VOLUME X / NUMBER 3 / THIRD QUARTER 1970

MODERN STEEL CONSTRUCTION

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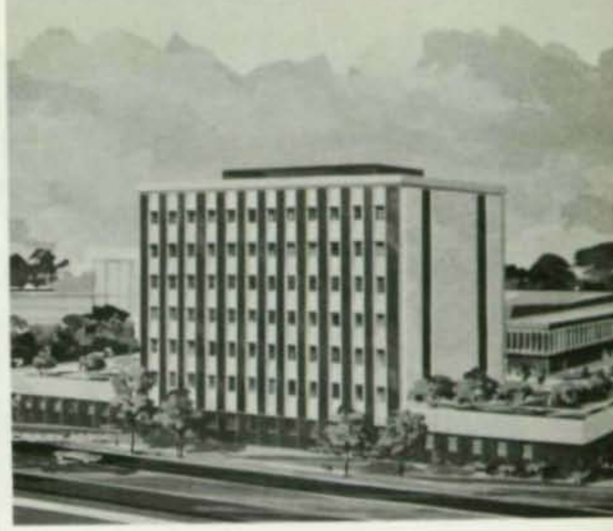

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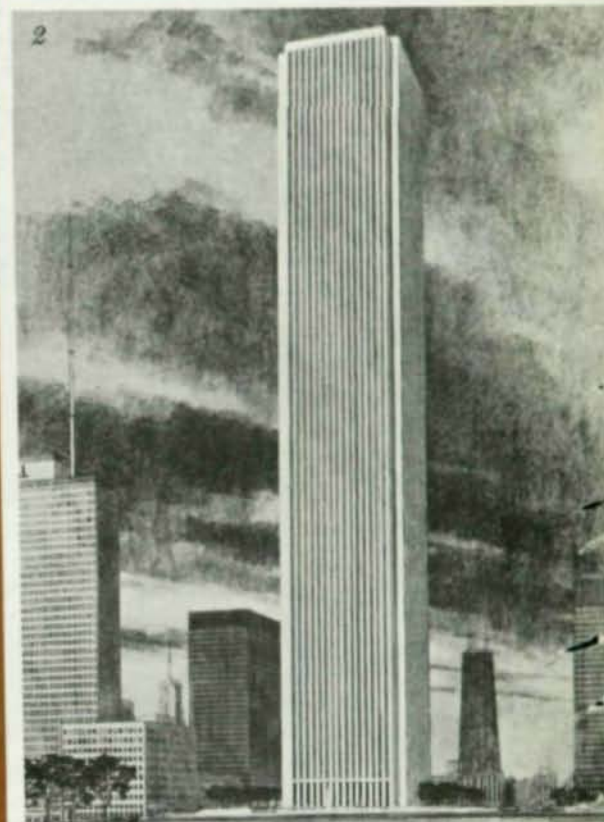

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EDITORIAL STAFF

Daniel Farb, Director of Publications
Mary Anne Donohue, Editor

CONTENTS

THE T. R. HIGGINS LECTURESHIP AWARD

During its 50th Anniversary Year, the American Institute of Steel Construction will conduct the first T. R. Higgins Lectureship Award in honor of Theodore R. Higgins, former AISC Director of Engineering and Research.

In his more than 30 years with the Institute, Dr. Higgins has contributed substantially to the advancement of the structural steel industry through innovative engineering, technical papers, and professional lectures.

The T. R. Higgins Lectureship Award will recognize the author of the technical paper that is judged to be the most significant contribution to engineering literature on fabricated structural steel published within the period from July 1, 1968 to July 1, 1970. The Award, to be made annually, will consist of an engraved certificate and a $2,000 honorarium. If the paper selected has more than one author, the senior author listed will receive the Award, but the other authors will be recognized by the recording of their names.

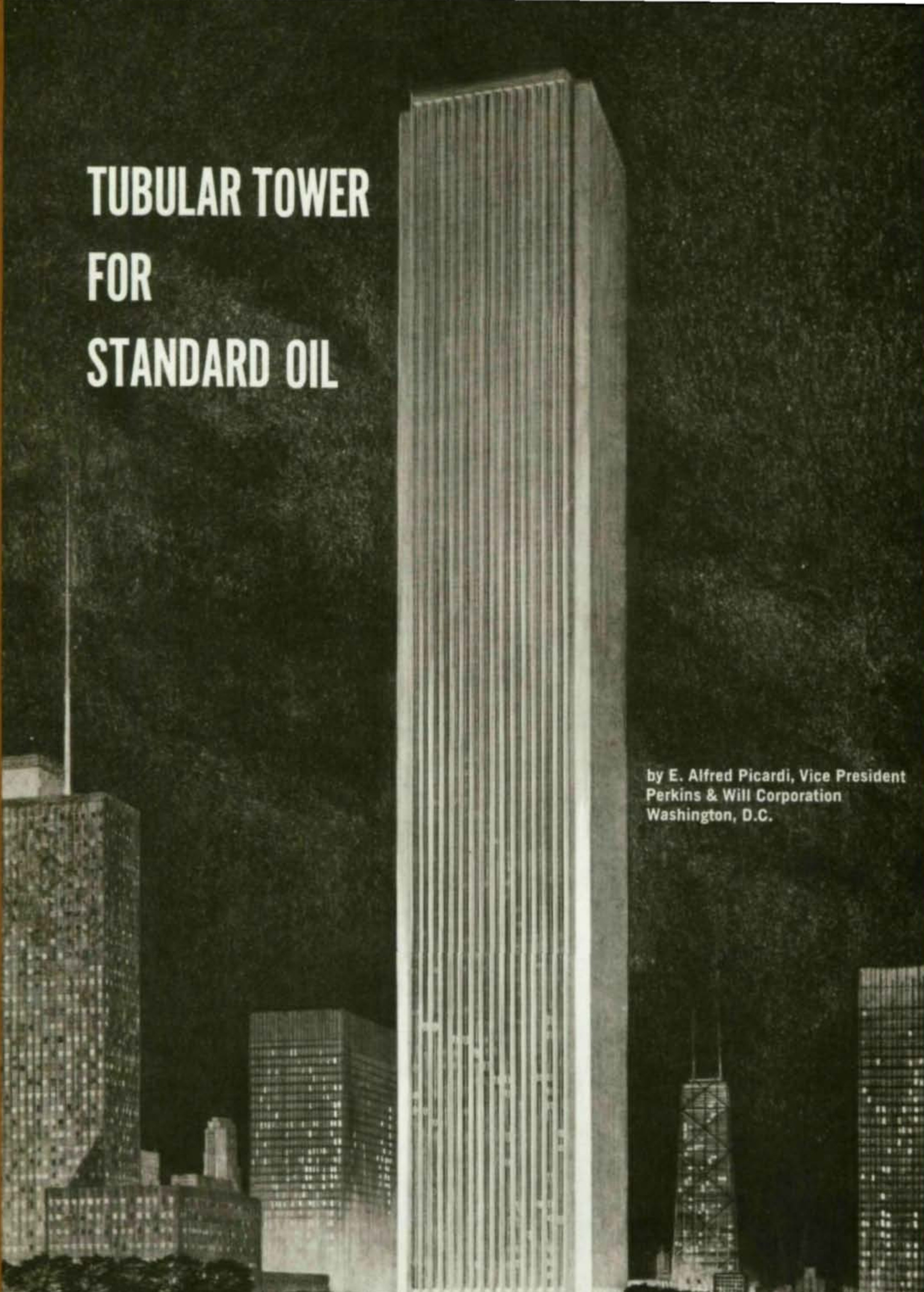
The 1971 winner will be announced on February 15, 1971. The recipient will be expected to present an oral review of the prize-winning paper at AISC's National Engineering Conference in Cleveland and, upon invitation by AISC, at five other locations during the year.

