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Supplemental Report
A STUDY
EVALUATING THE CITY OF DALLAS CODES
TO IDENTIFY CODE MODIFICATIONS
COROLLARY TO THE PROPOSED EXPANSION
OF AUTOMATIC SPRINKLER REQUIREMENTS

FOR THE

CITY OF DALLAS

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OCTOBER, 1983

REVISION NOTICE

This report has been revised as a result of a review by the City of Dallas Staff after it was originally submitted to the City on October 17, 1983. Revised sections and/or pages of the report are identified as such in this report.

TABLE OF CONTENTS

	<u>PAGE</u>
LIST OF TABLES	iii
INTRODUCTION	1
PROPOSED CODE CHANGES	12
CONCLUSIONS	50
APPENDIX A - PROPOSED CODE CHANGES	A-1
APPENDIX B - OCCUPANCY DESCRIPTIONS	B-1

LIST OF TABLES

<u>TABLE</u>		<u>PAGE</u>
1.	CODE CHANGES STATUS SUMMARY	6
2.	COMPARISON OF MAXIMUM ALLOWABLE HEIGHTS AND AREAS OF SPRINKLERED ONE-STORY AND MULTIPLE STORY BUILDINGS	16
3.	PROPOSED TABLE 5-E BY DALLAS STAFF	38
4.	CALCULATED ALLOWABLE UNSPRINKLERED AREAS	40
5.	DALLAS FIRE EXPERIENCE BY OCCUPANCY GROUP FOR 5 YEAR PERIOD, 1974-78	42
6.	WHERE FIRE FATALITIES OCCUR IN DALLAS	43

INTRODUCTION

In 1981, changes proposed to the building code by the City of Dallas included a proposal to require that all buildings having an area greater than 7,500 square feet be sprinklered. The building size limit of 7,500 square feet was based upon the physical ability of the Dallas Fire Department to manually extinguish fires in typical occupancies of that size. Without such an ordinance, it could be expected that the manpower, operating expenditures and capital expenditures for the fire department would be greatly increased in the future. This proposed change represented a significant expansion of sprinkler requirements in the code at that time. Given such a requirement, the City of Dallas codes and ordinances were analyzed by Schirmer Engineering Corporation to identify traditional provisions which could be amended, recognizing the benefits of automatic sprinkler protection.

In February, 1983, Schirmer Engineering Corporation submitted a series of proposed changes and accompanying rationale for the 1980 edition of the Dallas Building Code (DBC), Dallas Fire Code and Dallas Water Works ordinances. The proposed changes identified amendments which could be made to the city codes and ordinances in order to provide an improved level of fire safety for the citizens of Dallas, and their property, without imposing an economic hardship.

The proposed modifications consisted of 48 changes to the building code, 6 changes to the fire code and 2 changes to the water works ordinances. The proposed changes, aimed at providing an improved level of safety while minimizing overly redundant requirements, were based upon a study of local and national fire experience, selected building and fire department records, other codes and standards, technical articles, test data and application of the "systems concepts" along with professional engineering judgment.

In addition to code language to accomplish the city's intent to require sprinkler systems in buildings greater than 7,500 square feet, proposed modifications included:

- o An overall reduction in the required class of building construction for most occupancy groups.
- o Greater allowable building height and areas than presently permitted for sprinklered buildings.
- o Reduced requirements for high-rise buildings, atrium buildings, covered mall shopping centers and open parking garages.
- o Revised method of calculating the required number of exits and exit width.
- o Increased exit travel distance in selected occupancies.
- o Reduced requirements for corridor construction.
- o Additional requirements for electrical supervision of sprinkler system components for increased reliability.
- o Reduced public fire (water) flow requirements.
- o Elimination of water meters for closed sprinkler systems.
- o Elimination of monthly charges for water connections serving fire protection systems.

Following submission of the proposed changes, the Dallas Building Code Advisory and Appeals Board (BCAAB), the Dallas Fire Code Advisory Board (FCAB) and the staffs of the Dallas Building Inspection Division and Fire Department (Staff) conducted an extensive review of each proposed modification. The FCAB and fire department have recommended approval for each of the proposed changes to the Dallas Fire Code. Proposed changes to the water works ordinances are presently under consideration.

The Dallas BCAAB conducted several public meetings in recent months to consider each of the proposed changes to the building code. As a result, the BCAAB has recommended

either approval, modification or disapproval for each of the changes. Certain concerns have been expressed by the BCAAB related to some of the proposed changes. Concern has been expressed on behalf of the Staff for some of the proposed changes which have been modified by the BCAAB. The Building Inspection Division has established a position for each proposal.

Prior to completion of the February, 1983 report, the City of Dallas adopted the 1983 edition of the Dallas Building Code, based upon the 1982 Uniform Building Code (UBC). The adoption of the 1983 edition rendered several of the proposed changes editorially obsolete because of changes between the 1980 and 1983 editions.

During the BCAAB study period, considerable discussion centered upon the original recommendation of the city for the provision of automatic sprinkler protection for buildings greater than 7,500 square feet. The Dallas Fire Department demonstrated to the BCAAB that this area represented the size of a typical building beyond which the fire department did not have capabilities in terms of manpower or equipment.

The BCAAB felt that application of a 7,500 square foot provision in the building code was "arbitrary" and did not take into account other pertinent factors such as building construction type and the relative combustibility of the occupancy.

To alleviate this concern, the fire department prepared an alternate method for determining the maximum size of an unsprinklered building by presenting the Insurance Services Office (ISO) method of calculating fire flow. The ISO fire flow formula takes into consideration building construction type, building area, occupancy and exposures. The fire department stated that the original 7,500 square foot area was derived from a fire flow of 3,000 gpm, which was the maximum amount of water that could be delivered by the fire department onto a fire, given the physical limitations of manpower and equipment. The fire department had previously averaged this data to produce the 7,500 square foot building size.

