

# ARCHITECTURE

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ARCHITECTURE

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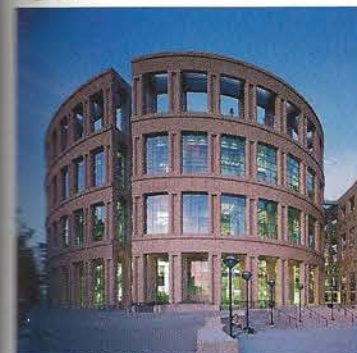
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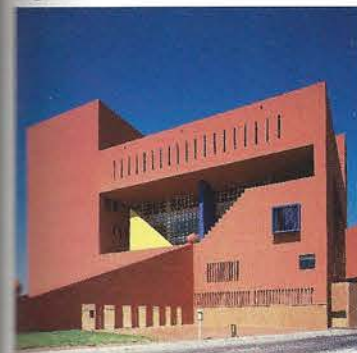
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Photograph by Timothy Hursley.

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# Desert Illumination

One of the best ways to grasp the character of Will Bruder's new library in Phoenix is to see it through the windshield of a car when driving west across the sprawling city. As the freeway sweeps into a sunken corridor, the library suddenly comes into view on the skyline, an abstract billboard of uncertain size. The building holds its own in a shapeless setting by the tight minimalism of its form, the visual tension of its surfaces, the ambiguity of its scale, and the haunting texture of its metallic facades, which glint and glimmer in the strong Arizona sunlight. It sets off a string of associations that run from the industrial to the natural, even to the geological.

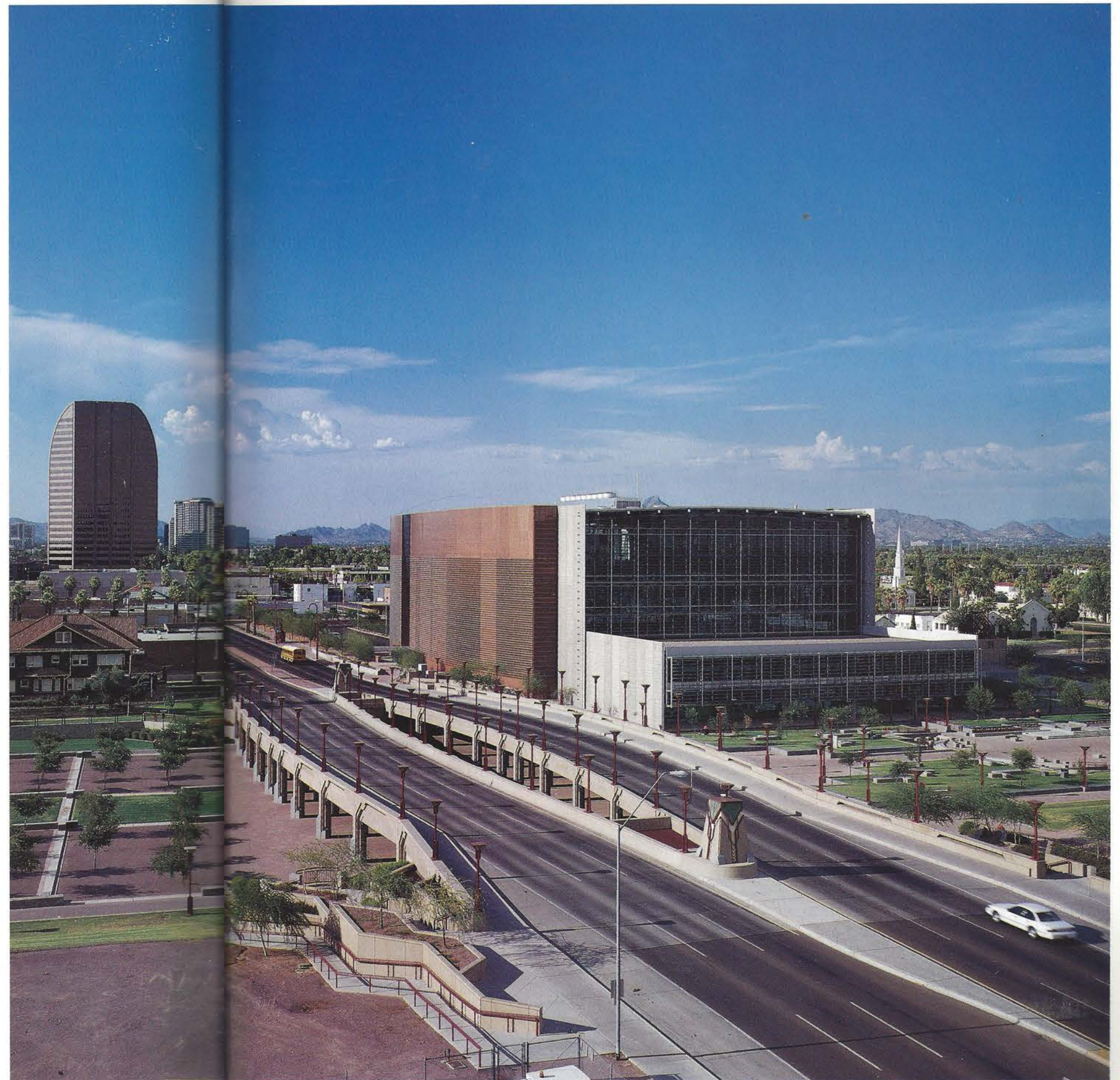
From north-south streets, the library presents an image both dignified and welcoming. The fierce sunlight and noisy traffic of Central Avenue are kept at bay by curved flanking slabs clad in corrugated copper. Between them, floors are stacked on reinforced concrete columns, which rise the full height of the building. Both south and north ends are fully glazed, allowing glimpses of people inside. The southern glass facade is protected from the sun's rays by means of computer-controlled louvers, while the northern facade is fitted with angled fabric sails.

The curved copper facades of the library are reiterated in the tense arc of the roof and

in the receding stainless steel plates above the entrances, which guide people past low, sinuous walls of finely laid stone to canopies of splayed steel. These curves are rediscovered inside the building, especially in the symmetrical entrance tunnels that converge on the concave light shaft at the heart of the library. Called the "crystal canyon," this glassy vertical slot rises the full height of the building and acts as a central point of orientation.

The main volume of the library is a flexible, open-plan structure with a grid of precast concrete columns. Ducts and electrical systems are slotted into the crossbeams. Flanking this central space, the copper-clad curved elements known as "saddlebags" contain mechanical services and fire stairs. Here, the structure consists of a steel frame with concrete walls clamped onto the armature.

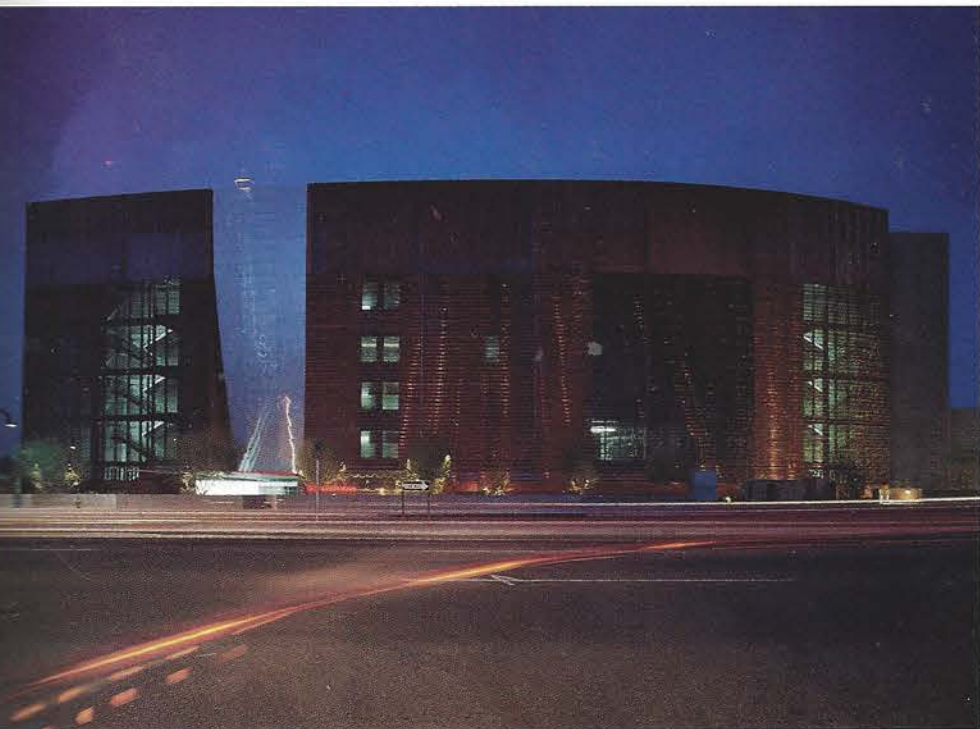
A mundane interpretation of the Phoenix Central Library is that it is a colossal, air-conditioned warehouse protected from the ferocity of the sun by insulating layers, employing the same sort of straightforward structural system as a factory or a roadway bridge. But Bruder has managed to raise prosaic technology to the level of architecture by making it obey a formal order and by translating it into metaphorical terms corresponding to his concept of the public library as a late-20th-century popular institution.



