The Evolution of the Structural Engineers Association of California

Some Historical Notes

1931 1981

PREFACE

On the occasion of the fiftieth anniversary of the founding of the Structural Engineers Association of California it seems fitting to look back at the events that led to its formation and to follow the subsequent course of its development.

We are indebted to our predecessors for all of their efforts during the past five decades of steady growth. Their dedication has enabled the Association to enjoy a reputation of respect throughout the world.

This collection of historical notes was prepared by the San Diego Association in connection with the 1981 annual convention of SEAOC at the Hotel del Coronado, September 10-12, 1981.

We gratefully acknowledge the cooperation and assistance of William W. Giles, Jr. of SEAONC, and of Stephenson B. Barnes and Edward M. McDermott of SEAOSC in gathering and assembling historical records and photographs used in preparing this publication.

THE EVOLUTION OF THE STRUCTURAL ENGINEERS ASSOCIATION OF CALIFORNIA

Thomas G. Atkinson

In The Beginning

"To advance the science of structural engineering; to assist the public in obtaining dependable structural engineering services; to encourage engineering education; to maintain the honor and dignity of the profession and to enlighten the public with regard to the province of the structural engineer."

This was the avowed purpose of the new Structural Engineers Association of Southern California as it came into being in a meeting at the University Club in Los Angeles on February 20, 1929. The organizers were a group of twelve structural engineering consultants; two were also architects and one was a professor at the California Institute of Technology. Many of their names are well known today for their contributions to the science of structural engineering:

Rufus M. Beanfield	Paul E. Jeffers
Oliver G. Bowen	William Mellema
Clarence J. Derrick	Romeo R. Martel
Ralph A. Deline	Clarence E. Noerenberg
Murray Erick	Blaine Noice
Mark M. Falk	( ) Walz

The membership grew rapidly, and by the end of 1930 included many additional engineers who are well remembered in the State of California, such as R.V. Labarre, D.F. Shugart, S.B. Barnes, R.W. Binder, W.M. Butts, B. Benioff, F.J. Converse, C.G. DeSwarte, M.F. Deering, N.W. Kelch, A.F. Miller, D.L. Narver, A.A. Sauer, S.S. Stahl, H.L. Whittlesey, W.E. Wilson, R.W. Wehr, and T. Von Karman.

Meanwhile, consulting structural engineers in the San Francisco area were meeting informally. The official beginning of the Northern California Association is traced to a meeting organized by R. C. Buell of the Portland Cement Association and held at the Engineer's Club on Sansome Street on January 18, 1930. Those invited to attend were H.F. Brunnier, E.L. Cope, W.P. Day, H.B. Hammill, W.L. Huber, C.H. Snyder, R.S. Chew, M.C. Couchot, H.D. Dewell, J.H. Hjul, J.B. Leonard, and L.H. Nishkian. On April 14, 1930 the Northern

California Association was officially organized, with 18 of a total membership of 31 present. Henry J. Brunnier was the first president, and Harold B. Hammill was the secretary-treasurer.

The impetus which brought the structural engineers together was the need to improve their business practices and their relationships with architectural clients. During the years immediately following their formation, both the Southern California and Northern California associations limited their membership to structural engineers in private practice. To expand the membership, however, this criterion was later abandoned, and all structural engineers, whether in private practice or otherwise employed, were encouraged to become members.

After the formation of the Northern California Association in 1930, it quickly became apparent that much could be gained from closer contact between the Northern and Southern California groups. There was considerable discussion in both groups about establishing a means of correlating efforts and exchanging ideas between the north and the south. An exploratory meeting was held in Santa Monica in 1931 between representatives of the two organizations. A. J. Saph, Jr. of the Northern Association recalled that the Southern Association at that time seemed more inclined to identify with the architects, whereas members of the Northern Association considered themselves to be civil engineers. Later that year the state organization was founded. The first convention of SEAOC was held at the Santa Maria Inn on December 3 and 4, 1932. A constitution was adopted at that time, and was later ratified by the constituent associations.

Efforts had already begun to obtain the title of Structural Engineer for registered civil engineers in California specializing in this practice. The minutes and records of the Association of Northern California indicate that they spearheaded these efforts, and H. J. Brunnier devoted considerable personal effort to this task. Initially there was some difference of opinion about the scope that the license of structural engineer should have. Many thought it should include and regulate bridge designers as well as those who specialized in buildings. A few, particularly in the south, thought that the title should be tied to the architect's license rather than to that of the civil engineer. Nonetheless, the structural engineer title in its present form was brought into being by the state legislature in 1932.

Probably no single incident had as profound an effect on the practice of structural engineering in the state of California as the severe earthquake that struck the city of Long Beach on the evening of March 10, 1933. The disaster occurred at a time when interest in the problem of earthquakes was prominent among structural engineers. Only nine days earlier at a meeting of the Southern California Association the program included motion pictures of shaking building models which had been subjected to varying load conditions and horizontal forces. The film was the property of the Structural Engineers Association of Northern California.

