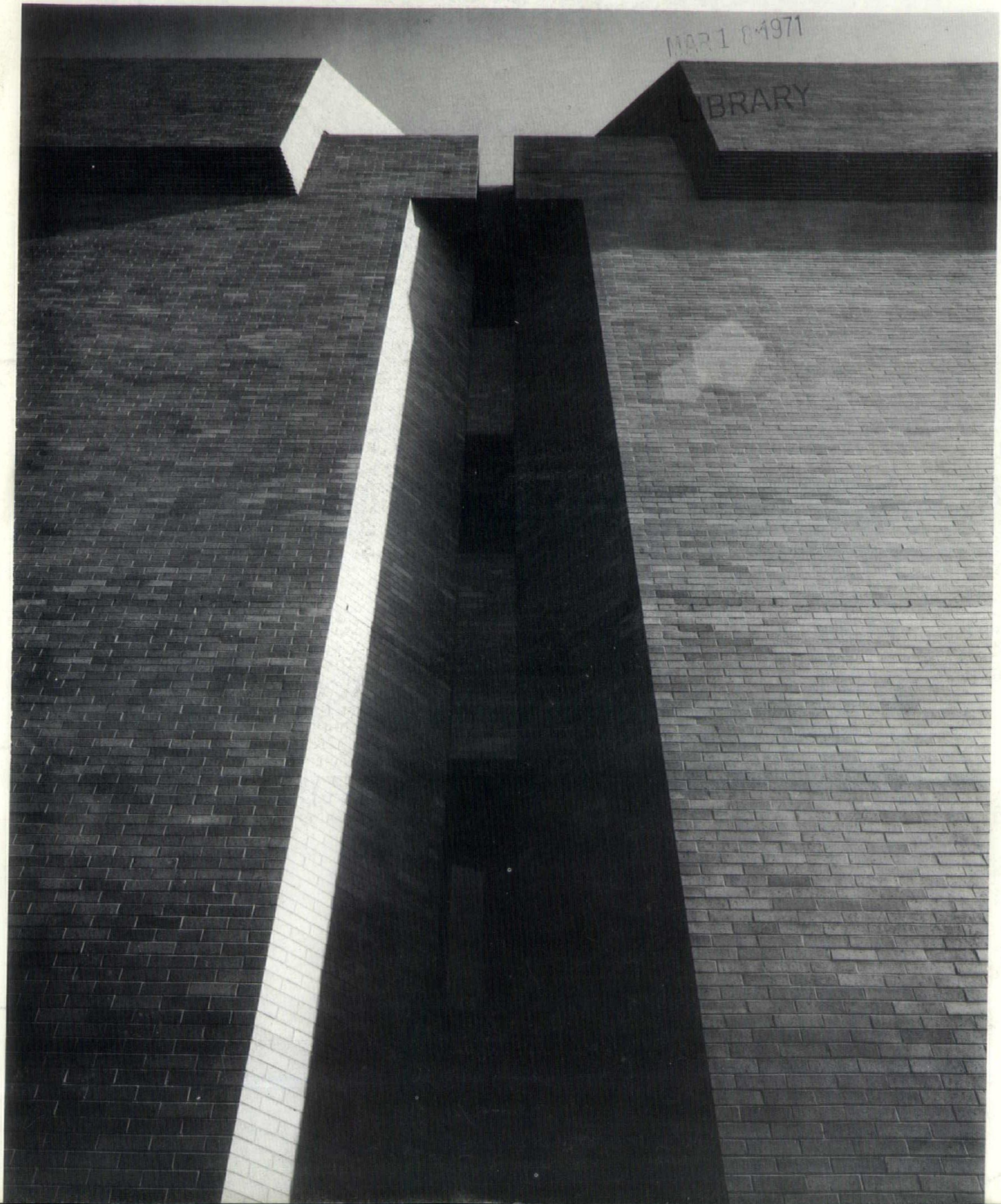
new england Architect

February 1971



It will pay you to look into on-site power...

the savings can be electrifying!

Witt-Armstrong Equipment Company specialists will be happy to consult with you on the engineering and layout of any on-site power installation.

Caterpillar natural gas and diesel engines deliver dependable power with operating costs that can be considerably less than purchased electricity. In addition, they serve the dual purpose of supplying prime power for operating air conditioning, pumps, and other equipment plus the added safeguard of standby power when needed.

Under emergency conditions, Cat engines will provide reliable power for lights, elevators, heating, alarm systems, fire protection and other critical requirements.

DON'T BE LEFT IN THE DARK!

Call or write for complete details about how Cat engines and Witt-Armstrong service can save money and protect businesses from loss caused by power failures.

YOUR **CATERPILLAR**® & **TOWMOTOR**® DEALER

WITT-ARMSTRONG EQUIPMENT CO.

Needham Heights, Mass. Route 128 (Exit 56W) Tel: (617) 444-5800
South Hadley, Mass. 600 New Ludlow Rd. Tel: (413) 536-4580


SPAULDING BRICK COMPANY INC.
ESTABLISHED 1933
Distributors of Brick and Structural Tile
120 MIDDLESEX AVENUE
SOMERVILLE, MASSACHUSETTS
Selection of materials and specifications for the seven million bricks used on the Campus of the Rochester Institute of Technology were determined by the Spaulding Brick Company, Inc., New England distributor for the Belden Brick Company of Canton, Ohio.

new england
Architect

February 1971 Volume 1 Number 9

features

departments

Photo Credits: Photowork, cover, pages 1, 16-21 (Colleges of Science and Applied Science, Rochester Institute of Technology); Wayne Soverns, Jr., 6-9 (Bradford Student Housing).

Editorial & Sales Office:
Three Sheafe Street
Portsmouth, N.H. 03801
Telephone: 603-436-4503

Published monthly by the Walsh Publishing Corporation, Three Sheafe Street Portsmouth, N.H. 03801. No article appearing in this issue may be reprinted in whole or in part without permission of the publisher.
Controlled circulation postage paid at Portland, Maine. Postmaster: Please send Form 3579 to NEW ENGLAND ARCHITECT, P.O. Box 900, Portsmouth, N.H.
Fifty Cents A Copy
Subscription: Five Dollars Per Year.

NOTES & COMMENTS

The Amherst College Science Center, design by Campbell, Aldrich and Nulty, Boston architects and planners, was cited for outstanding architectural excellence by screening jury of 1971 College & University Conference & Exposition to be held in Atlantic City, New Jersey, March 26-27-28, 1971.

Campbell, Aldrich & Nulty Win Citations

Campbell, Aldrich and Nulty, Boston architects and planners, received architectural citations for Pinwheel, its new architectural concept for college dormitories at Bradford Junior College, Haverhill, Mass., (pages 6-9) and the design of its recently completed Science Center at Amherst College, Amherst, Mass.

The citations were made by the College and University Conference and Exhibition under the auspices of American School and University magazine.

Pinwheel is a unique design employing a structural concept of wood joists to form a module of seven residential units at Bradford, each with a different angle or direction in the slope of the roof. Its flexible design provides a maximum number of living units at lower costs than traditional buildings.

The Amherst Science Center solved a major design problem relating a large building to its site, the corner of a hill, and to other buildings on a small 19th century campus. This problem was solved by utilizing the slope site to relate the building harmoniously to the existing campus.

The citations will be presented to Nelson W. Aldrich, managing partner of the architectural firm, at the publication's third annual conference at Atlantic City, New Jersey, March 26-27-28, 1971. The conference will be attended by over 2,500 leading college and university administrators from the United States and Canada.

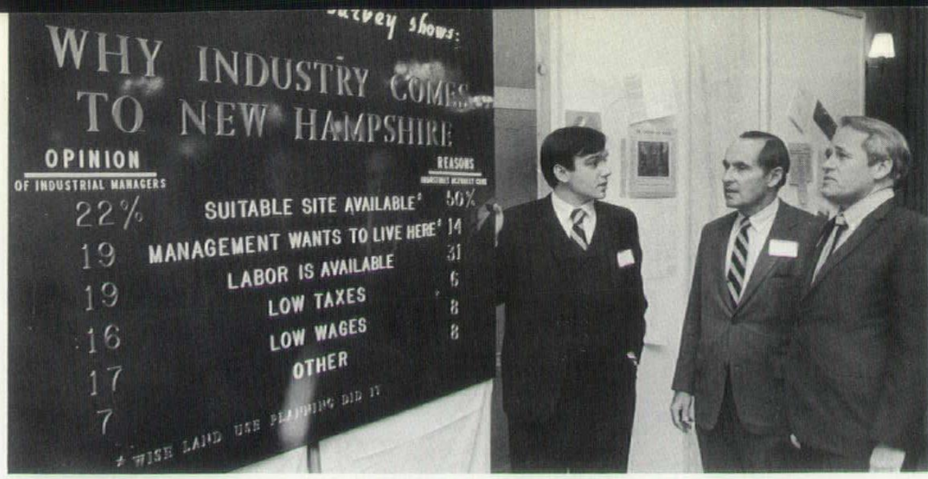
Over 200 entries focusing on architectural designs of facilities at junior colleges, colleges, universities and private elementary and secondary schools, were submitted in the competition.

Systems Building Session Set at M.I.T.

A special summer session on Systems Buildings and Industrialization in the United State will be offered at the Massachusetts Institute of Technology, Cambridge, June 28-July 2, 1971.

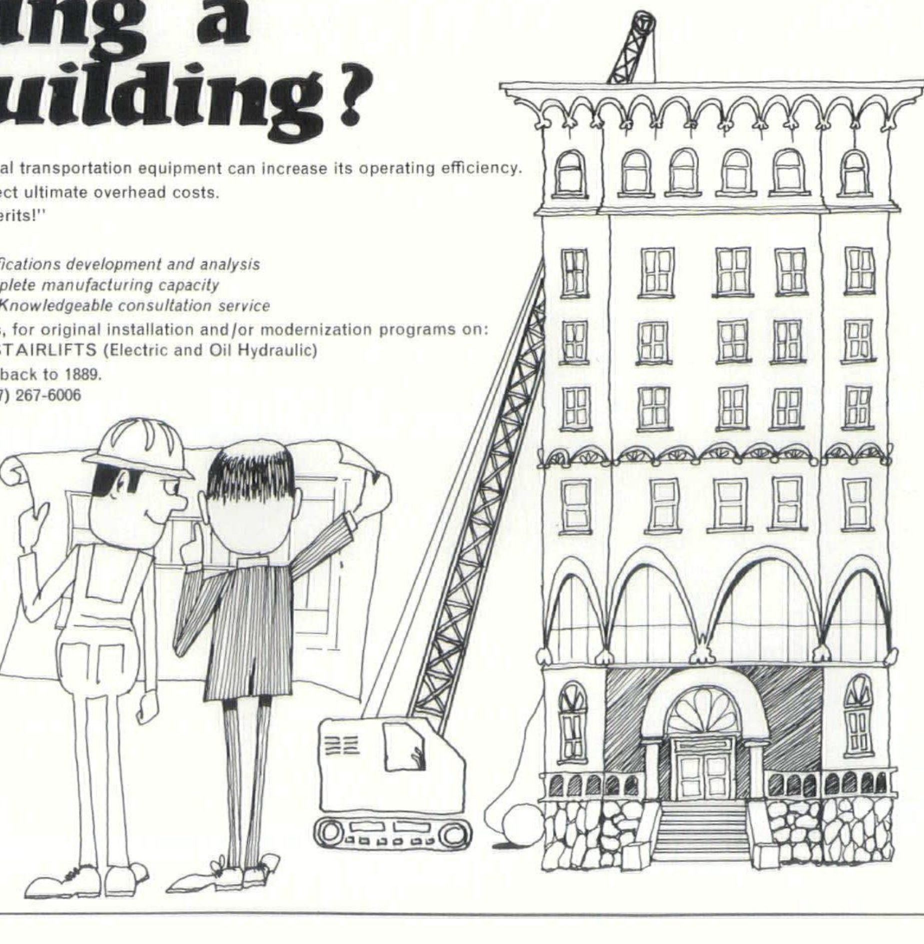
This special session will examine the developing urban requirements and the principles leading to industrialization and the types of building systems evolving, particularly in housing. Included will be the underlying performance concepts, the effect of building codes, volume production, the problems of evaluating and introducing innovation, governmental policy, labor, building modules, and organization for design and production. Examples of industrialized systems will be described.

(Continued on page 27)



The combined annual meeting of N.H. Chapter AIA and the land use foundation: Gerry Blakeley (center), President of Cabot, Cabot & Forbes, and land designer-developer Emil Hanslin hear the results of LUF's survey of business attitudes toward the environment from Executive Director Bob Dunning.

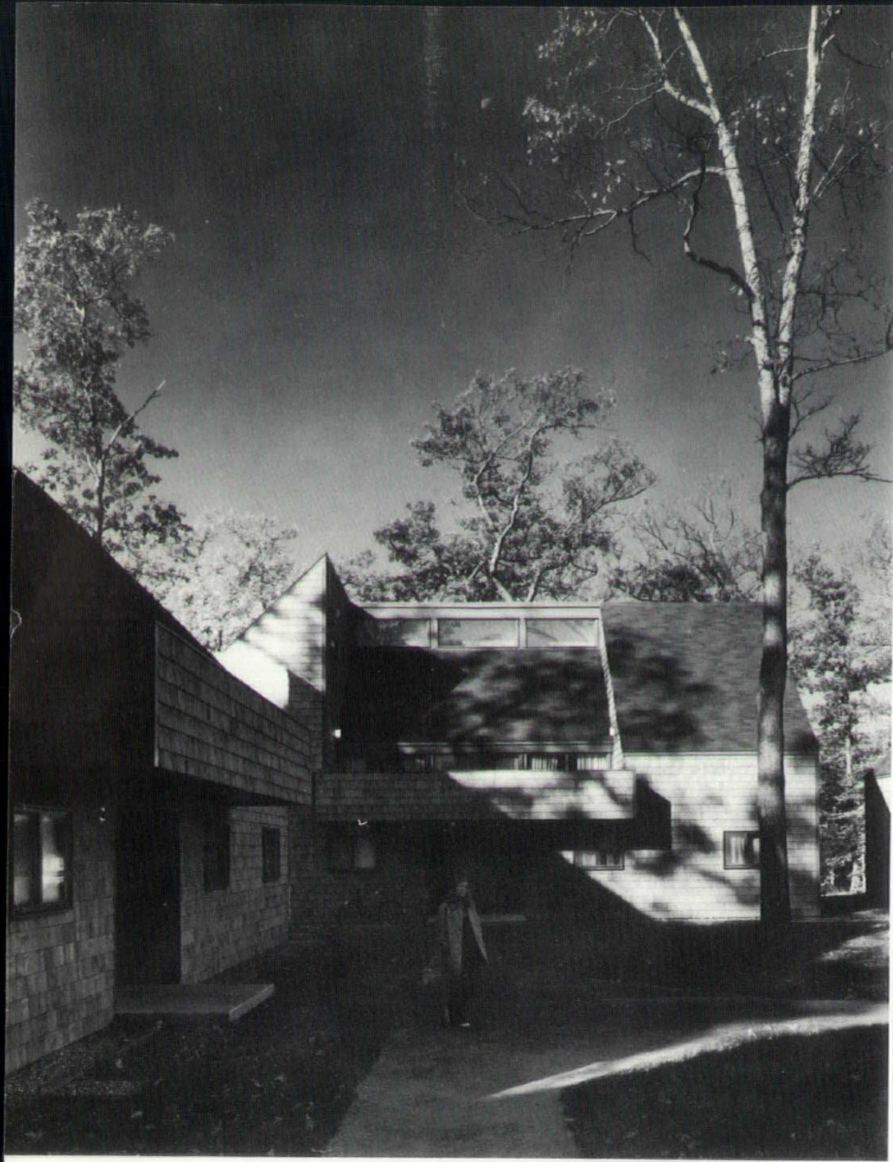
Left to right: Edward C. Lewis, Hanover, outgoing president of N.H. Chapter-AIA; Richard H. Dudley, Manchester, incoming president; and Bob Dunning, Executive Director, Land Use Foundation.

