ACI News Letter Contents

April 1951

On the Cover—Using the vacuum process, it was possible to remove forms ½ hour after casting concrete pipe at Mucone, Italy. An impressive aisle is formed in the curing yard by the 16 ft long and 10 ft diameter pipe.

San Francisco Meeting Features Varied Program

Atomic Blast Resistance
Earthquake Design
Building Code

ACI's 47th annual convention was its first, probably not last, on the Pacific Coast. For this memorable occasion, Feb. 20, 21 and 22, 571 registrants felt the warmth of San Francisco's special brand of hospitality—where California now has first rank in membership total.

The three-day program included sessions on structural design, materials and properties of concrete, construction, precast concrete, a panel discussion of concrete problems and the annual open session on concrete and cement research.

ACI technical committees presented one new standard and revisions of three others, all of which were passed by the convention and ratified by letter ballot of the membership.

A special session on precast concrete featured its use as protection against atomic blast. Advances in precast floor systems and structural elements were described, as well as construction techniques used.

Several design sessions had papers on concrete buildings to resist earthquakes, parking garages, arches, prestressed highway bridges and concrete pavements.

Construction topics included tilt-up techniques, lightweight monolithic construction, aggregate cooling plant for mass concrete, finishing and curing methods for improving concrete pavement durability and resurfacing concrete pavements with thin layers of concrete.

"False set" of cement, and concrete durability were discussed at a session on materials and properties. Other papers covered ultrasonic testing of concrete structures and studies of inhibitors of alkali-aggregate expansion.

Lighter portions of the convention program included the annual general luncheon and three entertainment features provided with the compliments of cement manufacturers, concrete and building industry, and engineers from the 11 Western states—a sightseeing trip through San Francisco's Chinatown, a dinner, and a twilight cruise on beautiful San Francisco Bay.

Steel savings seen in ACI Building Code revision

Revisions of the ACI Building Code approved at Tuesday morning's session and ratified by ACI members in letter ballot allow for improved properties of new-style deformed reinforcing bars, which saves steel in reinforced concrete construction. (See p. 589 for revised code.)

Can eliminate hooks

"If this type bar is used, we can eliminate hooks," stated Frank Kerekes, Chairman of Committee 318, Standard Building Code. "Eliminating hooks saves pounds of steel, which can be available for more civil or military use. In addition, we save man hours of labor and eliminate some difficult placing situations on construction jobs."

Increase bond stresses

The changes in "Building Code Requirements for Reinforced Concrete" decrease allowable bond stress in plain bars (including old types of deformed bars) and increase allowable bond stresses for new bar types over those allowed for the old types. Top bars, with more than 12 in. of concrete under them, are assigned lower bond stresses than bars in other positions.

In the new provisions, all plain bars must be hooked, to correspond with special anchorage under old provisions. The new reinforcing bars develop enough anchorage by bond alone to correspond to special anchorage with the old-type bars, *i.e.*, hooks are not necessary, resulting in less total steel required.

The new-style deformed reinforcing bars with higher, closely-spaced deformations have proved their superiority in bonding to concrete, in forming a series of narrow, closely-spaced cracks instead of a few wide ones, and in providing the equivalent of "special anchorage."

Bars in this country were originally plain round or square, then twisted square bars. It is only within recent years that the advantage of deformations on the bars themselves has been recognized. The majority of steel mills are now rolling only deformed bars that meet new ASTM specifications.

Several members of the West Coast convention committee relax and enjoy Western fellowship—(l. to r.) Chairman Harmer E. Davis, Institute of Transportation and Traffic Engineering, University of California; Wallace A. Marsh, Permanente Cement Co; Charles H. Purcell, California Highway Commission; and committee vice-chairman Robert Glenn, Institute of Transportation and Traffic Engineering.

Shotcreting standard adopted

Pneumatically placed mortar

"Recommended Practice for the Application of Mortar by Pneumatic Pressure," Committee 805, was adopted as a standard at the same session. (See ACI JOURNAL, Nov. 1950.) Revisions of two other standards were also adopted, and have now been ratified by ACI Members' letter ballots.

The new standard on pneumatically-placed mortar establishes recommended practices for placing and mixing shotcrete, qualifications and duties of workmen, preparation of surface before shotcreting, sequence of application, type and use of equipment and other items involved in shotcreting. The standard emphasizes the importance of workmanship in such construction.

Pavement specifications

"Specifications for Concrete Pavements and Bases," applying to construction of portland cement concrete pavement and base under normal conditions, including the preparation of the subgrade, was presented for revision by Committee 617.

New paragraphs include air entrainment, removal of forms, premolded joint fillers and joint filling materials and method of placing reinforcement. Definitions were added to the section on soil foundation preparation and other parts of this section were revised.

Several amendments were passed by the convention, in addition to revisions proposed in the Oct. 1950 JOURNAL, p. 93. These were the addition of ASTM Specification A 305 to the list of standards to which reinforcing bars must conform, and a change in lap requirements due to increased bond of new-style deformed bars.

Detailing manual

Revisions of the Institute's "Manual of Standard Practice for Detailing Reinforced Concrete Structures," Committee 315, make the manual conform with changes in ACI Building Code allowing new bond values for deformed reinforcing bars. (See ACI JOURNAL, Jan. 1951, p. 349.) Higher bond of the new bars eliminates need for hooks as anchorage when these bars are used. The bar designations in the manual were also changed to conform with numbered designation of the U. S. Department of Commerce Simplified Practice Recommendation R 26-50.

Chairman Raymond C. Reese, consulting engineer, Toledo, Ohio, said that in a survey of 146 technical institutions, 100 percent returns indicated various ways in which the manual could be used to advantage in teaching. Mr. Reese suggested that the next step in Committee 315 activity should be the preparation of a syllabus on using the manual as a teaching medium.

Convention approves higher dues

"For many years ACI has been spending a great deal more per capita than is received in dues. Last year that amounted to approximately $28 per member against national dues of $12.50 per member. That difference is made up by corporation contributions, margin in sale of reprints and advertising. But, in spite of that, it became evident that ACI was being forced to dig deeper into its reserve," stated Harry F. Thomson, chairman of the Board's Finance Committee, in introducing the proposal to raise membership dues.

He said the Board was faced with two alternatives: increase dues or drastically curtail services the Institute gives members.

The convention approved a change in the By-Laws which changed individual dues from $12.50 to $15, contributing member dues from $50 to $100, and corporation member dues from $25 to $50. Individual member dues for those not residing in North America* were raised from $10 to $12. There was no change in student or junior member dues. (See January NEWS LETTER for complete text.)

Changes in By-Laws have gone to all voting members of the Institute for ratification by letter ballot.

* Formerly this group excluded United States and Canada only. It has now been changed to North America which includes all countries and territories in Central America and the West Indies. Authorities: *Commercial Atlas of America*, Rand McNally & Co., Chicago; and *Survey Atlas of the World*, The Times, London, England.

Concrete strength

The morning session concluded with a general summary of conditions affecting concrete strength by Walter H. Price, head, Materials Laboratory Section, Research and Geology Division, Bureau of Reclamation, Denver.

He discussed the effect of mix proportions, type and brand of cement, availability of moisture for curing, accelerators and curing temperatures on the rate and potential of strength development. The influence of rate and frequency of load applications, dimensions of test specimens and lateral restraint also effect the indicated strength.

"No matter how well a job is controlled there will be some variation in the strength," he stated. The number of values above and below the average fall into the familiar "bell-shaped" pattern. The better the control, the more values bunched close to the average, making for greater economy. (Published in ACI JOURNAL, Feb. 1951, p. 417.)

