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MODERN STEEL CONSTRUCTION

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CONTENTS

SPACE FORMS IN STEEL

Unusual and dramatic roof structures are becoming increasingly popular as an architectural expression. In the belief that engineers and architects would like a review of the various structural design procedures, AISC is preparing a lecture series for presentation in major cities throughout the U.S. This series, expected to begin in early 1966, will consist of five lectures:

Three Dimensional Roof Systems *– Various roof systems will be described and their basic design philosophies explained.*

Two-Way Truss Systems *– Simple grid systems will be solved by finite-difference and consistent-deflection analyses. A simple two-way system will be designed.*

Folded Plates *– Simple procedures will be developed for the analysis of folded plate structures. Both membrane and truss-type folded plates will be considered.*

Hyperbolic Paraboloids *– Analytical procedures for membrane and orthogonal grid hyperbolic paraboloid shapes will be reviewed. Design examples will include use of light gage deck membrane and structural steel h-p grids.*

Steel-Framed Domes *– Several dome types will be surveyed. Design procedures will be suggested for Schwedler and Ribbed Domes, including practical design examples.*

WE'RE SORRY

Page 2 of the last issue of Modern Steel Construction incorrectly identified the location of one of this nation's most respected colleges. Everyone, except the gremlin in our printing press, knows that Drexel Institute of Technology is in Philadelphia, Pennsylvania.

1965 Architectural Awards of Excellence

Deere & Company Administrative Center
Moline, Illinois
Architect: Eero Saarinen and Associates

Phoenix Mutual Life Insurance Building
Hartford, Connecticut
Architect: Harrison & Abramovitz

Emery Air Freight Terminal
Chicago, Illinois
Architects: Hammond and Roesch, Inc.
William V. Kehoe (Associate Architect)

Structural steel today is emerging more than ever from the restrictions of conventional uses. Steel as an architectural element appears regularly, and in far more diverse kinds of structures. And steel is opening the way to new construction concepts, some of which have not yet found a place in our architectural vocabulary.

Some of these new developments are apparent among the eleven buildings that have won 1965 AISC Architectural Awards of Excellence. This is the sixth year the American Institute of Steel Construction has made the awards – a continuing effort to honor architects employing steel in ways that are intelligent, imaginative, novel and creative.

The 1965 Awards competition was judged by a distinguished panel of five architects and engineers: Richard M. Gensert, Consulting Engineer, Cleveland, Ohio; Arthur G. Odell, Jr., FAIA, A. G. Odell, Jr. & Associates, Charlotte, N. C. (immediate past-President of AIA); Dr. Ralph G. Owens, Dean of Engineering and Physical Sciences, Illinois Institute of Technology, Chicago, Ill.; John Lyon Reid, FAIA; Reid & Tarics, San Francisco, Calif.; Hugh Stubbins, AIA, Hugh Stubbins & Associates, Cambridge, Mass.

In summing up their reactions, the jurors said that the more than 100 entries were quite different in their expressive use of steel. Many, for example, set their design theme with long spans or exposed steel in structures that used other materials to complement steel aesthetically and wed it structurally.

One of the most impressive award winners is the Deere & Company Administrative Center in Moline, Illinois, by Eero Saarinen & Associates. It is truly a great building – an honest expression of a steel skeleton with a sympathetic skin of bronze-tinted, laminated glass. The unpainted corrosion-resistant structural steel will weather to a deep hue, similar to that of oak trees. It beautifully accomplishes what Saarinen wanted: "to build an iron building that would recognize the special character of Deere & Company."

A delightful change of pace is provided by the New Jersey Tercentenary Pavilion at the World's Fair. Architect Philip Sheridan Collins, AIA, has used steel in a sprightly and imaginative way. The tapered steel tubes in com-

New Jersey Tercentenary Pavilion
New York World's Fair, New York
Architect: Philip Sheridan Collins

Rosen Residence
West Los Angeles, California
Designer: Craig Ellwood

First State Bank & Trust Company
Edinburg, Texas
Architect: Neuhaus and Taylor

Shamel Residence
Palm Desert, California
Architect: William F. Cody

pression and steel cables in tension represent steel used at its maximum. This is a gay, refreshing pavilion, with no pomposity.

Planning a residence for a tight, restricted lot in an established neighborhood is nearly always a challenge. In the Curtis residence, New Orleans, Louisiana, the challenge was met with evident imagination by the architect-engineer team of Curtis and Davis. Slender steel columns stiffened by arched steel supports supply the necessary strength without sacrificing delicacy and beauty. The designer has captured something of Mississippi Delta architecture, and it is very convincing.