THESE PAGES: New Phoenix Central Library occupies prominent site on Central Avenue in downtown. Copper-clad service zone filters out noise of traffic; adjustable louvers protect glazed south facade from fierce sunlight.



BELOW: Copper-clad west facade is visible from freeway passing under site.  
BOTTOM: At night, interiors can be seen through perforated copper on east side.  
FACING PAGE, TOP: Bordered by new park designed by HNTB, library will be southern anchor of proposed Arts District Walk, connecting Heard Museum, Phoenix Art Museum, and Phoenix Little Theater.  
FACING PAGE, BOTTOM: Grand reading room on top floor glows at night through louvered south facade.



The ground floor functions as an information forum, with a large auditorium, a children's library, and a *mediathèque* for videos and discs. Level two contains general reference, periodicals, and the interlibrary research department. Level three is set aside for staff areas and storage. Level four is reserved for rare book collections, seminars, and lectures. Level five houses the entire nonfiction collection in a grand reading room with long views of the city and distant landscape.

Natural light is central to the meaning of Bruder's building. The connection between light and enlightenment is a familiar theme in library design, exemplified by Henri Labrouste's Bibliothèque Nationale in Paris (1875). Light filters into the fifth floor reading room at the north and south ends through glazing, and a gap between the roof and the east and west walls allows the sun to play across the concrete surfaces. Above the tapered concrete columns, each laminated circular skylight has a small hole in its blue interlayer positioned to produce a zenithal beam of light. This arrangement alludes not only to ancient hypostyle halls with their grids of ceremonial columns toplit through small openings, but also to the candle-flame flowers sprouting from the top of cacti.

In addition to the crystal canyon, there are numerous transformations of light passing through layers of opaque, transparent, or semireflective material: double-glazed, smoked panes with optical fibers playing behind them, simple metal screens punctured with holes, and sequences of spaces alternating between light and shadow. The inventive use of materials and textures has long been a hallmark of Bruder's architecture, and in the Phoenix Central Library he succeeds in taking standard products such as perforated metal plates and embedding them within his own metaphorical themes.

The corrugated copper cladding of the east and west facades is the best example of this poetic transformation. Dense and opaque when seen from a distance, it becomes light,





BELOW: Teflon-coated fabric sails shield north side from sun.

BOTTOM: Splayed I-beam canopy shelters main entrance. Copper sheeting was specified with deeper corrugations for building's center section.

FACING PAGE, TOP: Tensegrity structure supports bowed roof. Perimeter precast concrete walls are attached to steel structure of "saddlebags."

FACING PAGE, BOTTOM: Illumination and transparency convey notion of library as an open, popular institution.



even immaterial on closer inspection. At night, the perforated surfaces are like veils.

Unapologetically an example of American Middle Tech, the corrugated copper skin makes numerous allusions: to silos, freight cars, rustication, the Wrightian notion of a striated exterior, and even to geological formations and the ribbed skin of desert plants. In contrast to the deliberately crude concrete surfaces protruding at each end of the building and the polished steel surfaces above the entrances, the copper reads, in a bizarre case of reverse tectonics, as a weightless wall. Bruder takes a basic fact of much day-to-day American construction—the sandwiching together of separate layers of skin, structure, and insulation—and walks a knife-edge between the modern and the historical, the natural and the mechanical.

The theme of unpeeling layers, perceptual and actual, is pursued inside and outside the library to convey Bruder's idea of arriving at a luminous center, a place for the opening of the mind. Given this attention to the poetics of the object, it is disappointing that more ways were not found to bring natural light down into the belly of the building, other than the 28-by-48-foot central atrium.

The rigidity of the overall concept disallows subtler interventions that might have given a more intimate contact between reader and city. Nor are Bruder's junctions and connections always as clean as one might have wished. There is an awkward transition in the building between the ground level of the crystal canyon and the rest of this floor, where the visitor simply trickles past a book-control checkpoint to enter. And in the upper reading room, a complicated structural beam under the end of the bowed roof obscures the idea of a hovering parasol.

The new Phoenix Central Library corresponds to a key moment in a city's evolution when the need for cultural monuments appears, a need manifest in several other projects of note currently under construction in Phoenix (ARCHITECTURE, April 1995, pages

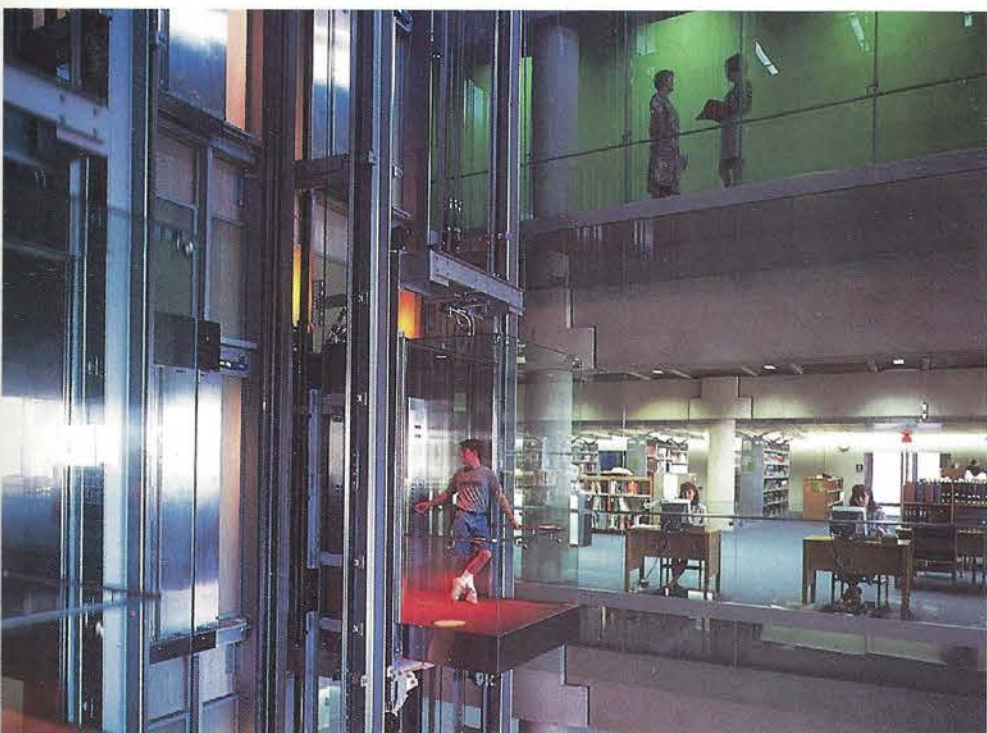




BELOW LEFT AND RIGHT: Main staircase behind elevator banks is enclosed in laminated, translucent  $\frac{3}{8}$ -inch-thick glass panels supported in a steel frame with structured silicone joints.

BOTTOM: Glass-enclosed elevators are visible across atrium.

FACING PAGE: Computer-controlled mirrors in skylights above atrium direct daylight deep into five-story, glass-enclosed "crystal canyon."



76-85). Bruder's idea is distinguished by his transformation of the local landscape—the palm groves and mesas—into modern architectural terms. His updated version of a hypostyle hall draws lessons from Frank Lloyd Wright's Johnson Wax Building (1936) or Le Corbusier's Parliament in Chandigarh (1963), while the primary gesture of metallic curves reacting to a wider landscape owes something to minimalist sculptors such as Richard Serra. But Bruder adapts these influences to fit his own ideas.

Popular without being populist, regionally sensitive without being regionalist, Bruder's library makes a contribution to the general architectural culture of today well beyond the American Southwest. Parallel lines of research are evident in the mechanistic precision and sensitivity to natural forces of the Australian Glenn Murcutt's work; the abstraction binding together hidden images in the buildings of Swiss architects Jacques Herzog and Pierre de Meuron; the transformation of urban banality in projects by Frank Gehry and Rem Koolhaas; and the elaborate transparencies of Jean Nouvel. But the library also develops from Bruder's own earlier experiments and vocabulary; it even returns to the evocative minimalism in crude industrial materials—corrugated metal, rusty steel, scaffolding poles—of his own desert studio of 15 years ago.

