JOURNAL

TRANSPORTATION

This relatively simple but superbly designed bank is a striking example of the manner in which Terne roofing can become an integral part of a total architectural concept.

Aesthetics aside however, Terne also has certain outstanding functional characteristics. Among these are great tensile strength combined with light weight and a low coefficient of expansion; exceptional resistance to corrosive attack, and a durability measured in generations rather than years.

Terne roofs are also relatively inexpensive when judged by the standards of those to whom ultimate performance is no less significant than initial cost.

Citizens' Bank, N.A., Readington Township, New Jersey
Finne · Lyman · Finne · Reese,
Architects-Engineers, Elizabeth, New Jersey
Roofer: J. Strober and Sons, Ringoes, New Jersey
Photographs by Otto Baitz

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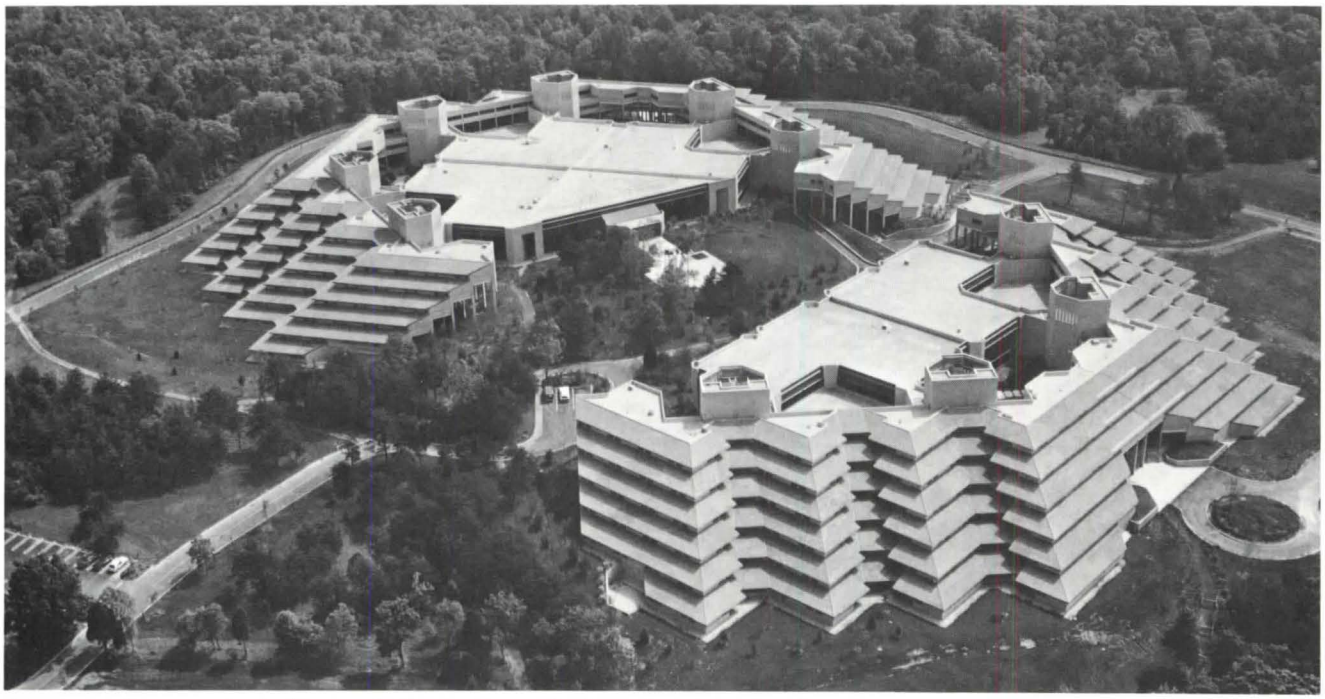
WHAT PRICE FORM, COLOR, FUNCTION?

Case Study No. 16*

Xerox Runs Off Five Campus Originals: Living/Learning Modules That Save Students' Time and HVAC Energy



Air view of two main buildings of Xerox center. Students live in terraced perimeter surrounding flat-roofed learning areas.

With innovations such as octagonal classrooms and electric heat recovery, this new industrial training facility features a cohesive layout that encourages employees to learn from one another as well as from their teachers.

Leesburg, Virginia. Along with a number of other brilliantly run U.S. firms, Xerox Corporation is studied and analyzed as a classical model of good management in the classrooms of Ivy League business schools. When it decided to build its own campus back in 1971, however, Xerox did not return the compliment by emulating traditional college architecture. Instead it came up with a totally unique approach that is as inventive in its own way as the company's famed copying process.

A standard vision of the American college scene is one of large numbers of students hurrying across the grassy expanses between dormitory and classroom buildings set here and there at random. The physical exercise involved certainly does the students no harm, especially when there are four leisurely years to spend and time is not of the essence. In industrial training, however, where courses range only from a day or two to a few weeks, time is very much a factor and campus walkabouts could be considered dispensable items in tight schoolday schedules. Xerox and its architects thought so, at least, and invented their own solution: the "living/learning module."

Free Association. The module is a physical structure containing classrooms, laboratories, residence rooms, recreational areas and other needed support facilities. Two or more modules can be freely combined in one building. Each module serves about 200 people, a number large enough for efficient application of physical plant and teaching facilities—yet small enough for a stabilizing, congenial sense of community among the members and for attention to the individual needs and progress of each student.

When the architects elected to couple the living and learning spaces, an intriguing opportunity was presented to the team of design engineers. The classrooms and laboratories were to be highly loaded with electronic teaching aids, test equipment and working models of the company's own machines. The engineers were given the challenge of recovering the energy dissipated by this equipment and using it to provide space heating for the living spaces.

River View. The Xerox International Center for Training and Management Development sits on a wooded hillside overlooking the Potomac River, near the historic village of Leesburg and about 30 miles from the nation's capital. Overall, the site comprises 2265 acres, but the facility uses only about 40 acres of the available land. Two terraced buildings are the essence of a complex totaling more than one million square feet and accommodating over a thousand students at a time plus a staff of 500. These buildings contain five of the living/learning modules (three in one building, two in the other).

**One of a series of reports giving recognition to the efforts of architects and engineers on behalf of resource conservation.*

The unique architectural approach opened for the engineers the intriguing possibility of transferring excess heat from spaces where students would work during the day to where they would sleep at night.

Entering any one of the modules from its courtyard, the visitor finds himself in a dramatic three-story-high carpeted mall known as the "commons" area. Each commons contains a different variety of facilities which are used by all of the students. A service desk, newsstand and game lounge are housed in module 1; a snack bar/cocktail lounge in module 2; a large dining room in module 3; barber shop, health services area and game lounge in module 4; and a library in module 5.

The service desks accommodate the registration of newcomers as well as the distribution of mail, check cashing and valet services. Game lounges are well planned for student relaxation, furnished with amenities such as grand pianos, billiards and table tennis equipment, card tables and softly cushioned seating arrangements. These lounges and the pub area are where students gather during evenings and weekends.

Tiered Suites. Ringing each high-bay mall or commons are six levels of glassed-in space where the students reside. The living quarters on these tiers are divided into suites for six people. The focal point of a suite is its generously proportioned lounge. Upholstered butcher block sofas, swivel armchairs, television consoles and indoor plants give these lounges a living room atmosphere that reflects the wooded environment of the site.

Six private bedrooms open directly onto each lounge. Carpeting and brightly colored blinds and bedspreads make these small but efficient rooms pleasant retreats for sleeping or studying. Between each pair of rooms is a full-sized bathroom shared by the two occupants. All bedrooms are outside rooms with unobstructed views of the lush Virginia countryside.

One of the two major items of furniture in a sleeping room is a single bed with a custom designed headboard containing a lockable storage compartment for the student's use. The second item is a large, well-lighted desk that runs the full length of one wall. In a sense, the desk could be considered as part of

Architect Peter Gerridge isn't particularly upset when, now and then, a casual visitor leaves with the wrong impression.

the HVAC system. One side of the desktop is supported by the customary drawer case. The opposite side, however, rests on the cabinet of a free-standing, floor-mounted heat pump unit that supplies the room's heating and cooling. The louvered outlet grille for the unit is flush-mounted directly into the laminated plastic work surface.

Don't Stop Now. The visitor who stops his tour at this point might come away with the impression that he had just seen one of the newer hotels built around soaring lobbies designed to spellbind guests with architecture as drama. Or, perhaps, a fine resort motel. "We certainly wouldn't be displeased if people did get that impression," says lead architect Peter Gerridge of the Kling Partnership. Kling's several divisions handled the entire design. "We wanted the modules to be interesting and comfortable places in which to stay. For several reasons.

"First, the training that goes on here is rather intensive, and after an eight-hour day in class, the students need some relaxation. The center is far away from any type of downtown entertainment, so we had to help them provide their own. Second, we aimed to provide a structural environment that would help relieve any sense of boredom. The average employee may return here many times during his career, and we hoped to make him want to come back. But our most important design objective was to provide structures that encourage employee interaction. Xerox feels strongly about this. A lounge where, for example, a sales representative and a service engineer converse informally about their particular approaches to the company's objectives can be just as important as the classroom in promoting on-the-job performance and harmony."

Learning-in-the-Round. To get to class each day, the students leave their rooms, cross the commons and enter the "learning area." This is a three-story space that contains sales and service classrooms and labs.