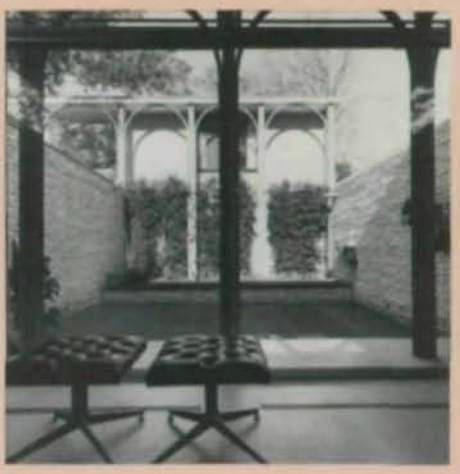
An outstanding example of steel's use to span interior space is demonstrated in the Seattle Center Coliseum, Seattle, Washington. Its 400 ft x 400 ft roof is supported by a two-way steel cable system on four mammoth triangular steel truss members. Designed by Paul Thiry, FAIA, the structure is both utilitarian and aesthetic in its dimensions. And the steel complex makes an exceptionally ordered and attractive ceiling.

Simultaneous demands on steel for visual prominence and effective strength are handsomely fulfilled in the General Electric Pavilion at the World's Fair. Welton Becket and Associates turned out an exhibition building that is more powerful, more direct, and simpler than the average. The web of thin-wall steel tubing which supports the steel roof deck is a type of lamella construction that reflects the variation in stresses within the dome, but not their magnitude. It's most fitting as a festive building.

Twenty, slender steel columns support the cantilevered, lenticular hyperboloid shape of the Phoenix Mutual Life Insurance Building in Hartford, Connecticut. In a very real sense, this effort by Harrison & Abramovitz is a fine piece of sculpture. As an architectural form, it is very smooth, very clean, very pristine, and relates well with its surroundings.

The Emery Air Freight Terminal at O'Hare International Airport in Chicago, may well become a prototype for low-rise industrial buildings on the out-

Chancery for the Federal Republic of Germany
Washington, D. C.
Architect: Egon Eiermann



Curtis Residence
New Orleans, Louisiana
Architect: Curtis and Davis

General Electric Progressland Pavilion
New York World's Fair, New York
Architect: Welton Becket and Associates

Seattle Center Coliseum
Seattle, Washington
Architect: Paul Thiry

skirts of major cities. Designed by Hammond and Roesch, Inc., and William V. Kehoe, Associate Architect, it is clean, attractive, and an obvious product of careful detailing. Steel made it possible to design minimum beam sizes to produce a light, open appearance, and long, clear spans for the typical industrial and clerical operations within.

An extravagantly beautiful setting in Palm Desert, California, has been matched by the straightforward simplicity of the Shamel residence, executed by William F. Cody, FAIA. Steel columns and beams keep the proportions trim and clear, and permit the extensive use of glass to make the view part of the family's everyday experiences. Since the house faces a golf course and passing golfers on three sides, the architect has neatly wrapped it around an interior privacy court.

One award is going to a German this year. He is Professor Egon Eiermann, an architect-engineer who designed the Chancery for the Embassy of the Federal Republic of Germany, in Washington, D.C. Steel, which is really the building's only decoration, is externally visible, pure, and natural in profile. It is dignified, attractive, and has none of the pomposity associated with earlier embassies.

The white, steel-framed lines of the Rosen house in West Los Angeles, California, mark out a structure that is practical, restrained and orderly. This is a home that blends admirably into its present setting. Yet, it could fit a number of alternate settings equally well. The house, designed by Craig Ellwood, is an expression of architectural clarity done with obvious care and precision.

While admittedly not unique, the First State Bank & Trust Building in Edinburg, Texas, is nevertheless the kind of architecture that is delightful and refreshing in its discipline and restraint. A soft-gray glass forms the interior skin of the building, while a hue-white glass sun screen between the steel collonade columns shields the banking floor and offices. Designed by Architects Neuhaus and Taylor, this simple and modest steel panel building is direct, has a certain quiet elegance, and is most appealing to the eye.

R_x FOR A HOSPITAL

by Louis Krasner

Preliminary design work for St. John's Mercy Hospital in Creve Coeur, Missouri (a suburb of St. Louis), began in December of 1958. We quickly narrowed our consideration to two structural systems – steel and reinforced concrete – and then ran detailed comparisons of typical floor designs in both types. These designs were for A7 steel, and 3,000 pounds per square inch 28-day strength concrete, prior to adoption of present AISC and ACI specifications.