At a time when American architecture seems doomed to ricochet between cheap Postmodernism, arbitrary Neo-Modernism, and the remote theorizing of academia, it is heartening to find a work rooted in the daily facts of its society, in the myths of its place, and in the features and forces of the natural setting. Whatever its faults and limitations, Bruder's Phoenix Central Library uses the slang of contemporary construction to make an architecture of evocative space, light, and material.—William J.R. Curtis

William Curtis's most recent book is Denys Lasdun: Architecture, City, and Landscape.





**SECTIONS:** Southern volume (right) houses microfiche and children's library. Saddlebags on east and west increase in size on upper floors.

**PLANS:** Curved profile of saddlebags is repeated in glass walls of atrium.

**FACING PAGE, TOP:** Reading room's tenebrity roof has circular skylights.

**FACING PAGE, BOTTOM LEFT:** Bruder designed shelving's built-in light fixtures.

**FACING PAGE, BOTTOM RIGHT:** Atrium's glass cage interrupts east-west main axis of reading room.

# **PHOENIX CENTRAL LIBRARY** PHOENIX, ARIZONA

**ARCHITECT:** BruderDWLarchitects, a joint venture between William P. Bruder and DWL Architects & Planners—Will Bruder, Wendell Burnette (lead designers); Carleton Van Deman (project manager); Bob Adams, Marc Arnold, Lito Aquino, Maryann Bloomfield, John Chopas, Lauren Clark, Mark Dee, Beau Dromiack, Dan Filuk, Michael Haake, Frank Henry, Toni Ann Hindley, Sharon

Kraus, Rick Joy, James Lindlan, Dean Olsen, Peter Pascu, Vicky Ramella, Jeff Wagner (project team)

**LANDSCAPE ARCHITECT:** Martino & Tatasciore

**ENGINEERS:** Ove Arup & Partners (structural/acoustic/building systems); Bates/Valentino Associates (building systems); Hook Engineering (civil)

**CONSULTANTS:** Mason Associates, Professional Library Consultants (library); lighting dynamics (lighting); Tait Solar Company (daylighting);

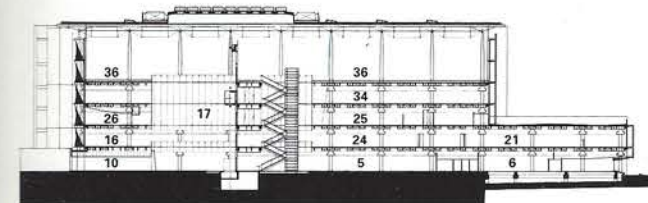
Construction Consultants Southwest (cost); FTL/Happold (structural fabric)

**DEVELOPMENT MANAGER:** CMX Group

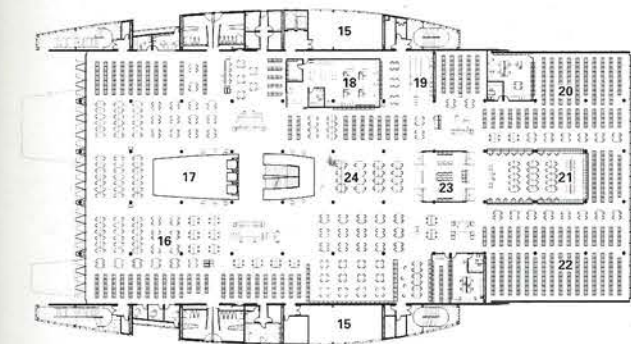
**GENERAL CONTRACTOR:** Sundt Corp

**COST:** \$28 million

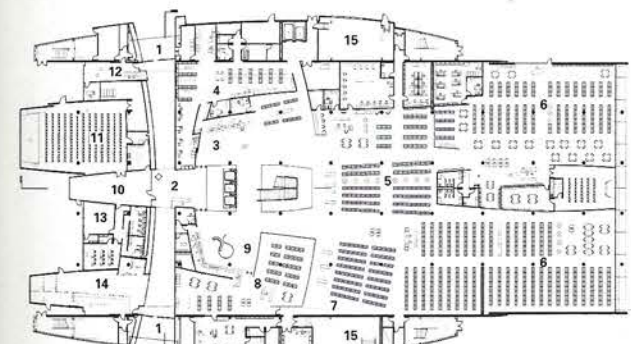
**PHOTOGRAPHER:** Timothy Hursley, except as noted



