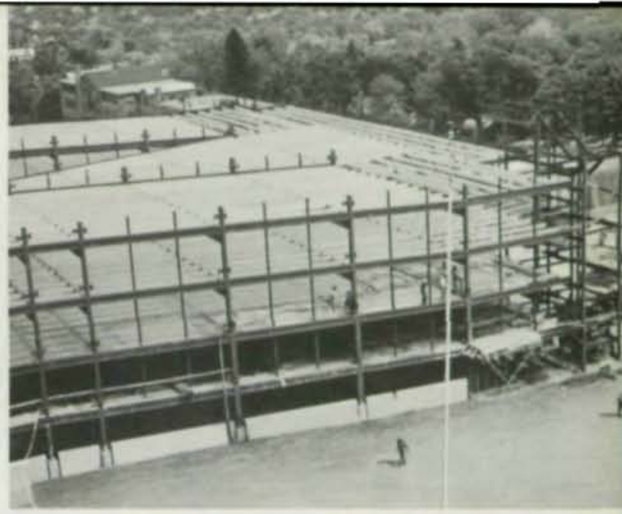
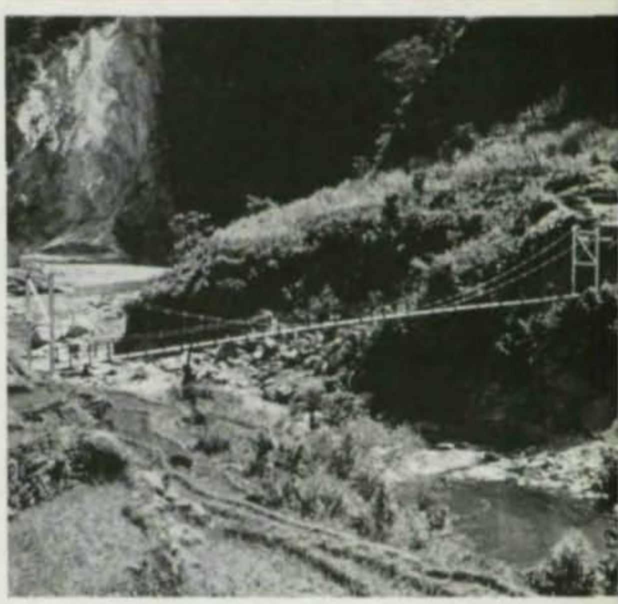
VOLUME XIV / NUMBER 2 / SECOND QUARTER 1974

MODERN STEEL CONSTRUCTION





MODERN STEEL CONSTRUCTION

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American Institute of Steel Construction

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New York, N.Y. 10020

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NEW AISC HEADQUARTERS LOCATION

The American Institute of Steel Construction has moved its Headquarters Office to the following address:

1221 Avenue of the Americas
New York, N. Y. 10020
Tel: (212) 764-0440

All inquiries or communications formerly directed to AISC at 101 Park Avenue, New York, N. Y., should now be directed to the new address.

ARCHITECTURAL AWARDS OF EXCELLENCE

All registered architects practicing professionally in the United States are invited to enter steel-framed buildings of their design constructed anywhere in the 50 states and completed after January 1, 1973 and prior to August 31, 1974. Each building must have been designed, detailed, fabricated, and erected in the U.S. All structural steel and plate must have been produced in the U.S. The 1974 Jury of Awards includes:

Roy O. Allen, FAIA *Design Partner, Skidmore, Owings & Merrill, New York, New York*

William Marshall, Jr., FAIA *President-elect, American Institute of Architects; Principal, McGaughy, Marshall and McMillan, Norfolk, Virginia*

Maxwell G. Mayo, AIA *Associate Professor, Department of Architecture, Carnegie-Mellon University, Pittsburgh, Pennsylvania*

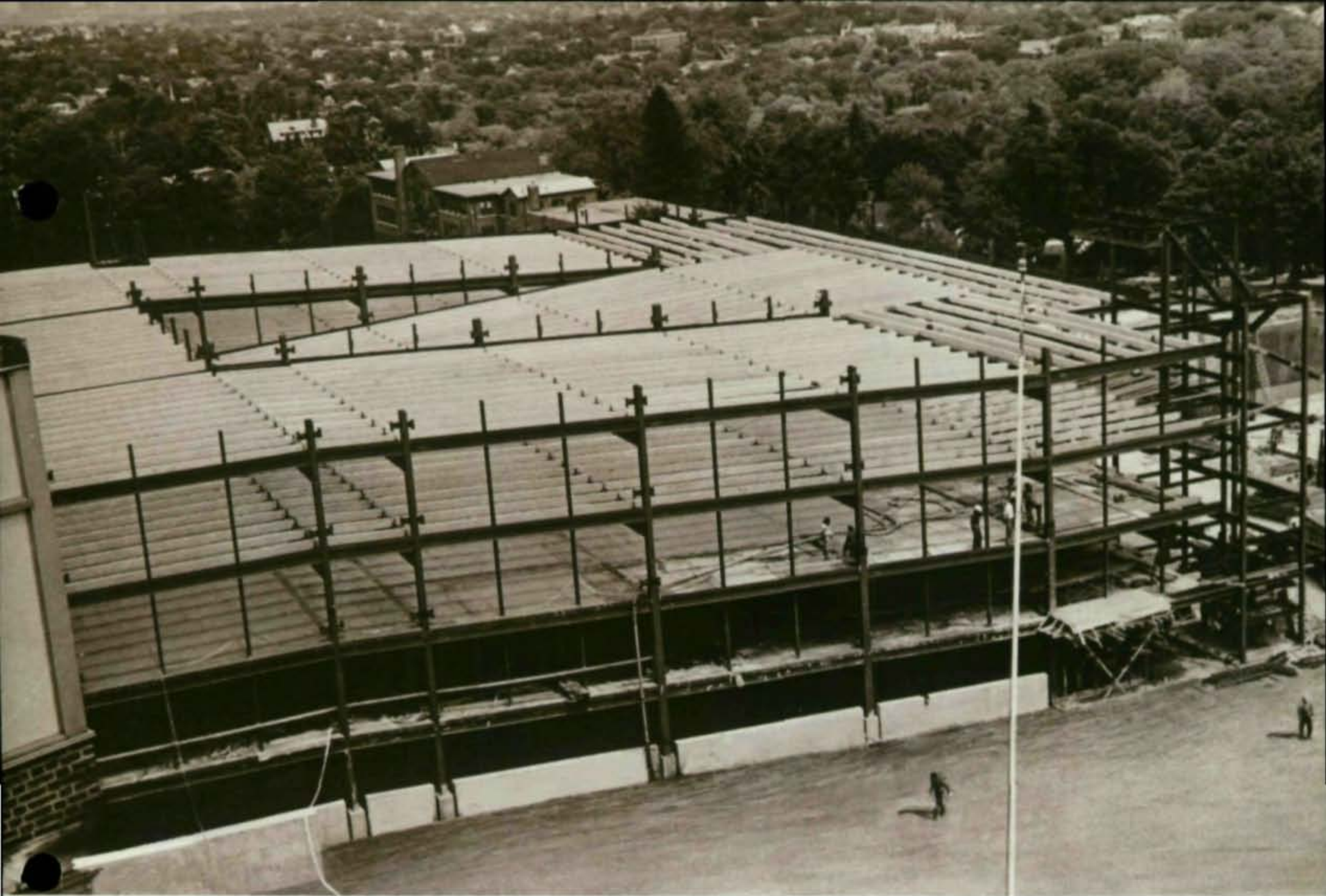
Byron L. Nishkian, F.ASCE *President, Nishkian, Hammill & Associates, San Francisco, California*