Two days after the earthquake a meeting of the board of directors of the Southern Association was called by Professor Romeo R. Martel of the California Institute of Technology. Three major actions were taken at that meeting. First, a joint committee, consisting of ASCE, SEAOSC, and the Associated General Contractors, made a complete report on the damaged area in order to ensure that reconstruction would be carried out on a sound basis. Second, a motion was passed that the Board of Building Safety of Los Angeles require that all buildings be checked for lateral and vertical forces. Finally, it was agreed that a letter be sent to the supervising architect of the U.S. Treasury Department strongly urging that all federal buildings built on the west coast be designed and checked for lateral forces by competent engineers. The Northern Association was informed of this action and also wrote a letter supporting this recommendation.

Much of the work of reconstruction and inspection was being done without compensation at that time in order to meet the urgent needs of the City of Long Beach and the surrounding areas. Mr. Charles Wailes, Chief Building Inspector for Long Beach, was a guest at the next general meeting of SEAOSC on March 14, 1933. He described conditions in his city, and discussed building safety and efforts to guard dangerous buildings. He discussed the Uniform Building Code that was in force, and stated that it was a good code, although it obviously did not require construction that would resist earthquakes of the magnitude of the one that occurred on March 10. He also thanked the engineers for all of their help and cooperation in Long Beach.

At another meeting which was held the following week much discussion concerned the problems of public schools and public buildings and possible legislation

that would provide proper structural design of such buildings. J. B. Leonard of the Northern Association stated that the State Architect, George B. McDougall, had been asked to suggest legislation for design to withstand earthquake forces in public buildings, particularly in schools. Mr. McDougall in turn had telephoned him to ask whether there was unified opinion as to what legislation was desired. This exchange led ultimately to the passage of the Field Act, which assigned to the State Architect the responsibility for the safe design and construction of public schools.

Some of the early members of SEAONC worked for several years in drafting a State Chamber of Commerce Uniform Building Code which included provisions for design of buildings to resist seismic forces. These data were made available to the State Division of Architecture following passage of the Field Act, and later became the basis for Title 21 and Appendix A which regulate the structural design of public schools.

The Long Beach earthquake had painfully emphasized the fact that little work had been done by engineers to establish earthquake design requirements. Individual differences of opinion regarding earthquake design had hampered the formulation of a consensus regarding specific provisions until the Long Beach event. Since that time, the Structural Engineers Association of California has worked extensively in the formulation of earthquake resistant design provisions, work which continues today in the SEAOC Seismology Committee and the Applied Technology Council.

Many of the engineers who were involved in earthquake reconstruction design operated under somewhat difficult conditions because of the economic conditions which prevailed during those depression years. In the year 1934 engineering fees on school reconstruction projects were based on a standard fee set at 4 mils per cubic foot of building. (During that same year at a meeting of the Northern Association at the Engineer's Club, dinner was one dollar per plate.) Nonetheless, the year 1934 was an important one for the Structural Engineers Association both in southern and in northern California. Numerous programs related to earthquake design were presented by both associations in 1934, and much progress was made toward improving the state of the art. One of the meetings of the Northern Association was devoted to discussion of construction of the Golden Gate Bridge towers and foundations which were under way at that time. During

this year much of the work was done which established a relationship of mutual respect between structural engineers and architects, particularly in the area of school design. A SEAOSC meeting notice of June 21, 1934, illustrates the problems of the times. The notice contained the following resolution which was to be offered at the next meeting of the Association:

> *"Resolved, because of technical limitations established by the State Division of Architecture and economic limitations set by the Board of Education, the structural engineer is prevented from exercising his independent judgment and therefore cannot accept responsibility for the structural sufficiency of schoolhouse design."*

Although the record does not show whether this resolution was passed, an arrangement for handling structural engineering fees on school design work was subsequently established with the Southern California Chapter of the American Institute of Architects.

A joint convention of the northern and southern California sections was held on October 18 to 20, 1934 at the Santa Maria Inn, Santa Maria, California. The main items of discussion concerned earthquake hazard and protection, the pending legislation for the Field and Riley Acts, and technical features of building code changes.

Overall, the decade of the thirties was one of curtailed activity in the structural engineering profession because of the low volume of building construction during the depression years. SEAOC's files contain a number of letters from individual members of the association who were experiencing hard economic times. Most of the letters contained apologies for nonpayment of dues which had taken a lower priority than the payment of day to day living expenses. Yet of technical significance was the development during this era of more accurate means of designing statically indeterminate beams and frames using procedures devised by Professor Hardy Cross and other distinguished engineering researchers of the day. Many programs on analysis of continuous frames and similar subjects were developed and presented to both associations, and structural engineers were quick to take advantage of these more sophisticated approaches to a more reliable design of structures.