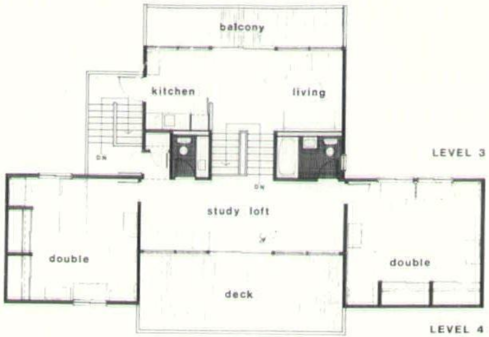


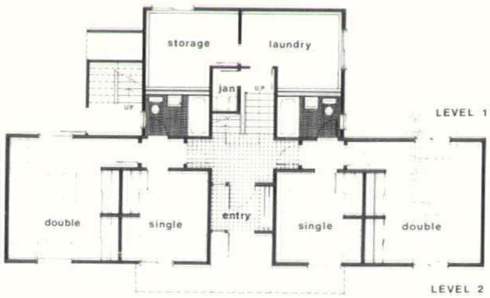
BRADFORD STUDENT

CAMPBELL, Aldrich and Nulty, the Boston architects and planners who have received citations from the 1971 College & University Conference and Exposition for their design of the Science Center at Amherst College (Page 4) and the "pinwheel" system used for the Dormitories at Bradford Junior College, have been architects for Bradford for the past ten years.

The firm had already built one set of dormitories on a conventional basis — using concrete flooring, brick walls, room arrangements with single or double occupancy on both sides of a corridor, with facilities on each floor for about 20 girls. Consequently, when Brad-







Pinwheel Design Wins Award Sponsored By *American School & University*

HOUSING

Haverhill, Mass.

Campbell Aldrich & Nulty Architects — Boston

ford decided to increase enrollment by a few hundred girls, the architects were asked to design another dormitory built along traditional lines — a fireproof building, several stories high with rooms on each side of a central corridor.

Cost estimates ran about $46 per square foot — $10 a square foot higher than the last set of dormitories completed by the firm. In the construction of the new buildings initial costs per student were budgeted at $9,000 per student, but the "pinwheel" system brought the cost per student down to $6,000 per student (around $23 a square foot) or 33⅓ percent less than the original cost estimates.

The "pinwheel" boxes were designed to work as small, residential buildings. Each house contains single and double bedrooms for 10 girls. They have their own living room, and a small kitchen where the girls can do their own cooking if they don't want to go to the main dining room. Laundry facilities are included as well as storage facilities. A study unit is included in the design of each unit.

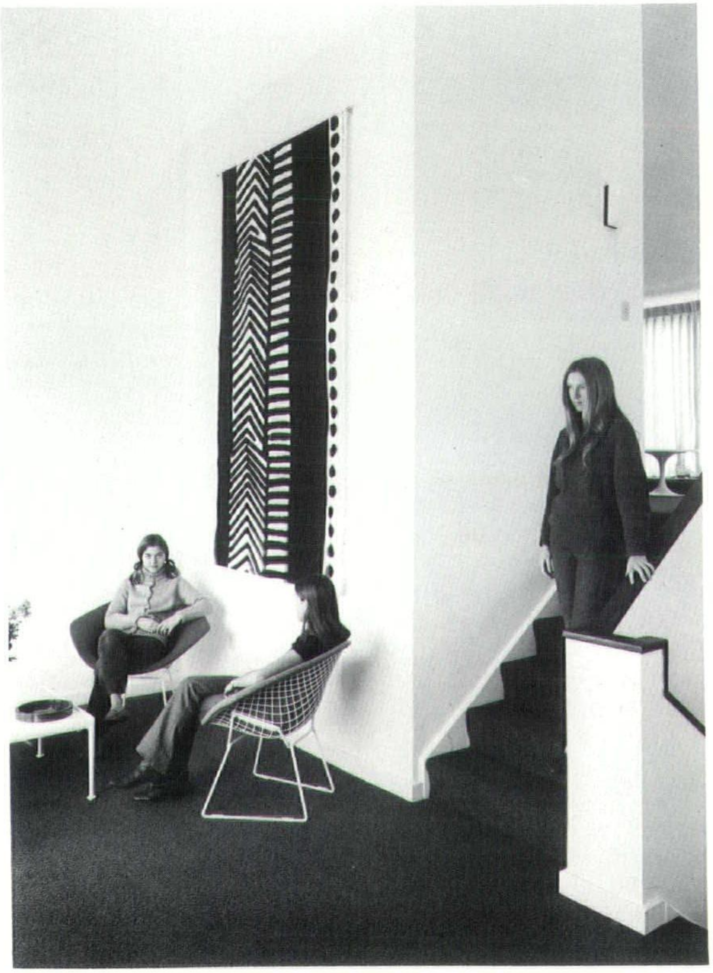
The original dorms designed by the firm were fireproof buildings using sheetrock, fire walls and a fire alarm system. The new dormitories not only conformed to local fire regulations but exceeded them.

In the design of the buildings, the central motif was an interior court — all the buildings face on the court. The buildings in themselves provide a fence around the area which helps to discourage trespassers — particularly important in girls schools in rural areas where there isn't the kind of police protection that you find in an urban setting.

The basic box shape of the design can be put together in a variety of ways. The "pinwheel" system derives its name from the fact that it can be put together in the form of a "pinwheel" — the effect produced when you look down on four boxes put together, each with a different angle, or direction in the slope of the roof.

The concept of the diaphragm construction utilized can be illustrated by comparing it with the strength of an egg, which is a pure diaphragm — or a structural system in which the stress is transmitted throughout the structure by a skin. The roof panels are designed with plywood sheathing glued and nailed to lightweight rafters. Stresses are carried by the edges and thereafter to the exterior side walls. The side walls are sheer walls. The weight of the roof is then transmitted along the side walls to the foundation. The plywood at the foundation is nailed (nails perpendicular to the plywood which creates maximum wind resistance). This means that wide areas can be spanned without having internal supports or internal columns.

Each house contains single and double bedrooms for ten girls. They have their own living room, and a small kitchen where the girls can do their own cooking.



The "pinwheel" design system used at Bradford Junior College is based on a simple structural concept using spans of wood joists, 12 feet wide and 16 feet wide. These two elements are coupled with a 45 degree angle to the roof of the building.

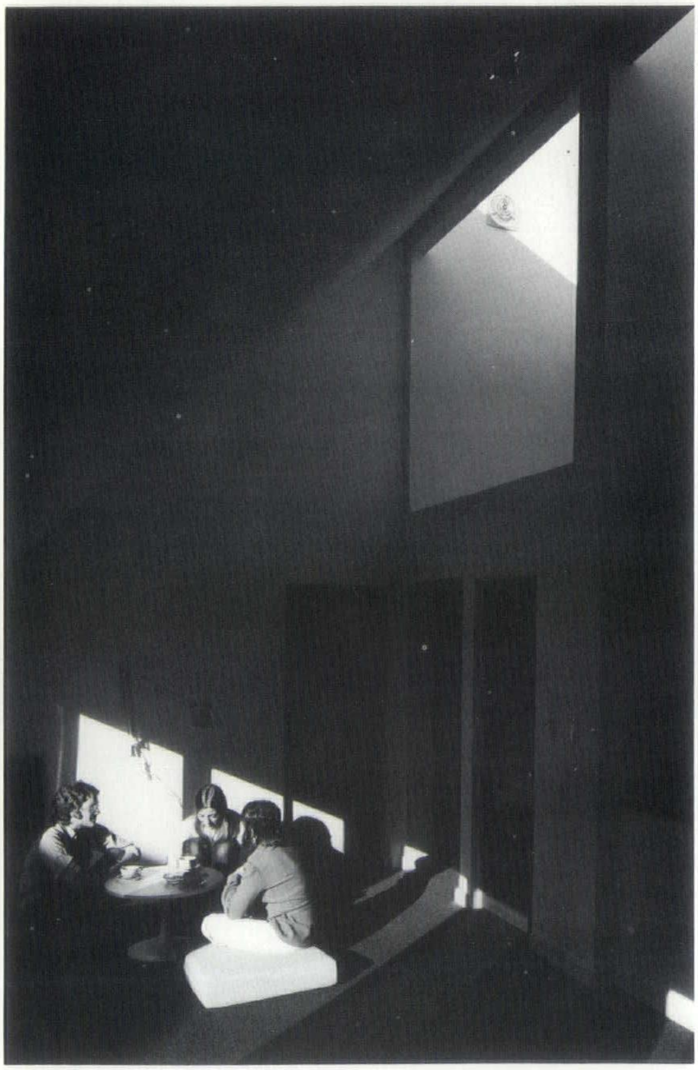
The dimensional constant in this system is a 4-foot grid, 4 feet in two directions. In other words, it is a module in multiples of 4 feet in one direction, and a 12 or 16 foot module in the other direction. The 45 degree pitch was selected because it is the easiest to design with and can be adapted to any layout. Aesthetically it provides a pleasing response and creates ample space on the second floor of the building level for use as bedroom or storage space. If the roof pitch were less steep than 45 degrees, the available space in the loft area would be that much smaller. On the other hand, if the pitch of the roof were over 45 degrees, it would cause wasted space at the top of the structure where the angle is.

The 45 degree pitched roof, therefore, is a happy compromise, for both aesthetic and practical purposes. It utilizes the space above the ceiling line, or the floor line, which divides the triangular unit from the box unit at the base.

The entire project was completed from start to finish within a year, but actual construction time of the Bradford dormitories required less than five months. Construction began in May 1970 and occupancy was completed in October.

One of the contractors working with the architects fabricated the components for the Bradford College job with three radial saws, three tables, and two or three small jigs — platforms that are put in

The 45 degree pitched roof proved a happy compromise, for both aesthetic and practical purposes. It utilizes the space above the ceiling line, or the floor line, which divides the triangular unit from the box unit at the base.

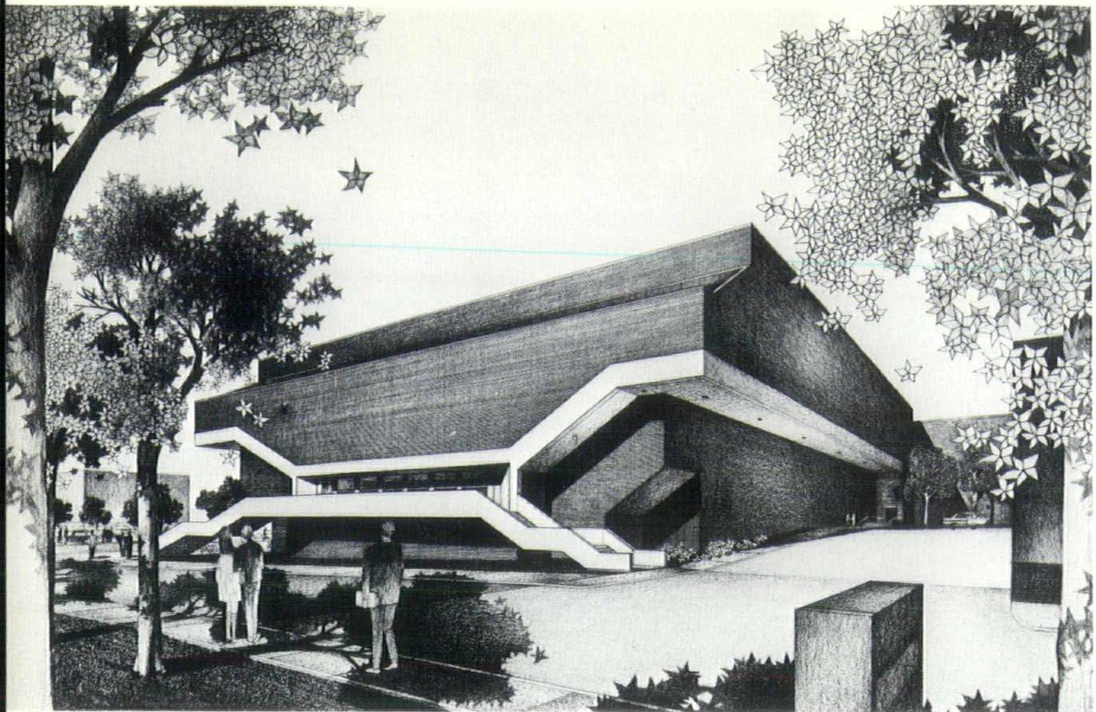


small forms to produce the repetitive panels. This resulted in a tremendous cost reduction.

In effect, the design of the "pinwheel" buildings with the 45 degree roof, the proportions of the 16 feet wide and 12 feet wide box, when they're put together, are really a throwback to the Old New England saltbox. Perhaps, like the Cape Cod house that has found acceptance all over the United States, the "pinwheel" system, too, will prove popular in other parts of the country, especially since the pitch of the roof provides an insulation from heat as well as cold.

One of the contractors working with the architects fabricated the components for the Bradford College Dormitories with three radial saws, three tables, and two or three small jigs.

The entire project was completed from start to finish within a year, but actual construction time required less than five months. Construction began in May 1970 and occupancy was completed in October.