Working from the 3,000 gpm figure and taking the construction and occupancy into consideration for each building type could, therefore, generate a table of maximum allowable unsprinklered areas for each occupancy and construction type as defined in the

building code. Such a table was produced by the Staff and reviewed by the BCAAB. Because the fire flow formulas favor noncombustible construction, the table produced by the fire department demonstrated a rather substantial discrimination against combustible construction types.

The BCAAB, therefore, in conjunction with the Building Inspection Division, requested Schirmer Engineering Corporation to perform the following tasks:

- o Evaluate the modifications proposed by the BCAAB and Staff to the code changes proposed by Schirmer Engineering Corporation in its February, 1983, report to assure that the overall integrity of the code would be maintained in the interest of public safety. Recommendations for acceptance, modification or rejection of each modification proposed by the Board and Staff, along with supporting rationale, is to be provided for each recommendation.
- o Evaluate additional possible modifications of the code with respect to residential occupancies, as furnished by the city, along with supporting rationale for each recommendation.
- o Evaluate all proposed code changes with respect to their applicability to 1983 edition of the code. Insure that all changes are preserved and that other affected sections of the code will be consistent with the context of the changes. Modify code language as necessary to accomplish the transition and to provide ordinance-ready language.
- o Recommend criteria for the application of automatic sprinkler protection, depending upon building construction and occupancy, and evaluate the criteria developed by the city for maximum allowable unsprinklered building areas, along with rationale.

This report represents an evaluation of each of the proposed code changes which have been modified by the BCAAB as well as further discussion for proposed changes which have been questioned or recommended for rejection by the BCAAB or Staff. This report also includes modifications for each change proposed in the February, 1983 report to

correlate with 1983 code language. Additional proposed modifications for residential occupancies are also included. An evaluation of the criteria for the application of automatic sprinkler requirements was performed and is included in this report, along with supporting rationale. The following section of this report includes a discussion of the code changes and supporting rationale for those changes which were either modified or rejected by the BCAAB or Staff. In addition, a discussion of the newly proposed code changes for residential occupancies is presented.

It should be noted that the February report contained a more lengthy discussion of rationale, including references and bibliography, for all code changes that were initially proposed. That rationale is not included in this report for those changes which have only been editorially revised.

Table 1 is a summary of the current code change status indicating each code change, section number, topic, BCAAB recommendation, Staff recommendation, Schirmer Engineering Corporation (SEC) recommendation and a summary of its disposition.

Complete code change language is included in Appendix A of this report. For the convenience of the reader, a summary of occupancy classifications is included in Appendix B.

TABLE 1 -- CODE CHANGE STATUS SUMMARY

Change Number	Code Section	Topic	Recommended Action/Modifications by Building Code Advisory & Appeals Board (BCAAB)	Recommended Action/Modifications by Staff	SEC Recommendation of BCAAB and Staff Modifications	Disposition of Code Change
B-1	503(a)	Minor Accessory Uses	Accept ¹	Accept	N/A	Text revised to correspond with '83 code language.
B-2	503(d)	Occupancy Separation	Accept	Accept	N/A	No revisions. Proposal compatible with '83 code.
B-3	Table No. 5-B	Occupancy Separation	Accept	Accept	N/A	No revisions. Proposal compatible with '83 code.
B-4	Table No. 5-C	Allowable Area for Group I, Division 1 & 2 Occupancies.	Accept	Accept	N/A	Text revised to correspond with '83 code.
B-5	Table No. 5-D	Allowable Height for Group I, Division 1 & 2 Occupancies.	Accept ²	Accept	N/A	No revisions. Proposal compatible with '83 code.
B-6	506(b)	Unlimited Area	Substitute unlimited area all slots in 5C present permitted - See Table 5F.	Accept - staff cannot agree to unlimited areas for combustible construction types.	Reject BCAAB recommendation. Accept change as originally proposed.	No revisions. Proposal compatible with '83 code.
B-7	506(c)	Area Increases for Automatic Sprinklers	Delete - in lieu of permitting unlimited area for all construction types in 506(b).	Accept	Reject BCAAB recommendation. Accept change as originally proposed.	Text revised to correspond with '83 code with deletion of exclusion of atrium buildings from area increase.
B-8	507	Building Height	Accept with elimination of 1 Occupancies from height increase.	Accept with elimination of 1 Occupancies from height increase.	Accept as originally proposed. Do not eliminate 1 Occupancies from height increase.	Text revised to correspond with '83 code with deletion of exclusion of atrium buildings from height increase.
B-9	508	Fire Resistive Substitution	Accept with addition of Type IV Buildings to Item 5 under the "new" Section 508.	Accept with addition of Type IV Buildings to Item 5 under the "new" Section 508.	Accept as originally proposed. Do not add Type IV Buildings to Item 5.	Text revised to correspond with '83 code.
B-10	604, 704, 804, 904, 1004, & 1204	Smokeproof Enclosures	Accept	Accept, but retain '79 DBC 1807 - smokeproof enclosure.	Reject Staff recommendation. Accept as originally proposed.	Text revised to correspond with '83 code.
B-11	702(a)2	B1 Occupancy Separation in B2 and R1 Buildings	Accept	Accept	N/A	No revisions. Proposal compatible with '83 code.
B-12	702(b)	Smoke and Heat Venting	Accept	Accept	N/A	No revisions. Proposal compatible with '83 code.