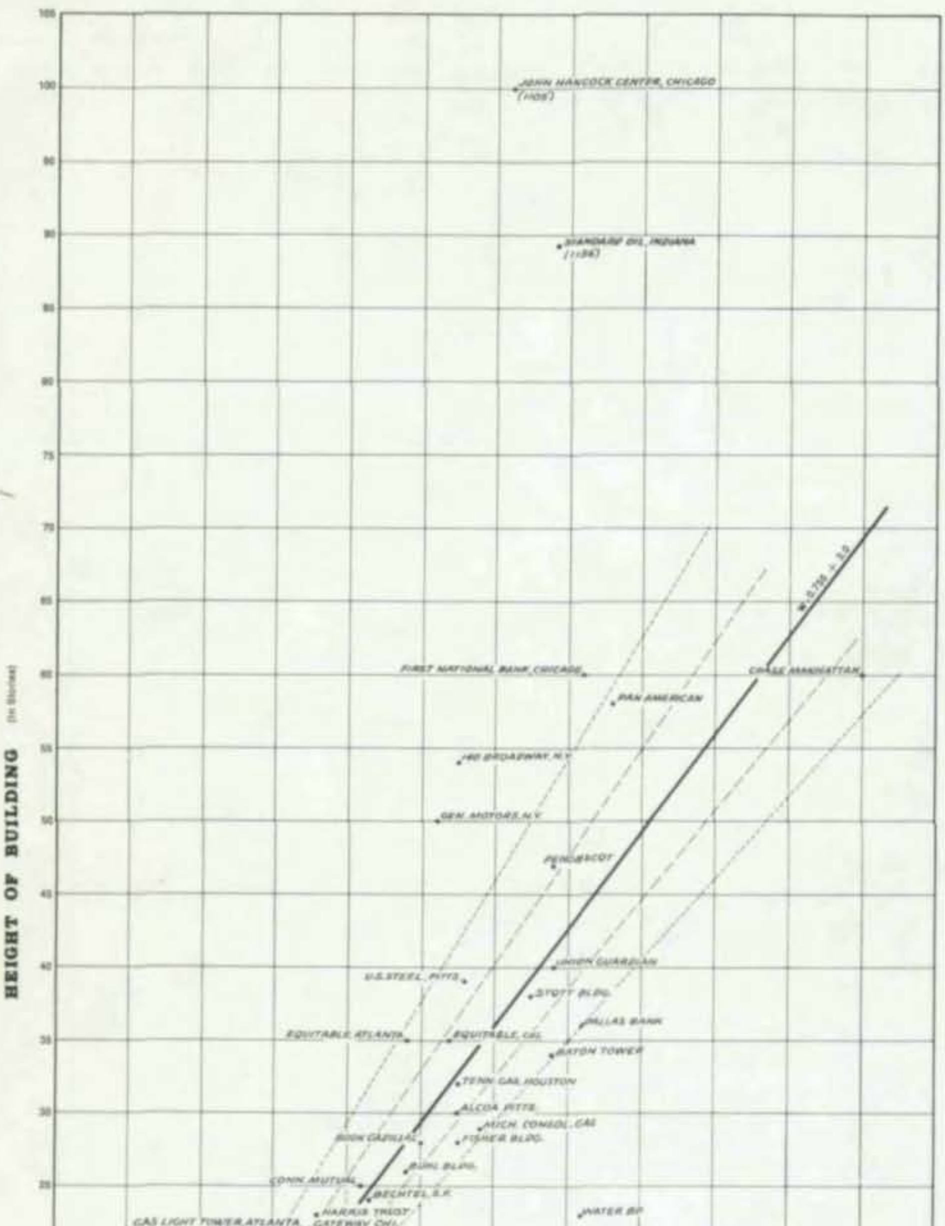
IN KANSAS

In the story entitled "Build 'em and Forget 'em," page 13, 2nd Q, 1970 MSC, we are advised that St. Joseph Structural Steel Company, St. Joseph, Mo., was the structural steel fabricator of the six county bridges described.

TUBULAR TOWER FOR STANDARD OIL

by E. Alfred Picardi, Vice President
Perkins & Will Corporation
Washington, D.C.





Structural steel weight vs. number of stories

The Standard Oil Company of Indiana office building will usher in a new era of high rise construction. It will be the first steel shell tube building in the Chicago area, emphasizing the "tube within a tube concept" and the simple prefabrication possible with this concept, proving that weight per square foot is no longer an acceptable criterion with which to judge the efficiency of the structural design.

This building will be among the three highest buildings in the world. The magnitude of the project rates it as one of the notable engineering accomplishments of our time in the field of structural design and construction. It is believed to be an "advancement in the state of the art" as it greatly simplifies the now proven tube effect used on Chicago's John Hancock Center, New York's World Trade Center, and other smaller buildings. This innovation did not require development of new design or analysis techniques. The applicable theory was known, and computer software for a rigorous analysis was available. Existing shop fabrication and field erection techniques are applicable for construction.

The 89-story building is 1,136 ft above grade and extends 68 ft below grade for a total height of 1,204, making it slightly higher than the John Hancock Building.

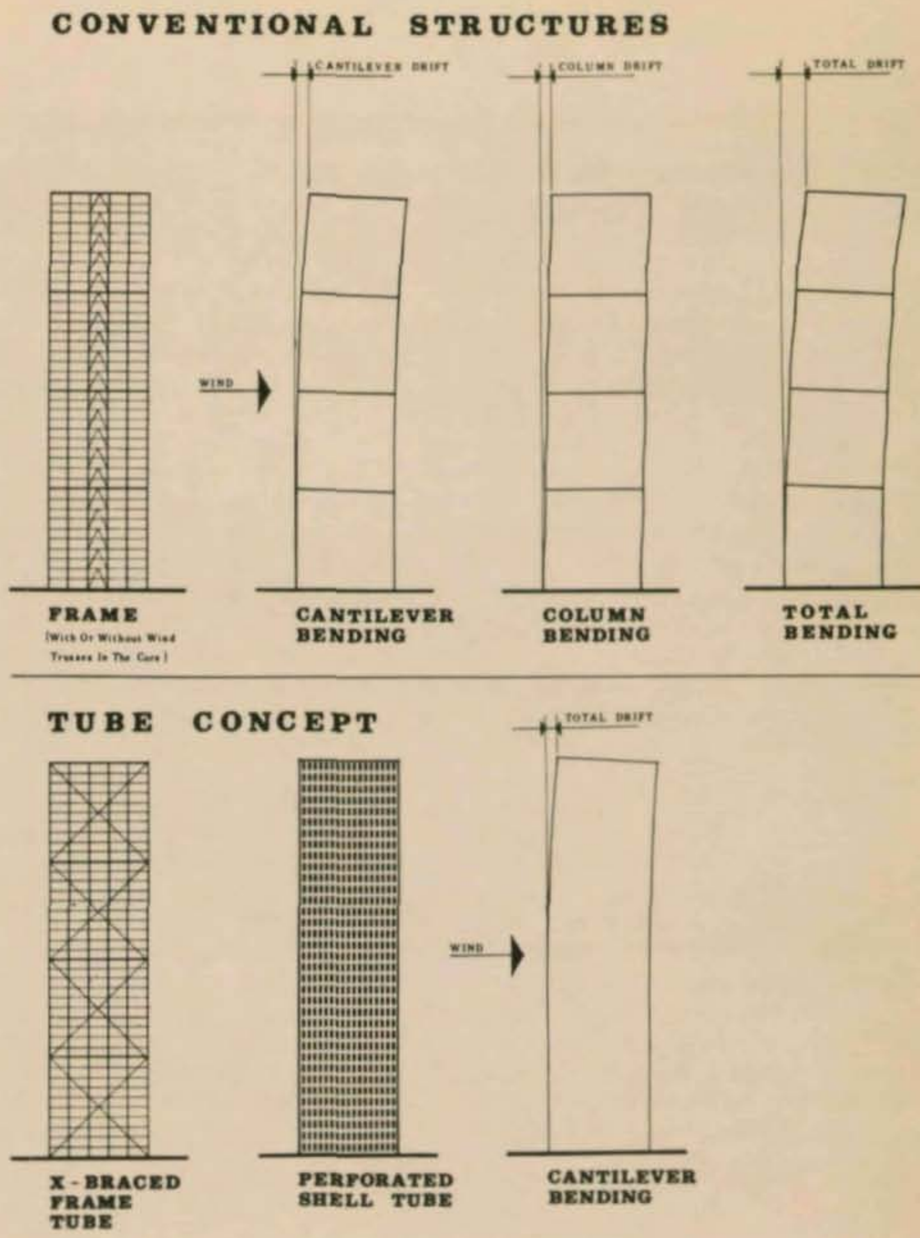
Another difference, aside from the basic design concept, is that the Standard Oil Building will be completely office space. This makes the design loads heavier and the total loads greater than the John Hancock Building, which is partly apartments.

