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ARCHITECTURE OF JOY?
A Gallic version of Miami Beach Wonderland is La Grande Motte, one of the newest and most flamboyant of French Riviera resorts. Designed by architect Jean Balladur, the assorted megastructure-type hotels and apartments resemble a cock fight between clashing architectural cliches, all designed to make this part of France the vacation land extraordinaire. Covering 1,730 acres of land and 7,900 acres of lakes, La Grande Motte is part of the largest state-supported resort development ever undertaken in France: Languedoc-Roussillon, which stretches 120 miles from Marseilles to the Spanish coast. By 1975, the area will expect 2 million tourists and La Grande Motte will have 42,000 beds for them in hotels, apartments and homes. It already has 10,000 ready for those who can't wait to visit Miami.
MASONRY MUSEUM
The new Nova Scotia Museum makes available 65,000 square feet of display halls, classrooms, auditorium, and workshops for displaying a large and varied collection of valuable scientific and historical material. The Halifax architectural firm of Duffus, Romans, Kundzins & Rounsefell explain that the external treatment was intended to express the internal function—the large exterior brick wall, for instance, shields the main interior exhibit area, expressing that significant interior volume. The main floor is open, glazed from floor to ceiling, and bands of brick wrap around each facade for a height of several stories. As the local newspaper expresses it, the building can be "viewed from any angle," since it has "four front sides and no rear." Cars parked in a sunken area are not visible to street traffic. The building cost $1.6 million, the exhibits $400,000.

CURVACEOUS COLLEGE
New College II, of the University of Toronto, is an exploration of the possibilities of the curved line, according to Architects Fairfield & DuBois. "More and more contemporary structures are using this kind of geometry. In this building we have added another aspect by using the curve in relation to the straight line." They explain further: "New College exploits the spatial resonances of curved-walled exterior space in its courtyard, and of undulating interior spaces in its bedroom and common floors. The idea has many possibilities for future development," say the architects; "in this urban context we are showing one such possibility." The architects state that their "basic misgivings about client dictated corridor system residences were strong motivations behind the shaped corridor." They wanted to create "eddies and cul-de-sacs for sub-groupings." The roof terraces are a welcome facility in an urban residential college complex.

AWARD-WINNING CHURCH
Recipients of an Honor Award from the Architects Society of Ohio for St. Margaret of Cortona Church in Columbus, Ohio, are Pietro Belluschi and Brubaker/Brandt, Inc., Architects-Planners. The jury commended the building's "appropriate air of religious tranquility. The introduction of soft daylight is both dramatic and effective to the form and content. The lofty space and use of natural materials also contribute to the total success of the building." While the jury felt the building to be "strong" it deplored the inadequate site development.

SHELLS FOR LIVING
The ruffled skirts and horned face-mask at left belong to a house in Golden, Colo., designed by Architects Stan Nord Connolly. Its fanciful structural shells are made entirely of urethane foam, poured over inflatable forms. Window and door frames—and other more unconventional details—we shaped by hand when the shapes reached the proper thickness. Double curvature makes the plastic shells rigid enough to stand up without reinforcement (except where they are anchored to the concrete foundation). Surface materials in the 1,600 sq.-ft. interior include white plaster applied to the form, natural wood, steel, and carpet. Many interior details, including curved storage walls and a freestanding steel fireplace, were personally shaped by the owner, Sculptor Ron Kessinger.
EXAGONAL OFFICES

The concrete-and-glass building shown below contains the West German headquarters for the Xerox organization. The floors consist of three hexagons grouped around a central service and circulation core, and the sides of board-formed concrete parapets that protect balconies used as emergency exits from different office floors. (The building is actually sealed and air conditioned.) The site is in a suburb of Dusseldorf, and the architects were Hentrich-Petschnigg & Partner—best known for their Bochum University campus (March '69 issue) and their Europa Zentrum in West Berlin.

OUTER TUBES

Designed expressly for the owner's use, this five-story building contains offices for the Tubing Division of Bundy Corp. The building is planned on a 5-ft. module and is supported by a central core with columns 10 ft. on center at the exterior wall. Between each pair of structural columns is a mechanical riser-tube bringing all utilities to window induction units. Fed from the roof, these tubes service the ground floor at the ceiling line. In order to give the building an industrial character, limited corrosion steel tubes are used for both mechanical distribution lines and as forms for columns. The building in Warren, Mich. was designed by William Kessler & Associates, Architects.

A PLACE IN THE SUN

On the slopes overlooking the Maltese fishing village of Marsascala, the British development company, David Charles, has built a vacation community called Ta Monita of linked villas, terraced houses and flats. Shown here are curved apartments by architects England & England. Each floor has only four apartments; all living-dining rooms and primary bedrooms face onto the terraces, while kitchens and secondary bedrooms face the rear. A single apartment will have as many as three terraces along the arc. Construction is of the solid masonry traditional in Malta.
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An unusually innovative nursery school, with 50 children in each of its four "houses," is planned for the Child Growth and Development Corp. (in Harrington Park, N. J.) by Paul Heyer, architect. Traditional classrooms are abolished in favor of an open plan that gives children more freedom of choice, more opportunity for growth, as they explore what interests them in their richly equipped house.

The "houses" open symmetrically off a central spine (lit from above). A dining-painting gallery is at the northern end, and a sun bowl at the southern. The second-floor space, with its outdoor staircase, is for teacher training.

"I believe in universal space, but in doing it specifically," says Heyer; "the spaces are very open but are of a very particular character." A soundproof room in the center tends to zone each house.

Heyer wanted the building clearly understood by children aged three to six, and construction is of brick bearing walls and wood beams. Everything is exposed, including the piping. (Carpeting, piping, etc., are different color in each house.) A seating carousel, audio book and puppet theater are specially designed.
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LETTERS

NORRIS IS NO TRIFLE
Forum: In Frederick Gutheim's tribute to Roland Wank in the September issue of the Forum, reference was made to the design of the town of Norris as a "trifle" which Mr. Wank did not concern himself with. This is an error. Mr. Wank was a neighbor of ours in Norris, and I recall that he was very much involved with the design of the buildings and houses in Norris and the many other communities in the TVA. If Mr. Gutheim will refer to the August 1939 issue of the Forum, he will see that Mr. Wank was a member of the planning staff and principal Architect in the Department of Regional Planning Studies under the direction of my father, Earle S. Draper. My dad and Mr. Wank were good friends and worked together in a team effort with the other distinguished professionals, and I recall the occasion when dad called on the great Albert Kahn to support Roland Wank's outstanding designs for the engineering structures. As far as the design of the town and structures of Norris, Eliel Saarinen was consulted in the early stages of the planning, and he concurred with the general design approach. I wish that there were many more "trifling" towns like Norris for our restless youth to grow up in. I recall with pleasure the meandering paths, the houses carefully sited to complement the beautiful landscape, and most of all the abundance of open spaces and play areas. It is a pity that the great achievements brought about by the collaboration and team effort of the distinguished Architects, Planners, Engineers, Geologists, and other professionals in the TVA in the late 30's are so easily forgotten by other prominent individuals as Mr. Gutheim.

EARLE SUMNER DRAPER, JR.
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MONUMENTAL HOGWASH
Forum: How can anyone today seriously propose such continuing waste of our throw-away riches, and repeats unspeakable crimes against art? I wish that there were many more Mr. Wanks, many of our clients. And of course, do you. You can help by demolishing our prejudice and reordering our priorities.

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Sibyl Moholy-Nagy, who died on January 8th, was my severest critic. Whenever it seemed to me that we had done something reasonably well there would arrive, sure as hell, a blast from Sibyl pointing out to me in acid tones what a miserable wretch I had turned out to be, after all these years. Her loyalties were fierce, and her fiercest loyalty was to architecture as an art. She thought that she also harbored hatreds, but she was wrong—she harbored only withering contempt for anyone who, in her view, cheapened the art she loved.

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Her accomplishments are listed in Who's Who. She was the most prolific member of our Board of Contributors, and the most controversial and the most distinguished.

Although she was well over 30 when she died, those who trusted and revered her most were her young students in the U. S. and abroad. What they saw in her, I think, was an honesty so pure as to be almost devastating. She never once pulled a punch. I know. I had to dodge a few of them myself.

When I knew that Sibyl was dying, I wrote something for this space hopefully to cheer her up. I reported that the American Institute of Architects had decided to award to her its 1971 Architecture Critic's Medal. I wrote that a lot of her critical writing had appeared in our pages, and that we were thrilled. I also wrote that Sibyl might have some fairly sarcastic comments on that award, her opinion of the A.I.A. being what it was.

Well, I take it all back. The only nice thing that happened to her before she died was to hear that the A.I.A. had awarded her that medal. It really made her very happy, and it did the same for us.

—PETER BLAKE

Housing

Housing Bill Passed

While the lame-duck Congress was immobilized by filibuster, it managed to further frustrate the Administration's legislative program by passing a comprehensive housing bill that President Nixon had asked it to defer until next year. The main provision—a broad new policy for building new communities—had been suggested, in similar form, earlier last year by HUD. But Administration budget analysts had pulled it because it was too costly. The House had obligingly removed it from the legislation, but it was restored in joint Senate-House conference.

Present law—enacted in 1968—provides for loan guarantees and other assistance for establishment of new communities, but only three applications have been approved because HUD hasn't the resources to guarantee the required investments.

The new bill would authorize the Community Development Corporation to act in the acquisition of land in both new and blighted areas, extend loan guarantees for long-range building plans and administer grants for various public services.

Other provisions of the $2.9-billion housing measure provide for the government to underwrite crime insurance to maintain reasonable rates; and charge the President with formulating an urban growth policy.

One Senate provision—appropriating $750 million to pay deficits of mass-transit lines—was dropped by the conference.

The Fire This Time

The start of construction on a precedent-setting housing project in Englewood, N. J.—on sites both inside and outside the city's primarily black Fourth Ward—has coincided with a series of fires in the Fourth Ward that has left more than 40 persons homeless. The arrest of a black woman for one of the fires (in her own home) has not quieted fears or answered questions concerning the people behind this systematic destruction.

Some theorize that the fires were engineered to lower property values in and around the Fourth Ward's recently approved urban renewal area. Others fear that it is an attempt to drive blacks out of town so as to lower the property values of those who need relocation, or is revenge against the Greater Englewood Housing Corporation (GEHC) for its unusual split-site project.

GEHC's 270 units are divided between a site in the Fourth Ward and another in the predominantly white Second Ward. (Housing on both sites is a pleasant cluster design, by Feldman and Sanzari, Associates, Architects.) By using two sites, the city meets the "balance requirement" written into HUD regulations by former Secretary Weaver (for every relocation unit built in a racially confined area, one unit must be built outside that area). Englewood's failure to meet the balance requirement caused federal rejection of its urban renewal plan in 1967; before that, all efforts to get the local Housing Authority into balanced housing had failed.

Resistance to GEHC is tenacious and bitter. In December at the Second Ward site, a construction shack was battered, a bulldozer run into the creek, and surveyor's stakes pulled up. During the past 18 months, citizens of the Second Ward had brought a total of nine court suits, challenging the City Council for making a lease, challenging the Zoning Board for granting a variance, etc.

The final court decision, 7-0 in the state Supreme Court last
July, was a landmark case in the struggle for open housing in suburban America. Seeking to sustain the municipal approvals, lawyers Mazer & Lesemann did not argue for a traditional interpretation of "the general welfare" (for instance, providing low and moderate income housing). Instead they sought to define the breaking up of racial confinement as promoting the general welfare. Their successful argument gives a precedent to communities across the country, and meanwhile a project moves ahead in Englewood.

**PLAN FOR A METROPOLIS**

Meanwhile, out in Dayton, Ohio, five outlying counties have approved a plan to disperse some 14,000 units of housing (many of them public housing) throughout the white suburbs. The plan is regarded nationally as "remarkable," and even locally there is some amazement that it has been approved by officials. Opposition has been vigorous, but proponents waged a strong campaign to allay fears.

