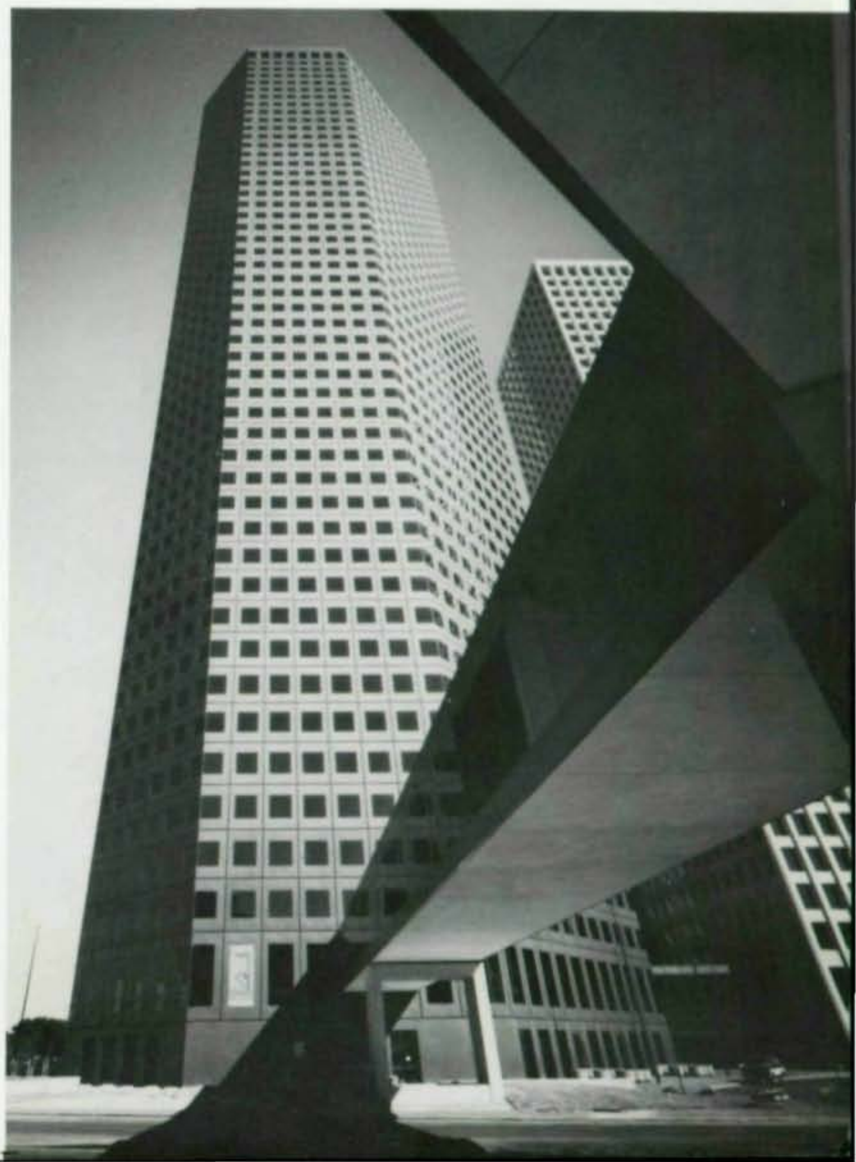
VOLUME XXI NUMBER 4/FOURTH QUARTER 1981

MODERN STEEL CONSTRUCTION



MODERN STEEL CONSTRUCTION

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CONTENTS

NEW DIRECTIONS FOR "HANDS ON STEEL"

The "Hands on Steel" program is just that—students at colleges and universities accredited in architecture can get their "hands-on" experience with steel. Sponsored by AISI and AISC as an "investment in the future"—the program now takes some new directions to broaden its outreach. The new emphasis will be on structurally oriented projects, rather than sculpture. And schools may now use the program as part of an accredited course throughout the year. Funding has been increased to simplify the program and make it easier to administer. For complete information: William Noble, AISC, 400 N. Michigan Ave., Chicago, IL 60611.

1982 PRIZE BRIDGE COMPETITION SET

Entries for AISC's 51st Prize Bridge competition—to select the most beautiful steel bridges opened in 1980 and 1981—are now invited. Entries must be postmarked by May 15, 1982. A distinguished panel of professionals—to be announced—will judge entries on June 8. Further details and entry forms may be obtained from: AISC, Awards Committee, 400 N. Michigan Ave., Chicago, IL 60611.

8TH EDITION MANUAL ERRATA

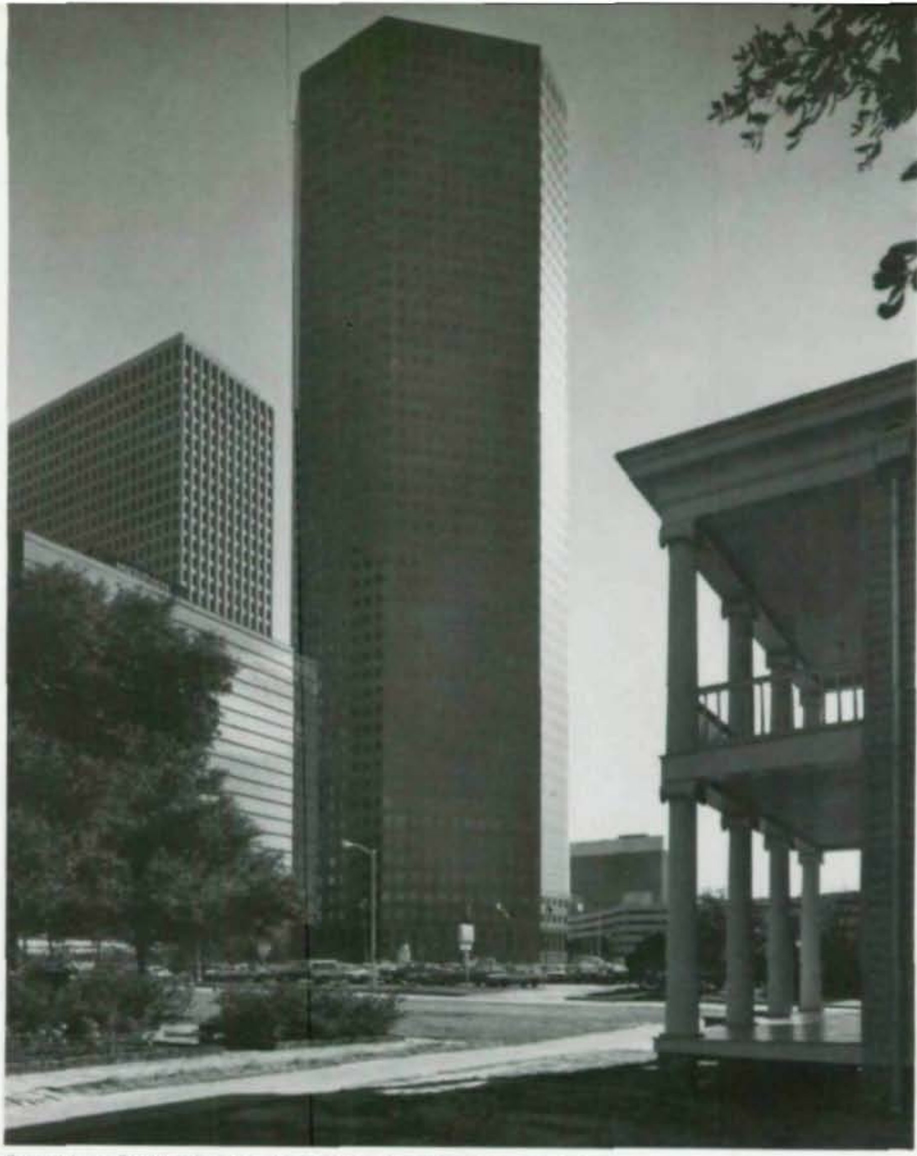
As errors in the 8th Edition Manual of Steel Construction *have been discovered, they have been corrected in subsequent press runs (impressions) and reported in the AISC* Engineering Journal. *These errata have now been assembled in a reprint of the Journal reports, so that owners of the 1st, 2nd and 3rd impressions of the* Manual *can correct their copies. (All these errors have been corrected in the 4th and 5th impressions.) These reprints (Pub. No. TR 227) are available without charge from: AISC, 400 N. Michigan Ave., Chicago, IL 60611.*

OUR APOLOGIES

In the last issue, in "Composite Structural System for Unique 'Building on Building'," author's credit line should have read "Irwin G. Cantor, P.E., is president of the structural engineering firm of The Office of Irwin G. Cantor, New York, New York."