The Leesburg classrooms are unusual —octagonal in shape rather than rectangular. Because it has no identifiable "front," the octagon dispels the traditional image of the instructor standing at the head of the class as the dominant figure. The effect is a learning-in-the-round atmosphere that encourages student involvement. Instructors guide the work, but there is also plenty of crosstalk among the students as the lesson proceeds.

Another reason for embracing the octagon is simply that it has more sides and all of them are put to work. One wall and the space behind it are occupied by audiovisual aids, including a rear screen projector, a television receiver and videotape cassette unit and storage racks for tapes and slides. Others are lined with tackboards and chalk slates.

Some small classrooms have adjoining studio/like rooms for taping the role-playing exercises used in sales training. Here a pair of students can act out a customer sales situation and later participate in a group critique as the tape is played back on the audiovisual equipment. Larger classrooms for technical instruction have adjoining labs where students receive hands-on training on current Xerox machines.

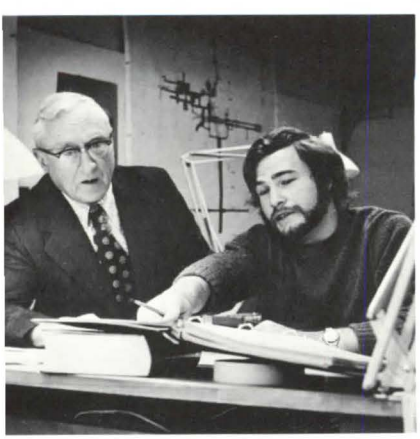
Engineering Helps. The design of the electrical and mechanical systems was carefully coordinated with the overall objectives for the living/learning modules. Lighting, for example, is a blend of various types of equipment, each chosen only after some consideration

Electrical engineer Peter Knuppel sees a place for mood lighting even in a down-to-business educational center.

of psychological effect. "We lighted learning areas to 130 footcandles with fluorescent fixtures," reports Kling/Lindquist electrical engineer Peter Knuppel. "We did this, of course, to provide the conditions needed for efficient work in the classrooms and labs. But we wanted the students to experience a change in mood, an uplift, when they left the learning areas for the day. So we went to the softer tones of lighting afforded by incandescent fixtures in the living spaces. The multistory commons areas presented a special problem which was solved nicely through the installation of a low-brightness system using 250-watt quartz floodlamps."

Space conditioning for the two-module building and for the three-module building is supplied by two separate closed-loop water-to-air electric heat pump systems. The total of 1700 individual units in the two buildings makes the Leesburg installation one of the largest based on the closed-loop principle. Unit sizes range from ¾ to 20 tons. The smallest of these are of the cabinet type with integral thermostats and are located in the students' bedrooms. Larger areas, such as the lounges and classrooms, are served by ducted units installed above ceilings or in equipment closets.

All of the heat pump units in a building are coupled into a common closed loop of circulating water. In the cooling mode, the heat pumps reject heat to the circulating water; in the heating mode, they extract heat from it. It is the closed loop that makes possible the heat recovery capability of this system. The highly loaded learning areas are almost continually on cooling even in cold weather. Heat rejected to the water by the equipment in the learning spaces is then available when required for the commons or residence spaces. Supplementary heating is provided by two 1500-kw electric boilers in the three-module complex and by two 1020-kw boilers in the two-module building.



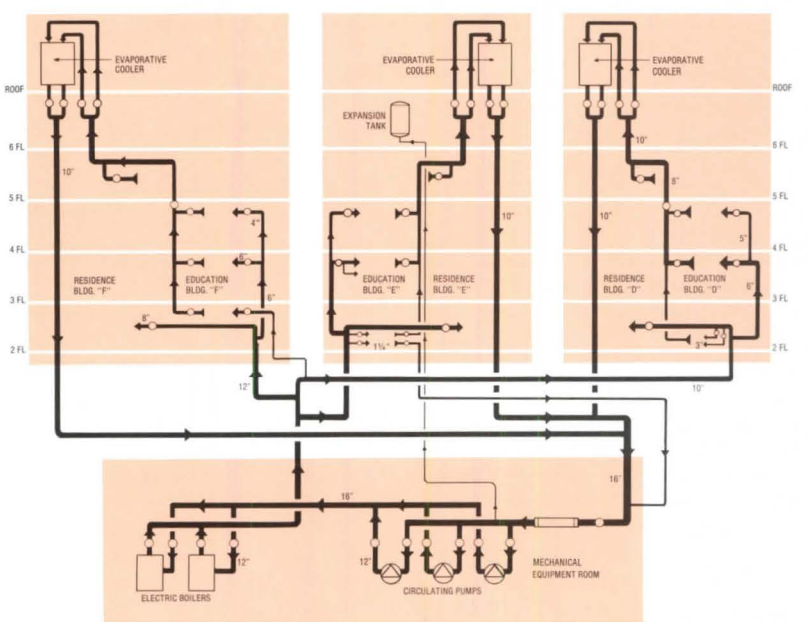
HVAC engineers Howard Shaner and Roger Halterman are still probing for the upper limits on closed loops for heat pumps.

No Limits on Loops. The efficient operation of water-to-air heat pumps entails some very specific flow requirements in terms of gallons per minute. So the success of any installation hinges on the design of the hydronic circuits with emphasis on adequate pipe diameters. As a general rule, pipe size in the main loop is directly proportional to the total tons of heat pumps served. Over the past several years, main loops four, six and eight inches in diameter and serving a hundred or more units have become commonplace.

From a statistical standpoint, it would appear that the greater the number of units in a single loop, the more often balanced conditions would obtain in the random mix of units on heating and cooling. But large numbers of units need great volumes of circulating water, and one wonders just what are the practical limits on system size.

Manager of plant engineering Henry Spector salvages energy for use long after the crowds have left the meeting hall.

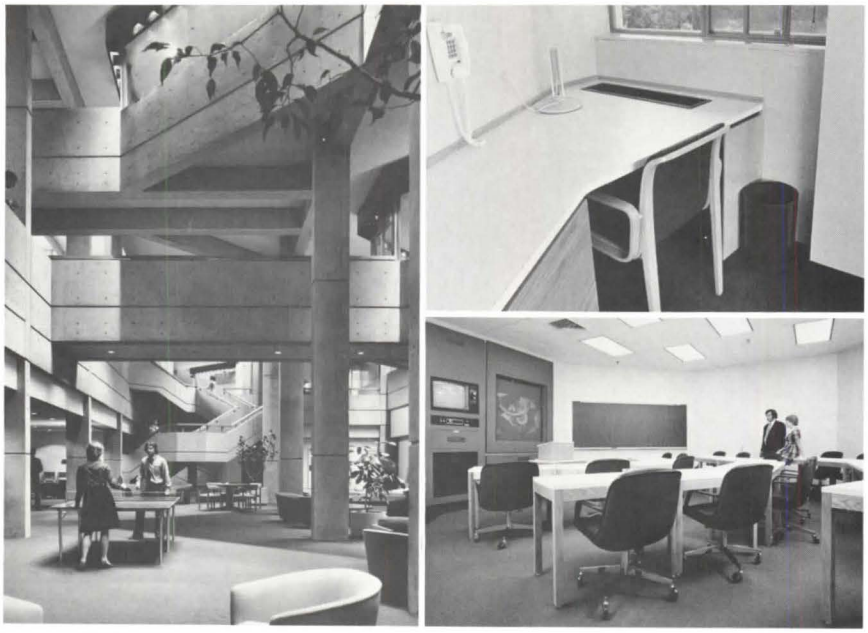
"We haven't seen the maximum limit on loop size," says HVAC engineer Howard Shaner, associate with Kling/Lindquist, Inc. "Not yet at least. We have more than 1000 units in the system for the larger of the two living/learning complexes at Leesburg. We



PIPING LAYOUT FOR THREE-MODULE SYSTEM

Schematic diagram shows the interconnection of the hydronic piping network in the three-module complex. The smaller pipe sizes installed in individual zones feed into progressively larger branches which terminate in the 16-inch-diameter welded steel main trunk. Water circulation throughout the entire network is maintained by two continuously operating pumps and one standby machine located in the mechanical room.

Situated near the circulating pumps are two electric boilers whose function is to provide supplementary heating whenever recoverable heat is insufficient to offset the cumulative heat losses of the structure. The boiler resistance elements are energized in sequence as water in the main trunk approaches 65F, which is the lower limit of the recommended range of operating temperatures. The upper limit is 90F, and whenever water temperature approaches that maximum, the roof-mounted evaporative coolers are phased into operation. For faster response to temperature fluctuations, each cooler is controlled independently by a sensor in a feeder pipe in the branches nearest it. The original plan to operate the coolers in response to temperature in the main trunk was shelved when it was determined that there was a lag of several minutes before a change occurring in a branch was reflected in the water temperature in the 16-inch main.



Innovations in the center include high-bay recreational lounge in commons (left); desk partially supported by heat pump cabinet (top right); octagonal classroom (bottom right).

could have treated this three-module complex as six separate buildings (see box). However, our early studies proved that one large system would be more economical and we didn't hesitate to design it that way. We're looking forward to applying this same heat recovery concept to even larger structures."

Orderly Approach. Kling/Lindquist engineers designed the hydronic network as an orderly progression of increasing pipe sizes. Starting with branches as small as 1¼-inch diameter in certain zones, the network feeders expand gradually and culminate in a massive welded-steel main trunk 16 inches in diameter.

An added benefit of loops of this magnitude is that the volume of contained water is great enough to offer considerable thermal inertia. This tends to stabilize the system despite hour-to-hour shifts in the operating modes of various zones. Also, heat stored in the water provides a flywheel effect that helps meet heating needs at night and during weekends when there is less recoverable heat available or none at all.