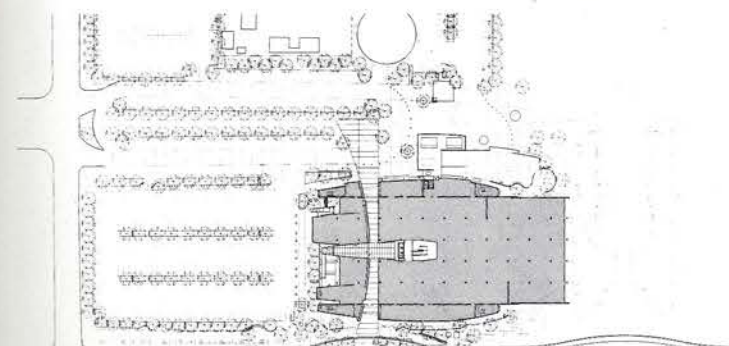
NORTH-SOUTH SECTION



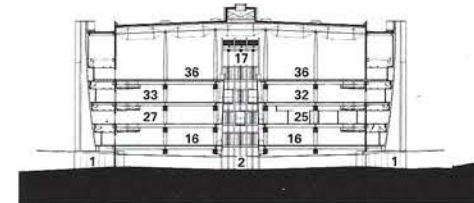
SECOND FLOOR PLAN



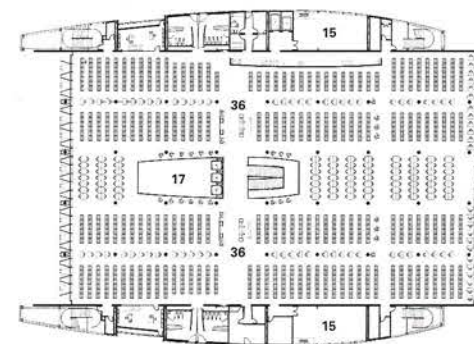
FIRST FLOOR PLAN



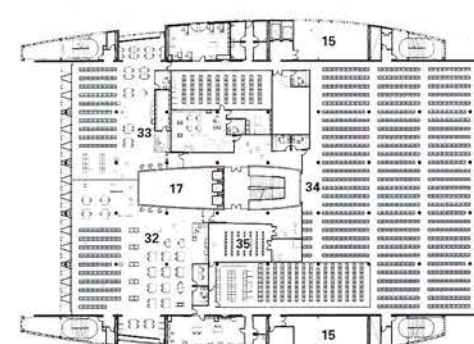
SITE PLAN



EAST-WEST SECTION



FIFTH FLOOR PLAN

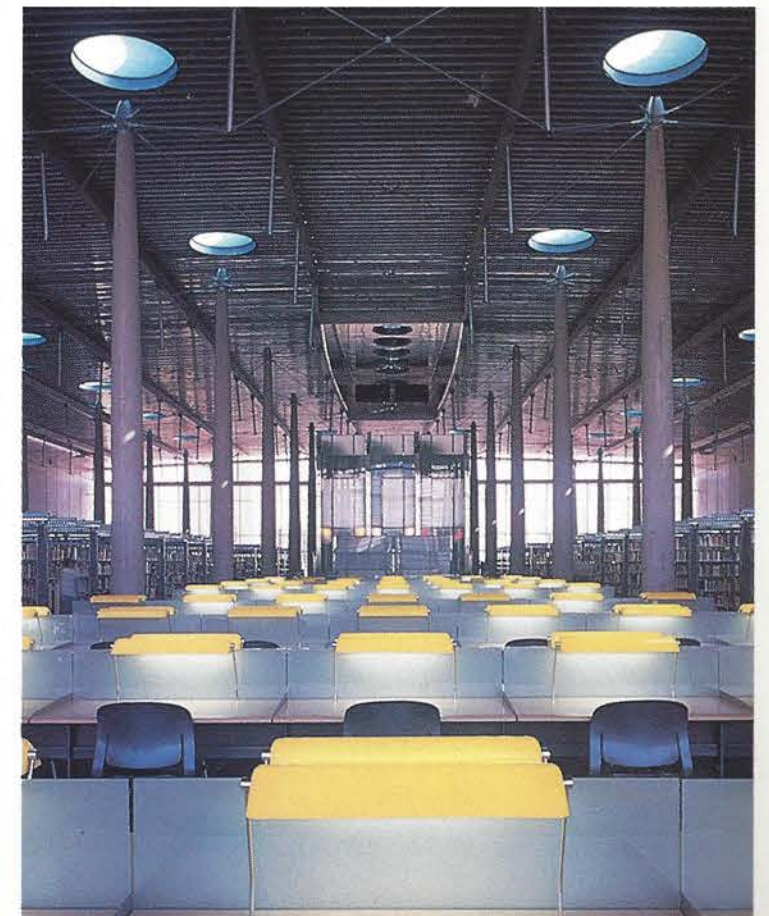


FOURTH FLOOR PLAN



THIRD FLOOR PLAN

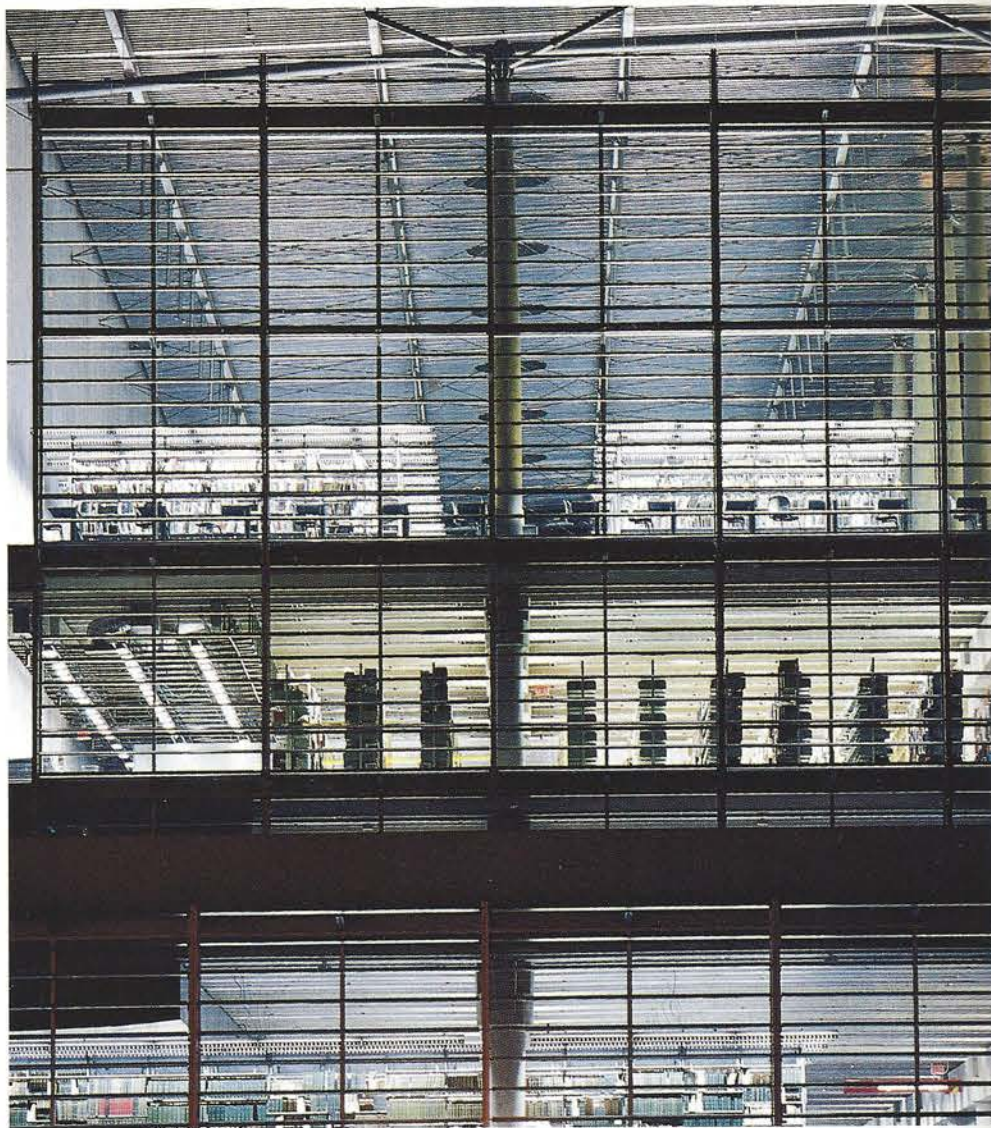
- 1 ENTRANCE
- 2 LOBBY
- 3 CHECK-IN
- 4 CIRCULATION
- 5 FICTION
- 6 CHILDREN'S LIBRARY
- 7 BIOGRAPHY
- 8 VIDEOS
- 9 CHECK-OUT
- 10 GALLERY
- 11 AUDITORIUM
- 12 GIFT SHOP
- 13 MEETING ROOM
- 14 RESTAURANT
- 15 SERVICE
- 16 REFERENCE
- 17 ATRIUM
- 18 INTERLIBRARY LOAN
- 19 MAPS
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- 35 LECTURE
- 36 NONFICTION COLLECTION





## High Heat, High Tech

*Phoenix Central Library's building systems are fine-tuned to the desert climate.*



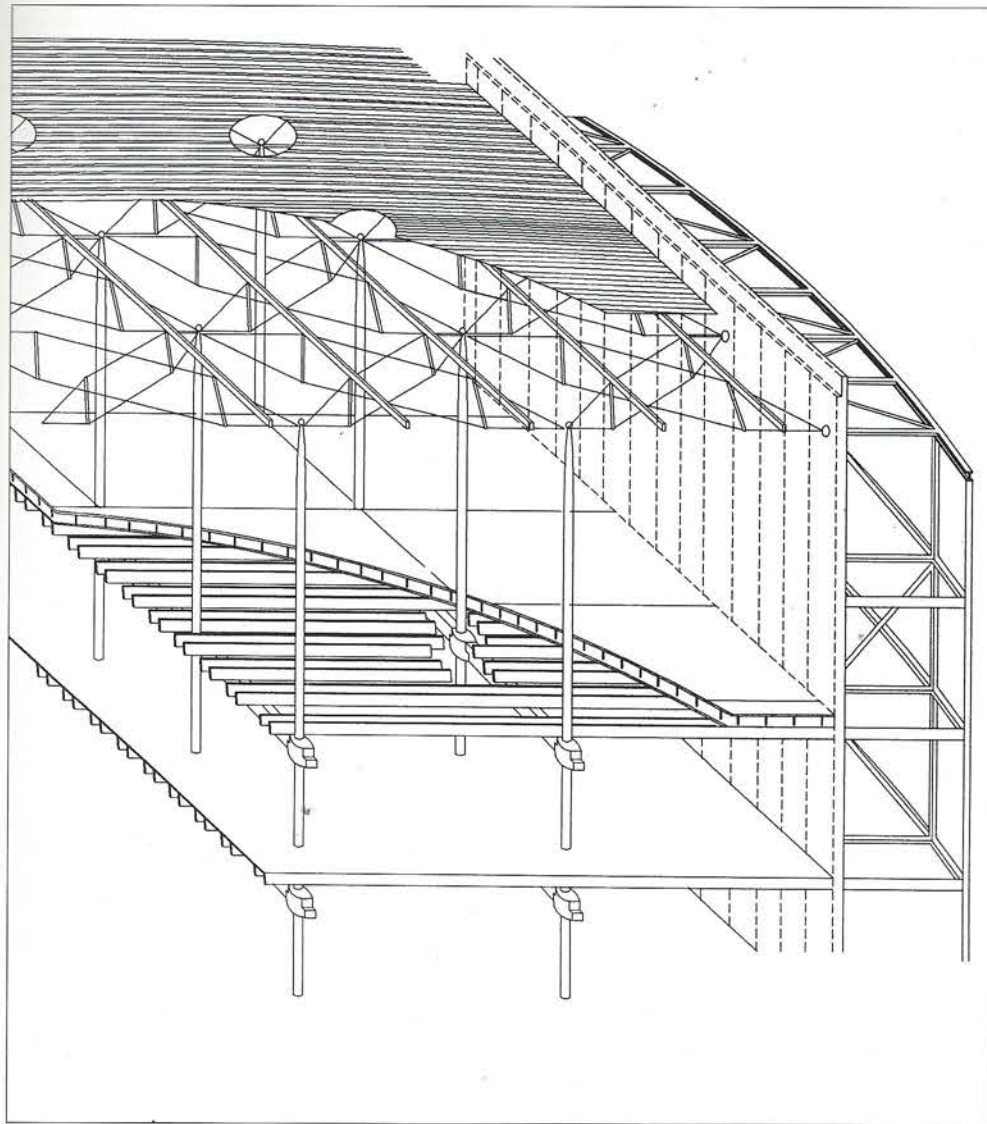
**ABOVE RIGHT:** Library's concrete structure and tensegrity roof are visible through motorized aluminum louvers.