During the mid-thirties the U.S. Bureau of the Budget threatened to discontinue the seismological program of the U.S. Coast and Geodetic Survey in California. This was vigorously opposed by the Structural Engineers Association. The profession is particularly indebted to A. V. Saph, Jr., of San Francisco who led the fight to have funds restored and kept the program alive so that strong motion earthquake records were obtainable in later years.

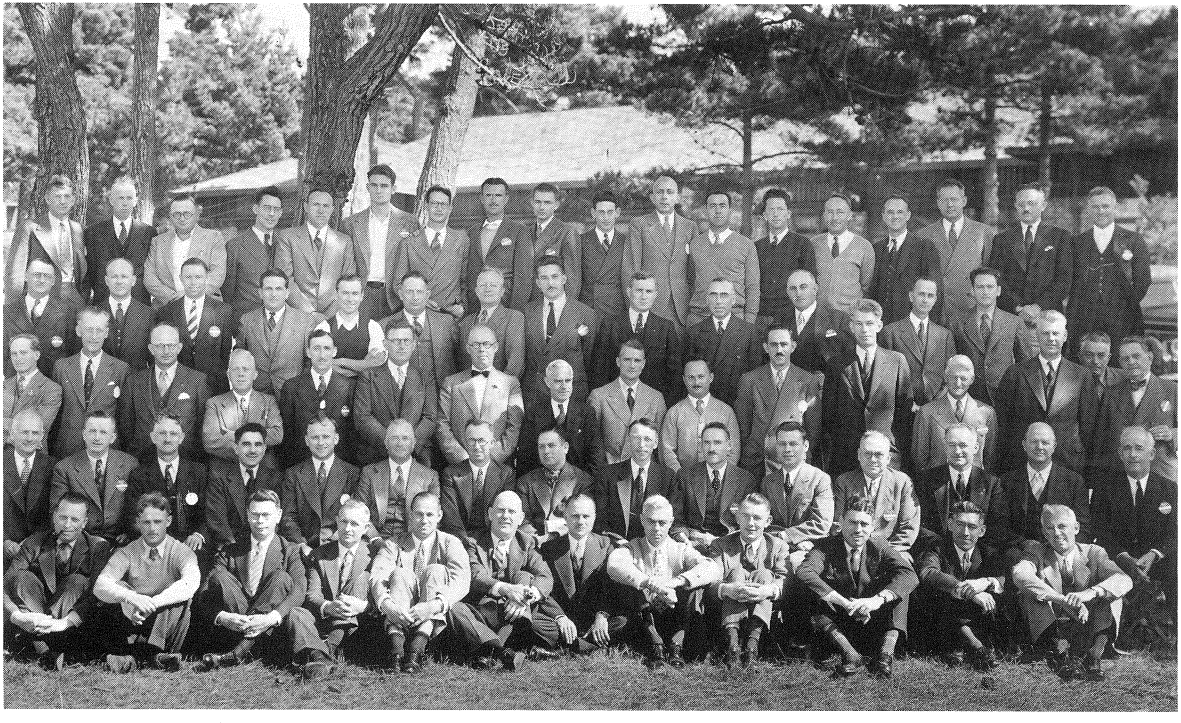
Structural engineers were enjoying increasing prestige during this period. SEAONC sponsored legislative joint meetings in San Francisco in 1935, 1937 and later years. Many prominent members of the legislature and executive branch of the state were invited guests. The meetings were attended by representatives of SEAOC, ASCE, and other professional groups.

The 40's

The decade of the 1940's was ushered in rather significantly by a sizeable earthquake which occurred in the Imperial Valley on May 18, 1940. Little was learned from the extensive damage to structures that had not already been noted in the major earthquakes of 1906 in San Francisco, 1925 in Santa Barbara and 1933 in Long Beach. However it is of considerable importance that during the course of this quake the first reliable strong motion seismographic record was obtained, and this record provided the basis for subsequent study which has continued to the present time.

The early half of the 1940's found the structural engineering community widely dispersed in support of the war effort. Many of the members were in uniform and most of the others were applying their talents to defense or defense-related industries. The southern and northern associations met regularly during the war years, but their activities were somewhat curtailed. The convention for 1942 was cancelled and no conventions were held in 1943, 1944 or 1945. The 1946 convention was a one-day meeting held in Santa Barbara.

During the latter half of the 1940's structural engineers were very busy meeting the needs of an expanding construction economy in the state. Older consulting offices were reformed and expanded, new consultants were entering the profession and numerous professional opportunities existed for all capable civil and structural engineers as the population in the state began to increase at a rapid pace. Engineering seismology advanced in sophistication under the strong influence



1937 Convention at Asilomar, California

of John Blume in the north and George Housner in the south, together with numerous practicing engineers who were able to lend their experience and judgment to the development of theoretical concepts by active investigators in the field. It was during this period that lightweight concrete came into widespread use, and many technical programs were devoted to that subject. Code committees were active in the technical matters pertaining to structural design, but perhaps most noteworthy were their monumental efforts to bring standardization to structural requirements and to reduce overlapping of requirements by differing political jurisdictions.