William L. Pereira, FAIA *William L. Pereira Associates & Planners, Architects & Engineers, Los Angeles, California*

1974 FELLOWSHIP AWARDS

Four engineering students have been awarded $3,000 fellowships in the 12th Annual AISC Fellowship Awards Program. The program is designed to encourage expertise in the creative use of fabricated structural steel.

Christopher J. Adams *University of California at Berkeley*
Salvatore E. Caccavale *University of Arizona at Tucson*
James R. McCarthy *University of Wisconsin at Milwaukee*
Arnold L. Wagner *Portland State University, Oregon*



A new structural system for PARKING DECKS

by Ira Hooper

Architect:
John Ciardullo
New York, N.Y.

Structural Engineer:
Seelye, Stevenson, Value & Knecht, Inc.
New York, N.Y.

System Developer:
V. I. P., Inc., Subsidiary of
Composite Construction Systems, Inc.
New York, N.Y.

General Contractor:
George B. G. Macomber
Boston, Mass.

Steel Fabricator:
A. O. Wilson Structural Co., Inc.
Cambridge, Mass.

The first parking structure to employ a new composite steel-concrete structural system has been completed and put into service. Although the 590-car Faulkner Hospital Garage at Jamaica Plain, Mass., includes fireproofing to meet the requirements of the Boston Building Code, it was built at a cost saving of $300,000 over an alternate all-concrete design that was also investigated. The saving would have been even greater if, as is now usual in most cities, no fire rating was required.

Ten other parking projects using the same structural system are now in various stages of design or construction. They total 2,000,000 sq ft and include a 354-car parking structure for St. Mary's Hospital in Rochester, N. Y. (where construction time was cut to a total of six months); a 710-car structure for Yale University in New Haven, Conn.; an 802-car structure at Rutgers University in Newark, N. J.; and a combination parking garage-physicians' office building at St. Joseph's Hospital in Syracuse, N. Y. Cost savings for these projects averaged between $100 and $300 per car space compared to other proposed competitive structural systems. The system is applicable to building types other than garages.

Mr. Hooper is Vice-president at Seelye, Stevenson, Value & Knecht, consulting engineers, New York, N. Y.

An inexpensive forming system of reusable standard plywood panels eliminates the need for intricate formwork and shoring.

Special concrete joists have pre-spaced holes to receive telescoping end pins of the tubular joist supports.

The CJ/FP System

The new system (identified as the CJ/FP system) is a steel-concrete composite system that uses longspan composite beams, steel columns, a new type of precast prestressed concrete joists, and a unique forming system for poured in place monolithic floor slabs. No shoring is required for any element of the system.

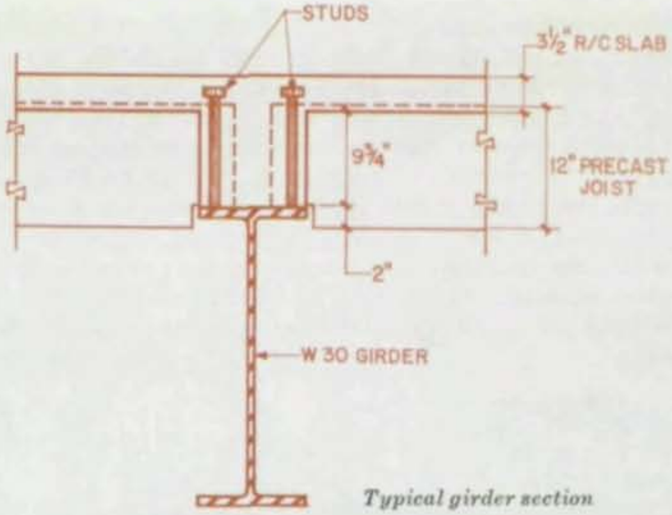
The 3½" thick monolithic concrete slab is cast in place on a simple, inexpensive forming system of reusable standard plywood panels, eliminating the need for intricate form cutting, nailing, fastening, and shoring. The slabs are reinforced with wire mesh and span 4 ft between the joists. A monolithic concrete floor is considered superior to a topped precast deck system for parking structures because it requires a minimum number of joints and reduces the incidence of cracks. The Faulkner Garage was built with shrinkage compensating cement to further reduce cracking, although one-way post tensioning could also have been used for the same purpose.

Standard 4 ft x 8 ft plywood form panels are supported during construction by aluminum tube "Formstruts" (patent pending) spanning between the concrete joists. These "tubular supports" have telescoping end pins that are inserted and locked into pre-spaced holes, 2 ft o. c., factory-cast into the special concrete joists. Unlocking the pins automatically decenters the "tubular supports" for easy removal.

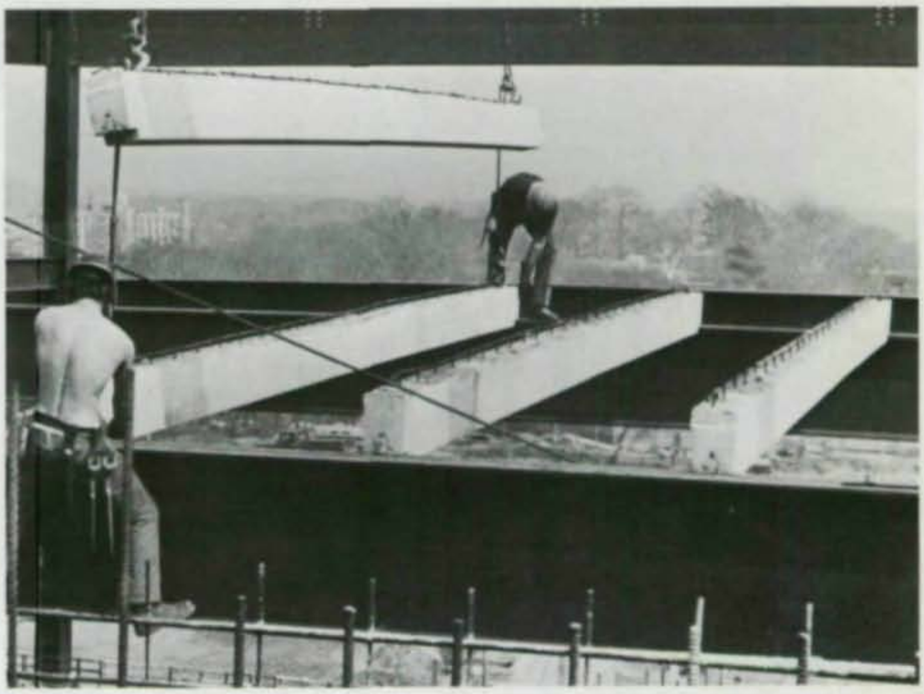
CJ/FP concrete joists (patent pending) are factory precast-prestressed in special forms to meet specific job requirements of spans up to 31 ft and live loads up to 150 psf. The joists are fabricated complete with mesh supporting chairs positioned in the top surface. The chairs also act as shear connectors for composite action between the joists and slab. Joists are erected with their ends resting on the top flanges of steel girders. Special features of the CJ/FP system provide lateral bracing to the girder top flanges during construction. The joist ends are encased in a concrete haunch cast in place on the girder flange. The haunch is cast monolithic with the slab by means of special haunch forms.