The weight per square foot in the Standard Oil Building is 34 psf.

Structurally, the high rise building is a volume of layers of floors cantilevered vertically from a foundation. It is subject to lateral loads from wind, weather, and possibly earthquakes; and it must transmit to its foundation these lateral loads, its own dead load, and all other vertical loads superimposed upon its layers of floors by occupants and their furnishings and equipment. To date, most high rise structures are designed as frames consisting of vertical columns, usually arranged on a grid system, and beams and girders spanning between columns to support a membrane forming each floor level.

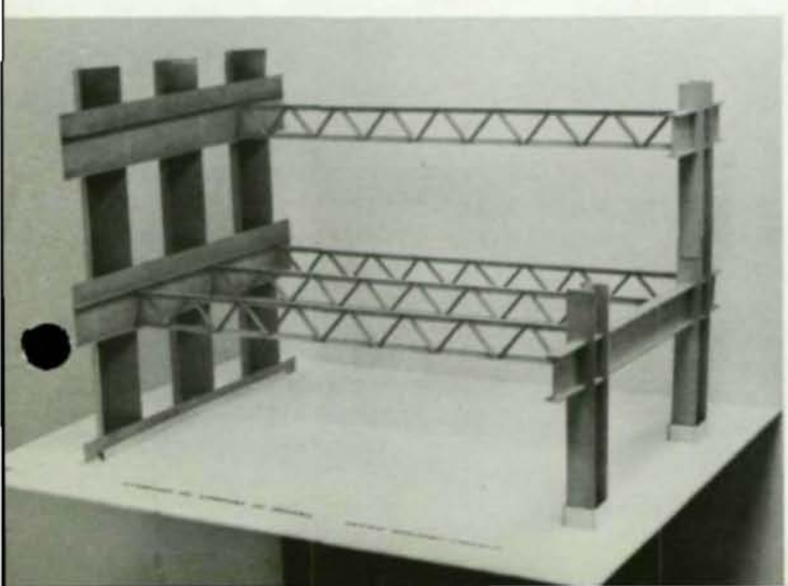
The frames resist lateral loads by various combinations of girder-to-column moment connections, vertical trusses within the core of the structure, and the various types of knee or portal braces. The structure must be sufficiently rigid so that its sidesway under lateral loads is not sensed by occupants and its elastic distortion does not tend to damage the exterior wall, floor, or partition systems. The lateral deflection of such a high rise structure is a combination of cantilever bending, due to shortening of leeward columns and lengthening of windward columns, plus a drift between each restraining floor level causing an "S" curve in the length of columns between each floor. Generally in the lower stories, because of the rather stiff columns and girders, most of the lateral deflection is due to the cantilever effect, while in the upper stories each phenomenon contributes more equally to the total sway.

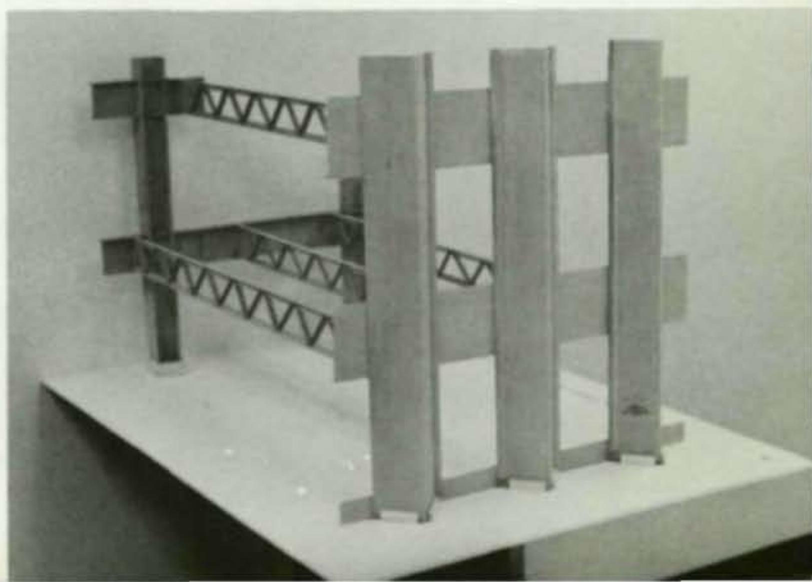
Ideally, in framed buildings, if bracing systems could be designed to minimize or eliminate the floor-to-floor column drift effect so that the tower would bend essentially as a cantilever beam, considerable savings in material for



High-rise buildings lateral drift

Study model of Standard Oil Building shows details of tube structure





any predetermined, acceptable total tower drift could be realized. If this bracing system could also contribute to the gravity load carrying capability of the frame rather than just act as a stiffener, then further economy of material could be achieved.

The 100-story John Hancock Center in Chicago is perhaps the best example of a frame designed to perform under lateral load in a similar way to a cantilever beam. The "X" bracing in the four sides of the perimeter frame causes the entire tower to behave under lateral load very much the same as a vertically cantilevered hollow tube. In addition, the inclined braces carry their fair share of gravity loads. The average structural steel weight for this 100-story frame was about 29 psf. This is about the same average steel weight of conventional frames in the 30- to 50-story height range. A notable breakthrough involves the development of a real tube eliminating exterior framing members and substituting instead a steel shell wall. Shells will be relatively thin and fabricated from simple rolled plates. The steel will be distributed continuously around the perimeter rather than having heavy columns, spandrels and bracing members. Shells will be mass produced in large floor-to-floor pieces in fabricating shops, using automatic cutting and welding techniques; and large sections will be shipped and erected quickly at the site using automatic welding tools. Quality control and inspection will be relatively simple, because of the inherently smaller size welds and thin plates compared to those on heavy column and girder work.