Student Union/Gymnasium

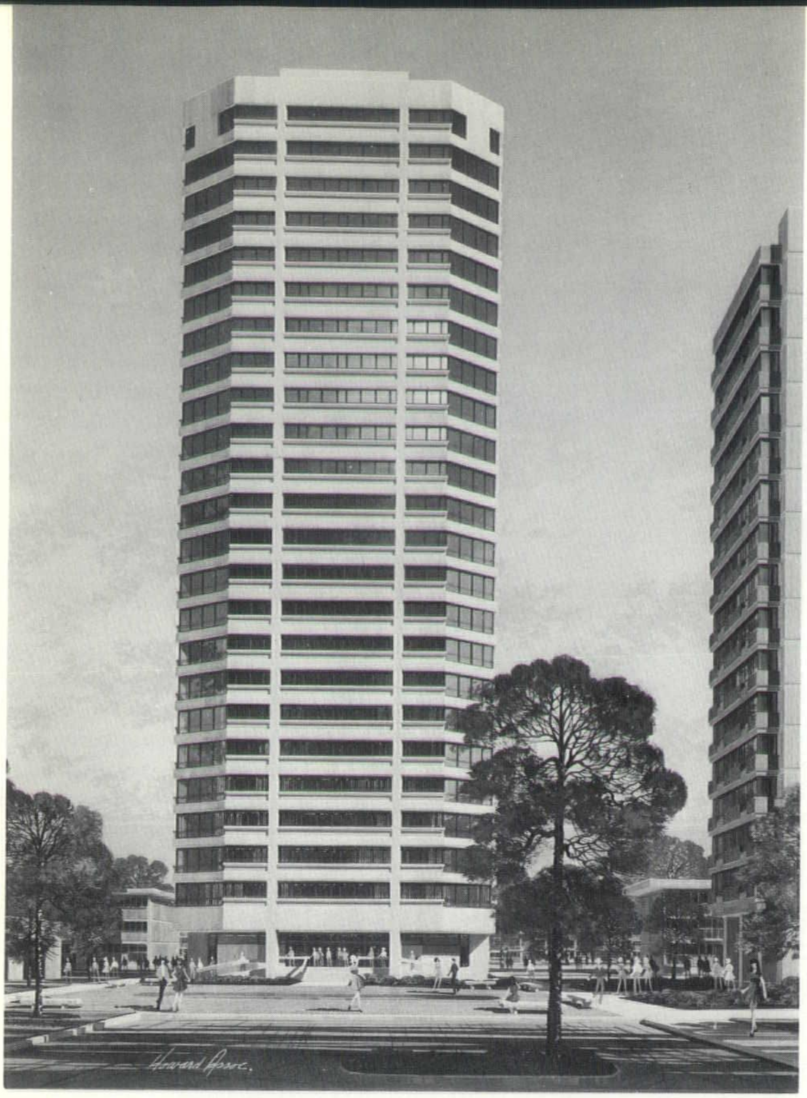
Campus circulation played a dominant part in determining the motifs to be employed in construction of the $5 million Student Union facility designed by Haldeman and Goransson of Boston for the State College at North Adams, Mass.

Level one of the Union will connect the dormitory area to the academic quadrangle. Level two, with entrance at grade between a classroom building and dormitory, incorporated a secondary lobby with game rooms and lounges. Level three houses offices and special dining rooms for business and meetings.

Construction will be concrete with finishes of concrete and brown brick. Steel sash in several configurations will be used with a bronze finish. All glazing will be tinted.

ON THE DRAWING BOARD

Note: Size of the new Indian Head Millwork Facility in Nashua, N. H., featured in last month's Drawing Board column, will be 200,000 square feet — not 100,000 as reported earlier.



Westgate II

Ground has been broken in Cambridge for Westgate II, a $5 million, 24-story tower to house more than 400 graduate students at the Massachusetts Institute of Technology. Designed by Hugh Stubbins and Associates of Cambridge, it will be located at the extreme end of the M.I.T. campus overlooking the Charles River.

The tower will be divided into two, three, and four-student apartments, each with single bedrooms, living room, dining area, kitchen and bath facilities. Living rooms will be located in the chamfered corners of the building, with views in two directions. Community facilities, on the first and twenty-fourth floors, will include laundry, mail and parcel rooms, service spaces, and a manager's office.

Structural consultants are LeMessurier Associates, Cambridge; mechanical and electrical consultants are Hankins and Anderson, Cambridge. General contractor is Jackson Construction, Inc., Needham.

U. S. Naval Hospital

Ritchie Associates, Inc., Chestnut Hill, Mass., have been commissioned by the Northern Division, Naval Facilities Engineering Command, as the architects for a new 342-bed hospital building being planned for the Naval Hospital at Chelsea, Mass. It will replace the present 55-year-old main building on a site adjacent to the existing Dependents Building of 120 beds.

As the first hospital in the Boston area designed to resist earthquakes, the eight-story structure is planned to carry two additional floors. Exterior walls of cast-in-place concrete 11 inches thick and concrete interior sheer walls 10 and 12 inches thick are reinforced to withstand the moderately severe earth movements that geologists expect in the near future.

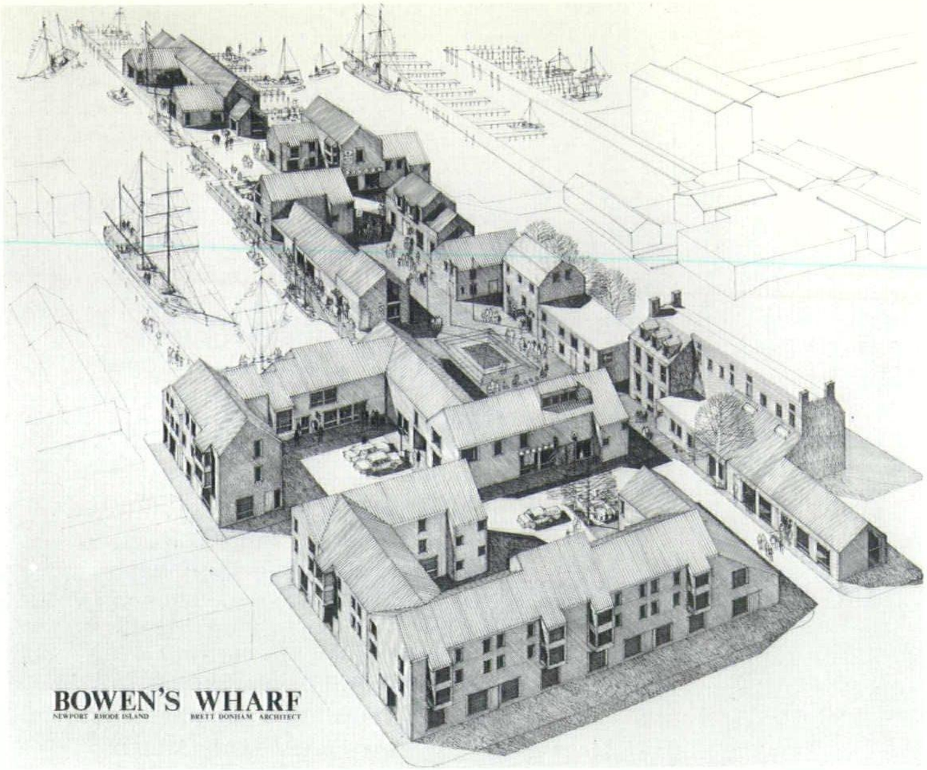
The exterior wall surface treatment features windows set in panels with rough surface texture, and separated from the remaining smooth surface concrete by rustications. Windows are vertically pivoted anodized aluminum, double glazed, with a bronze-color finish. These windows, with other details, are designed to reduce nearby aircraft noise to acceptable levels.

A relatively unique feature is the materials handling system utilizing conveyors, dumbwaiters and a pneumatic trash and linen carrying system. This latter carries the material directly from the nursing floor to the containers at the truck dock.

Access to the building on different levels is facilitated by the steeply sloping site. The site, together with the required proximity to the Dependents Building, presented substantial problems of design.

The three lower floors are devoted principally to storage, dining room, kitchen and administration, while the fourth floor houses a large (57,000 square feet) outpatient department.

The four top floors contain eight nursing units and two intensive care units. A large surgery suite is joined to the rear of the two surgical nursing units on the fifth floor. A tunnel will connect the new building with the existing Dependents Building, creating a unified and diversified treatment facility.



Bowen's Wharf:

Work is complete on the rehabilitation of four existing structures and financing has been secured for Phase II of a $1.5 million mixed commercial and residential project designed by Bay State architect Brett Donham, of Boston, for the reviving historic waterfront in Newport, R. I.

Shops, restaurants, a chandlery and limited offices are planned for the ground floor of the buildings with efficiency, one and two-bedroom apartments planned for the upper floor.

The center of the site is free of traffic for pedestrian use and is to be paved in old granite pavers and brick.

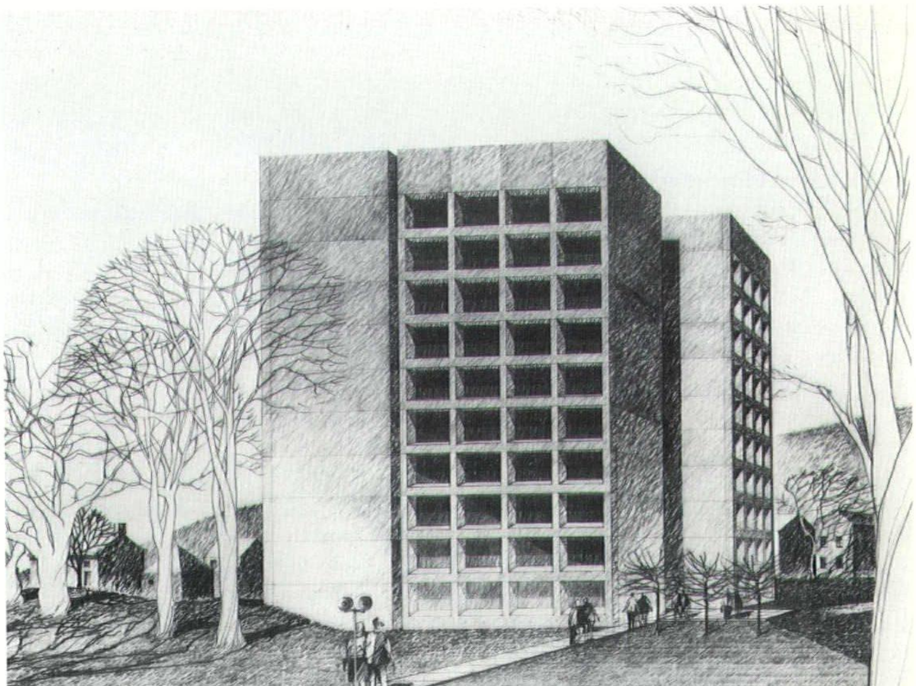
DRAWING BOARD (Cont.)

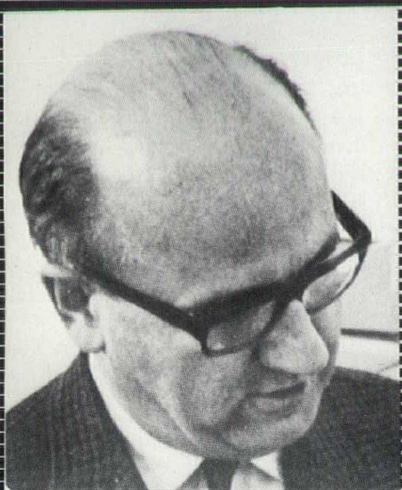
Highrise for the Elderly

Construction is scheduled to start next month on a Highrise for the elderly in Rutland, Vt., designed by Burlington Associates/Architects and Planners, Inc., of Burlington, Vt.

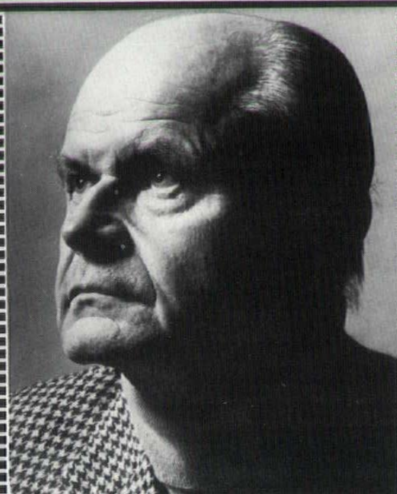
Partner of the architectural firm in the "Turnkey" project is Vermont Construction, Inc., of Burlington and Montreal.

Estimated cost of the total project is $1,378,000.

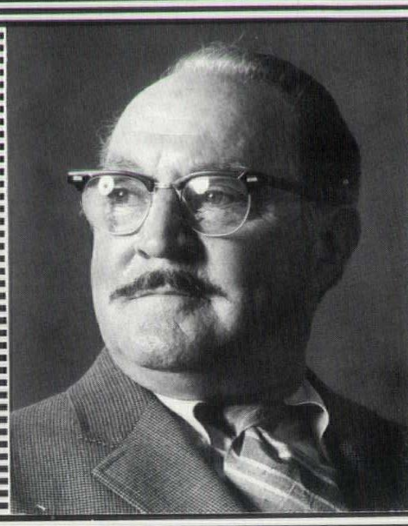




Dr. Waclaw P. Zalewski



Jerzy W. Soltan



S. Tyson Haldeman

haldeman goransson

a new architectural progression

HALDEMAN and Goransson Associates, a Boston based architectural firm with offices around the world is presently developing an architectural organization that is expected to reach far beyond present architectural design frontiers.

Foundations of the Haldeman and Goransson complex have emerged in the shape of two uniquely new companies named Soltan, Inc., and Archimetrics Inc., which will perform in their respective realms of architecture and engineering.

The Soltan, Inc., team will be led by world renowned architect Jerzy W. Soltan, who will be deeply involved with the development of new architectural design concepts. Professor Soltan's background includes over 30 years of experience in the field both in the United States and abroad. Currently Chairman of the Department of Architecture at Harvard University in Cambridge, Mass., Professor Soltan has lectured throughout the world.

Professor Soltan's professional career began in 1939 as a partner/designer with St. Murczynski, Warsaw, Poland. Following World War II, he worked with the architectural firms of Le Cobusier in Paris and Claude Laurens in Brussels. Before coming to the United States, Professor Soltan was the principal designer for the Polish Chamber of Foreign Trade and the Design Research Unit of the Academy of Fine Arts in Warsaw.

In America, he was principal designer and partner with Albert Szabo prior to joining Haldeman and Goransson. Numerous international professional awards for architectural excellence have been awarded to Professor Soltan from 1937 to the present for his design contributions.

The Archimetrics team, led by Waclaw P. Zalewski, will be involved in programming and planning analysis of architectural, structural and environmental design. Archimetrics will be concerned primarily with development of flexible industrialized building systems. It will devise vitally needed methods of increasing the efficiency with which buildings are constructed while reducing manpower usage and time losses. Such new methods will be systematized to apply equally well to a wide variety of structures including high and low rise apartment complexes, school systems, office and other commercial structures.

Dr. Zalewski's experience, after receiving his degrees from Warsaw Polytechnic Institute and Danzig Polytechnic Institute, has included academic positions in Warsaw, Poland; Caracas, Venezuela; and Cambridge, Mass.