"The sheer magnitude of the loop did oblige us to make a couple of design compromises," remembers engineer Rodger Halterman. "We might have chosen a single evaporative cooler for the three-module complex but we couldn't obtain one large enough. So we had to divide the cooling job among three identical units, one for each residential structure."

The original intention was to control the three evaporative coolers in unison by means of a single sensor immersed in the 16-inch-diameter main trunk. During shakedown trials of the system, however, it was determined that a three-minute lag occurred before a temperature rise in the water flowing in the branches of any one of the modules was reflected by a rise in the water temperature in the main trunk. Accordingly, the system was retrofitted for independent control of each evaporative cooler from a sensor installed in a branch pipe close by.

Crowded Room. Several hundred yards away from the module complex is a separate recreational building. Space conditioning for this structure is also provided by a closed-loop system. "You might consider this an unusual application for the heat recovery concept," says Xerox manager of plant engineering Henry Spector. "Most of the volume of the building is taken up by two college-size gymnasiums. Ordinarily there is only a modest amount of heat exchange among the four large packaged heat pump units in each gym as they operate to equalize temperature conditions throughout the building.

"However one gym is designed to double as an auditorium and is equipped with demountable seating for 500 people. When this room has a capacity crowd, we strike it rich. We can recover enough heat to take care of the remainder of the building for hours."

DESIGN SUMMARY*

GENERAL DESCRIPTION:

Area: 1,020,000 sq ft
Volume: 11,150,000 cu ft
Number of floors: six
Number of occupants: 1000 resident students, 500 nonresident staff
Types of rooms: classrooms, laboratories, private and general offices, bedrooms, lounges, kitchen, dining room, TV studios, mechanical rooms, storage

CONSTRUCTION DETAILS:

Glass: single
Exterior walls: ribbed-face concrete block or mahogany siding over steel frame, 1″ urethane insulation (R-7), gypsum board; U-factor: 0.1
Roof and ceilings: clay tile over built-up roof, 2″ rigid insulation (R-7), suspended acoustical tile ceilings; U-factor: 0.1
Floors: concrete slab on grade
Gross exposed wall area: 150,000 sq ft
Glass area: 20,000 sq ft

ENVIRONMENTAL DESIGN CONDITIONS:

Heating:
- Heat loss Btuh: 35,940,000
- Normal degree days: 4300
- Ventilation requirements: 100,000 cfm
- Design conditions: 10F outdoors; 75F indoors

Cooling:
- Heat gain Btuh: 30,080,000
- Ventilation requirements: 100,000 cfm
- Design conditions: 95F dbt, 79F wbt outdoors; 75F, 50% rh indoors

LIGHTING:

Levels in footcandles: 25-130
Levels in watts/sq ft: 1-5
Type: fluorescent, incandescent, quartz

CONNECTED LOADS:

Heating and Cooling (3340 tons)	12,000 kw
Lighting	3,000 kw
Pumps and Fans	500 kw
Water Heating	1,000 kw
Cooking	300 kw
Machines and Misc.	11,700 kw
TOTAL	28,500 kw

PERSONNEL:

Owner: Xerox Corporation
Architects: Vincent G. Kling & Partners
Consulting Engineers: Kling/Lindquist, Inc.
General Contractor: Frank Briscoe Co.
Electrical Contractor: Beach/Fischbach & Moore, Inc.
Mechanical Contractor: Courter-Poole & Kent, Inc.
Utility: Virginia Electric and Power Company

*For all five modules.

ENERGY MANAGEMENT PROGRAM
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AIA JOURNAL

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BPA

Construction Site Picketing Bill Passed by Senate

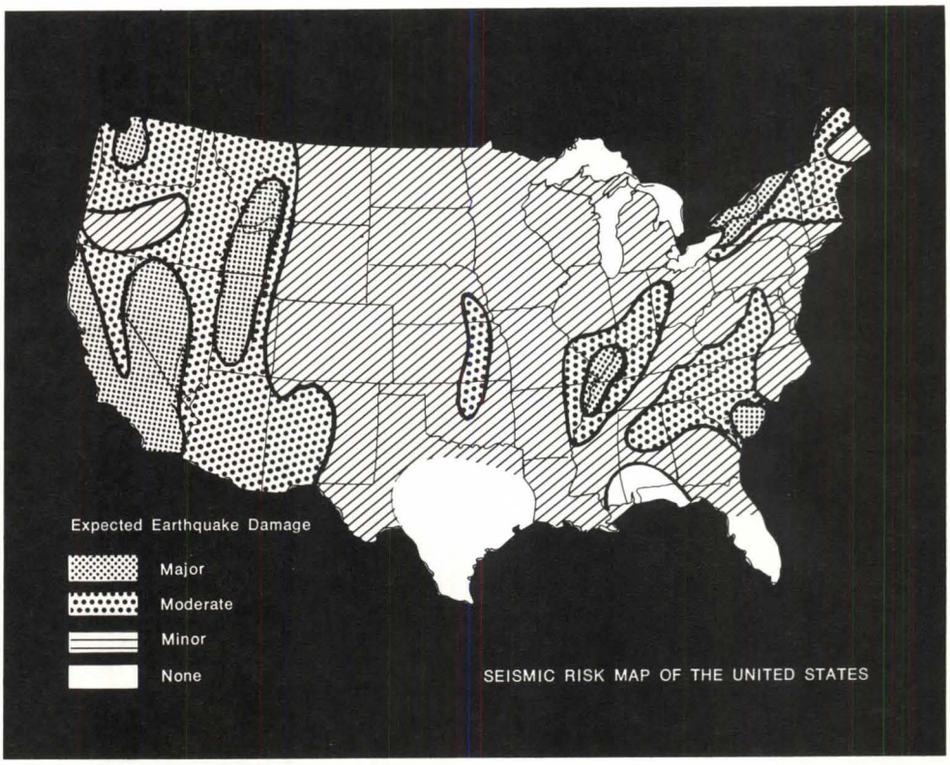
On Nov. 19, by a vote of 52 to 45, the Senate passed the long-delayed and controversial bill (S 1479) which would legalize common situs picketing at construction sites. The legislation would permit unions to close down an entire construction site even though a dispute might be with only one subcontractor. The bill, which would amend Section 8(b)(4) of the National Labor Relations Act and legalize secondary boycotts, was vigorously opposed by AIA, the Associated General Contractors of America, the U.S. Chamber of Commerce and other organizations. AIA opposed the bill "because legalizing secondary boycotts at construction sites would materially interfere with the orderly construction process, to the great detriment of the construction industry and the country."

A filibuster against the bill was started when the legislation came up on the Senate floor, but on a second cloture vote, the filibuster was stopped.

By a vote of 78 to 20, the Senate adopted an amendment stating that the bill's provisions would not apply to a project on which work had begun by Nov. 13. Another amendment exempts residences with three or fewer floors. An amendment of particular importance to the architectural profession prohibits common situs picketing if it is intended to force a contractor to use or install a particular product.

The measure was sent to the House, which had passed its version (HR 5900) last July by a vote of 230 to 178, for reconciliation of the minor differences between the two bills.

Earlier this year, President Ford announced that he would sign the secondary boycott bill only if it reached his desk accompanied by legislation which would reform the construction industry collective bargaining process. Meanwhile, Secretary of Labor John Dunlop, with assistance from industry and labor officials, drafted the Construction Industry Collective Bargaining Act of 1975 (S 2305 and HR 9500) which has been included as Title II of the bill. It provides for a labor-management committee with power to oversee contract negotiations and impose a "cooling off" period before a strike or lockout.



SEISMIC RISK MAP OF THE UNITED STATES

Earthquake Hazard Areas Charted

A seismic risk map of the U.S., prepared by the Coast and Geodesic Survey, Department of Commerce, indicates that major earthquake damage is expected not only in California, but also in portions of such states as Washington, Nevada, Wyoming, Idaho, Montana, Tennessee, Mississippi, Illinois, Missouri, Kentucky, New York and South Carolina. In fact, there are 38 states other than California where there is likelihood of earthquake losses.

New scientific methods for reducing earthquake losses in the San Francisco Bay area can also be used in other places, according to a report titled "Studies for Seismic Zonation and the San Francisco Bay Region," recently issued by the Department of Housing and Urban Development and the Geological Survey, Department of the Interior. A future report will give localities helpful specifics.

"By knowing the potential hazards for each area, planners and decision makers can develop regional zone-by-zone land use and construction procedures such as building codes and designs that enable structures to withstand earthquake hazards," says HUD. "This knowledge is vital to the location of critical structures such as nuclear power plants, dams and schools in areas with lesser potential for quake hazards."

Charles J. Orlebeke, HUD assistant secretary, emphasizes that "the value of seismic zonation can be realized only if it is used wisely by those making the day-to-day decisions that determine development and redevelopment in the nation's urban areas."

The report, which describes various kinds of quake effects and their severity, may be ordered prepaid for $2.80 from the U.S. Geological Survey, Branch of Distribution, 1200 S. Eads St., Arlington, Va. 22202.