One of the most technically expressive public buildings in America is not designed by Norman Foster, Richard Rogers, or Nicholas Grimshaw, but by Arizona architect Will Bruder. The new Phoenix Central Library (pages 56-65, this issue) brings sophisticated building technology to the Southwest at the remarkably low cost of \$100 per square foot.

Bruder designed his open-plan "warehouse for books" to accommodate future change and growth, collaborating with the Los Angeles office of engineering guru Ove Arup & Partners to develop a way to distribute mechanical, electrical, and telecommunications systems anywhere in the building. On lower floors, ducts, wires, and cables are tucked between structural concrete joists, and flexible conduits dropped in as required. On the fifth floor, systems are contained beneath a flexible raised floor deck. Bruder even detailed the building's glazed north facade so it can be taken apart and reassembled for future expansion.

Bruder also paid close attention to the library's energy performance. The north facade is fitted with fabric sails that shade its glazed skin from sunlight while maximizing views; motorized aluminum louvers on the library's south facade (above) adjust automatically to eliminate interior glare and heat gain while allowing views of the city and mountains beyond.—*Raul A. Barreneche*





## Structural Systems

The new Phoenix Central Library is a concrete box flanked by service cores to the east and west and topped with a lightweight, cable-supported roof. Book stack dimensions dictated a primary structural grid of 32-foot, 8-inch-square bays. Following this grid, the first four floors are constructed of precast concrete T-stems and beams supported on precast columns. The library's east and west perimeters are enclosed by 8-foot, 2-inch-wide loadbearing precast concrete wall panels that fit within the overall structural grid. In designing these walls, engineer Ove Arup & Partners determined that 12-inch-thick walls would not radiate absorbed heat into the building until evening, when excess heat would be radiated back out into the cool night air.

Outside the precast walls, steel-framed "saddlebags" act as the primary east-west lateral bracing for the entire library structure. The sad-

dlebags contain fixed services, such as stairs, rest rooms, and mechanical and electrical power sources. Their braced-frame structures are clad in both perforated and solid copper panels (above right).

One of the library's most innovative structural maneuvers is the cable-stayed tensegrity roof crowning the fifth floor reading room (drawing, above). Developed by Arup engineer Michael Ishler, the corrugated galvanized-steel roof appears to float above the candlestick-shaped columns, which taper in diameter from 2 feet at the library's lower floors to just 10 inches atop the fifth floor reading room, as loads on the columns diminish.

Steel caps bolted to the top of each 30-foot-high column anchor tensile cables that support a series of stainless steel struts. These struts appear suspended between cables, but they actually support the north-south purlins that in turn support an

insulated galvanized-steel roof-deck, perforated for acoustic absorption.

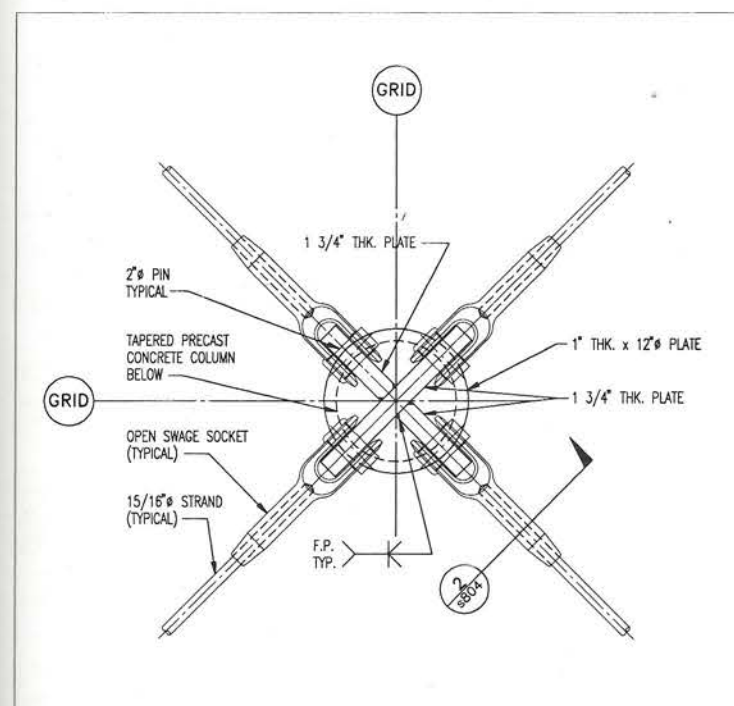
Within the roof, Bruder inserted 6-foot-diameter skylights and located each above a column. The tops of the drum-shaped skylights are fitted with two layers of 1/4-inch-thick laminated glass, located above a pair of 1/4-inch-thick layers and one 1/8-inch-thick layer of laminated glass that enclose a blue inter-layer in which a 4-inch-diameter hole is cut. On the summer solstice, sunlight is intended to pass through the clear openings as if to "light" the candlestick columns.

**FACING PAGE, TOP LEFT AND RIGHT:** Slot between wall and roof admits daylight; tensile cables supporting roof are anchored to braced steel frame of saddlebags through east and west walls.

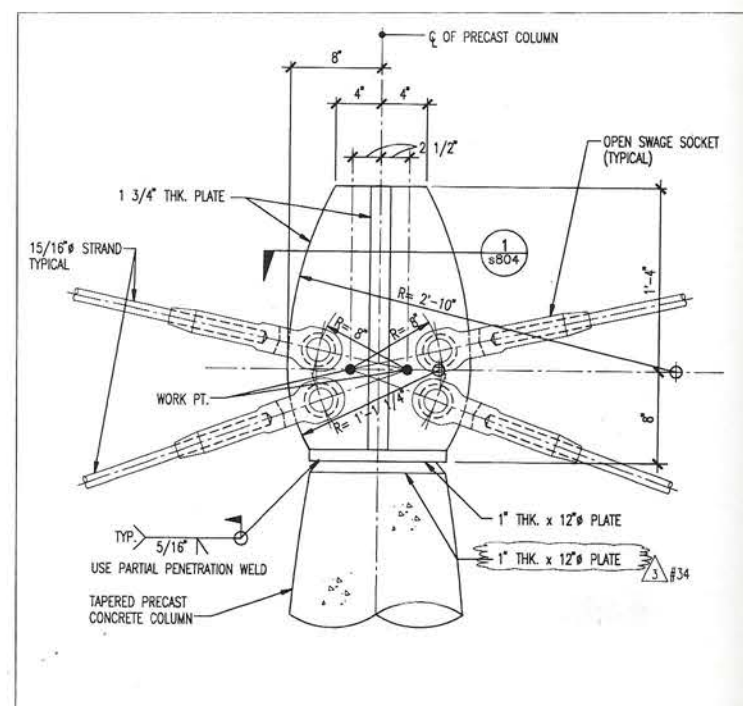
**FACING PAGE, PLAN AND DETAIL:** Steel cables are bolted to caps that are fastened to columns. Cables transfer roof loads from purlins to saddlebag.