* * *

Also, in "The Case of the Portable Parking Deck," the structural engineer on the original parking deck designed for Love Field was Joseph Nagler, Dallas, Texas.



Prestigious Capital Bank Plaza in downtown Houston completes Phase I of giant $1-billion Allen Center project.

Capital Bank Plaza: The Case of the "Unplanned" Advantage

by James S. Notch and Bob G. Fillpot

Build a 1,200,000-sq ft, $100-million building in the heart of downtown Houston—on speculation? In the recent economic climate, that is an act of faith in the continuing good health of the city. Century Development Corporation demonstrated that faith by beginning construction on the third building in Allen Center—without a single lease in hand—to complete Phase I of what will eventually be a $1-billion complex.

Careful planning and thorough economic studies preceded the design of this distinctive eight-sided, 50-story tower. Six prototype structural framing systems, including steel, concrete, and composite steel-concrete framing were considered and compared before the design was finalized. An all-steel-framed system was finally selected on the basis of these comparisons.

But one of steel's major advantages—flexibility—did not become totally apparent until the building was almost half-built!

Shortly after steel erection was well underway, Capital National Bank of Houston initiated plans to move their banking operation into the tower. To accommodate the space needs of this major tenant, which included a four-story atrium in the lobby area and relocation and addition of several core area elevator banks, the owner called for extensive redesign and major structural revisions to the existing steel frame. The use of steel made these substantial changes feasible.

Architectural Objectives

Lloyd Jones Brewer Associates, project

James S. Notch is vice president of the structural engineering firm of Ellisor & Tanner, Houston, Texas

Bob G. Fillpot is principal in charge, the architectural firm of Lloyd Jones Brewer Associates, Houston, Texas

architects, approached the design of Capital Bank Plaza with several objectives:

"First, we were determined to create a dramatic structure to complement the growing Houston skyline. Second, we determined to form a strong link with all the existing amenities already established at Allen Center. And third, we wanted to take full advantage of the site and capitalize on the dramatic views available to those who would use the building. The Center is a people-place, with plaza and trees unique to its urban setting."

Orientation of the building at a 45° angle to the gridiron pattern of the central business district provides visual relief, enhancing both Houston's skyline and the Plaza's presence in it. The irregular octagon plan, while adding architectural integrity, permitted configuration of the central core and clear lease areas to achieve the optimum desired by the developer.

Selecting the Framing System

Due to the high aspect ratio of the building (approximately 1:5), the desire to eliminate structural restraints on the space planning of the interior, and the need for a structure that could resist hurricane-force winds, early planning moved toward a "framed-tube" approach, where the perimeter framing of the building would provide the necessary lateral strength and rigidity. The framed-tube system has many attributes which were important considerations in the initial planning stage:

- Structurally, the system is very efficient. Since the wind resistance arrangement is located at the building perimeter, the entire width of the building is utilized in resisting overturning moments due to lateral forces. The entire structure behaves as a cantilevered hollow tube, perforated by window openings.
- Due to the location of all lateral resistance elements at the building perimeter, it is generally possible to design all interior floor framing and columns for gravity loads only, thus allowing for much greater freedom in placing interior columns. This gives the architect a free hand in the space planning of the interior, thus increasing the rentable space area for the owner. All typical floor beams would maintain a relatively constant size, since flexural members are designed for gravity floor loads only, not varying moments that result from lateral forces.
- Design and construction could be expedited greatly, since after initial resolution of exterior column and spandrel dimensions, the time-consuming lateral analysis and design could proceed without delays normally attributed to the process of coordinating the structural layout in the core area with all the service requirements of various disciplines.
- Since Houston soil structure normally dictates a mat foundation for a structure of this type, the perimeter framed-tube system would be most efficient in transmitting the overturning moments caused by lateral forces to the mat foundation. The rigid perimeter frame forces the complete mat to rotate with the structure and minimize any localized moments on the mat. The rigid perimeter elements would also force the mat to deform in a much more desirable manner when subject to gravity loading.
- The deep, exterior spandrel beams tend to equalize gravity loads on all exterior perimeter columns, thereby minimizing varying column designs. This results in a greater number of identical "tree-column" modules, thus economizing fabrication.

Initially, the design concept called for a 50-story tower that would blend into the existing Allen Center. The building plan was rectangular, and included precast window units similar to those in the other two Allen Center buildings. Five variations of the framed-tube system were discussed initially:

1. A perimeter reinforced concrete frame using precast window units as forms. Perimeter column spacing 10 ft o.c. Interior floor

Under construction, steel-framed Capital Bank Plaza lends air of spectacular to Houston skyline.

On our cover: *Unusual octagon-shaped structure adds strong contrasts to other Center architecture.*

framing and columns were designed for gravity loads only using structural steel construction. Structural steel erection could proceed several levels above the perimeter frame concrete placement by using W10 steel erection columns embedded in the perimeter frame.

2. Similar to No. 1, except with a welded "tree column" structural steel frame in lieu of reinforced concrete. The precast window units were "clad-on." The system was less efficient than No. 1, but accelerated the construction schedule.

3. Similar to No. 1, except with a lightweight concrete pan joist floor system in lieu of steel floor framing.

4. Similar to No. 2, except perimeter steel column spacing was at 20 ft o.c. in lieu of 10 ft o.c.

At this stage of planning, the owner and architect agreed to several modifications of the original architectural concept. It was decided the new tower should make a stronger architectural statement—and should provide a bold, new expression to the Center by contrasting, rather than blending, with the existing development. The owner expressed a desire for a plan which created an abundance of corner office areas to enhance the developer's leasing efforts.

The architect submitted a number of conceptual building shapes for scrutiny by the structural engineer. A prototype structure with an irregular octagon plan was selected as the basis for establishing a project budget.

5. Framed-tube composite steel/concrete perimeter frame with conventional steel-framed system on the interior. Stone cladding on the facade. Protrusions at corner of the building were fabricated of structural steel and connected to embedded weld plates.

Based on input from the owner, architect, engineer and contractor, the structure was molded and refined into its final form:

6. Irregular octagon plan. Framed-tube all-steel perimeter frame composed of an assembly of tree columns (see Figs. 1 & 2). Conventional steel-framed interior. Lightweight aluminum/glass panel cladding.

The all-steel perimeter frame was a natural choice after several developments:

1. The space planners had difficulty incorporating the wide, composite perimeter into their modules. They needed a column of narrower exposure, a dimension which could only be achieved by using steel.

2. Although a concrete frame offered some advantage in simplifying the attachment of stone cladding, selection of a lightweight metal cladding gave the advantage to steel.

3. A concrete perimeter frame increased the weight to such an extent that foundation costs would have been prohibitively expensive. To compensate for the added dead load of the structure, three basement levels would need to be constructed, instead of two. In turn, a more elaborate retention system would be needed since the excavation would extend below the water table.

4. The desire for an early completion date for the project dictated an all-steel building to speed up the construction process. Interim financing costs could also be reduced. A composite scheme would involve integrating several trades, with resultant delays expected.

Due to the height of the structure, its unique shape and its location near other tall buildings, it was decided to base the lateral force design on local meteorological data in conjunction with a wind tunnel test. In addition, the many landscaped plazas at the tower base introduced the need to study the flow of wind in those areas to assure pedestrian comfort. Wind distribution resulting from placement of a future Four Allen Center tower controlled the landscape design of the complex.