Using the joist height as the haunch depth greatly increases the strength and stiffness of the steel girder to which the haunch is stud shear connected. Long spans with low deflection are economically achieved by the use of high-strength, low weight steel composite girders.

Much of the construction cost saving of the system is attributable to the reduction in field labor requirements and the rapidity of erection. No shoring is necessary as is generally required with concrete construction. Connections between steel girders and columns are conventional and avoid the field fitting problems and special techniques of precast construction. The precast-prestressed joists are quickly lowered in place on the steel girders by the erection crane and require no special connection. Slab and haunch forms are quickly erected and dismantled. Wire-mesh slab reinforcement is rapidly unrolled or placed as flat sheets. Concrete quantities are low, so that up to 10,000 sq ft of deck can be placed and finished in one day.

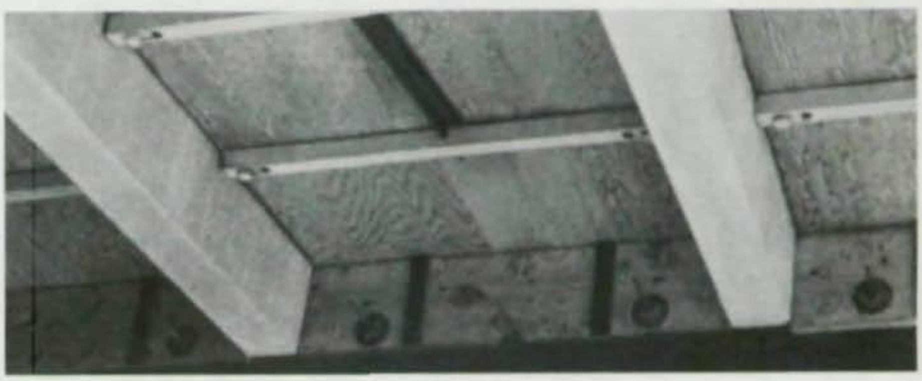


Typical girder section



Joists are lowered into place on the steel girders by the erection crane. No special connections are required.

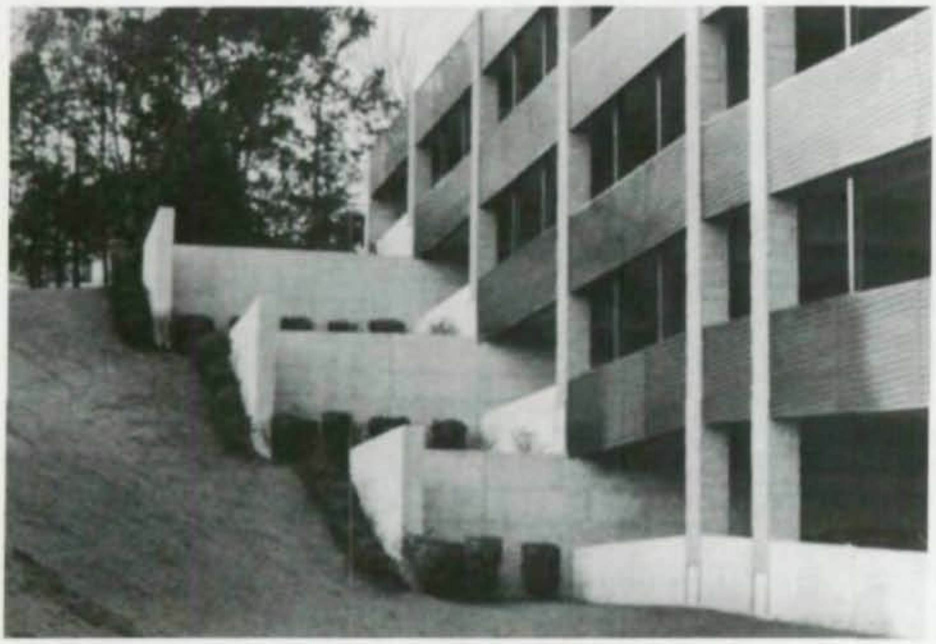
Slab and haunch forms can be quickly erected and dismantled.



Faulkner Planning and Design

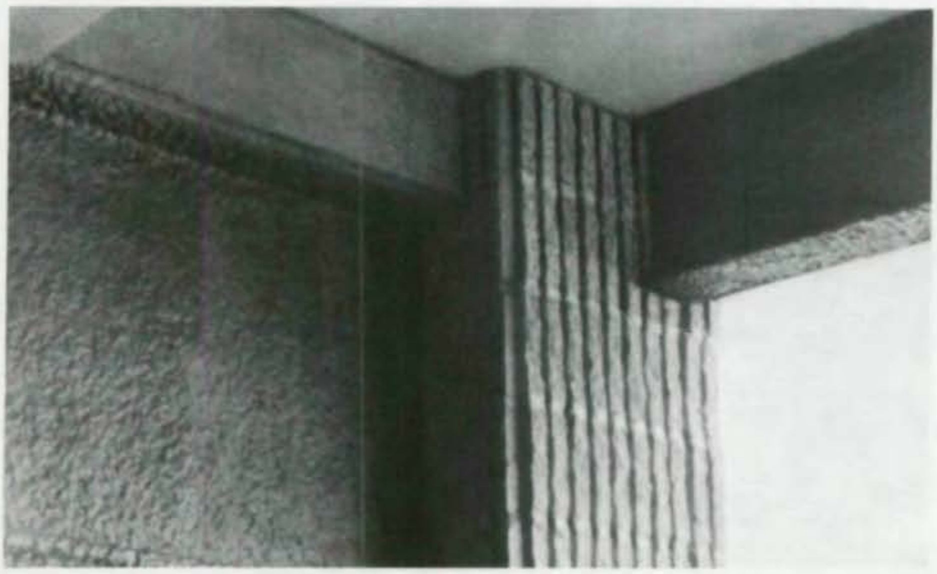
The Faulkner Hospital master plan required construction of the garage before the rest of its $35,000,000 expansion program, which will be completed in 1975. Any hospital expansion or renovation disrupts the parking habits of the staff and visitors, and adds a new source of parking demand. By building the new parking deck first, this transition and construction phase became less disruptive.