The plan, which originated in the Miami Valley Regional Planning Commission, divides the metropolitan area and its population of 842,000 into 53 "planning units." Each unit is assigned its quota of subsidized housing under a formula that considers the present density, present amount of housing for low-income families, and other factors.

At this point, much depends on a firm policy from Washington. The Dayton plan seems to fit the views of George Romney, secretary of HUD at this writing, but is in apparent contradiction to President Nixon's views. In his press conference in mid-December, the President stated that "forced integration of the suburbs is not in the national interests."

**STUDENTS**

**ACTIVIST ARCHITECTURE . . .**

A small group of student volunteers at the Pratt Institute School of Architecture in Brooklyn have completed a self-help housing plan for the Freedom Quilting Bee Cooperative in rural Alabama. The project began with some materials will be purchased in the area and over 40 per cent of the construction cost per unit (that for labor, largely unskilled) will be returned to the community in the form of wages. Construction may begin as soon as February on the first of the four-bedroom units, and the students will be on the scene to lend a hand.

**Present home, FQB**

photographs of the present housing conditions at the FQB—a quilt-sewing co-op aided by OEO. The Pratt volunteers, with their project director, Assistant Professor Theoharris L. David, visited the co-op to offer their help. The Alabamans responded with caution, having been "surveyed to death," says David, by people whose "help" had been nothing they could see.

Later, when the students forwarded their plans and drawings, the co-op reacted with enthusiasm, comments and suggestions. Flown to New York by the school for a formal presentation of various alternate schemes, the Alabamans indicated their preferences and made further requests and alterations.

The plan includes three- and four-bedroom detached houses, housing clusters and a commercial center. Twelve families are now arranging financing—through 30-year, low-cost loans from the Farmers' Home Administration—for the first four-bedroom units. And HUD has approved design and construction of the cluster units—to be owned by the co-op—and will either advance the money or guarantee third-party loans. The students' cost estimate for the four-bedroom unit: $8,275.84.

The specifications were worked out so that all the materials will be purchased in the area and over 40 per cent of the construction cost per unit (that for labor, largely unskilled) will be returned to the community in the form of wages. Construction may begin as soon as February on the first of the four-bedroom units, and the students will be on the scene to lend a hand.

**. . . AND FROZEN MUSIC**

The fifth-year design problem at Catholic University of America's School of Architecture and Planning was to design a three-dimensional space that expressed the emotional quality of a chosen sound. Some architecture students we know with a passion for relevance have rioted over less. But assistant professors J. Ronald Kabriel and Theodore Naos explain their project this way: "Order or disorder of sound, space, and emotion is used to evoke particular feelings about our environment and has much to say about how effectively any society communicates."

**Future cluster housing, FQB**

**Bach's Passacaglia**

Student Joseph Prucnal incorporated the designs of Giu­ gavalli Bibiena, finding "basic perspective frame work (theme) with applied ornament (variations)" expressive of the chosen sound: Bach's Passa­ caglia and Fugue in C Minor (for harpsichord).

**Moustaki's Nos Corps**

Apolinar A. Fernandez three dimensions to the "scien­ tifically rhythmical flow great amount of mystical­ ity" in the song "Nos Corp­ res" (theme) with applied orna­ ment (variations)" expressive of the chosen sound: Bach's Passa­ caglia and Fugue in C Minor (for harpsichord).
Late in November, Santee accomplished another first in recycling water sewage. For the first time in this country, it is using reclaimed waste water through a metered system of lines for irrigation uses. Separate pipelines were constructed to deliver water to a Little League baseball field, a golf course, and a commercial Christmas-tree growing farm. The meter costs the customers $50 per acre-foot, which is 326,000 tons. This is compared with $0 for domestic water imported from the Colorado River. Eventually, the district plans to install a second distribution system for homeowners' garden needs. And a pilot project, led by the federal government, is purifying 100,000 gallons of sewage for drinking water. District officials hope that some day the recycling of sewage for drinking water can be made economically feasible for general use.

SANCTUARY IN PARADISE

Honolulu Academy of Arts that demonstrated the complex interdependence of man and nature. The show began to make its point before the visitor even entered the door with large graphic panels representing sun, water and earth hung from a frame of construction scaffolds. Inside, the scaffolding continued to bring everything together: photographs by Robert Chinn and Robin Lee focused on the island's many different ethnic life-styles; tapes of traffic sounds and pile drivers mixed with contemporary music, and four television sets tuned to different programs with audio from unrelated FM radio stations represented man's electronic environment (pollution?); and three slide shows, viewed simultaneously, brought Honolulu's stunning natural setting into the framework.

To cap it off, closed circuit television monitors put the visitor in the picture and on the spot, though Fanning says there was "no attempt to draw any conclusions."

(continued on page 69)
GREENWICH, CONN.

Headquarters offices for American Can are a model of restraint

Gordon Bunshaft, of S.O.M., has designed a great many headquarters offices intended to present to the outside world a dignified and civilized "corporate image;" but this new building for American Can may be the first one he has done to create a sense of "corporate anonymity." It is, in fact, a perfect example of less being more.

When American Can decided to move out of Manhattan and into Greenwich, Conn., the company acquired a beautifully wooded 175-acre estate. The land was zoned "residential," and American Can's management—an unusually enlightened group—decided to work as closely as possible with the Town of Greenwich in getting a variance that would permit the construction of the new headquarters offices. The company's objectives and those of the Town were identical: both wanted to preserve as much of the natural beauty of the site as possible; neither wanted to disturb the quiet, residential character of the old King Street on which the estate was located; and neither wanted an eyesore.

So American Can, in effect, helped the Town of Greenwich to write the new zoning regulation that would regulate American Can's own headquarters building: not more than 25 employees per acre; no cars on acres of parking lots; no excessive building height; no excessive encroachment upon natural preserves; in short, the least possible amount of building.

When S.O.M. were presented with this site and these limitations, it became clear to Bunshaft that the only way to build an invisible building for 2,200 employees was to seek a remote corner of the site and to go, at least partially, underground. The contours on the site plan, below, show how the building was screened from King Street (though it is visible from the new highway—Route 684—to

View at left shows main office building as seen from smaller executive complex. The latter has post-tensioned girders, and ends of tension cables are capped with stainless steel "buttons" (see also cover). At right, an aerial view from the south showing the four ramps that serve the 1,700-car garage under the main complex.
The contours also show that pulling the new buildings that far back from the street meant placing them into very hilly terrain.

In fact, the main building (a 558,422 sq. ft. office complex) was sited to bridge a deep ravine that bisects the property and drains into a swampy area of about 40 acres along the eastern portion of the site. But having decided to "bridge" the ravine with his main building, Bunshaft then realized that this bridge could be turned into a dam by hiding almost all of the necessary parking facilities in a five-story, 1,700-car garage under the building proper.

This basic design decision solved several problems: first, it put almost all the cars (except for those of visitors) out of sight; second, it created a pretty lake in the northern, uphill portion of the ravine; third, it regulated the flow of water into the swampy bird sanctuary at the foot of the site; and, fourth, it positioned the main building between rocky and wooded hillsides and thus reduced its apparent height to that of a sliver of concrete and glass.

There are, in fact, two buildings: the main building has five garage floors, topped by one terrace floor (containing cafeterias, lounges, data processing center, and mechanical equipment), plus three office floors on top of that—an incredible nine stories, most of them invisible. This building contains all the staff of American Can's many divisions. The second building, a square doughnut, one story in height above an underground garage, houses the executives. The two buildings are connected underground, but separated by gardens and terraces above grade.

The two buildings differ in size as well as detail: the main office block measures 525 ft. by 255 ft.; its structural bays are 60 ft. long and 30 ft. wide; the 30 ft. spans are handled by enormous, cast-in-place girders, poured with a handsome granite...
The building, with its five floors below, acts like a dam seen above. On top of those floors there is, first, a terrace whose dining spaces overlook a man-made lake. Below: a typical office space, showing the details of the ceiling system. At right, views of the entrance lobby.
jobs. American Can is as good as it is because those lessons have been learned.

What does all of this competence do for the people who work there? American Can was obviously concerned about resignations when it moved into the suburbs. There have been very, very few—about 80 out of a total of 2,200. One reason may be the generous amenities supplied by the management: a health club, a bank, a general store, a cafeteria (mentioned earlier) that compares favorably with most Manhattan restaurants; plus, of course, the convenience of a drive-in job (elevators take you up to your office from the parking garage inside the “dam”), and beautiful walks over the remaining, untouched acres.

But there are other qualities as well to keep American Can’s staff content. And those were supplied by the architects.

The qualities of light, for example. The ceiling system does not really provide the normal sort of office lighting; it supplies a glow instead. (One of the lessons Bunshaft learned from this job was that fluorescent tubes glowed one way when mounted on top of heat-emitting ducts, and another way when mounted on top of dummy—or sound-absorbing—“ducts.”)

And the qualities of sound. The offices are carpeted throughout, and there are also those sound-absorbing tubes above. There is a sense of luxury about these offices, and there is also an extraordinary silence. Many of the offices have partitions that stop well short of the ceiling; yet there is no loss of privacy, and no irritating noise.

Because American Can was under pressure to vacate its Manhattan offices, these new headquarters were programmed, designed, and built in less than three years—a truly impressive achievement. Perhaps the success of this job is partly due to that fact: neither the architects, nor the contractor, nor the client had the time to make mistakes.

Executive offices are contained in 165 ft. square, one-story building with a 75 ft. square central court. The structural bays, spanned with horizontal post-tensioned girders, measure 60 by 60 ft. Reception, circulation, a some secretarial areas face the interior court; executive offices are the perimeter of the building. Centra leaf, red Japanese maple in court was brought in by helicopter.

FACTS AND FIGURES

American Can Company corporate headquarters, Greenwich, Conn. Architects: Skidmore, Owings & Mer (Gordon Bunshaft, partner in charge); Roger Radford, design; Frederick C. Gans, project manager; Morris kowitz, production; Davis B. All (interiors). Engineers: Paul Weidlin (structural); Jaros, Baum & Bo (mechanical and electrical). Landscape architect: Sasaki, Dawson & Def Associates, Inc. Consultants: Wil Smith & Associates (traffic); Arthur Dana (food). General contractor: Turner Construction Company. Building area: 1,300,000 sq. ft. (For a listing of key products used in this building, see p. 85.)

PHOTOGRAPHS: Ezra Stoller © ES
Piazza Meda is located two blocks from the Piazza Scala, in Milan, and is ringed with arcaded buildings of varying vintages. The recent and best addition to this parade of buildings is the modern office building (largely designed by the headquarters of Chase Manhattan Bank in New York) located on these pages. It is not particularly significant, but it is a particularly commendable configuration of the building, and produced an office layout that is reasonably efficient—probably the best that has been achieved under circumstances—but also contains a few oddly shaped rooms. As a piece of urban design, it is an interesting idea, as a new facade inserted into an existing, neo-classical street, the building is a significant achievement indeed.

The building is arched in three layers: an arched ground floor (actually two floors), 27 feet tall; four less routine office floors; and a recessed top floor. The height of the arcaded ground floor was determined by the Milan code, which specified that the height of the adjoining arcades on the Piazza had to be matched. BBPR, architects (originally Banfi, Belgiojoso, Peressutti and Roggi only Belgiojoso and Peressutti now survive) went much further than simply trying to match the existing arcade; they attempted to echo the arcade in and in detail as well. They did this primarily in two ways: by creating an unusual form of exposed steel arches that hold up the building; and supporting those arches on square columns that recall some of the doubled-up piers in older buildings nearby.

The broken-arch form of the steel supports not only replicates the neo-classical arches...
nearby, in a general way; but it also helps to reduce the apparent height of the ground floor which might, otherwise, have seemed disproportionately tall.

The doubled-up steel columns are extremely elegant—somehow monumental without appearing at all massive. While they may seem overly elaborate and wasteful, it is easy to imagine how painfully inadequate this arcade would have looked if the upper floors had been supported merely on a row of single toothpicks of steel.

