DOCUMENT RESUME

ED 072 554 EA 004 890

TITLE	California State Board of Education Guide for Determining "Earthquake Unsafe" School Buildings.
INSTITUTION	California State Dept. of Education, Sacramento. Bureau of School Planning.
PUB DATE	72
NOTE	15p.
AVAILABLE FROM	California State Department of Education, Bureau of School Planning, 721 Capitol Mall, Sacramento, California 95814 (Free)
EDRS PRICE	MF-$0.65 HC-$3.29
DESCRIPTORS	Administrator Responsibility; Boards of Education; Building Obsolescence; Engineering Technology; *Guides; Operating Engineering; *Safety; *School Buildings; School Districts; School Improvement; State Laws; *State Standards; *Structural Building Systems
IDENTIFIERS	California; Structural Survey Reports

ABSTRACT

This guide is intended to help members of school district governing boards understand more clearly their responsibilities and how to obtain sufficient factual information regarding existing unsafe school buildings. The first part provides an outline of procedures that members of the school district governing board should follow when obtaining structural survey reports and cost estimates. It also contains information that a governing board should use as a basis for its decision on whether a school building should be reconstructed or replaced. The second part contains an explanation of structural engineering requirements for school buildings. It has been included to assist governing boards in understanding the responsibilities and concerns of an architect or a structural engineer who examines a school building and submits a structural survey report stating that the building is either "safe" or "unsafe." The third part of the guide presents a review of the current legal requirements regarding pre-1933 (Field Act) school buildings. (Author)

California State Board of Education Guide for Determining "Earthquake Unsafe" School Buildings

CALIFORNIA STATE BOARD OF EDUCATION

California State Department of Education
Wilson Riles – Superintendent of Public Instruction
Sacramento – 1972

This publication, which was prepared by the Bureau of School Planning, was edited and prepared for photo-offset publication by the Bureau of Publications, California State Department of Education, and was published by the Department, 721 Capitol Mall, Sacramento, CA 95814.

1972

Contents

Members of the
California State Board of Education

Newton L. Steward, President
John R. Ford, M.D., Vice-President
Mrs. Henry Drinker
Mark T. Gates, Jr.
David Hubbard
Mrs. Donald P. Krotz
Clay N. Mitchell
Eugene N. Ragle
Tony N. Sierra

Introduction

Many people in the state do not understand current earthquake safety laws which require that school buildings constructed prior to April 10, 1933, be examined and that, if necessary, action be taken to make the buildings comply with structural safety requirements. Much apathy toward the requirements is caused by an honest belief that the threat of an earthquake is grossly exaggerated.

Some believe that school earthquake standards are too strict and that corrective measures are too expensive. Consequently, bond and override tax elections for the purpose of rehabilitating or replacing unsafe school buildings frequently are defeated.

School district governing boards have not always been fully aware of their obligations under the Garrison Act or of the responsibilities of architects or structural engineers regarding the examination and structural adequacy reports on existing school buildings. Some structural adequacy reports have not described building inadequacies in sufficient detail to indicate the corrective measures needed to comply with safety standards, thus impairing the decision-making process.

Sometimes school district governing boards have limited the scope of architectural and engineering services by restricting expenditures for subsurface building examination and testing.

This guide is intended to help members of school district governing boards understand more clearly their responsibilities and how to obtain sufficient factual information regarding existing unsafe school buildings. Hopefully, in turn, they will be prepared to disseminate significant information to the voters of the district.

This guide consists of three major parts. The first part provides an outline of procedures which members of the school district governing board should follow when obtaining structural survey reports and cost estimates. It also contains information a governing board should use as a basis for its decision of whether a school building should be reconstructed or replaced.

Part two contains an explanation of structural engineering requirements for school buildings. It has been included in this guide to assist school district governing boards in understanding the responsibilities and concerns of an architect or structural engineer who examines a school building and submits a structural survey report which states that the building is either "safe" or "unsafe."

The third part of the guide presents a review of the current legal requirements regarding pre-1933 (Field Act) school buildings.