All vertical loads applied to the shell from floor systems will be carried directly to the foundations in a vertical line rather than to a girder or spandrel, and then to columns for transmission to the ground.

Application of insulation, fireproofing, and a skin over the shell will be considerably simpler and more economical, as such application will be made on a continuous surface requiring no auxiliary framing for support.

This concept results in even further steel weight reduction than the framed braced tube. Economies in fabrication, erection, fireproofing, insulation, and skin cost are achieved.

The design requires a departure from the overdone glass box solutions as the system works best when stiffened window openings are no more than 50 percent of the total perimeter, although they may extend almost the full height from floor to ceiling. While the circular tube is an optimum structural shape, the concept can also apply to square or rectangular plans, or even to free forms, angular or curved.

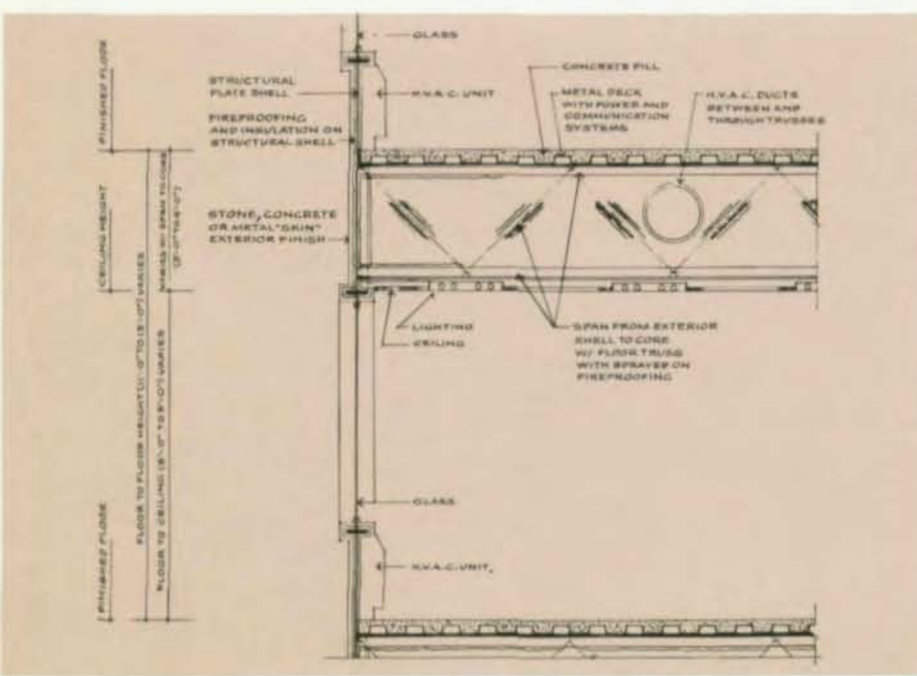
Preliminary computations to test the scheme have been made and a probable weight of 34 psf of tower floor area has been obtained. Details and approximate sizes of the various primary members have been developed, working closely with the architects to assure the compatibility of the structure with both the architectural concept and the proper integration of the mechanical and electrical systems in the structure.

The criteria for design is based on the following design specifications:

Live Load	80 psf
(with reductions per Chicago code)	
Dead Loads:	
Partitions	20 psf
Metal Deck	7
Concrete Floor	38
Ceilings	7
Mech. & Elect.	6
Floor Beams	15
Fireproofing	2
TOTAL	95 psf

Wind load is being taken at 1.40 times the Chicago Code requirements. This increase in wind loading is the result of an in-depth study of wind conditions in the Chicago area and isotach maps. It also includes the drag coefficient, gust coefficient, and corrections for height above ground. A summary of this study is reported in the proceedings of the Boston Society of Civil Engineers, January, 1967, in the paper entitled, "Structural Description of the John Hancock Center—Chicago", by the author.

At present, the foundation of the building is under construction, and steel erection is scheduled for March, 1971.



Exterior wall section of theoretical tube structure

Architects: (Joint Venture)
Edward Durell Stone & Associates and
The Perkins & Will Corporation
Chicago, Ill.
Structural Engineers:
Tower: Engineering Div., Washington, D.C.
Perkins & Will Corporation
Plaza: P/W Engineers, Inc.
Chicago, Ill.
General Contractor:
Turner Construction Company
Chicago, Ill.
Fabricator:
American Bridge Division—
United States Steel Corp.
Pittsburgh, Pa.

VULCAN SMILES AGAIN

by R. J. Schaffhausen
AISC Regional Engineer
Birmingham, Alabama

Not long ago when I made the remark, "Birmingham is booming," a casual comment was heard, "What's so great about that, it's only about ten years behind." Undeniably true, but being a Birminghamian of the early 1950's vintage, I long ago became fond of the City and am now proud of its sudden thrust ahead, however belated. The construction surge is not only in evidence throughout the area but helps account for the State of Alabama being listed fourth among states in heavy construction contracts awarded during the first quarter of 1970 (Engineering News-Record, April 16, 1970).

Steel production and fabrication have always played a major role in the lives of Birmingham citizens. The first blast furnace in the Birmingham area was completed in 1863. Ten years later this infant industry was almost lost in the panic of 1873, but through the efforts of a few faithful early settlers the furnace survived and on February 28, 1876, using coke as fuel, the first coke iron was produced. And, as iron did then, steel today plays a major role in revitalizing the Birmingham scene.

University Kicks Off Construction

The University of Alabama provided the impetus for the boom. Plans were made to expand its medical center to encompass over 60 city blocks at an expenditure of over $400,000,000. One of the larger buildings now under construction in the complex is the Basic Science building. Originally planned in reinforced concrete, the design was changed when more column free space was desired, resulting in larger floor modules which required some beam spans of 52 ft. The building has a gross area of 418,000 sq ft. Simple beam and column design was used and steel was especially advantageous where skew framing was necessary. The architect was Charles McCauley and Associates, and the structural engineer was Strickland and Associates. They are both from Birmingham.

Building Trades Towers will have 242 apartment units.

Birmingham's Municipal Airport will be one of the most modern airports in the nation.

This initial kickoff by the University had a chain reaction effect. The First National Bank-Southern Natural Gas Building topped out its 30 stories on April 1, 1970. Due for occupancy late this year, the simple steel framing surrounds a concrete center core. The building's 570,000 gross sq ft of floor area will be enclosed in a special curtain wall of reflective glass. Speed of erection which will allow early occupancy was one reason for selecting structural steel. Welton Beckett of Houston, in association with Charles McCauley of Birmingham are the architects. The 2,700 tons of structural steel were fabricated by the American Bridge Division of the United States Steel Corporation, Pittsburgh, Pa.

Steel Framing For Phone HQ

Birmingham's largest project now under construction is the Headquarters Building for the South Central Bell Telephone Company. There were several reasons for using steel in its structural frame. An alternate scheme in concrete would have resulted in either an additional row of columns or columns several times larger in area than the steel columns. Clear, unobstructed space of 35 ft and 45 ft was desired from the steel framed center core to perimeter walls. Lower framing weight resulted in a savings in foundation costs. The building is 390 ft high, has 723,000 sq ft (gross) of floor space, will house 2,300 employees, and is expected to cost $20,000,000. Architects are Kahn and Jacobs of New York City and Warren, Knight and Davis of Birmingham. Structural engineers are Weiskopf and Pickworth of New York and Hudson and Associates of Birmingham. The Ingalls Iron Works Company of Birmingham fabricated the 8,350 tons of structural steel.