TABLE I -- CODE CHANGE STATUS SUMMARY
(CONTINUED)

Change Number	Code Section	Topic	Recommended Action/Modifications by Building Code Advisory & Appeals Board (BCAAB)	Recommended Action/Modifications by Staff	SEC Recommendation of BCAAB and Staff Modifications	Disposition of Code Change
B-13	709, Table No. 7-A	Open Parking Garages	Modify to allow unlimited height & unlimited area without sprinklers.	Accept - BCAAB suggested modification is not a tradeoff for sprinklers.	Accept BCAAB recommendation. Modify proposal with criteria similar to NFPA 88A. Add criteria for occupancies located above garage.	Text revised to correspond with '83 code, with technical modification.
B-14	711	Covered Mall Buildings	Accept	Delete - Use '83 DBC.	Reject Staff recommendation. Accept as originally proposed with minor modifications.	Text revised to correspond with '83 code, with technical modification.
B-15	802(c)	Construction of Closets in Group E Occupancies	Accept	Accept	N/A	Text revised to correspond with '83 code.
B-17	901(b)	Vocation Shops, Laboratories, etc., in Educational Buildings	Accept	Accept	N/A	No revisions. Proposal compatible with '83 code.
B-18	902(b)	Smoke & Heat Venting	Accept	Accept	N/A	No revisions. Proposal compatible with '83 code.
B-19	1204	Emergency Egress for Group R Occupancies	Accept	Accept	N/A	Text revised to correspond with '83 code.
B-20	1705(b)5	Nonrated Partitions Within a Single Tenant Space	Accept	Accept	N/A	Text deleted to correspond with '83 code.
B-21	1706(b)	Fire Dampers	Accept	Delete	Reject Staff recommendation. Accept with modifications.	Text revised with technical modifications.
B-22	1706(d)	Elevator Shaft Venting	Accept	Accept	N/A	No revisions. Proposal compatible with '83 code.
B-23	1715	Atriums	Accept	Delete - use '83 DBC.	Reject Staff recommendation. Accept with modifications.	Text revised with technical modifications.
B-24	1717 (New)	Materials in Plenum Spaces	Delete	Delete	Original proposal considered acceptable but will delete as recommended in lieu of '83 code, Section 4305(e). (Revised: 10/28)	Deleted in lieu of '83 code, Section 4305(e). (Revised: 10/28)

TABLE 1 -- CODE CHANGE STATUS SUMMARY
(CONTINUED)

Change Number	Code Section	Topic	Recommended Action/Modifications by Building Code Advisory & Appeals Board (BCAAB)	Recommended Action/Modifications by Staff	SEC Recommendation of BCAAB and Staff Modifications	Disposition of Code Change
B-25	1806	Roof Construction of Type I Buildings	Accept - add Type IV HT as permissible for roof construction.	Accept - add Type IV HT as permissible for roof construction.	Accept as modified per BCAAB and Staff comments.	Text modified to allow use of heavy timber construction for roof members.
B-26	1807	High Rise Buildings	Accept	Accept - make requirements applicable to all "high-rise" occupancies except B-3 (open deck parking).	Accept Staff recommendation.	Text revised to correspond with '83 code. Provisions expanded to include other building occupancies.
B-27	1907	Roof Construction in Type II-F.R. Buildings	Accept - add Type IV HT as permissible for roof construction.	Accept - add Type IV HT as permissible for roof construction.	Accept as modified per BCAAB and Staff comments.	Modification suggested by BCAAB and Staff will be effective with implementation of B-25.
B-28	2516(f)4	Subdivision of Combustible Concealed Spaces	Accept - if all concealed spaces are sprinklered - relocate to Sec. 2516(f).	Accept - if all concealed spaces are sprinklered - relocate to Sec. 2516(f).	Code change relocated to 2516(f) as recommended.	Text revised to correspond with '83 code. Change relocated from Section 3205(b) to Section 2516(f) in '83 code.
B-29	3206	Smoke and Heat Venting	Accept	Accept	N/A	No revisions. Proposal compatible with '83 code.
B-30	3303(a)	Number of Exits Calculation Procedure	Accept	Accept	N/A	Text revised to correspond with '83 code.
B-31	3303(b)	Exit Width Calculation Procedure	Accept	Accept	N/A	Text revised to correspond with '83 code.
B-32	3303(c)	Arrangement of Exits	Accept % diagonal with 30-foot minimum.	Accept % diagonal with 30-foot minimum.	Accept as modified per BCAAB and Staff recommendation.	Text revised to correspond with '83 code using a % diagonal rule.
B-33	3303(d)	Exit Travel Distance	Accept	Accept with 200 feet in H-2 and H-3.	Accept Staff recommendation. Modify change to eliminate H-2 and H-3 from 300-foot travel distance.	Text revised to correspond with '83 code. The 300-foot travel distance for H-2 and H-2 as originally proposed is eliminated.
B-34	3303(e)	Exiting Through Store-rooms	Delete - use '83 DBC - comparison requested.	Delete - use '83 DBC - comparison requested.	Reject BCAAB/Staff recommendations. Incorporate change in '83 code.	Text revised to correspond with '83 code.
B-35	3305(e)	Maximum Dead End Corridor Distance	Accept - allow all occupancies except I-1 & R-1 (motel/hotel) to be 50 feet; I-1 & R-1 (motel/hotel) to be 30 feet.	Accept - allow occupancies except I-1 & R-1 (motel/hotel) to be 50 feet; I-1 & R-1 (motel/hotel) to be 30 feet.	Reject recommendations for 50-foot dead end, but modify proposal to allow 35 feet in R-1.	Text revised to correspond with '83 code. Dead end of 35 feet for R-1 occupancies added.

TABLE I -- CODE CHANGE STATUS SUMMARY
(CONTINUED)

Change Number	Code Section	Topic	Recommended Action/Modifications by Building Code Advisory & Appeals Board (BCAAB)	Recommended Action/Modifications by Staff	SEC Recommendation of BCAAB and Staff Modifications	Disposition of Code Change
B-36	3305(g)	Corridor Wall Construction	Accept - allow all buildings other than R-1 (motel/hotel).	Accept - allow all buildings other than R-1 (motel/hotel).	Reject recommendations in part. Allow for all but R-1 and I-3. Allow reduction to 1/2 hour without dampers in R-1.	Text revised to correspond with '83 code. Change modified to allow reduction of corridor construction in R-1.
B-37	3305(h)	Corridor Door Gaskets	Accept	Accept	N/A	Text revised to correspond with '83 code.
B-38	3310	Smokeproof Enclosure	Accept but retain '79 DBC 1807 - smokeproof enclosure.	Accept but retain '79 DBC 1807 - smokeproof enclosure.	Reject BCAAB/Staff recommendations.	Text revised to correspond with '83 code.
B-39	3319(e)	Educational Occupancies Corridor Wall Construction	Accept	Accept	N/A	The current code ('83) permits the exception originally proposed for corridor walls, in educational occupancies. Therefore, B-39 is not needed and text is deleted.
B-40	3802, Table 38-B	Automatic Sprinkler System Requirements	Delete	Delete - Substitute Table 5-E.	Accept recommendations in part. Use Table 5E (38-B) with modifications.	Text revised to correspond with '83 code. Technical modification made for mandatory sprinkler provisions both in maximum allowable unsprinkled areas and exceptions thereto.
B-41	3803	Supervision of Automatic Sprinkler System	Accept	Accept	N/A	Text revised to correspond with '83 code.
B-42	3805(g) (New)	Standpipe Water Supply Requirements	Delete - use '83 DBC.	Delete - use '83 DBC.	Accept recommendations to delete and use '83 code.	The current code ('83) addresses filling standpipes with water and UBC Standard 38-2 addresses water supplies. Therefore, B-42 is not needed and the text is deleted.
B-43	3803, Table 38-A	Standpipe Requirements	Accept	Accept	N/A	Text revised to correspond with '83 code.
B-44	3805(c)	Standpipe Outlets	Accept	Accept	N/A	Text revised to correspond with '83 code.