The next four stories are clad in steel and glass (with marble spandrels), but the curtain wall is anything but routine in the spacing of the steel mullions. There are deep, I-beam mullions that grow directly out of the broken steel arches of the arcade; and then there are shallower mullions that actually hold the glass and marble. Although the building appears to be curved, its wall is made up of a series of straight lines, so that the glassy facade reflects its surroundings in constantly changing images. A more massive treatment of the wall would have made the building more of an intruder in the piazza; as it is, the glassy facade, by mirroring its neoclassical surroundings, makes the new building a part of its older setting.

The top floor follows the other office floors in configuration up to a point; but as it curves toward the Church of San Fedele, at the short end of the Via Catena, the top floor is recessed so as to open up a view of the apse of that handsome church (see also first page). If the new building had simply occupied the entire, permissible envelope, from the ground floor up, the view of the church from the Piazza Meda would have been blocked. As it is, by sacrificing some of the permissible cubage, and by retracting the top floor, the architects have, in fact, drawn the church into the composition of the square. An earlier city plan for Milan suggested that the entire site, including the sliver of land along the Via Catena, might be covered by a new building; if the architects had followed that plan, the apse of San Fedele would have been concealed permanently.

The materials that face the new building were chosen with great care to blend in with what the architects call the "polytonic monochrome" of San Fedele. In addition to painted steel (charcoal), tinted glass, and marble, there is an elaborately patterned terrazzo sidewalk (under the arcade), and a sort of mansard roof clad with copper sheets. The effect is that of an entirely modern building—that looks as if it had been there all along.

If the building has one weakness, it is this: the steel structure, so dramatically visible from both outside and in, does not seem too clearly related to the interior column system; but given the complications of the site, this was unavoidable.

Near right: Views of typical offices, of the arcade, and of the ground floor Milan branch of the Chase Manhattan Bank. The difficult configuration of the site has created some similarly difficult interior spaces, but plans at the top of this page show how these problems have been effectively resolved. The elevator, stair, and service towers are toward the back of the building, and, being of reinforced concretes, help stabilize its structure. Far right: View from Via Catena, with the old church at right.

FACTS AND FIGURES
HILADELPHIA

Small United Fund office building plays important role in the urban scene

"In effect, it is a glass box surrounded by concrete screens where they are needed." With these few, simple words Architect Romaldo Giurgola sums up not only the distinctive character of the United Fund Building, but a whole philosophy of design as well.

In many ways, the architecture of Mitchell/Giurgola Associates typifies the work of several firms sometimes grouped together as the Philadelphia School. Disciples of Louis Kahn, these architects see design as the product of interaction between internal needs (Kahn's "existence will") and external circumstances. In this case, very simple internal needs—for a "box" of office space—have been acted on by compelling external demands—need for sunscreens, shape of site, etc.—and the resulting design symbolizes this interplay of forces.

Like his Philadelphia contemporary, Robert Venturi, Giurgola feels that symbolism in design need not be hindered by Early Modern inhibitions about structural honesty. The United Fund Building is not literally a glass-clad box shielded by concrete screens, but it has been contrived to look that way "in effect."

The location along Benjamin Franklin Parkway, near the center of Philadelphia, determined just about everything about the form of the building. This broad boulevard, slicing across the gridiron plan of the city, shaped the trapezoidal site and left a small triangular park next to it—one of several public triangles along the parkway. And with the parkway location came a city-imposed height limit of 80 ft.—set to match the cornice line of the nearby cathedral and other major public buildings near Logan Circle.

This height limitation forced the architects to use virtually the entire trapezoid of land. That is not apparent, because the adjoining park looks—but is not—part of the building's site. The long wall bordering the park, visible from blocks away across Logan Circle, naturally became the visual "front" of the building. And the opposite side, adjoining some low rowhouses, became the "back"—a party wall with few openings except in the upper stories.

A building seen across such an extensive open space had to present a strong image, if it was to be noticeable at all. Giurgola observes that a strong building form was needed at this point "in order to prop up all those giants around it"—those taller, bulkier, but rather amorphous piles that line the parkway to the east. And he stresses that no building is ever an isolated event.

And it was the location, of course, that determined the widely differing treatment of the building's three exposed walls. On the north side, where direct sun is a minor problem, the whole facade is of gray-tinted glass in thin aluminum frames, allowing floor-to-ceiling views out over the roofs of the cathedral across the street.

On the west, the urge to give office floors full exposure to a panoramic view and the need to protect them from west sun led
to the design of the concrete screen, with its horizontal openings set about 1 ft. below the corresponding windows. Even though conventional wisdom calls for vertical sun-baffles on west walls, the architects claim that this horizontal design gives better protection against the high summer sun, which is most critical, and cuts out sky glare as well. The fact that this whole screen is suspended from the floor slabs is pointedly expressed on the exterior by detaching it from the ground.

Conditions on the south wall called for sun protection, too, but it took a very different form. A bearing wall was needed here, to pick up loads from the column-and-beam concrete frame where it is cut off at an odd angle. Windows on this side are set into recesses whose walls line up with the 3-ft-square grid of interior partitions and lighting. Projecting corners of the building provide enough sun control here, without special shading devices.

One obvious question comes up concerning the facades: why are the two very different screens on the south and west sides—one supporting the structure and the other suspended from it—both made of cast-in-place concrete? Two reasons, replies Giurgola:

1. to preserve the unity of the building. (The sides may differ, but the inner plane is always of glass, the outer one of cast-in-place concrete.)

2. because concrete was readily "moldable" to meet complex needs. (The west screen is "not just a plane," but folds back around the windows and provides duct spaces behind the angled planes at the sills.)

And the plane of concrete gives the west front the visual solidity the building needs for its position in the cityscape. A screen composed of smaller-scaled elements would not have read as one unified plane from a distance, as this screen definitely does. Yet somehow the horizontal baffles, streaking across the facade with so little apparent support, look inherently unstable—like a giant venetian blind. And the unbroken horizontal lines—while they help distinguish this building from its neighbors—contrast so strongly with other parts of the same building that it tends to break apart visually; Giurgola knows this, of course, and is willing to chance it.

At the southwest corner of the building, between the two big screen-walls, is a glass-lined notch where the main entrance is located. The broad double doors are distinguished from the dark glass walls around them only by their clear glass and polished stainless steel frames.

Inside this entrance, a diagonal corridor leads straight to the elevator core at the center of the blank "back" wall. This diagonal passage and a corresponding one on the other side of the core link all of the conference rooms on this floor together. The angular layout provides well-shaped meeting rooms and leaves generous alcoves outside them for casual encounters. Dark glass partitions between the corridors and the meeting rooms (except for the more private one in the south corner) give the whole lobby area views of the park to the.

The three very different fronts on north, west, and south (left to right below) respond to lighting conditions and—in the case of the bearing wall on the south—to structural demands. The building section (below right) shows duct space under the angled planes below the west windows; the ground, one of these duct closures marks the property along the park to the west. Architects' proposals for this project (plan, right) have not been adopt
west, through layers of interior reflections.

The typical floors are loft spaces with circular columns forming 15 by 40 ft bays. The long strips of window on the west front need no blinds at all. Air is supplied through the sills and exhausted at the window head with no obstruction.

The combination of concrete sun-screen and dark gray glass gives virtually every worker a glare-free vista down the parkway to the Museum of Fine Arts and the vast park beyond—at least where the space has been left unpartitioned, as the architects recommended.

The angular spaces at the south end of each floor are well suited for private executive offices. Floor-to-ceiling windows in these offices (equipped with drapery) provide side-long views west along the parkway, and those at the southeast corner have windows facing east toward Philadelphia's unique City Hall.

At the top of the building is a penthouse with employees' cafeteria and lounge, opening onto a roof deck. On two sides of the building, the screen walls rise a full story above the deck to match the cornice height required by the city's Art Commission. Only at the gap above the entrance and at the very deliberate "window" cut through the west screen (which is aligned, for purely symbolic reasons, with the building's vertical core) can the fine view to the west be seen. The effect from the cafeteria is like looking through a peephole. It seems perverse to have blocked off such an exceptional view (even though most employees can look the same way from their desks on floors below).

Undoubtedly, Giurgola was determined not to let the profile of the building trail off at the top with a stack of diminishing penthouses (as most of its larger neighbors do). Then, too, he must have considered the height limitation a bit arbitrary, considering the much greater heights allowed on blocks immediately to the south and east. What better way to indicate an arbitrary height restriction than with these great concrete planes, seen in sharp profile against the sky? —John Morris Dixon

West windows of a typical floor (left) need no blinds and afford broad views; ceilings are designed to recover heat from lighting. Dark glass around first-floor mezzanine rooms (bottom left) can be screened with drapery. The roof deck (at upper right) affords a good view toward City Hall. The intersection of the angular wall with window walls (right) represents at small scale the relationship of Benjamin Franklin Parkway to the city's street system.

FACTS AND FIGURES


(For a listing of key products used in this building, see p. 82.)

PHOTOGRAPhS: Rollin R. La Fran...
WASHINGTON, D. C.

Trauma and tenacity prevailed in the design of a Federal office building

BY DAVID R. DIBNER

This is the story of the development of the James Forrestal Building (Federal Office Building No. 5), in Washington, D. C. It began in October 1961 when the design contract was negotiated and ended over eight years later on a foggy day in November 1969 when the building was dedicated. During this time the project was subject to countless reviews by agencies with constantly changing membership, it required an Act of Congress, and it demanded all the patience and perseverance of the three architectural firms involved. The story is recounted here because it may serve as a beacon of hope to other architects faced with similar frustrations, who may be tempted to give up.

On October 3, 1961, three architectural firms were called to Washington: Curtis & Davis of New Orleans, Fordyce & Hamby Associates of New York, and Frank Grad & Sons of Newark. Meeting each other for the first time, Nathaniel C. Curtis, Jr., A. Grant Fordyce and Bernard J. Grad were told they had been selected to design Federal Office Building No. 5. The government’s prospectus called for housing various activities of the Department of Defense in two six-story buildings “with wing extensions”, each building to contain 890,100 sq. ft. Timing was critical, and a 69-week schedule was established; contract documents were to be completed by February 14, 1963.

The architects quickly set up a joint venture office in New York. The three partners established themselves as a Policy and Operating Committee, selecting Nathaniel Curtis, Jr. as design coordinator, Howard Grad as business partner; I was chosen as project partner, and C. Woodford Dayton as project manager. And so we began.

The divided site

There were really two sites—two islands totaling ten acres, isolated from their surroundings by depressed expressways and a broad railroad cut I. And right through the middle, between them, the new 200-foot-wide 10th Street Mall was to be built. Furthermore, the land was part of the Southwest Urban Renewal Area, so it had to be integrated with the area plan. South of our project along the proposed mall was the L’Enfant Plaza project, which was to consist of three office buildings and a hotel around a large plaza. It was sponsored by Webb & Knapp, the well-known New York concern headed by William Zeckendorf; the architect for the complex was I. M. Pei & Associates.

A model of the 10th Street Mall prepared by the Government showed our project as four buildings in L-shaped configuration.

The government’s requirement to build almost two million square feet of space on a restricted site was complicated by the 120-ft. height restriction imposed by the National Capital Planning Commission (NCPC). We were concerned about the large masses which would result, especially since the project faced the small-scale original Renwick Building of the Smithsonian Institution.

Our first effort was to build as much of the building in the ground as possible and, since the 10th Street Mall rose northward, we proposed linking the two sites with a mall extending under the mall. This would ease circulation between the portions of the buildings while reducing the mass of the building above grade.

The next decision was more dramatic: if we were going to use the space below the mall, why not utilize the air rig above it by spanning the mall? This would allow even greater ease of circulation throughout the complex, especially desired since one tenant would own all of it. And furthermore, raising the major mass in the air, would allow a much broader view down the mall to L’Enfant Plaza than a canyon between two tall buildings.

Our first studies showed a building along Independence Avenue, 35 ft. above the ground with two low, symmetrical extensions extending South along the mall 2.