In view of the multitude of ducts involved – oxygen and vacuum in every patient room, plus all the usual plumbing and wiring, plus pneumatic tubes in most service areas – we had to assume that ceilings would be required for both types of construction. In addition, we knew from an early date that emergency, lab and administrative areas would have flexible floor plans, and were thus alerted to the possibility that at some future time it might be necessary to punch through floors or ceilings. Those factors set us to thinking very seriously about a steel frame right from the start.

The 600-bed St. John's Mercy is Missouri's largest private hospital, and the very size of the program was a further factor in our final structural decision, for we knew that construction would require several seasons, and felt that steelwork could continue during cold weather months. Soil tests, moreover, indicated that we might expect to encounter boulder formations (and some **were** encountered during construction); so we were concerned over reduction of dead load.

We determined further that (a) there was no need for long spans, (b) the patient floor room-corridor-room arrangement was strictly modular, (c) patient floors would be lightly loaded, and (d) a square bay arrangement on the lower processing, emergency, lab and administrative areas was "best".

With all these reflections in hand, we chose steel beam and bar joist construction, by that decision obtaining a 25 per cent reduction in dead load, an 8 to 10 per cent saving in cost and the ability to continue work through three winter seasons. For a project of this size (400,000 sq ft), the material cost saving alone was considerable.

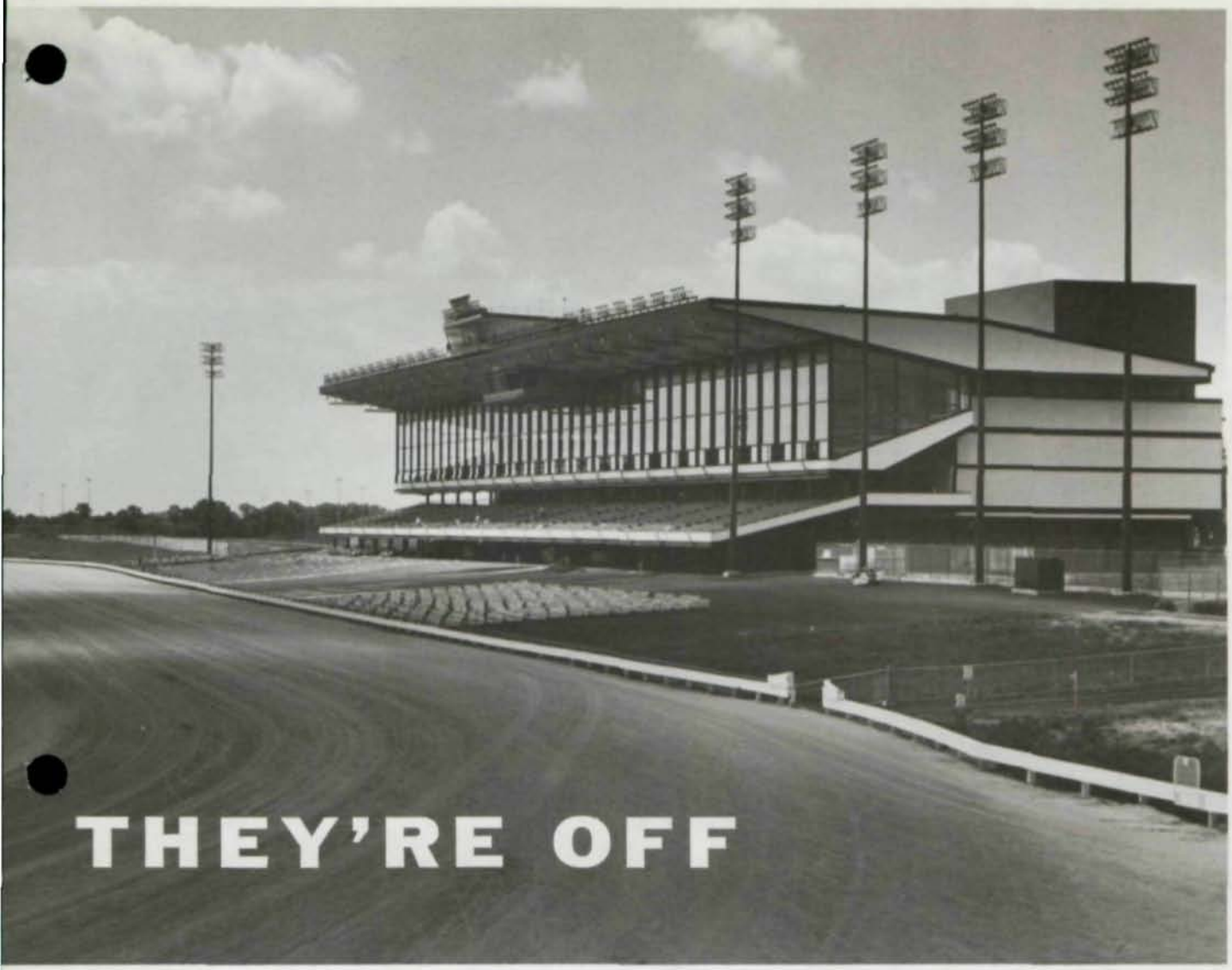
Turning to the three 12-family apartment buildings for resident physicians, and to the hospital's connected 285-student nursing school, we found essentially the same reasons for choosing steel still to be applicable (viz. light loads, desirability for reducing dead load due to subsurface boulder conditions, desirability to keep the work going through three winters). The boiler plant, 224 ft long, 84 ft wide and 28 ft high, presented somewhat different problems; but when we found that the plans could easily accommodate three 27½-ft spans providing flexibility for pipe suspension, we had no difficulty in selecting a steel frame for that building as well.