The year 1947 marked the formation of the Structural Engineers Association of Central California. Shortly thereafter this organization became part of the state association and was able to lend its support to the efforts of the northern and southern associations.

1948 Convention at Santa Barbara, California.

Pictured L to R (front): L. C. Hollister, S. B. Barnes, J. A. Blume; (rear) D. F. Shugart, L. K. Osborn, H. W. Bolin

The 50's

The structural engineering profession continued to increase in numbers and in strength in the state of California during the decade of the fifties. This was the decade during which prestressed concrete came into being and began to be widely used throughout the state. Tilt-up concrete wall construction had its beginnings in the early 1950's and soon became a standard means of construction, particularly for one-story industrial buildings. Plywood replaced boards as the commonly used material for wood-frame diaphragms and shear walls. Glue-laminated timber beams, although developed in prior decades, came into prominent use in the 1950's, and the question of proper criteria for their design was the subject of much research and discussion. Lift slab construction began in the 1950's and enjoyed increasing usage throughout the state during the remainder of the fifties and during the following decade as well. All of these developments were prominently mentioned and discussed at SEAOC conventions during the 1950's. The first convention presentation regarding prestressed concrete was made by John A. Gould of SEAONC who reported on the use of this construction technique in Europe at the 1951 convention.

On July 21, 1952 the state experienced the strongest earthquake it had suffered since 1906 when Kern County was subjected to a temblor with a magnitude of 7.7. Although the bitter lessons learned from previous earthquakes were relearned, it was particularly gratifying that this time the public schools, which had been designed under the requirements of the Field Act since 1933, emerged without structural damage. It was then apparent that the painstaking procedures which had been required for their design and construction had been justified.

Considerable technologic progress in structural engineering was made in the decade of the 1950's. The theory of plastic design in steel structures was introduced to the association in 1954 in a talk by Lynn Beedle of the American Institute of Steel Construction. Precast thin-shelled construction, "hyperbolic paraboloids", were introduced in 1956. A number of engineers were engaged in the design of structures for atomic blast protection during this period, and various programs concerning this area of interest were presented. The association had its first program in the use of electronic computers for solving structural engineering problems at the 1956

convention. The program was presented by two engineers from the State of California Division of Highways.

In 1957, as a result of several years of correspondence and discussion, a state seismology committee was formed under the leadership of William T. Wheeler, Chairman. This committee was charged with developing recommendations for earthquake resistant design to be issued as a standard by the association throughout California. It was during this era that the height limit on buildings was extended above the traditional 13 stories which had been used for many decades in the Los Angeles area. Proficiency in design of tall buildings immediately became a matter of necessity for structural engineers, and because of its vital interest became the subject of several programs at the annual SEAOC convention. One of the most interesting of the programs was a presentation on the analysis of the Latino Americano Building, which had withstood so well the Mexican earthquake of July, 1957.

Association members attending the 1957 convention at the Hotel del Coronado were faced with a $10 registration fee and a cost of $30 per day for a double room (including meals). Moreover, registrants had to specify whether they were arriving by car, plane, bus or train.

During the latter part of the decade higher strength steel began to be used by structural engineers for reinforcement of concrete. A program related to this topic was presented at the 1958 annual SEAOC convention. Another program that stirred considerable interest was one concerning missile tower design. This was truly a sign of the times, since it was clearly an outgrowth of a pervasive competitive climate in the U.S. resulting from the success of the Russians in a major non-manned space flight. Many of our engineering firms were engaged in design of facilities in support of the missile and satellite programs. High strength bolts replaced rivets to a large degree in the assembly of structural steel members, and welding became a fully accepted means of connecting structural steel after its tentative use for many years only in specialized situations.

The "Recommended Lateral Force Requirements of the Seismology Committee of SEAOC" were presented to the convention in 1958, and were approved by the membership on October 2 of that year. This very significant document has since been augmented and revised many

times and serves as the accepted criterion for earthquake resistant design of buildings throughout the United States and in many other parts of the world.

During the year 1959 much discussion centered upon the seismic design requirements for reinforced concrete. In some respects this was probably an outgrowth of the design limitations on that material imposed by seismology committee requirements. Also during that year, folded plate structures came into widespread vogue; a special program on that subject was presented at the convention by the well known Denver engineer Milo Ketcham. Substantial improvement was seen in criteria for the design of diaphragms, a result of work by S. B. Barnes and other researchers in the steel, concrete, and timber industries.

The end of the 1950's witnessed continued increase in the volume of structural engineering activity in the state. Many new firms continued to emerge and the effects of greatly increased construction were being enjoyed in all sectors of the state.