Reinforced concrete furnishes quake resistant structures

Earthquake resistant provisions of the San Francisco Building Code were met by the exclusive use of reinforced concrete in the construction of eleven 13-story apartment buildings at Parkmerced said John J. Gould, consulting engineer of San Francisco, at the design session, Tuesday afternoon.

The X-shaped apartments have flat-slab floors with wide flat beams over corridors. Exterior walls are of the bearing-wall type without columns. Many interior partitions commonly built of plaster or other materials are of reinforced concrete to resist vertical as well as horizontal loads.

"These provisions resulted in extremely economical structures," Mr. Gould said. Because of the structural system chosen, he estimated extra cost of earthquake resistance was only 1 to 2 percent of the total, as compared with otherwise sound minimum construction.

Major economies were realized, he continued, through elimination of plaster ceilings as concrete gave a pleasing finish. The structures were adapted for mass production and mass building methods—speed, simplicity of formwork, ease of placing and maintaining reinforcement, and speed and ease of placing concrete.

"A prime advantage of the interior bearing wall system is that lateral bracing is increased at no extra cost. A secondary advantage is that there are no breaks around columns in the rooms, thus giving more usable floor area." The foundations were tied together by a concrete slab and were generally individual footings. He went on to say that the interior bearing walls provide greater rigidity against vertical load deflections and greater safety to the occupants in case of earthquake or even atomic blast.

Reinforced concrete structures, properly engineered, afford effective protection against destructive forces of nature as well as atomic blasts asserted Mr. Gould. (Tentatively scheduled for June JOURNAL.)

ACI's new president Harry Thomson enjoys a laugh at the Wednesday evening dinner

Earthquake observations basis for rules

Other papers of the session were concerned also with earthquake resistance. Alfred L. Miller, University of Washington, Seattle, presented a paper by R. R. Martel, professor of structural engineering, California Institute of Technology, Pasadena, discussing earthquake resistance as learned from observations of earthquake damage.

Some general rules of thumb derive from observations of earthquake damage, he said, but these are not enough in not being quantitative. "There are so many variables: building layout, materials, workmanship, founda-

Frank E. Richart, research professor of engineering materials, University of Illinois, long active in Institute affairs, was elected to Honorary Membership.

tion conditions, as well as varying combinations of earthquake forces and character, that damage data can often be interpreted convincingly in different ways." (Tentatively scheduled for June JOURNAL.)

New design method

A paper by Charles S. Whitney, Boyd G. Anderson and Mario G. Salvadori, of Ammann and Whitney, consulting engineers, New York, explained a new method for the design of structures under dynamic loading which is applicable to earthquake design. This step-by-step analysis of earthquake stresses takes into account the stiffness of the structure, rocking of the foundation due to the elasticity of the ground, and period and amplitude of earthquake components. (Tentatively scheduled for June JOURNAL.)

H. J. Brunnier, consulting engineer, San Francisco, admitted that engineers still have problems in designing against earthquakes because their exact behavior is not known, nor is the exact behavior of buildings known. The principal thing, he said, is that lateral stability must be considered in design.

Discard the crystal ball

"The only way to find out about an earthquake is to have one, discard the mystical and mathematical, and give a practical interpretation of what happened," asserted Professor Miller, in discussing earthquake effects. He stated that most structures that fail are essentially piles of material not fastened together; such failure can be avoided if these piles are tied together.

He reviewed briefly the work of the Seismological Field Survey of the Coast and Geodetic Survey, and the newly organized Earthquake Engineering Research Institute.

Prestressing offers savings in freeway construction

Prestressed slab construction offers particular advantages for urban expressways and freeway separations where shallow depths are pertinent, said Stewart Mitchell, bridge engineer, California Division of Highways, Sacramento, at the Tuesday afternoon session. Although, at present labor costs, prestressed construction offers little saving over ordinary types of construction, if and when the prestressing cost is reduced it will compete with conventional construction, he predicted.

Considerable savings would be possible in depressed freeways and grade separations, Mr. Mitchell believed, because of reduced cost of the bridge superstructure and reduced excavation. Since prestressing allows less depth of beam, the reduced depth of overpasses would save substantial quantities of excavation as well as allow savings in cost of abutments, retaining walls, etc.

The use of prestressing will increase the economical span lengths of concrete slabs and girders and will make this type of construction competitive in span lengths formerly reserved for concrete arches and steel structures, he declared.

But, he asserted, prestressed bridge construction will be accelerated in the United States only "when American engineers take their eyes from the practices favored in Europe and develop fabrication and erection methods suited to American conditions."

It was noted that prestressing may be warranted even where no actual monetary saving over conventional reinforced concrete

Where did they hail from?

The West Coast, Midwest and East Coast, as well as Canada, England and Mexico, were represented in the 571 registrants at the San Francisco meeting.

Calif.	392	Ohio	4
Wash.	17	Miss.	3
Ill.	17	Nev.	3
Canada	14	Mexico	3
Colo.	14	Kan.	2
N. Y.	14	Mo.	2
District of Columbia.	13	Mont.	2
		N. J.	2
Ore.	11	Del.	1
Wis.	9	Fla.	1
Idaho	7	La.	1
Mich.	7	N. C.	1
Ia.	6	N. M.	1
Texas	6	Pa.	1
Ind.	5	Utah	1
Minn.	5	W. Va.	1
Mass.	4	England	1

is realized because of possible savings in concrete and steel. "It has been demonstrated that prestressed construction permits saving as much as 50 percent in quantity of concrete and 80 percent in poundage of steel." (Tentatively scheduled for June JOURNAL.)

Prevention of joint trouble

F. N. Hveem, construction engineer, also with the California Division of Highways, discussed at the same session, prevention of joint trouble in concrete pavements. He reported warping and curling of slabs a major factor in pumping and faulting of joints. A suggested remedy was elimination of expansion joints and placing contraction joints as far apart as possible. The effects of pumping can be counteracted or reduced by treating the subgrade with either asphalt or cement so that it will not be eroded readily by slab movement under traffic. (Tentatively scheduled for June JOURNAL.)

Parking garage utilizes principle of toy blocks

The principle of unit buildings, an arrangement of identical parts so that the completed structure is composed of a repetition of like units, as with toy blocks, was used in the construction of a New Orleans parking garage described by L. G. Farrant and W. C. Harry, consulting engineers, Miami, at the Wednesday morning session. The 30 units used in the parking garage resembled a set of tables resting on each other.

An ideal balance between function, economy and aesthetic value were achieved, the authors said, in unit buildings and flat-slab construction.

The flat slab allowed space for parking as well as horizontal movement of cars. A ramp was supported between building units for access to the parking space. Since the units could be separated, both horizontal and vertical movement was provided without complicating the structure. An extra row of cars can be accommodated since cantilevers were overlapped at the center of the building. Since the cantilevers would develop large moments in columns, a tapered column hinged at the base was used to eliminate need for large supports, since it reduced the moment in columns and maintained the nature of the unit structure. The column also provided a maximum parking area at the tapered base.

Garage cost was $400 per car exclusive of property values, Mr. Farrant declared — this below the national average. The yardstick provided by the American Automobile Assn. calls a garage economically sound if the cost is no more than $1350 per car. This economy resulted partly from its open decks, eliminating need for walls and mechanical ventilation.

The slab was reduced to 7½ in. instead of the 12 in. needed if the garage had been designated as a continuous monolithic structure.