Figure 1

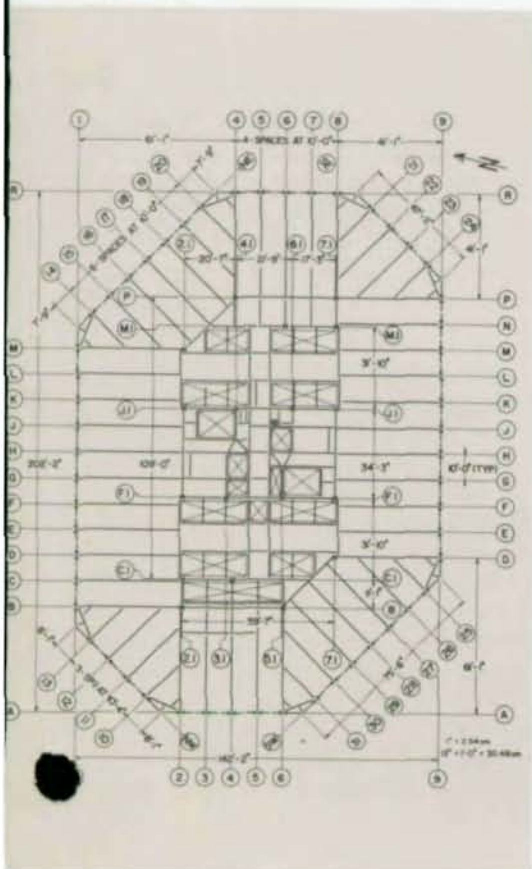
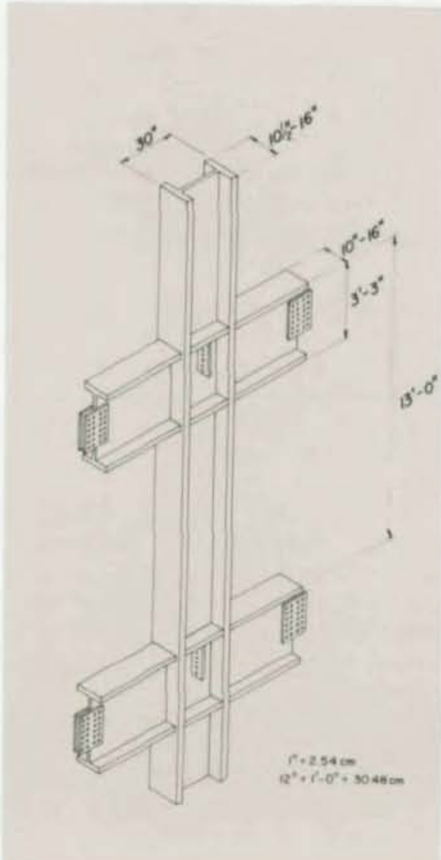


Figure 2—*Assembly of tree columns*



The Primary Structure

The framed-tube system consists of two-story high "tree column" modules about 10 ft o.c. A column width of 2 ft-6 in. was maintained throughout the tower height. Perimeter column sections are three-plate, H-shaped weldments on the lower half of the structure, transitioned to W30 rolled shaped at the top. Use of the rolled sections reduced significantly shop welding in the later stages of fabrication. Column-to-column splice connections were made midway between spandrel beams at points of theoretical minimum moment.

Column web stiffeners aligning with the spandrel beam flanges were provided to meet requirements of strength, or in most conditions, to stiffen the beam-column joint and restrain flexibility within the joint.

Spandrel beam stub pieces, shop-welded to perimeter columns to form the tree column assembly, were 3 ft-3 in. deep. Rolled W36 sections were considered, but the added steel weight resulting from the shallower depth, the size selection process and the

Magnificent four-story atrium, an "unplanned" event, was literally carved from steel frame already erected, to accommodate major bank tenant. Photo across page shows steel reframing in progress.

over-designed web section of standard rolled shapes would offset any savings generated in fabrication.

Window wall attachments were located next to floor slab diaphragms to minimize minor axis bending of the relatively slender column sections.

The Interior Framing System

Typical floor construction is 5¼-in. composite metal deck (3¼-in. lightweight concrete on 2-in. metal deck). The deck, spanning 10 ft, was supported by W21 rolled sections. Spanning approximately 41 ft-6 in. from the perimeter tree column frame to the central core area, typical purlins were designed to act compositely with the slab with shear studs. A shop camber was specified on all long purlins to compensate for deflection of the beam under the weight of wet concrete. This provided a constant-thickness, level floor system after pouring. U-shaped rebar ties at the perimeter provided a mechanical tie between shear connectors on the spandrel beams and the floor diaphragm.

Beams on typical levels were reduced to minimum depths to permit unobstructed passage of the ductwork and the piping. No web penetrations were required on typical levels. To provide the most efficient architectural layout without encroaching into elevator shaft areas, core girders were offset from column center lines in several locations.

The nature of a framed-tube system makes it important to achieve a framing configuration which loads the perimeter columns at a uniform gravity stress level. Any large difference in the distribution of perimeter frame gravity loading induces differential axial shortening between the closely spaced columns. This generates large resisting moments in spandrel sections.

Due to the large reactions on the core area columns, most interior columns in the lower one-fourth of the tower were fabricated as three-plate, H-shaped weldments. The largest column weighed 1,275 plf and consisted of two 6-in. x 26-in. flange plates and one 6-in. x 10½-in. web plate. Built-up core systems were A572-42 plate. To facilitate erection, all interior columns were spliced at 2 ft-6 in. above the finished floor, a height convenient for the steel worker.

All interior columns bear on milled base plates, the largest weighing 10,500 lbs. Plates were selected in accordance with the latest AISC code allowables which were recently modified to ACI recommendations. To provide some contingency in the capacity of interior columns to support file areas, computer rooms and other excess loadings, a surcharge of 200 psf was added at level 49, and 10 psf was added at all typical lease levels. During tenant work, composite beams can be stiffened by the simple addition of flange cover plates.

Careful consideration was given to the effects of axial shortening and foundation deformation on the detailing length of interior columns. Since the interior columns were designed of high-strength steel for gravity loading only, they were subject to much more axial shortening under gravity than the A36 perimeter columns designed as beam-columns subject to gravity and wind loading. Also, the mat foundation, subject to tower loading, "dishes," thus lowering interior columns relative to perimeter columns. To compensate, interior columns were detailed "over-length," and column lengths were proportioned to achieve a level floor datum two years after completion.

Enter the "Unplanned" Tenant

Throughout the design and decision-making process, resolution of each issue continued to verify the validity of the total structural steel-frame system. Little did we know the biggest architectural advantage of the total system was yet to come!

Enter Capital National Bank! This final, unplanned happening was possible because structural steel had been chosen for the project. Capital National Bank, a major Houston firm and a prime lease prospect, appeared on the scene after construction was well on its way.

But they wanted a unique expression of their business—in the form of an open atrium. The design solution was a four-level atrium that had to be carved from the lower part of the building that had already been built.

The steel structure allowed us to remove floors, reframe and reinforce existing columns with minimum difficulty, moderate cost and without delay to the overall project schedule.

Incorporating the open atrium resulted in extensive changes in many areas of the structural system. The large expanse of floor system removed left core columns partially or totally unbraced over a height of 61 ft. Perimeter columns on the long sides of the structure were partially or totally unbraced due to removal of the floor diaphragm at Level 2, and were elastically braced by suspended mezzanine-type level floor diaphragms at Levels 3 & 4.

Because of the complexity of existing beam/column connections, and architectural and mechanical restrictions, it was not feasible to add stiffening plates to the core columns. Instead, the columns were elastically braced through the core area diaphragms by K-bracing. The bracing was carefully proportioned and optimized so it would provide sufficient stiffness and strength for the gravity-loaded core columns.

It was very important that bracing stiffness be minimized so that it would not attract large induced forces from the lateral movement under wind loading. Of particular concern was not the larger members sizes required if wind force were resisted, but possible over-stressing of floor diaphragms weakened by the new openings. By using high yield-strength steel and the selected bracing configuration, all criteria were met. Several bracing members were flat plates, designed to buckle under compression. These were designed at peak stress levels based on tensive allowable stress levels.

Photo courtesy U.S. Steel Corporation

Extensive construction sequence criteria were issued for performing the renovation work. By following this sequence, the contractor was assured of the stability of all elements during construction. The core was temporarily braced by cables and struts to adjacent braced columns.

Adding bank vaults and their security systems and elevators required considerable rework of the subgrade system. Their weight was supported by adding stub columns from below, rather than stiffening existing floor members. In areas where it was not feasible economically to stiffen existing members with plates, they were replaced by larger beams or plate girders.

The architects and structural engineers take great pride in having the opportunity to raise the architectural quality of the interior to a level equal to the beauty and grace of the multi-faceted exterior.

Simply, along with its other proven attributes, the structural steel frame continued, even through the construction process, to allow us to make a good building an even better one.

And, according to the construction manager on Capital Bank Plaza, "It is highly unusual to make this kind of major revision once a building is in progress. Creating the new atrium was possible only because the basic structural system could be modified to accommodate it."

What do you do when a major tenant walks in and wants a four-story atrium—after the building is half-completed?

Very simple—you give it to him (if it's framed in steel). □

Architect
Lloyd Jones Brewer Associates
Houston, Texas

Structural Engineer
Ellisor & Tanner, Inc.
Houston, Texas

General Contractor
Miner-Turner, a joint venture
Houston, Texas

Steel Fabricators
Mosher Steel (basic tower)
Houston, Texas
Industrial Steel Products, Inc. (renovation)
Shreveport, Louisiana

Steel Erectors
Peterson Bros. Erecting (basic tower)
Houston, Texas
Miner-Turner (renovation)
Houston, Texas

Owner
Allen Center Company #3—a partnership of Century Development Corp., Centennial Equities Corp. (sub. of Metropolitan Life Insurance Co.) and American General Realty Co.
Houston, Texas

Horizontal ribbons of solar gray glass mirror desert sky in Tucson's new IBM General Products complex. Architects used modular approach in design of 1.7-million sq. ft in 18 buildings (below).