The 60's

The 1960 convention was held in Yosemite. One of the principal technical papers was devoted to the topic of precast concrete and connections. Considerable concern was expressed in discussion about the effectiveness that connections commonly used for precast concrete members would have if subjected to the violent action of an earthquake. Later in the decade this concern proved to be well founded by the failure of some of these connections in the Alaskan earthquake of 1964.

Many technologic advances marked the decade of the 1960's. There was growing use of metal curtain walls for high rise buildings, and the new high strength structural steels conforming to ASTM A-440 and A-441 were stimulating a great deal of interest. At the 1961 convention held in Sacramento the design of a 1500-foot guyed tower was reported by John Minasian. Also on the program that year was a symposium dealing with the ever present topic of earthquake lateral force requirements; discussion centered on overturning criteria, torsion in buildings, and diaphragm deflections.

The growing use of computer solutions was very evident to structural engineers at that time; the application of computer techniques to the design of a multi-story

frame was an important discussion topic of 1962. Slip form construction was also coming into vogue that year, and the techniques of design of cable supported roofs were much discussed as these roofs began to be seen.

In May, 1962 another earthquake struck Mexico. Many major buildings in the Mexico City and Acapulco areas suffered fairly extensive damage, but once again the Latino Americano Building withstood the temblor without damage. The successful performance of this building and its dynamic design were the subject of a presentation about the earthquake at the convention that year. Another important subject was professional liability insurance.

By the 1962 convention, the registration fee had skyrocketed to $25 for a man but was still only $10 for a woman. The price of a double room (including meals) had only gone up to $34 at the Hotel del Coronado (see figure).

In the early 60's the SEAOC seismic provisions were still the subject of much discussion. Section J of these provisions, which required the use of a "ductile moment resistant frame" for buildings more than 160 feet in height, was particularly controversial. The 1963 convention featured a symposium on Section J of the seismic provisions. Amidst the natural beauty of Yosemite, which was the 1963 convention site, the implications of Section J were discussed in detail. This discussion led ultimately to changes in that requirement in subsequent issues of the building code.

The year 1964 marked the formation of the Western States Conference of Structural Engineers. This was a significant event, for it initiated a cooperative effort between the states of California, Arizona, Washington, Oregon and Hawaii in matters affecting the structural engineering profession. It was also during 1964 that the term "soil-structure interaction" was first heard. This very descriptive term was a reflection of interest at the time in the challenges of foundation engineering, and constituted one of the main subjects of the technical program of the 1964 convention at Lake Tahoe. It was during the spring of that year that the Alaskan earthquake occurred. Many of the members of the association participated in inspecting the damage, and several later reported the results of research projects they had undertaken relating to the earthquake. These investigations together with the losses suffered brought about changes shortly thereafter in the codes which governed the design of structures to resist earthquakes.

HOTEL del CORONADO REGISTRATION

Name (print)

Address

Check-in date_____ Check-out date_____

Check accommodations desired — meals included

☐ Single room	$24.00
☐ Double room ☐ Twin ☐ Double	34.00
☐ Lanai — additional charge daily	8.00

Friday night Banquet and Saturday night Luau $2.50 extra each per person. 10% tip added to basic rate for gratuities.

NOTE: For guests, fill out above information on separate sheet

SEAOC CONVENTION REGISTRATION OCT. 4, 5 and 6, 1962

(Print) Last Name First Name Wife's First Name (for name tags)

Address

Check whether from North ☐ Central ☐ South ☐
Is this your first SEAOC convention ☐

Registration fee covers partial cost of technical and social programs and publishing of Convention Proceedings (check payable to SEAOC Registration Fund must be enclosed)

☐ Man and wife	$35.00
☐ Man	25.00
☐ Woman	10.00
☐ Junior and wife	22.50
☐ Junior	12.50

Guests must pay above fees

Fill out Hotel and Convention registration fully — do not separate — return to:

KEN WOODWARD
KAISER STEEL CORPORATION
612 So. Flower Street
Los Angeles 17, California

The Good Old Days?

The 1966 SEAOC convention was held shortly before the Bay Area Rapid Transit System was scheduled to go into service. One of the highlights of the convention program was a presentation describing the design of the structures for this system. It was during the same year that the results of tests and research by the timber industry brought about a revision of plywood diaphragm criteria and glue-lam beam design criteria. It was also at the 1966 convention, much to the dismay of the membership, that reports by elder statesmen of the profession were heard concerning the decline in prestige and professional status of the structural engineer in California. Though characterized by levity and interspersed with humor, a presentation by John Minasian carried an emphatic message. His concerns were echoed by similar reports in later years by Henry Degenkolb and other prominent members of the profession.

In 1967 the Structural Engineers Association of San Diego came into being, the fourth constituent association of SEAOC. Ultimate strength design of concrete was a new technique at that time, and reinforced load bearing concrete block walls were coming into wide use for medium rise structures. An innovation of that era was "lift on" slab construction for building floors and roofs. All of these techniques were discussed at the 1967 state convention at Lake Tahoe.