The Structural Survey and Cost Estimates

As of February, 1972, a total of 226 of the 1,133 school districts in California (including community college districts) were using one or more unsafe school buildings. Many of the school districts undoubtedly have members new to their school district governing boards since the structural safety checks were initiated. Community sentiment perhaps has changed, or developments within the community may have altered the factors upon which previous decisions were made. An adequate structural survey accompanied by a complete explanation of necessary procedures to correct structural deficiencies, including reliable cost estimates, will do much to reassure the taxpaying public that public monies will be well spent. Since unsafe school buildings may not be used for school purposes after June 30, 1975, all necessary information must be available to school district governing boards so that appropriate decisions regarding remaining unsafe school buildings can be made.

The initial step required by the Garrison Act on the part of the governing board of each school district is to determine if buildings in the district are being used for school purposes which were not constructed according to the requirements of the Field Act (Education Code Section 15503). This step has already been taken by most school district governing boards for all pre-1933 buildings, and there should be on file a copy of the architect's or structural engineer's report. If there are school buildings within the district which were built after 1933 without the requisite approval, they must also be examined. If no examination has been made of such buildings, a licensed architect, structural engineer, or a structural engineer of the State Office of Architecture and Construction must be retained by the district to examine all nonconforming buildings within the district and to report his findings and recommendations.

The report must be as complete and as comprehensive as possible. A survey of a cross section of structural adequacy reports indicates that, while the investigations may have been adequate, the reports communicate poorly the inadequacies of the buildings and the measures required for correction of structural problems. In some of the reports, it is evident that the members of the school district governing board limited the scope of the services of the examining architect or structural engineer or failed to fund necessary testing. Adequate financial support for investigation and testing services is essential.

The suggested contents of an engineer's structural report that follow should assist school district governing boards in obtaining necessary information prior to making a decision on whether a pre-1933 or nonconforming school building should be replaced or rehabilitated. The suggested contents also provide an outline of procedures which should be followed in making a structural adequacy report. If existing structural survey reports do not provide the recommended information, it is suggested that the architect or structural engineer of record be requested to provide the additional data or that another architect or structural engineer be retained to provide the information. The structural report should include the items that follow:

- An explanation of the method of investigation

  The explanation should provide answers to the questions that follow:

  1. Were original plans, specifications, and structural calculations utilized?
  2. Was a visual examination of the building made? Was it necessary to take measurements and make new drawings?
  3. Were surface materials removed so details and structural framing could be examined? If not, why not?
  4. Were tests, such as core tests of concrete and masonry, made to ascertain actual composition and strengths of materials? If not, why not?

5. Were structural design calculations made? Are assumed design strengths stated? If not, why not?

- Documentation of a declaration that a school building is "safe" or "unsafe" as required in Education Code Section 15503

  If a building is declared "safe," no further action is required by the governing board.

- A detailed comparison of the structural capabilities of the building with the current structural requirements of the Department of General Services as contained in the California Administrative Code, titles 21 and 24

  The regulations concerning construction requirements are stated in very precise terms. Procedures for making structural design calculations also are stated precisely, and the appropriate and necessary assumptions to be made are well defined. If it is necessary to remove finish materials so that structural framing and details can be examined, this should be done. If tests, such as core tests of concrete or masonry, are necessary, they should be made. If it is possible to provide protection which is adequate or equivalent to the protection required under the Field Act by means of waivers of specific code requirements, this possibility should be explored with appropriate state officials. Procedures followed by the architect or structural engineer in making comparisons should be explained in the survey report. The school district governing board must have before it all the necessary facts on which to base its judgment of what should be done with the school building under examination.

- A detailed analysis of the necessary structural corrections

  It is most important that the analysis of the necessary structural corrections be given in detail. If alternate methods of correction are available, each method should be outlined with the advantages and disadvantages of each listed for consideration by the school district governing board. The effect of necessary structural corrections, including the installation of particular types of electrical and mechanical systems, on the architectural aesthetics should be considered, since these aspects of the problem may have an important bearing on the ultimate decision.

  No arbitrary time limitation should be placed on the life-span of the corrections. The law specifically allows the structural requirements to be relaxed for older school buildings which are being examined for a determination of whether the building is "safe." For example, old buildings are required to withstand only one serious earthquake whereas new school buildings must be designed to withstand repeated severe earthquakes with a minimum amount of building damage. Some architects and structural engineers have stated in their reports that a building was unsafe because it did not meet the construction inspection and testing requirements of the California Administrative Code, titles 21 and 24. Since it is evident that these construction requirements cannot possibly be met retroactively, the architect or structural engineer should base his decisions on the structural capability of the building to provide life safety and not on a legal technicality.