Construction economy was possible in that concrete need not be placed continuously, but carried from one unit to another and one slab to another. As units are similar there was maximum standardization and reuse of forms. Savings in steel were accomplished with new-style high-bond reinforcing bars eliminating hooks and reducing anchorage requirements. (Tentatively scheduled for May JOURNAL.)

Slab system for roofs

The morning session on design included also a paper, "Getting More for Our Concrete Dollar," by I. E. Morris, consulting engineer, Atlanta, Ga., presented by Frank Kerekes, Iowa State College, Ames, describing a slab

system of framing intended primarily for roofs where an exposed ceiling is desired for economy. The slab has alternating horizontal elements connected by sloping elements, which Mr. Morris said utilized concrete and steel to maximum advantage and at the same time had enough effective depth to span a reasonable distance without excessive deflection. In commenting on the design of concrete slabs he said that all structural concrete in a member should be put to work. (Published in ACI JOURNAL, Jan. 1951, p. 389.)

Arches

The effects of lateral loads on arches and the magnitude of these effects were considered by James P. Michalos, associate professor of civil engineering, Iowa State College, Ames. He discussed the effects of wind on unbraced arch ribs and arch ribs braced with struts normal to the ribs. He presented procedures for drawing approximate and exact moment curves for these arches and assessed the importance of haunching. (Published in ACI JOURNAL, Jan. 1951, p. 377.)

Spaced and tied reinforcing bars

In the absence of William T. Walker, Structural Research Section, Bureau of Reclamation, Denver, Douglas McHenry, also of the Bureau, presented Mr. Walker's paper on tests of spaced and tied reinforcing bars.

Harrison F. Gonnerman, assistant to the vice-president for research and development, Portland Cement Assn., elected to Honorary Membership, has been an ACI Member since 1918.

Beam and pull-out tests at the Bureau indicated that little or no advantage was obtained by spacing deformed reinforcing bars at splices. In pull-out tests, when deformed bars were placed vertically, with interlocking of lugs, there was a slight increase in strength due to tying the bars, while beam tests showed no significant difference between spacing and tying. (Published in ACI JOURNAL, Jan. 1951, p. 365.)

F. N. Menefee, University of Michigan, Ann Arbor, commented that these tests and others had shown need for revision of ACI's Building Code in relation to spacing reinforcing bars, especially in precast joists. He mentioned the work of Committee 711, Precast Floor Systems for Houses, in this respect.

The bundling of reinforcing bars was discussed and H. M. Hadley, consulting engineer, Seattle, concluded that in many instances it can be done with safety to the structure. He made the plea that many rules should be revised to conform with the reality of nature.

J. P. Thompson, Portland Cement Assn., Chicago, secretary of the Building Code committee, said the group was working on a section on precast concrete to be included in the Code that would eventually take care of many of the objections raised by building inspectors on such projects, since the Code was evolved principally for monolithic and cast-in-place construction.

Proper design lowers cost

An added bonus in the morning program was an illustrated talk by R. C. Sandberg, architectural engineer, Rock Island, Ill., who emphasized that structural and architectural design cannot be separated. Good structural design is also pleasing in appearance. Costs can be lowered through proper design so that the structure itself offers acoustical properties without extra materials. The projects illustrated used precast concrete elements to good advantage; and showed how the structural frame and its elements gave finished interior and exterior surfaces without added architectural treatment.

By following these principles, it was possible to build one school building at a cost of about $11,000 per classroom. In a church with precast arches, the entire structural design became the architectural design of interior as well as exterior.

False set in cement can be corrected in manufacture

Most cases of false set in cement can be corrected in manufacturing, according to R. F. Blanks and J. L. Gilliland, chief, Research and Geology Division, and head, Chemical and Cement Laboratoy, respectively, Bureau of Reclamation, Denver, at the Wednesday morning session on materials and properties.

The authors reported several ways to overcome false set (often called rubber set or gum set). Holding down grinding temperatures by using cool clinker and water-sprays on the mills has been very successful, and wherever proper precautions to cool the mills have been taken, false set has disappeared. The authors found it generally agreed that premature stiffening usually stems from unstable gypsum (plaster set) and the most common cause of unstable gypsum in cement is a high grinding temperature. Instability is also affected by storage temperatures, aeration and moisture.

Another possible approach, they said, is to use stable calcium sulfate, either natural anhydrite or gypsum which has been calcined to form insoluble anhydrite. Limited tests have shown that low alumina cements may be adequately regulated with these materials.

In some cases the addition of an admixture at the mixer has relieved false set in cement. Mechanically, stiffening can sometimes be overcome by prolonged mixing, or by remixing. This "doctoring" is not as desirable as a change in the manufacturing conditions responsible for false set.

"When stiffening of concrete occurs, it delays construction schedules, causes excessive bleeding, makes uniform control of concrete quality practically impossible, and increases the cost of handling, placing and finishing."

"Certainly the problem is worthy of the research necessary to provide a solution that will be satisfactory to both consumer and producer," the authors concluded. (Published in ACI JOURNAL, Mar. 1951, p. 517.)

"There is no question that dehydrated gypsum is one of the reasons for false set, but not the only one," declared Myron A. Swayze, Lone Star Cement Corp., New York, in discussion. Grinding temperatures can be controlled, but many factors contributing to false set are beyond control of the cement plant.

Coarse-ground cement

Cement was also discussed by H. W. Brewer and R. W. Burrows, Bureau of Reclamation, Denver, who reported tests showing that coarse-ground cement produces more durable concrete than fine-ground cement. They concluded from these tests that concrete made with coarse-ground cement is more resistant to cracks resulting from drying and that it has a greater resistance to freezing and thawing under normal exposure. (Published in ACI JOURNAL, Jan. 1951, p. 353.)

Hubert Woods, Portland Cement Assn., Chicago, said that the way to frost-resistant concrete does not lie in the use of coarse-ground cement, but in the correct use of air entrainment. He stated that entrained air will not always prevent deterioraton of concrefe subjected to freezing and thawing, however, "frost resistant concrete cannot be expected to result from manipulation of cement fineness."

Tests made at the PCA laboratories were cited to show "that there is no general relation

Elected ACI vice-president for a two-year term, Henry L. Kennedy, Dewey and Almy Chemical Co., joined the Institute in 1934 and has been active in technical committees and on the Board, 1944-49.

which can be given any degree of generality between the fineness and durability because the whole thing seems to be determined by the way in which the experiments are made."

In answer, Mr. Burrows emphasized that air entrainment was not the whole solution to deterioration. "The wetting and drying, heating and cooling cycles can eventually weaken a concrete so it is not protected from freezing and thawing, even with entrainment of air. Coarse-ground cement reduces shrinkage and cracking while air entrainment has little effect upon this common weakness of concrete."

He explained that contradictory data often result from test procedures where short drying periods, after initial thawing, are used.

Winter curing simplified

Mr. Brewer with J. J. Shideler and Wilbur H. Chamberlin, also with the Bureau of Reclamation, presented another paper showing that entrained air simplified winter curing. These tests indicated that less protection against freezing during curing is required when air-entraining concrete is used. (Published in ACI JOURNAL, Feb. 1951, p. 449.)

"This reduced period of protection, coinciding with the greatest heat evolution, makes insulation practical as a means of winter protection," noted L. H. Tuthill, also with the Bureau. He mentioned a project in northern New Mexico where 1-in. insulating blankets, Rockwool between Sisalkraft paper, were used successfully. The temperature under the mat was 20 to 40 degrees above outside temperature.