The expression "earthquake risk analysis" was first heard in the year 1968. This important aspect of earthquake design guidelines ultimately was integrated into the SEAOC requirements and then into many building codes. Computer aided structural design techniques had increased in sophistication and were coming into widespread use at that time.

In 1969 the American Institute of Steel Construction issued a new code which set forth some of the broadest changes in design rules for structural steel that had occurred in many decades. The subject of proper design of shear walls received careful scrutiny, and at the 1969 convention in Hawaii a symposium on this topic was presented, with speakers selected from engineers who had specialized in the analysis and design of shear walls both in masonry and concrete.

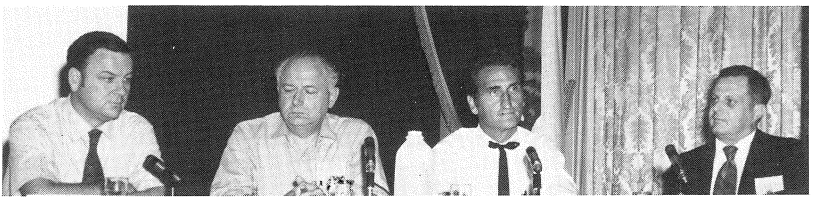
The 70's

The decade of the 1970's marked the development of the time- history technique for analysis of buildings under earthquake motion. The practical aspects of

ductile moment resisting concrete frame design were reported on at the annual convention in Lake Tahoe in 1970. Ductile weldable reinforcing bars were a new material that structural engineers were just beginning to hear about and the association was considering what role it should play in seeking a standard specification for this material.

The disastrous earthquake which occurred on February 9, 1971, in the San Fernando Valley had profound effects upon the activities of the profession both immediately after the disaster and for many years to come. One of the first significant actions resulting from this earthquake was the enactment of legislation requiring that a structural engineer prepare the structural design and supervise the construction of all hospitals in the state of California. This legislation established the structural engineering title as a practice requirement under state law.

The Applied Technology Council, a subsidiary nonprofit corporation of SEAOC, was formed by the SEAOC board of directors shortly before the 1971 convention. This was in response to the stated need by the federal government and others for a research oriented organization, particularly in the area of earthquake engineering research. The convention in 1971 was again held at the Hotel del Coronado. Most of the technical papers had to do with the San Fernando Earthquake. By that time, much of the data had been compiled, and the engineers in attendance eagerly awaited the reports which were to be presented. Excellent strong motion records had been obtained, and a summary was presented to the membership. An extensive report was made on freeway structures and the design deficiencies which had led to the widespread destruction of these structures. A complete report was given on the Olive View Hospital and overall studies and recommendations were made for code changes.



Leaders of the Structural Engineering Profession in a Panel Discussion at the 1971 Convention

Pictured L to R: James H. Thompson, Henry J. Degenkolb, Hans G. Steinmann, Clarkson W. Pinkham

In 1972 structural engineers in California were continuing to digest the lessons learned in the San Fernando earthquake. The Applied Technology Council received significant grants from the National Science Foundation and other agencies of the U.S. government for research. The 1972 convention featured a report on the new University of California shaking table which had the capability of subjecting large prototype structures to simulated earthquake motion. The term "lamellar tearing" became known to many engineers for the first time during 1972 as a result of unfortunate failures in heavy steel structures with welded joints.

The 1972 convention marked the introduction of the Saturday Morning Aquatic Races, which have now become a tradition. The exact nature of the races is a closely guarded secret until the early morning hour when they begin. Nonetheless, they have pitted the hardier convention attendees from the four associations against each other for several years and are enjoyed by all.

At the end of 1972, during the holiday season, a destructive earthquake occurred in Managua, Nicaragua. Many of the buildings in Managua had been designed under modern building codes as used in California, and the investigation and report on this earthquake was of intense interest to California engineers. A number of structural engineers from California participated in the examination of the damage as well as in the analysis of the structures with respect to their condition.

Following heroic efforts on the part of the Seismology Committee a new issue of the "Blue Book" was developed in 1973. Many unselfish hours of study, analysis and discussion went into the preparation of this important document, and many lessons learned in San Fernando and Nicaragua were incorporated. The convention in 1973 featured talks on precast segmental construction of bridges, problems associated with the design and construction of tapered glued-laminated wood beams, and the phenomenon of soil-structure interaction under the forces induced by earthquake motion.

The profession continued to progress and grow during 1974. The Applied Technology Committee Council was very busy that year on its second contract, an analysis of the response spectrum approach to seismic design of buildings. Their third contract, also well under way, was to prepare national comprehensive design provisions for earthquake resistant structures.

The importance of cooperation between the geotechnical engineer and the structural engineer in the development of seismic design criteria was a featured subject at the convention in 1975. Their work together in subsequent years led to a strong relationship of mutual respect by these two professions as they were involved in establishing seismic design criteria for structures.