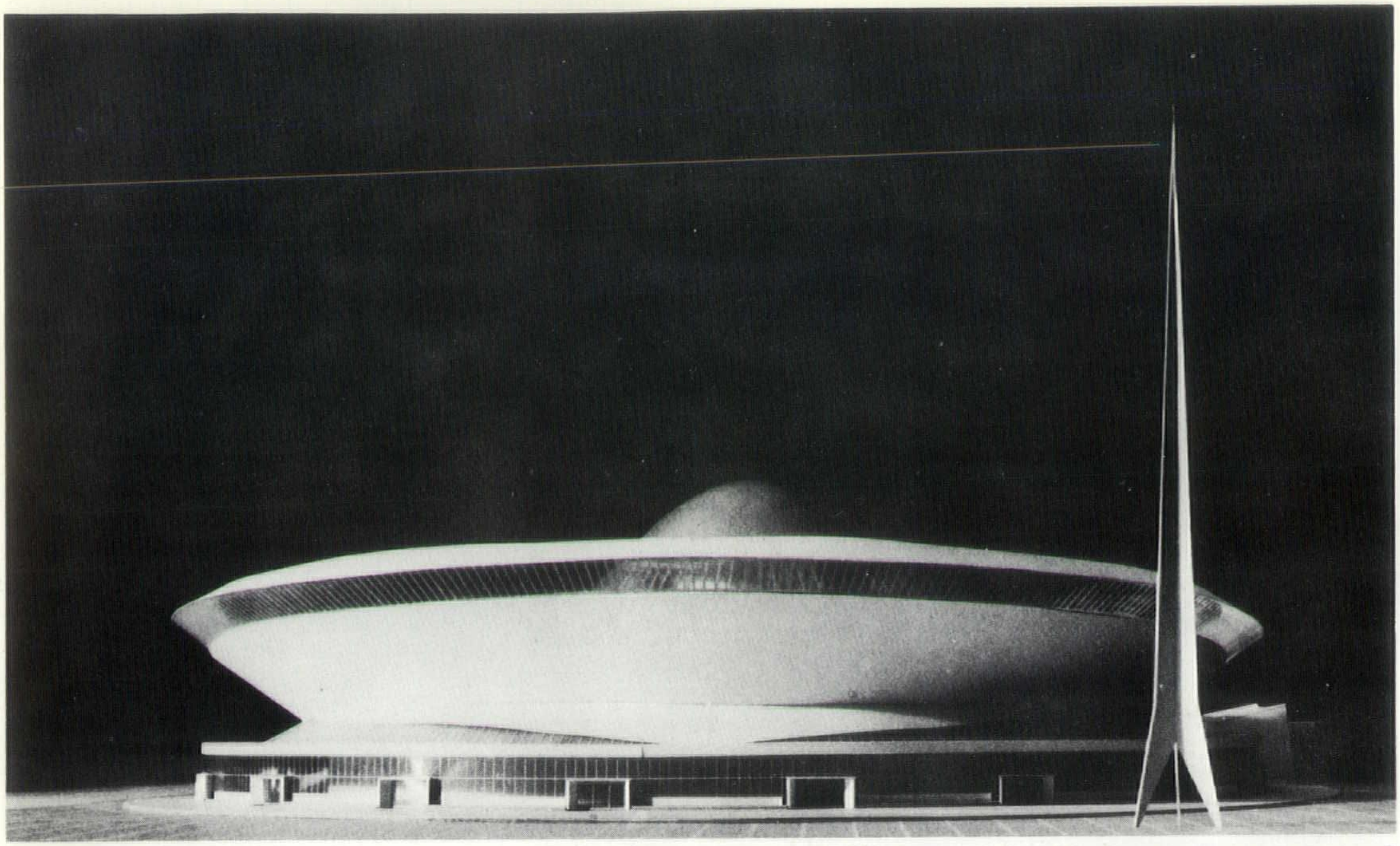
Currently a professor of Design Structures in the Department of Architecture at the Massachusetts Institute of Technology, Dr. Zalewski has presented numerous new concepts and methods of analysis on specialized engineering problems. Projects he has designed and supervised have ranged from dismountable steel pavilions in Damascus and New Delhi to a covered multi-purposed stadium for 10,000 spectators in Katowice, Poland. Dr. Zalewski is recognized internationally as an authority on design and construction of thin walled prefabricated shell structures, industrialized housing systems and hanging roofs covering many multifunction units in a number of countries.

Haldeman and Goransson's staff of architects, engineers and planners will use the design concepts developed by Soltan, the systems developed by Archimetrics and combine them into plans for finished structures. This systematic approach to designing, engineering and construction is expected to go a long way toward ensuring that all structures are built on time and on budget.

The three firms will work together closely as an "architectural progression" of design, engineering and construction know-how. However, each firm will stand as a completely separate entity and will work on projects commissioned by other architectural firms, engineering companies, city planners and other groups throughout the world that require the special services of these firms.

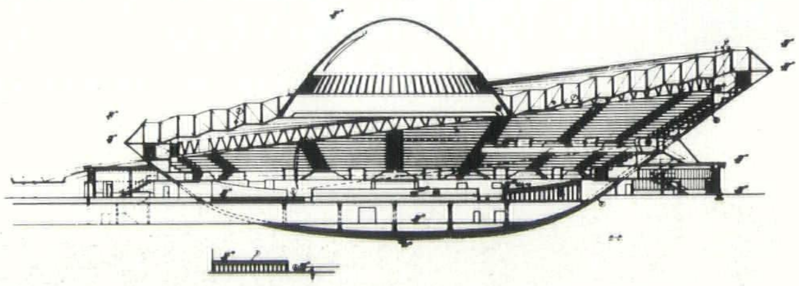
"We've developed a corporate philosophy which we call 'creative innovation,' of which this new organizational expansion is a part,"

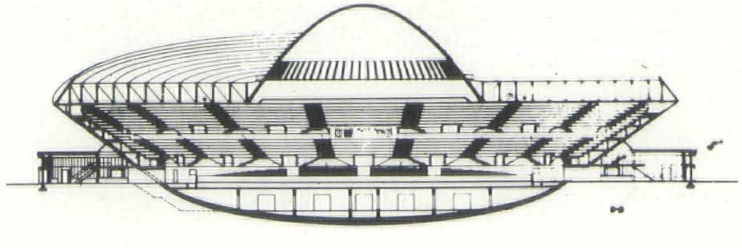
This 4,000-seat sports arena built in Barcelona, Venezuela, represents the first reported use of a suspended roof in that country.



This multi-purpose auditorium complex was constructed on a site in the mining region of Upper Silesia in Poland. The site presented designers with an extremely critical problem: unusually poor foundation conditions. The project was engineered to rest on a small inner zone of a cup-shaped foundation. This "Cup-and-Saucer" concept was created so that the tapered conical bulk literally swims *in the unstable subsoils. The complex is impervious to mining disturbances in the ground beneath it.*

says S. Tyson Haldeman, President. "This corporate philosophy seeks to bring together complete in-house architectural capabilities on today's building problems as well as satisfy tomorrow's anticipated needs. The team approach is the result of our desire to meet difficult architectural challenges and improve our environment."

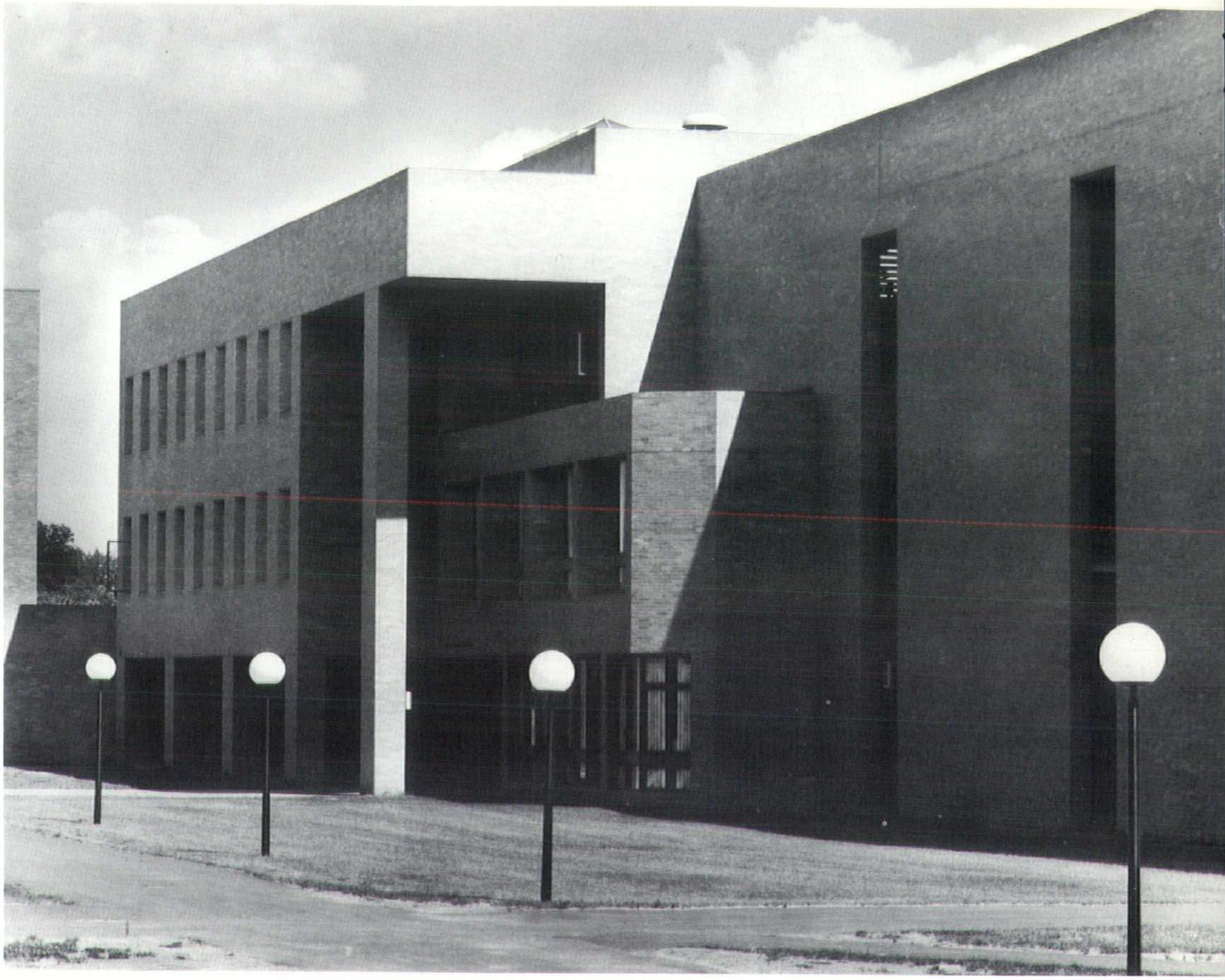




Accordingly, when a project is assigned, the appropriate personnel — 1) planner, 2) architect, 3) engineer, 4) interior designer and 5) site supervisor — each an "expert" in his individual field will be called in to exercise his knowledge on that part of any job on which he will be exceptionally well versed. Other specialists on staff will be employed whenever their talents are required on any project being undertaken.

All the firms will be operating on an international scope. Offices have already been established in San Juan, Puerto Rico; Bangkok, Thailand; and Accra, Ghana, West Africa. The firm's other offices are located in Boston and Cambridge, Massachusetts.

ROCHESTER INSTITUTE



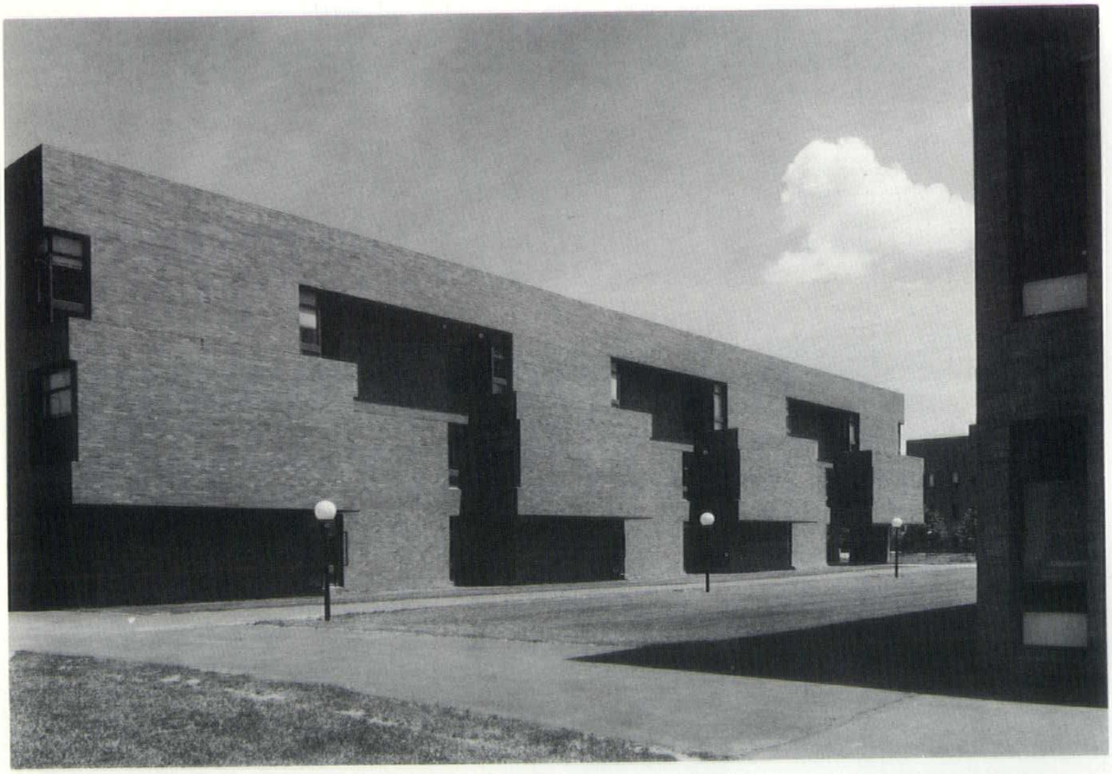
College of Science

Anderson Beckwith & Haible
Architects — Boston

THE buildings of the $60 million campus of the Rochester Institute of Technology sit at the crest of a slope, like sentries overlooking the upper New York State countryside — massive, straightforward, rectangular and fortress-like, the realization of a dream born less than ten years ago and the result of a coordinated venture involving three New England architectural firms: Anderson, Beckwith