IBM General Products Division: Tuned to the Desert

Ten miles east of Tucson, Arizona the Sonora Desert boasts a new feature: a vast complex of buildings that is closely integrated, both visually and functionally, with the arid landscape.

This 1.7-million sq ft research and manufacturing complex appeared quickly, thanks to fast-track scheduling, modular design *and steel construction. Manufacturing oper-*ations started just 18 months after the March 31, 1978 groundbreaking.

IBM commissioned the project for its General Products Division of San Jose, California—and asked Albert C. Martin and Associates to produce the site utilization plan, the master plan and building designs.

According to Bernard Milstein, Martin's chief structural engineer, "Structural steel was the obvious choice, both for economy and speed of design and construction. Although no comparative records are available, there is a good likelihood that our firm, under the direction of project structural engineer Moy Mitra, set records in speed of structural design and production of drawings. This speed could only have been accomplished by using structural steel. The speed of fabrication was facilitated by using three structural steel fabricators simultaneously for different buildings."

The General Products complex was conceived primarily to produce IBM's high-speed printer, the 3800 printing subsystem, which employs a combination laser and electrographic technology to produce fine quality, high-contrast printing. It is used principally for telephone books, hospital billings and bulk mailings. Other products include tape drives and their control units, disk drives and a mass storage system with a capacity for billions of characters of information.

Sensitivity to Environment

IBM's design objective was to obtain con-

Unifying element of complex is 3,000-ft long blue steel spine, which serves double function of utility/communication lines and providing covered passage between buildings.

temporary, efficient buildings with distinctive architecture and interior design and sensitivity to the desert environment, according to Gustav H. Ullner, Martin's division manager of architecture and engineering.

The complex that evolved to meet IBM's requirements consists of buildings grouped along a "spine" in a "T" configuration, explained Jack Oskorus, project manager for Martin. The steel columns of the spine support vital utility and communication lines in an overhead soffit. These lines supply essential services and commodities to each building.

The spine, which doubles as a covered walkway and forklift passage, is 3,000-ft long, 20-ft high and 20-ft wide. Stability is achieved with moment framing in a transverse direction, with periodic lengthwise bracing. Steel paneling protects the utility lines. The spine, painted blue, functions as an important unifying element in the overall design of the complex. Its design allows easy, rapid extension to service new buildings.

Four one-story buildings of 220,000 sq ft each, and five two-story buildings with 60,000 sq ft per floor, flank the long north-south leg of the spine. These are designed on a modular scheme using a basic footprint for each building type. Variations accommodate mirror imaging and orientation. The one-story manufacturing buildings are of joist and trussed-joist design. The two-story administrative/development buildings are simple beam-column construction with moment frames on the perimeters.

At the top ends of the "T" are the central plant buildings and the media manufacturing building. Phase I of construction was the media building, a 40-ft high bay with 105,000 sq ft of floor space. The steel frame was constructed between June 30 and August 31, with the building completed by September 12, 1978.

Modular Design Speeds Construction

Phase II of construction consisted of the central plant, one manufacturing building and four administrative/development buildings. Structures and decking for each building were completed in six to eight weeks. One-and-a-half in. steel decking was used

Handsome cafeteria serves giant new IBM complex

with a 2½-in. lightweight concrete fill on second floors. These buildings were completed by February, 1979.

Because of modular design and the nature of steel construction, work began on the buildings' steel framing while designers were still working to complete finished building plans. Design time for the structural components of each building was three to four weeks.

Succeeding phases of construction were completed on similar fast-track schedules. Manufacturing began in August, 1979. By dedication day, October 17, 1980, nearly 4,000 employees were on site, a population which rose to 5,000 by the end of 1981.

The overall design theme of the complex developed out of IBM's masonry and metal-sided media building in Boulder, Colorado. This structure provided the basis for the taut, simple off-white skin of insulated steel panels on a structural steel frame with horizontal ribbons of solar gray reflective glass.

Rigorous Energy Concerns

The complex represents an interpretation of IBM's rigorous energy conservation policy. Design features work together to achieve a 10 to 20% reduction in energy use as compared to conventional design. This is no mean feat in the Sonora Desert where winter temperatures may fall to freezing and summer temperatures hover well over 100°F. And the effects of sun and wind are felt in full force on the flat desert plain.

Passive solar energy concerns helped shape the refined master plan, according to David C. Martin, partner in charge of design for Albert C. Martin and Associates. The buildings were placed on the site to minimize the effects of sun and wind. The off-white color reduces heat absorption and blends with the terrain.

Within the thoroughly insulated buildings, a sophisticated, computerized energy management system assures optimum use of energy resources. The key to efficiency is "distributed control." This is achieved by placing microprocessors throughout the complex to monitor environmental variables and control many electrical and mechanical processes.

Air conditioning is accomplished through the circulation of chilled water. The water is chilled at night when power rates are lowest. The system, which continuously recycles the water it uses, has a storage capacity of 2.4 million gallons. Sanitary and industrial waste water is also recycled in separate loops in the interest of conservation.

"We had no specific aesthetic dictate from IBM," said Michael O'Sullivan, director of design for A. C. Martin. "We wanted to give the occupants an image of a straight-on, simple, but high-tech group of buildings. No way would it seem as though Mother Earth had ruffled up her petticoat and pushed these buildings out of the ground. They look descended from the sky, rather than molded from the earth." □

Architect/Structural Engineer
Albert C. Martin and Associates
Los Angeles, California

General Contractors
Sundt Construction Co., Tucson, Arizona
Kitchell Contractors, Inc., Phoenix, Arizona
Kraus-Anderson Construction Co., Minneapolis, Minnesota
Hansel Phelps Construction Co., Greeley, Colorado

Steel Fabricators
W & W Steel Company, Albuquerque, New Mexico
Robberson Steel Company, Oklahoma City, Oklahoma
Go Steel Company, Tucson, Arizona

Two-story administrative/development buildings are of simple beam-column construction. Curtain wall is insulated steel panels and solar reflective glass.

• FOCUS '82 •

THE NATIONAL ENGINEERING CONFERENCE

Chicago Marriott Hotel
March 11-13, 1982
Chicago, Illinois

SPONSORED BY THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION

FOCUS '82
THE NATIONAL ENGINEERING CONFERENCE

as sponsored by
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Chicago Marriott Hotel
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Chicago, Illinois

AISC's 60th Anniversary Year

YOUR PROFESSION, STRUCTURAL ENGINEERING, from its earliest time has demanded not only the most exacting attention to existing technical information, but also full consideration of how functional the structural design will be from both the sociologic and economic points-of-view. This phenomenon places you in the position of needing to know that which has transpired in your profession, along with the present state of the art, plus what the future may hold. FOCUS '82 NATIONAL ENGINEERING CONFERENCE will take a look at "The Engineering Experience: Past, Present, and Future."

A total of fifteen subjects will highlight "The Engineering Experience" next March in Chicago. Presentations will include:

Thursday, March 11
General Session

"Connection Design and Detailing"—Robert O. Disque, AISC

"How To Inspect Structural Steel"—Edward M. Beck, Law Engineering

"Simplified AISC Specification"—Lynn S. Beedle, Lehigh University

"Computer Graphics"—William McGuire, Cornell University

Friday, March 12
Concurrent Sessions
Session A—Buildings

"Economics of Low-Rise Steel Framed Structures"—John L. Ruddy, Fletcher-Thompson, Inc.

"Cladding Attachments to Steel Frames"—Roger W. Hotz, President, Hotz Corporation and Thomas Limperis, Weiskopf & Pickworth

"Hollow Structural Sections in Building Construction"—Frederick J. Palmer, Copperweld Tubing Group

Session B—Bridges

"Innovations in the Design of Steel Bridges"—J.E. "Tom" Sawyer, Greiner Engineering Sciences, Inc.

"Rehabilitation of Steel Bridges"—Theodore H. Karasopolous, State of Maine

"Curved Girder Design Aids"—Dann H. Hall, Bethlehem Steel Corporation

"Cable Stressed Steel Bridges"—Charles Simes, T.Y. Lin International

Saturday, March 13
General Session

"Construction in Space"—John D. DiBattista, National Aeronautics and Space Administration

"Design and Construction of the Sewickley Bridge Replacement"—Arthur W. Hedgren, Richardson-Gordon Associates and John F. Cain, ABD Engineering and Construction Company

"Experience With Weathering Steel for Bridges"—Edward V. Hourigan, N.Y. Department of Transportation

T. R. Higgins Lecture—To Be Named

THE FIELD TRIPS

On Friday afternoon, March 12, the National Engineering Conference offers four field trips. These special tours will afford you a unique view of Chicago—a vital, bustling, brawny city continuing one of its largest building booms.