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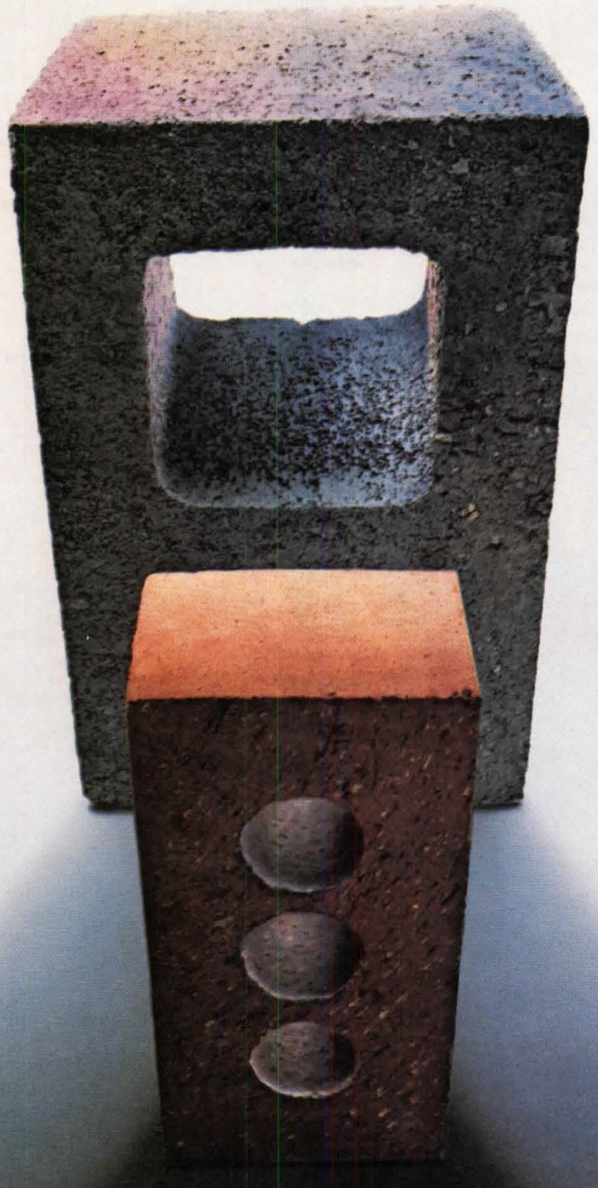

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AIA, AGC, Engineers Endorse Construction Management Program

A resolution endorsing cooperation in a "national comprehensive construction management program" has been approved by the governing boards of the Associated General Contractors of America (AGC), the American Consulting Engineers Council (ACEC) and AIA.

Endorsing the cooperative efforts at its September board meeting, AIA was the first of the three organizations to support the five-point "Statement of the Joint Conference of the Construction Management Committees," which was developed Aug. 15. The statement calls for a collectively developed CM program that will:

1. Develop, define and disseminate standards and quality levels for construction management.
2. Develop guidelines and educational programs for assisting members and owners engaged in construction management.
3. Relate and coordinate with all elements in the industry in order to develop acceptable industry-wide standards for construction management.
4. Monitor and make joint recommendations on legislation and regulations at the federal, state and local levels affecting construction management.
5. Communicate and create liaisons with owners and users of construction management services, advising and assisting on the most economical procedures.

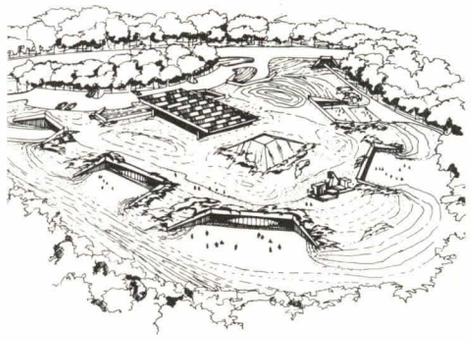
Energy Conservation Awards Announced

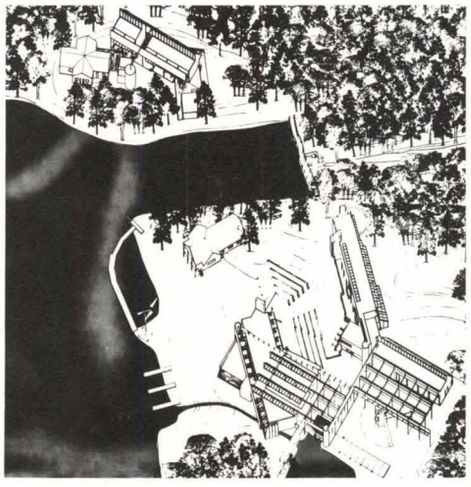
The jury of architectural and engineering experts for the Owens-Corning Fiberglas Corporation's fourth annual energy conservation awards program agreed that "realistic, economically justifiable energy-saving designs are feasible today with existing technology and properly integrated architectural and engineering approaches."

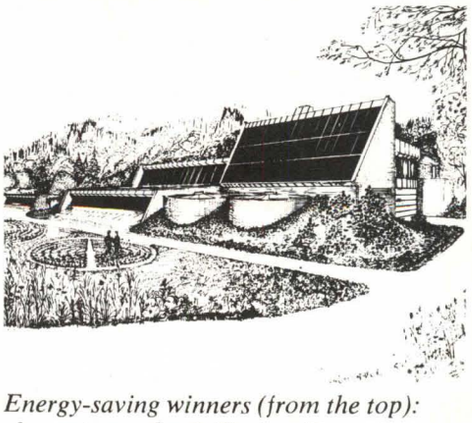
William Porter, dean of the Massachusetts Institute of Technology school of architecture and planning and chairman of the jury, said: "There is no need to wait for new energy sources or governmental action to solve this part of the energy crisis. Totally integrated design approaches can produce energy-efficient structures that are economically justifiable. There need be no exotic solutions. Planners must consider everything from availability of natural energy sources to peak utility rates in all aspects of their design."

Top honors in the institutional category in the awards program went to Davis, Smith & Carter, Inc., and Vinzant Associates, both of Reston, Va., for the design of the Terraset Elementary School in the new town. Among the school's energy-conserving features is that 100 percent of the structure is built under two to three feet of earth, providing natural insulation. It is estimated that the 60,000-square-foot-school will use up to 80 percent less energy than a conventional school of this size. The project, whose solar energy consultant was Hankins & Anderson, Inc., of Richmond, Va., uses storage from solar collection for both heating and cooling.

Honorable mention in the institutional category went to the architectural firm of Harrison Fraker of Princeton, N.J., and Flack & Kurtz, consulting engineers, of New York City. The firms were cited for the design of the Princeton Education Center at Blairstown, N.J. Approximately 75 percent of the heating load and virtually 100 percent of hot water needs will be supplied by solar energy. The center, being built on a 170-acre site, will have 90 percent of its electricity provided by a 6kw experimental "sail wing" wind generator and a 12 kw hydrogenerator.







Energy-saving winners (from the top): elementary school, Reston, Va.; education center, Blairstown, N.J.; Waste Water Treatment Plant, Wilton, Me.

In the industrial category, top honors were awarded to architect/engineer Douglas A. Wilke of Glen Head, N.Y., and Wright, Pierce, Barnes, Wyman, an engineering firm in Topsham, Me., for the design of the Waste Water Treatment Plant in Wilton, Me. The plant will save $3,594 in heating oil and $875 in electricity per year through the use of solar collectors, heat pumps, a small building shell and basic concrete materials. On cloudy days, methane gas produced by the plant's waste treatment process and an electric generator will provide the required energy. Praised for its "integrated approach," the plant minimizes the requirements for off-site energy sources by means of the use of the natural terrain for process requirements.

No awards were granted to governmental and commercial category entrants in this year's program. "Many entrants," said Porter, "took creative approaches to solving the conservation problem, but the jury felt that none presented an integrated or total solution."

In addition to Porter, other jury members were: Chih-Chen Jen, AIA, principal in Kahn and Jacobs/Hellmuth, Obata & Kassabaum, New York City; Ken Mahal, AIA, president of L.K. Mahal & Associates, Bloomington, Minn.; Richard E. Masters, principal in the consulting engineering firm of Jaros, Baum & Bolles, New York City; Robert R. Ramsey, vice president, Leo A. Daly Co., Omaha, and Robert Wehrli, AIA, chief of the architectural research section, National Bureau of Standards.

The energy conservation awards are sponsored by Owens-Corning to honor architects, engineers and building owners "who have made outstanding contributions to energy conservation."

Managers Organize

A new national organization has been formed by professional business managers from planning and design firms. The goals of the Professional Services Business Management Association are: "to provide a forum for exchanging ideas and information and for discussing common problems and issues: to establish guidelines for approaches to common management concerns; to increase the recognition of the value of good business practices among planning and design firms, and to advance and improve services to clients."