  If the structural analysis is not reported in sufficient detail or if the school district governing board, for any reason, questions the validity of the report, board members should not hesitate to seek confirming reports.

- Preparation of a cost estimate (See Education Code Section 15503.)

  If the report shows that a school building is unsafe for use, the governing board of the school district immediately shall have an estimate prepared of the cost necessary to repair, reconstruct, or replace the building. The estimate shall be based on current costs and may be prepared by the same architect or structural engineer who examined the building, or it may be prepared by another architect or structural engineer. If the Office of Architecture and Construction was retained to prepare the structural survey report, someone else must now be retained to prepare the cost estimate, since the Office of Architecture and Construction does not prepare cost estimates.

  A cost estimate for the replacement of comparable educational services during the time of construction or reconstruction should also be made and included in the survey report. This estimate should include the cost of interim facilities if such are required. The cost of such facilities may differ in an

estimate to reconstruct a school building from an estimate to replace it. For example, it may be possible to construct a new building, as many school districts have done, while continuing to use the old building for educational purposes. If this is not possible, some compromise may be available. However, if the school district governing board decides to reconstruct the old building and the reconstruction work can be accomplished in phases or during the summer, the cost for interim facilities may be minimal. If the entire building cannot be used for part of the school year, the cost for interim facilities may be substantial.

The best solution for provision of interim facilities will vary for each district and for each school.

It should be recognized that reconstruction costs often exceed the cost estimate because of unknown factors. A study by the Bureau of School Planning, State Department of Education, reveals that the actual costs to reconstruct old school buildings under the requirements of the Garrison Act have exceeded estimates. The amount by which the actual costs exceed the estimated costs varies greatly from project to project but averages more than 40 percent. This is undoubtedly due to the unknown factors that are present in every remodeling project. For example, piping may be found to be faulty, wiring may be discovered to be unsafe, and termite damage or dry rot may be found. The possibility of these unforeseen conditions being present should be anticipated by the school district governing board, and an appropriate contingency should be included in the cost estimates.

The estimate for repairing the school building also should include any possible corrections required by the State Fire Marshal for fire and panic safety. Since the requirements of the California Administrative Code, Title 19, Public Safety, have changed gradually over the years, any pre-1933 building probably would be in violation of many of the current fire safety code requirements. If the school building ultimately is reconstructed or replaced, the plans shall be reviewed by the State Fire Marshal in compliance with the California Administrative Code, Title 19, Public Safety.

Similarly, the estimate should include any possible corrections required in the California Administrative Code, Title 8, Industrial Relations.

Each school district also should have prepared a cost estimate for updating the school building educationally as well as structurally. For example, space flexibility created by the removal of walls and the joining of spaces should be considered. The replacement of mechanical and electrical systems may be essential from an educational standpoint. Surface improvements, such as painting or installing acoustic tile, carpet, chalkboards, and tackboards, should be included in the estimate. Such renovations for educational purposes are at the option of the school district governing board and are not required by law.

However, educational renovations should be considered by the school district governing board that is contemplating the reconstruction of an unsafe school building. Consideration of renovations for purposes of the education program will enable the board to make a more accurate comparison of a reconstructed building with a new building. If the more complete estimates are sought as suggested, the school district architect is best prepared to make the estimates, because he has the necessary knowledge of the design and cost items involved.

The school district governing board also should consider comparative cost estimates of long-term building maintenance for old, reconstructed buildings and for new buildings.

If the steps in the preceding outline are followed, the governing board will have before it all of the information necessary to make a reliable decision. Utilizing the information acquired from the survey report and the comparative cost estimates, the school district governing board can establish a system of priorities on which to base the decision of whether to repair, reconstruct, or replace a school building which has been found to be unsafe. If the governing board decides to reconstruct an unsafe school building and the cost to reconstruct it approaches the cost of replacing it, the board's decision should be based on evidence that the reconstructed building will be better educationally than the replacement building would be.

The governing board's decisions and the evidence on which they are based should be presented to the citizens residing in the school district. The board's presentation should clearly communicate the fact that the basis for the decision includes an adequate structural survey, reliable cost estimates, a firm background of legal requirements, and a proper analysis of these data.