OF TECHNOLOGY

College of Applied Science



South Elevation

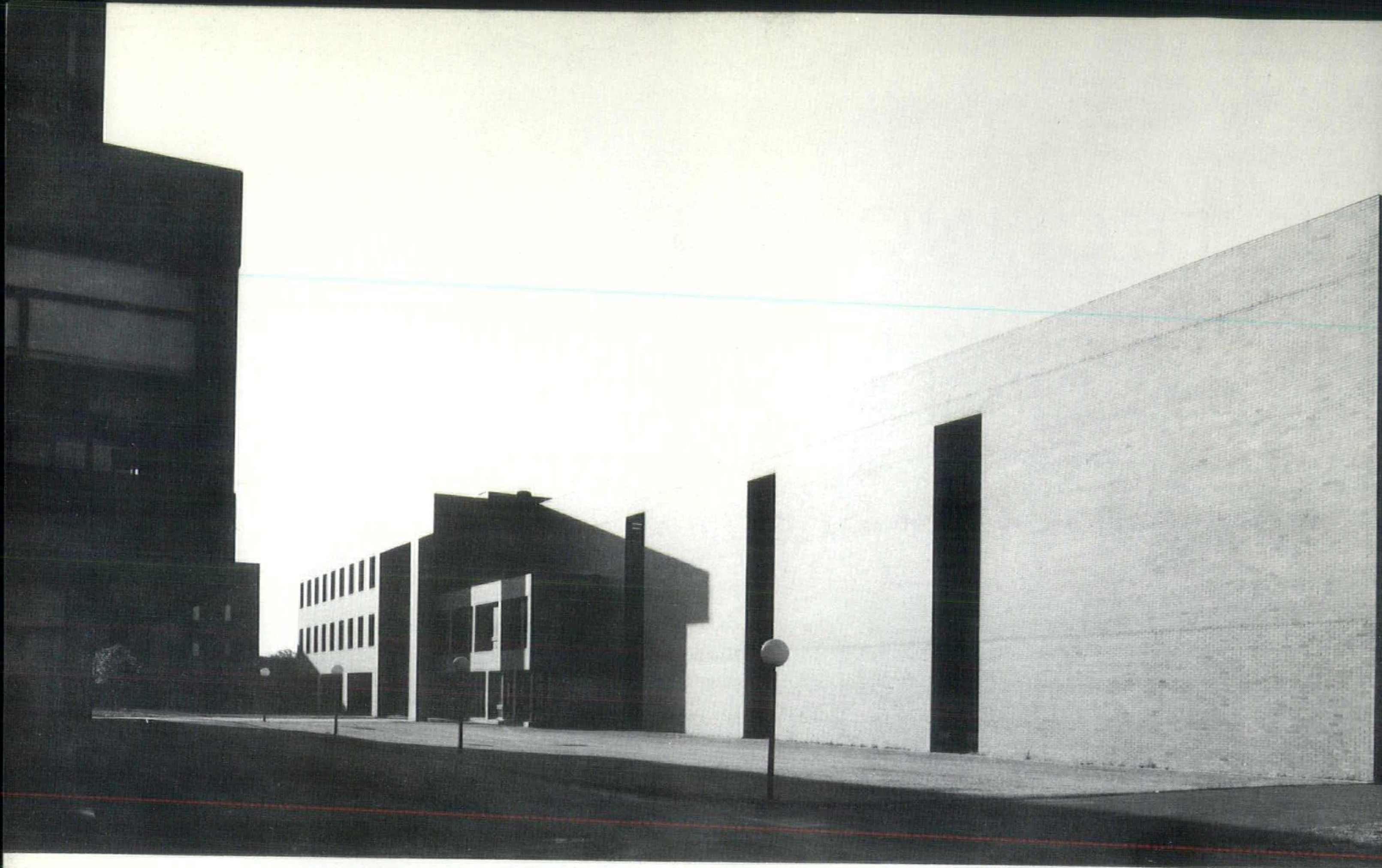
& Haible, Boston; Hugh Stubbins & Associates, Cambridge, and Kevin Roche, John Dinkeloo & Associates, Hamden, Conn. Other participating firms included Harry Weese & Associates, Chicago; Edward Larrabee Barnes, New York City, and Corgan & Balaestiere, Rochester.

Site planning was done by Lozier Engineers of Rochester and Dan Kiley, of Charlotte, Vt.

Coordinating architect for the total project was Lawrence Anderson, of Anderson, Beckwith & Haible, who designed the College of Science and the College of Applied Science, as well as the Central Service Facility. Project managers were David R. Johnson and Roger Marshall.

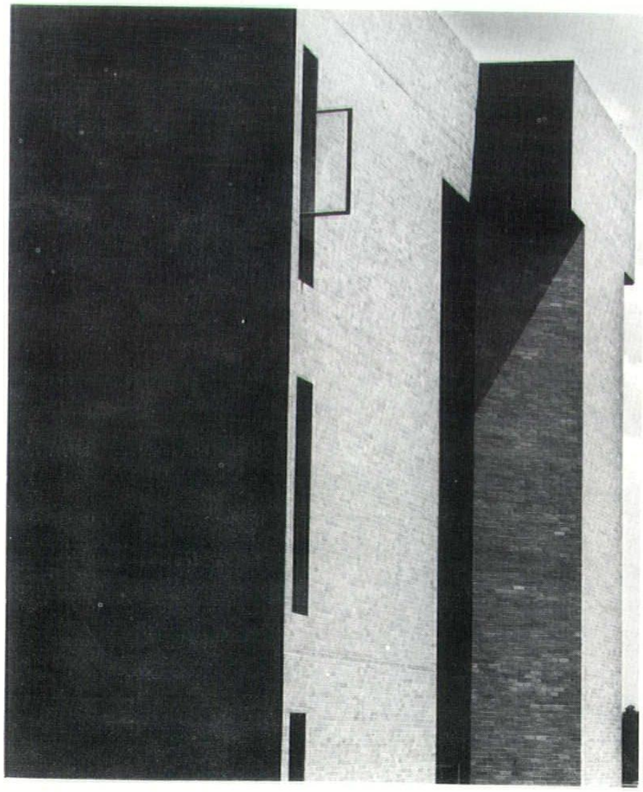
"The architectural style of the new R.I.T. campus is controversial," it was noted in a special supplement to the *Democrat & Chronicle* published shortly before completion of the Institute's move from its downtown campus to the new 1,300-acre campus. "It's *not* a ho-hum sort of place. Once you've seen it, you not only won't forget it, but you'll catch yourself musing about it for some time."

"Architectural detail is strong and sure," it continued. "Columns and archways are firmly rooted



North side of the College of Science building faces a courtyard shared with the Wallace Memorial Library and the College of General Studies designed by Harry Weese & Associates, Chicago, and the College of Fine and Applied Arts designed by Hugh Stubbins & Associates, Cambridge.

The fortress-like appearance of the buildings is strongest in the College of Science Building with its buttressed battlements. The permanence and strength of styling are clearly in evidence here.

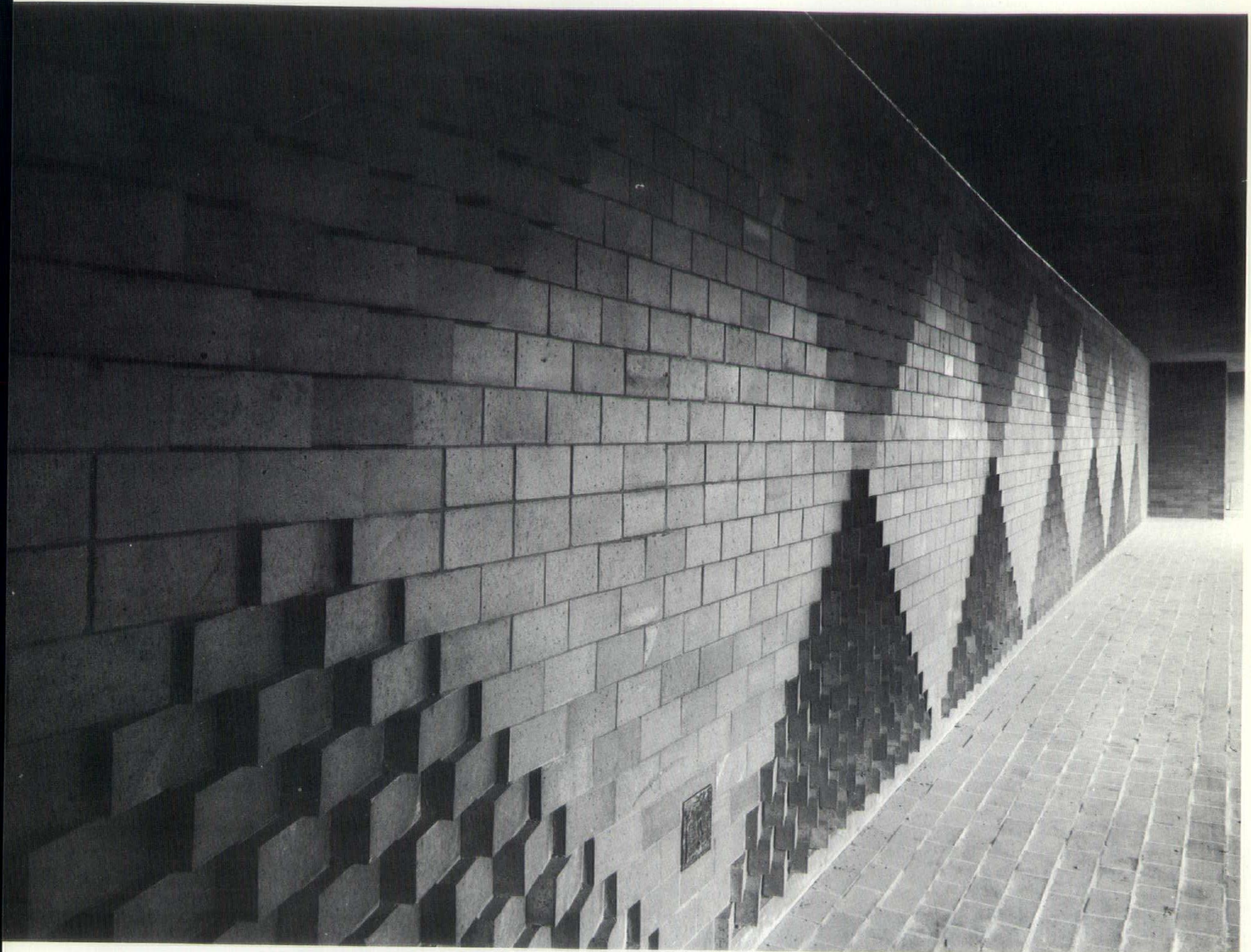


to the ground. Secure. After a while the visitor realizes why the overall design is ultra-modern, but timeless. This is architecture that will endure; it'll be here for a long time and will never be dated.

"And there's a warmth to the place. Outside it's the ferrous-red of the iron-spot brick."

(In fact, more than 7,000,000 bricks were used to construct the 13 academic buildings, walkways, and dormitory complex, according to Richard Spaulding, whose firm is New England distributor for the Belden Brick Co., of Canton, Ohio.)

The feeling of warmth is generated also by the dark, tinted glass used to bisect the brick walls. In many of the buildings, floor-to-ceiling recessed windows, some half the width of a door, let light into offices and corridors.



The brick-work mural by Josef Albers seems to change in texture as one moves on to the College of Science courtyard.

000-square-foot building is devoted to a different science, with its own labs and stockroom.

In the College of Applied Science the rooms are filled with great, grey machines used for the study of electrical and mechanical engineering. Course offerings include power mechanics and hydraulics and thermodynamics and computer applications; and here, too, in the Power Mechanics lab is a long, white wind tunnel.

Most of the $3 million building is three stories tall, with the major work areas in the central core and smaller offices and classrooms toward the outer walls.

The College has 14 laboratories, engine test cells and a lecture hall large enough for 110 students. There is a total of 117,000 square feet of space in this facility, built as a memorial to James E. Gleason, Rochester industrialist and institute trustee for 65 years, including 23 years as board chairman and honorary chairman.

The campus buildings are divided in two distinct groupings — the colleges or academic area, and the residential area. The academic buildings form a core at the center of the 1,300-acre campus, connected to the residential sector by a large pedestrian mall which marches East-West across the athletic fields.

This functional division is purposeful. By day, the full time students invade the academic buildings from their nearby, but separate living quarters. At night, when they retire to the residential complex, a different group converges on the campus and academic sector. The College of Continuing Education then becomes the center of activities. Thousands arrive each evening to do work to further occupational objectives and to keep abreast of innovations related to their professional endeavors. Others come to complete work for both undergraduate and advanced degrees. Many attend classes with no particular plan other than the love for learning, and to seek a channel for a creative urge.

As for the fortress-like appearance of the buildings, this feeling is strongest in Anderson, Beckwith & Haible's College of Science building (cover) with its buttressed battlements outlined against the sky. The permanence and strength of styling are clearly in evidence here.

As one approaches the College of Science courtyard, one sees a brick-work mural by Josef Albers that forms the building's facade. It appears to change in texture as one moves on and provides a backdrop for the clean lines of a revolving stainless steel sculpture by Jose De Rivera.

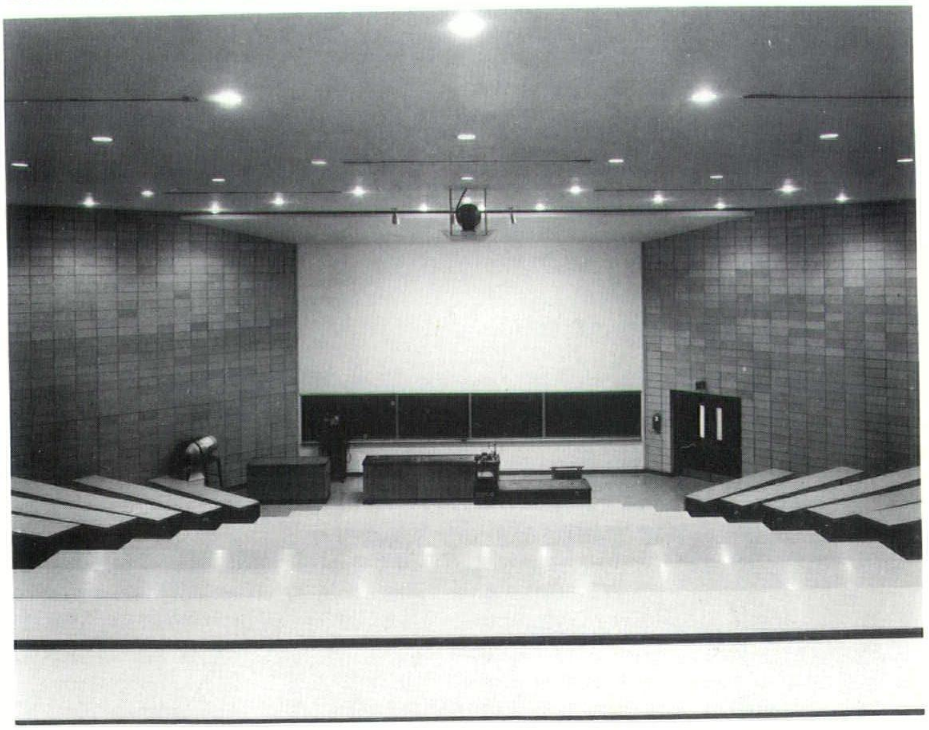
Inside the College, it's all stone countertops and chrome levers and glass equipment. Biology, chemistry, mathematics, medical technology and physics are taught here.