TABLE 1 -- CODE CHANGE STATUS SUMMARY
(CONTINUED)

Change Number	Code Section	Topic	Recommended Action/Modifications by Building Code Advisory & Appeals Board (BCAAB)	Recommended Action/Modifications by Staff	SEC Recommendation of BCAAB and Staff Modifications	Disposition of Code Change
B-45	3806(b)	Standpipes in Buildings Under Construction	Delete - use '83 DBC.	Delete - use '83 DBC.	Accept recommendations to delete and use '83 code with editorial revision.	The current code ('83) permits an exception similar to that proposed for buildings under construction. B-45 is not needed, however, an editorial revision is included.
B-46	5103(d)	Elevator Door Operation	Delete - use '83 DBC.	Delete - use '83 DBC.	Accept recommendation in part. Allow exception when automatic recall is provided.	Text revised with technical modification.
B-47	5206	Roof Panels	Accept - ask if can be unlimited.	Accept - ask if can be unlimited.	Reject unlimited proposal.	Text revised to correspond with '83 code.
B-48	5207(a)	Skylights	Accept - ask if can be unlimited.	Accept - ask if can be unlimited.	Reject unlimited proposal.	Text revised to correspond with '83 code.
B-49	Table No. 5-A	Exterior Wall Requirements at Property Line for R-1 Occupancies	N/A	N/A	Accept	New Change.
B-50	503(d), Exception 3	Separation of Parking Garages in R-1 Occupancies	N/A	N/A	Accept	New Change.
B-51	503(d), Exception 4	Separation of Parking Garages in Dwellings	N/A	N/A	Accept	New Change.
B-52	Table No. 5-B	Separation of Parking Garages in R-1 Occupancies	N/A	N/A	Accept	New Change.
B-53	1202(c) (New)	Material Substitution	N/A	N/A	Accept	New Change.
B-54	Section 4205 and Table No. 42-B	Flame Spread of Exterior Exitways	N/A	N/A	Accept	New Change.

TABLE 1 -- CODE CHANGE STATUS SUMMARY
(CONTINUED)

Change Number	Code Section	Topic	Recommended Action/Modifications Fire Code Advisory Board (FCAB)	Recommended Action/Modifications by Staff	SEC Recommendation of BCAAB and Staff Modifications	Disposition of Code Change
FIRE CODE						
F-1	16-13.101(12)	Water Main Size	Accept	Accept	N/A	Editorial change. Technical content remains unaffected.
F-2	16-13.104(3)	Fire Hydrant Location	Accept	Accept	N/A	Text revised to correspond with '83 code.
F-3	16-13.401A	Alarm System - When Required	Accept	Accept	N/A	No revisions. Proposal compatible with '83 code.
F-4	16-13.502	Fire Dept. Connections for Standpipes	Accept	Accept	N/A	No revisions. Proposal compatible with '83 code.
F-5	16-13.503	Standpipe Outlets	Accept	Accept	N/A	No revisions. Proposal compatible with '83 code.
F-6	16-35.103	Access Doors	Accept	Accept	N/A	No revisions. Proposal compatible with '83 code.
WATER WORKS ORDINANCE						
W-1	49-26	Sprinkler or Fire Service Requirements	No Board action required.	Accept	N/A	No revisions. Proposal compatible with current ordinance.
W-2	49-26A	Charges for Fire Service Systems	No Board action required.	Accept	N/A	No revisions. Proposal compatible with current ordinance.

Notes to Table:

1. "Accept" means acceptance of proposals in February report.
2. Not officially stated in Meeting Minutes (8/16), but believed to have been intent of the BCAAB since this change is companion change to B-4.

PROPOSED CODE CHANGES

A discussion of each proposed code change, including supporting rationale, was presented for the 56 original code changes in the February report. This report includes a discussion of each proposed building code change which:

- o Has been technically modified since the February report.
- o Required clarification or additional rationale, as expressed by the BCAAB or Staff.
- o Has been added since the February report.

Modifications to proposed changes to the Dallas Fire Code and Water Works ordinances beyond the February report are editorial in nature and do not require further discussion.

B-6 — Unlimited Area; and B-7 — Area Increases for Automatic Sprinklers

Building Code Change B-6, as presented in the February, 1983 report, was intended to allow buildings of noncombustible construction (Types I and II) and heavy timber construction (Type IV) to be built without any limitation of the area when the building is protected by automatic sprinklers. The BCAAB considered the proposal to be unfair to combustible types of construction, since an "equivalence" in the allowable areas between noncombustible construction types and the combustible construction types of equal fire resistance would be reduced or eliminated. For example, the allowable area table of the building code, Table 5-C, currently permits Group A-3 sprinklered occupancies of either Type II-N (noncombustible construction) or Type III-N (combustible construction) to be built to the same maximum area of either 27,300 square feet for one-story buildings or 18,200 square feet for two-story structures. The February, 1983, proposal would change the allowable area requirement such that the area of a noncombustible structure of this

example would not be limited at a one- or two-story height, while the combustible structure would be limited to 36,400 square feet in area.