Civic Center For Centennial

The Birmingham Civic Center is the result of an architectural competition conducted according to rules set forth by the American Institute of Architects. Mr. George Qualls, AIA, of Philadelphia, the winner of this international competition, has developed a plan which will make the Civic Center, when completed, one of this country's great sights. The complex consists of an exhibit hall of over 100,000 sq ft, and now under construction, a 13,000-seat coliseum, an 800-seat theatre, and a 3,000-seat music hall, all fronting on an open piazza or square. Steel will be used as the major structural framework for each unit. Auxiliary facilities include a 400-seat restaurant. Completion is scheduled in time for Birmingham's 1971-72 Centennial Celebration. James Whitten is the Associate Birmingham Architect. Tucker Steel Division of U. S. Industries, Inc. is furnishing the steel for the exhibition hall. Contract bids were opened in May and work will begin soon on the music hall and theatre.

Other Projects

The residential-commercial field is not without its bright spots. The Building Trades Towers will add 242 living units to Birmingham's apartment scene. Several types of construction were investigated before the eleven story braced steel frame was chosen. Here again foundation cost entered the picture. As light a structural system as possible was desirable to keep the cost of caissons down. A total of 520 tons of structural steel were required with 175 tons of open web steel joists. Charles McCauley and Associates is the architect, and the structural design was by Robert H. Wallace of Birmingham.

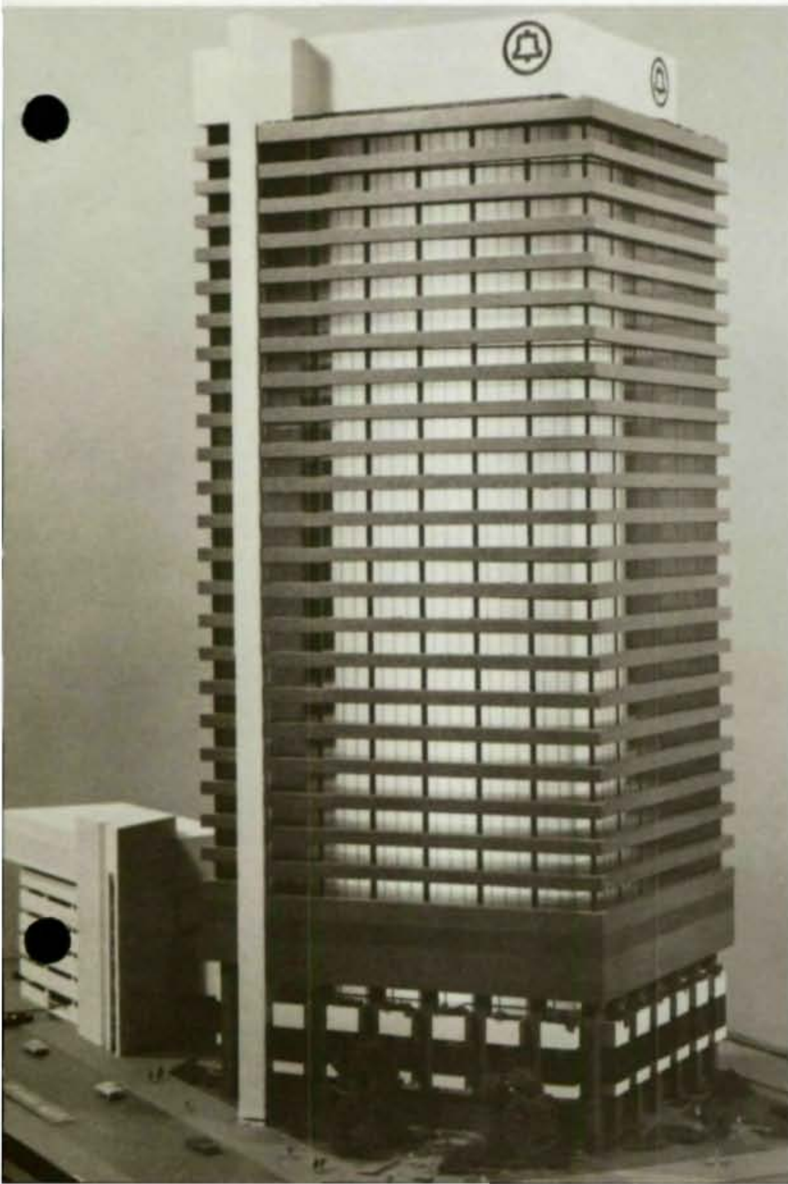
Architect Warren, Knight and Davis help round out the construction picture with plans for the new Greater Birmingham Municipal Airport. Two hectagon satellites will be connected to a main semi-circular concourse by loading ramps. Each satellite and ramp will be able to load and unload passenger traffic from ten planes. These, plus a new rectangular ramp and new air freight facilities, along with continued use of the existing buildings, will make this one of the most modern and up-to-date airports in the nation. Plans are now complete and $13,000,000 of the $26,000,000 program has already been approved by Birmingham voters. Satellites, ramps, and passenger concourse all will be framed using structural steel. Hudson and Associates of Birmingham are the structural engineers.

This by no means concludes the Birmingham picture. The Red Mountain Expressway, opened in April, is an important link in 125 miles of interstate highway which will tie the city together by 1975. Ten steel framed stories are being added to the Liberty National Life Insurance Company Headquarters Building and in the next two years the medical center will see the addition of three specialty hospitals for the treatment of diabetes, cancer and heart ailments. Numerous other high rise residential and commercial buildings are in various stages of planning.

Vulcan sits atop Red Mountain overlooking the Greater Birmingham area. A cast iron statue depicting the mythological god of the forge or metal working, some say they now see a smile on his face. After all, what would make an iron man happier than looking down on a young, energetic and growing steel city!

Simple steel framing for The First National Bank-Southern Natural Gas Building

South Central Bell, now under construction, has realized savings in space and costs by selecting steel.



MULTISTORY STEEL APARTMENT BUILDINGS

The following is an address presented to the Eastern Institute of Structural Steel Fabricators, New York, N.Y., on March 5, 1970.

by Ira Hooper, Consultant
Seelye Stevenson Value & Knecht

Rising field labor costs and new fire protective assemblies compel us to take a fresh look at steel apartment buildings. Multistory steel frames can now be less expensive than concrete flat plate structures by as much as one dollar per sq ft in the New York area.

Cast-in-place concrete construction needs a much higher proportion of field labor than structural steel. Consequently, it has been hit harder by the recent runaway increases in field labor costs. By July 1971, the current contract for concrete and cement workers calls for a wage increase of 33 percent over the present rate.

To add to steel's advantages, an open-web joist floor with a gypsum wallboard ceiling has received a fire-rating of 3 hours from the New York City Building Department. The ceiling is screwed to furring channels tied to the bottoms of joists that support a 2½-in. concrete slab. Maximum architectural flexibility and economy result from choosing the beam depth as 2 in. less than the joist depth to allow flat ceilings without beam-drops.

Costs

The following cost breakdown shows how a 20-story steel superstructure system can be built for about $4.60 per sq ft; concrete flat plate superstructures cost between $5 and $6 per sq ft. The frame is braced and simply connected with 12-in. beams spanning 22 ft and 14-in. open-web joists spanning 25 ft. The floor is a 2½-in. concrete slab with mesh cast on permanent metal forms welded to the joists. The ceiling is gypsum wallboard screwed to furring channels tied to joist bottom chords. An allowance has been included for extra construction depth compared to concrete flat plate and for steel column fire protection.