Structural Engineering Requirements

The structural requirements for building designs are regulated by the California Administrative Code, Title 21, Public Works, and Title 24, Building Standards. The basic standards are contained in the Uniform Building Code and are adopted by reference into the California Administrative Code, Title 24, Building Standards, which also contains the modifications deemed necessary by the Office of Architecture and Construction. Some of the modifications are more restrictive than the Uniform Building Code and are considered excessive by many architects and structural engineers, especially in terms of costs. Detailed interpretation and justification of the more restrictive structural requirements would result in more widespread acceptance and implementation of the safety standards. Studies by the Department of Education show that the structural standards of the Office of Architecture and Construction add no more than 2 percent to the total cost of new construction. Reports following many recent California earthquakes, and especially the reports following the San Fernando earthquake of 1971, testify to the effectiveness of the code requirements and suggest that other buildings should be built to these (Field Act) standards rather than to weaken the code requirements for school buildings.

Because of the magnitude and nature of earthquakes now recorded, future building standards for earthquake safety may become more severe and restrictive rather than less restrictive.

The structural requirements of the adopted building code require a homogeneity of design in which various elements of the building, such as the walls, roof, and floor, are tied together with sufficient strength to act together during a vibratory movement of the ground. Inertial motion generated by ground accelerations must be withstood by the various building elements. For example, forces imposed by the mass of the roof and walls of a structure may be transmitted by the roof, acting as a girder or diaphragm, to cross walls, acting as shear walls, which in turn deliver the forces to the ground. The transmission of these forces then depends upon the ability of the roof to act as a diaphragm, the ability of the cross walls to deliver the forces to the ground, and the strength of all the various connections between them acting as links in a chain.

School buildings constructed prior to 1933 lack this homogeneity. Roof and floor structures usually are not constructed to act as diaphragms; cross walls are not able to resist the necessary lateral loads; and most of the connections are either insufficient or missing.

Under the California Administrative Code, titles 21 and 24, types of construction that were allowable prior to 1933 are now considered unsafe. These types of buildings need to be altered as follows:

- Brick walls built without reinforcing steel and with weak mortar must be removed or strengthened.
- Unreinforced hollow tile partitions must be replaced.
- Weak concrete must either be replaced or strengthened by gunite or other means.
- Wood roof and floor members which are cast in or rest upon concrete or masonry walls must be securely tied to the walls.
- Plaster ceilings on wood lath must be replaced if it is apparent that the bonds or keys are weak.

The Uniform Building Code uses a logical structural design sequence based on the categories that are discussed in the paragraphs that follow.

Requirements Based on Occupancy

The building code classifies each building by occupancy. Most buildings in a school are Group C-1 occupancy; e.g., classrooms and most libraries. If the school has an auditorium with a stage and a capacity of less than 1,000 people in the building, the auditorium is classified as Group B-1

occupancy, and the remainder of the school is classified as Group C-1 occupancy.

The occupancy group determines certain minimum fire resistive characteristics and required separations from other buildings. For example, a Group C-1 occupancy school, under certain conditions, must have at least a two-hour fire resistive wall if it is located less than five feet from another building.

Requirements Based on Types of Construction

The type of construction refers to the materials of which the building is constructed and to their relative fire-resistive characteristics. For example, a wood frame building is classified as a Type V building, but a heavy timber wood frame building, which is more fire-resistive, is classified as Type III. The type of construction is related to occupancy by certain limitations of area and height. For example, a Type V building with a Group C-1 occupancy is limited in size to a certain number of square feet. Decisions regarding the type and number of buildings to be constructed should be based on educational planning as well as on economic factors.

Design Requirements for Loads

The building code establishes standards for loadings, which include dead loads, live loads, roof loads, wind loads, and earthquake loads. Dead loads include the weight of the walls, permanent partitions, framing, floors, roofs, and of all other permanent stationary construction that becomes a part of the building. Each part must support its own weight plus the weight of the members above it. Should assumed strengths of materials be erroneous or if construction errors are made, failure due to dead weight is possible.

Live loads are loads created by such things as the furniture, equipment, building occupants, rain, and snow. For example, a school classroom with movable furniture must be designed for a live load of at least 40 pounds per square foot. A minimum roof live load of 12 pounds per square foot is established in the Uniform Building Code. In addition, roof loadings such as snow loads must be determined for each area. Should the assumed live loads be exceeded, there is a possibility of failure or even collapse.

Wind-load calculations take into account the expected wind pressure for the geographical area, the height of the structure, and the shape of the building. A wind load is assumed to be a horizontal push against the outside wall from any one direction plus an uplift factor on the eaves. Failures due to excessive wind load often occur.