In addition, an existing zoning variance for the parking structure was due to expire. The zoning deadline required working drawings to be completed from concept to groundbreaking in only six weeks. This entailed completion in the same six week period of architectural and engineering design concepts, working drawings, all reviews and approvals, construction costing, and contract releases. Remarkably, the deadline was met for these steps as well as for all reviews by agencies covering local codes, building department, and Hill-Burton funding. Only a closely coordinated effort by the design firm, consulting engineer, architect, and the contractor made this possible.



Retaining walls at each floor extend past the building perimeter to create areaways for free flow of air.

Girders and beams are fire-protected with a hard impact-resistant sprayed coating. Split-ribbed masonry block serves as fireproofing for exterior columns.



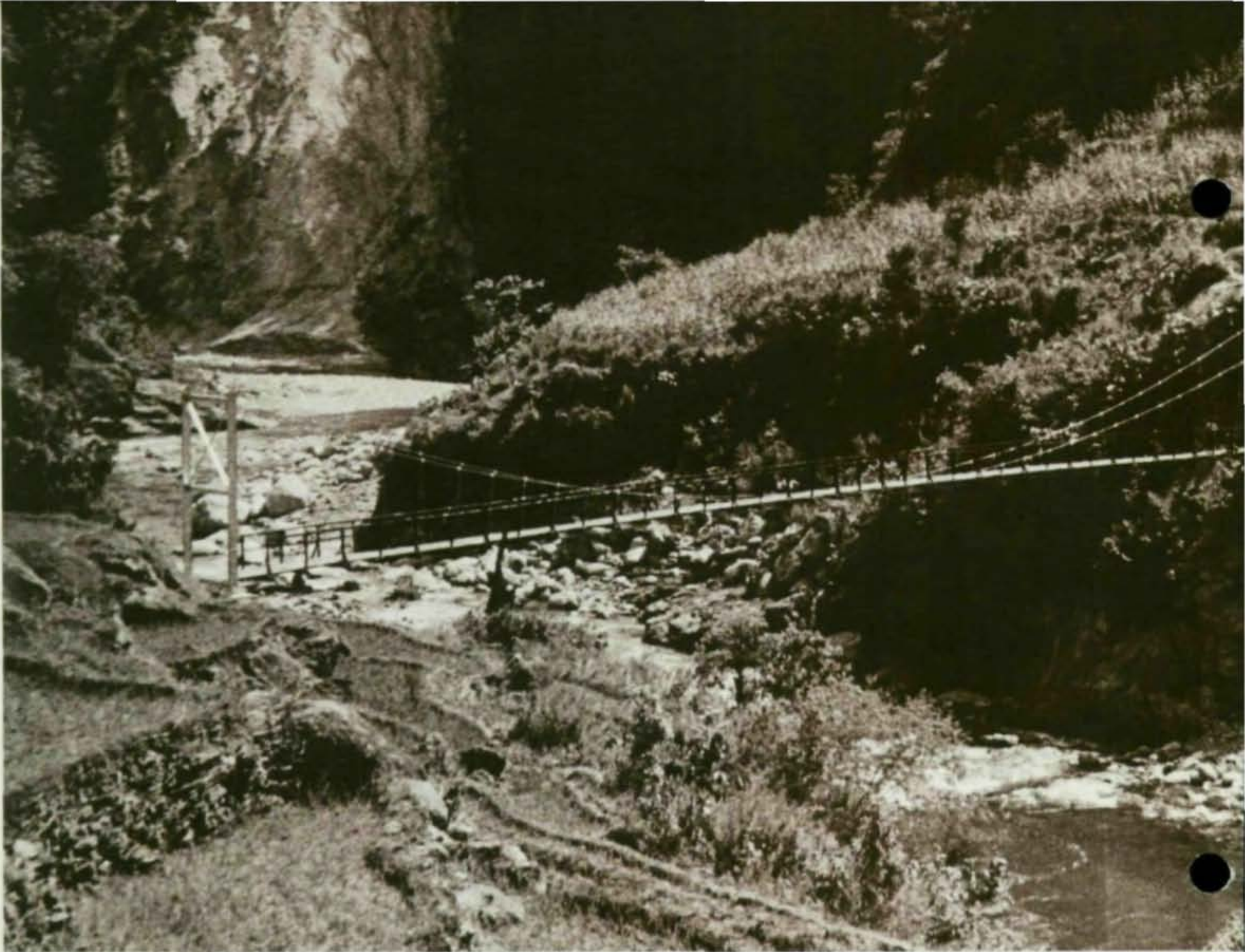
The design of the Faulkner Hospital Garage typifies the idea that site and parking structure must work together and that no standard designs can be adapted for all sites. The site selected for the Faulkner garage was the side of a hill. As a result, the designers followed this natural topography and "stepped" the structure into the hill, gradually increasing the length of each higher floor. All floors are identical in width. The walls retaining the hill on each floor extend past the perimeter of the garage to create areaways for free flow of air. Consequently, mechanical ventilation was not necessary.

The Faulkner Hospital Garage is a five-level, 590-car space facility. It is a three-bay sloping floor structure with one-way traffic in the outer bays, and two-way traffic in the center bay. Girder spans are 58'-6" in the outer bays and 62'-3" in the center bay; girder spacing is 27'-0" o. c. Steel yield strengths are 50 ksi for girders and columns and 36 ksi for minor members.

The Faulkner Hospital Garage was built in one of the few areas of the country still requiring fire resistant construction for open parking decks. A recently developed sprayed-on fire protective material that dries to a hard impact-resistant coating was applied to the girders and beams at Faulkner. Attractive bright paint coloring was sprayed over the fire protective coating, resulting in a pleasing appearance. Each floor received a different paint color for easy floor identification.

Attractive commercially available split-ribbed masonry block covers and fire protects the exterior columns. Its rough surface is virtually vandalproof and does not show rain streaks.

A system that employs modified highway guardrail acts as a protective barrier at the edges of all floors of the garage. The system is an efficient steel design that protects the exterior facade against automobile impact without applying torsion or twist on the spandrel beams. Workmen erected the facade panels from inside each floor without exterior scaffolds.