Membership in the newly formed association is open "to anyone with management or administrative responsibilities in firms that deal with the planning and design of the man-made environment." The first general membership meeting will be held in Chicago on Feb. 25-26, at

continued on page 12

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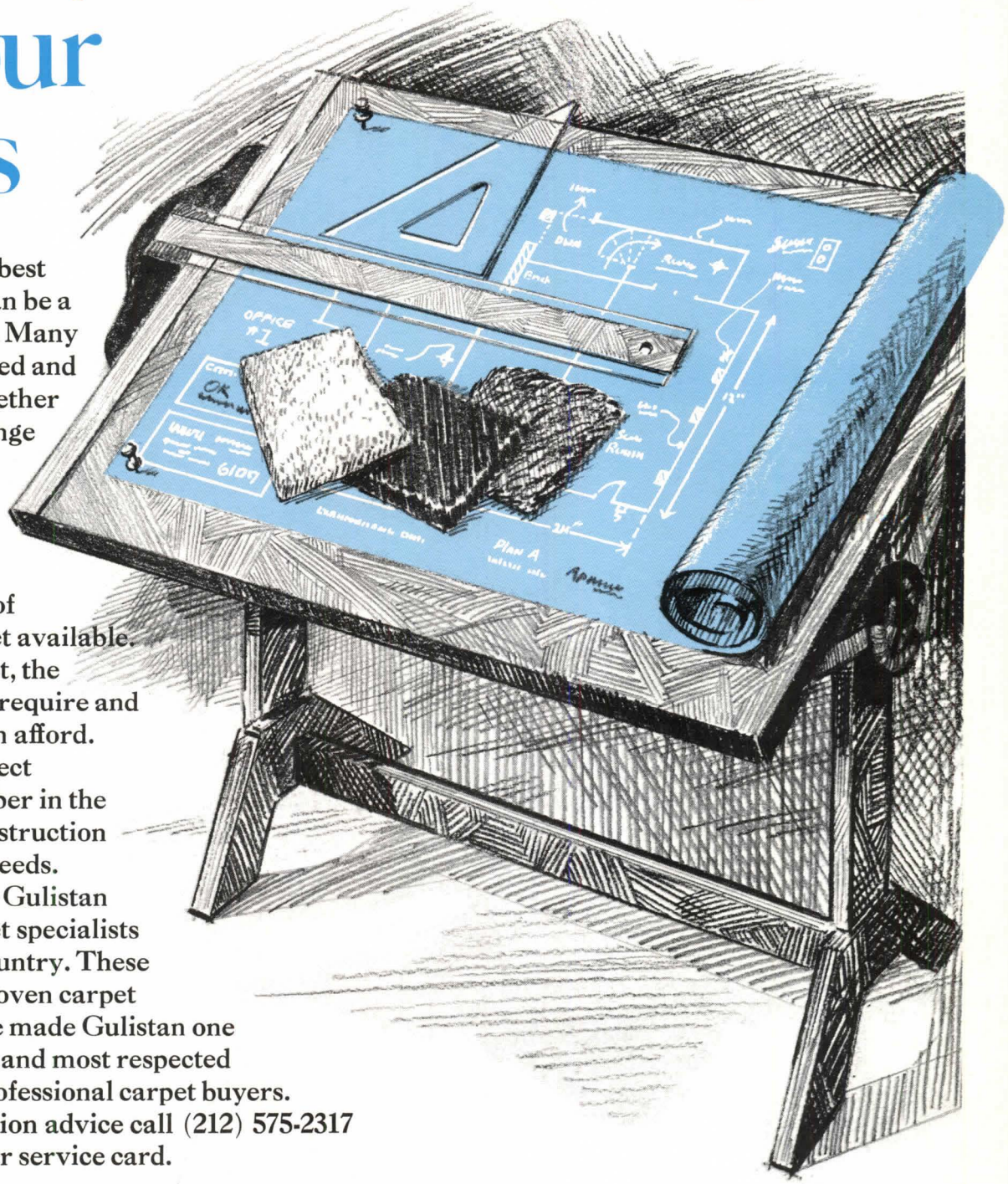

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Cedar Shingle and Shake Awards Given

"The entire portfolio of projects entered represented an extremely high quality of architectural work," said the jurors of the 1975 Red Cedar Shingle & Handsplit Shake Bureau architectural awards program, which is sponsored jointly by AIA. The 223 entries were submitted by architects from 35 states and four Canadian provinces. The purpose of the awards program is to "demonstrate design excellence and significant functional or esthetic use of red cedar shingles or shakes."

First award winners are:

- Thompson house, Acoaxet, Mass., in the vacation homes category (architect: William D. Warner, AIA).
- Sammamish Shores project, Bellevue, Wash., in the residential multifamily category (architects: The Mithun Associates, Don Doman, AIA, project architect).
- Civil War log house, Montgomery County, Tex., in the remodeling-restoration category (architect: B. Carroll Tharp, AIA, of Koetter, Tharp & Cowell, Inc.).
- Gaches house restoration, LaConner, Wash., also in the remodeling-restoration category (architects: L. A. Bailey & Associates).
- Spiral Tee Pee, campsite and park shelter design, Regina, Saskatchewan, Canada, in the commercial-institutional category (architect: Clifford Wiens of Wiens & Associates, Ltd.).
- Briarhills Community Center, Houston, also in the commercial-institutional category (architects: John Mitchell & Associates, Inc.).

In addition to the six first award winners, eleven merit awards were given for the following projects:

- Development house, Glen Cove, N.Y. (residential single-family category; architect: Alfredo De Vido, AIA).
- DaPont residence, Aptos, Calif. (residential single-family category; architect: Herbert Ichikawa, AIA).
- Covell residence, Boulder, Colo. (residential single-family category; architects: L. Gale Abels & Associates).
- Sea Point, San Diego, Calif. (residential multifamily category; architects: Richard D. Stoddard Associates).
- Fort Verde Historic Park, Camp Verde, Ariz. (remodeling-restoration category; architects: Gerald A. Doyle & Associates).
- Blackwell house restoration, Roosevelt Island, New York (remodeling-restoration category; architect: Georgio Cavaglieri, FAIA).
- Frisco Sewage Treatment Plant enclosure, Frisco, Colo. (commercial-institutional category; architects: Harold R. Carver and James R. Morter, AIA).
- Bethlehem Lutheran Church, Santa Rosa, Calif. (commercial-institutional category; architects: Roland/Miller Associates).
- Beach house, Stinson Beach, Calif., (vacation homes category; architects: Bull Field Volkman Stockwell).
- Weekend house, St. Helena, Calif. (vacation home category; architect: Kirby Ward Fitzpatrick, AIA).
- Bross house, East Hampton, N.Y. (vacation home category; architect: Alfredo De Vido, AIA).

Vacation house in Acoaxet, Mass. (top) and restored Civil War log house in Texas.

Selection of the winners was accomplished by a jury consisting of John Hackler, FAIA, Peoria, Ill., chairman; Victor Christ-Janer, AIA, New Canaan, Conn., and Gordon W. Bradley, AIA, Honolulu.

Jobs in Engineering

The American Society of Civil Engineers has updated its nationwide survey of employment among civil engineers. The first survey, completed last June, reported that 64 presidents or appointed representatives of ASCE's local units could identify only a total of 29 unemployed ASCE members (*see* Aug., p. 66). ASCE reports in a press release dated Oct. 31 that a total of 57 unemployed civil engineers are now identified, according to 36 presidents or appointed representatives of local units who responded to the followup survey. ASCE says that when respondents were asked to describe today's employment situation for civil engineers in their geographical areas that 3 percent replied "excellent"; 47 percent "good"; 22 percent "fair," and 11 percent "poor." There was no reply from 28 percent. In June, 13 percent replied "excellent"; 34 percent "good"; 28 percent "fair"; 8 percent "poor," and 23 percent did not reply.

Historic Provision Added to Code

The International Conference of Building Officials recently adopted a historic buildings amendment to the Uniform Building Code. The amendment states that a building or structure that is officially recognized by local legislative jurisdiction as historically or architecturally significant is qualified to be exempt from conformity to all provisions of the code for "repairs, alterations and additions necessary for preservation, restoration, rehabilitation or continued use of a building or structure."

The amendment stipulates that unsafe and substandard conditions must be corrected according to an approved plan and that the restored structure must be safer than the existing building.

The National Trust for Historic Preservation has published a booklet titled *Preservation & Building Codes* that contains "current preservation issues and solutions and state and national code organization legislation for application of building codes to historic structures." It may be obtained for $4 from Preservation Press, NTHP, 740-748 Jackson Place, N.W., Washington D.C. 20006.

European Tours Scheduled by ACSA

Architectural students and those professionals who are externally committed to new learning experiences will have an opportunity to explore Europe together on study tours sponsored by the Association of Collegiate Schools of Architecture. The tours will leave from Dulles International Airport, near Washington, D.C., on May 31 and will return there on June 28.

The group will split into five segments of about 40 persons each for specialized tours in Europe. These include "New Town Planning," "Vernacular Architecture," "Restoration and Renovation," "Classical and Renaissance" and "Beauty and the Beast" (and exploration of the differences between "the true and the artificial"). Everyone will get together in London finally for a week of seminars and visits to the architectural monuments of that city and its environs.

The tours have been planned for ACSA

continued on page 18

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by Charles Jencks, author of *Architecture 2000* and other books; Leslie Ginsburg, an authority on new town developments in Europe; Derek Linstrum, director of conservation studies at the University of York; Bernard Feilden, a leading British conservationist and restorer of Norwich, York and St. Paul's cathedrals; Paul Oliver, director of art and design, Dartington College, and Geoffrey Broadbent, author of *Design in Architecture*. These advisers will lead the various special tours and will lecture to the group as a whole at the London finale.

The tour of "Vernacular Architecture" will visit farms, a fishing port, a medieval hill town, a walled city and other places in France, Germany and Holland. On the "Restoration and Renovation" tour, visits will be made to many cities, including Paris, Venice and Prague, to study current restoration work. The "Classical and Renaissance" tour will explore Italian architecture, visiting both large and small towns. The "New Town Development" tour will include stops at such places as the satellite towns around Dusseldorf and new towns on the reclaimed polder of the Ijssel Meer near Amsterdam. Charles Jencks will lead the "Beauty and the Beast" tour, which ACSA calls a "pinball delight" that will bounce "from Chenonceau through Palladia, Corbu and the worst of King Ludwig."