Steel, incl. joists (9 lbs @ $0.30)	$2.70/sq ft
Floor deck, complete	1.00
Ceiling, wallboard	0.50
	$4.20
Allowance for extra construction depth and steel column fire protection	0.40
	$4.60/sq ft

Composite design can reduce the cost for additional savings compared to concrete flat plate. The recently developed K-Composite System has been approved by the New York City Building Department and makes composite action practical for both beams and joists. Cost savings for the building frame described above will be at least $0.50 per sq ft, or $4.10 net per sq ft.

Many benefits other than direct structural cost savings per square foot result from using the steel frame just described. Dead load reductions for difficult foundations are well understood, but several less obvious advantages need consideration.

Planning Flexibility

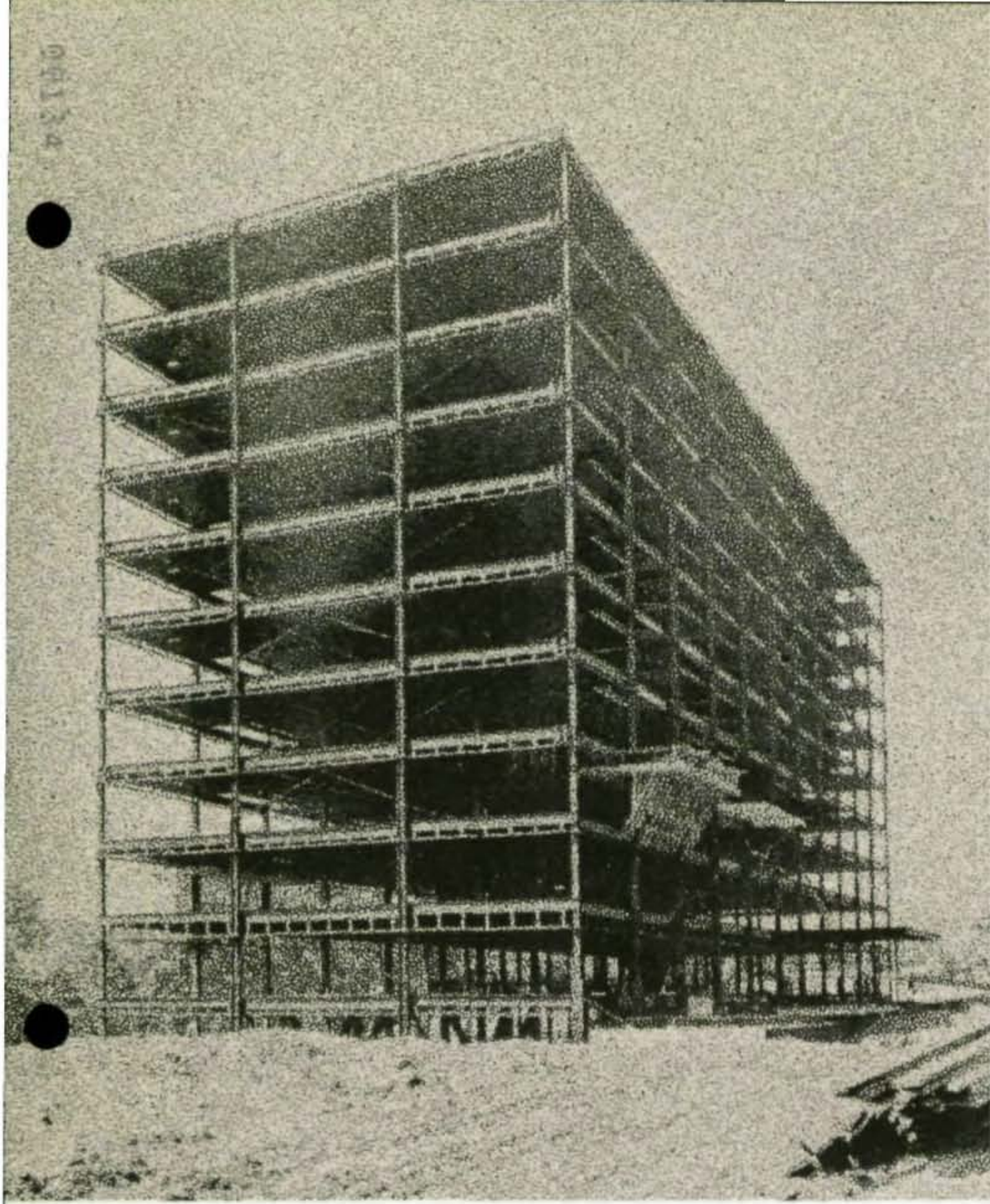
The steel frame floor bay covers 550 sq ft compared to about 300 sq ft for a flat plate building. The reduction in the number of columns opens the building interior to more flexible room layout by the architect.

Garages

Steel shows marked advantages for basement garages. Even where garages are not required by law, they offer attractive income for the investment needed to build them. In New York, parking space will rent for up to $100 per month for each car. These rents are quite profitable for space that is not air conditioned, has little architectural finish and needs minimum maintenance. However, concrete flat-plate buildings require a load-transfer system at grade, usually framed in heavy steel, to widen the spaces between columns to allow passage of automobiles. By contrast, steel building frames use longer spans in the superstructure and do not need the expensive transfer system; the steel columns can extend down through the garage levels without offsets. Cost savings can be more than $0.25 per sq ft for the entire building.

Mechanical Trades

Concrete flat plates must be shored at close spacing for several days until slab forms are removed, after which reshores must be placed. The reshores



can be spaced farther apart than the original shores, but must remain in place for at least 28 days. All of these shores are impediments to the movements of installers of the mechanical trades. Furthermore, removing the shores can overstress green concrete and improper reshoring can do even more damage. Reshoring procedure is an art not well understood by all contractors and carries an element of risk. Steel structures need no shoring.

In concrete buildings, sleeves are placed in the floor forms to allow passage of pipes and conduits buried in partitions. The sleeves are often put in the wrong location or dislodged during concreting operations, so that much time must be spent for correction. This means cutting through 6 or 8 in. of concrete slab. In a steel building with open-web joists, no sleeves are needed. Holes cut through the 2½-in. slab after partitions are laid out can eliminate the possibility of wrong locations.

Cranes

Concrete buildings must be built with mobile cranes or climbing cranes. Climbing cranes are expensive to install and operate slowly, so that they are avoided for buildings under 35 stories. Due to the occurrence of many recent accidents, New York City has adopted new rules governing the use of mobile cranes. Crane operators object to the rules as being severe and unworkable. The profits in crane operation are threatened, which must result in higher prices for concrete buildings.

Steel buildings are usually erected with derricks. Crane use can be minimized so that cost increases will not affect steel buildings.

Construction Speed

Multistory concreting can be performed at the rate of a floor every four days under ideal conditions and proper planning. Such speed is not often achieved, however, and it is generally agreed that conventional steel construction is faster than concrete. The use of open-web joists and permanent metal forms accelerates the rate of steel construction. Up to two months of construction time can be saved by the 20-story steel building, compared to concrete flat plate.

When it is necessary to get a rapid start of construction, steel may require a waiting period for shop drawings and fabrication. The solution is to use concrete for the foundations and the basement levels with a transition to a steel superstructure at the ground floor level.