1. **FABRICATING PLANT TOUR**—Visits to Wendnagel and Company, Inc. and Arlington Structural Steel Co., Inc. Limited to 100.

2. **INLAND STEEL COMPANY**—A preview of steel making through a film showing the complete process will start tour participants through this impressive facility. They will see a Basic Oxygen Furnace and slab caster, a slabbing mill, and a hot strip mill. The tour will also visit blooming and wide flange mills. Limited to 150.

3. **UNITED STATES STEEL SOUTH WORKS**—From the comfort of the bus you will drive past the impressive Blast Furnace Facility. From there you'll walk to the Basic Oxygen Steel Shop, see the blooming mill, the rolling and finishing of structural sections, and U.M. Plates. Limited to 150.

4. **ARTS AND ARCHITECTURAL TOUR**—Chicago is heralded as a city of more "municipal art" than any other in the United States. The work of Picasso, Chagall, Miro, and Calder are prominently displayed. It is the City of Louis H. Sullivan and Frank Lloyd Wright. The skyscraper was invented in Chicago . . . and the world's tallest building pierces the clouds. This bus and walking tour is certain to increase your "take home value." Limited to 250.

Select your first, second, and third choice of field trip on the registration form. Assignments will be made on a "first come, first served" basis.

OPTIONAL FRIDAY EVENING ACTIVITY

CHICAGO-FIT FOR A KING—You are invited to the "King's Manor." A medieval paradise awaits you as you step back in time upon entering your restaurant for the evening. As the hours pass, you will feast on a six course dinner (no eating utensils allowed), freely savor wine, beer, and cider, and mix with your courtly hosts—the King, Minstrel, Jesters, and the "Singing Wenches." The spirit is of the dark ages but the feeling is joyful and bright. You'll board your "time machine" at the Hotel's Rush Street Entrance at 6:30 P.M. To reserve yourself a place(s) complete the section on the back of the registration form. Transportation, food, drink, and entertainment at $45.00 per person. Please make your reservation early.

SPECIAL PROGRAM FOR SPOUSES or "Chicago, As You Like It."

Thursday, March 11

7:30 am Registration
to
1:30 pm AISC'S Registration Desk will be open whatever your arrival time.

1:30 pm "What Makes Chicago Tick?"—A whimsical, spirited talk featuring CHARLOTTE KIRSHBAUM, a Chicago enthusiast and noted authority on the City—its many niches, secrets and idiosyncracies. Kirshbaum's style was featured in a *Parade* magazine article. Her viewpoint is never "ho hum." She mixes architecture, art, and native wit, and provides an exciting new and different dimension to Chicago—your kind of town.

2:30 pm Break

2:45 pm "How To Have The Time Of Your Life."—Getting the most out of life means getting the most out of time. SHEILA KIMMEL, experienced counselor and psychotherapist will heighten your own personal awareness of time misuse, of thinking ahead, and of learning to live with life's conflicts. Ms. Kimmel is in private practice, an adult educator, teacher, and psychology instructor at several of Chicago's colleges. She also conducts workshops and training seminars on a variety of topics involving the self, relationships, management, and job fulfillment.

4:00 pm Adjournment

6:30 pm AISC Reception

Friday, March 12

9:30 am Board busses at the Hotel's front entrance for an Art-See Chicago. Upon your arrival in the Hyde Park section of the City, you will enjoy an insiders look at Chicago's art world. Meet one of Chicago's most exciting and exceptional artists. Chat informally and discover how an urban environment can spark creativity . . . how a love of nature is one of the keys to a stimulating and artistic metropolitan existence.

Also on your morning itinerary will be a visit to the magnificent Rockefeller Chapel on the University of Chicago campus. And then there's lunch at Geja's where you will experience the best in fondue dining. As you leisurely dip fresh vegetables, breads, and fruits into delicious imported cheese and chocolate fondues you can thank the Moorish Prince Geja who established the original Geja's in 723 A.D. at Mt. Tizi. Geja's has been termed "the most atmospheric restaurant in Chicago." You will find out why as you lunch and sip the house wine.

The trip back to the hotel is sure to please and you will arrive there at about 3 pm.

Saturday, March 13

This is a free day, but before you pack to leave Chicago why not visit the famous Marshall Field store on State Street, between Randolph and Washington. A copy of the *MAGASIN PRINTEMPS* in Paris Marshall Field is a shoppers delight. We sincerely hope you will enjoy Chicago!

FOCUS '82
THE NATIONAL ENGINEERING CONFERENCE

as sponsored by
The American Institute of Steel Construction

Chicago Marriott Hotel
March 11-13, 1982
Chicago, Illinois

AISC's 60th Anniversary Year

AISC REGISTRATION AND ROOM RESERVATION FORM

Professional Member Fee: EARLY REGISTRATION (Postmarked *on or before* February 1, 1982)—$85.00.
Professional Member LATE REGISTRATION (Postmarked after February 1, 1982)—$115.00.

Regular Fee: EARLY REGISTRATION (Postmarked *on or before* February 1, 1982)—$110.00.
Regular LATE REGISTRATION (Postmarked after February 1, 1982)—$150.00.
(Registration Fee includes all NEC General Sessions, Luncheon, Reception, and Field Trip.)

Please register and make room reservations for the following individuals: *(Please Type or Print)*

NAME ______________________ TITLE ______________________

Arrival ________ (date) Time ________ Departure ________ (date) *Will Spouse Accompany you to Conference?* ☐
(If yes, see registration form on reverse side)

Accommodations Desired: *(Indicate Rate—See Below)* ☐ **Single** ________ ☐ **Twin/Double** ________

Friday Field Trips: *(Indicate Preference 1st, 2nd, or 3rd)*
- ☐ **FABRICATING PLANT TOUR**
- ☐ **INLAND STEEL COMPANY**
- ☐ **UNITED STATES STEEL SOUTH WORKS**
- ☐ **ARTS AND ARCHITECTURAL TOUR**

Optional Friday Evening Activity—*See Reverse Side*

NAME ______________________ TITLE ______________________

Arrival ________ (date) Time ________ Departure ________ (date) *Will Spouse Accompany you to Conference?* ☐
(If yes, see registration form on reverse side)

Accommodations Desired: *(Indicate Rate—See Below)* ☐ **Single** ________ ☐ **Twin/Double** ________

Friday Field Trips: *(Indicate Preference 1st, 2nd, or 3rd)*
- ☐ **FABRICATING PLANT TOUR**
- ☐ **INLAND STEEL COMPANY**
- ☐ **UNITED STATES STEEL SOUTH WORKS**
- ☐ **ARTS AND ARCHITECTURAL TOUR**

Optional Friday Evening Activity—*see reverse side*

ROOM RATES: CHICAGO MARRIOTT HOTEL
SINGLES: $65
TWIN/DOUBLES: $78

(Rates subject to City and State Sales Tax—9.1%)

IMPORTANT NOTICE: THE CHICAGO MARRIOTT HOTEL will honor and guarantee those reservations postmarked on or before February 11, 1982. In order for you to reserve the accommodations of your choice at a guaranteed rate, please mail this form promptly.

THIS RESERVATION IS SUBMITTED BY: ______________________

COMPANY OR AFFILIATION ______________________ Telephone

ADDRESS ______________________
Street City State Zip Code

Mail Completed forms and registration fee to: **AMERICAN INSTITUTE OF STEEL CONSTRUCTION, 400 North Michigan Avenue, Chicago, Illinois 60611—*Attention:* Convention Services**

REGISTRATION FORM FOR SPOUSES

REGISTRATION FEE: $85.00 (Includes AISC Reception, Thursday, March 11, and Special Program for Spouses, Thursday and Friday, March 11 & 12.)

Please register the following for the Spouses' Program: (Please Print or Type)

COMPANY or AFFILIATION ____________________

ADDRESS ____________________

NAME __________ NICKNAME __________ TOUR __________

NAME __________ NICKNAME __________ TOUR __________

NAME __________ NICKNAME __________ TOUR __________

REGISTRATION FORM FOR OPTIONAL FRIDAY EVENING ACTIVITY

Chicago—Fit For A King
FEE: $45.00 Per Person

Please register __________ persons as listed below:

Mr. & Mrs. ____________________

Mr. & Mrs. ____________________

Mr. & Mrs. ____________________

Please refer to the enclosed folder for description of Optional Friday Evening Activity.