In the past, earthquake loads were assumed to be a horizontal push from any one direction against the building, but recent studies show that earthquake forces can come in the form of a vertical push as well. The Uniform Building Code places each geographical area in an earthquake zone rated 0, 1, 2, or 3. Buildings in earthquake zone 3 must meet the most severe construction requirements. According to the Uniform Building Code, most of California is in earthquake zone 3. The Central Valley and part of northern California, however, are in earthquake zone 2.

The California Administrative Code, Title 24, Building Standards, modifies the Uniform Building Code by requiring that all school buildings constructed in California meet the earthquake load requirements of zone 3. The more stringent requirement is controversial, since the earthquake resistive capability in zone 3 must be twice that of zone 2. For most school construction, the Uniform Building Code assumes the strength of the horizontal push as an arbitrary value of 13.3 percent of the weight of each part of the building. For example, if the weight of a wall is 1,000 pounds, then it is assumed that an earthquake will create a maximum horizontal push of 133 pounds at the center of gravity of that particular wall. This 133-pound sideways push against the wall must be resisted by the structural system. A diagonal brace may provide the strength needed to resist this force.

Vertical elements used to transfer these lateral forces to the ground are shear walls, braced frames, and moment resisting frames. Horizontal elements used to distribute the lateral forces to vertical resisting elements are diaphragm and horizontal trusses or beams. If an earthquake exerted a force of 200 pounds instead of the 133 pounds assumed in the code, failure of the diagonal brace may result. If the maximum earthquake force exerted on the wall were 50 pounds instead of the 133 pounds assumed, the diagonal brace would have been "overdesigned" for that particular earthquake.

The Uniform Building Code classifies each building structure into four different types of systems: box system, combination frame and shear wall system, frame system, or other. Each type of system is assigned a different horizontal force factor which is appropriate for the general earthquake resistive characteristics for that particular structure.

The assembly of resisting elements determines the system classification and the magnitude of design forces. The basic problem is to picture the geometry of the structure in such a way that the internal actions by which the structure resists and sustains its loading can be determined. The assumed loadings must be ultimately transferred to the ground, but, further, the building must be anchored into the ground to prevent it from overturning.

Regulations for Quality and Design of Building Materials

The Uniform Building Code also establishes design standards for all commonly used building materials, such as wood, steel, concrete, and masonry. Wood, for example, is classified by species, and strength assumptions are made for each different grade of each specie of lumber. Strength assumptions are also made for the particular use to be made for each piece of lumber. For example, a wood rafter is assigned different values than a wood stud, because it performs a different structural job. Tables are established in the Uniform Building Code for "standard" or nominal methods of construction, but deviations from the tables are allowable if the actual stresses are calculated. If an older building is being evaluated and the size and spacing of wood members in that building differ from currently established practice, it is possible to calculate the adequacy of the wood members to withstand earthquake movements by assigning values based on the type and species of lumber used in the building.

The Uniform Building Code also assigns values to the method by which the members are connected to each other – by nail, bolt, or other method. When nails are used, an allowed value is determined by practical experience and is based on size of the nail and the direction in which the nail is placed into the wood members. A sufficient number of nails is then required to transmit fully all expected forces or loading through each connection. Limitations are placed on the deflection of each member, under loading, so that finished materials such as plaster will not fail under expected loadings.

Potential problems particular to each material also are taken into account in the building code requirements. For example, wood which is subject to rot and insect infestation is required to be [illegible] from earth by concrete or masonry. A [illegible] safety of varying degree is applied automatically to all strength assumptions for materials and connections in the Uniform Building Code requirements.

Detailed Regulations in the Code

The Uniform Building Code also describes in detail many other construction requirements. It describes the steps which must be taken to evaluate soil bearing capacity and foundation design. It also designates standards and procedures for roof construction and coverings, glass and glazing, and plaster and wallboard.

The code assumes an area in square feet for the number of people that may reasonably occupy space used for a particular purpose, and it establishes the number of exits that must be provided for any particular number of occupants. The number of square feet per occupant assumed for a classroom is 20. A 1,000-square-foot classroom is, therefore, expected to be occupied by a maximum of 50 persons. If a classroom has over 1,000 square feet, it is required to have at least two exits. Regulations concerning the protection of exits, width of exits, and so forth are very exacting and detailed and are administered by the State Fire Marshal under the California Administrative Code, Title 19, Public Safety.