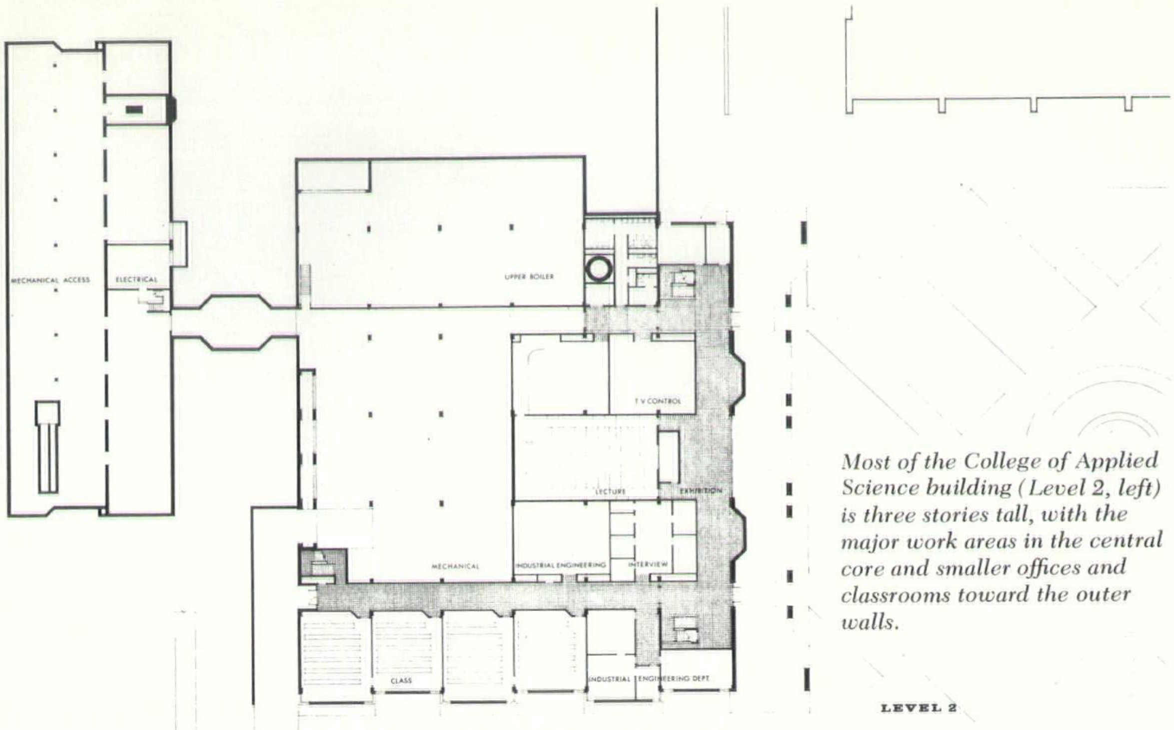
All the labs, incidentally, are on one side of the $4 million building to allow the grouping of "wet" installations. Among these labs are ten research areas housing sophisticated equipment for original work by R.I.T.'s students. In addition, there is a greenhouse that stretches for 55 feet and an auditorium that seats 250 at built-in tables.

Each floor of the four-story, 134,-

Entrance Loggia, College of Applied Science.

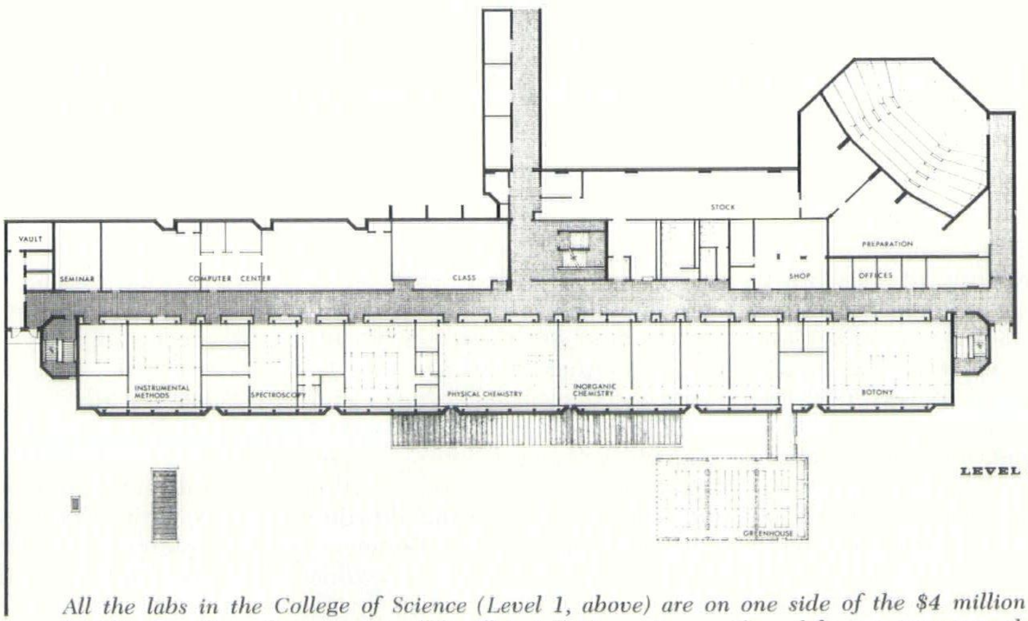
The College of Science Auditorium (designated Preparation area, Level 1 on page 21) seats 250 at built-in tables.





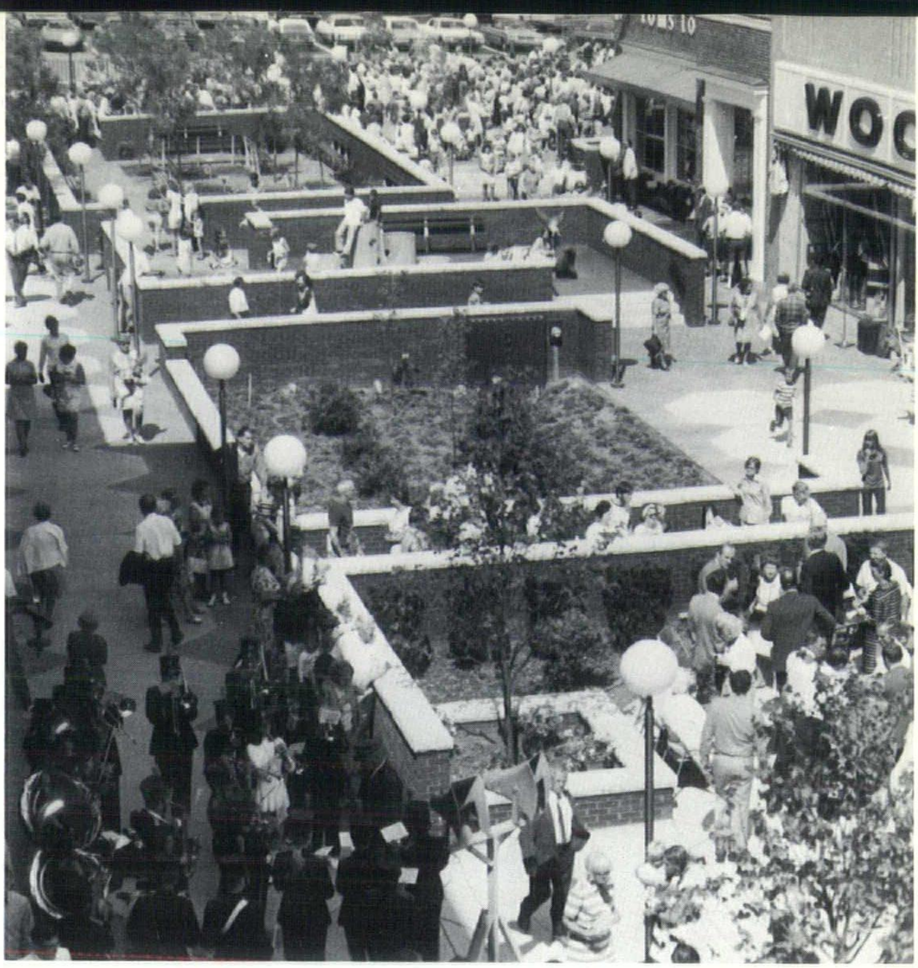
Most of the College of Applied Science building (Level 2, left) is three stories tall, with the major work areas in the central core and smaller offices and classrooms toward the outer walls.

LEVEL 2



LEVEL 1

All the labs in the College of Science (Level 1, above) are on one side of the $4 million building to allow the grouping of "wet" installations. Among these labs are ten research areas housing sophisticated equipment for original work by R.I.T. students. In addition, there is a greenhouse that stretches for 55 feet and a two-level Auditorium.



Architectural Planning Revitalizes Fire-Razed Area in Lebanon, N.Y.

by David A. Tillman

ON August 4, 1970, the Lebanon Housing Authority held dedication ceremonies for its downtown pedestrian mall, marking completion of a six-year effort and a remarkable change in the city's major retail area from disunity and aesthetic cacophony to harmony around a central architectural theme.

The comprehensive plan for revitalization of Lebanon's major shopping area was written by Hans Klunder Associates of Hanover, N.H., shortly before it was destroyed by fire on June 19, 1964. After the fire, which caused damage estimated at $2.5 million and left many commercial establishments without space, Klunder was again retained — this time to plan an urban renewal project.

Of the several alternatives suggested, the Lebanon Housing Authority selected the pedestrian mall, which called for red brick buildings not more than 25 feet high; small framed windows; flat signs with a maximum size of three by thirty feet; unexposed lighting and trim that would tie the structures together visually.

Metcalf and Eddy became the project engineers with responsibility for detailing and coordinating all elements of the downtown area into an "agora." Engineer in charge was Maurice Freedman, who is now with Sasaki, Dawson & DeMay.

Some of the existing grades were utilized while changes of level achieved by ramps and steps were added to create various vantage points and achieve an everchanging landscape and vista.

Low brick walls and various contrasting textures were used to define different activities. Brick and hexagonal concrete pavers were laid in interesting patterns for the walkways. Light standards with globes — plus trees and shrubs — were placed between the stores where feasible.

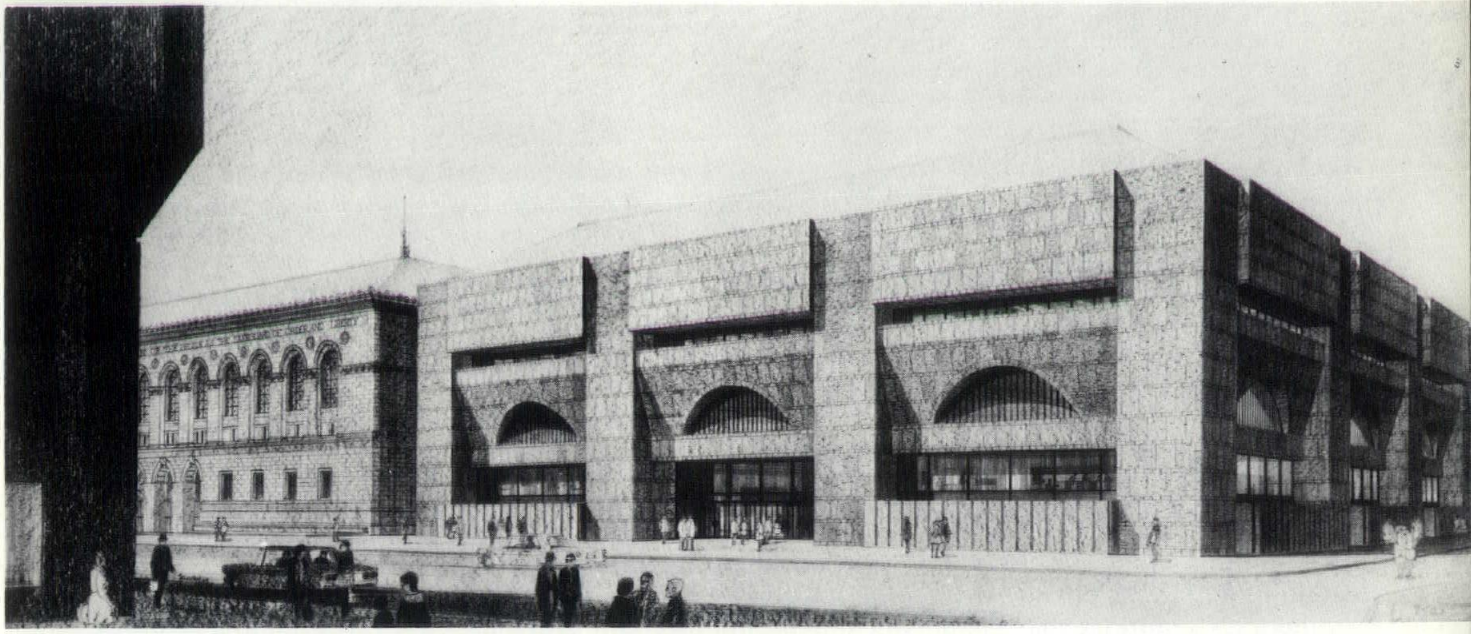
After the fire, Tome's Toggery, Lewis Brothers Hardware, McNeil's Drug Store, and the French Shop reestablished in new buildings designed to conform with Klunder's plan. Upon their completion, Commerce, Inc., built a multitenant 30,000-square-foot facility, primarily for commercial establishments relocating under urban renewal. Its tenants included the Colonial Book Shoppe, American Finance Co., Sherwin Williams Co., and Harrison Insurance. Granite State architects Gordon Ingram and Frank Barrett, both of Hanover, designed these structures.

Older buildings, including Currier's Department Store, Hildreth

(Continued on page 26)

AN ENGINEERING MASTERWORK

Architects:
Philip Johnson (New York)
Architects Design Group, Inc. Cambridge
Engineer:
LeMessurier Associates, Inc. Cambridge
General Contractor:
Vappi & Co., Cambridge



Boston Public Library Addition

ONE of the most unusual buildings in the Boston area is now emerging on famous Copley Square with the raising of intricate steelwork on a unique seven-story addition to the Boston Public Library's main downtown facility.