TIMOTHY HURSEY/PHOTOS

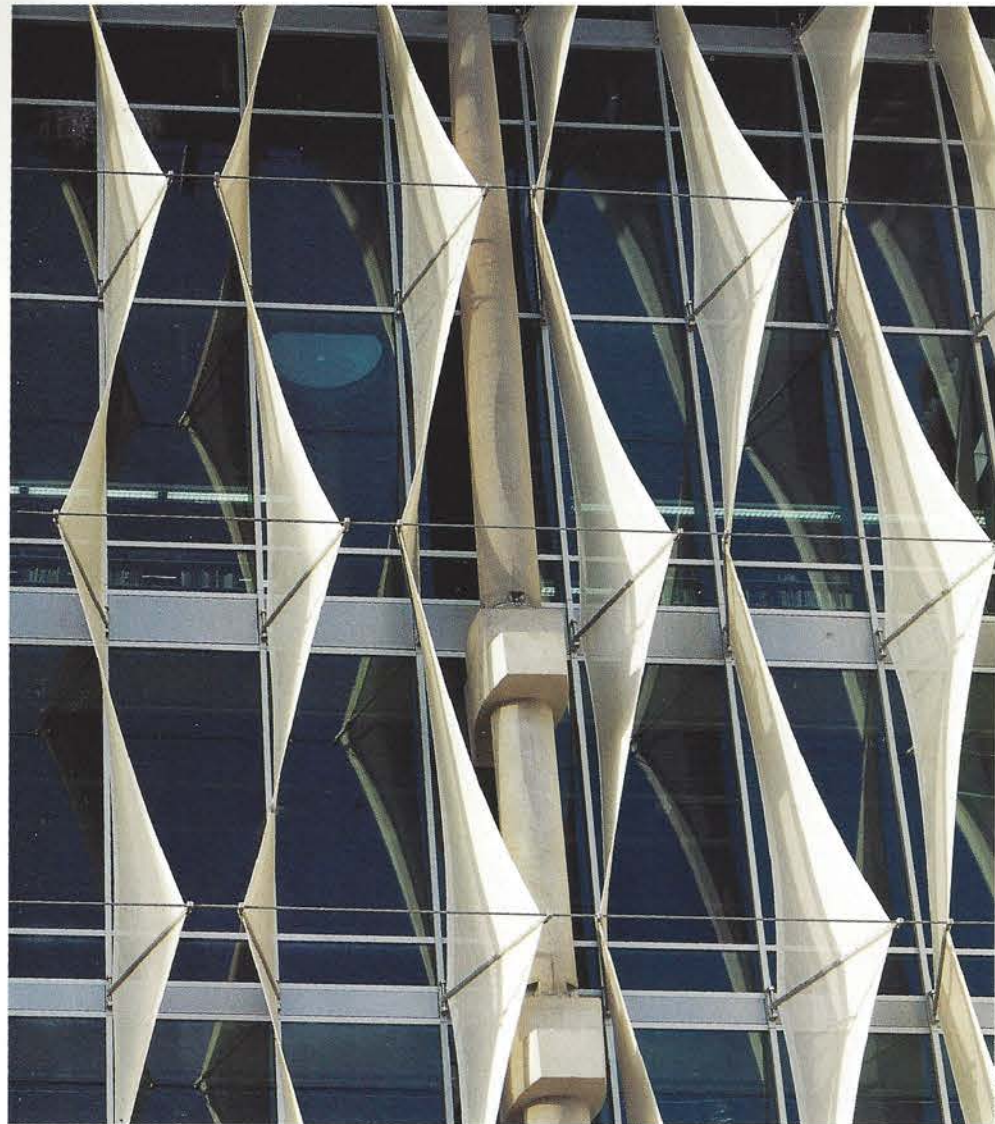


PRECAST COLUMN CAP PLAN



PRECAST COLUMN CAP DETAIL





## Fabric Sails and Skylights

In Phoenix's desert climate, sunlight is more a liability than an amenity. So Bruder and his team devised ways to cut down on harsh glare and solar gain while maximizing daylight and views inside the library.

On the glazed north facade, the architect installed Teflon-coated acrylic fabric sails to shade the glass and minimize glare (above). The perforated sails provide shade between March and September—when the sun rises north of east and sets north of west—without obstructing views of the city and mountains beyond. New York City-based FTL/Happold generated computer models to determine the precise geometric profiles that would eliminate direct sunlight. The rigging components were detailed and crafted by the Fabric Shop, a tent-maker in Monmouth, Maine.

The 28 fabric sails are fastened to aluminum struts bolted to horizontal mullions at each level of the

north facade. At the top of each sail, a pair of cables anchors the fabric to a tubular steel beam spanning the length of the facade; another pair of cables, tied to steel anchors bolted to the concrete foundations, secures the bottom of each sail. Kevlar ropes inserted into fabric sleeves at the edges of the sails help keep them rigid. Meanwhile, horizontal cables stretching the width of the north facade brace the aluminum struts and tie them to the steel framing of the saddlebags (above, section).

Daylight is also diffused in the library through nine skylights atop the library's central atrium. Bruder collaborated with local specialist Tait Solar to develop a way to eliminate glare by fitting each skylight with a circular frame supporting motorized, mirrored louvers that reflect sunlight into the building. A row of six sensors mounted on the library's roof measure sky conditions for brightness. This data is

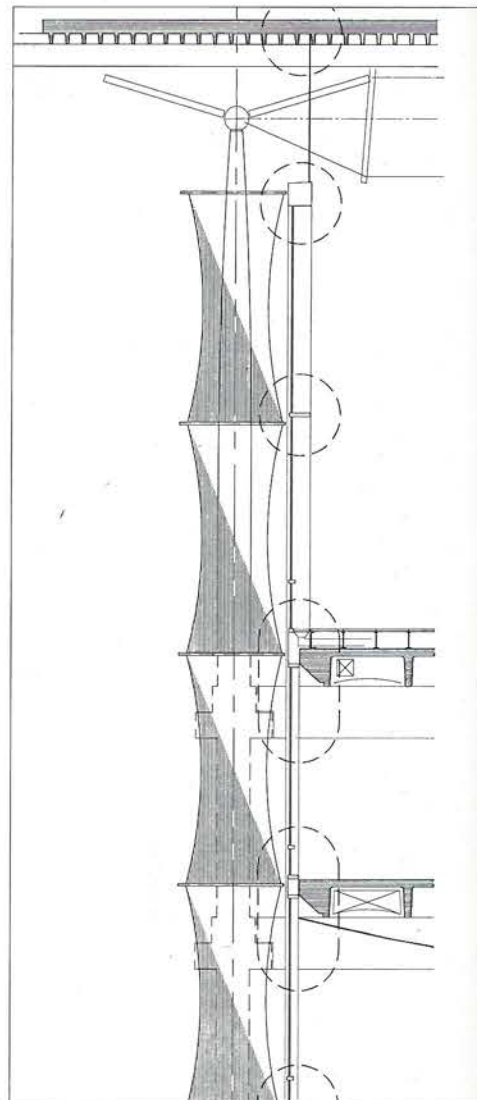
fed to computers that control the angle of the mirrored louvers. Computers also track the sun's position in the sky and rotate the louvers during the course of a day to follow the path of the sunlight.

A second set of solid steel louvers, suspended below the mirrored blades, blocks overhead midday sun from penetrating between the mirrored louvers. The motorized louver system successfully tames the harsh Arizona sun inside the library, but the system seems unnecessary, requiring technically complex maneuvers to achieve minimal effect.

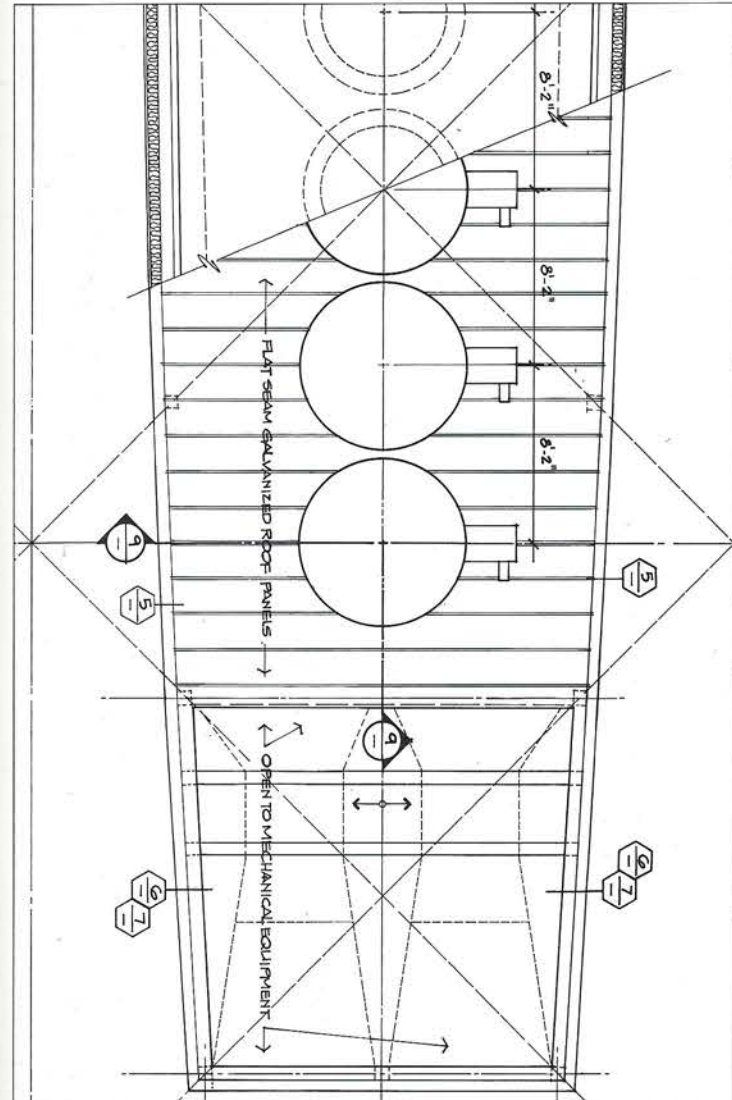
**ABOVE LEFT AND SECTION:** Perforated, Teflon-coated fabric sails are braced by aluminum struts and cables.