Remote mountain hideaway in picturesque setting features all-steel framing to minimize construction difficulties and provide partition flexibility.

Who Said Steel is Only for *Big* Buildings?

Structural steel is usually associated with the heavier commercial construction of large buildings, factories and the like.

But a number of entries in the 1981 Architectural Awards of Excellence competition were of homes with steel frames. In fact, one of the winners—The Steel and Glass House in Chicago (see page 19)—is a steel-framed house.

Designers of three of these homes used steel for different reasons:

To Create a Simple Space...

A quiet place to think, to reflect, to escape and to bring friends to contemplate a starry sky. The owner, a theoretical physicist, wanted that little mountain cabin 9,500 ft high in the snow-capped peaks.

His site was bisected in one direction by a rough access road, the other by a steep-angled ridge. In the winter, guests come in by skis, in the summer, by foot.

A clear architectural solution indicated that foundation work should be kept to a minimum, and that all elements possible should be shop-fabricated. And, since snow accumulations of 20 ft are not unusual and require structural consideration of the highest order (140-160 psf live load), a steel-framed structure would best resist vertical and high wind shear loads.

The architect stated, "Experience has shown us that, under these snow and wind conditions, flat roofs, due to wind shear, tend to keep snow accumulations to a minimum and roof loads balanced. Elevated structures which allow blow-through to keep a building free of snow on the leeward minimize the difficulties inherent in high-altitude building."

This structure was prefabricated of four identical wall frames 10 ft x 30 ft on a 10-ft module, diagonally braced at the corner bays. Together with individual columns and beams packaged on a single trailer, these modules were delivered to the site where they were erected by a small, high-capacity crane.

Reversible venetian blinds, black on one side and chrome on the other, enclose the entire 30-ft x 30-ft space to balance heat gain/loss.

Only "what was necessary was done to express the intrinsic beauty of the steel frame in its mountain setting," according to the architect.

Architect/Structural Engineer
Studio J. J. International
Salt Lake City, Utah

Owner
Dr. Peter Gibbs
Salt Lake City, Utah

Owner who wanted view enjoys open planning of 5,400-sq. ft pond-side home. Steel framing provided maximum interior flexibility in floor planning.

To Open up a View . . .

The owner wanted extensive open space and considerable glass area viewing a pond in the rear yard. The architect generated a plan of continuous open areas defined by a change in materials and floor elevations. Walls created shafts and masses as opposed to room dividers.

To accomplish this with few interior walls, and achieve the clerestory heights and glass openings, the entire structure, including roof framing, was built with steel.

In addition to the increased flexibility in design layout achieved by using structural steel, an aluminum standing seam roof was employed to provide both a contemporary appearance and a virtually maintenance-free system. From the time of steel erection to job completion, carpenters had only to deal with interior partitions, minimizing the difficulty of the usual construction with heavy wood framing members.

The main living area in the 5,400-sq ft home is divided into formal and informal areas off the deck. The dining room serves as a core, where view was a minor consideration. Second-floor living areas are segregated into three distinct spaces—one comprised of three bedrooms for children and guests; the second a master suite totally segregated; and the third, the owner's study interconnected by a bridge.

Architect/Structural Engineer
R.A.L. Design Associates
Garden City, New York

Owner
Robert Levine
Kings Point, New York

For Tough Terrain . . .

The view was unbelievable—but the terrain was tough, confined. It was steep, with trees in the center. In the winter you get in only on skis, or a ski-cat.

The owner, manager of a nearby ski lodge, wanted the living area as high as possible to take full advantage of canyon and valley and mountain views 20 miles distant.

Architecture of any structure built in the mountains must overcome unique philosophical demands, coupled with construction difficulties of the highest order. Such projects, if poorly conceived, become a constant irritant not only to the landscape but also to anyone concerned with the fragile ecology at these elevations.

The architectural solution for the remote site was a basic cube, 30 ft on all sides, with living on the top floor, bedrooms on the next floor down and storage in the half-basement.

Steel-framed terraces surround the basic cube, with sliding doors opening out to a terrace in the center bay of each 30-ft frame—thereby allowing an extension of space for literally living in the trees.

All elements that could be were shop fabricated—including five identical frames 10-ft x 30-ft and two side frames 10-ft x 10-ft. For, says Architect John W. Sugden, "It has been my experience with fabrication techniques that the more work done in the shop and the less done in the field the better the project turns out . . . mandatory with a mountain location where the building season is short, crafts must travel longer distances and weather is often questionable.

Tough describes terrain in retreat home of ski lodge manager. Shop-fabricated components eased construction, provided necessarily heavy steel framing for snow/wind loads.

"I try to minimize field connections, limit field work to erection and prefabricate interior as well as exterior elements. All this is done in an effort to condense building time and raise the quality of construction."

Mountain architecture is like all other, perhaps just more dramatically set. This project, in view of its 9,000-ft above sea level site required a very substantial structure to resist heavy vertical snow loads (140-160 psf live load) and very high wind shear loads. Frames, columns, beams and decks are exposed and the frame infilled with pre-cut glass connected with structural Neoprene gaskets in diagonal areas—all pre-packaged to the site.

Architect Sugden describes his "philosophy of mountain architecture as being unobtrusive, natural, reflective to its surroundings, clear in structure and barely noticeable." □

Architect/Structural Engineer
John W. Sugden, AIA
Salt Lake City, Utah

Owner
Mimi Muray
Alta, Utah

Terrace Tower 1, Denver, Colorado features new limestone cladding system over its steel frame.

New Attachment Technique: Alternative to Traditional Stone Cladding Systems

by James H. Bradburn

I was researching various types of natural limestone for the exterior of Terrace Tower One, a new 12-story office building in Denver, Colorado whose structural steel already had been designed and ordered. I traveled to Bedford, Indiana for Indiana Limestone samples to compare with the same ollithic limestone used on New York City's Rockefeller Center over 50 years ago.

While touring Indiana Limestone's Bedford plant, I saw a prestressed limestone spandrel and asked John D. Tucker, company president, whether a similar spandrel 30-ft wide could be constructed to be supported by a building's steel columns.

At the time, we at C. W. Fentress and Associates P.C., architects for Terrace Tower One, were considering two other traditional methods to attach limestone to a structural steel frame: (1) 2-in. thick panels attached to prestressed concrete, or (2) 3-in. thick panels supported by a "stick-back" truss support system. Terrace Tower One's structural steel support system, designed by Bill O'Neal of KKBNA, Denver consulting engineers, required that the building's skin be supported at the columns.

Indiana Limestone Company turned to Hugh Kleusner, its past president and chief consulting engineer, who developed the new limestone spandrel utilizing the same principles for constructing prestressed concrete panels.

To construct the longest spandrels, individual limestone panels—each 5-ft wide by 6-in. thick by 7 ft-2 in. high—were cut

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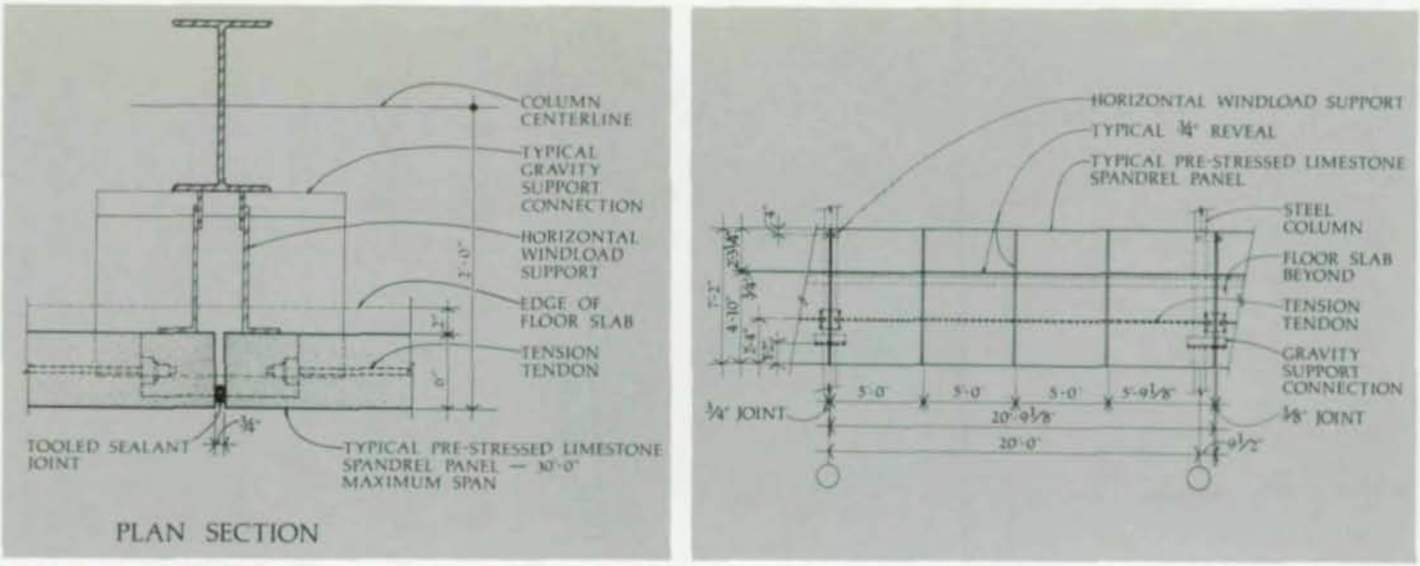
James H. Bradburn is a partner in the firm of C.W. Fentress and Associates P.C., Denver, Colorado architects and planners.