At another dam, steel forms were insulated by filling the ribs in the forms with sawdust and putting an outside sheet on them. The wooden forms in power house walls were readily insulated by filling between studs with sawdust or shaver plannings and dumping 8 in. of sawdust on the walls.

"The heat is in the concrete. We can use that to advantage in winter protection," Mr. Tuthill declared.

Soniscope used effectively

Use of the Soniscope in determining the condition of structures was described in the paper by E. A. Whitehurst, research engineer, Joint Highway Research Project, Purdue University, Lafayette, Ind., and presented by I. L. Tyler, Portland Cement Assn., Chicago.

He reported that the Soniscope, which measures group velocities through as much as 50 ft of concrete, was used to field test various types of structures. Repeated tests permitted study of changes in the condition of the concrete and the development of group velocities indicating the condition of the structure.

"The more complete the knowledge of concrete mix proportions, aggregates, methods of placing, etc., the greater the assurance which may be placed upon the interpretation of group velocity measurements." (Published in ACI JOURNAL, Feb. 1951, p. 433.)

Alkali-aggregate expansion inhibitors

The morning program also included a paper on alkali-aggregate expansion inhibitors by W. J. McCoy and A. G. Caldwell, director of research and research chemical engineer, respectively, Lehigh Portland Cement Co., Allentown, Pa.

Experimental data were reported which indicated that small amounts (1 percent or less) of specific salts added to high alkali cement are effective in reducing expansion. Other tests showed that 0.2 percent or less of selected proteins appear to inhibit expansion to a greater degree than comparable air entrainment introduced by conventional air-entraining agents.

The materials which appear to be the most effective in reducing expansion are copper sulfate, lithium salts, and air-entraining substances such as aluminum powder, various proteins and proprietary agents.

"It may be that these materials are too expensive for practical use in concrete," they stated, but the research conducted has offered another approach to the problem of reducing expansion due to alkali-aggregate reaction. (Tentatively scheduled for May JOURNAL.)

The JOURNAL is indebted to Turner Barton, advertising manager, Permanente Cement Co., Oakland, Calif., and William Q. Hull, associate editor, Chemical and Engineering News, San Francisco, for the convention photos.—Editor.

Construction costs cut with new materials

"Rising costs of labor and materials have made it imperative for architects and structural engineers to work more closely together—the structural engineer to devise new methods of framing, the use of new materials, and the architect to adapt his design concepts to their best use," declared J. A. Murlin, of George L. Dahl, architectural and engineering firm, Dallas, Texas, at the construction session Wednesday.

"Now that we are faced with a short-of-war emergency, it is all the more important that we learn to use noncritical materials, and still keep down the over-all cost," he asserted.

In describing lightweight concrete construction, Mr. Murlin illustrated the potentialities of new materials in reducing structural costs. He did not evaluate the attendant savings effected in heating, lighting and plumbing when lightweight materials are used.

Although lightweight concrete can be substituted for ordinary concrete in almost any type of framing, to achieve the greatest economy it should be used only where it makes the most effective contribution.

If steel is the critical item on a project, it is possible to save steel by increasing floor slab thicknesses with lightweight concrete, although the increased depth will make costs equal or exceed costs of sand-gravel concrete. He emphasized that one of the advantages of lightweight concrete was that it permits use of flat plate type of construction with much greater column spacing than is economical with ordinary concrete.

Precast lightweight concrete floor and roof joists also offer savings in framing costs. Mr. Murlin said that on a Dallas school building the saving amounted to almost a dollar per sq ft in favor of lightweight, precast joists. (Tentatively scheduled for September JOURNAL.)

Key to durable pavements

The afternoon meeting also included papers on finishing and curing, resurfacing concrete pavements, architectural concrete, and the aggregate cooling plant for mass concrete at Detroit Dam.

Myron A. Swayze, director of research, Lone Star Cement Corp., New York, said that finishing and curing methods offered the key to durable concrete pavement surfaces. He recommended that finishing operations be delayed until the concrete is close to its initial set and should be preceded by compaction of the upper portion of the slab. "Nearly all finishing of concrete surfaces today is performed too soon."

Mr. Swayze also suggested that early application of curing water is wrong, that it should not be added until the concrete has reached its maximum temperature and is beginning to cool. However, the protection of the surface from evaporation and from carbonation by contact with the air is essential. (Published in ACI JOURNAL, Dec. 1950, p. 317.)

T. C. Powers, Portland Cement Assn., Chicago, augmented Mr. Swayze's paper by saying that half measures will not do and that a critical re-evaluation of current practices is warranted. "Beginning and ending the finishing process too soon can produce a slab that will scale under frost action."

The importance of properly managing the finishing and curing schedule is important in considering capillary forces, as well as mechanical compaction, he declared. "The control of capillary forces is as subject to abuse as the application of ordinary tools in finishing and curing."

Resurfacing pavements

H. Walter Hughes, associate engineer, Department of Public Works, Rochester, N. Y., described resurfacing of concrete road slabs with thin layers of concrete. Results indicated that the use of low water-cement ratio, graded mixes and compaction gives ample bond for thin toppings of badly scaled pavements in which the concrete is sound.

"Experience has shown that dense, weather-resistant concrete surfaces can be produced by using dry, harsh mixtures, finished with a compactor power float." (See p. 653, this issue.)

An architect's viewpoint

The program also included a discussion by Michael Goodman, professor of architecture, University of California, Berkeley, "An Architect Looks at Concrete."

In using concrete as the exterior surface of buildings, he cited a number of problems that must be solved. One of the big problems in general building construction is the lack of good job supervision, inspection and control of the concrete. Until closer control is achieved, concrete construction will be used in the supporting framework, but not as the exterior finish.

Aggregate cooling plant

H. H. Roberts, chief engineer, Consolidated Builders, Inc., Mill City, Ore., explained the plant at Detroit Dam for cooling aggregate and cement used in the mass concrete.

"The principal reason," he said, "for specifying temperature control of mass concrete is to reduce cracking caused by thermal expansion and contraction stresses."

At Detroit Dam the coarse aggregate is immersed in water at 35 F until cooled to 38 F. It is then drained and screened to remove excess moisture. Sand and cement are cooled in continuous hollow-flight screw conveyors in which 35 F water is circulated. Heat transfer is through the conveyor surfaces; there is no direct contact with the cooling water. (Tentatively scheduled for June JOURNAL.)

Precast concrete provides protection against atomic blast

Precast concrete presents an excellent means for protection against atomic blast asserted Arsham Amirikian, head designing engineer, Bureau of Yards and Docks, Department of the Navy, Washington, D. C., at the session on precast concrete Wednesday afternoon.

Precast concrete is suitable for emergency shelters and protective structures and is adaptable to existing structures by providing a protective shell. The readily-assembled framing elements could be prefabricated at regional plants and stockpiled at various points for immediate use in an emergency.

"Fast-changing conditions of a world in turmoil have finally brought grim prospect of another conflict whose new weapons may endanger everyone's life—irrespective of boundaries or location," declared Mr. Amirikan. "The destructive effect of the atomic bomb is not confined to a single objective or structure," and the probabilities of damage to any structure in a community are increased greatly.

As yet no clear-cut policies have been adopted by the various local and public agencies regarding the type and extent of protective measures to be used against atomic blast. The technique of thin-shell precast concrete was offered by Mr. Amirikian as a solution in providing shelters, to be used either as an initial shield against blast and radiation or as emergency shelters after attack.