Costs for the tours have been "pared to the bone," says ACSA, to make them as accessible as possible to students. Many schools will give credit for the experience. Professionals "with an adventuresome spirit" are urged to come along as well to provide a richer experience for all concerned.

For more information, contact Eileen Nichols, ASCA, AIA Headquarters Building, in Washington, D.C. (202) 785-2324.

Community Design Competition Set

An urban design competition is being sponsored by the City of Riviera Beach, Fla., and private developers for an integrated, overall design of Singer Island, a developing community bordered by the Atlantic Ocean and Lake Worth. The competition is composed of a design for an urban street (state road 703) and related commercial buildings adjacent to the street.

The competition, which is open to all registered architects and landscape architects practicing professionally in the U.S., its territories and the Commonwealth of Puerto Rico, offers a first prize of $10,000, a second prize of $2,500 and a third of $1,000. The first place winner "may be selected to provide professional services to complete the entire project." Professional adviser is Joseph Middlebrooks,AIA.

To receive the design competition package, send a money order or check in the amount of $25 to: Urban Design Competition, City of Riviera Beach, City Hall, 2214 Ave. E, Riviera Beach, Fla. 33404. Submissions are due by Feb. 16, 1976.

State to Purchase Louis Kahn Drawings

The architectural drawings of the late Louis I. Kahn, AIA gold medalist, will be housed at the University of Pennsylvania. The state legislature of the Commonwealth of Pennsylvania authorized purchase of the Kahn archives when the drawings were in danger of being dispersed in order to pay the architect's debts after his tragic death in 1974. The university will endeavor to raise funds to locate the archives as a research facility and to establish a professorship in Kahn's honor.

Ada Louise Huxtable, Hon. AIA, in a *New York Times* article calls the state's purchase of the drawings "not a sentimental act spurred by Kahn's tragic and untimely loss, but a responsible act motivated by a realistic appraisal of the architect and his work." Equally important, she says, is that this is an act of government "that secured this national cultural heritage. That is indeed good news in a country that has traditionally considered its culture expendable and thrown its heritage to the wolves or the highest bidder."

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The Architecture Of Transportation

Viewing the city as a work of architecture, transportation is at once its circulation system and a significant element of its structure, thus becoming a prime determinant of the city's form. It is in this role, as well as in its function of moving people and goods, that we look at transportation in this issue.

We look first at national urban transportation policy, perhaps a more active and conscious participant now in the shaping of cities (and their regions) than ever before. Then we look at the planning and design approaches being pursued by the unprecedented number of cities installing new transportation systems.

Finally, we look at the remarkable and sometimes dramatic architectural end products of the nation's two largest new transit systems. For transportation, in addition to its other roles and functions, is creating opportunities for an urban architecture of a new kind and scale.

To strike an unusually personal note for this page, I would like to dedicate this issue to an architect who took a position of unique leadership in exploring these possibilities, the late Norman Klein of Skidmore, Owings & Merrill.

I first met Norman Klein as chief planner for SOM's design for the Market East area of Philadelphia. In it a variety of transportation modes were woven together with other facilities and functions in a single giant multilayered construction promising great drama.

Later he was a leader in developing the so-called "concept team" which worked to soften the impact of a highway through Baltimore, and which became a prototype for similar multidisciplinary efforts elsewhere. The work of the Baltimore team was notable for the breadth of the ideas gathered and applied to the relationship of transportation to the city, and for the depth of its sensitivity to the people of the city.

These are qualities in architecture, and in an architect, worth emulating. *D.C.*

Urban Transportation Policy: Where Do We Go from Here?

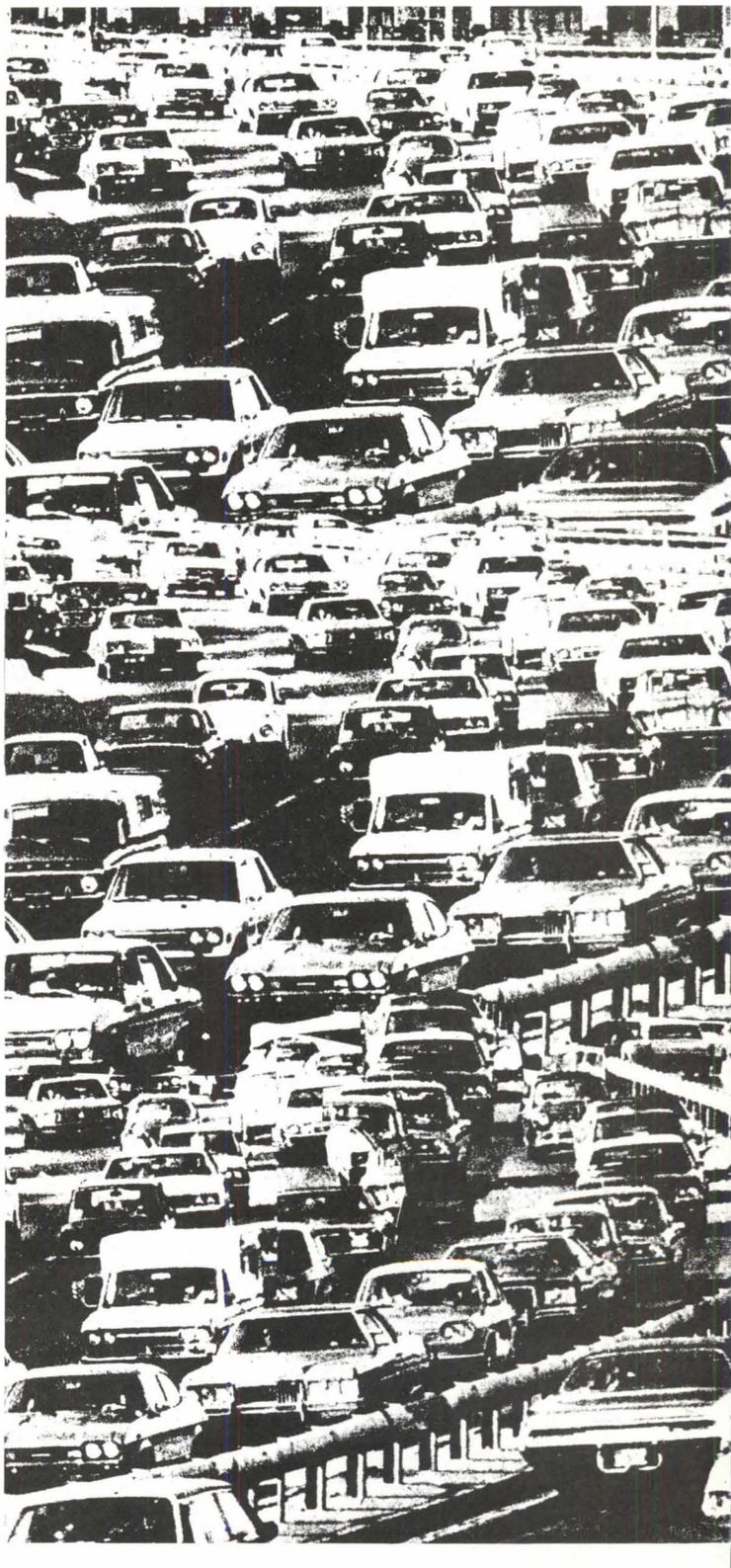
It is time to reappraise our urban transportation policy in terms of what it has done and what it can do. After nearly 20 years the urban part of the federal highway system is virtually complete and is now at a standstill. At the same time, we are now approaching the 15th anniversary of substantial federal help to mass transit. Both the highway and transit programs were intended to ease the traffic congestion bedeviling American cities—the highway program by providing more capacity, transit by providing a more viable, competitive alternative to the automobile. Together, the two programs resulted in the spending of $29 billion on urban transportation. Yet the common perception is that congestion in urban areas is as bad or worse than before. What does this seeming failure imply for future urban transportation policy?

The urban highway program is at a standstill because people have concluded that it has failed to reduce congestion enough to be worth the costs—especially the social costs of deteriorated environment, increased pollution and urban displacement. Curiously, despite all the rhetoric about the congestion problem and all the billions spent to cure it, there are no comparative data to tell us what has, in fact, been accomplished. Such data as exist seem to indicate that in the large old cities there has been virtually no improvement in downtown traffic congestion during the rush hour. For example, Manhattan's downtown traffic moved at about the same speed in 1966 as it did in 1924, 10 to 12 miles per hour north and south, seven miles per hour east and west.

Massive increases in automobile use have swamped all of the highway improvements made in the approaches to Manhattan. In 1924, 225,000 cars entered Manhattan each day. In 1966, the number reached 800,000. If congestion remains unchanged, did highway improvements just barely keep pace with growing "needs?" Or did the improvements themselves create these needs?

The highway program has solved part of the congestion problem for traffic moving at times other than the peak and to destinations other than the central business district (CBD). For example, the data for New York show that over the past 13 years access to the countryside from Manhattan has markedly improved for weekend recreational trips. Traffic congestion around Manhattan on summer weekends seems not to have improved much; Manhattanites can't cover much more ground in one hour today than they could 13 years ago. But the two-hour improvement has been dramatic. Once New Yorkers break through the congestion that immediately surrounds them, they can now travel so much farther in two hours that they have access to an additional 200 parks and recreation areas for a day's outing—a four-fold increase.