Louis Krasner is a Principal in the firm of Krasner, Hale and Harvie, Consulting Engineers, Clayton, Mo.

If the architect and engineer of a race track had to consider only the dedicated horse player, the "improver of the breed", his job would be relatively simple—some wooden stands and standing room at the finish line, a couple of hot dog counters and a string of pari-mutuel windows. He would be much more concerned about the care and comfort of horses and accommodations for grooms than the needs of patrons who would go anywhere, and do anything, to be in on the "action". But such patrons don't sustain racing or race tracks. The people who do are those who go for an evening's entertainment and who, today, demand the best.

To provide the best was a basic decision of the Liberty Bell Racing Association. But there was another important decision to be made. Liberty Bell Park, in the northeast section of Philadelphia, was the first race track to be licensed following the legalization of pari-mutuel harness racing in the Commonwealth of Pennsylvania. Opposition to the track had been strong. Would this inhibit patronage? How big should the plant be?

The owners selected the architectural and engineering firm of Alexander Ewing & Associates to provide the planning, designing and engineering. An $18,500,000 project evolved, to be built on a



THEY'RE OFF

300-acre site, comprising 73 structures. This included stables, dormitories, track buildings and all other auxiliary facilities for 1,200 horses and 600 grooms, plus two ⅝ mi. tracks (the main track and a practice track) and lighting.