A BRIDGE IN

The following article was written by Paul Benjamin, aged 28, while he was serving in the Peace Corps in Nepal. Peace Corps training provided Mr. Benjamin (University of Illinois, B. A.) with a rudimentary knowledge of basic technical aspects and field practices of bridge building.

by Paul Benjamin

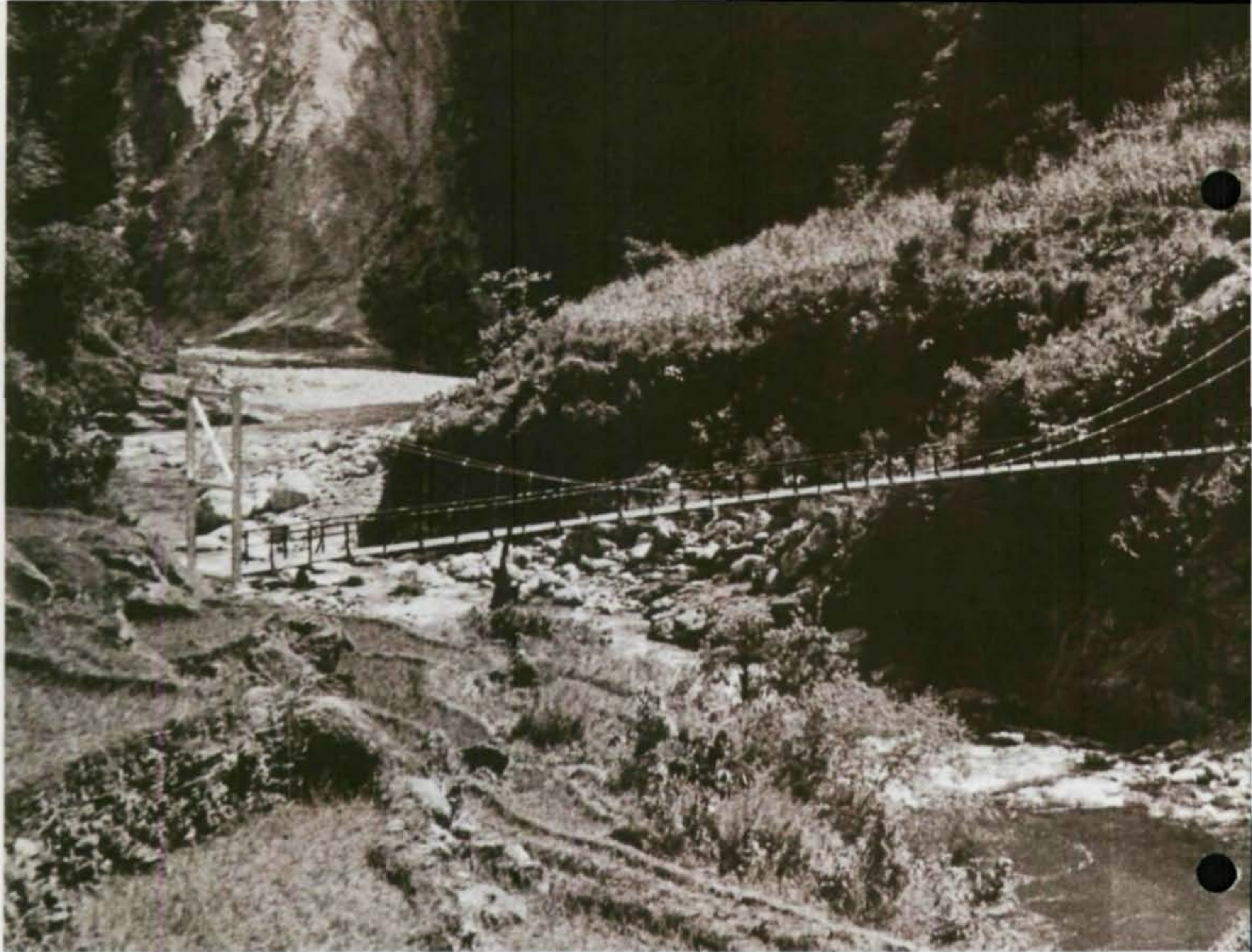
In Nepal the main means of transportation is by foot. Although there is a concerted effort to build new roads, getting from village to market or from home to fields is in most cases still a matter of walking. Often that's no easy matter. This small Himalayan kingdom is a patchwork of steeply-terraced mountains, tortuous footpaths, and periodically turbulent rivers. To expedite transportation, building suspension bridges is a top government priority.

As a Peace Corps volunteer, I worked with the Makwanpur District Council in the central part of the country. After helping to complete a suspension bridge in a village called Namtar, I was assigned by the Council to be the "overseer" on a project to bridge the Kali Khola (Black River) and link the villages of Bharta and Katunje.

The Kali Khola is like most rivers in Nepal. Eight months of the year one can wade across it. But during the three or four months of the monsoon, when its swollen waters surge south from the Mahabharat mountain range, there is no way to cross in safety. Villagers are cut off completely from their markets and travelers from their destinations.

The idea of building a bridge there was generations old. In fact, I discovered that the site had been surveyed on at least two separate occasions, but the project had always died from lack of funds. This time, however, the Council was prepared to back their proposal with money, and important political figures promised their support.

The project presented an exciting opportunity and considerable challenge. The most money I could count on was 20,000 rupees, or about $2,000; not an enormous sum, to be sure. With that amount, however, I hoped to build the equivalent of a $15,000 bridge by scrounging around for materials. I had



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NEPAL

already been a volunteer in Nepal for two years, and I had learned something about working with Nepalis — in their villages, markets and bureaucracies. And so, extending my Peace Corps service, I set out in early January, 1972, to examine the area where the bridge was wanted.

The site was in a poor, rather primitive part of Nepal, inhabited by three distinct groups of people. The Chepang, my best workers, could be classed as borderline hunters and gatherers who, for at least part of the year, sustain themselves by gathering roots and herbs in the forests and by hunting and fishing. They also do some farming, although the land is poor, much of it on a 45° grade or more. Another group, the Tamangs, are, according to legend, the descendants of a Tibetan army who settled in central Nepal perhaps 2,000 years ago. The third group includes the dominant Brahmin and Chetriya castes, people who are part of the Aryan culture that moved into India thousands of years ago.