Drawings detail special limestone cladding attachments.

Each panel was drilled lengthwise with one 2-in. hole to accommodate a Dgwiday Thread Bar Post Tension System. Then, each of six panels was placed into a specially built jig system; the long ends of the panels were coated with high-strength epoxy for strength at the joints, and the panel system prestressed to a tension of 32,000 pounds.

Upon completion of enough full-length spandrels to construct a full-size, two-story, two-bay mockup, the spandrels were shipped to Construction Consultants Lab Inc., Dallas, Texas where they were subjected to gravity and wind-load testing to determine the success of the new fabrication process.

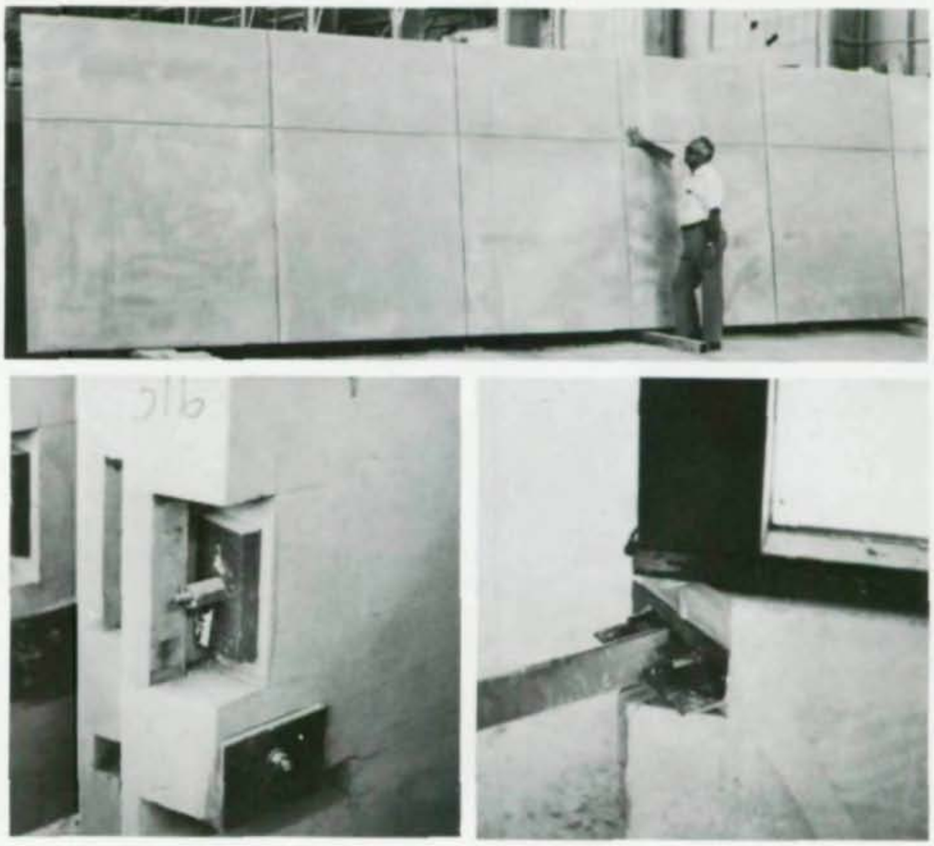
Following the successful completion of testing, Indiana Limestone fabricated the remainder of the 380 spandrels required to enclose the 12-story structure, and trucked them to Denver.

The process of installing each limestone spandrel was a welcome surprise to all involved—particularly R. Richard Dennison, project manager for the general contractor. Because each spandrel was manufactured to match the length of each bay, spandrels could be pre-rigged with all installation hardware prior to being lifted into position. "Haunch" brackets welded to the support columns provided a saddle into which a 1-in. thick bracket, attached to the ends of each spandrel, was placed. This bracket also served as a point to shim each spandrel level. Vertical stabilization was accomplished with tie-backs at the top of each spandrel, along with wind-load connector brackets spaced intermittently along the floor line.

The installation process, which averaged 10 lifts per day, required a total of only 38 days of actual working time. The resultant time savings, coupled with elimination of the truss support, brought the cost of the limestone exterior within the project budget.

The newly developed limestone panel system not only reduced total building costs to Terrace Tower One's owner/developer, but also provided him with the natural stone exterior he preferred for his $22-million project. □

Post-tensioned limestone panel, 30'-9" x 7'-2" high. Panel end (l.) shows post-tension anchorage and gravity connection. Wind-load connection (r.) on top of panel at "V" condition.



Photos courtesy Kluesner Engineering

Architect
C.W. Fentress and Associates
Denver, Colorado

Structural Engineer
KKBNA, Inc., Consulting Engineers
Denver, Colorado

General Contractor
Al Cohen Construction Co.
Denver, Colorado

Steel Fabricator/Erector
Midwest Steel and Iron Works Company
Denver, Colorado

Owner
Jay Roulier Interests
Denver, Colorado

Mountain View High School, Orem, Utah

Presenting . . .

The Winners: 1981 Architectural Awards of Excellence Competition

Mountain View High School

The multi-level concourse fosters a sense of community in the Mountain View High School, Orem, Utah. The school's wide curriculum requires a broad range of classroom types, from auto mechanics labs to ceramics and painting studios. Yet, the concourse links the school's diverse functions into a comprehensive whole. A white interior takes full advantage of the abundant natural lighting entering the concourse through the skylights, which double as passive solar collectors. "The lighting is one of the nicest parts of the building," said the awards jury.

A structural steel frame was chosen because of cost and time considerations. The exterior is smooth enameled steel panels.

"The relationship of the interior to the exterior is very nice. A highly sophisticated building—very high quality of detailing, particularly for a school building."
—Jurors' Comments

Architect
Fowler, Ferguson, Kingston, Ruben Architects
Salt Lake City, Utah

Structural Engineer
KKBNA, Inc.
Salt Lake City, Utah

General Contractor
Paulsen Construction Co.
Salt Lake City, Utah

Owner
Alpine School District
American Fork, Utah

Herman Miller Seating Plant

The Herman Miller Seating Plant in Holland, Michigan was designed with people in mind. The result is "an amazing structure for an industrial plant," according to jury comments. A skylighted "people place" provides a common entry for executives and factory workers, and a break/social place. It will also be available for community activities.

Domed skylights above columns and curved strip skylights at the top of exterior walls provide extensive daylighting. A continuous strip of angled eye-level windows provides views of the surrounding countryside.

The facility, first increment of a three-unit factory, is a single-level space designed on a 40-ft grid. The structural system is a steel two-way open web joist system. Pre-assembled wall system panels have a high gloss white interior for optimum light reflection, and a stainless steel exterior that the jury called classy.

"This is a beautifully detailed industrial project. When you look at it, you feel you wouldn't mind working here."
—Jurors' Comments

Architect/Structural Engineer
Caudill Rowlett Scott, Inc.
Houston, Texas

General Contractor
Owens-Ames-Kimball Co.
Grand Rapids, Michigan

Steel Fabricator
Haven-Busch Company
Grandville, Michigan

Owner
Herman Miller, Inc.
Zeeland, Michigan

Herman Miller Seating Plant, Holland, Michigan

Briggs & Stratton Corp.

Briggs & Stratton Corporation needed a new 744,000-sq ft distribution center and manufacturing facility that would present a thoroughly contemporary image to the Menomonee Falls, Wisconsin community.