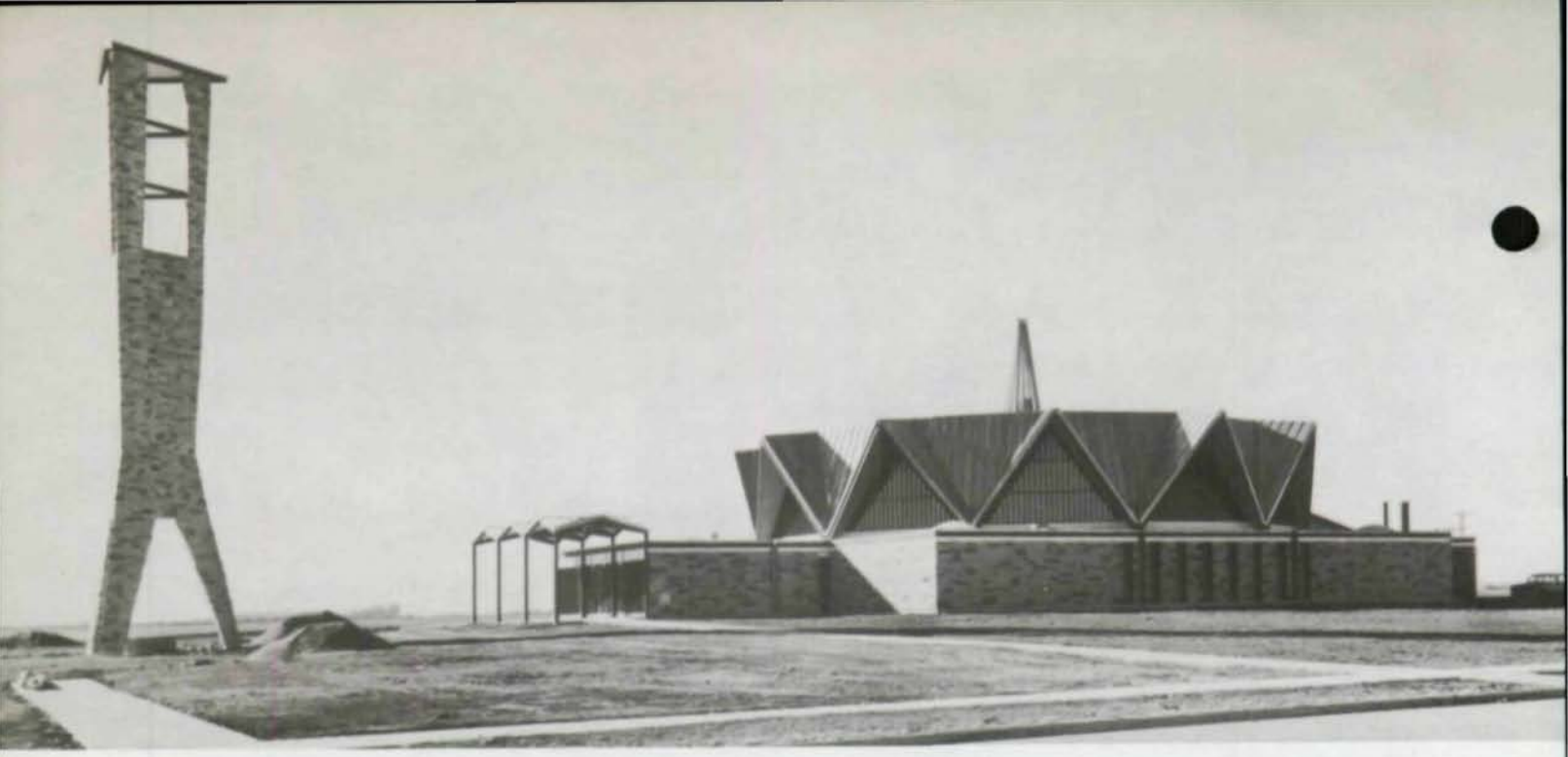
The Grandstand

The $8,500,000 grandstand was designed to accommodate a capacity of 28,000 race goers. Indeed, it was designed to coddle them, with an enclosed dining room overlooking the track (the largest in Pennsylvania, seating 1,000), a cafeteria for 200, grandstand seating for 8,300, and parking space for 12,500 cars. Now time became a vital element —18 months from the beginning of working drawings to opening night. Steel had the answer—quick fabrication, fast erection and lower costs.

A grandstand is a problem in vertical and horizontal traffic circulation and sight lines. Therefore, stairs, elevators and toilet rooms are clustered in the rear of the stand at the towers, so that traffic does not impede access to mutuel windows. Mutuels run longitudinally on each floor and are stacked one over the other. They have a 50 ft clear space front and rear for line forming. Concessions generally are at end walls on each floor.

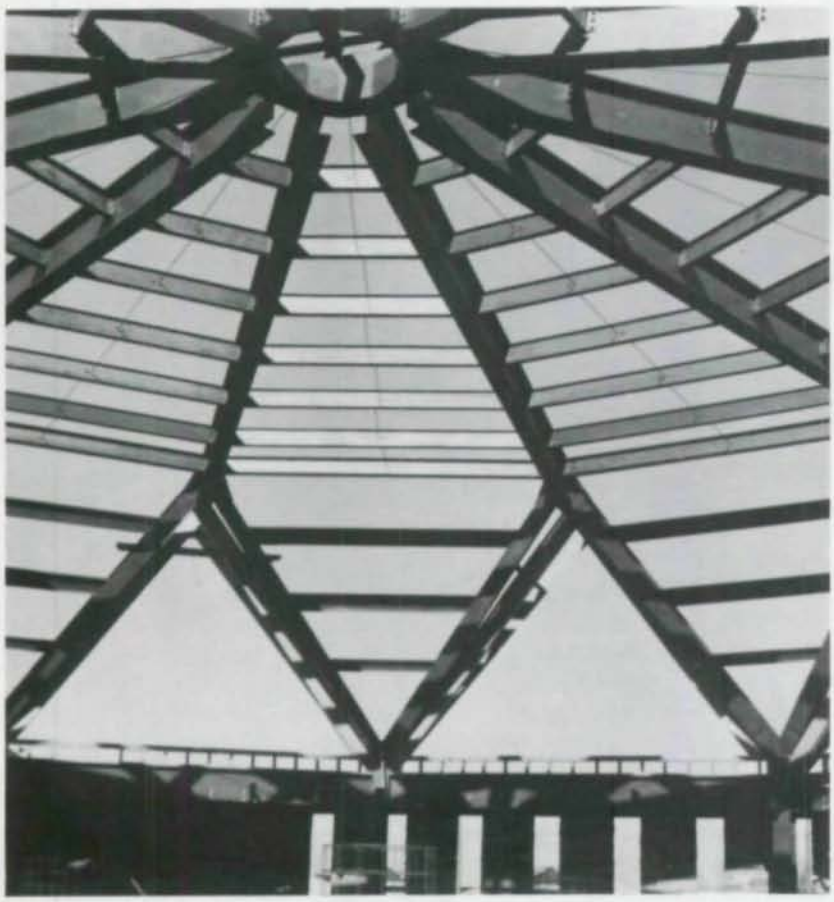
There are three public levels, two with seating. The basement level houses Administration, Money Rooms, Kitchen, Storage, etc. To facilitate deliveries, there is a loading dock in the basement with a truck tunnel through the building below grade and below public facilities.