Sound Transmission

There seems to be a general suspicion that steel joist construction does not provide sufficient sound control for apartment buildings. Nothing could be farther from the truth. Let me quote from "Residential Noise Control" by Michael J. Kodaras, acoustical consultant: "The use of steel framing and open-web steel joists in combination with other materials is inherently a positive step towards better sound control in residential building construction." In this article Mr. Kodaras gives acoustic ratings for several floor assemblies, based on authoritative tests, including some in his own laboratories. Open-web steel joist floor assemblies with carpets are equal to or better than carpeted concrete slabs for both impact noise and air-borne sound.

In Conclusion

I have tried to give you a concise statement of why I feel market conditions have swung decidedly in favor of steel construction for apartment buildings. Although the cost figures I presented are rough and the other topics have not been fully developed, the sense of the argument should be quite clear. It will be worth your while to dig into the subject.

PRIZE BRIDGES OF 1970

Mr. Baxter, chairman of the Jury of Awards for the 1970 Prize Bridge Competition, is President of the ASCE and Water Commissioner of Philadelphia.

by Samuel S. Baxter

I suppose that it is somewhat presumptuous for an engineer who has devoted his principal time for the past twenty years to water and pollution control work to act as a judge in a Prize Bridge Competition. In earlier years, I had been involved in some small bridge work, including a well known bridge (which incidentally was not built of steel). My more recent contacts with bridges have been from the standpoint of an individual citizen, and perhaps also from one who, in considering the merits of a bridge, has some knowledge of the problems which face the bridge designer.

In this day, when there is more emphasis than ever before on the aesthetic and social factors involved in all phases of public works construction, including bridges, it does seem desirable that non-bridge engineers should be part of the jury to select prize winners. Three of us who served on the jury this year are directly concerned in our everyday work with the design and construction of bridges, and two of us work in fields which are only incidentally connected with bridge work.

It is possible that, in selecting judges for future competitions, AISC may include on the jury a citizen who is not an engineer, and not an architect or a planner. The view of the man in the street, hopefully an intelligent one, and even a woman (I will get crucified for using the word "even") will add the viewpoint of the millions who must use and look at our bridges.

There is danger, however, in suggesting that we must include aesthetic and social factors in designing and building our bridges and other structures. Too much emphasis on this point gets us into the "when did you stop beating your wife" situation. There is ample emphasis that designers in the past have been fully aware of aesthetics and social needs. There are beautiful structures which have been built in the earlier years of this century, and in many past centuries. Their beauty did not come about by accident, but because all people involved, and especially the designers, wanted to build something that had some beauty in addition to usefulness.

Social needs have not been forgotten in the past, and nearly all bridges that have been built came into being to meet the needs of the traveling public, and of industry, commerce, and recreation. Although in some cases people have been inconvenienced by the building of these bridges, a much larger segment of people has benefited.

Every structure which is built does not have equal merit from the standpoint of design, aesthetics, social considerations, and economics. If they did, the job of the judges in reviewing several hundred bridges would have been overwhelming. But the balancing of needs against resources, and an attempt to compromise the viewpoints of groups of citizens, can lead to structures which do not satisfy every body.

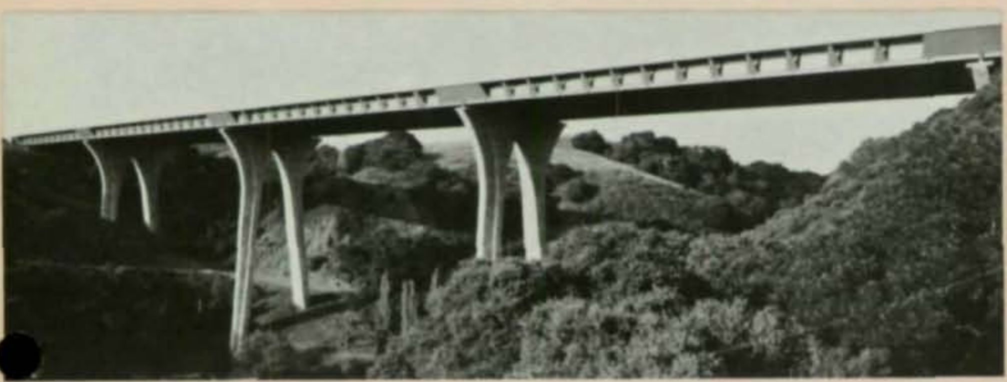
I can allow myself to become annoyed at persons, including professionals, who criticize a structure built today, or in the past, without giving full consideration to the restraints and limitations which faced the designer. I believe that the engineer or architect should make his clients aware of factors of present and future needs, beauty, safety, disruption of people, and many others. But when all of these are known, compromises generally have to be made in order that the project may go ahead. How to measure these limitations, and how far we may go on any of them, is the somewhat lonely job of the designer in consultation with his client. These decisions produce a fertile crop of Monday morning quarterbacks.

The general excellence of the many projects which were submitted in the 1970 Prize Bridge Competition is an indication that engineers and related designers are giving full consideration to all factors, and are producing structures which benefit mankind, and thereby are both physical and social additions to our society.

PRIZE BRIDGE 1970 — LONG SPAN

Arkansas State Highway 23 Bridge
Over Arkansas River
Ozark, Arkansas

Designer: Howard, Needles, Tammen & Bergendoff
Owner: State of Arkansas
General Contractor: Al Johnson Construction Co.
Steel Fabricator: Nashville Bridge Company



PRIZE BRIDGE 1970 — MEDIUM SPAN, HIGH CLEARANCE

Eugene A. Doran Memorial Bridge (San Mateo Creek Bridge)
Five miles west of San Mateo, California

Designer: California Division of Highways
Owner: State of California
General Contractor: Dan Caputo Co.
Steel Fabricator: Kaiser Steel Corporation

PRIZE BRIDGE 1970 — MEDIUM SPAN, LOW CLEARANCE

North Approaches—Fort Duquesne Bridge
Pittsburgh, Pennsylvania

Designer: Richardson, Gordon and Associates
Architectural Consultant: Stotz, Hess and MacLachlan, Architects
Owner: Commonwealth of Pennsylvania
General Contractor: John F. Casey Company
Steel Fabricators: Pittsburgh-Des Moines Steel Company
American Bridge Division, U.S. Steel

PRIZE BRIDGE 1970 — SHORT SPAN

Nine Mile Creek Bridge
Bloomington, Minnesota

Designer: Howard, Needles, Tammen & Bergendoff
Owner: City of Bloomington
General Contractor: Allied Structural Steel Company
Steel Fabricator: The Maxson Corporation

PRIZE BRIDGE 1970 —
HIGHWAY GRADE SEPARATION

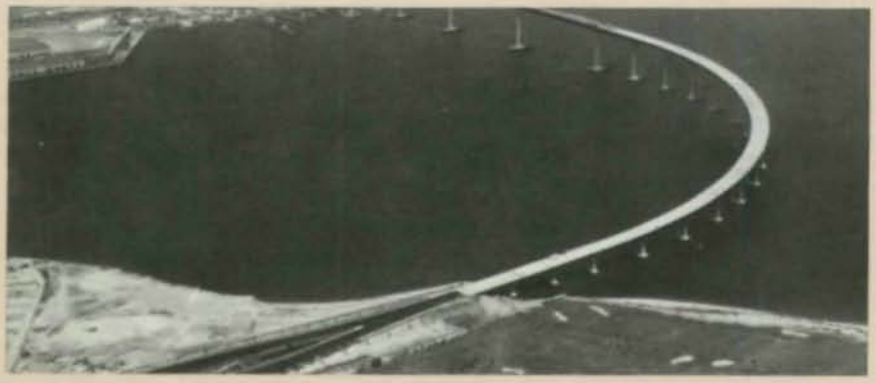
Interstate 480—20th Street Exit Ramp
Omaha, Nebraska