Numerous innovations in building design are highlighted in the \$23-million addition to this city's Central Library Building, itself long considered a landmark of American architecture. Some features of the new structure — a joint architectural venture between the office of Philip Johnson (New York) and Architects Design Group, Inc. (Cambridge) — include:

• engineering design which incorporates for the first time in buildings, so far as is known, "orthotropic" pedestrian bridges. These low-profile bridges, only 19-¼ inches deep and either 6-½ feet of 13 feet wide as required, span 58-foot open modules at the interior mezzanine level.

The term orthotropic generally refers to the design of a steel plate bridge deck which serves the double purpose of being a structural member of the bridge as well as the roadway surface. (In conventional bridge construction, all structural members are designed as independent elements.) The library addition bridges incorporate a 2-¾-inch concrete walking surface held by welded stud shear connectors to ¼-inch steel plate.

Among other advantages, orthotropic design permits construction of very shallow-depth bridges spanning long distances, as was required in the library addition to provide necessary headroom between the street and second floors.

• other complex structural engineering, executed by LeMessurier Associates, Inc., Cambridge, Mass., engineer for the project. Upper floors three through six, for example, are to be "hung" from a main grid of 16-foot-deep interconnecting trusses, most of which also span the building's nine basic 58-foot bays.

Nearly all of these deep trusses will be supported on 36 steel box columns (18x18 inches) rising from the basement foundation slab (27 feet below street level), while some will be supported on 9-foot-deep welded plate girders spanning 58 feet between columns.

The lower level of the trusses (bottom chord) will carry the seventh floor for large items of mechanical equipment (up to 150 pounds per square foot of live load) and for additional book storage (165 psf total seventh floor live load). In the four floors three through six, design calls for similarly high live loads ranging up to 120 psf in book stack areas (reduced to 100 psf for hangers and columns). By contrast, a normal Boston office building may be designed for a maximum 75 psf live load.

The upper level of trusses (top chord) is designed to support the sloping steel-framed roof — maintaining almost the same shape as the existing library roof. In addition, 33-inch-deep wide-flange composite beams will span 58 feet over an interior court of the 252x230-foot building to support pyramidal skylights.

Some unusual structural features are found in the lower floors. Built-up 32-inch-deep by 10-inch-wide composite plate girders span 58 feet at the second floor, for example, to carry post-tensioned two-way waffle slabs 60 feet square. In one of the structure's two below-ground floors, 27-inch-deep cover-plated composite beams span 60 feet over a 374-seat lecture hall.

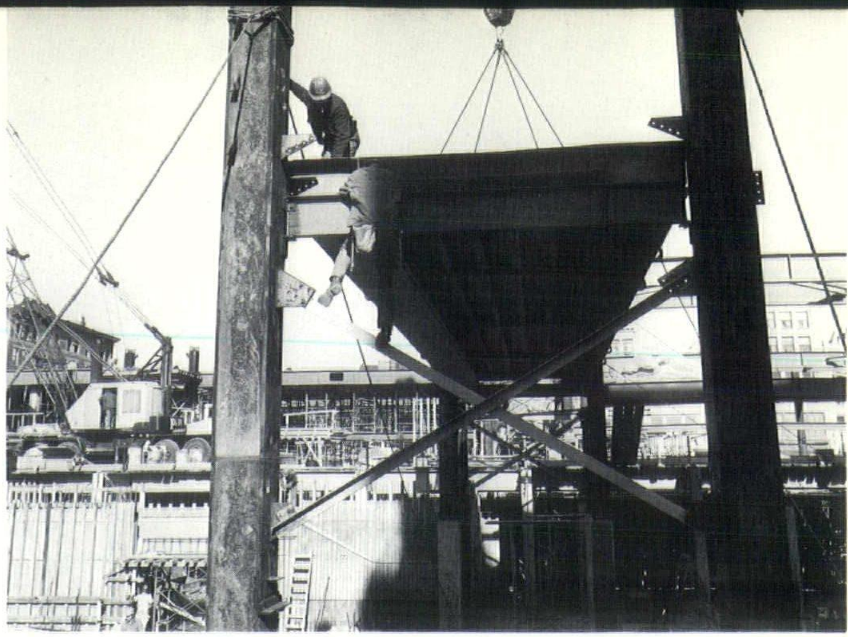
At the present stage of construction, approximately 30 percent of 1,700 tons of steel required for the addition has been fabricated and erected by A. O. Wilson Structural Company, Cambridge, from material supplied by Bethlehem Steel Corporation.

Another 2,000 tons of reinforcing bars, high-strength ASTM A615 Grade 60, are being fabricated and supplied to the project by Bethlehem's Cambridge bar shop. Much of this material will be utilized in foundations and in the hanging floors consisting essentially of flat slabs of lightweight concrete. Shear brackets will be used to connect the slabs to 8-inch wide-flange hangers suspended from the all-welded trusses. Three of the hanging floors will carry book stacks, while a fourth is for the library staff.

Now nearing completion is concrete work up to the top of the second floor slab — which must first be done to provide a solid base for subsequent erection of columns, trusses, girders and hangers.

Involved in this unusual construction technique of starting the building from the bottom up, then from the top down will be erection of a grid of temporary beams just below the trusses. These beams will be planked over as a safety platform and work level for the seventh floor construction.

Near the bottom of the hangers a second level of temporary horizontal struts and X-bracing will tie the main columns and hangers together to help brace the building against wind and erection loads. In the finished structure, wind bracing will be provided by sets of two and four column towers, some of which will contain stairs.



One of several 58-foot-long, 13-foot-wide "orthotropic" pedestrain bridges is erected at mezzanine level for new addition to Boston's Central Library Building. Use of the low-profile bridges, only 19-¼ inches deep, is an engineering innovation in building design.

Slab construction is then specified to proceed in the following order: (1) seventh floor; (2) roof; (3) third floor; (4) fourth through sixth floors.

So intricate and varied are structural details and loading sequences for the addition, particularly in the upper floors, that the LeMessurier firm utilized the STRESS (Structural Engineering System Solver) computer program developed at Massachusetts Institute of Technology. The program was especially useful in providing information for a variety of loadings on member forces, reactions, joint displacements and support displacements.

"Finding a solution to architectural requirements that dictated absolute minimum depth structures for the mezzanine level bridges (which had to span 58 feet in not more than 20 inches depth) was no easy task either," comments Kenneth B. Wiesner, associate in charge of the project for the LeMessurier firm.

"There again we pushed engineering technology to the limit — and finally ended up borrowing a trick from the bridge builders. We considered everything from Vierendeel trusses to W14x426 sections for those bridges.

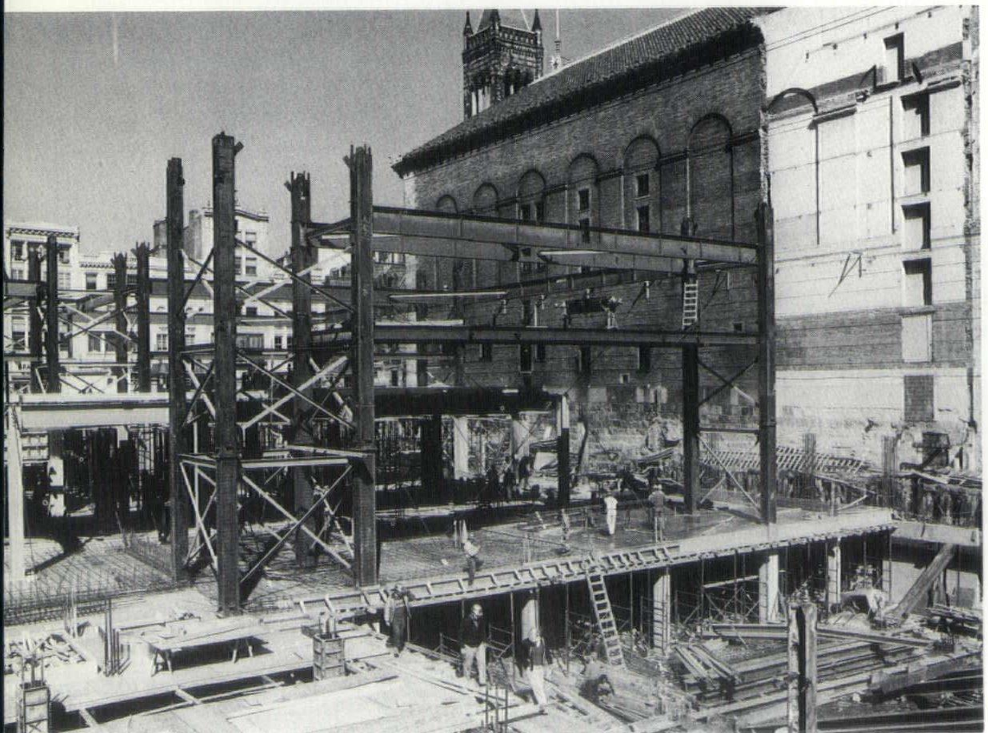
"But," says Mr. Wiesner, "only orthotropic design could provide the necessary 11-foot height from the first floor to the mezzanine level and still permit a required 9-foot ceiling clearance to the second floor."

The addition's crescent-shaped windows presented another interesting engineering challenge. These window areas are based at the second floor level with a granite arch above to provide some design continuity with the existing library. However, the granite could not be placed to act as a true arch system with normal base support because of framework design. This problem ultimately was solved by suspending the granite in arch configuration from the third floor through the use of special hangers and brackets.

Another important problem that had to be solved in the library addition project was the presence of extensive ground water. Many buildings near the construction site, including such historic structures as Trinity Church, Old South Church and the present central library, rest on wooden piles. These foundations must be kept submerged to prevent rot.

To maintain the existing ground water level, steel sheet piling was driven around the entire construction site — and an elaborate recharging system was set up. The sheet piling wall prevents intrusion of the surrounding subsurface water into the pumped-out excavation. Since the sheet piling is not completely watertight, ground

Huge 16-foot-deep welded trusses for the addition were fabricated in the Cambridge, Mass., shop of A. O. Wilson Structural Company. Upper floors three through six in the addition will be "hung" from a main grid of the deep interconnecting trusses, most of which will span the building's nine basic 58-foot module areas. Sloping steel-framed roof of the new library structure will also be supported by the trusses (note angled structural truss member at left).



Steelwork rises as reinforced concrete work proceeds on lower floors. Approximately 30 percent of 1,700 tons of steel required for the addition has been fabricated and erected for the structure from material supplied by Bethlehem Steel Corporation. Another 2,000 tons of reinforcing bars, high-strength ASTM A615 Grade 60, are being fabricated and supplied to the project by Bethlehem's Cambridge bar shop.

water lost through it is replaced by pumping clean water into the soil by means of a conventional well point system installed outside of the sheet piling. Numerous observation wells around the Copley Square area are checked twice weekly to see that water levels remain high. Heavy 7-foot-thick reinforced concrete spread footings up to 40 feet square are being used for foundations. Interconnecting them is a 3-foot pressure slab that is designed to resist water uplift of 1,000 pounds per square foot.

Because the basement of the new building is right next to the present library — yet is 18 feet deeper — the owner engaged the soils engineering firm of Golder, Gass Associates, Inc., of Cambridge to monitor subsurface soil strains by use of special instruments. The firm also keeps watch on any settlement movement of both the old and new library buildings during construction.

Groundbreaking for the new 480,000-square-foot addition, which is approximately the same size as the existing library, took place on June 6, 1969.

The first three floors of the addition will provide the citizens of Boston ready access, on open shelves, to a well-selected collection of upwards of one-half million volumes. This facility will provide service for children, young adults, students (both high school and college) and adults.

The auditorium, adjacent to the audio-visual rooms, will be a center for the library's dynamic educational programs. These have included story hours for children, weekly programs for the Never Too Late group, film showings and lectures celebrating important occasions.

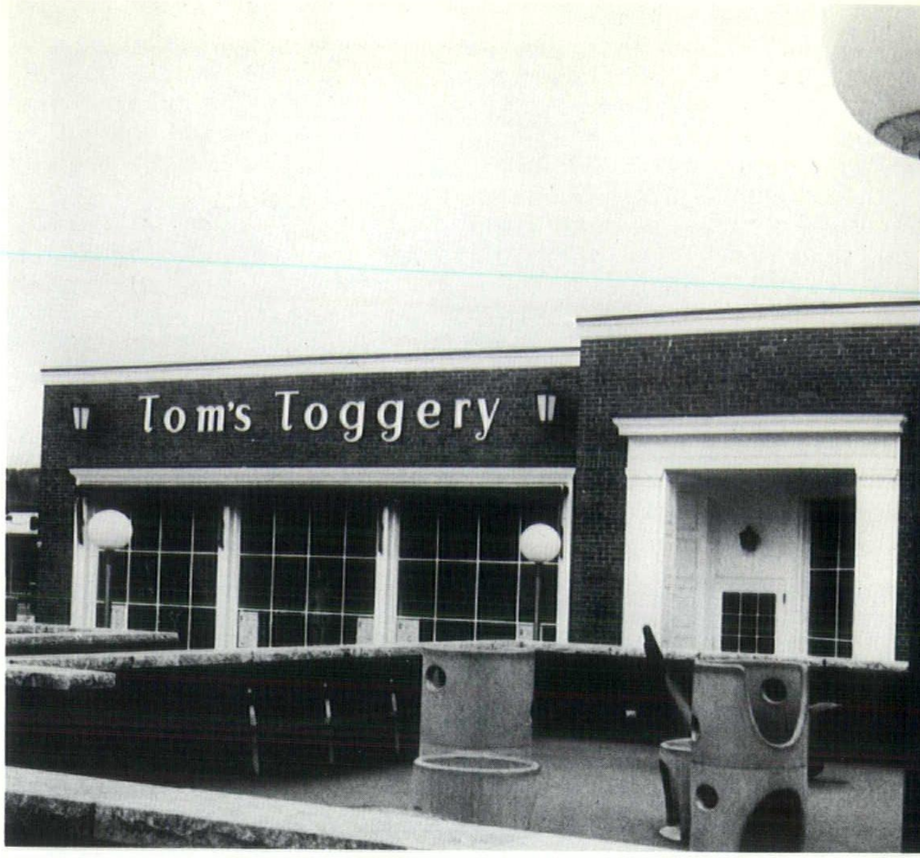
The total enlarged library will be better equipped not only to serve its increasing role as a reference and information center for the city, but for metropolitan and regional areas and for the state as a whole.

General contractor for the project is Vappi & Co., Cambridge. Representing the owners, Trustees of the Boston Public Library, during the construction phase is Resident Engineer John J. Doherty, Jr.

The addition is scheduled to be ready for occupancy in 1972.