Design was concerned with volumes, planes, shapes, and materials as they would cut patterns into the night sky when the track was in use. For this reason, glass was introduced immediately under the roof so that it seems to float in a pool of incandescence. Timeless materials were used wherever possible, since the grandstand must be able to withstand the ravages of cold weather with the interior heated in the off season.



New Architecture for a New Liturgy

by John G. Hotchkiss



In the creation of the design for religious architecture, liturgical requisites can be an imaginative challenge to the architect. Liturgy – the official worship of the church – as architecturally expressed in today's churches, reflects the emotional feeling of atmosphere and climate, and is symbolic of local congregational worship.

The profound influence on religious architecture in Europe began in the early twentieth century with the Liturgical Revival under Pope Pius X. In America, too, the Liturgical Revival offers new opportunities to the designer for expressing the Christian spirit today.

New liturgical requisites offer one means of escape from the stinted attitude of mediocrity. Architects Freerks-Sperl-Flynn of St. Paul were thus free to express their architectural style through a choice of materials.

The design for St. John the Evangelist Church, the Roman Catholic church in Grafton, N. D., is a meaningful synthesis of theology and architecture. It encapsulates new liturgical directives, which recognize congregational participation.

John G. Hotchkiss is Senior Regional Engineer, AISC, New York, N. Y.

Congregation is close to altar; no seat is more than 65 ft away.

Three requisites were given special emphasis. The patron of the church, St. John, is represented by the campanile containing three exposed swinging bells which can be seen for miles across the flat table land. The second emphasis centers around the baptistry enclosed within the entry. Finally, the sacrifice is given pre-eminence by the copper dome and the focal prominence of the altar.

A solution was found in an unobstructed, 12-sided dome structure to enclose the congregation. Within, it was necessary to consider a new liturgical requirement. The congregation should be brought as close to the altar of sacrifice as possible, in order that they may participate more fully with the celebrant. The effects of the recent Ecumenical Council are evident here.

This was accomplished by fanning the pews around the altar. With a seating capacity of 700 people, the most remote seat is only 65 ft from the celebrant, and 75 percent of the congregation are less than 50 ft away.

A further consideration, emphasizing the importance of the sacred space, led to the decision to create a low 100 ft square solid base capped by a light dome of structural steel covered by copper roofing.

The dome structure is wheel-like, radiating out from a central ring. The spokes fan out to meet steel tripod-type legs, carrying the thrust to earth. Resembling inverted V's, these legs form the large triangular windows, or dormers, that give an illusion of luminosity, a quality especially desired in churches. Small sheets of greyed colored glass enhance the feeling of lightness.

Religious structures often bring to memory the once traditional massive masonry Gothic edifices. It is well to recognize, however, that in Gothic style stone was used to the limit of its potential. Numerous devices emerged whereby stone could be opened up to admit interstices of stained glass. Paramount in the design was the goal to provide expanse of glass and illumination.

The modern steel frame far exceeds the potential for unobstructed openings of masonry materials, making this goal of Gothic builders possible for the first time. Thus the application of the steel frame and glass curtain wall to religious structures deserves far more attention than it has received. It suggests one more way to capture luminosity.

As the architects also pointed out, "This frame is buttressed by the surrounding low mass. Steel was selected for its lightness and ease of erection as well as for economy."

Religious architecture, and art as well, have reached a degree of maturity throughout the Christian world. It was in the 1930's, a turning point in ecclesiastical architecture, that occurred a period of liberation from outworn clichés and nostalgic practices. Today's religious architecture is a living architecture which cannot find inspiration in a recall of past triumphs.

Otto Bartning, the late German architect, said "It is wrong to believe that by using modern materials and building techniques we secularize church construction. There is a spiritual quality in any material. It is our present task to find this spirit and put it into the service of religion." Comparatively speaking, Freerks-Sperl-Flynn have produced a religious building which is closely akin to the philosophy of Bartning.

Structural Engineer for the project was Schuett-Meier Co.; General Contractor was Eickhof Construction Co.