This example illustrates that while a combustible structure would receive a benefit resulting from Code Change B-5, the benefit would not be equal in magnitude to that permitted for the noncombustible construction type. Thus, the parity that currently exists in the 1983 DBC would be eliminated with the implementation of Code Change B-6.

In recognition of the potential elimination of this parity of allowable areas between combustible and noncombustible construction types, the BCAAB recommended that Code Change B-6 be modified to extend the unlimited area allowances to the combustible construction categories. Pursuant to this recommendation, the BCAAB recommended deletion of Code Change B-7, which would be unnecessary if unlimited area were permitted per the modification of B-6. The Staff is opposed to the extension of the unlimited area provisions for the combustible construction categories of the code and has recommended acceptance of Change B-6 as originally proposed.

It is recommended that Code Changes B-6 and B-7 be accepted without the modification to allow unlimited area for combustible construction types. The basis for this action is related to the nature of sprinkler installations in combustible construction-type buildings, particularly Type III construction (commonly referred to as ordinary construction) and Type V construction (commonly referred to as wood frame construction). Both Type III and Type V buildings are constructed primarily of wooden members which result in numerous concealed combustible areas or pockets in walls, floors and roof areas.

The installation standards for automatic sprinklers recognize the practical problems associated with maintenance and installation of sprinklers in such concealed spaces and, therefore, allow the omission of sprinklers in properly firestopped areas and spaces less than six inches in depth. Such spaces, primarily unsprinklered six-inch spaces, pose a potential for failure of the sprinkler system to control a fire originating or spreading to these spaces. For this reason, unlimited area of Type III or Type V construction is not considered an acceptable risk.

The lack of sprinkler protection in combustible concealed spaces has been cited as a leading cause of unsatisfactory sprinkler performance by the Australian studies. More than twenty-eight percent of the unsatisfactory performances reported have been attributed to concealed space fires. The National Fire Protection Association's automatic sprinkler performance tables (1970 edition) attribute 161 of over 3,000 reported failures to the lack of sprinkler protection in concealed horizontal or vertical spaces within a structure. These statistics demonstrate that a potential does exist for a fire in a concealed space to gain impetus before sprinklers in the nearest protected area have the opportunity to affect control of the fire. By limiting the area of the building, and consequently the extent of combustible concealed spaces in a structure, the potential for a large loss fire or a fire that may be difficult for fire department personnel to access is minimized. It is noted that the construction types, Types I, II and IV, which will be permitted unlimited area, inherently will not contain unsprinklered combustible concealed spaces and, therefore, are distinguished from the combustible construction types, Type III and V.

B-8 — Building Height

Change B-8 would permit unlimited height for sprinklered Type II-Fire Resistive structures which are currently limited to various heights or respective occupancy classifications in the code. Both the BCAAB and the Staff, however, have expressed a concern regarding the use of Type II-Fire Resistive building types for Group I occupancies (e.g., hospitals, nursing homes, jails, etc.) and have suggested that height limitations remain for Group I occupancies.

This modification to B-8 is not considered necessary. The basic level of fire resistance of Type II-Fire Resistive buildings, two hours, provides sufficient redundancy for Group I occupancies which exhibit fuel loads equating to a fire severity of one hour. Also, as previously noted in the February report, the 1981 edition of the NFPA Life Safety Code recognizes buildings having two hours of fire resistance as providing adequate structural fire integrity without the supplemental use of sprinklers and does not limit the height of such buildings. For these reasons, Change B-8 has not been modified and the intent of this change remains as originally proposed.

Presented, again, in this "Supplemental Report" is Table 2 which summarizes the intent of all the height and area code change modifications. This Table 2 is an updated version, including editorial corrections, of Table 10 of the February report.

B-9 — Fire Resistive Substitution

Section 508 of the building code is modified by Code Change B-9 to allow the provision of automatic sprinkler systems to substitute for or reduce the magnitude of various fire-resistive features of a building. Both the BCAAB and Staff have accepted this proposal, but have recommended that Type IV (heavy timber) construction be added to Item 5 of the proposed Section 508. This modification would allow a one hour reduction in the fire resistance of Type IV structures housing assembly occupancies.

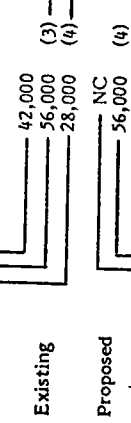
This recommendation is rejected since the elimination of one-hour fire resistance for Type IV structures is not plausible. Type IV or heavy timber construction consists primarily of noncombustible walls (typically masonry) with columns, beams, floors and roofs of large dimensional bare wood members. The wooden members must meet the minimum size requirements of the building code to qualify as heavy timber. Due to the nature of the size and mass of this type of wood construction, there is inherent resistance to the effects of fire. However, since the bare wooden components have no specified fire-resistance rating, a specific one-hour reduction in fire resistance cannot be easily quantified nor can it be accomplished without down-sizing the wood members. Simply, the fire resistance of heavy timber structures cannot be reduced without downgrading the structure to the classification of a lesser construction type. Since the less substantial wood construction types are already permitted for A-2 and A-2.1 occupancies via Item 5 of Section 508, there would be no purpose served by the implementation of this modification. Code Change B-9 remains as originally proposed.

TABLE 2
COMPARISON OF MAXIMUM ALLOWABLE HEIGHTS AND AREAS OF SPRINKLERED ONE-STORY AND MULTIPLE STORY BUILDINGS
EXISTING REQUIREMENTS VS. PROPOSED REQUIREMENTS

Explanation of Tables: Each grouping of numbers provides the following information:

- Maximum total building area allowable with associated height increase.
- Maximum total building area allowable with sprinklers.
- Maximum allowable area of one story building, also maximum allowable area of any floor of multi-story building.
- Maximum number of stories allowable with sprinklers.
- Maximum number of stories allowable with associated area increase.