Our approach received the immediate approval of our client, the central office of the Services Administration (GSA). Buoyed by this encouragement, we presented our design to the National Capital Planning Commission (NCPC) on December 6, 1961. The Commission was in accord with our approach. It was suggested that we contact the Redevelopment
MALL ARCH DISPUTE TURNS "CHINESE WALL".

It was resolved that the architects for the two developments would meet to try for a mutually acceptable design solution. It was also agreed that no publicity would result from the meeting.

The newspaper headline the next day read:
"SOUTHWEST MALL ACCORD PUT UP TO ARCHITECTS" and "MAIL ARCH DISPUTE TURNS PEACEABLE".

Despite the optimism of the newspapers, we could reach no agreement. After further meetings with GSA, RLA and NCPC, it was resolved to carry forward the idea of spanning the mall. A May 14 press release from GSA was accompanied by a rendering showing the view under the building toward L'Enfant Plaza. Press coverage was almost unanimously favorable, with the Washington Post even reversing its former position in a May 22 editorial.

"One thing can be unhesitatingly said of the design for the new Federal Office Building Five: it has style. The plans show imagination, and that alone would make it almost unique among recent Federal architecture. . . . The architects propose to raise on 36-foot pilotis a building half the size of the Pentagon, and to let the new 10th Street Mall flow underneath it toward the Potomac.

In July, 1962, a bill was passed in the House of Representatives authorizing GSA to use the public space under and over the 10th Street mall. On July 19, 1962 the Washington Star headlined: "PLANS DEADLOCK BROKEN ON FEDERAL OFFICE BUILDING NO. 5——Firm Government action has broken a deadlock on plans for construction of the huge $36-million Federal Office Building No. 5.

The building has been under bitter attack by New York developer William Zeckendorf, with Washington's Redevelopment Land Agency trying to remain neutral.

Now RLA has quietly veered to the side of the General Services Administration, the building's sponsor. Earlier RLA had arranged a series of fruitless conferences between the New Yorker and GSA's architects to find out whether an agreement with Zeckendorf could be worked out. While the New Yorker remained adamant, GSA Administrator Bernard Boutin investigated the fracas, personally checked the plans, and strongly backed the project...."

The first battle had been won.
The Commission of Fine Arts (CFA) was created in 1910 "to give expert advice on matters related to art". The members of the Commission, representing all the arts, are appointed by the President for terms of four years or until their successors are appointed and qualified. Unfortunately, our project was caught in the chaos of several changes in the make-up of CFA.

The tide of change

Our first presentation to the Commission was on December 19, 1961. The members at that time were: Chairman David E. Finley, William G. Perry (architect), Ralph Walker (architect), Felix W. de Weldon (sculptor), Douglas W. Orr (architect), Michael Rapuano (landscape architect), and Peter Hurd (painter). The meeting ended with the commission commending the architects upon the whole approach.

Encouraged by successful appearances before CFA and NCPC, we proceeded to develop the design. It was felt that the large mass spanning the mall would best be treated with lightweight aluminum and glass walls faceted to provide a play of light and shade.

When we next met with the commission in April, 1963, its membership had changed slightly: Hideo Sasaki (landscape architect) had replaced Mr. Rapuano. Again, the architects were commended, but the light materials were questioned as not being in keeping with the other governmental buildings nearby. The result of this meeting was a letter from the commission which stated in part:

"As presently designed, the elevations of this mass would consist entirely of glass, the surface being faceted in a pyramidal form with the apex projecting away from the face of the building and supported by a series of narrow aluminum rods tied to a secondary structural frame. In the words of the architect, this system of enclosing space would be entirely unique and would make a complete departure from all other buildings in Washington. The Commission felt that the basic question to be determined, however, was not one of uniqueness of individual design but of appropriateness . . . .

"The Commission strongly recommends that new studies be made with a greater emphasis on solid elements in the development of the facade. In addition, the use of masonry elements is to be encouraged over metals, which again have little relation to the character of major structures in the vicinity".

"The Commission believes that it is entirely possible to develop these new studies concurrently with the development of plans and engineering drawings for the remainder of the project and need not unreasonably delay the schedule of construction".

Oh, how unprophetic were these last words; but how could anyone predict, since all Commission members, except one, were to be replaced by the next time we met.

Meetings were held with the highest level of GSA, and it was decided to study the use of masonry in the facade. By September 18, 1963, we again appeared before the Commission of Fine Arts with a revised design with concrete exterior walls. By then, President Kennedy had completed all his appointments except one and all the familiar faces were gone, except for Mr. Sasaki. The chairman was now William Walton (painter) and the rest of the members were Burnham Kelly (Dean of Cornell College of Architecture), Theodore Roszak (sculptor), and John Carl Warnecke (architect), and Aline Saarinen (critic).

Double jeopardy

The architects felt like defendants on trial again, after one jury had rendered a decision, before another panel who had heard none of the earlier testimony. The verdict of the new "jury" was that the facade should have a masonry treatment more compatible with the surrounding buildings. It is interesting to note that the Department of Agriculture building to the west of the site was faced in buff brick and limestone, the Smithsonian to the north in red sandstone, the new FOB #10 to the east was in a bluish white marble and the future L'Enfant Plaza was to be in a pinkish concrete.

Many sketches were made in an attempt to interpret the commission's position, and another presentation was made on October 15, 1963. But again the jury had changed.

The Kennedy appointments had now been completed with the addition of its last member, Gordon Bunshaft (architect). While this change added only one new face, the effect on the commission's judgment was monumental. After reviewing our presentation — and a much discussion — this commission recommended that we seek the entire scheme, suggesting three possible solutions which they would accept:

1. To combine the two schemes, including the area of the roadway, between and create one building sitting in the middle of the street.

(This would have eliminated 10th Street Mall!)

2. To build two distinct buildings, one on each site.

3. To build two distinct buildings, one on each site, with or two light glass links along the roadway.

After the two years of intense effort and schematic proposals by GSA, RLA, DCP, the original CFA, the Washington newspapers, to mention an enabling act, Congress, the project was still back to GO!

Responding to this direct call by the CFA, the architects developed several new mass studies. At a presentation to Congress on November 20, 1963, the architects stressed the value of a three-part scheme, but Bunshaft summed up the opinion of the CFA as giving approval to a single block building, 200 ft. by 6 stories, sited on the 10th Street Mall —it just not even owned by GSA! The new approval negated all previous approvals.

What would NCPC and RLA say? Not to mention Mr. Zender! The answer came soon enough. On November 5, 1963, the CFA requirement for massive building was reviewed and the Planning Commission affirmed its approval of the original three-part scheme spanning the mall. What next? The approval of NCPC is mandatory and the Board of Public Works is a Federal project, while the CFA is an advisory body. It had become customary, however, for GSA...
in Fine Arts' approval.

The answer to this stalemate was a meeting of both commissions, so that they could confront each other with their diametrically opposite positions. On January 9, 1964, for the first time in their histories, the NCPC and the CFA met in joint session. What resulted was the approval of a design which allowed the building spanning the Mall, but had two unequally sited buildings extending to the rear. We began designing in and the scheme was developed into the final project. The progress of the project took a more normal course after this meeting. There were still many obstacles to surmount, but they were small compared to what had been through.

arel Yasko of GSA, who believed in President Kennedy's call for outstanding Federal architecture, wrote to commend the joint venture in June, saying in part:

"...patience, fortitude, humor, responsibility to self and country and of these facets of human dignity were tested to create the James Forrestal Building. You have a right to be proud of your survival and achievement. Lesser men would have tossed in the towel at many places in the development of this project and sought the easiest route".

The James Forrestal Building was dedicated at 11:00 a.m. on November 18, 1969. My flight from Newark and was diverted due to weather to Norfolk. Finally arrived at the building at 11:45 a.m. They were mantling the stands and revolving the bunting. After eight hours of effort, I had missed the ceremony by a matter of minutes. A fitting conclusion to an architectural odyssey.

**TS AND FIGURES**


For a listing of key products used in this building, see p. 82.)

**OTOS:** Louis Checkman (model); Amiaga (completed building).
“Like a pioneer surveying a land of promise,” says George McCue of the St. Louis Post-Dispatch, the new Ralston Purina headquarters stands at the edge of a 140-acre site that the company proposes to redevelop. This $30 million “new town in town” to be sponsored by Ralston Purina will be a balance of residential, commercial and industrial uses. The company calls it “one more commitment” to the city that has been its home for 75 years.

The 15-story building by architects Hellmuth, Obata & Kassabaum is headquarters for 1,500 of the company’s 21,000 employees. But it is also a showpiece for countless visitors and a place to display Ralston’s activities and products.

The upper part of the building (where the walls are vertical) contains offices. A typical floor has elevator towers at east and west, and the remaining space can be subdivided freely along the 5’ by 5’ grid.

But the massive structural columns of the four lower levels extend diagonally outward to form a large triangular interior, a multilevel space quite unlike a typical office tower. The resulting “Great Hall,” as it is called, encompasses one level below grade (a 400-seat dining area for employees), the main entrance level, an office floor looking down into the space from the second floor and a mechanical floor on the third. At lobby level, two wells open to the level below.

The entire structure is concrete, in the exposed finish typical of Ralston’s many concrete grain elevators across the country. The Great Hall has paving of dark brown brick; glass throughout the building is bronze. Interior design and landscaping was by the same firm that did the architectural design.

Mechanical and electrical design was also closely controlled by the architects. Air, electricity and communication lines can be introduced into any 5’ by 5’ module, so that movable partitions can be placed anywhere on the grid—for offices from 10’ by 10’ to 20’ by 20’ anywhere on any tower floor—and levels of cooling and illumination will be constantly comfortable in every working area. Cost of the building is reported to be “in excess of $10 million.”
The typical floor (photo, top, and plan, left) of the Ralston Purina headquarters is on a 5' by 5' module. Mechanical services are introduced from the solid walls at east and west (diagram, bottom) and can be introduced into any 5' x 5' module. Facing page: the ground floor of the office building is a grand four-level entry and exhibit space.

FACTS AND FIGURES
(For a listing of key products used in this building, see p. 82.)
PHOTOGRAPHS: Balthazar Korab.
Office-apartment structure has an industrialized look

Rising above Tokyo's motley Shinjuku district is a gleaming symbol of things to come—that is, if you believe industrialized building is on the way. The New Sky Building looks like a stack of factory-produced modules plugged into a linear armature, but that image is—quite literally—only superficial. Architect Yoji Watanabe has completed designs for real modular buildings, but here he had to be content with prefabricated wall sections—assembled to look like busses split in half—supported on a conventional steel frame.

The factory-made walls have stressed steel skins and weigh less than one ton per 23-ft section. Despite their light weight, they have the sound and heat insulation of 6-in. concrete walls, according to the architect.

Watanabe has strengthened the image of industrialization by painting the steel enclosures with shiny silver-colored paint. Sleekly punctured windows, like those of railroad cars, and futuristic projections—actually air-conditioner enclosures—add to the effect.

Inside the factory-smooth shell of the building, Watanabe has shaped the interiors of familiar, non-industrial materials. Above an open ground floor, the building contains three floors of offices, then nine stories of apartments. Despite the exterior suggestion that each metal section is a separate unit, the typical apartment floor is divided into only four units. Each apartment has at least two balconies, with railings and slatted "windows" that look like Space Age versions of Zen teahouse details.

Watanabe's own observations about the building stress its underlying arrangement more than its technology. To give all occupants vital sunlight, on a narrow site with little south exposure, he has overlapped the sections, so that each section has a south-facing balcony outside floor-to-ceiling glass doors. "The basic idea," he tells us, "developed from the branches of a willow tree, where all parts have equal access to sunlight."

The relation between this building and a willow tree may seem far-fetched at first, yet this is one of the important potentials that Watanabe sees in modular construction—that units need not be compacted into blocks, but can be clustered like leaves on a tree.
The typical apartment floor above) has four units, each with or three balconies. The top two (13 and 14) each have only two units. The ground floor is an loggia, and the three floors just it house offices.