**FACING PAGE, PLAN AND TOP RIGHT:** Spacing of 6-foot-diameter skylights over atrium conforms to structural grid.

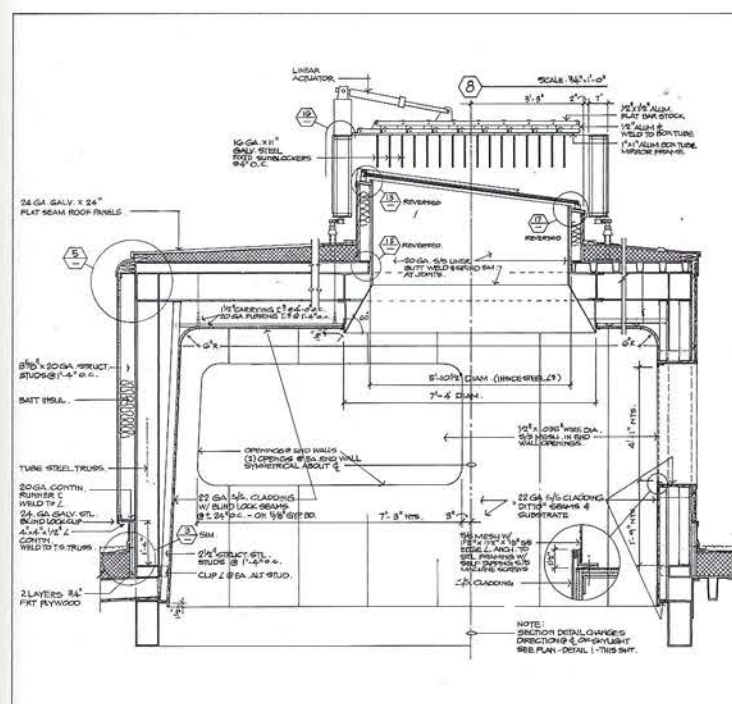
**FACING PAGE, SECTION AND BOTTOM RIGHT:** Computers track sun angles and brightness to control mirrors atop skylights.



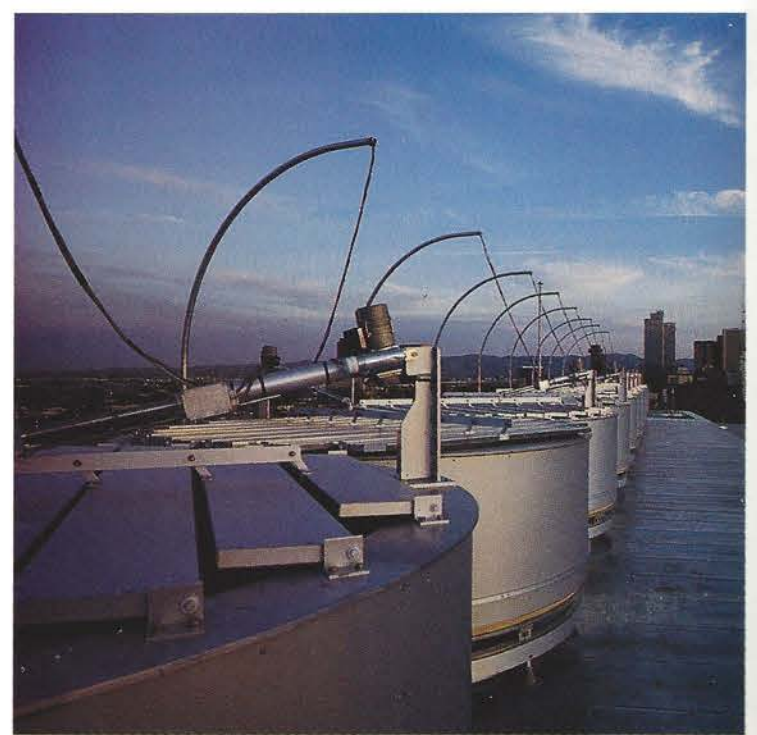
NORTH WINDOW WALL SECTION



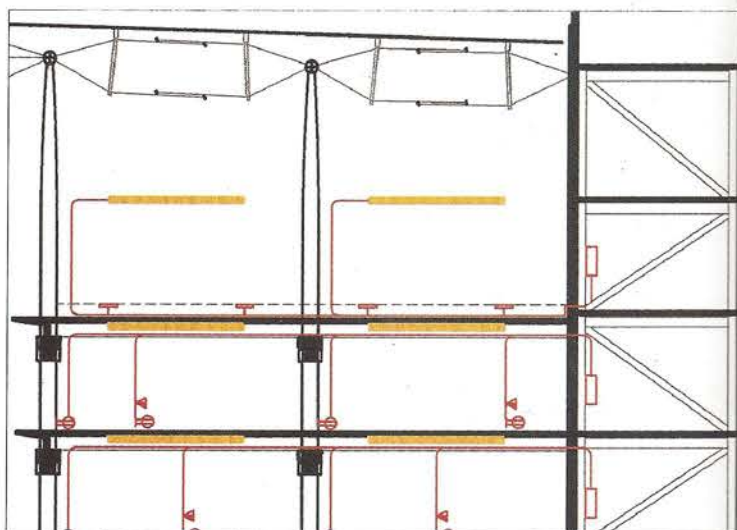
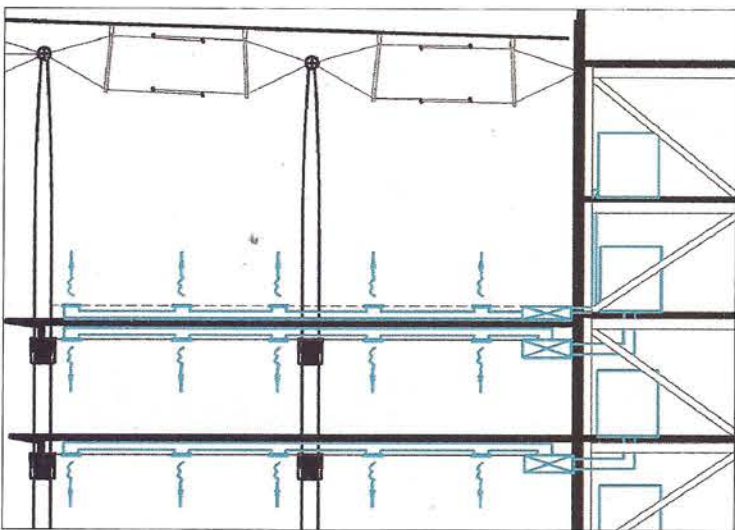
SKYLIGHT PLAN



SKYLIGHT SECTION







AIR DISTRIBUTION

POWER DISTRIBUTION

## Mechanical Systems

Bruder maximized the library's flexibility by separating all fixed services from the main concrete volume and inserting them into six-story volumes on the east and west sides. Each of the 270-foot-long saddlebags contains exit stairs, rest rooms, service elevators, and electrical, mechanical, and telecommunications risers and equipment. Ducts and conduits are fed from the saddlebags into the central space through openings punched in the precast concrete walls at east and west perimeters (facing page, center drawing).

Bruder and the Arup engineers considered a raised floor deck, which offers maximum flexibility, to distribute the building systems at each level, but found that it was prohibitively expensive. So the team devised a cheaper, equally flexible system. Along the perimeter walls, they installed perforated aluminum panels concealing huge supply and return air ducts, electrical conduits, and

cable trays for telephone and computer wires, all feeding from the saddlebags. These power "bellies" are hung from the concrete structural T-stems and extend north-south the entire length of the library (facing page, bottom drawing).

Cabling for air ducts, light fixtures, sprinkler lines, and telecommunications wires extends east-west from the power bellies on the library's lower four floors and is suspended from the floor slabs in the spaces between precast concrete T-stems (facing page, top drawing). Curved, perforated aluminum panels, providing acoustic absorption and easily removed for maintenance, conceal the ducts and cables and enclose the space around light fixtures.