Improvement in weekday off-peak trips has been less dramatic though still considerable. Here, the data are quite old and for all we know the improvement has been wiped out by increases in



Mr. Myers is director of urban systems studies for the Institute of Public Administration in Washington, D.C. This article is based in part on research by the institute's transportation staff: Ralph Rechel, Joseph Revis, Alex Eckmann, Lee Rogers, Steve Hoglund, Anne Chacon, Margot Leydic and Frank Graves.

traffic. Still, in 1949 it took 40 minutes to go from Times Square to Elizabeth, N.J., during the nonrush hours and in 1966 the same trip could be made in about 25 minutes. From Elizabeth, N.J., to JFK Airport used to take 80 minutes, now about 40. Why then do people still complain bitterly about traffic congestion? In some places it hasn't improved at all. And where it has, improvements have failed to keep pace with rising expectations.

Part of the cost of better highway facilities to Manhattan, for example, was the near destruction of one of the best transit systems in the world. Transit ridership dropped off by 400 million passengers from 1960 to 1974. Not that the automobile relieved transit of its peak-hour trips. No such luck; that might have helped the situation. Instead, it took away most of the business that made the transit system socially indispensable and economically viable—the weekend, off-peak and off-central traffic. In short, *New York's Transit* System lost everything to the automobile but the most expensive peak-hour business.

Transit kept its peak-hour traffic despite the massive highway improvements because its comparative advantage for this kind of trip is overwhelming. Most people find it impossible to commute to Manhattan's downtown by automobile because parking space is so scarce and so very expensive—four to seven dollars per day. Little wonder that transit still carries 92 percent of the peak-hour commuter traffic to downtown Manhattan. Yet the streets above remain crowded beyond their capacity.

While transit may have the commuters to downtown Manhattan, it can't seem to attract enough additional motorists whose diversion would relieve downtown traffic congestion during the peak hours. In this respect New York is like other large cities only more so: The same situation is common to every single city in the Western world that has a rail transit system. No matter how good the rail system, none of them has ever succeeded in relieving traffic congestion on the downtown streets. For the past 15 years "transit diversion" theory has blinded U.S. transit policy to this inconvenient fact.

Despite the empirical evidence of congested cities, planners theorized that building a new, superior transit system would relieve congestion by diverting motorists. If you open up a new subway and people who used to drive now take the subway, how can there not be fewer cars on the road than formerly? Indeed, there *will* be fewer cars on day one and on day two; but after a while more cars seem to show up on the roads to fill the "empty" spaces left by those who have shifted to transit. It happened most recently in Mexico City. When the subway opened there was a noticeable reduction in downtown traffic for about three weeks. Shortly thereafter the city reverted to its "steady-state" of traffic congestion.

The question is, will the same thing happen to BART in San Francisco and Metro in Washington, D.C.,? Probably. Building a subway system improves access to the CBD and stimulates economic activity there. This, in turn, stimulates construction of highrise office buildings. You can see that happen both in Washington's and San Francisco's downtowns. In fact, both BART and Metro take credit for the spurt of construction in their respective downtowns.

A high percentage of those working in the new buildings will undoubtedly take the transit system to work. At the same time, however, a small percentage of office workers will take their cars to work—for whatever good or perverse reasons. Auto users as a percentage of commuters to downtown may be greatly reduced but the absolute number will increase enough to create additional congestion. To the number of auto users who work in the new buildings must also be added the number of visitors who come by car to do business in the CBD. Many of these people are salesmen and others who "can't be without their cars." At the same time, the size of the CBD will remain about the same as will its street capacity. So with the increased economic activity downtown we may well have more subway riders but we will also add more cars to the same amount of street space—which means more congestion.

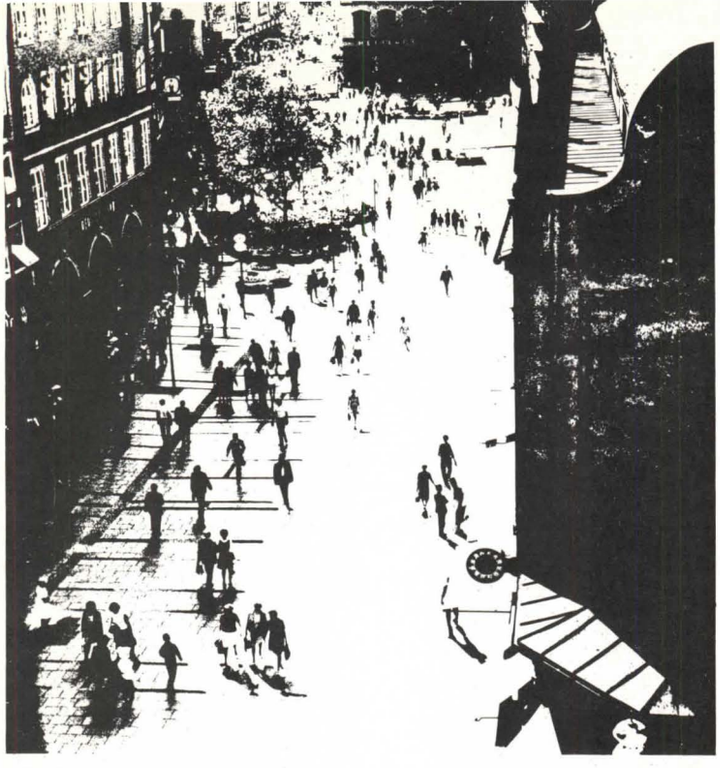
What are the policy implications of a finding that capacity addition, whether highway or transit, may not reduce congestion but may actually increase it just where it is already worst? In examining these implications, as in framing policy, it is necessary to focus on the problems that people want solved and are solvable. These are: (1) congestion, (2) cost, (3) equity, (4) energy and (5) environment. These problems are, of course, related as are their solutions. Each will be discussed separately here with a brief definition of the problem and a description of the one major policy that can most powerfully address it.

Congestion: The Coming Age of Restraints

Basically, the only way to reduce congestion is to reduce the number of vehicles trying to use a facility at the same time. Since costly experience has now proven that it is impossible to do this indirectly by "attracting" motorists to improved mass transit, it's time to "bite the bullet" and deal with the motorist directly. This means restraining the use of congestion-prone facilities.

Conventional traffic management is an accepted means of restraining traffic which can reduce congestion up to a point. For example, progressively timed lights can speed the flow of vehicles on urban streets. But ultimately at some level of vehicle load, such measures break down and even become counterproductive. Thus, in the urban areas where automobile use is extremely heavy and growing, use itself must be restrained to reduce absolutely the number of vehicles on the congested facilities. In the U.S. that violates a dearly-held tradition of "freedom of the road." And so until recently usage restraints have been politically unacceptable. But times are changing.

There are several ways to restrain use through both physical design and administrative measures. The most popular physical restraint system is the pedestrian precinct, or vehicle-free zone. Vehicle-free zones are "all or none" restraint systems which effectively eliminate most traffic, and all congestion, in the controlled area. While the idea is an old one, its time has only recently come, particularly in Europe, where its popularity has grown greatly during the past several years. In Germany alone,



more than 30 cities—of which Munich is the largest—have introduced vehicle-free zones since 1967.

While vehicle-free zones are useful as local traffic restraints, they are usually limited to shopping areas and are too small in scale to have much effect on overall automobile use. Such zones seldom exceed 1,200 to 1,500 feet in length. Larger-scale efforts have been attempted with varying degrees of success. Florence has gone further than most cities in restricting automobile use in a 40-block area in the historic center of the city. But all things considered, because banning vehicular traffic is such a drastic action, the scale of application tends to remain too small to have large transportation benefits.

In specialized situations, auto use can be physically restrained without banning all vehicles in an area. For example, in Gothenburg, Sweden, planners noted that about half the traffic in their congested downtown was just passing through—a fairly usual pattern. The ordinary approach to this problem is to build a ring-road to divert through traffic around the CBD. Gothenburg already had such a ring-road but somehow it wasn't doing the job. In order to correct this situation, Gothenberg's planners designed a system of physical barriers which divided downtown into five sectors. Cars could no longer drive *through* the CBD, although they could drive *into* each of the sectors. When through traffic was physically banned in this way, downtown traffic congestion virtually disappeared.

The administrative approach to restraining traffic involves little, if any, physical construction. It simply involves charging motorists for their use of congestion-prone streets and highways —something that economists have been recommending for almost a quarter of a century. Simple as it is technically, politically this has been virtually impossible to do. But now, disillusionment with more and more highway capacity, environmental and energy problems, and economic pressures have caused local governments to take another look at the prospect of controlling traffic by applying highway-user charges.

While the objective of road pricing is to reduce congestion, it will, at the same time, generate vast amounts of money which can be used to pay for transit improvements or make up transit deficits. That helps change political attitudes. These attitudes should change even more when people can actually see how such a system works.

Only a small fraction of the private vehicles now on the streets —perhaps 10 percent—need to be priced off in order for the remaining vehicles to perform much better. The question is which 10 percent? Pricing answers that question by diverting the motorists who feel that their trip at the time isn't worth whatever is being charged. The majority of motorists will pay the price and enjoy a congestion-free situation. Bus and trolley riders in particular benefit because their vehicles no longer get caught in traffic and therefore operate much more speedily and reliably. Thus, managing traffic through pricing motorists is a key measure to improve as well as pay for public transportation.

The question is how to accomplish the necessary reduction in city street traffic in a cost-effective way. Parking charges are relatively simple to apply and traditional enough to be acceptable. Used alone, however, parking charges would reduce congestion only for a while. By discouraging people who work in the downtown from parking their cars in that congested area, parking charges will surely clear the streets. But clearing the streets of cars going *to* the downtown will attract some other people to drive *through* the downtown.