Steel wall sections (top left) were assembled—except for balcony before hoisting into place. Apart interiors (middle left) include rooms with traditional surfaces—sliding blinds to cover square doors—as well as up-to-the-kitchens. A broadside view shows half of the 150 identical sections and one of the twin tanks, boldly displayed above roof. The arbitrary variation in the balconies (right) is emph. by reflections from the metallic.

**FACTS AND FIGURES**

New Sky Building, Tokyo, .
Architect: Yoji Watanabe. Str. design: SDG. Contractor: The M. Construction Co. Floor area: 1 floor, 3,025 sq. ft.; total, 63,700 PHOTOGRAPHS: Matsuo Matsuo
TECHNOLOGY

Giant steel hangars’ cantilevered roofs will each shelter four jumbo planes

For sheer dimension, the hangar prototypes under construction at San Francisco and Los Angeles International airports are even more impressive than the huge planes they are designed to service. The hangars each cover an area equivalent to four city blocks. But the twin hangars’ size is far exceeded by their scale of structural and design innovation.

The hangars were designed for American Airlines by a joint venture of Lev Zetlin Associates and Conklin & Rossant, engineering and architectural firms, respectively, in New York. The shape is not only a display of structural virtuosity, but a practical solution to the airline’s maintenance program requirements: flexibility and economy.

In section, the hangars look much like the planes they will shelter: four 747s, or DC-10s or two SSTs. They are designed with modular roof sections that almost unbelievably cantilever 230 ft. from either side of a central core structure, for a clear span 80 ft. high and 450 ft. wide.

The modules are made of standard light-gauge steel decking, warped into the shape of a hyperbolic paraboloid and contained by rigid steel edge members. Eight such modules (hypars) are welded to either side of a core truss system, 40 ft. deep and supported by eight steel towers, 80 ft. high. Walls and doors for the hangars are ground supported; core maintenance floors are suspended from the roof trusses above.

Using standard steel decking as the primary support material for the huge cantilever roof is a structural first at this scale. It also cut the roof’s weight by 40 per cent over conventional steel truss roof construction, reducing material costs.

The hangar projects, which include extensive site development and utility construction, will each total about $22 million. (A hangar alone would cost about $10 to $15 million.)

Hypar design

Each hypar is 230 ft. long, with a center rise of 40 ft. from ridge to valley at the core end and 4 ft. at the tip of the cantilever. The side dimensions vary according to slope, but the surface of the cantilever tip is 28 ft. from valley to ridge member and 50 ft. where the module joins the roof truss at the core.

The steel decking for the hypar comes to the site in flat sections, which are then warped into shape on site. Each is typical light-gauge flooring or roofing, with corrugations 7 1/2 in. deep.

The warped hypar shape stiffens the cantilever by introducing a form of energy into the module’s surface. Generally, such decking is used only as a composite beam, but in this case it is used as a shear membrane. Basically, the whole hypar module acts similarly to an idealized I-beam, with the upper member in gravity tension, the lower in compression and the middle in shear. The hypar’s middle element is, of course, the warped steel decking.

For additional stability, the hypars are designed with post stressed cables that take about 15 per cent of the design load and there is a system of X-bracing underneath the hypars.

The X-bracing may be removed in whole or part after erection to provide additional clear space within the hypar form. Adding to stability was the decision to maintain a slight cantilever in the tips of the cantilever.

Original plans called for the cantilever to be flat, but computer simulation proved that maintaining even a small ridge here would greatly increase rigidity. It is reinforced by a relatively small truss that runs beneath cantilever tips, tying them.

The cantilevered hypars are welded to a longitudinal single truss resting on the towers with eight modules to a tower, or 16 to a hangar. An expansion joint separates each group of eight into fours, which is designed to act as a single member because they are joined by truss underneath their tip.

The cantilever of either side of the core is structurally independent of the other side. The joint venture even has plans for a single cantilever structure.

The shape of the hypars is used to space up to 120 ft. high at core for the tail of an aircraft to be jacked up for gear change. (Where X-bracing has been removed.)

In final construction, the hypars are coated with white paint on their undersides. Insulation and aluminum decking are plied to the exterior for weather and temperature protection.

Core support

The core of the hangar projects the entire load of the through eight towers, which support the maintenance facility that hang inside the core structure. The towers are steel, X-bracing, and measure 1 sq. ft. for the lower 64 ft., taper to 3 ft. sq. on the upper 16 ft. They are placed 11 ft. c-c on either side of the area, which measures 45 ft. wide and 100 ft. deep.

The eight towers support transverse roof trusses and two huge longitudinal trusses.
hangars' cantilevered roof elements (top) are of steel decking, warped hyperbolic paraboloid shape, then lifted into place 80 ft. above ground. Cantilever on either side of the core covers almost two city blocks in one hangar will shelter four giant jets or two SSTs (plan). The core area and equipment is variable. Eight towers support the core trusses roof (isometric). The cantilevers are stabilized by poststressed cables, using and trusses along their tips (middle, right).
all 40 ft. deep, that are welded and bolted to the cantilevered hypars. The roof trusses are also attached to the top maintenance floor within the core, which remains integral to the supportive system and, unlike the other maintenance floors, may not be removed. The lower maintenance levels may be modified in many configurations for servicing requirements, but the bottom 32 ft. of the core can remain largely open space.

The core resists uplift and any other kind of force, including earthquakes (especially in California, where these are frequent). As protection, the center pairs of towers are joined lengthwise by an earthquake bent designed to distribute the load. The four opposing pairs of towers are also joined (transversely) for protection against earthquakes.

Walls and doors

Both the non-bearing walls and the doors of the hangars are ground supported. The doors are attached to the roof cantilever with rocker arms and the sidewhail, with clear spaces between the two structures). Neither the doors or walls are insulated because the California climate is mild, but this could change as weather demanded. The doors for the hangars are in four 112-ft. sections, mounted on double tracks. They can be opened for a clear entry space 224 ft. wide, or wide enough for the largest planes. (Earlier plans to have more and smaller door sections, so that the center opening could be larger, were abandoned as too expensive.)

The materials for the doors are not the same for both sites. At San Francisco, they have a metal surface. At Los Angeles, the doors are covered with plastic.

The plastic covering solved an airport communications problem neatly. The ground control center monitors planes coming in from or off the runways with electronic equipment. The large, exposed metal surface of the hangar's doors could possibly send waves bouncing off it into the communication field between the tower in Los Angeles and the planes. By reducing the reflective metal surface to a grid frame, then covering it with a plastic reinforced tensile membrane (guaranteed for ten years), this possible confusion was eliminated. Now the waves do not bounce off the doors, but go straight through them into the hangar, where they are dissipated.

The bottom 9 ft. of both door systems are protected by a steel facing, but this is not enough reflective metal to confuse ground control signals.

Prototype planning

The hangars are their own precedent and hence extensive testing had to be conducted throughout their design, including computer simulation, wind tunnel and dynamic model tests. Even then, the structures were so huge and novel that they were not covered by local building codes. The joint venture worked closely with local officials in studying the structures' special requirements and, where necessary, variances were granted on the basis of test calculations.

Prototype planning

The San Francisco and Los Angeles hangars are almost the same in scale and plan, but there are important differences in the sites and construction methods. The San Francisco project started in May, 1969, and is scheduled for completion in April, 1971. Its scope includes draining and grading 63 acres of muddy land, paving 32 acres of that, and providing parking for 420 cars. Utility access was remade and the project also had to include a mechanical building and storage tanks for the deluge system in case of fire.

The Los Angeles project, started in May, 1969, is somewhat smaller in area and founded on much firmer ground. But it has been hit by strikes and is now scheduled for completion the same month as in San Francisco. The land area is 51 acres gross, with 15 acres to be paved and parking provided for 1,125 cars. Other construction includes a small (but costly and underground) transformer and power substation, plus storage tanks and a mechanical building. Utility access, however, was closer than at San Francisco. (The deluge systems are immense for the hangars. In Los Angeles, for example, seven pumps can deliver 20,000 gpm of water for two hours.)

Construction methods differed on the two sites because each contractor elected to assemble the hangars in different ways.

The San Francisco contract joined two hypars on the ground and then raised the pair with a tremendous hydraulic jack system. The Los Angeles contract lifted the modules individually, with four cranes. The design is equally adaptable to either (a) other methods.

Perhaps the greatest difference between the two sites was in the amount of foundation work required. At Los Angeles, the soil was essentially firm and the entire hangar was founded on minimum amounts of concrete. The core towers are supported on concrete bases about 10 ft. deep. The hangar floor, which is a concrete slab 12 in. thick, is designed for flexure with minimal reinforcing. The walls and doors have spread footings.

Construction work in San Francisco, however, proved a different story. Here the earth is largely fill, with high water table and a big drainage problem, compounded by dike buried diagonally underneath the hangar site.

The only solution feasible was to drive piles and San Francisco used more than 2,000 of them. The tower foundations are comprised of clusters of 35 (or for the center towers) 100-piles, 120 to 130 ft. long. Of the piles are prestressed or precast, then driven as a single unit.

The hangar floor slab, also in thick, is reinforced with steel rods and supported by abut 1,500 80-ton piles, 110 ft. 1 and placed 14 ft. c-c. An unusual phenomena with the floor is that when a 750,000 747 is on top a pile, tests sl the pile will compress slightly, reversing the usual tendency of a slab to sag between support columns.

Looking ahead

Like all prototypes, the sign concept of the structure will become more sophisticated in materials, dimension, form. Some of the changes from what the project manager terms "basically a conservatively designed" are already envisionable. In the future, the depth of hypars may not have to be ft., but could perhaps be

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This would reduce the amount of materials needed, surface area, the depth of the roof and the height of the building (at 120 ft., it's about maximum for airports now.)

The reason for the shallower span is that no one had tested decking material before for such strength at this scale. The gars required 10,000 plf at present design specifications, but tests on a similar deck material showed that it would be enough to withstand 600 plf. As the hypar becomes shallower, the forces it withstand become greater, with this strength material, profile could easily be reduced by one-quarter.

In Los Angeles, four cranes lift each hypar into place (top) after it is assembled on the ground. (In San Francisco, hoisting is done with an hydraulic jack.) Once in place, the modules are welded and bolted to giant trusses (bottom), from which they extend 230 ft. out into space.

plan already envisaged is a span building with intersecting hypars for walls and any case, neither engineer nor architect plans to abandon hypar form at this stage, and new applications may be expected.

—Marguerite Villecco

AND FIGURES


—JAN/FEB-1971

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A REAL CLIFFHANGER
Spectacularly affixed to the side of the cliff, this office/gazebo/overnight-retreat lunges out into space 150 ft. above Green Bay, Wisconsin.

The audacity of the concept was the client's, says Architect Harry Weese; the studio was to be invisible from the client's main house atop the cliff. But the structural concept was Weese's. The double cantilever (a cantilever that cantilevers from itself) was arrived at in his office, on a crude model; it was built in a total of six months with a crane hanging over the cliff.

An earlier idea was to suspend the house from cables, but the masts would have been too high and the building too bouncy. The built design substitutes two struts going out as far as the point from which the load would have been suspended by cable. The main beams that project from the cliff, angled inward, extend only midway across the main room; beams welded to them have continuity across the point where the main beams stop. Beams are of weathering steel, perforated for visual lightness. The structure's total load is 54 tons dead load and 20 tons live.

The entire structure is tied back into the limestone cliff, where concrete-filled trenches go back about 20 ft. The structure is designed for 90 mph winds. Weese says one feels a slight tremor, "but it's a pleasing tremor."

The year-round building is designed for relaxing and entertaining and is also at times the office of the industrial-political man who is its owner. Two sofa-beds center on a dramatic window in the floor. Guests gather round the hole as if it were a fireplace, gazing down at the forest below.
Laminated glass 1 1/4 in. thick covers the hole in the floor. "You can jump on it," says Weese. The cliff is lighted from the house, and a greenish light reflects back through the hole from the trees below. The interior is mostly teak (floors and ceilings) and white-painted plywood (interior core); bright carpets are in the bathroom, "pit" and galley-like kitchen. The air-handling system, with fan-coil units, is as sophisticated as in any office building. A large number of telephone trunk lines come into the place. All sewage is pumped up to a septic tank at the top.