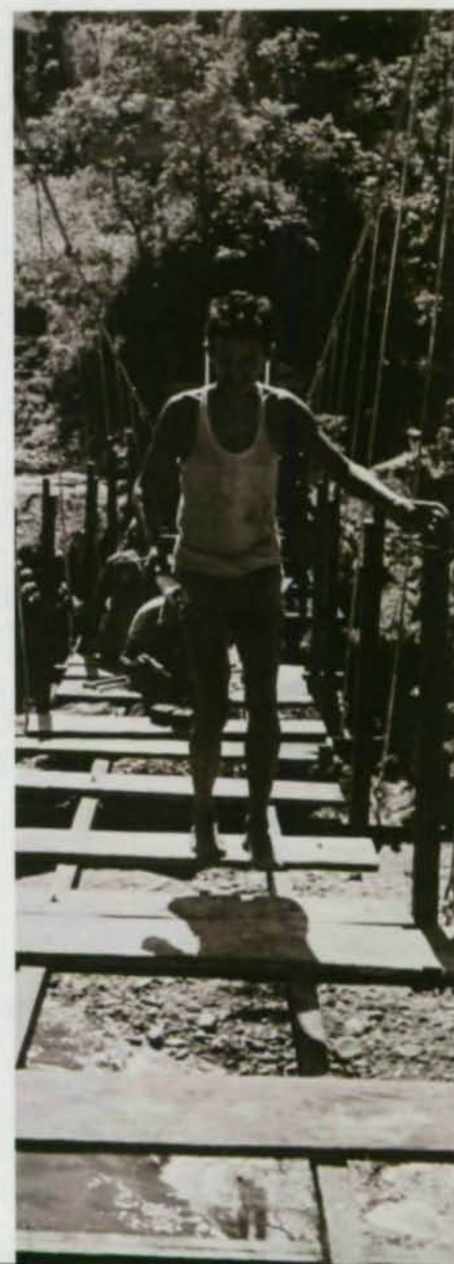
From beginning to end, I was involved at every level of the project: funding decisions, survey, design, estimates, liaison with the villages and the district office, selection and procurement of material, fabrication of parts, transportation, organization of construction, labor supervision, even details like pounding nails, tightening bolts, pouring concrete and, finally, painting. I did these things partly because I had to; but I did them also because I enjoyed them, because I like being involved in an entire range of activities aimed at a particular goal. In the United States, where specialization is the rule, an opportunity such as this would be rare indeed.

Working in Nepal takes some getting used to. The country does not have what might be called the "organizational response" that we take more or less for granted in America. It also lacks manpower in key positions and modern communications facilities. What would take five minutes on the phone in the States might require a two-day walk in Nepal. Or a week's delay because the man you wanted to see is out of town. Or a month's delay because when he returns it turns out he doesn't have the right part or tool, or because something breaks.

In addition, because of an old superstition, getting people to work on the bridge was a little troublesome at times. It is believed by some of the more primitive people that, in order for a bridge to be a success, the builders must bury a sacrificial victim in the foundation or anchorage work. At one point I heard a dark rumor to the effect that "they've already put an 'Amrikan' in there." As I was the only Westerner on the project, or for miles around, I couldn't imagine who they were talking about!

Probably the only similarity between the suspension bridge project at Kali Khola and one in America is that in the end, when all is built, you can say, "They're both suspension bridges, all right." Prior to completion nearly everything is different.

To begin with, the paucity of available funds forced me to proceed in a rather unorthodox fashion: I didn't design until I had a part. The normal process, presumably, is to design a bridge according to site conditions and other specifications and then order materials — new materials. But for that you need considerably more money than we had. Thus, I had to decide in the most general terms what sort of bridge I wanted, find available materials, and then design around them.



Work proceeds on west tower.

View of tower pin assembly, a motley collection of parts which were salvaged from junkyards and modified to fit in this configuration.

I began to search among junkyards and storage facilities for usable parts. In my previous travels around Nepal, I had found stockpiles of steel and other discarded or stored materials, some of which, I thought, could be fabricated into parts for the Kali Khola Bridge. Most of these materials were under the jurisdiction of various departments of the Nepali government. This meant that I had to find out whether the items I wanted could be had for free (or at least at bargain rates), and then steer an official request through the appropriate bureaucratic channels. All the while I had to figure how we could drill, cut, shape, or weld the pieces into functioning parts on the bridge, or, if I couldn't have those particular items, what I could use instead. I eventually gave up trying to make a drawing of the bridge or the towers and stored most of the ideas and data in my head or on note pads.

Fortunately I had friends at the Roads Department in the Hetaura bazaar where I had set up operations and, even more important, at the machine shop. There were American machines in that shop, left over from a road-building project some 12 years ago. A Nepali friend, Dil Bahadur, who had been trained by a U.S.A.I.D. technician during the earlier project, was extremely helpful in fabricating all the parts for the towers.

The tower design was fairly common for suspension bridges in the West, but of course completely new for that part of Nepal. I found some 10 x 5 in. I-beams, 20 ft long, at the Kathmandu office of the Nepal Ropeway. The beams, which had been made in India, were not new and the manager let us have four of them for 1.55 rupees (15 cents) per kilo, which was considerably cheaper than the market price. Although the specifications of those beams, which would serve as columns, indicated that they would bear the estimated bridge load, I decided to reinforce them because they were old and a little rusted.

I cut 2½-in. equal leg angles to stiffen the web between the I-beam flanges and welded them in place a foot apart on alternate sides. For the base, I had a piece cut out of the web at one end of each I-beam column to give the bearing of the pinned base a snug fit. At the other end, we marked and drilled holes for attaching a box eventually to hold the cable saddle block.

When all was cut, drilled, and welded on the four I-beams, two helicopters came down to Hetaura from Kathmandu to transport them to the bridge site. It was a thrilling moment. The nearest motorable road was 11 miles from the Kali Khola over a poor trail. To avoid the danger of some poor porter being crushed under a 600 lb beam, I had worked like crazy to secure those helicopters, which were supplied by the Peace Corps and Arizona Helicopters, Inc. I believe it was the first time that construction materials of that size were moved by helicopter in Nepal.

I opted for a pinned base partly, I suppose, because I was adventurous, but also because I didn't want to place the columns on the foundation under any other but a compressive force. With it we probably saved some cement and added several years to the life of the towers.

I fashioned bearings for the pins out of eight cast-iron wire rope spool bearings, substantial pieces of 20 lbs or more that we purchased for 1.50 rupees apiece at the Ropeway. From these we made four pairs on the lathe, shaper, and drill press. Each pair was male-female, one socketing into the other but with a ⅜-in. gap between the faces. Each was designed to sandwich around the webbing of the beam, which would occupy the ⅜-in. gap. After the sides were squared to fit on the webbing between the flanges, we drilled seven 15/16-in. holes on each side to match those in the column base and accommodate the ⅞-in. high tension bolts we had on hand.

The shaft holes in the bearings were 3¼-in. in diameter; and I just happened to find a 3-in. diameter steel shaft, again at the Ropeway. We cleaned it up on the lathe, cut it in four 20-in. pieces, and we had our pins.

I also found eight halves of bridge baseplates made of 13/16-in. thick plate. Apparently they had been ordered years before for a bridge that was never built. The parts lay scattered around so I grabbed them and, conveniently enough, there were already 3-in. diameter holes in the vertical portion of the plates — a near perfect fit. I didn't have to modify them at all.