(Continued from page 22)
Hardware, Western Auto and the Lebanon National Bank, required refurbishing to blend with the total scheme. These buildings form a diverse collection ranging from Hildreth's white painted two-floor building to the Lebanon National Bank's four-story structure. Yet they all boast quality brick construction and architectural elements in common with each other and with the newer facilities

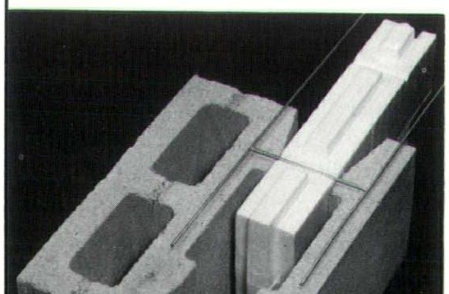
Metcalf and Eddy, concurrent with their primary planning and engineering activities, prepared a monograph titled *The Upstreet Manual* to enhance coordination of structures. It discussed such topics as design principles, sign aesthetics and window advertising, and was a key factor in stimulating the cooperation of all merchants in the mall area. Gary Laredo Associates of Boston was hired to plan rehabilitation of Currier's Department Store, while architects Ingram and Barrett worked on the facades of other buildings to emphasize those elements that would relate them to the mall most effectively.



Tom's Toggery, designed by Granite State architect Gordon Ingram, of Hanover, is one of several buildings in the Lebanon shopping complex designed by Ingram and Frank Barrett, also of Hanover.

In addition, a major highway was relocated to run outside the mall area and all parking areas were established at the rear of commercial establishments.

Today, as a result of coordinated architectural planning and civic cooperation, downtown Lebanon is once again an important center of community activity, and among the advantages and dividends paid on the "community investment" cited by Housing Authority officials during dedication ceremonies were increased tax revenues for the city, business for the merchants and a mall that is "a great place to stroll through, shop in, relax in and enjoy."



(Continued from page 4)

The program will be under the general direction of Professor Albert G. H. Dietz and Professor Laurence S. Cutler. They will be joined by other members of the M.I.T. staff, and invited guests, such as:

John Collins, Professor of Urban Affairs, M.I.T., former Mayor of Boston;

John Doar, President, Bedford-Stuyvesant D & S Corporation, former Assistant Attorney General, U.S.;

John Eberhard, Dean, State University at Buffalo;

William Morris, Housing Director, N.A.A.C.P.;

Joseph Newman, Vice President, Tishman Research Corporation.

Tuition for the Program is $350. Academic credit is not offered. Individuals interested should get in touch with, Professor James Austin, Director of the Summer Session, Massachusetts Institute of Technology, Cambridge, Massachusetts.

Cabot's New Handbook

A new guide to stains and staining is now available from Samuel Cabot Inc., manufacturer of stains and paints since 1877.

The handsomely illustrated, full-color booklet answers those questions most commonly asked about types of stains, how to apply them, color effects, exterior and interior staining, stains for furniture, helpful hints for better results, when to stain and when to paint.

To obtain a copy of the booklet, the architect, builder or consumer should write (on his own letterhead) to Samuel Cabot Inc., Dept. AB, One Union Street, Boston, Mass. 02108.

Waste Reduction Brochure Available

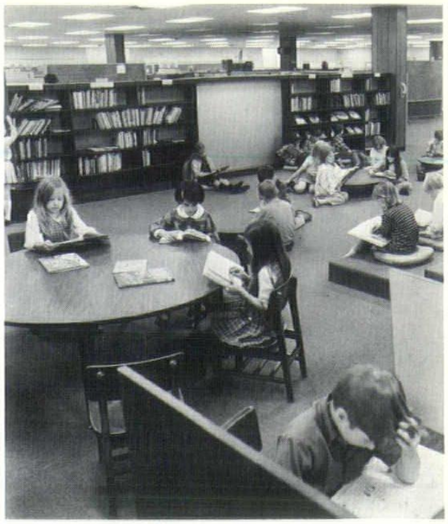
A coordinated approach to industrial waste reduction — from problem definition and recommendations on through engineering, construction and start-up of waste treatment facilities — is the subject of a 12-page, 4-color brochure. Entitled "The Waste Reducers," the brochure describes how Nalews, Inc. management and technical skills are applied to solving industial pollution problems. Available on letterhead request from: Waste Reduction Division, Nalews, Inc., Laconia, N.H., 03246.

Index To Advertisers

Ashley Exhibits at AASA Convention For 18th Consecutive Year

For the 18th consecutive year, school designs by the architectural firm of Warren H. Ashley, West Hartford, Conn., have been selected to be in the Exhibition of School Architecture at the annual American Association of School Administrators (AASA) Convention, February 20-24, Atlantic City, New Jersey.

Approximately 500 schools submitted from throughout the country were chosen by a panel of four AIA architects and four AASA members. Selection was based on the architect's solution to the educational requirements of the community. Judging considerations included the building's adaptability to the educational program and to community use, aesthetics, cost, safety features, environmental controls, ease of expansion, and site planning.



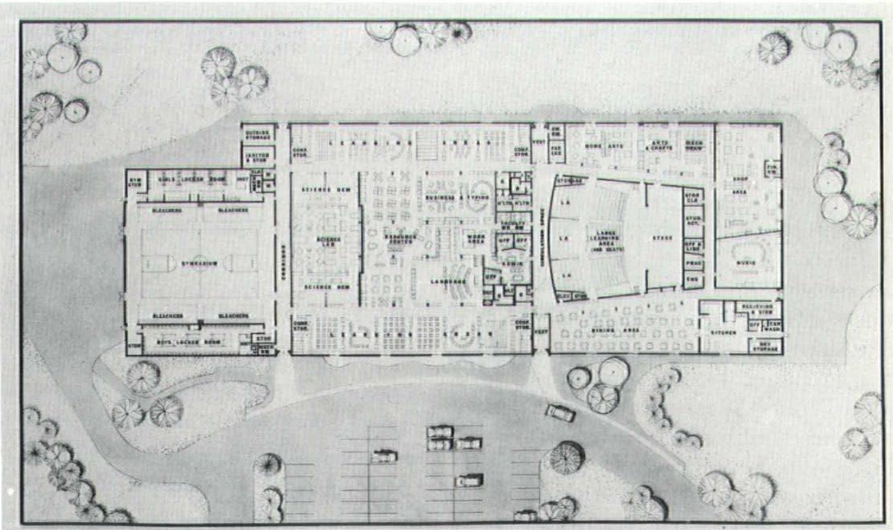
The primary section of the resource center at Memorial Elementary School in Bow, N. H., caters to the seating fancies of the young.

The selected schools, Bow Memorial Elementary, Bow, New Hampshire, and Kearsarge Regional High, Sutton, New Hampshire, were both designed on the "open space concept" to allow maximum flexibility in curriculum and teaching methods.

Kearsarge Regional High, the second open high school to be built in New England has capacity for 600 students in grades 9-12. The nearly 80,000-square-foot building includes a divisible auditorium, cafeteria, gym, resource center, 12 general learning areas, science, language, music, shop, drawing, arts and crafts, home arts, and business areas.

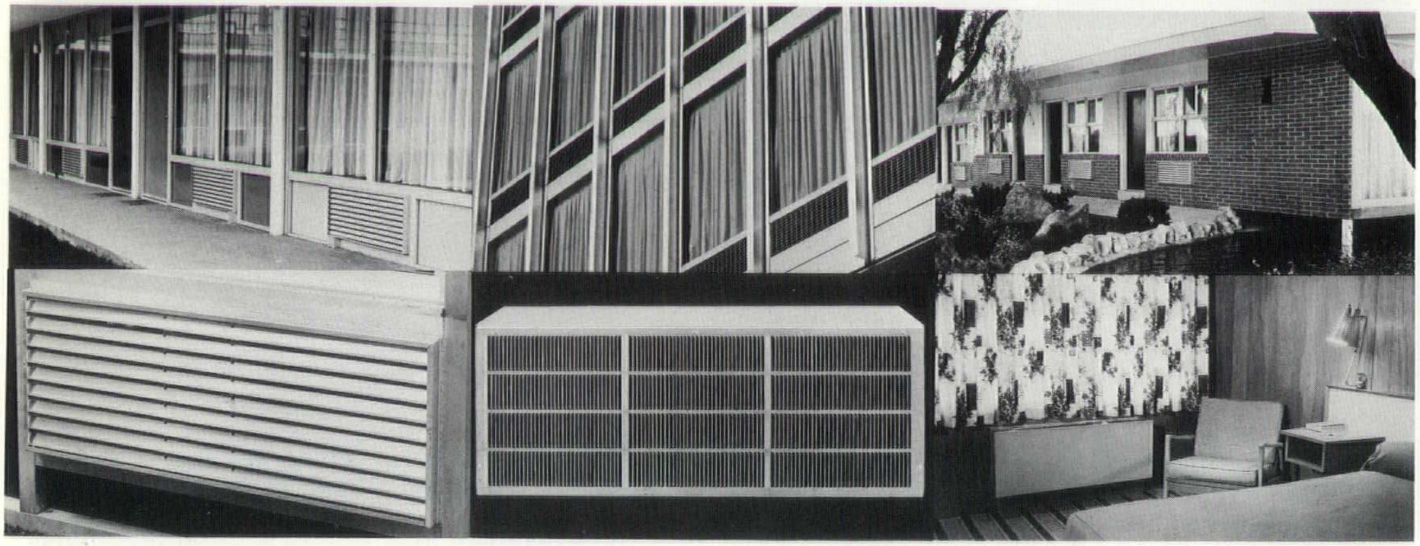
At Bow, a 50,000-square-foot addition was added on to a conventional classroom school. The conventional half is used for grades six through eight; the open learning areas for grades kindergarten through five. The new resource center, gym, kitchen, science, art, and music areas are shared.

Total construction costs, including air conditioning, amounted to $17.07 per square foot for Kearsarge, and $16.83 per square foot for Bow; both well below the average cost of $24.00 per square foot.



Kearsarge Regional High in Sutton, N. H., the second open space high school in New England, serves students from seven surrounding towns. The open space concept was chosen for its flexibility and lower construction cost.

GE Zoneline Cooling-Heating systems blend in functionally, architecturally ...and you can see installations now in Boston



GE's exciting, through-the-wall Zoneline units blend handsomely, quietly with their surroundings both inside and out. At the same time, they offer several important advantages over most central plant systems:

- Initial investment economy
- Individual heating and cooling comfort control
- Operating and maintenance economy
- Ease of specification and application
- Opportunities for individual metering

Because of GE Zoneline's versatility, hundreds of unique and highly efficient applications have been made — among them apartments, motels, hotels, nursing homes, hospitals, schools and offices.

Whatever your application — for new construction or remodeling — high, medium or low-rise, you can easily specify a GE Zoneline system. There's a Zoneline model to do the job — beautifully, effectively, economically.

For information on where to see GE Zoneline installations in Boston, call 329-2900. For catalog and complete specifications, simply fill in the coupon and return today.

GENERAL ELECTRIC

Appliance and Television Sales Division

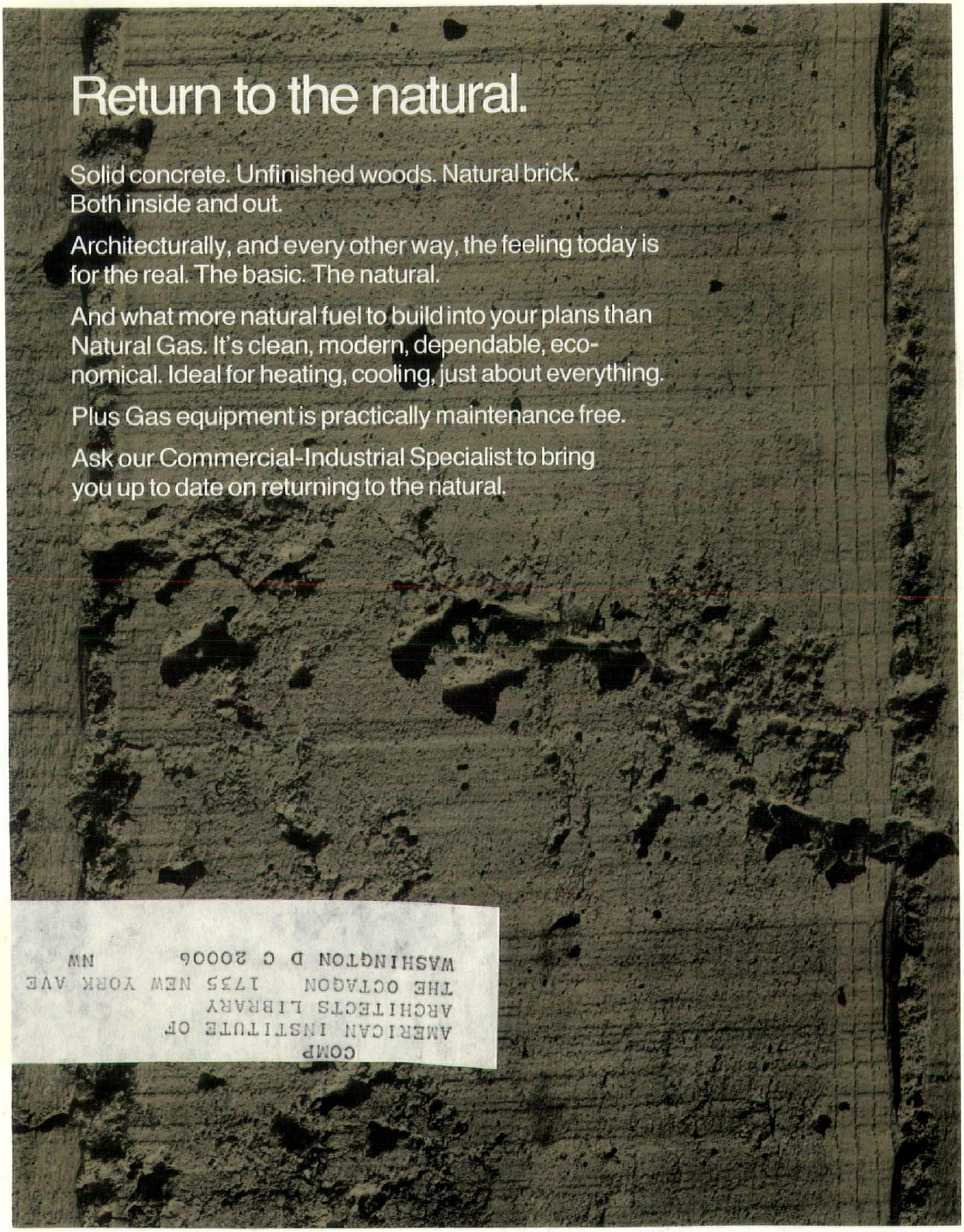
Contract Sales Department
General Electric Company
346 University Avenue
Westwood, Massachusetts 02090

Yes! Please send me complete information on GE Zoneline Cooling/Heating Systems.

Name ______________________

Firm ______________________

City __________ State __________ Zip ________



The Natural Gas Companies of Massachusetts