The seismic rehabilitation of the State Capitol Building was the featured topic at the 1976 convention. This was a gigantic project which began that year and which continued for several years thereafter. By 1977, many firms had gained experience in the design of hospitals under the codes which had been developed as a result of the 1971 earthquake. Henry Degenkolb's organization reported upon their struggles in the design of the Moffatt Hospital in the San Francisco area; steel plate shear walls had to be used because of the immense design forces involved. Masonry research was being developed, and the liquefaction of soils under seismic motion was something which many engineers became acquainted with for the first time in the 1970's, largely as a result of the 1971 San Fernando earthquake. More refined criteria and methods of design for this conditions were presented at the convention in 1977, information which subsequently became the basis for building ordinances in many California cities.

Responding to the obvious need for some reliable method of rehabilitating old unreinforced masonry buildings, a group of Los Angeles structural engineers came up with recommendations, and reported on their design criteria at the 1978 convention. During 1978 and 1979 the various constituent associations formed earthquake damage assessment teams consisting of engineers who would be available to assist in the examination and assessment of damage immediately following an earthquake. It was not long before these teams were brought into service, first at a landslide in Laguna Beach, near Los Angeles, and later in response to the need for help in the Imperial Valley following the earthquake of October, 1979. In both instances the services rendered were found to be extremely helpful by the people who needed them, and much was learned about the procedures which should be followed in any subsequent disaster.

The expression "eccentric braced steel frame" came into widespread use in 1979 as a result of studies made at the University of California by Professor

1977 SEAOC Board of Directors

Pictured L to R: Dick Miller, Phil Griffin, Robert Burkett, Ed Johnson, Robert Toft, Sanford Tandowsky, David Messinger, Tom Cook, Al Blaylock, John Shaffer, Ajit Virdee, Don Strand, Pete Kellam, Gerald Haines, Ben Schmid, Jack Martin.

Egor P. Popov. Soon afterward this valuable technique for designing and building multi-story steel frames was employed in several buildings in California cities. The growing problem of professional liability and litigation leveled against the structural engineer had been present throughout the 1970's, and as the decade ended it was of increasing concern to all engineers in private practice.

The decade of the 1970's also witnessed the demise of the slide rule as the universal aid to the structural engineer in making his calculations. In the early years of the decade engineers waited eagerly to buy their first hand-held electronic calculator or small desk-top model at a cost of $400 and up. By 1979 smaller and more sophisticated models were available for less than $50. Young engineers now entering the profession would find it difficult to imagine the mental fatigue as well as the increased tendency to make numerical errors that resulted from the use of the slide rule for carrying out calculations. The electronic calculators and accompanying computer systems were a development of the 1970's for which all engineers certainly can be thankful.

The Present

Since 1980, structural engineers have been enjoying an ever widening construction economy throughout the state. There has been much ferment in the profession regarding proposed changes in the Professional Engineers Act. While it is not as yet resolved, the proposed changes in the law seem to point toward an expanded and more appreciated role for the professional structural engineer in California.

Members of SEAOC are deeply indebted to their representatives who have served on the Board of Registration through the years, including Paul Jeffers, Steve Barnes, John Minasian, Roy Johnston and Jim Yee. Also, the long dedicated service of Don Wiltse as Executive Secretary of SEAOSC until his retirement in 1980 will be gratefully remembered.

As we enjoy this 50th anniversary, we are grateful to our predecessors for all of their efforts during a half century of steady development and growth. Although they are too numerous to mention, it is their dedication that has enabled this Association to enjoy a reputation of respect throughout the world for its accomplishments and service to mankind.

STRUCTURAL ENGINEERS ASSOCIATION
OF CALIFORNIA

PAST PRESIDENTS

1932	Oliver G. Bowen	Southern
1933	E. L. Cope	Northern
1934	Robert V. Labarre	Southern
1935	John B. Leonard	Northern
1936	Murray Erick	Southern
1937	A. V. Saph, Jr.	Northern
1938	Frederick J. Converse	Southern
1939	A. W. Earl	Northern
1940	C. G. DeSwarte	Southern
1941	Clement T. Wiskocil	Northern
1942	Blake Beatty	Southern
1943	J. Bertrand Wells	Northern
1944	Charles D. Wailes, Jr.	Southern
1945	J. G. Wright	Northern
1946	Ernst Maag	Southern
1947	William W. Moore	Northern
1948	S. B. Barnes	Southern
1949	John Blume	Northern
1950	Harry W. Bolin	Southern
1951	Arthur W. Anderson	Northern
1952	Donald F. Shugart	Southern
1953	John E. Rinne	Northern
1954	Harold P. King	Southern
1955	G. A. Sedgwick	Northern
1956	C. M. Herd	Central
1957	Henry M. Layne	Southern
1958	Henry J. Degenkolb	Northern
1959	Joseph Sheffet	Southern
1960	J. Albert Paquette	Northern
1961	Walter D. Buehler	Central
1962	Roy G. Johnston	Southern
1963	John M. Sardis	Northern
1964	Lawrence G. Amundsen	Central
1965	Cydnor M. Biddison, Jr.	Southern
1966	Robert D. Dalton, Jr.	Northern
1967	John F. Meehan	Central
1968	David L. Narver, Jr.	Southern
1969	F. Robert Preece	Northern
1970	Jack S. Barrish	Central
1971	William F. Ropp	Southern
1972	H. Robert Hammill	Northern
1973	Thomas G. Atkinson	San Diego
1974	Henry C. Reyes	Central
1975	Clarkson W. Pinkham	Southern
1976	H. S. Kellam	Northern
1977	Albert J. Blaylock	San Diego
1978	Ajit S. Virdee	Central
1979	John A. Martin	Southern
1980	Stephen E. Johnston	Northern
1981	James A. Willis	San Diego