In conclusion, the code provides performance standards to guide the architect or engineer in his design process procedures pertaining to requirements for structural, fire, and panic safety.

Current Legal Requirements

On Friday evening, March 10, 1933, at 5:55 p.m., much of southern California was shaken by a severe earthquake. Heaviest losses were sustained in the Long Beach and Los Angeles areas, where there was widespread damage to school buildings. If the earthquake had occurred during school hours, the toll of dead and injured schoolchildren would have been great and tragic. Investigations of the damaged buildings indicated that the buildings failed to resist the horizontal forces imposed by ground movement. In many cases, the engineering design for the buildings had not included provisions for seismic forces.

The Field Act

A wave of public indignation swept the state when it became known that many schools were not designed to resist earthquakes. State legislators responded to their constituents by making earthquake safety for public schools an issue of immediate concern. Assembly Bill 2342, introduced into the California Legislature by Assemblyman Don Field of Glendale, was passed by the Legislature and was signed by the Governor on April 10, 1933. This assembly bill became sections 15451 through 15465 of the Education Code. The legislation, which has been amended but has not been substantially changed since 1933, has become known as the Field Act. The Education Code sections, which follow, regulate the construction of new school buildings:

15451. The Department of General Services under the police power of the state shall supervise the construction of any school building or, if the estimated cost exceeds ten thousand dollars ($10,000), the reconstruction or alteration of or addition to any school building, for the protection of life and property. . . .

15454. The Department of General Services shall pass upon and approve or reject all plans for the construction or, if the estimated cost exceeds ten thousand dollars ($10,000), the alteration of any school building. To enable it to do so, the governing board of each school district and any other school authority before adopting any plans for such school building shall submit the plans to the Department of General Services for approval . . . .

15455. Before letting any contract for any construction or alteration of any such school building, the written approval of the plans, as to safety of design and construction, by the Department of General Services, shall be first had and obtained.

15459. All plans, specifications, and estimates shall be prepared by a certified architect holding a valid license under Chapter 3 of Division 3 of the Business and Professions Code or by a structural engineer holding a valid certificate to use the title structural engineer under Chapter 7 of Division 3 of the Business and Professions Code, and the supervision of the work of construction shall be under the responsible charge of such an architect or structural engineer, except that where plans, specifications, and estimates for alterations or repairs do not involve architectural or structural changes said plans, specifications, and estimates may be prepared and work of construction may be supervised by a professional engineer duly qualified to perform such services and holding a valid certificate under Chapter 7 of Division 3 of the Business and Professions Code for performance of services in that branch of engineering in which said plans, specifications, and estimates and work of construction are applicable.

15461. From time to time, as the work of construction or alteration progresses and whenever the Department of General Services requires, the certified architect or structural engineer in charge of construction or registered engineer in charge of other work, the inspector on the work, and the contractor shall each make to the Department of General Services, showing, of his own personal knowledge, that the work during the period covered by the report has been performed and materials used and installed, in every particular, in accordance with the approved plans and specifications, setting forth such detailed statements of fact as are required by the Department of General Services.

15463. . . . The school district, city, city and county, or the political subdivision within the jurisdiction of which any school building is constructed or altered shall provide for and require competent, adequate, and continuous inspection during construction or alteration by an inspector satisfactory to the architect or structural engineer and the Department of General Services. . . .

The Garrison Act

In 1939 the California State Legislature added to the Field Act a statute which was designed to provide an enforcement mechanism for the structural rehabilitation of old school buildings. This statute, called the Garrison Act, provides that a pre-1933 school building shall be inspected for structural adequacy, which is interpreted to mean compliance with the standards set forth in the California Administrative Code, Title 21, Public Works and Title 24, Building Standards. If the building is found to be inadequate, the school district governing board must take action to repair the building or to abandon it.

An opinion by the State Attorney General in 1966 focused statewide attention on the problem. The opinion stated that members of a school district governing board which failed to procure an inspection of pre-1933 school buildings and to repair or replace any such buildings found to be unsafe could be held personally liable.