Steel conduits delivering power to the book stacks (fitted with built-in light fixtures), computers, and electrical outlets are simply dropped from the ceiling as required. The conduits are suspended by Y-shaped

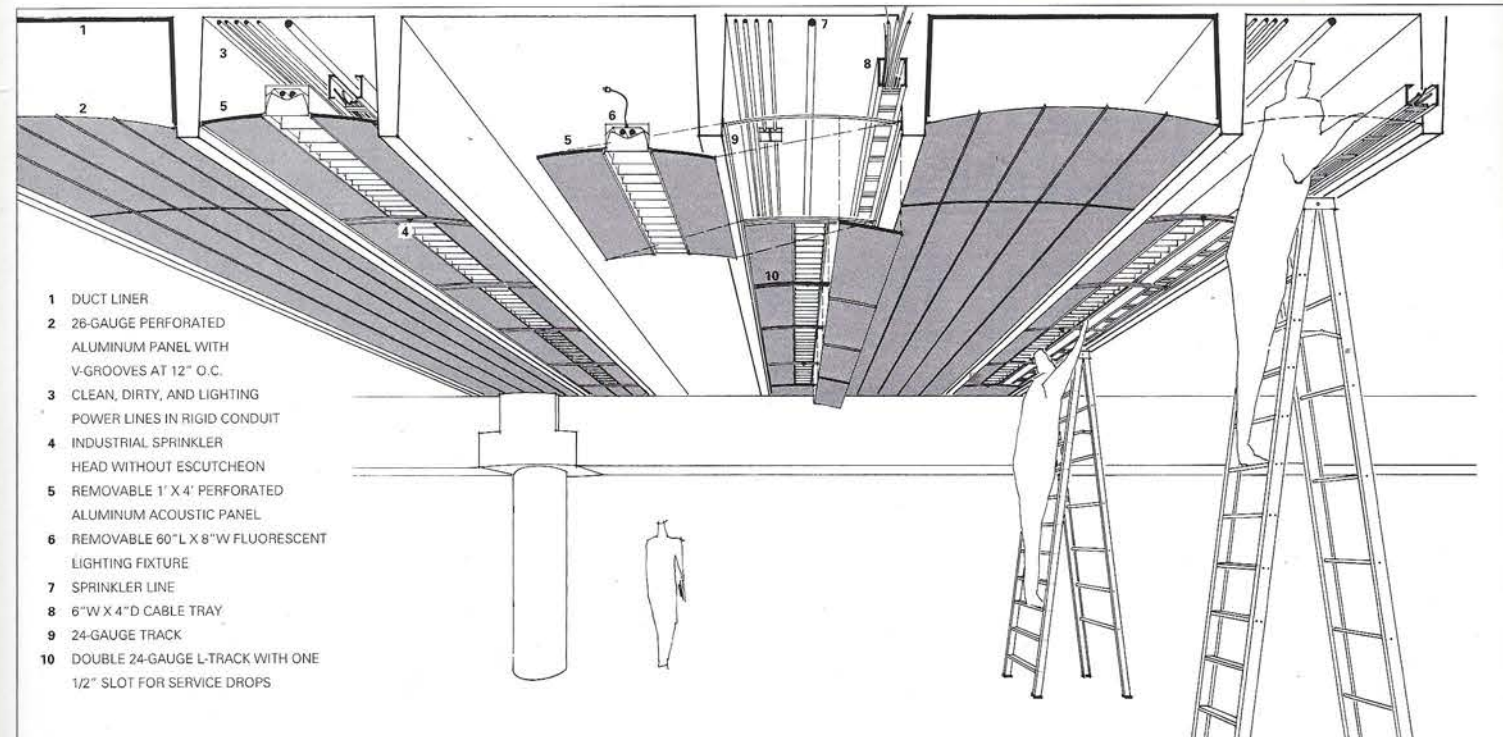
stainless steel wires anchored to the underside of the concrete floor slabs and structural T-stems.

On the top floor, Bruder specified a raised floor system, since ducts and conduits could not be concealed in the tensi-grity roof over the 36-foot-high reading room. Services are fed from the saddlebags and laid in the 12-inch-deep plenum between the structural concrete slab and the raised floor deck. Air ducts and electrical outlets are punched through at varying intervals within the grid of book stacks and study desks. New openings can be added should the organization change.

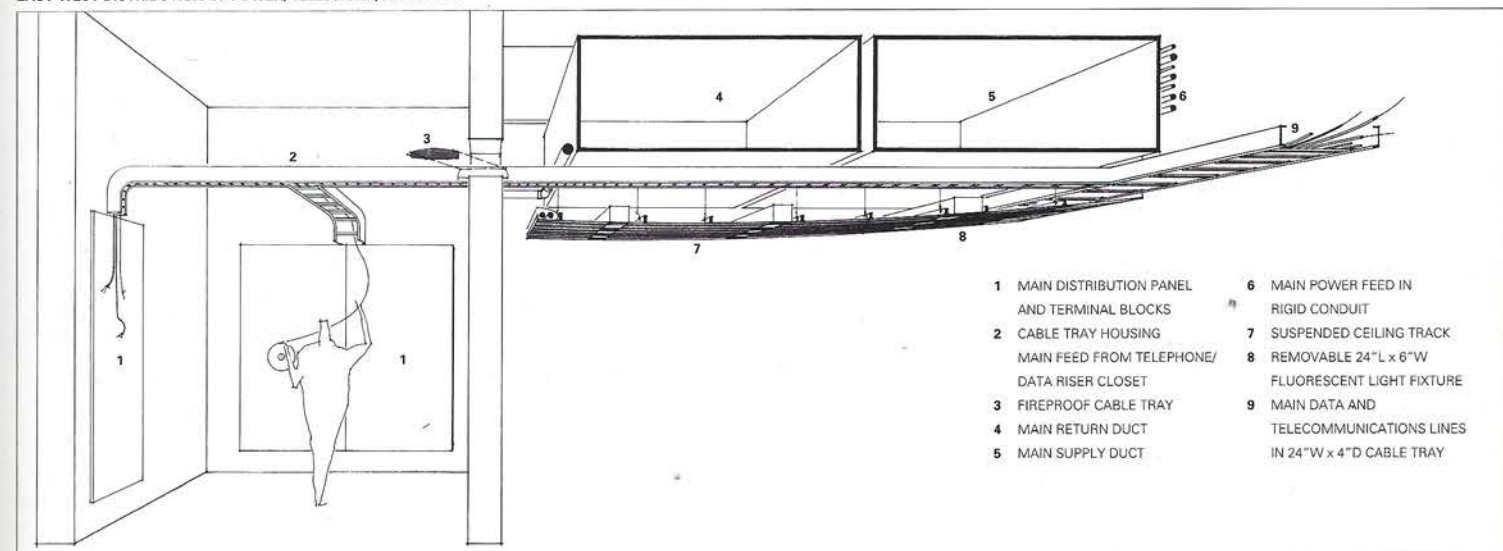
**TOP LEFT:** Exterior saddlebags contain fixed building services.

**TOP RIGHT:** Conduits, sprinklers, and air ducts are concealed between T-stems.

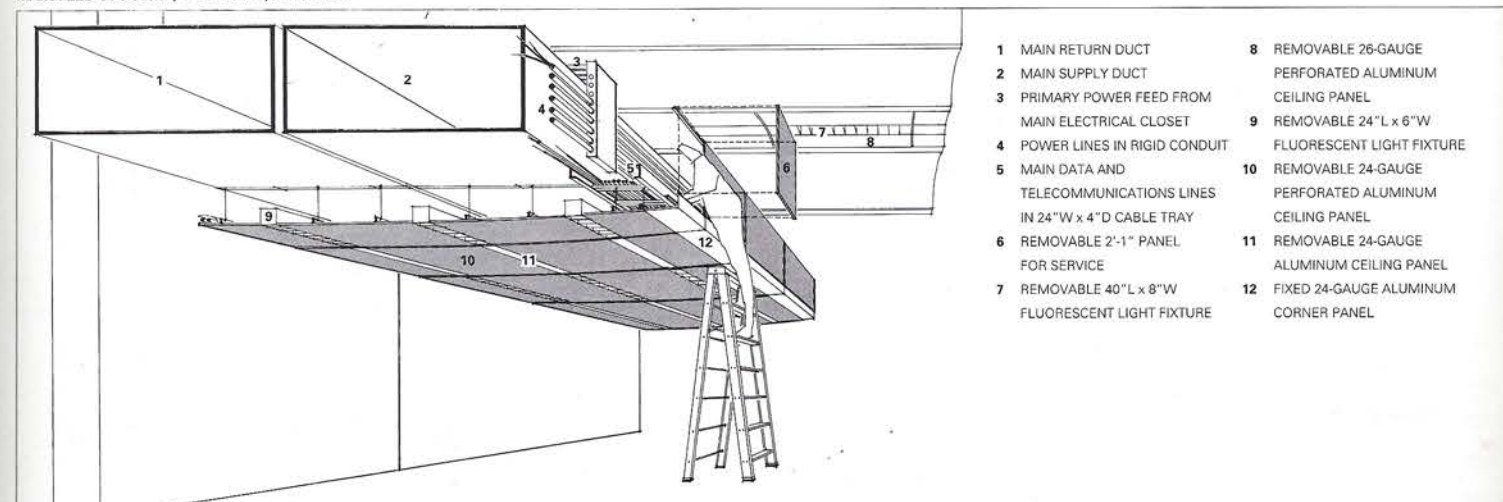
**SECTIONS:** On lower floors, air and power are routed from saddlebags to paneled ceiling ducts. Underfloor ducts supply reading room.



EAST-WEST DISTRIBUTION OF POWER, TELEPHONE, AND DATA



MAIN FEED OF POWER, TELEPHONE, AND DATA



NORTH-SOUTH DISTRIBUTION OF POWER, TELEPHONE, DATA, AND AIR