Designer: Nebraska Department of Roads
Owner: State of Nebraska
General Contractors:
Foster-Smetana Co. and
Fischer-Nixon-Greer, Inc.
Steel Fabricator: Pittsburgh-Des Moines Steel Company

PRIZE BRIDGE 1970 — SPECIAL TYPE

Clinic Inn Pedestrian Bridge
Cleveland, Ohio

Designer: Barber and Hoffman, Inc.
Architectural Consultant:
Flynn, Dalton, van Dijk & Partners
General Contractor:
The Albert M. Higley Company
Owner: Bolton Square Hotel Company
General Contractor: The Albert M. Higley Company
Steel Fabricator: Paterson-Leitch Company



AWARD OF MERIT 1970 — LONG SPAN

San Diego-Coronado Bay Bridge
San Diego, California

Designer: Division of Bay Toll Crossings, State of California
Architectural Consultant: Wm. Stephen Allen, FAIA, Anshen & Allen
Owner: California Toll Bridge Authority, State of California
General Contractors: Superstructure: Murphy Pacific Enterprises
Substructure: Guy F. Atkinson Co.
Steel Fabricator: Murphy Pacific Corporation

AWARD OF MERIT 1970 —
MEDIUM SPAN, HIGH CLEARANCE

Edgewood Road Bridge
Cedar Rapids, Iowa

Designer: Ned L. Ashton
Owners: The City of Cedar Rapids and Linn County
General Contractor: Cramer Bros. Constr. Co.
Steel Fabricator: Pittsburgh-Des Moines Steel Co.

AWARD OF MERIT 1970 — MEDIUM SPAN, HIGH CLEARANCE

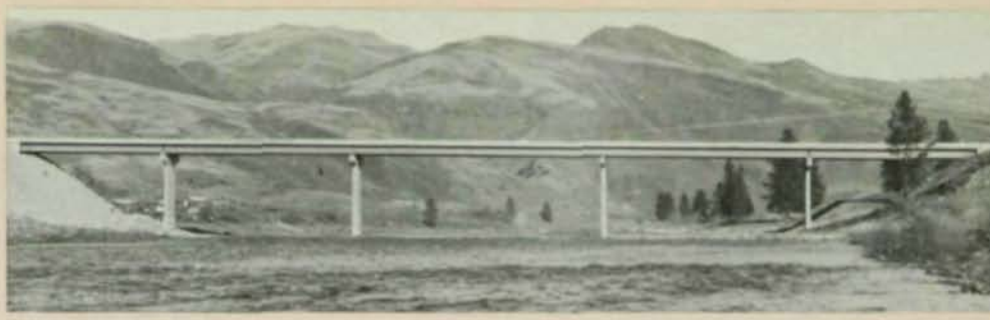
Sacramento River Bridge at Elkhorn
North of Sacramento, California

Designer: California Division of Highways
Owner: State of California
General Contractor: C. K. Moseman Construction Co.
Steel Fabricator: San Jose Steel Company, Inc.

AWARD OF MERIT 1970 — MEDIUM SPAN, HIGH CLEARANCE

U. S. 95 Over Salmon River
North of Riggins, Idaho

Designer: Idaho Department of Highways
Owner: State of Idaho
General Contractor: Sletten Construction Co.
Steel Fabricator: S & A Fabricating Company



AWARD OF MERIT 1970 — MEDIUM SPAN, LOW CLEARANCE

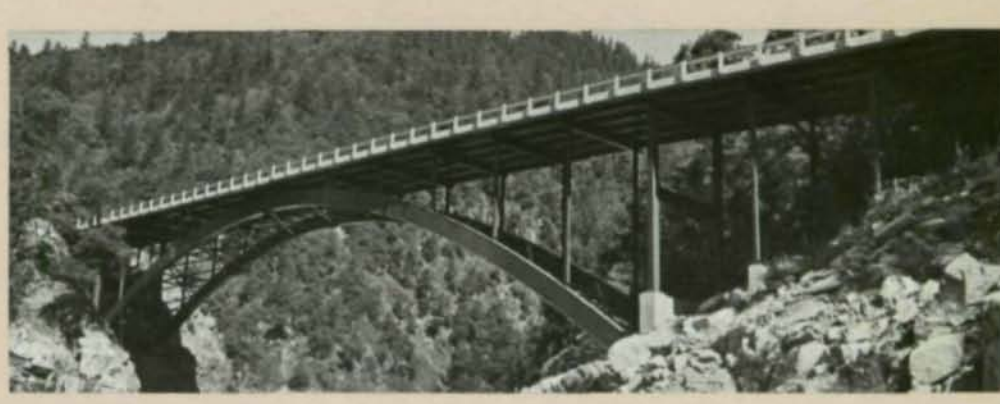
Calcasieu River Bridge
U. S. Route 171 near Lake Charles, Louisiana

Designer: Louisiana Department of Highways
Owner: State of Louisiana
General Contractor: F. Miller and Sons Construction Company
Steel Fabricator: Mosher Steel Company

AWARD OF MERIT 1970 — SHORT SPAN

Salmon River Bridge at Wooley Creek
Near Somesbar, California

Designer: Clair A. Hill & Associates
Owner: U. S. Forest Service
General Contractor: Leo Davis
Steel Fabricator: Western Steel Company



AWARD OF MERIT 1970 — HIGHWAY GRADE SEPARATION

Ramp A (State Route 41 Over State Route 11)
Goodlettsville, Tennessee

Designer: Tennessee State Highway Department
Owner: State of Tennessee
General Contractor: Oman Construction Company
Steel Fabricator: Nashville Bridge Company

AWARD OF MERIT 1970 — MOVABLE SPAN

Southern Branch Elizabeth River Bridge
Chesapeake, Virginia

Designer: Hayes, Seay, Mattern & Mattern
Engineering Consultant: J. E. Greiner Company, Inc.
Owner: Commonwealth of Virginia
General Contractor: B. F. Diamond Construction Co., Inc.
Steel Fabricators: Bristol Steel & Iron Works, Inc.
Nashville Bridge Company

AWARD OF MERIT 1970 — SPECIAL TYPE

Olmstead Island Footbridges
Great Falls, Maryland
Designer: U. S. Department of the Interior
Owner: U. S. Department of the Interior
General Contractor: Slavin & Shafer, Inc.
Steel Fabricator: Leckenby Company

AWARD OF MERIT 1970 — SPECIAL TYPE

Pedestrian Skyways
Minneapolis, Minnesota
Designers: The Cerny Associates, Inc.
Meisch and Robertson
Owners: Dain, Kalman & Quail, Inc.
Farmers & Mechanics Savings Bank of Minneapolis
Minnesota Federal Savings & Loan Association
First National Bank of Minneapolis
General Contractor: Naugle-Leck, Inc.
Steel Fabricator: Crown Iron Works Company

AWARD OF MERIT 1970 — SPECIAL TYPE

West College Pedestrian Bridges 3 and 4
Santa Cruz, California
Designer: Wildman & Morris, Consulting Engineers
Architectural Consultants: Thomas D. Church
Ernest J. Kump
John E. Wagstaff
Owner: University of California, Santa Cruz
General Contractor: Murphy Pacific Corporation
Steel Fabricator: Murphy Pacific Corporation

AMERICAN INSTITUTE OF STEEL CONSTRUCTION
101 Park Avenue • New York, New York 10017

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