"Standardized designs of framing and methods and procedures of fabrication will unquestionably simplify the task of construction."

Definition of protection

Mr. Amirikian found a clear definition of protection against a weapon difficult to state. The more practical concept, he said, is that it is a means of providing partial security against specified aspects of a given weapon, that is, the use of precast concrete will not assure complete safety; occupants must accept the possibility of danger as a calculated risk. No structure can escape destruction if it is at or near the center of an atomic explosion.

He then illustrated and explained precast structures designed to assure a reasonable degree of personal safety to occupants against the effects of a bomb assumed to explode at an altitude of 2000 ft, similar to the explosions over Hiroshima and Nagasaki. Different protective structures were proposed for an area of ¾-mile radius around the target, an area of ¾ to 1-mile radius, and an area outside 1-mile.

"For an economical and practical shelter design, it will be necessary to utilize the full resistance of a critical member, or the weakest component of framing, just short of collapse," explained Mr. Amirikian.

Shelters vary in target area

In the area closest to ground zero of the air-burst bomb, an earth-covered precast-type shelter is required to provide protection against nuclear radiation. A curved or

"Some last-minute changes will have to be made here." No rest for convention committee chairman Davis or vice-chairman Glenn, as evidenced at the Wednesday evening dinner while Charles H. Purcell, director of public works, California Highway Commission, waits for further developments.

shaped framing outline was recommended. These include ribbed-shell circular frames (precast concrete version of the well-known Quonset hut), ribbed-shell gable frame, and ribbed-shell dome.

Owing to reduced radioactivity outside the ¾-mile radius, the same type structures can be used without earth cover. The area outside the 1-mile radius is considered as the zone of minimum protection and panel and rib framing can be used.

Many types of existing structures, lacking strength and stability to resist blast pressures in this zone, could be provided with the needed protection by an external shell enclosure. This arrangement is adaptable to single-story brick or frame buildings of narrow width by attaching ribbed-shell panels to the brick walls and wooden roof. When the width of the building exceeds 20 ft, the reinforcing panels need an independent supporting system. This means erecting a complete frame to enclose the existing structure. (Published in ACI JOURNAL, Mar. 1951, p. 497.)

Cost—$50 per person

Providing shelters for a community involves a huge construction task and its success depends on our ability to make optimum use of available materials and labor as well as methods of mass production, concluded Mr. Amirikian.

Mr. Amirikian estimated that a structure to accommodate 8 people would cost about $400, or $50 per person. In larger shelters the price per capita would be less.

S. J. Warberg, Giffels and Vallet, Inc., architects and engineers, Detroit, suggested that standard forms could be made so that home owners could use them to produce their own shelters, thus reducing cost.

Precast developments

Three papers covered various developments in precast concrete. F. N. Menefee, University of Michigan, Ann Arbor, described advances in precast floor systems.

The high cost of carpentry has brought about a successful attempt to eliminate most of the previously required formwork through the use of precast elements, he stated. The trend is toward units made of high strength, lightweight aggregate under closely controlled factory conditions.

He described briefly the Dox floor and roof system, the F and A system, Joistile and Strestcrete. (Tentatively scheduled for September JOURNAL.)

The considerations influencing and determining the design of Strestcrete precast structural elements were discussed in detail by A. G. Streblow, president, Basalt Rock Co., Napa, Calif. Precasting has proved itself in a keenly competitive field by increasing speed of construction and consequently reducing costs, he asserted. "Important economies can be effected in jobs requiring substantial quantities of identical units."

The use of precast structural elements reinforced with pretensioned steel is still in its infancy, he noted, but its use is bound to expand as practical applications are developed. (Tentatively scheduled for September JOURNAL.)

Precast construction in Canada was then described by Otto Safir, consulting engineer, Vancouver, B. C., Canada. Precast beams and columns were used for the frames of warehouses. In a parking garage, precast elements were combined with cast-in-place members to form an essentially monolithic structure. Another project used precasting to advantage in the construction of a retaining wall.

"The designer need not hesitate to employ complicated shapes if such shapes are those best adapted to the requirements of the structure," emphasized Mr. Safir. "In some cases this leads to economy in concrete and steel."

Precasting opens up many new fields for reinforced concrete, fields which up to now were the prerogative of structural steel, he concluded. (Published in ACI JOURNAL, Feb. 1951, p. 461.)

Economy important

The most important reason for the growth of precasting is its economy, declared F. Thomas Collins, consulting engineer, San Gabriel, Calif., in speaking about new techniques in tilt-up construction.

Tilt-up construction is economical and practical. It will meet building code requirements. However, he urged careful attention be given the erection and joining of these precast elements. (Tentatively scheduled for September JOURNAL.)

The precast concrete session closed with the showing of a film on prestressed concrete by J. R. Janney, Portland Cement Assn., Chicago. The film showed the formwork, placing of prestressing strands, placing and curing of concrete, prestressing and testing of a concrete beam. Mr. Janney reviewed the data collected during the test.

Research

Committee 115 had its annual open session Thursday morning under the direction of Stephen J. Chamberlin, Chairman, and George W. Washa, Secretary. As since 1937, when the first open meeting was held, research men were invited to discuss their problems and things under investigation among themselves without publicity. The convention reporter recorded proceedings only for Committee 115 and ACI headquarters. One had to be present to learn what was discussed.

Ten brief papers from laboratories throughout the country reported:

Tests on the spacing of reinforcement in beams

Prestressing in thin beams

Effect of repeated bond loads on bond-slip curves of bars already carrying axial tension

Performance of automatic freezing and thawing equipment for testing concrete

Pressure method for determining the air content of hardened concrete

Mechanism of frost action in cement paste

Ice prevention by electrically heated concrete pavements

Effect of thermal differences in aggregates on concrete deterioration

Use of radioactive salts in studying properties of concrete

Effect of rate of loading on the compressive strength and modulus of elasticity of concrete.

Contributors to the program were: R. F. Blanks, Bureau of Reclamation, Denver; S. J. Chamberlin, Iowa State College, Ames; Phil M. Ferguson, University of Texas, Austin; Thomas B. Kennedy, Waterways Experiment Station, Dept. of the Army, Jackson, Miss.; Marvin L. Mass, University of Colorado, Boulder; T. C. Powers, Portland Cement Assn., Chicago; C. H. Scholer, Kansas State College, Manhattan; Bailey Tremper, Washington State Highway Dept., Olympia; Stanton Walker, National Sand and Gravel Assn., Washington, D. C.; and David Watstein, National Bureau of Standards, Washington, D.C.

Panel discusses precasting, prestressing, radiant (panel) heat, standard compression test, mass concrete lifts, coatings, stirrups

Of particular interest to builders, superintendents, foremen, engineers and concrete technologists was the panel discussion Thursday afternoon. C. H. Scholer, professor of applied mechanics, Kansas State College, Manhattan, served as chairman and Raymond E. Davis, director, Engineering Materials Laboratory, University of California, Berkeley, vice-chairman.

The panel included engineers well known in the various fields of the concrete construction industry: A. Amirikian, head designing engineer, Bureau of Yards and Docks, Dept. of the Navy, Washington; R. F. Blanks, head, Research and Geology Division, Bureau of Reclamation, Denver; H. J. Gilkey, head, Dept. of Theoretical and Applied Mechanics, Iowa State College, Ames; A. T. Goldbeck, engineering director, National Crushed Stone Assn., Washington.