The main cable is clamped to the "saddle" at the top of the tower.

A technician on loan from the Nepal Ropeway "sockets" our bridge strand.

Perched precariously above the Kali Khola, workers hoist a "section" into place for the walkway.

For the box, which would be fitted to the other end of the column, I used pieces of channel and angle and welded them together. Inside I placed a cast-iron "cable saddle block," rounded and grooved on top to hold and carry the cable over the tower. The cable was clamped fast to the whole assembly. The cast-iron block as well as the suspender rods, cable clamps, eyebolts, and gusset plates were made at the Agricultural Tools Factory, a plant built and equipped by the Soviet Union.

The two columns of each tower were joined by six 6-in. channels per tower, each 8 ft long. Placed in pairs, these served as the cross-members. In the upper half of each tower, I used 2½-in. equal leg angles as X-bracing. Then, at the junctions of the channel pairs, angles, and I-beam columns, I joined everything together by a gusset fitted between the channels and the column flanges, and bolted down the whole works with ⅞-in. A325 high tension bolts. I had managed to extract those bolts from the Roads Department, and Mr. Robert O. Disque of the American Institute of Steel Construction kindly supplied me with a booklet on their use.

The channels and angles we used here were parts from an old, British-built ropeway, which had been dismantled. The steel was more than 60 years old and serving Nepal once again.

The main cables were actually bridge strand donated by Nepal's Suspension Bridge Division, which, in turn, had received it from U.S.A.I.D. It was galvanized, 1¼-in. dia. and composed of 37 parallel strands. We hung suspender rods from it at 4½-ft intervals, 39 pairs over the 180-ft length of the bridge.

The anchorages were rather interesting. On the west side, in a bluff about 25 ft to the rear of the tower, we dug two pits, 17 ft deep. From each pit to the face of the bluff, a trench was dug, in which we put the anchor rods and nets. Cement was layed on top. Later we filled the rest with sand and boulders.

The eastern anchorage was, of necessity, a bit different, for directly behind the tower was hard rock. I assigned a few select workers to dig through it at a specified angle. They spent two weeks chipping away at the rock with chisels and hammers to create two tunnels, 10 ft long and 3 ft in diameter. We fit the rods and nets snugly into each tunnel and then pounded sharpened ⅞-in. steel rods into the sides of the tunnels. Finally, we poured the concrete and erected a wall in front of it.

It was a job well done for my men, and a hard job at that. All this work was done by hand. We had one machine and that was a hand-operated winch.

Meanwhile, Dil Bahadur, my friend from the Hetaura machine shop, came out to the site to help erect the towers.

The walkway, nearly completed

Not only could I rely on his considerable expertise and competence with regard to the steel towers, but he was someone with whom I could discuss other facets of the construction as well. Until then, I had been taken very seriously by all concerned, even though for at least part of the time I didn't know what I was talking about and was learning step by step from books. With Dil Bahadur, I could talk about a problem and mull over possible solutions. He was smart and quick and did not hesitate to question my opinion when he thought it necessary, which was often enough. We also had the help of a man sent out by the Ropeway to "socket" the strand. He, too, had received his training from U.S.A.I.D.

With the towers up and the cables strung, we set about cutting and shaping the wood for the walkway. All our lumber was cut from whole trees, using two-man rip-saws. When the parts were finished, we coated them with a mixture of hot coal tar, unslaked lime and spirits. Then we hung the 39 sections across the river. I tried to do this equally, hanging three sections on one side, three on the other and so on. It was slow, dangerous work. One slip and it was down into the swirling, rocky river 40 feet below. We were very lucky and only lost some tools. In fact, during the entire project, there were just two accidents, which fortunately resulted in nothing more than a few scratches.

We finished the project in July, 1973, in time for the bridge to be used during the monsoon. Villagers would come down with their children to marvel at the gleaming structure that would allow them to cross the Kali Khola in safety. Some jobs, of course, remained to be done — like improving the approaches and building a better walkway fence. But I knew that my Nepali friends and co-workers could easily do that. I knew because I had seen the pride in their eyes as they gazed at their handiwork. And the awe, too, at seeing something new in a place where little had changed in hundreds of years.

HILTON Goes to College

Architect/Engineer:
Geddes Brecher Qualls, Cunningham, P.C.
Philadelphia, Pa.

General Contractor:
Frankel Enterprises
Philadelphia, Pa.

Steel Fabricator:
Bethlehem Contracting Co.
Bath, Pa.

All the steelwork has been erected for a new $10-million hotel and parking garage structure now under construction adjacent to the University of Pennsylvania, in Philadelphia. The 20-level structure, which will be known as "The Philadelphia Hilton, on the University of Pennsylvania Campus," is being built on a dense in-town site.

According to the Philadelphia and Princeton architect-engineer for the project, Geddes Brecher Qualls Cunningham, P.C., it is designed to meet several types of needs in the university area. The 400-guest room hotel, for example, has been designed to accommodate nearby hospital out-patients, visitors to exhibitions and meetings at the Trade and Convention Center, spectators for sporting events held at Franklin Field, and families attending commencement ceremonies. Parking will be provided in the garage facility for the Philadelphia Civic & Convention Center, for the University's Franklin Field one block away, for the New Children's Hospital, and for the University Hospital across the street.

Design Considerations

In earlier design considerations by the architect, it was determined that in order to provide the required 400 guest rooms a high-rise tower structure was necessary for the congested site. It became apparent during the design development stage that the tower would have to be over the service area of the hotel. (The service area includes the motor entrance, lobby, ballroom and meeting rooms, restaurant, and housekeeping facilities.)

In order to accommodate the projected traffic at the motor entrance area, a double driveway within the building lines of the tower had to be included. This provided for two-lane traffic in and out of the hotel and the parking garage. The width of the double driveway — 22 ft curb to curb — widened the first column bay to a minimum of 23 ft clear.

After various design considerations, a structural steel frame was selected for the tower because it provided vertical and horizontal flexibility, while at the same time offering an economical structure.