FACTS AND FIGURES
Shadowcliff Studio for Ben W. Heine- man, Green Bay, Wis. Architect: Harry Weese & Associates Ltd. (Paul Hansen, associate in charge.) Engineers: The Engineers Collaborative (structural); Cosentini Associates (mechanical and electrical). Interiors consultant: Design Unit. Building area: 1,000 sq. ft.
(For a listing of key products used in this building, see p. 82.)
PHOTOGRAPHS: Orlando R. Cabanban.
SUPERBLOCK:  
NEW LIFE  
ON THE STREET
It is a year since the opening of the Superblock in Bedford-Stuyvesant in Brooklyn (Dec. '69 issue, p. 23), designed by I. M. Pei & Partners, M. Paul Friedberg & Associates, and the community.

The Superblock grew out of a proposal by Pei, which grew out of a request for help by Sen. Robert Kennedy, and the final result grew out of long hours with community people, and 15 months—on and off—of construction. It is not the only visible improvement in this second largest black ghetto (after Chicago's South Side). Bedford-Stuyvesant's dual corporations—Restoration and D & S (Development & Services)—have renovated the exteriors of 45 blocks, the interiors of 50 units of abandoned housing, and the Sheffield Farms plant. But the Superblock is the most visible.

The plan shows traffic on St. Marks Avenue curtailed by a park, and the parking rearranged. (“People still whip across there in their cars, as we knew they would,” says a member of the design team.) A block away is Prospect Place, a quiet street mainly of homeowners (the 1,800 residents of St. Marks are mostly tenants, poorer, with more children). Little was done on Prospect, by their choice — cars still go through, but are slowed by two broad paved bumps, each bump marked by a foursome of rounded planter-benches, on the sides of which residents have glued small reflectors.

The Superblock cost up to $700,000, this last figure from Restoration Corporation which paid the bills. They have no doubt it was worth it, in the number (unspecified) who want to stay in the area and fix up their homes with funds from Restoration’s mortgage pool.

Top left: Cars parked at the end of St. Marks. Middle left: Prospect Place, a different solution for a different population. In St. Marks park (opposite), the big trees are happily flourishing, the lighting is a vast improvement, and the playground is a rugged construction that is nevertheless visually light. The park is somewhat marred by shoddy workmanship (the car-washing faucet covered by paving, for instance); by poor maintenance (Parks Department only takes care of the planting, and maintenance will be a problem until there is more tenant ownership, says Restoration); and by unsuccessful details (drains along the “urban stream” are easily clogged).
Will there be other Superblocks? The second one to be built by the Vincent Astor Foundation's $1 million grant has been deferred because of "more pressing needs," reports Restoration. The remainder of that million is seed money for 52 units of housing soon to go up on St. Marks Avenue.

"The first time out," says Friedberg, "it's OK to have it cost this much." But it could easily be repeated for $150,000, he says—without the expensive paving and fountain.

Indeed, Pei cites a city traffic survey suggesting that two out of three of Bed-Stuy's unusually broad streets could be "de-emphasized"—closed to traffic and redeveloped. A park of about 70' by 200' (St. Marks, all photos on this page) is created without taking land off the tax rolls, says Friedberg, a point he makes in his new book.*

St. Marks residents were worried about drawing junkies to the attractive public space. Some persons in the street are suspected of being "associated with" narcotics (as one Restoration staff member puts it), "but you can't tell them to leave; it's a community problem, not caused by the Superblock."

In reply to outside inquiries, August Nakagawa of Pei's office stresses two points: first, working with the people involved—there were about 15 meetings with a local design committee (Jim Balsley of Friedberg's office regards the citizen involvement as something of a farce) and second, planning on a wider scale. "One or two streets don't mean that much," says Nakagawa, "except to the people involved."


FACTS AND FIGURES
Superblock, St. Marks Ave. and Prospect Pl., between Albany and Kingston Aves., Brooklyn, N. Y. Coordinating architects: I. M. Pei & Partners (I. M. Pei and Henry N. Cobb, partners; William T. Chafee and Yann R. Weymouth, architects; August T. Nakagawa, planner). Landscape architects in charge of design: M. Paul Friedberg & Associates (James Balsley, associate in charge). Engineers: Robert Silman (structural); I. M. Robbins (mechanical). Other consultants: Travers Associates (traffic); Howard Branston (lighting); Sam Wiener (porcelain enamel plaques). Cost: $501,069 (excluding management costs and facade work).

PHOTOGRAPHS: Bill Mackey
CORBU IS NOT DEAD!

In New Delhi, India, not far from Embassy Row, there stands a brand new hotel, as yet unoccupied. It is a very elegant building, and was designed by Shiv Nath Prasad, who once worked for Le Corbusier at Chandigarh. The lessons learned from the master were not lost upon Mr. Prasad—though they may have been slightly misunderstood (language problem?): for what we have here, as these photographs show, is an extraordinary collection of bits and pieces taken from Corbusian buildings the world over.

Starting at the top, we have the roof garden of the apartment block in Nantes (1957); the stair tower of the Secretariat at Chandigarh (1952-56); the spiral fire stair of the apartment block in Marseilles (1946-52); and the double-height "street," halfway up the hotel, of the same Marseilles apartments. The fenestration, in accordance with the Modulor, for that same double-height "street," is similar to that used at La Tourette (1950-55); and the curvilinear restaurant that juts out from under the hotel, on both sides, is, of course, the Visual Arts Center at Harvard (1961-64).

There are a couple of nice, smaller Corbusian details as well—scuppers, rails, ramps and so on—and the workmanship is beton brut, possibly not quite brut enough. Anyway, it is a nice collage; and now that Mr. Prasad has got that out of his system, he is doing some highly creative work, entirely in his own very talented manner.

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PREFABS

LEVITT MOBILIZES

Levitt & Sons, the nation's largest homebuilder, has announced it is in the mobile home business, producing wood frame versions that look more like modern suburban homes than the traditional metal filing cabinet. A new subsidiary, Levitt Mobile Systems, Inc., will produce the homes, designed by Environmental Systems International, a firm headed by architect Barry Berkus. (Berkus and Levitt have worked together before, notably on the winning Operation Breakthrough projects.)

The first of the mobile homes are just coming off the line and they range from 886 sq. ft. to 1,665 sq. ft. Prices will range from $10,600 to $16,000, including furnishings, though cheaper versions may be produced later.
CITYSCAPE

STREET PEOPLE
New York City's avenue closings, which have been scheduled experimentally over the past year, have proved so successful in lowering auto-exhaust pollution and in raising spirits, that they are becoming policy.

Fifth Avenue, from 34th to 59th Streets, was closed to automobile traffic from 2 to 5 in the afternoon on five successive Sundays, in December and through January 3. Holiday shoppers, traditionally more hostile than the season would suggest, were remarkably good-humored, unhurried, and kind to one another, with no cost to the city.

Entertainment—such as the improvised skating rink of Slick, a plastic material resembling ice—was donated.

The city plans to close the Avenue to cars every Saturday next summer.

FIBERGLASS TREES
New York City will get its biggest outdoor sculpture some time this year in Jean Dubuffet's "Group of Four Trees," the gift of David Rockefeller. Dubuffet's trees will stand on the Plaza "trees" by Jean Dubuffet

2 1/4-acre Lower Manhattan plaza of the Chase Manhattan Bank, of which Rockefeller is chairman.

Being made now, piece by piece, in the artist's Paris studio—of fiberglass, resin and epoxy—the sculpture will stand 40 ft. high, 10 ft. shorter than the Chicago Picasso.

A few steps away from the projected site is the popular sunken garden of Sculptor Isamu Noguchi.

"This work will harmonize with the scale of the [Chase Manhattan] building," said Rockefeller, "and offer a fanciful contrast to the severe lines of the surrounding environment"—buildings like the World Trade Center.

Dubuffet says his trees embody "operations and structures belonging to a strictly mental realm."

At the unveiling of a 3 1/2-ft. maquette of the work, Rockefeller revealed that its selection had climax ed a ten-year search.

CHILDREN

LIVE-IN TOYBOX
Start with a toybox full of flopppy bean-bag animals and a Tinker Toy-like set of round wooden dowels that screw into wooden blocks; blow it all up to room size; add some vinyl-covered mattresses and modular panels and you have an environment for children to live, learn and play in. More than an environment, a life style.

The vinyl beans are also chairs and footstools, or even punching bags; the hardwood dowels and blocks a framework for bunk beds, trapezes, a teeter-totter, a slide. A desk, made of dowels, panels and blocks, turned upside down and set on end makes a wagon. Or, if the children like, they can take the whole thing down, pile it in a corner and have a virtually empty room for a race track. Or they can take it in the yard and erect a jungle gym. The dowels and blocks are color-coded to make the game easy for children as young as four years old.

The system's designer, Stanley Selengut, also distributes it through his company, Children's Motivational Environments, Inc. Still to come are a series of "packs"—low-voltage electrical power, organs, cam windmills, toy people, and a photo-optical kit that works on the principle of breaking a light beam. Each pack will come with a booklet describing the principle on which each functions and its potential uses. Attaching the air pack to the children's system could create an improvised pipe organ or wind tunnel. A conveyor system could be created with pulleys made from cans and Poppit-type beads. Hook the desk-wagon up to the power pack and you have a drag racer. The whole system, fully trolled up, would surely have charmed the late Rube Goldberg. The system's designer, Stanley Selengut, also distributes it through his company, Children's Motivational Environments, Inc. 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FELLOWSHIP

The Architecture Machine Group at MIT will begin a fellowship program for advanced study of computer-daided architecture funded by the Graham Foundation.

Candidates familiar with computers and who have strong "design" training and experience are being sought. Particularly encouraged are junior faculty members who may return to their academic environment. The fellowship will begin June 1 and continue through September 30, 1972, to $10,000 is available as a stipend for full-time Fellows. Each Fellow will initiate and pursue his own project with the department of architecture's computer facility.

Apply to Professor Nicholas Negroponte, Room 9-518, M.I.T., Cambridge, Mass. 02139. Applications should include a curriculum vitae, a statement of the intended area of study, and any other supporting material deemed relevant.

PARIS ARTS CENTER

The French government is sponsoring an international architectural competition in one study for a center in the heart of Paris. It is devoted to contemporary art and a public library.

Requests for registration forms and brochures must be received by February 26. The contest is anonymous; requests should be accompanied by a bank check for 200 French francs, which will be refunded after judging. Closing date for receipt of project entries is June 24, 1971.

First prize will be 250,000 francs ($45,300). There will be 30 additional awards of 10,000 francs each.

Address requests to: Delegation pour la realisation du Centre du Plateau Beaubourg, 19, rue de la Bienfaisance, Paris.
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Flexibility, Economy and Zone Control Lead to Choice of Electric Heating System for New Church Complex


**DESIGN CHARGE:** To design a complex that would serve as a church with social and recreational facilities until plans to develop the site into an elementary school materialized at which time the church structure would become a cafeteria. The structures were to contain a nave, sanctuary, office, kitchen, and a gymnasium which would also serve as a multipurpose area.

**DESIGN RESPONSE:** The one-story circular church structure is constructed of buff-colored brick, artificial stone, aluminum and glass. Laminated wood forms the arches of the vaulted ceiling. It contains a nave, sanctuary, and small office. Adjacent are a kitchen and a hallway leading to the gymnasium. The rectangular, two-story structure constructed of brick and artificial stone contains a gymnasium, locker and shower rooms, and is also used for church-sponsored dances, meetings, and a variety of social and recreational activities.

"The circular design and extensive use of glass not only creates a church architecture with a religious atmosphere that is very pleasing," Reverend William G. Eline says, "but will make the conversion from church to cafeteria easier and less expensive."

When it came to selecting a space conditioning system for the structures, the designers chose an all-electric system, Consulting Engineer Conrad E. Kambic explains, "because our experience with similar structures persuaded us that only an electric system would provide the desired flexibility of zone control, lower first cost, and economical operation." The church and gymnasium are conditioned by separate single-duct systems each equipped with an air handling unit having strip heaters and direct expansion coils. A 40-ton condensing unit provides cooling for the church structure at present and a second unit will be added sometime in the future for the gymnasium/multi-purpose structure. Through-the-wall heating/cooling units are installed in the office area and baseboard heating units in miscellaneous spaces.