STRUCTURAL ENGINEERS ASSOCIATION

PAST PRESIDENTS

	Southern California	Northern California
1929	Jeffers	
1930	Falk	H. J. Brunnier
1931	Martel	H. J. Brunnier
1932	Bowen	L. H. Nishkian
1933	Noice	E. L. Cope
1934	Labarre	C. H. Snyder
1935	DeLine	J. B. Leonard
1936	Erick	J. B. Leonard
1937	Narver	A. V. Saph, Jr.
1938	Converse	H. B. Hammill
1939	Shield	A. W. Earl
1940	DeSwarte	A. V. Saph, Jr.
1941	Falk	C. T. Wiskocil
1942	Beatty	H. C. Powers
1943	Byers	J. B. Wells
1944	Wailes	C. E. Seage
1945	Taylor	J. G. Wright
1946	Maag	W. Adrian
1947	Ware	W. W. Moore
1948	Barnes	J. A. Blume
1949	Bolin	J. Rosenwald
1950	Hillman	A. W. Anderson
1951	Shugart	J. E. Rinne
1952	King	J. J. Gould
1953	Benioff	G. A. Sedgwick
1954	Wright	M. V. Pregnoff
1955	Layne	H. A. Schirmer
1956	Wheeler	W. L. Dickey
1957	Binder	H. J. Degenkolb
1958	Sheffet	J. A. Paquette
1959	Omsted	C. D. De Maria
1960	Sparling	L. W. Graham
1961	Johnston	J. M. Sardis
1962	A. Johnson	J. L. Stratta
1963	Holstein	D. M. Teixeira
1964	Biddison	R. D. Dalton, Jr.
1965	Gray	R. D. Dewell
1966	Narver	R. F. Wildman
1967	C. B. Johnson	F. R. Preece
1968	Kudroff	T. D. Wosser
1969	Ropp	D. Shapiro
1970	Brugger	H. R. Hammill
1971	Pinkham	K. D. Bull
1972	Haussler	A. R. Weatherbe
1973	Jephcott	H. S. Kellam
1974	Loevenguth	A. T. Simpson
1975	Schmid	D. L. Messinger
1976	Martin	S. E. Teixeira
1977	Christensen	S. E. Johnston
1978	Steinmann	E. G. Zacher
1979	Ruthroff	E. Elsesser
1980	Kamei	J. P. Nicoletti
1981	D. Strand	E. G. Hirsch

STRUCTURAL ENGINEERS ASSOCIATION

PAST PRESIDENTS

Central California

1947	D. C. Willett
1948	L. C. Hollister
1949	E. D. Frances
1950	W. H. Peterson
1951	A. H. Brownfield
1952	J. S. Barrish
1953	M. A. Ewing
1954	W. S. Wassum
1955	C. M. Herd
1956	W. A. Buehler
1957	J. F. Meehan
1958	A. L. Brinckman
1959	N. W. Beattie
1960	W. D. Buehler
1961	K. V. Venolia
1962	L. G. Amundsen
1963	L. Favero
1964	G. M. Hart
1965	A. R. Watson
1966	K. V. Marr
1967	D. A. Crane
1968	E. E. Cole
1969	F. W. Cheesebrough
1970	W. D. Rumberger
1971	J. R. Yee
1972	H. C. Reyes
1973	K. A. Luttrell
1974	G. H. Haines
1975	J. M. Shaffer
1976	A. S. Virdee
1977	C. H. Grimes
1978	J. C. Dunlap
1979	H. P. Campbell
1980	K. G. Beaumont
1981	A. Ross

San Diego

1968	C. B. Hope
1969	E. Meier
1970	J. A. Willis
1971	N. D. Perkins
1972	T. G. Atkinson
1973	W. L. Travis
1974	J. R. Libby
1975	T. L. Cook
1976	A. J. Blaylock
1977	R. L. Miller
1978	E. H. Johnson
1979	G. R. Saunders
1980	R. K. Burkett
1981	D. H. Day