J. W. Kelly, professor of civil engineering, University of California, Berkeley; H. L. Kennedy, manager, Cement Division, Dewey and Almy Chemical Co., Cambridge, Mass.; T. E. Stanton, materials and research engineer, California Division of Highways, Sacramento; M. A. Swayze, director of research, Lone Star Cement Corp., New York; Bailey Tremper, materials and research engineer, Dept. of Highways, State of Washington, Olympia; L. H. Tuthill, engineer, Bureau of Reclamation, Denver; and I. L. Tyler, manager, Field Research, Portland Cement Assn., Chicago.

Topping gives tough floor

The session opened with a color film on construction of heavy-duty floor topping by Eastman Kodak Co. The procedure for laying bonded concrete floor topping over a concrete slab has been used successfully on several million square feet of floor area at the Eastman plant. A dry mix, rolling and power floating were cited as the essential elements in getting tough, wear-resistant floors.

H. Walter Hughes, Dept. of Public Works, Rochester, N. Y., said a quick check on consistency of the topping is to pack a hard ball of the material; there should be just enough moisture to discolor the hands.

Precast concrete replaces wood forms

What is being done toward the use of thin reinforced concrete slabs in place of wood forms in building construction, the slabs becoming a part of the finished structure?

Few projects have tried to use precast concrete in this way, commented Mr. Amirikian. The Navy built a concrete barge where practically no conventional forms were used; precast slabs and cells were tied together by pneumatically-placed mortar.

An apartment building, only in design stages, plans to utilize 2-in. precast slabs in walls. The walls will be 4 in. thick. Interior forms will be attached to the precast slabs and the interior half of the wall will be cast-in-place, the precast slabs serving both as forms and exterior surface.

Another application is the thin-shelled technique of box construction where vertical forms are 1-in. precast slabs.

"With the present cost of wood forms, the use of thin reinforced concrete slabs offers definite advantages," declared Professor Davis. By using precast slabs as part of the finished structure, it is possible to get the color and texture desired for architectural treatment. In addition, high-strength concrete can be used in the slabs to give impermeable surfaces, which will encourage the use of concrete in building exteriors.

Victor L. Brooks, Texas Concrete Products, Austin, described structural work on a four-story building where precast slabs served as forms. The outer surface was faced with unpolished terrazzo and the back side of the slab had projecting steel dowels to tie into the structural concrete. These slabs were erected as formwork and structural concrete placed between them. He said the project is experimental and some problems remain unsolved.

In using precast concrete as both form and part of the structure, shrinkage of cast-in-place concrete will transfer stresses and cracks to the precast elements.

"The best solution," Mr. Amirikian believed, "is to deal with relatively small

dimensions. If the element is relatively small, the problem will be relatively small in turn." Large elements also complicate casting and handling.

Precast single and multistory buildings

What is the prevailing trend in the use of precast reinforced concrete elements in the construction of single and multistory buildings?

The Navy has been a pioneer in this field, but further work is desirable, emphasized Mr. Amirikian. A housing project of two-story and single-story houses will use "sandwich" panels, built of two concrete slabs separated by an insulating layer. Floor elements are ribbed panels or slabs on joists.

Many houses are being built by conventional precast techniques where floor joists are precast and some walls are precast panels. Cemenstone framing has been used for buildings up to four stories.

He contended that not enough precasting was being used. "Either the contractors are hesitant because they can't see avenues of profit, or are waiting for somebody else to do the pioneering and spade work, or more competition is needed in this field." He emphasized the importance of new methods in conserving materials and cutting labor costs.

"We are now entering a new era, where for economic reasons, precast reinforced concrete construction definitely enters as a competitor of monolithic concrete," asserted Professor Davis.

By using recent developments in precasting, Mr. Amirikian said, materials can be reduced at least 50 percent from the usual monolithic construction. "Two buildings can be built with materials normally required for one." The saving in cost would not be as great, about 25 percent, although factory production methods could cut this further.

"Under factory controlled conditions it is feasible to produce concretes with 8000 psi compressive strengths and within the realm of practicability to build thin sections with 12,000 psi concrete," noted Professor Davis. High elastic limit steel for reinforcing these sections is already available at reasonable prices.

"We should always distinguish between new methods of precasting and conventional methods," Mr. Amirikian said. The conventional method consists of casting essentially the same thing as in monolithic concrete, using about the same amount of material. This was done as early as 1900.

"Why use 2500-lb concrete and ordinary reinforcing, when it is feasible to use 5000-lb concrete with wire mesh reinforcing to get balanced framing?" With special wire reinforcing it is possible to use 8000-lb concrete. As concrete strength is increased, there must be a corresponding increase in grade of reinforcement. This type of precasting promises savings in both materials and cost.

Radiant heat pipes easy to install in slab

What allowance should be made for conduits, sleeves and radiant heat pipes in the design of slabs to overcome the loss of continuity brought about by their inclusion?

Mr. Kennedy replied that a few simple rules usually eliminate any trouble in radiant heat jobs: (1) leave at least ¾ in. protection for all steel; (2) place pipes in top of slab so it doesn't affect tensile steel; and (3) proportion size of pipe according to thickness of slab.

Terrell R. Harper, with George Dahl, architectural and engineering firm, Dallas, Texas, described difficulties encountered in controlling positioning of radiant heating coils near the top of slabs on the ground. To eliminate damage, instead of placing coils on chairs, they placed the lower part of the slab first, positioned coils and then placed rest of slab.

Supervision and inspection are important factors, Mr. Kennedy said, in supporting coils on chairs and keeping them at correct levels in the slab.

Compression test approximate measure of quality

Is the compression test for determining quality of concrete obsolete?

The compression test is not obsolete, asserted Professor Gilkey; it will tell us a lot about many properties of concrete, although it must be supplemented by other tests for those properties that do not vary in direct proportion to compressive strength.

It merely gives an indication, a comparative basis for different batches or mixes. It is a

standardized procedure for measuring a number of properties. The strength shown by a standard cylinder will not be the same as that of some other shape.

"The standard compression test is an approximate measure of quality," said Harlan H. Edwards, with Jones and Bindon, Seattle. It is a rough indication of what can be expected of the concrete in a structure if the conditions of temperature, curing, etc., were comparable to laboratory conditions. It does not show what exists in the structure.

Mr. Edwards advocated that greater use should be made of testing cores from the structure itself to get a true picture of the concrete's characteristics.

"The standard 7-day or 28-day compressive test will indicate the quality of the concrete mixture. It may tell little of an accurate nature about what is in the structure," added Professor Gilkey.

The standard compressive test and compression tests of cores are tied together, he said, in quality control and job control on a project.

Temperature controls mass concrete lifts

What is the effect of high lifts in dam construction?

"There is no effect as far as quality of concrete is concerned. You can place it as high and as fast as you want, provided the forms hold. The only effect in mass concrete is temperature," Mr. Blanks commented. "It is a matter of economy in keeping temperature rise and subsequent fall down by short lifts rather than artificial means." The Bureau of Reclamation usually limits lifts to 5 ft so that nature will aid in cooling the concrete.

R. B. Young, Hydro-Electric Power Commission of Ontario, Toronto, Ont., Canada, in describing Canadian practices said they don't worry about heat in higher lifts, nor use cooling coils.

The Commission started using high lifts about 20 years ago when it was found that existing structures were deteriorating at horizontal joints. It was difficult to make joints watertight, so it was decided to eliminate them as much as possible with higher lifts. The structures do not develop serious cracks; core tests and Soniscope tests have shown them to be in good condition.