Motor Hotel with a View

The site of the Charter House Motor Hotel, Cambridge, Massachusetts, is surrounded by industrial buildings on three sides. The fourth side faces east to the Charles River and across to a magnificent view of Boston. Architects Curtis & Davis made sure that each of the 225 rooms in the building faces east, giving every guest a beautiful view to the river. The structure is designed as two clearly articulated masses. A low mass running north and south, raised off the ground, allows parking below and contains a restaurant, coffee shop, meeting rooms and pool. An 8-story tower of 200 guest rooms runs at right angles to the low mass. The tower, formed of a series of alternating solid and glass planes, runs 30° and 120° to the main east-west axis. This allows each guest room on a double loaded corridor full orientation toward the only available view. It also creates a sitting space somewhat separate from the sleeping area within each guest room, defining it in a way that is not possible in a rectangular room of the same size. Difficult soil conditions caused careful consideration to be given to several structural systems. Steel was chosen because of its light weight and because it was the most economical solution for the problem. Isidor Richmond and Carney Goldberg of Boston were Associated Architects, and Metcalf and Eddy, Inc. of Boston were Structural Engineers for the project.

STEEL CONSTRUCTION IDEAS IN ACTION

A Unique Garage

A garage structure recently constructed at Brunoy, France is not only functional, as such structures must always be, but also possesses unusual qualities of simplicity, beauty and lightness. Designed by Architect M. J. Compere for the main agent of a European automobile manufacturer, the garage houses a service station, a repair shop and storage space on four floors, one a basement. The framework is completely in steel, including the roof and a constant radius helicoidal access ramp for vehicles. Situated in the center of the garage, the ramp is the determining element in the architectural design of the building. The whole scheme is uncluttered and bright, taking advantage of the delicacy of the structural steel parts, and using interlocking glass panels on the main facade. Square steel tubes serve as columns to carry the upper levels of the helicoidal ramp, and create a safety cage for the ramp. The access ramp consists of hollow floor units covered by a concrete slab, all supported by steel joists bearing on curved channel stringers. No fire protection was considered necessary anywhere in the structure.

Photo courtesy of Acier Stahl Steel

Simple — But Sophisticated

The Howard C. Baldwin Memorial Pavilion, Oakland University, Rochester, Michigan, is an open air summer concert pavilion to shelter most of a seated audience from rain. But beyond this basic need, several more sophisticated requirements faced the architects:

- A shape that would lend itself well to the acoustics of the building, even with open sides.
- A clean, straightforward, attractive clear span structure that needed nothing other than itself aesthetically and practically.
- A need to relate the structure to an extremely beautiful natural wooded "bowl".
- An economical structure dictated by a limited budget. The project was completely financed on a contribution basis (including the Architect-Engineer and the General Contractor).
- A ridiculous time schedule. Architectural and structural design started simultaneously just a bit more than four months before dedication.

Structural steel rigid frames, plastically designed, were chosen as a scheme that would satisfy all these requirements. And they did, beyond the most optimistic hope of the designers. The frames, uniform in depth, relate to the shape of the pavilion, varying from 30WF to 36WF rolled sections. A handsome wood roof deck spanning to fanning purlins relates to the "woodsiness". The frames increase in span by 15 ft per bay, and simultaneously, the ridges and column bases rise up in elevation (but at different slopes). The result is almost a three dimensional quality, particularly in its relationship to the surrounding trees. The somewhat triangular plan not only lends itself ideally to the required seating, but aids in the bracing of the frames. Architects and Engineers were O'Dell, Hewlett & Luckenbach, Inc.; Stephen S. Page, Associate Architect; and Thomas E. M. Wheat, Associate Structural Engineer, all of Birmingham, Michigan.

Eye-Catching Bank

Two basic problems confronted Architect Robert Bowlby in the design of the Founders National Bank Building, Oklahoma City, Oklahoma: a large bank lobby was to be constructed without interior supports that might impede traffic, and the building was to create attention without resort to signs or other promotional devices. Architect Bowlby's unusual solution is a striking illustration of the aesthetic and functional use of steel in creative architecture. Two giant steel arches, carrying a suspended steel-framed roof, provide 9,000 sq ft of column-free banking space and an eye-catching exterior which provides its own identification to the banking public. Each arch is a curved tapered box section of 3/16-in. A36 steel plate. The "hanging" roof structure is made up of open web steel joists, all curved to the same radius. Structural Engineer was Calvin Garrett of Oklahoma City.

LIBRARY ON A SHOE-STRING BUDGET

by Mariano E. Martinez, AIA
Media, Pennsylvania

My assignment began when residents of Marple Township, Pennsylvania – a suburb of Philadelphia – voted in favor of a $100,000 loan to build a new community library. I knew the figure couldn't be increased, so my goal was set: to design a structure within that budget, and, at the same time, produce a building that would meet the present and future needs for a library in this fast-growing community (an area that has doubled its population during the last decade.) And since I, too, am a resident, I felt particularly responsible for its success.