How has the system worked out? Engineer Conrad Kambic sums it up this way: "A good application, good design, good installation, and a satisfied client."
1. CATEGORY OF STRUCTURE:
   Religious—Church and Gymnasium

2. GENERAL DESCRIPTION:
   Area: 22,500 sq ft
   Volume: 386,000 cu ft
   Number of floors: one in church, two in gymnasium
   Number of occupants: 500
   Types of areas: nave, sanctuary, gymnasium, locker and shower rooms, kitchen, office

3. CONSTRUCTION DETAILS:
   Glass: single
   Exterior walls: artificial stone, aluminum or brick, 2" pearl foam insulation (R-7), 8" block; U-factor: 0.1
   Roof or ceilings: built-up roof on 1½" rigid insulation (R-5); U-factor: 0.12
   Floors: concrete slab
   Gross exposed wall area: 11,000 sq ft
   Glass area: 2500 sq ft

4. ENVIRONMENTAL DESIGN CONDITIONS:
   Heating:
   Heat loss Btuh: 870,000
   Normal degree days: 5258
   Ventilation requirements: 5500 cfm
   Design conditions: 0°F outdoors; 70°F indoors
   Cooling:
   (nave and sanctuary only)
   Heat gain Btuh: 480,000
   Ventilation requirements: 2000 cfm
   Design conditions: 95°F dbt, 75°F wbt outdoors; 76°F, 50% rh indoors

5. LIGHTING:
   Levels in footcandles: 40-60
   Levels in watts/sq ft: 3-5
   Type: incandescent

6. HEATING AND COOLING SYSTEM:
   The nave and sanctuary are heated and cooled by an electric ducted system incorporating an air handler equipped with strip heaters and direct expansion coils which are supplied by a 40-ton condensing unit located outside the building.
   A similar system for the gymnasium structure, which is also used for meetings and social events, provides heating and ventilation only at present but is designed for the addition of cooling sometime in the future.
   Through-the-wall heating/cooling units condition the office area. Miscellaneous spaces are equipped with electric baseboard heating units.

7. ELECTRICAL SERVICE:
   Type: underground
   Voltage: 265/460v, 3-phase, 4-wire, yye
   Metering: secondary

8. CONNECTED LOADS:
   Heating & Cooling (52 tons) 384 kw
   Lighting 100 kw
   Cooking 100 kw
   Water Heating 150 kw
   Other 25 kw
   TOTAL 759 kw

9. INSTALLED COST:
   General Work $344,000
   Elec., Mech., Etc. 141,000
   TOTALS $485,000

10. HOURS AND METHODS OF OPERATION:
    Usual church services on Sundays and weekdays, and some evening meetings and social/ recreational activities.

11. OPERATING COST:
    Period: 4/2/69 to 4/3/70
    Actual degree days: 5787
    Actual kwh: 404,300
    Actual cost: $5,017.21
    Avg. cost per kwh: 1.24 cents
    *For total electrical usage

12. FEATURES:
    The complex was designed so that each area has its own independent space conditioning system with pneumatic controls. Thus, the complex can be expanded as planned for the future without the need to disturb existing installations.

13. REASONS FOR INSTALLING ELECTRIC HEAT:
    The choice was based on operating experience with other generally similar churches which indicated that the electric system would best accommodate the varying occupancy of the church and related areas, would provide the independent room control of temperature desired, and would be lower in total owning and operating cost than equivalent systems using a flame fuel for heating.

14. PERSONNEL:
    Owner: St. Philip the Apostle Church
    Architects: Nassau, Hemsley, Kohler & Associates
    Consulting Engineers: Brinjac & Associates Inc.
    General Contractor: Joseph Lamonaca Inc.
    Electrical Contractor: E. H. Gouchnauer & Sons, Inc.
    Mechanical Contractor: C. J. Beshore
    Utility: Pennsylvania Power & Light Company

15. PREPARED BY:
    Joseph C. Krum, Architect & Engineer Consultant

16. VERIFIED BY:
    Conrad E. Kambic, P.E.
    William Hemsley, Architect

NOTICE: This is one of a series of case histories of buildings in all structural categories. If you are an architect or consulting engineer, an architectural or engineering student, or an educator; a government employee in the structural field; a builder or owner, you may receive the complete series free by filling out the strip coupon at the left and mailing it to EHA. If you are not in one of the above categories, you may receive the series at nominal cost.

ELECTRIC HEATING ASSOCIATION, INC. 437 Madison Avenue, N.Y., N.Y. 10022
This introduces a new Architectural Forum department which will cover the latest and best in the design and development of building products. The "Product Review," in every Forum issue, will supplement the principal editorial subject of that issue—in this case, office design. The products illustrated and described below serve to make offices better places to work in.

**TOTAL OFFICE ASSEMBLY**

"The Westinghouse Way" total office environmental system consists of work surfaces, storage units and accessories that attach directly to movable wall panels. Cabinetry attaches to the wall panels or suspends from work surfaces. Wall panels can rotate 360 degrees around a connector assembly, permitting free-form office layouts. Panel widths are 36 or 48 in., with heights of 60 or 80 in. Accessories include cord clips, electrical outlets, light fixtures and free-standing tables.

**TEXTURED WALLS**

Seventeen new "studies" have been added to the design repertoire of sculptured ceramic wall units by Design-Technics, Inc. Installed like tiles in modules of from 6 to 18 in., the walls are relatively light-weight, water-resistant, impervious to weather and easily maintained. The surfacings are available in natural clay colors and matte or glossy finishes. They are called "studies" because architects need not be limited to existing designs.

**FIRE-TEST PANELS**

Marlite Paneling, with flame-retardant surfaces, are available in textured woodgrains, smooth-faced grains and colors. Each 4 by 8 ft. panel is impregnated under pressure with special fire-retardant chemicals that leave no odor or toxic residue. The panels do not absorb moisture, remain dimensionally stable under normal conditions and never require refinishing. Flame-spread ratings are under 25 and smoke ratings under 30.

**MODULAR WALL SYSTEM**

Signature, an efficient, economical wall system manufactured by E. F. Hauserman Co. uses steel panels with a modular connecting system. Intersecting walls may be established on either or both sides of a panel joint on the modules. The slim glazing post is also suitable for partial or full-height glass walls and it provides for quick wiring and easy electrical access. The steel panels have a low-gloss, baked enamel finish that does not need repainting and the system's accessories include suspended wardrobe closets, shelving and chalkboards.
QUICK AND EASY OFFICES
The Apton office module system, manufactured by Dexion, Inc., can provide a fully furnished private office for $350 to $500. Each is custom-sized, furnished and easily dismantled at any time. The walls are of laminated vinyl panels (in 12 colors) with steel tube framing. Built-in modular components include desks, closets, shelves, files, etc.

LIGHTWEIGHT INTERCOM
The Norelco "mastercom M-16" solid-state intercom system for smaller offices comes in eight or 16-station models and features one-button control for hands-free conversation. A press-to-talk button increases volume in high-noise situations and converts the system to manual control. The 16-station version has a privacy button which returns an "absent" signal to callers, as well as a standing-by button to indicate that a third person is waiting to use the system. The lightweight units may be moved and re-plugged into the system without re-wiring or changing station codes.

OFFICE CHAIR LINES
A new line of chairs, called Contoura II and manufactured by the InterRoyal Corp., can be used for executive offices, conference rooms and other general office purposes. Available in fabrics, vinyl, and leather, and with bases in bright or satin chrome, the Contoura line (left) features removable seat pads and several style varieties. Also available from InterRoyal are three new lines of chairs based on a single design (right) for compatible office furnishing at all levels. Called the 6200, 6300 and 6400 series, these chairs are also available in a variety of sizes, types, arm designs, fabrics and bases.

For more information, write or call any of the Institute members listed below:

MO-SAI INSTITUTE, INC.
Information Office
110 Social Hall Ave.
Salt Lake City, Utah 84111
Members, Producers' Council

ALLIED BUILDING SYSTEM, INC.
260 Tolland Turnpike
Manchester, Connecticut 06040

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WILSON CONCRETE COMPANY
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Red Oak, Iowa 51566

TEXAS INDUSTRIES, INC.
P.O. Box 7208
South Omaha Station
Omaha, Nebraska 68107

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South Omaha Station
Omaha, Nebraska 68107
A distinguished jury named nine structures as winners of equivalent top awards in the 1970 Prestressed Concrete Institute Awards Program. Three of the winners were produced by Mo-Sai manufacturers.

1. Battelle Northwest Technical Center
Richland, Washington
Architects: Naramore, Bain, Brady & Johanson
Structural Engineers: Skilling, Holle, Christensen & Robertson

A wide range of precast concrete with exposed aggregate elements was used in this complex including structural bearing walls, window walls, spandrels, fascia elements facing for cooling tower, and large precast pylons that serve as exhaust shafts. Jury comment: "Handling of the various complex shapes and their finishes is commendable. Reflects the highest order of contemporary design."

2. Stephen Leacock Collegiate Institute
Borough of Scarborough, Ontario, Canada
Architect: A. M. Ingleton
Structural Engineers: Robert Halsall & Associates, Ltd.

Jury comment: "This building demonstrates a masterful handling of precast and prestressed concrete. It makes a clear and powerful statement without violation of the human scale."

3. Physical Sciences Complex
University of Guelph, Guelph, Ontario, Canada
Architects: Craig, Zeidler & Strong
Structural Engineers: J. Maryon & Partners

The exterior is precast concrete panels with an exposed warm local aggregate. Featured is a random sculptured rib face. Jury comment: "Textures expressed in precast concrete lend warmth and interest."

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Mo-Sai
PRECAST, PRESTRESSED CONCRETE
WITH EXPOSED AGGREGATE
PRODUCT REVIEW

ADJUSTABLE DESK
A modular walnut desk system, called Interchange 1, is being marketed by Dictaphone's Marble/Imperial Furniture division. Interchangeable panels are joined to a structural steel frame with metal brackets and screws. For example, a single-pedestal desk can be converted into a double-pedestal model or to either a right- or left-hand L-shaped executive desk.

PROBLEM-SOLVING CABINETS
A roll-out workshelf and a communications center are the newest additions to the Steele Mobiles office furniture line. The workshelf adjusts to desk height and will support office equipment such as a typewriter. When work is done, it will slide back into its cabinet, out of sight. The communications center relieves desktops of dictating units and letter trays and puts them at head level.

MODULAR OFFICE FURNITURE
The new Davis Allen (of Skidmore, Owings & Merrill) office furniture collection features a stable, unitized steel frame that allows panels, desk top and other components to be removed and interchanged. Luxury features include: side drawer pulls, hidden channels for telephone and other equipment wiring, gang locking mechanism, and power panels for typewriters.

CLERICAL DESK UNITS
Alpha (photo) and Omega office furniture units, manufactured by the General Fireproofing Co., are designed for general administrative, clerical, engineering or middle management personnel. Units are easily modified, with changeable box drawers, letter drawers, pedestals, cabinets, files or storage places. Five desk top sizes are available, with finishes including woods and laminates. A variety of metal trims is available. Work tops can fit flush to the pedestals or overhang.

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If you're like most of us, you and your clients spend about a third of your lives sitting behind desks, working. So, each of you needs a chair that is comfortable, good looking and well priced, yet is built to help get your job done. Our new Double-Shell chair is that kind of chair.

It helps you work better. It's good looking, very comfortable, well priced, and has some terrific engineering features that no other chair has. For example, the Double-Shell construction lets us fasten cushions and covers so they can't come loose or bunch up. This helps you work better.

The Double-Shell idea also gives an incredibly strong and stable fastening point for the chair base. It won't wobble. This also helps you work better.

And, a unique trim channel on the outer shell protects both chair and desk from getting all nicked up, and saves you from aggravation. This has to help you work better.

