center for buildings over this height but three stories, or 35 feet or less in height.

1.6 & 2.1 This reference should be to Section 9.5 but the phrazing should be modified to read as follows: --- Conventional Light Timber Construction as permitted in Sec. 9.5. Add the following to the third sentence of Section 9.7.1: "--- studs unless specifically excepted in Sec. 9.7.3. Add the following sentence to Section 9.7.3B: "Blocking need not be provided at horizontal joints". These accomplish the intent of Dans comments. The seven diameter embedment requirement is more consistent than a specified length. UBC has a conflict between Sec. 2907(c) and Table 26-G. I suggest, however, for the sake of simplification, that we make the embedment 8 diameters: 4 inches for 1/2 inch bolt, 5 inches for 5/8 inch bolt, etc.

Exhibit E

H. J. BRUNNIER ASSOCIATES
STRUCTURAL ENGINEERS

May 7, 1980
Mr. C. Yancey, Secretary
response to comments
from Dan Brown
page two

2.4 Modify the language proposed in my previous response regarding Section 9.5.3 as follows: --- in a joint <u>of a frame or similar component of the seismic resisting system</u> the total --- .

I have not sent this response to the committee.

Very truly yours,

Edwin G. Zacher
Structural Engineer

EGZ/ng

UNITED STATES DEPARTMENT OF COMMERCE
National Bureau of Standards
Washington, D.C. 20234

May 27, 1980

MEMORANDUM FOR Members of Technical Committee 7: Wood

Thomas E. Brassell
Daniel H. Brown
Roderick B. Buchan
David Gromala
Marco F. Venturino

From: Charles W. C. Yancey, Secretary CWCY
Committee 7: Wood

Subject: Suggested Changes to Chapter 9 of ATC 3-06

All of the suggested changes to Chapter 9 of the ATC 3-06 document have been compiled and are enclosed. You should refer to letters from Mr. Dan Brown (dated 4 January and 25 April 1980) and Mr. Ed Zacher (dated 1 February and 31 March) for the applicable background material. Also, I have enclosed a copy of a letter from Mr. Zacher, dated 7 May, which you have not previously been sent. You are asked to vote on each of the changes. Please indicate your vote (Affirmative, Affirmative with Comment, or Negative) in the right hand margin adjacent to each item. You are asked to make your comments directly on the orange copy and return it to Dr. E. V. Leyendecker at:

Room B168 Building 226
National Bureau of Standards
Washington, DC 20234.

In view of the fact that the results of this ballot should be discussed at the June 5 and 6 meeting of the Coordinating Committee, your immediate response is requested. Although the allotted review time seems quite short, practically all of the recommended changes were listed in Mr. Zacher's letter of 1 February 1980. As a time expedient, I will call you next week to record your vote. Then, the written ballot can be sent to Dr. Leyendecker as mentioned above.

Enclosures

cc: Edwin G. Zacher
E. V. Leyendecker
Edward O. Pfrang
Roy G. Johnston
Roland Sharpe
William Kirkland

Exhibit G

May 29, 1980

MEMORANDUM FOR Patrick W. Cooke, Project Leader
Building Rehabilitation Technology

From: Charles W. C. Yancey
Structures and Materials Division

Subject: Review Comments of ATC Technical Committee 9 Relative to Technical Committee 7

I call your attention to my memorandum to you dated May 6, 1980. As a follow-up, I sent a copy of Mr. Edwin Zacher's letter, dated March 31, 1980, to each member of Technical Committee 7.and then polled their response via telephone. The committee members were in agreement with both of Mr. Zacher's comments. With reference to Mr. Zacher's second comment, it was the opinion of Mr. Daniel Brown (American Plywood Association) that the anchor bolt spacing specified in 9.7.1(A) could be extended to 6 feet in buildings not over 20 feet high. In fact, one of the suggested changes presently being ballotted within Committee 7 provides for up to 6-feet spacing of anchor bolts in buildings "two stories, 20 feet, or less in height." I am enclosing a copy of the page on which this suggested change is included.

In summary, it is concluded that Mr. David Johnson's comment on the need for expanding the guidelines for top plates in 9.7.1(B) will receive no further consideration by Technical Committee 7. Also, it is inferred from the fact that Committee 7 is now voting on a suggested modification to 9.7.1(A) which would effectively reduce the anchorage requirements that Mr. Robert Fuller's suggestion of strengthening the anchorage requirement will not be sustained.

Enclosure

(B) PLYWOOD SHEAR PANELS

Remove this subsection and transfer it to Section 9.6.3.

Section 9.6.3 DIAPHRAGM LIMITATIONS

The existing sentence in subsection 9.5.3 (B), without the heading, should become the first sentence in Section 9.6.3.

Section 9.7.1 WALL FRAMING AND CONNECTIONS

(A) ANCHOR BOLTS

Section 9.7.1 can be modified as follows: ---provided at not over 6 feet on center for buildings two stories, 20 feet, or less in height and at not over 4 feet on center for buildings over this height but three stories, or 35 feet or less in height. Anchor bolts shall have a minimum embedment of 8 diameters.

Section 9.7.1

(C) BOTTOM PLATES

Delete the word "stud" at the end of the sentence and add the following "...studs unless specifically excepted in Section 9.7.3."

Section 9.7.3 ACCEPTABLE TYPES OF WALL SHEATHING

(B) PLYWOOD

Add the sentence: "Blocking need not be provided at horizontal joints."

Table 9-1 - Change the table heading to read: ALLOWABLE SHEAR IN POUNDS PER FOOT FOR HORIZONTAL PLYWOOD DIAPHRAGMS WITH FRAMING OF DOUGLAS FIR-LARCH OR SOUTHERN PINE[1]

- The entry under 10d nails should be corrected from 3/8" to 5/8"

- Revise Footnote 1 as follows: [1]Space nails 10 inches on center for floors and 12 inches on center for roofs along intermediate framing members. Allowable shear values for nails in framing member of other species set forth in Table 8.1A NDS (REF. 1) shall be calculated for all grades by multiplying the values for nails in STRUCTURAL I by the following factors: Group III, 0.82 and Group IV, 0.65.

- Change the wording under the column heading "BLOCK DIAPHRAGMS" to read: Nail spacing at diaphragm boundaries (all cases), at continuous panel edges parallel to load (Cases 3 and 4) and at all panel edges (Cases 5 and 6).

- Table 9-2

Revise the table as shown on the attached sheet.