Although the intent of the Field and Garrison acts has always been clear and many school districts have either rehabilitated or replaced pre-1933 school buildings, other school districts have delayed taking action. In 1967 the Legislature added sections 15501 through 15515 to the Education Code. Part of Section 15501 follows:

> (c) Recognizing that some school buildings are better preserved than others, that some are less hazardous than others, that some more nearly satisfy modern educational needs than others, but that the best of these buildings are at least 33 years old and approaching the end of their efficient service life, it is reasonable to expect that all of them will have been repaired, reconstructed or replaced by 1983, at which time the newest of them will be 50 years old.

The Education Code sections added in 1967 require that the school district governing board launch a program of action to correct unsafe conditions, and they define the area of liability for not taking such action. Structural reports prepared prior to 1967 for unsafe school buildings which have not yet been replaced or reconstructed should be reviewed at this time for conformance with the current requirements.

Legislation in 1968 advanced to June 30, 1975, the deadline after which unsafe pre-Field Act school buildings may not be used for school purposes. This deadline is still in effect.

The Field Act and the Garrison Act do not establish design criteria for school buildings. This is accomplished under titles 21 and 24 of the California Administrative Code.

California Administrative Code, Titles 21 and 24

The Field Act placed responsiblity for establishing structural safety standards and their enforcement with the Office of Architecture and Construction, State Department of General Services. The established standards are contained in the Uniform Building Code, which is published by the International Conference of Building Officials. The Uniform Building Code is adopted by reference into the California Administrative Code, Title 24, Building Standards. Modification of the Uniform Building Code requirements which are deemed necessary for the design and construction of public school buildings are printed in the California Administiative Code, Title 24, Building Standards.

The Uniform Building Code and the California Administrative Code, Title 24, Building Standards, regulate the design, construction, and reconstruction of public school buildings. The regulations provide that the buildings shall be constructed to resist damage due to earthquakes in addition to the normal loads to which such buildings are subjected.

Also included are provisions for the strengthening or rehabilitating of public school buildings built prior to the enactment of the Field Act in order to bring such school buildings into conformity with minimum legal requirements for the safety of schoolchildren. Any school building constructed prior to the Field Act which has not been examined and found to be safe is now considered potentially "unsafe."

California Administrative Code, Title 19

The Field Act also includes a provision for the state of California to be vested with the authority to supervise the construction or remodeling of school buildings for the protection of life and property. In 1940 the State Attorney General rendered the opinion that this requires the state to assure that school construction meets fire safety as well as structural safety standards. This opinion was subsequently upheld by the California Supreme Court. Fire and panic safety standards are part of the rules and regulations of the State Fire Marshal, which are included in the California Administrative Code, Title 19, Public Safety, and in Title 24, Building Standards. These regulations establish minimum standards for the prevention of fire for the protection of life and property. School buildings represent only one type of building affected by the regulations. Therefore, the Office of Architecture and Construction, State Depart-

ment of General Services, when reviewing plans and specifications for school construction, also checks for conformance with the California Administrative Code, Title 19. A fire engineer under the State Fire Marshal works directly with the reviewing structural engineer in the Office of Architecture and Construction.

California Administrative Code, Title 8

In 1958 an opinion of the State Attorney General extended the state's responsibility over school safety to include mechanical and electrical elements. Also, the California Labor Code requires compliance with the safety regulations of the Department of Industrial Relations, which are included in the California Administrative Code, Title 8, Industrial Relations. The Office of Architecture and Construction, State Department of General Services, requires that plans for mechanical and electrical work be prepared under the supervision of the architect by mechanical and electrical engineers.

Code Enforcement

Although the Office of Architecture and Construction checks all plans for public school construction for conformance with the regulations in titles 8, 21, and 24 of the California Administrative Code, that office has primary responsibility for enforcing only the regulations in titles 21 and 24 which relate to structural safety.

Although the Field Act regulates only the design and construction of school buildings, other laws regulate their use and provide for periodic inspections during the life of the buildings.

The State Fire Marshal has the responsibility of making periodic field inspections for conformance with California Administrative Code, Title 19, Public Safety, regulations that relate to fire safety. The enforcement of those regulations is also the responsibility of the State Fire Marshal. Field inspections are made by fire engineers from the Office of the State Fire Marshal or by local fire chiefs in those communities in which such officials have the assigned authority to enforce fire regulations.

Periodic field inspections and enforcement of the regulations in the California Administrative Code, Title 8, Industrial Relations, are a function of the Division of Industrial Safety, State Department of Industrial Relations.

71-113 DE-2560 6-72 1M