A structural bay 30 ft by 50 ft was used throughout to provide for the high ceiling, special loading requirements and flexibility in office and machine arrangements required by Briggs & Stratton. A concrete floor slab steps down six ft between the warehouse and manufacturing areas to minimize earth work and to create a unified, level roof line. Offices and the cafeteria are in a separate structure connected to the main building by three enclosed passageways. Totally shop-fabricated, prefinished steel curtain wall panels with insulation and finished interior surfaces made for rapid construction.

"The articulation of the wall is beautiful. It shows that quality detailing pays off. This industrial building will be a good neighbor by aesthetically adding to the community."
—Jurors' Comments

Architect
J. D. Ferris & Associates
Chicago, Illinois

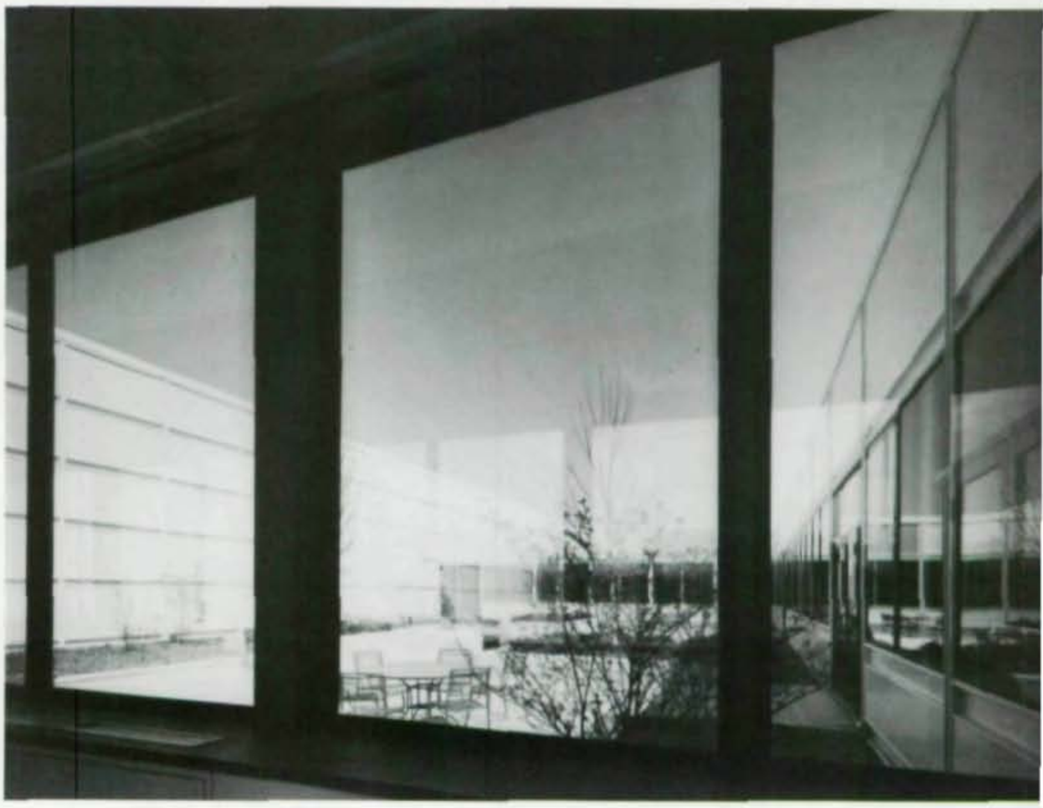
Structural Engineer
Gillum-Colaco
Chicago, Illinois

General Contractor
Hunzinger Construction Co.
Milwaukee, Wisconsin

Steel Fabricator
Mid States Steel Co., Inc.
Stoughton, Wisconsin

Owner
Briggs & Stratton Corporation
Milwaukee, Wisconsin

Briggs & Stratton Corporation, Menomonee Falls, Wisconsin



Reunion Arena

The Reunion Arena in Dallas, Texas uses apparent simplicity to fulfill the many demands placed upon it. It's a multi-purpose coliseum built to accommodate basketball, ice hockey, tennis, boxing, rodeo, concerts, the circus and other special events.

An oval seating bowl is placed diagonally beneath the square flat space frame roof, which is supported by columns outside the amphitheater. The roof has a clear span of 412 ft each way and cantilevers 70 ft at all four corners. Outside, the roof structure, revealed dramatically through a glass fascia, appears to rest lightly on slender columns.

The corners of the square serve as entries and exits to the concourse, which loops below the upper tiers and serves all public areas.

"A fantastic plan, it's a tough building to have been kept as simple as it is."
—Jurors' Comments

Architect
Harwood K. Smith & Partners, Inc.
Dallas, Texas

Structural Engineer
HKS Structural
Dallas, Texas

General Contractor
Henry C. Beck Co.
Dallas, Texas

Steel Fabricator
Mosher Steel Company
Dallas, Texas

Owner
City of Dallas
Dallas, Texas

Steel and Glass House, Chicago, Illinois

Reunion Arena, Dallas, Texas

Steel and Glass House

This sophisticated 5,000-sq ft house "really belongs in Chicago," said the jury. They praised its elegance and the privacy it affords—a steel grating serves as an entry screen and ribbed steel siding blocks the view from neighboring buildings. The U-shaped house encloses a central garden court and is organized into three pavilions: A two-story living space; private sleeping quarters; and a service area with guest accommodations and a communal sun terrace.

The all-steel structural frame is entirely shop-fabricated. Steel beams support bar joists that carry the second floor and roof loads.

Angle frames carry the prefinished steel window system, inset with insulating glass units of varying opacities.

"Superbly detailed. One of the nicest things about it is that you're completely unaware it is there on the street. It fits just right in the neighborhood."
—Jurors' Comments

Architect
Krueck & Olsen Architects
Chicago, Illinois

Structural Engineer
Gullaksen & Getty
Chicago, Illinois

Harborplace

Harborplace in Baltimore, Maryland is part of a downtown renewal area, intended as a year-round specialized waterfront marketplace with over 100 small specialty shops and restaurants.

Two low pavilions frame the harbor's edge without obstructing views of the water or the historic schooner anchored there. Cast-in-place columns inset from the transparent outer walls support the gabled steel-frame roofs. Projecting porticos mark entries to passageways, promenades and balconies to encourage circulation. Glass lean-tos extend into the walkways and open up with garage doors for increased flexibility.

"There is a very tight level of quality as opposed to the shopping center quality you normally find in America. Its impact on people is tremendous, it attracts them and they are comfortable—a real people place."
—Jurors' Comments

Architect
Benjamin Thompson & Associates
Cambridge, Massachusetts

Structural Engineer
Gillum-Colaco
Boston, Massachusetts

General Contractor
Whiting Turner Contracting Co.
Baltimore, Maryland

Steel Fabricator
Jarvis Steel & Lumber Co., Inc.
Baltimore, Maryland

Owner
Harborplace Ltd. Partnership
Columbia, Maryland

Harborplace, Baltimore, Maryland

AMERICAN INSTITUTE OF STEEL CONSTRUCTION
The Wrigley Building, 400 North Michigan Avenue
Chicago, IL 60611

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Its Architecture Speaks Affection

The Opa-Locka (Florida) Neighborhood Center opened the same day 1980 rioting started in Miami. But the center, situated on the very edge of the riot-torn area, has created such a sense of civic pride that it was unscathed. Even conventional security measures—fences, gates, barred windows—were not needed on this gentle building. Its architecture was "hopeful, compassionate, inspiring"—in sharp contrast to its surrounding urban sprawl.

Rather, the new center evokes affection of the community through its architectural vocabulary. Surrounded by dense oaks, the one-story building emerges from sodded berms and undulating walls. It never exposes its full dimensions at once, appearing smaller and more intimate than its 17,000 sq. ft.

Public assembly areas grace one side of the building, with agency offices on the other. A spacious lobby/reception/waiting area around a vortex-like conversation pit serves as the heart of the center. Building zoning permits flexible uses of the structure and minimizes operational costs. The atmosphere of soft colors, light and shadow, curved walls and unexpected glimpses into outdoor patios give users a sense of protection and dignity. All interior spaces open visually, and some physically, to enclosed patios.

Construction is block walls, interior steel pipe columns and a steel joist roof framing and steel deck. Steel was used because it was far less expensive. And its ease and speed of erection—as well as the ability of steel framing to form the undulating roof soffits and fascias—were other important factors in the choice of materials. □

Opa-Locka Neighborhood Center, Opa-Locka, Florida

Architect
Bouterse Perez & Fabregas
Miami, Florida

Structural Engineer
Wilbur Smith & Associates
Miami, Florida

General Contractor
BEC Construction Corporation
Miami, Florida

Steel Fabricator
American Fabricators Corporation
Miami, Florida

Owner
Metropolitan Dade County
Miami, Florida