It has many other good ideas, all built into eight models that swivel, tilt, roll or telescope according to your particular needs.

See them now at your Steelcase showrooms. Steelcase Double-Shell chairs, the general office chairs of the 70's.

Showrooms and Offices:
New York - Chicago - Grand Rapids
San Francisco - Philadelphia
Boston - Cleveland - Dallas
St. Louis - Atlanta - Detroit
Los Angeles - Portland, Oregon
Toronto - Montreal.

Steelcase
Furniture That Works
For People Who Work.

On Readers Service Card, Circle 324
COMPLAINTS ON YOUR CARPETS?

It is the wall-to-wall sameness of a carpet, unbroken by traffic patterns and stains that the Architect and Designer visualize when the room is planned. If this matte finish is enhanced by a sheen as the light falls across the carpet, you have a thing of real beauty.

Maintaining a carpet to give this kind of appearance day after day, year after year, is no longer an impractical dream. In fact, it could have been planned to answer the crisis of the labor problem that exists in every area now.

Everyone with any first hand experience with carpet cleaning knows that shampooing merely hides the soil and that the carpets are left not only with all the soil but all the detergent, unless you wish to count the 5% a wet vacuum will remove. If you are not aware of this, we shall be happy to send you ample proof and simple test procedures to prove this to yourself.

When you realize that blotting up soil and solution is the only way there is that actually removes it you will see that you must clean your carpets the same way you clean your vinyl floors.

ARGOSHEEN answers the problem of selection of spotters because it contains every spotter you are ever likely to need whether yours is a hospital with spilled blood, a hotel that allows pets, a restaurant with hundreds of unidentifiable spots or an airline with ramp grease, coffee, milk and tea.

The applicator, a rug-mop that is harmless in the hands of the most reluctant beginner. When this little (or large) tool is used as a combination of sweeper and mopper, things happen. Good things. Like spots and soil actually coming up and hardened soil and detergent-filled carpet becoming soft and textured again. Like every room clean after a few days instead of weeks. And all done with less energy than sweeping with a vacuum cleaner, which you do not use the same day you sweep with the damp mop.

ARGOSHEEN is solving problems everywhere, from the plushest hotels in New York City to hospitals, schools, restaurants and 17 airlines (including TWA, Pan Am, Braniff, United and Delta).

Begin today to treat your carpets lovingly. For $12 we will send you a gallon of Argosheen, an Argomop and a tub—enough to see what it’s all about. (Please enclose this paragraph with your letterhead.)

Would you like to be able to prove that machines and vacuums can at best remove only 5 to 10% of the solution put down, and that they leave 90 to 100% of the dirt and detergent in the carpets?

Would you like to know about soil-banding and other interesting things about carpet cleaning we have been able to learn during the past 25 years which you should be able to pick up from one of the institutes or from the carpet manufacturer—but cannot?

We shall be happy to send you this information at no charge because we believe that you will join other designers and carpet stores who recommend, sell and even give ARGOSHEEN (The favorite of the Air Lines for 16 years) to their customers because they say it cuts down on complaints so drastically. Just write “Information” on your letterhead.

ARGO & COMPANY, INC.
Dept. AF-1
182 Ezell Street, Drawer 2747, Spartanburg, S. C. 29302
On Readers Service Card, Circle 325

PRODUCT REVIEW

continued from page 78

TABLES FOR OFFICES

Two new table designs in wood have been introduced by Knoll International. One has laminated wood legs and the other a solid, turned leg. Both types are engineered for lightness and are only 1½ in. thick without understructure (a veneered core with solid wood edge). Tables are shipped with legs detached and are available in a variety of sizes and types, with oak, walnut or teak finishes.

On Readers Service Card, circle 113

FLEXIBLE PARTITIONS

The "Divider Wall" partial-height partition system from the E. F. Hauserman Co. has solid panels factory finished on sheet steel laminated to a honeycomb core. The free-standing panels are connected to posts by a spring clip. Solid panels, in widths from 12 to 60 in. and heights from 42 to 84 in., can be exchanged for solid-and-glass combinations. Doors and gates are available. The system has the capability of making 120-degree angles in office layouts.

On Readers Service Card, circle 114

TUBE-FRAMED CHAIR

A new chair, designed by John Nance of J. G. Furniture Co. Inc., features a bent tube frame of chrome and a chrome back. The chair is adjustable for tilt and spring resistance (and its springs are hidden). The foam and foam seat and back is available in wet-look vinyls.

On Readers Service Card, circle 117

continued on page
Will snow be a problem on your next plaza design? "Plaza Six", another proven All-weather Crete insulated plaza design, solves this problem with snow melting coils in sidewalks, ramps and loading areas over occupied areas.

There are seven other AWC Plaza Systems. Each is developed for a different purpose. These systems are being used today by leading architects throughout the nation. Why? Because no other type of insulation offers so many advantages in plaza construction. Heavy density All-weather Crete acts as an insulating cushion to protect the waterproof membrane, thus solving a failure problem often encountered in other systems. The K factor is .46; it has excellent load bearing capabilities and can be sloped or applied level. There are other advantages too.

Check out "Plaza One"—Two—Six—all Eight! Write for a full color brochure complete with diagrams and specifications. (You may want to design "AWC Plaza Nine" yourself.)
RESTRAINED ELEGANCE

RWM SERIES Semi-recessed Water Coolers

Two Capacities — 8.0 and 13.0 G.P.H. of 50° water.

Cabinets — Vinyl-clad steel, silver spice and mocha brown; also stainless steel and gray baked-on enamel.

Features — Extends only 10 inches out from wall. Needs only a 4½-inch back recess for mounting.

Furnished with — Separate mounting frame with electrical and plumbing knockouts — helps reduce installation costs.

Write for Catalog and specifications.
THE HALSY W. TAYLOR COMPANY
1564 Thomas Road, Warren, Ohio 44481
SUBSIDIARY — KING-SEELEY THERMOS CO.

On Readers Service Card, Circle 329

Halsey Taylor®

PRODUCT REVIEW

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PLASTIC LAMINATE OFFICES

Free-standing modular offices, manufactured by Wels Industries, Inc. are available in wood stock covered with wood veneer or a plastic laminate called Textolite (made by General Electric Corp.). The modules come in five starter models, with 20 optional accessories, including a desk, sliding door bookcase/storage cabinet, desk organizer, and legal trays. Also available are two-sectioned drawers, furnitures, letter files, and cork (or chalk) boards. Units are fastened with special nut and bolt assemblies.

On Readers Service Card, circle 116.

The following is a listing of the key products incorporated in some of the buildings featured in this issue:

PRODUCT LITERATURE
To order material described, circle indicated number on self-addressed Reader Service Card, facing page 82.

ORS/WINDOWS
motion and technical details on "spray" solar glass, an insulating s unit with permanent, thin coat of reflective metallic gold. C.E.is. On Readers Service Card, circle 201.

FLOOR COVERINGS

METALS IN BUILDINGS
... and ful l architectural specs given. Also describes air conditioning systems for which access flooring is used as an air supply plenum with WebAir conditioners, Webber Technical Products. On Readers Service Card, circle 210. 1971 condensed catalog, 20 page catalog describes full line of advanced architectural hardware including specs and function charts. Sargent & Co. On Readers Service Card, circle 221.

WALLS/LAMINATES

LIGHTING
Comprehensive 40 page catalog which illustrates and describes complete line of architecturally styled luminaires. Catalog highlights the design versatility which helps architects create "customized" fixtures to meet varying requirements. Pemco Corp. On Readers Service Card, circle 224.

WALLS/LAMINATES

PROFESSIONAL SERVICES
A series of catalogs and brochures on sculpture, metal sculpture, bronze casting and Sarturo Modules. Austin Productions. On Readers Service Card, circle 236.

READERS SERVICE FILE
PRODUCT LITERATURE
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WALLS/LAMINATES
SMOOTHE® 4110 SERIES
AS SHOWN IN
PHOTOGRAPH (RIGHT)
MOUNTED ON
STOP FACE OF DOOR.

"SMOOTHE®" 4020 SERIES
MOUNTED ABOVE DOOR
ON TOP JAMB.

"SMOOTHE®" 4010 SERIES
FOR USE ON HINGE
FACE OF DOOR.

doors
closer notes...

TO GIVE ARCHITECTS AND HARDWARE CONSULTANTS
A FULL RANGE OF OPTIONS ON CLOSER PLACEMENT,
LCN BUILDS "SMOOTHEES" IN 3 SEPARATE STYLES,
(SEE DETAILS, ABOVE) EACH PROVIDES FULL CONTROL
OF BOTH OPENING AND CLOSING SWINGS OF DOOR.
ALL 3 HAVE THE SIMPLE GOOD LOOKS A FINE
DOORWAY DESERVES. CATALOG ON REQUEST.

LCN CLOSERS, PRINCETON, ILLINOIS 61356
We have added NIS 71* to serve you better

NIS 71 is one of the most advanced computerized information services now available.

Each new issue of The Forum offers an opportunity for you to get more of all the extra information you will want about technical developments, new products, services offered, etc., etc.,—free of charge. We even pay for postage.

All you have to do is circle the appropriate number on our reader service card and drop it in the mail. All of the new products, technical literature, and advertisements in the issue are key-numbered to the card.

As soon as your card arrives, the wheels and gears and circuits of the NIS 71 computer start whirring, and just as fast as return mail moves you’ll get what you asked for.

We urge you to use it. This month your card is facing page 82.

*Nielsen Inquiry Service
Mossy Pecan Marlite has the beauty of rare hardwood, but is priced to fit anyone’s budget.

Marlite paneling is color-coordinated, so Linen Stripe and Tapestry panels look great together.

Mediterranean influence is here to stay. Marlite captures its style in lovely Riviera paneling.

This authentic reproduction is Cathedral Oak Marlite, a new addition to the Trendwood line.

Four new Marlite wall ideas to make everybody’s job a lot easier.

When you’re looking for a really new and distinctive wall idea, look at Marlite. We have more than 80 different textures, colors and designs—including the four beautiful new panels shown above.

And Marlite makes it easier to create interiors with perfect color harmony. Our complete line is carefully color-coordinated. So there’s a solid-color panel to match the basic color in every pattern or design. (Marlite is also available in Fire-Test Panels to meet building code requirements.) Marlite makes the builder’s job a lot simpler, too. In fact, one man can install Marlite Planks by himself in a jiffy. They’re only 16” wide.

What’s new in soilproof, wash-and-wear walls? The answer is easy. Marlite. See it at your building materials dealer or write Marlite Division of Masonite Corporation, Dept. 107, Dover, Ohio 44622.

Marlite, plastic-finished paneling

Marlite is a registered trademark of Masonite Corporation.

On Readers Service Card, Circle 331
From v-v-v-vvrrrrrooooommmmmmm to shhh

ONTARIO MOTOR SPEEDWAY, Ontario, California / Architects: Benham-Kite & Associates / General Contractors and Developers: Stoett Inc. / Glazing Subcontractor: Sitelines Inc. / Glass tempered by Guardian Industries Corp.

... with Glaverbel Float Glass

At California’s new Ontario Motor Speedway the roar of the cars joins the roar of the crowd in a decibel-defying crescendo of nerve-knotting noise. Wall it out, demanded the owners. Wall it out for the race officials… the radio-tv people… the computer installation. With a wall that controls the temperature and humidity of the space it guards. But a wall so transparent it seems not to be there. The architects specified Glaverbel Float glass—criterion for flatness and transparency. Tempered Glaverbel Float in huge (eighty square feet), sealed, double-glazed acoustical window units. The sound-stopping power of an eight-inch solid concrete barrier! And a unique compensating system that equalizes the units’ internal pressure to ambient atmosphere, keeps the lights perfectly parallel, utterly undistorted, and as clear as—no glass at all!

Glaverbel

GLAVERBEL (USA) INC., 75 PLANDOME ROAD, MANHASET, NEW YORK 11030
GLAVERBEL CANADA LIMITED, 1550 MAISONNEUVE BLVD. W., MONTREAL 107, P.Q.

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