Coatings protect concrete in water treatment plants

What can be done to prevent deterioration of concrete subjected to chemicals used in water treatment?

The appendix in the 1940 Joint Committee Report was cited as a reference by Professor Kelly. It lists various chemicals that effect concrete and suggests protective coatings.

Low water-cement ratio concrete will reduce deterioration due to some aggressive waters and solutions, Mr. Tyler commented. A high sulfate concentration usually warrants a Type II or V cement. He noted that often the proportions, mix and batching are more important than type and composition of cement.

The most corrosive materials used in water treatment plants are iron and aluminum sulfates and phosphates. Normally these materials are kept away from concrete as much as possible, Mr. Blanks said. If this is not possible, as in feeding tanks, protective treatments that have proved effective are vinyl resins, coal tar and asphaltic paints.

Construction conditions govern stirrup placement

How should stirrups be placed?

Construction conditions govern it and in most cases it is simpler to make a true U instead of an inverted U, was the opinion of Mr. Amirikian.

J. P. Thompson, Portland Cement Assn., Chicago, commented that some designers say the Code states that hooks should be in the area of compression, which is in the bottom in continuous construction. In preparing ACI's detailing manual, however, a survey found that common practice is to place hooks at the top.

Professor Gilkey stated that as far as bond is concerned, it is no weaker in a region of tension than in a region of compression, so the stirrup can be placed either way.

"How you place stirrups is a question of how they are going to be held in place," said Arthur P. Clark, American Iron and Steel Institute, Washington. "You can't put them in a beam and let them float."

They must be hooked or welded to framing rods. However, it was his impression that straight stirrups, using new deformed bars, would be satisfactory.

"The problem of placing stirrups is a practical one," added R. C. Sandberg, architectural engineer, Rock Island, Ill. Unless the beam is small enough to make the whole reinforcing frame and drop it in place, the stirrups must be placed with hooks at the top to be continuous at the bottom, the other steel resting in the cradle.

Over-stretching prestressed wire eliminates some creep

What allowance should be made for creep or plastic flow in prestress design?

"The allowances for creep, plastic flow and shrinkage are not adequately defined," T. J. Gut, Prestressed Concrete Corp., Kansas City, Mo., answered. Magnel and Freyssinet allow about 15 percent and 10 percent has been used successfully.

Recent tests by Magnel show that by overstretching the wire for a short period some of the creep is eliminated. The Arroyo Seco bridge in California had a design stress of about 120,000 psi, so the wire was prestressed 110 percent, about 132,000 psi, and held for

two minutes which has been determined as a minimum optimum for decreasing wire creep by at least 60 percent. The wire was then released to 106 percent of the design stress and anchored, the extra 6 percent being allowed for shrinkage and plastic flow.

Post-tensioning of members usually waits at least 28 days after casting so a good deal of the concrete shrinkage has taken place, he said.

Freyssinet has suggested that the wire be stretched mechanically a number of times. The more times it is stretched and released, the greater its proportional limit and less the creep. Since wire is usually in large lengths, the method is not economical, Mr. Gut added.

The allowance depends upon the construction technique, Mr. Amirikian said. Where ordinary reinforcing bars are used, the allowance for shrinkage and plastic flow can't be as liberal as for high-yield steel. Four percent is generally accepted as shrinkage allowance and if post-tensioning is used it isn't necessary to figure this. He also allows 4 percent for plastic flow and creep which gives a maximum of 8 percent, subtracting whatever shrinkage there is in the concrete element if it is precast.

Concrete shrinkage was cited as the major problem by several speakers.

Professor Davis questioned whether allowances were great enough in regard to shrinkage and thought the effect of shrinking was greater than that of plastic flow.

He noted that shrinkage, plastic flow and creep of concrete are affected by many things but perhaps the most outstanding is the quantity of water in the mix.

"Other things being equal, the more water in the concrete mix, the greater the drying shrinkage and plastic flow."

Pacific Coast committee

All local arrangements for the 47th annual convention were handled capably by the West Coast committee under the direction of Harmer E. Davis, director, Institute of Transportation and Traffic Engineering, University of California, Berkeley. Robert Glenn, also with the Institute of Transportation and Traffic Engineering, was vice-chairman.

Program development

J. W. Kelly, professor of civil engineering, University of California, was chairman of the local advisory committee on program development. The committee included W. F. Arata, manager, Northern California Chapter of AGC, San Francisco; Hugh Barnes, district engineer, Portland Cement Assn., Los Angeles; Raymond E. Davis, director, Materials Engineering Laboratory, University of California; John J. Gould, consulting engineer, San Francisco; Robert Horonjeff, lecturer and engineer, Institute of Transportation and Traffic Engineering, University of California.

Walter L. Huber, civil engineer, San Francisco; J. E. Jellick, manager, Portland Cement Information Bureau, San Francisco; Walter H. Price, head, Materials Laboratory, Research and Geology Division, Bureau of Reclamation, Denver; Thomas E. Stanton, materials and research engineer, California Division of Highways, Sacramento; G. F. Steigerwalt, president, Haydite Concrete Products Co., San Rafael, Calif.; Bailey Tremper, materials engineer, Washington State Highway Department, Olympia; and Harry A. Williams, professor of civil engineering, Stanford University.

Finance

The finance committee was headed by A. G. Streblow, president, Basalt Rock Co., Napa, Calif., and included J. E. Jellick and Malcolm McIntyre, general sales manager, Basalt Rock Co.

Promotion and attendance

W. A. Marsh, general manager, Permanente Cement Co., Oakland, Calif., was chairman of the promotion and attendance committee. Each committee member was responsible for various areas as follows: Idaho—E. A. Dufford, vice-president, Idaho Portland Cement Co., Inkom; New Mexico—T. Jack Foster, president, Pumice Aggregate Sales Corp., Albuquerque.

Washington—Homer M. Hadley, consulting engineer, Seattle; Oregon—F. E. McCaslin, president, Oregon Portland Cement Co., Portland; Northern California—William

Wallace Mein, Jr., vice-president and assistant to the president, Calaveras Cement Co., San Francisco; Nevada—Robert L. Miller, sales engineer, Ready Mix Concrete Co., Reno; Wyoming—S. W. Russell, vice-president, Monolith Portland Midwest Co., Denver, Colo.; Arizona—H. W. Sayre, sales manager, California Portland Cement Co., Los Angeles, Calif.; Southern California—Byron Weintz, chief engineer, Consolidated Rock Co., Los Angeles; and Colorado, Montana, Utah—Robert W. Winters, general sales manager, Ideal Cement Co., Denver.

Entertainment

Entertainment was under the direction of Mr. Jellick, aided by T. P. Dresser, chief engineer, Abbot A. Hawks, Inc., San Francisco; and E. L. Howard, testing engineer, Pacific Coast Aggregates, San Francisco.

Local arrangements

Chairman of the local arrangement committee was Lee J. Rothgery, associate engineer, Institute of Transportation and Traffic Engineering, University of California. He was aided by Carl E. Monismith, teaching assistant, Division of Civil Engineering, University of California.

Display

The exhibit and display committee was headed by Michael Goodman, professor of architecture, University of California; James Hirst, architect, Berkeley, Calif., was a member of the committee.

Publicity

Publicity chairman was J. I. Ballard, vice-president and editorial director, Western Construction News, San Francisco. Wayne H. Snowden, associate engineer and lecturer, Institute of Transportation and Traffic Engineering, University of California, was also on the committee.