Structural Steel Chosen

E. Fred Brecher, chief structural engineer for Geddes Brecher Qualls Cuningham, P.C., explains the reason why steel was chosen for this particular project:

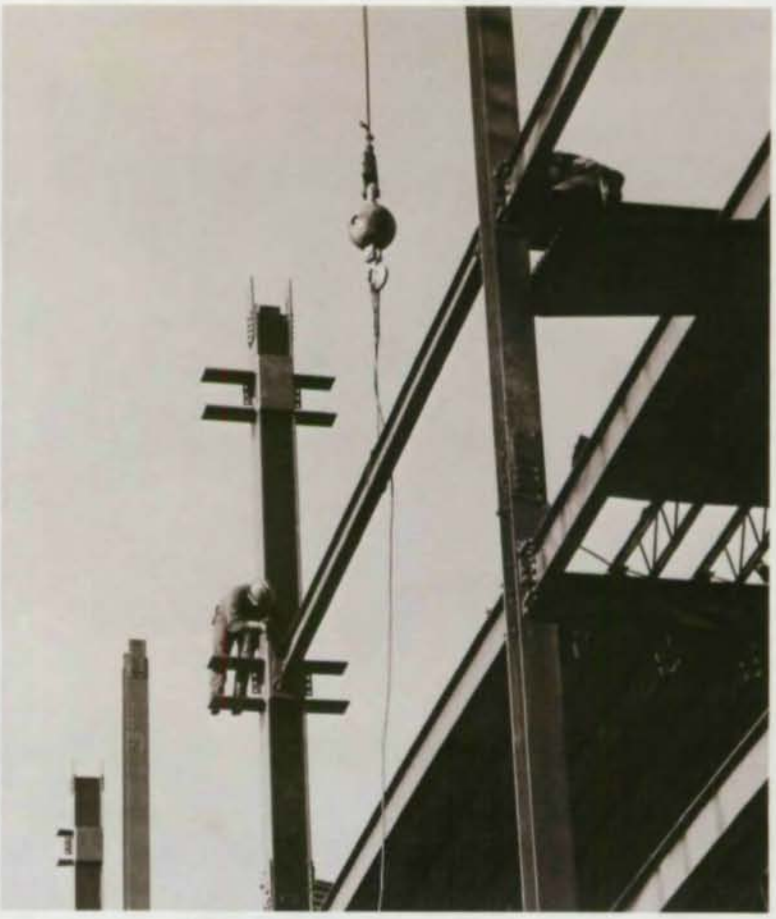
"A cast-in-place concrete structural system would have required 18-in. by 48-in. columns in the lower story — resulting in a transverse column bay of 27 ft center line of column to center line of column. In the hotel tower, the room layouts suggested a column spacing of 27 ft in the longitudinal direction. The resultant 27-ft by 27-ft bays would have been heavy concrete slabs (flat plate or waffle) or expensively formed beam and slab, or slab bands in the tower area.

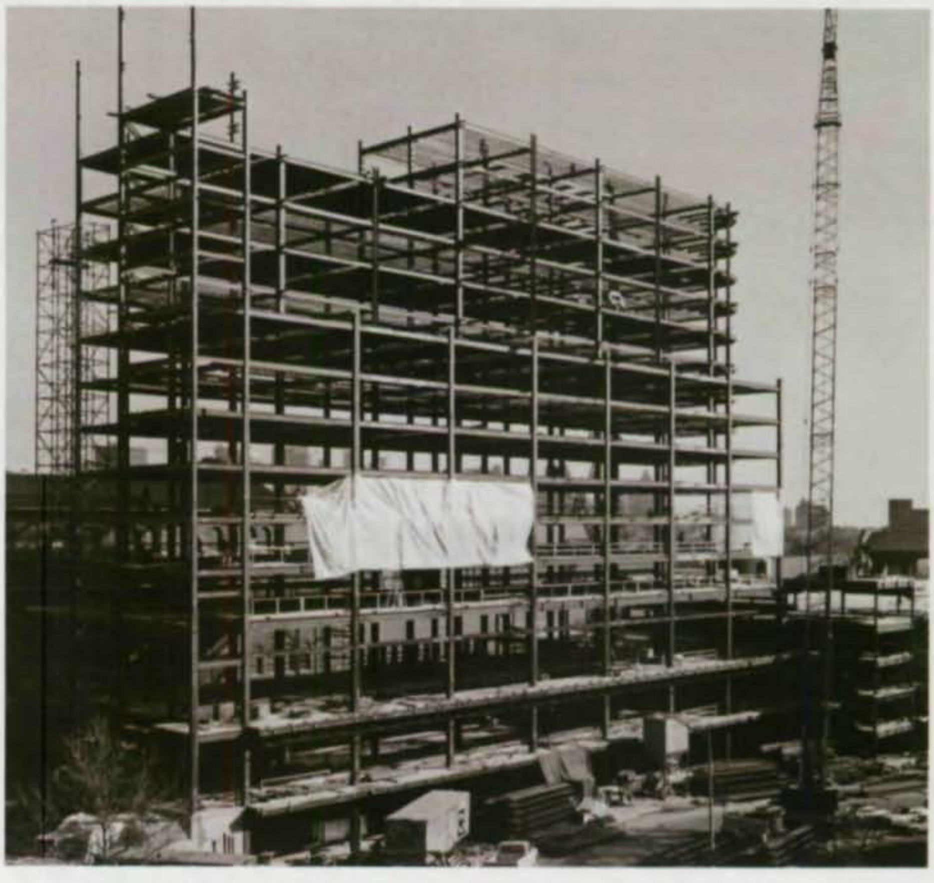
"To avoid this big bay in the tower, a transfer slab would have had to be inserted at the fourth level to cut down the column spacing to a more economical size for a concrete structure. Concrete contractors in the area advised that a full transfer slab might add as much as \$0.75 per gross sq ft to the cost of the structure. This cost and the time lost for the construction of such a slab stimulated a search for another answer to our structural problem.

"A scheme utilizing composite structural steel framing in the high live load levels of the base and simple joist and girder framing in the tower area was developed to allow straight-through framing from foundation to roof."

Mr. Brecher said the final design of the structure resulted in a steel weight of approximately 12.2 lbs per sq ft, including joists. Approximately 1,900 tons of A36 and A572 steel and about 400 tons of steel joists are being used to frame the structure. He also noted that the use of a steel frame structure simplified the connection details for the attachment of the precast facade desired by the architect.

Completion is scheduled for later this year.





AMERICAN INSTITUTE OF STEEL CONSTRUCTION
1221 Ave. of the Americas • New York, N.Y. 10020

Address Correction Requested

Sidewalk Canopies

One of the most attractive elements of the Downtown Evansville, Ind., rehabilitation program are the sidewalk canopies that serve to unify the shops and stores along the recently completed Main Street Walkway, a serpentine pedestrian mall. The city is constructing the canopies for any store or business that complies with certain Redevelopment Commission requirements, including safety, health and fire standards, and removal of any sign projecting from the facade of a building.

A cantilever system was chosen to avoid the possibility of any potential hazard to pedestrians. As a design element, the cantilever allows for maximum viewing of store facades and a lighter feeling than could be achieved by a post and beam system.

Steel was chosen for the structure of the canopies for its flexibility and relative ease of installation. Steel tube columns, and tee section glazing mullions were used in conjunction with I-beam cantilever members.

Architect/Engineer:
Condict & Fosse
Evansville, Ind.

General Contractors:
Key Construction Company
Evansville, Ind.
Peyronnin Construction Company
Evansville, Ind.

Steel Fabricator:
International Steel Company
Evansville, Ind.