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- Proposed maximum total area and number of stories simultaneously allowable with sprinklers.
- Proposed maximum allowable area of one story building; also maximum allowable area of any floor of multi-story building.

Occupancy	Type I		Type II		Type III		Type IV		Type V		
	Fire Resistive	Fire Resistive	I-Hour	I-Hour	N	I-Hour	N	I-Hour	N	I-Hour	
A-1 Existing	UL (UL)	89,700			N						
	UL (UL)	119,600 (4)	NP	NP	NP	NP	NP	NP	NP	NP	NP
Proposed	NC (NC)	UL (UL)	NC	NC	NC	NC	NC	NC	NC	NC	NC
	NC (NC)	UL (UL)	NC	NC	NC	NC	NC	NC	NC	NC	NC
A) 2-2.1 Existing	UL (UL)	89,700	40,500	40,500	NP x	40,500	NP x	40,500	NP x	31,500	NP x
	UL (UL)	119,600 (4)	54,000 (2)	54,000 (2)	NP x	54,000 (2)	NP x	54,000 (2)	NP x	42,000 (2)	NP x
	UL (UL)	59,800 (5)	27,000 (3)	27,000 (3)	NP x	27,000 (3)	NP x	27,000 (3)	NP x	21,000 (3)	NP x
Proposed	NC (NC)	UL (UL)	UL (3)	NC	NC x	54,000 (3)	NC x	UL (3)	NC x	NC	NC x
	NC (NC)	UL (UL)	UL (3)	NC	NC x	54,000 (3)	NC x	UL (3)	NC x	42,000 (3)	NC x
	UL (UL)	89,700	40,500	40,500	27,300	40,500	27,300	40,500	27,300	31,500	18,000
A) 3-4 Existing	UL (UL)	119,600 (12)	54,000 (2)	18,200 (2)	18,200 (2)	54,000 (2)	18,200 (2)	54,000 (2)	18,200 (2)	42,000 (2)	12,000 (2)
	UL (UL)	59,800 (13)	27,000 (3)	27,000 (3)	NA	27,000 (3)	NA	27,000 (3)	NA	21,000 (3)	NA
	NC (NC)	UL (UL)	UL (3)	UL (2)	UL (2)	54,000 (3)	NC	NC	NC	NC	NC
Proposed	NC (NC)	UL (UL)	UL (3)	UL (2)	UL (2)	54,000 (3)	36,400 (2)	UL (3)	UL (3)	42,000 (3)	24,000 (2)
	NC (NC)	UL (UL)	UL (3)	UL (2)	UL (2)	54,000 (3)	36,400 (2)	UL (3)	UL (3)	42,000 (3)	24,000 (2)
	UL (UL)	119,700	54,000	36,000	36,000	54,000	36,000	54,000	36,000	42,000	24,000
B) 1-2-3 Existing	UL (UL)	159,600 (12)*	72,000 (4)*	48,000 (2)*	48,000 (2)*	72,000 (4)*	48,000 (2)*	72,000 (4)*	48,000 (2)*	56,000 (3)*	32,000 (2)*
	UL (UL)	79,800 (13)	36,000 (5)	24,000 (3)	24,000 (3)	36,000 (5)	24,000 (3)	36,000 (5)	24,000 (3)	28,000 (4)	16,000 (3)
	NC (NC)	UL (UL)	UL (5)	UL (3)	UL (3)	72,000 (5)*	NC	UL (3)	UL (3)	NC	NC
Proposed	NC (NC)	UL (UL)	UL (5)	UL (3)	UL (3)	72,000 (5)*	48,000 (3)*	UL (3)	UL (3)	56,000 (4)*	32,000 (3)*
	NC (NC)	UL (UL)	UL (5)	UL (3)	UL (3)	72,000 (5)*	48,000 (3)*	UL (3)	UL (3)	56,000 (4)*	32,000 (3)*
	UL (UL)	119,700	54,000	36,000	36,000	72,000 (5)*	48,000 (3)*	72,000 (5)*	48,000 (3)*	56,000 (4)*	32,000 (3)*

TABLE 2
 COMPARISON OF MAXIMUM ALLOWABLE HEIGHTS AND AREAS OF SPRINKLERED ONE-STORY AND MULTIPLE STORY BUILDINGS
 EXISTING REQUIREMENTS VS. PROPOSED REQUIREMENTS
 (CONTINUED)