Harmer E. Davis, director, Institute of Transportation and Traffic Engineering, University of California, chairman of the Pacific Coast convention committee. He is presently a member of ACI's Board of Direction and was awarded the Wason Medal with Raymond E. Davis for the 1931 most meritorious paper, "Flow of Concrete under the Action of Sustained Loads."

Committee meetings

Six Institute technical committees took advantage of the San Francisco convention for meetings to consider problems of work extension. Interested visitors were welcomed.

Committee 115—Research (Executive Group)

Nine personnel changes were approved for increased efficiency and coverage. In the direction of further cooperation outside the United States, correspondence will be initiated with Canadian and Cuban research groups and copies of the committee's compilation, "Research Projects in Plain and Reinforced Concrete," are being sent to interested French and Danish research institutions.

In addition to Chairman S. J. Chamberlin, G. W. Washa, secretary, R. E. Davis, D. E. Parsons and M. A. Swayze were present.

Committee 207—Properties of Mass Concrete

Origin of the committee and its work since 1928 were reviewed and the surveys made in 1936 and 1937 were discussed. In the first, representative structures were visited but lack of construction records impeded the work.

In the latter, data are still in field notes but are considered valuable if the structures are revisited.

The recently developed Soniscope was recommended as an important aid in studying mass concrete structures. Several agencies in the United States and Canada are planning to use the device in surveys to be initiated and periodic surveys are being made of 60 to 70 structures of the Hydro-Electric Power Commission of Ontario. On new structures, this agency is compiling complete structural and construction data to aid in the interpretation of later data obtained with the Soniscope.

It was the consensus that study of a few representative mass structures would yield more of value than a more limited study of all dams. It was suggested that compilation of information should not be limited to structures containing more than 150,000 cu yd of concrete but include smaller structures which are of equal interest.

Status of structural behavior measurements in dams, by several agencies in the United States were reviewed briefly. Creep, hydration of cement measured through temperature change, and autogeneous volume change in various structures were mentioned. The use of embedded instruments was suggested as an additional technique to study service behavior.

Members present were R. F. Blanks, chairman, F. Barona, R. E. Davis, J. M. Raphael, secretary, I. L. Tyler, R. B. Young and G. L. Otterson (for W. R. Waugh). Visitors were Douglas McHenry (for TAC), R. F. Adams and C. H. Willetts.

Committee 318—Standard Building Code

Further changes in the Code to eliminate ambiguities were discussed and several design matters considered. Committee work toward a revision of the 1951 Code was outlined and work for the coming year planned.

Committee 323—Prestressed Reinforced Concrete

An informal group discussed the design and application of prestressed concrete. Since its last formal meeting, the committee has worked by correspondence. Progress has been made in the development of notations and definitions and it is expected that some of this material will be made available for publication soon.

Committee members present were A. E. Cummings, chairman, A. Amirikian, Leo H. Corning, Jack R. Janney and D. E. Parsons. Visitors were Phil M. Ferguson, James A. McCarthy, Howard Simpson and Douglas Wood.

Committee 326—Shear and Diagonal Tension

The initial test program on shear and bending in reinforced flat slabs without column capitals prompted some objections. The committee decided that to change the test slabs would throw the study outside the scope of the committee assignment and complicate securing basic data. The title of the project was changed to shearing strength of a reinforced concrete slab under a centrally located concentrated load.

Financial support of the study and the selection of a laboratory to do the work were considered. Additional agencies were proposed to take on part of each of these burdens.

Professor Bresler discussed the theory of the shearing strength of reinforced concrete beams and distributed copies of his paper on this subject. Other committee members were asked to comment on it or to submit similar contributions.

Committee members present were Charles S. Whitney, chairman, Boris Bresler, Arthur P. Clark, Douglas McHenry, D. E. Parsons and C. A. Willson, secretary. A. Amirikian, Miles D. Catton, Leo H. Corning, A. E. Cummings, Joseph DiStasio, Phil M. Ferguson, Jack R. Janney, James A. McCarthy, Howard Simpson and Harry F. Thomson were visitors.

Committee 613—Recommend Practice for the Design of Concrete Mixes

A committee report draft was considered at some length. Decisions were to change the title, proportion mixes on a cement factor basis where durability was not a consideration and to change the arrangement and values in three of the tables in the present report. A new draft report is being prepared for further consideration.

Committee members present were W. H. Price, chairman, Clayton Davis, A. T. Goldbeck, Frank H. Jackson, Henry L. Kennedy, Thomas B. Kennedy, I. L. Tyler and Stanton Walker. Visitors included R. F. Adams, R. A. Burmeister, R. W. Burrows, T. C. Powers and Douglas Wood.

Robert Gros, after-dinner speaker on Wednesday evening, related interesting stories about famous personalities he had met and interviewed.

Not all the discussion took place in formal sessions. Douglas E. Parsons, National Bureau of Standards, makes a definite point. Bob Glenn, vice-chairman of the West Coast committee, hovers in the background while an unidentified member "catches" the ear of A. Allan Bates, Portland Cement Assn.

Three big entertainment features

As hosts, the cement manufacturers, concrete and building industry, and engineers from the 11 Western states planned three entertainment features for the convention registrants. A sightseeing trip through San Francisco's Chinatown was the Tuesday evening feature.

Robert Gros, Pacific Gas and Electric Co., San Francisco, presented entertaining highlights about famous world personalities at the Wednesday evening dinner.

A twilight cruise on San Francisco Bay was Thursday evening.

Retiring ACI President Jackson presents Harry F. Thomson, ACI's newly elected president, the certificate and Wason Medal for the "most meritorious paper" of the year, "Specifications Should Be Realistic."

Courtesy
Chemical and Engineering News

Annual awards announced

Following a welcome to California from Harmer E. Davis, chairman of the West Coast convention committee, at the general luncheon Wednesday, President Frank H. Jackson presented ACI Awards to W. J. Cheesman, W. S. Colby, J. R. Leslie, Harry F. Thomson and Charles S. Whitney.

Charles S. Whitney, partner in Ammann and Whitney, consulting engineers, Milwaukee and New York, won the Alfred E. Lindau Award . . . . . "in recognition of his many contributions to reinforced concrete design practice." This award was founded in 1947 by the Concrete Reinforcing Steel Institute in honor of the late Alfred E. Lindau, past president of American Concrete Institute. It is given for outstanding contributions to reinforced concrete design practice.

W. S. Colby, structural engineer, Stone and Webster Engineering Corp., Boston, received ACI's Construction Practice Award for his paper "Design and Construction of a Circulating Water Intake," ACI JOURNAL, March 1950. The award was established in 1944 by ACI to recognize the man on the job for his resourcefulness in translating design into the completed structure.

J. R. Leslie and W. J. Cheesman, research engineer and assistant research engineer, respectively, Hydro-Electric Power Commission of Ontario, Toronto, Canada, received the Wason Medal for "noteworthy research" based on their paper "An Ultrasonic Method of Studying Deterioration and Cracking in Concrete Structures," September 1949 ACI JOURNAL.

Harry F. Thomson, manager, Redi-Mix Concrete Division, Material Service Corp., Chicago, was the recipient of the Wason Medal for "the most meritorious paper" of the volume year, "Specifications Should Be Realistic," November 1949 ACI JOURNAL.

President Jackson announced the Board's election to ACI Honorary Membership of Harrison F. Gonnerman, assistant to the vice-president for research and development, Portland Cement Assn., Chicago, and Frank E. Richart, research professor of engineering materials, University of Illinois, Urbana.