There had been an old library, and to a certain extent it helped dictate what we avoided. The former building was a wood structure. Over the years it had been invaded by termites. When the Township tore it down, many of the old wooden members were found to be literally crawling with termites. It was agreed, rather unanimously, that wood framing for the new library was out.

Aside from this, and the financial limitations, planning was relatively normal. We wanted to enclose a space that was airy, open, well lighted – without glare, and sound absorbing. The building would also have to adapt easily to a future addition. And we wanted to raise a structure that was architecturally appealing, creating an air of invitation to visit the inside, while keeping in mind that the site was wedged among single family homes.

One minor aspect was unusual. Township money had been set aside for a full-time librarian, but much of the routine work was to be done by volunteers – mostly mothers of the children who would use the library. These ladies (some 15 of them) much preferred to volunteer one night a week as groups. They enjoy working and chatting together in the same room. As a result, we enlarged the administrative area (to 24 ft x 40 ft), which levied more stringent restrictions on the remaining space.

In the end, we came up with a building which **did** stay within the budget and, we feel, proved a very satisfying answer to the various design criteria. One other thing. Although I wouldn't want to permanently endorse any one material over all others, it is true that the inherent strength and versatility of steel opened the way for the final design, at the price the Township could afford.

To keep site costs down and develop a more interesting relationship of spaces within the library, we let the building follow grade. Since the lot slopes about 10 ft from one end to the other, what resulted is a split-level. This permitted us to set off and close in the administrative area on the lower level, which left the main reading room and stacks on the center and largest level.

The choice of a steel, folded-plate roof for the major portion of the structure was influenced by several things. Most important, it allowed a continuous open span throughout the main reading room. Of course, the design also let us increase the glass area, raising the flow of daylight into the library and injecting a more pronounced sense of spaciousness from the reading room floor.

In addition, each steel folded-plate member was formed underneath to receive acoustical panels which became the ceiling. It was interesting to note that the per sq ft cost of the folded plate roof/ceiling was about the same as the cost of the flat roof over the administrative area. Yet, the more dramatic saw-tooth bays produce every bit as good sound absorption as sprayed acoustic plaster on the administration room ceiling.

The folded-plate members also allowed us to run our wiring through the indentation to fixtures which needed no special hangers. The fluorescent lighting panels in each bay sent out diffused light which was further diffused because beams from opposite panels crossed in mid-air at right angles. The outcome: glare is practically non-existent.

Tubular steel columns, 4 in. x 4 in., were used to support the folded-plate roof. The roof extends 4 ft beyond the face of the wall, but without the acoustic panels that appear on the inside. The folded-plate jumps a clear span of 40 ft, and therefore required welds with the most exacting tolerances.

Marple Township Library is open and inviting. Steel framing was key to economical aesthetic design solution.

Seven months were required for construction. New building holds 16,000 volumes, has ultimate capacity of 35,000.

All-Weather Bridge

Probably the world's only heated and air-conditioned bridge and fishing pavilion can be found at Meadow Lakes in Hightstown, N. J., a new concept in retirement living. Architect Richard Chorlton, AIA, of Princeton, N. J. designed the bridge to save the residents of the community a long walk around the edge of a lake which separates elements of this sprawling group of garden level apartments. The bridge is fully enclosed and temperature controlled to assure all-year comfort. Interestingly, architect Chorlton specified steel frames for the apartments when it was found that the incombustible steel framing significantly reduced the cost of fire insurance.

Multi-story Plastic Design

Some five hundred engineering educators, practicing engineers and building officials were introduced to the subject of Plastic Design of Steel in Multi-Story Frames at a Conference held at Lehigh University from August 24th to September 2nd, 1965.

Lectures at the Conference described the results of research and newly developed design methods. In addition, attendees had an opportunity to observe numerous full-scale tests on three-story steel frames.

The economic benefits offered by multi-story plastic design of steel will be important in the construction of commercial and institutional buildings, as well as structures for industrial use, public ultilities, public buildings, research facilities, and parking decks.

Tapered Tower for Chicago

Scheduled for completion in early 1968, the 100-story John Hancock Center will rise 1,100 ft above Chicago, and will become the world's second tallest building. (Only the 1,280-ft Empire State Building is higher.) It will, however, be the world's largest multi-use building, with 2.8 million sq ft of space divided among apartments, business offices, shops and parking. The tapered steel-framed tower features a unique structural design, and will behave like a true vertical cantilever under wind loading. X-bracing in the plane of the exterior walls will resist the major portion of the frame's lateral shearing stresses, and will be visible as part of the exterior architectural treatment. Architects and engineers for the project are Skidmore, Owings & Merrill, Chicago; General Contractor is Tishman Realty & Construction Co., New York.