Occupancy	Type I		Type II		Type III		Type IV		Type V	
	Fire Resistive	Fire Resistive	I-Hour	N	I-Hour	N	I-Hour	N	I-Hour	N
B-4 Existing	UL (UL)	179,700 **	81,000 **	54,000 **	81,000 **	54,000 **	81,000 **	54,000 **	63,000	36,000
	UL (UL)	239,600 (12)*	108,000 (4)*	72,000 (2)*	108,000 (4)*	72,000 (2)*	108,000 (4)*	72,000 (2)*	84,000 (3)*	48,000 (2)*
Proposed	NC (NC)	UL **	UL **	UL **	NC **	74,000 (3)*	UL (3)	NC	NC	NC
	NC (NC)	UL (UL)	UL (5)	UL (3)	108,000 (5)*	108,000 (5)	UL (3)	UL (3)	84,000 (4)	48,000 (3)
E Existing***	UL (UL)	135,600	60,600	40,500	60,600	40,500	60,600	40,500	47,100	27,300
	UL (UL)	180,800 (4)	80,800 (2)*	27,000 (2)	80,800 (2)*	27,000 (2)	80,800 (2)*	27,000 (2)	62,800 (2)*	18,200 (2)
Proposed**	NC (NC)	UL (UL)	UL (3)*	UL (2)*	NC	54,000 (3)*	UL (3)*	NC	NC	NC
	NC (NC)	UL (UL)	UL (3)	UL (2)	80,800 (3)*	54,000 (3)*	UL (3)*	UL (3)*	62,800 (3)*	36,400 (2)*
H) 1 Existing	15,000	12,400	5,600	3,700	5,600	3,700	5,600	3,700	4,400	2,500
	30,000 (UL)	24,800 (2)	1,500 (2)	1,500 (2)	1,500 (2)	1,500 (2)	1,500 (2)	1,500 (2)	1,500 (2)	1,500 (2)
Proposed	NC (NC)	NC (NC)	NC (NC)	NC (NC)	NC	NC (NC)	NC (NC)	NC (NC)	NC (NC)	NC (NC)
	NC (NC)	NC (NC)	NC (NC)	NC (NC)	NC	NC (NC)	NC (NC)	NC (NC)	NC (NC)	NC (NC)
H) 2 Existing	15,000	12,400	5,600	3,700	5,600	3,700	5,600	3,700	4,400	2,500
	30,000 (UL)	24,800 (5)	11,200 (2)	1,500 (2)	11,200 (2)	1,500 (2)	11,200 (2)	1,500 (2)	8,800 (2)	1,500 (2)
Proposed	NC (NC)	NC (NC)	NC (NC)	NC (NC)	NC	NC (NC)	NC (NC)	NC (NC)	NC (NC)	NC (NC)
	NC (NC)	NC (NC)	NC (NC)	NC (NC)	NC	NC (NC)	NC (NC)	NC (NC)	NC (NC)	NC (NC)
H) 3-4-5 Existing	UL (UL)	74,400	33,600	22,500	33,600	22,500	33,600	22,500	26,400	15,300
	UL (UL)	99,200 (5)*	44,800 (2)*	15,000 (2)*	44,800 (2)*	15,000 (2)*	44,800 (2)	15,000 (2)*	35,200 (2)	10,200 (2)*
Proposed	NC (NC)	UL (5)	UL (2)	UL (2)	NC	30,000 (2)*	NC	NC	NC	NC
	NC (NC)	UL (UL)	UL (2)	UL (2)	44,800 (2)*	30,000 (2)*	UL (3)*	UL (3)*	35,200 (2)*	20,400 (2)*
I-1 Existing	UL (UL)	45,300	20,400	NP	20,400	NP	20,400	NP	15,600	NP
	UL (UL)	60,400 (3)	13,600 (2)	NP	13,600 (2)	NP	13,600 (2)	NP	10,400 (2)	NP
Proposed	NC (NC)	UL (UL)	UL (2)	UL (1)	NC	NC	NC	NC	NC	NC
	NC (NC)	UL (UL)	UL (2)	UL (1)	27,200 (2)	NC	UL (2)	UL (2)	20,800 (2)	NC
I-2 Existing	UL (UL)	45,300	20,400	NP	20,400	NP	20,400	NP	15,600	NP
	UL (UL)	60,400 (3)	27,200 (2)	NP	27,200 (2)	NP	27,200 (2)	NP	20,800 (2)	NP
Proposed	NC (NC)	UL (UL)	UL (3)	UL (1)	NC	NC	NC	NC	NC	NC
	NC (NC)	UL (UL)	UL (3)	UL (1)	27,200 (3)	NC	UL (3)	UL (3)	20,800 (3)	NC

TABLE 2
COMPARISON OF MAXIMUM ALLOWABLE HEIGHTS AND AREAS OF SPRINKLERED ONE-STORY AND MULTIPLE STORY BUILDINGS
EXISTING REQUIREMENTS VS. PROPOSED REQUIREMENTS
(CONTINUED)

Occupancy	Type I		Type II		Type III		Type IV		Type V	
	Fire Resistive	Fire Resistive	I-Hour	N	I-Hour	N	I-Hour	N	I-Hour	N
I-3 Existing	UL (UL)	45,300	NP	NP	NP	NP	NP	NP	NP	NP
	UL (UL)	60,400 (2) 30,200 (3)								
Proposed	NC (NC)	UL (3)	NC	NC	NC	NC	NC	NC	NC	NC
	NC (NC)	UL (3)	NC	NC	NC	NC	NC	NC	NC	NC
M Existing	Special Provisions of Chapter II are Applicable									
Proposed	No Change									
R-1 Existing	UL (UL)	89,700	40,500	27,300	40,500	27,300	40,500	27,300	40,500	27,300
	UL (UL)	119,600 (12) 59,800 (13)	54,000 (4) 27,000 (5)	36,400 (2)** NA	54,000 (4) 27,000 (5)	36,400 (2)** NA	54,000 (4) 27,000 (5)	40,500 (4) 27,000 (5)	31,500 (3) 42,000 (4)	18,000 (2)** 24,000 (2)**
Proposed	NC (NC)	UL (UL)	UL (5)	UL (2)**	NC (5)	NC (NC)**	NC (5)	NC (3)	NC (4)	NC (NC)**
	NC (NC)	UL (UL)	UL (5)	UL (2)**	54,000 (5)	NC (NC)**	54,000 (5)	NC (3)	NC (4)	NC (NC)**
R-3 Existing	UL (UL)	UL (3)	UL (3)	UL (3)	UL (3)	UL (3)	UL (3)	UL (3)	UL (3)	UL (3)
	UL (UL)	UL (3)	UL (3)	UL (3)	UL (3)	UL (3)	UL (3)	UL (3)	UL (3)	UL (3)
Proposed	NC (NC)	NC (4)	NC (4)	NC (4)	NC (4)	NC (4)	NC (4)	NC (4)	NC (4)	NC (4)
	NC (NC)	NC (4)	NC (4)	NC (4)	NC (4)	NC (4)	NC (4)	NC (4)	NC (4)	NC (4)

Notes

- NA - Not Applicable
- NP - Not Permitted
- NC - No Change
- UL - Unlimited

- x Permitted by Section 508, which allows one-hour construction to be reduced to unprotected construction. Height and area may not exceed maximum unsprinklered height and area for one-hour protected construction.
- * The area of a sprinklered one- or two-story Group B or Group H, Division 5 occupancy of this construction type is not limited if the building is entirely surrounded by clear space of 60 feet in width.
- ** The existing code provisions allow unlimited area for a sprinklered or unsprinklered building of this construction type if the building is entirely surrounded by clear space of 60 feet in width. Proposed provisions will also permit unlimited area; however, such buildings are required to be sprinklered by the proposed provisions.
- *** Section 802(a) allows areas to be increased by 50 percent when the maximum travel distance specified in Section 3302(d) is reduced by 50 percent.
- + Rooms in Divisions 1 and 2 occupancies used for day care purposes, kindergarten, first or second grade pupils and Division 3 occupancies are not permitted above the first story.
- ** Group R, Division 1 occupancies more than two stories in height or having more than 3,000 square feet of floor area above the first story, are required to be not less than one-hour fire-resistive construction.

B-10 -- Smokeproof Enclosures; and B-38 -- Smokeproof Enclosure Requirements

The requirements and references relating to smokeproof enclosures and pressurized stairs in the DBC were proposed in the February report to be deleted per Code Changes B-10, B-38 and additionally with Code Change B-26 from the high-rise requirements of Section 1807.

The 1979 DBC required one smokeproof enclosure for high-rise office and residential buildings and also for other buildings with floors located 75 feet above grade. Also, high-rise office and residential structures were permitted by the 1979 code to substitute all pressurized stairwells in lieu of providing a single smokeproof enclosure when the building is sprinklered. The most recent edition of the code, 1983 DBC, which incorporates recent changes of the Uniform Building Code, requires all stairs in buildings with floors 75 feet above grade to be either smokeproof enclosures or be pressurized when the building is sprinklered.

The Staff and the BCAAB have accepted Code Changes B-10 and B-38 as they relate to the elimination of the references to smokeproof enclosures. However, the Staff has additionally recommended retention of the smokeproof requirements as found in the 1979 DBC for high-rise buildings.

The use of smokeproof enclosures in a sprinklered building or pressurized stairways in a sprinklered high-rise building is an unnecessarily redundant exit feature which also requires the incorporation of emergency power facilities. The "Decision Tree" (Figure 1, February report) demonstrates the unnecessary redundancy by indicating that automatic suppression is the single and only fire protection feature needed to protect building occupants and that concern for an exiting system is not necessary. However, since the code changes do not intend to remove all safety redundancies related to exiting, requirements for protected fire-resistive stair enclosures remain in the code and only the unnecessarily redundant requirements for smokeproof enclosures, stair pressurization and associated emergency power equipment are suggested to be eliminated.

The requirements for pressurized stairways and smokeproof enclosures have been promulgated only within the last 10 years into various codes and have evolved out of the original

concern to provide a protected access for fire fighters in unsprinklered high-rise buildings. With regard to fully sprinklered high-rise buildings, there has been no justification or substantiating history to indicate that smokeproof enclosures and pressurized stairs are necessary. Therefore, Code Changes B-10 and B-38 are proposed as originally intended and without modifications suggested by the Staff.

B-13 — Open Parking Garages

In the February report, Table 7-A of the 1980 edition of the Dallas Building Code (DBC) was modified to allow greater heights and areas for sprinklered open parking garages, in accordance with the intent of this project. However, in the conclusion of the report, we recommended that the subject of the open parking garages be studied for possible further modification as the provision of automatic sprinkler protection in garages has recently been recognized to be of limited value. The 1982 edition of the Uniform Building Code (UBC), upon which the 1983 DBC is based, was revised to allow larger areas for unsprinklered parking garages, subject to certain limitations.

Given the modification of the 1982 UBC and the desire of the BCAAB to allow greater areas for the unsprinklered condition, the February proposal was modified. Change B-13, as presented in this report, is consistent with the construction requirements of the nationally recognized NFPA Standard 88A-1979, "Standard for Parking Structures," which allows unlimited areas for unsprinklered Type I or Type II open parking garages up to 75 feet in height and unlimited area and height when construction is at least Type II-One hour. The major difference between the current DBC and NFPA 88A is that the DBC requires that such garages be open on all sides, while NFPA 88A requires only two sides of the garage to be open. The requirement that the horizontal distance on each tier be within 200 feet of an exterior wall opening in both the DBC and NFPA 88A is maintained in the proposed change. The provisions in NFPA Standard 88A represent some of the few building construction provisions included in nationally recognized codes and standards that are technically based, the result of a series of full-scale tests in open parking garages.

The revised Table 7-A has been simplified and does not distinguish between sprinklered and unsprinklered garages as the provisions for each condition are identical. The recently adopted text from the 1982 UBC is essentially redundant to Table 7-A and has been

stricken (at the top of page A-19 of this report). The basic construction requirements proposed in B-13 are consistent with those contained in the nationally recognized consensus standard, NFPA 88A.

Additional language has been added to Section 709(c) to address the subject of buildings which may be built with other occupancies over an open parking garage, as a result of an expressed concern by the Dallas Fire Department. The revision includes a requirement that construction of the parking garage supporting an occupancy above shall not be of less fire resistance than that required for the upper occupancy. Because of the relatively low fire loading, lack of continuity of combustibles and good fire experience of open parking structures, the provision of sprinklers in the garage for such a condition is not considered necessary, provided that the required occupancy separation is maintained.

B-14 — Covered Mall Buildings

At the initiation of this project, the 1980 DBC did not contain specific requirements for covered mall shopping centers. New requirements for covered malls were proposed in Code Change B-14 in the February report. During the BCAAB study period, Dallas Ordinance 17791 was adopted which included requirements for covered malls essentially as published in Appendix Chapter 7 of the 1982 UBC. The language originally proposed in B-14 was also based upon UBC Appendix Chapter 7, with certain technical modification. The BCAAB and Staff did not critically review Proposed Code Change B-14 because it was felt that the newly adopted code language was adequate. However, after discussion, the BCAAB has recently endorsed the concepts contained in the proposed change.

The proposal in this report has been editorially revised to correspond with the 1983 DBC and contains several major technical revisions aimed at minimizing overly redundant provisions in this section.

The amendments to the material contained in the 1982 Uniform Building Code are based upon the requirements of other model codes, fire experience and engineering judgment. Section 710 begins with definitions specifically applicable to covered mall buildings. As a matter of clarification, the term "covered mall building" is intended to include the covered common pedestrian area, associated "tenant" spaces and attached anchor stores.