Singapore has adopted a simple and cost-effective way to reduce traffic volumes by much more than 10 percent. It wanted to cut traffic in half and its highway-user charges reflect that intent. Singapore charges private cars about $2 to $3 each for permission to enter the congestion-prone CBD during rush hours.

Because the Singapore scheme is designed to discourage the lone, peak hour commuter, it requires all private vehicles except those carrying four or more persons to purchase and display a license to drive into the downtown area. A license valid for six months can be purchased in advance for $360 (alternatively, a daily license can be purchased for $3) at various fringe area parking lots not far from the CBD.

Fringe parking lots are cheap and are serviced by buses to the downtown. The commuter is offered a choice between paying $3 for a ticket and a heavy downtown parking charge ($60 per month) versus a modest charge for fringe parking and bus. Motorists who insist upon commuting by car during the peak hours have to pay $5 to $6 per day. Only about half of them proved willing to do so.

Singapore's pricing system opened for business on Monday morning, June 2, 1975. Literally overnight, traffic congestion disappeared completely. During the peak hours when payment was required, there was a 46 percent decrease in traffic volume—just about what the plan intended. A 76.6 percent drop in private car use made room for a 23½ percent increase in other vehicles including buses, taxis and trucks which were not subject to the charge.

Public transportation service improved dramatically: Buses and taxis now move rapidly and reliably. A taxi trip that used to take 30 minutes can now be made in 10. Buses travel as fast as safety allows and are delayed only by bus stops and traffic lights.

Bus ridership increased by 20 percent, from 330,000 daily to 390,000 daily.

The only real surprise is that carpooling increased but little. Apparently, it is not easy to get three additional passengers willing to go at the same time. In fact, some Singapore commuters were loading up their cars with their children who were on summer vacation.

The Singapore system is likely to have a profound effect on urban transportation policy: It has demonstrated that while the pricing approach may be politically painful, it can definitely con-

trol congestion and increase mass transit ridership. At the same time, it has demonstrated a user-charge collection technique that is so simple that it can be easily adapted to almost any urban situation.

The Singapore system uses a license or "congestion pass" rather than requiring motorists to pay tolls at toll booths. This means that the collection system can be designed without space-consuming toll plazas. Cars can be visually checked for payment without requiring them to stop—thus eliminating an important cause of congestion. That capability meets a major objection of New York City's Mayor Beame to charging tolls for East River bridges.

The Singapore model could be adapted to New York City's bridges as follows: Regular commuters would buy six-month licenses entitling them to cross the bridges during rush hours. These licenses might be in the form of windshield stickers. Rather than being required to check in at fringe parking lots as in Singapore, occasional users would be able to buy a self-cancelling ticket at, say, gas stations along the route. Before arriving at the bridge, a motorist would rub his ticket thus turning it yellow and activating a chemical clock reaction which would suddenly turn the ticket blue after, say, one hour.

One of the problems tending to delay the application of user prices has been the overly-sophisticated pricing systems proposed by economists and technologists—for example, an electronic license plate system that can be read at the gateway to controlled facilities. Apart from the potential abuse inherent in such a system, it could not be used until virtually all motorists were equipped with the necessary electronic license plates. Now congestion-pricing systems can be installed piecemeal and with little investment. The real barriers, however, are still less conceptual, technological or financial than they are political.

Costs: Reinventing the Jitney

The single most important problem confronting transportation planners is no longer congestion but costs. Transit operating costs have increased faster than many public services. In 1973, the transit operating deficit totaled $680 million dollars; by 1980 the transit deficit is projected to reach $3 billion dollars per year. Part of the reason for this escalation in cost has of course been general inflation and is beyond the control of transit operators. But another part has resulted from the fact that most transit systems in this country are now publicly owned and managed. Whereas transit in the past was a monopoly of private enterprise, it is now a monopoly of public agencies—with all that implies for inefficient management.

The most fundamental way of addressing cost escalation problems in monopoly situations is to break the monopoly. This is an approach that is currently being considered in other segments of the transportation industry—railroads, airlines, shipping. However, little if any thought has been given to the prospects of breaking the transit monopoly. And yet doing so might open the way not only for reduced costs, but for better service.

The best way to break the transit monopoly and increase competition for riders is to reinvent the jitney. Jitneys compete with transit in a number of cities throughout the world. They are called chaerrots in Israel, dolmishes in Turkey and peseros in Mexico. In some countries they provide a major share of public transportation services. In Teheran, Iran, a city of 4.4 million people, jitneys carry half of the public transportation rides and account for at least 30 to 35 percent of the total number of trips.

Jitneys carry an important share of total traffic in Mexico City, which also has a rail transit system as well as an ubiquitous fleet

of buses. The result is a multiclass system with different kinds of transportation at different prices. Something for everybody, so to speak. At one end is a bus system which is extremely low in cost and usually very crowded. At the other is a door-to-door taxi system, and in between are jitneys which provide more frequent services, higher speeds and more comfort than buses at somewhat higher prices. Buses are subsidized but taxis and jitneys make it on their own.

Jitney services could make it on their own in this country too. Why then not use them to provide better service at no cost to the public treasury? Because of opposition from both taxi companies and conventional transit operators, public and private. The transit operators hold to the idea that jitneys will skim the cream off their business and therefore they oppose them to the death.

It is true that once upon a time jitney services did skim the cream off the transit monopolies. They were therefore prevented from developing because they represented an economic threat to privately-owned transit systems. But times have changed: Public transportation systems now produce deficits, not profits. Nevertheless, revenue skimming remains a major issue among the public operators—a "psychological block" which is not to be taken lightly.

In order to look like they're earning their public subsidies, transit operators feel compelled to carry as many passengers as possible—even if this means still more subsidy is needed. The psychology is illustrated by Washington's Metro fighting against a private company which proposed to carry Reston commuters for less money per busload than Metro could possibly charge. Even at high charges Metro would be losing money, but it still wants its "rightful" business. What would you think of a widget manufacturer who is losing 25¢ on each widget but insisted on selling more of them?

Jitney service will probably not skim revenues from established transit systems. In fact, just the opposite may be the case. It will probably skim transit losses. Jitney operators, by taking over some of the peak loads could make a positive contribution to the economic viability of transit systems by relieving them of their most costly slice of traffic. The situation is roughly analogous to that of an electric power company which plugs in relatively more costly diesel plants for a few hours a day to help meet peak load demands.

In order to maximize the benefits of competition, the jitney service should be run by a separate entity, not by a local transit company. If the vehicles themselves are owned and operated by individuals, costs will tend to be lower than if they are run by a large establishment with a high overhead. Also, jitney services should not be subsidized but priced at full cost in order to let passengers themselves decide whether the services are worth more to them than the cheaper alternative, conventional transit.

In order to keep their costs low enough to attract passengers, jitney operators must be able to do something else in the off-peak period. One way to do this is to let jitneys operate as taxis during the off-peak times. Another way is to reinvent the jitney just as it was in 1914 when it first appeared on the scene.

At first jitneys were nothing more than random rider paid carpools operated by commuters who picked up their passengers along the streetcar lines as they drove to work. The private transit monopolies, jealous of their highly lucrative franchises, persuaded the regulatory agencies to stamp the jitneys out of existence. Now motorists driving to work are prohibited from picking up passengers for pay.

In their reincarnation, jitney services might operate about the same way they did in 1914. Under the new service commuters would run conventional vehicles—perhaps vans—during the peak hours along the bus lines. Passengers could be picked up as they hailed the carpool vehicle or assemble at indicated sites such as bus stops. The carpool vehicle would have access to reserve bus lanes and enjoy all the other advantages of public transportation vehicles except subsidy.

But a few other improvements are needed. The old fashioned jitney service was too *ad hoc* to be called a system. Service was erratic to say the least. Jitneys seemed to disappear from the streets when it rained or snowed. To correct that and other problems the new jitney service might start very simply with specially licensed drivers operating vehicles marked with distinctive emblems indicating their destinations. (These might be attached temporarily during the peak hours.)

To guard against robbery, passengers could pay with vouchers purchased in advance from local government instead of cash. The use of vouchers also would be an accounting mechanism for determining the actual activity of a carpool driver. If he did not pick up an established minimum number of passengers per time period, then he would lose his jitney license. This would tend to improve the stability of operations and could help pinpoint weaknesses in service patterns.

Equity: Mobilizing the Taxis

Urban transportation policy over the past 15 years has been highly inequitable. Government money has favored highways over transit and transit commuters over transit dependents. The result is an automobile system that works very well for most people, a transit system that works fairly well for CBD commuters and a nonsystem for everybody else. The next round of investments should be directed—not to the highway system that serves automobiles, not to rail and fixed route bus systems which serve CBD commuters—but to those door-to-door systems that are necessary for everybody else to get around with some degree of mobility approximating the automobile.

The inequities in today's urban transportation system stem from the fact that the automobile is just too good to give up. So many people have committed themselves to it that too few people are left for public transportation systems to serve well at a cost its riders can pay. This, of course, has killed off most public transportation service at times other than the peak hours and to places other than the CBD. The practical effect of such restricted transit service has been to limit the mobility of people, who, for

whatever reasons, are excluded from the automobile system. These transit dependents can go only *where* transit goes—downtown. And they can go only *when* transit goes—only during the peak hours with frequency and regularity. At the same time, the automobile has spread out trip destinations in such a way that they can be reached only by automobile.

Because people who are excluded from the automobile system can't go where and when everybody else goes, they are not only denied the benefits of that system, they are actually injured by it. Who are these people?—the aged and the handicapped who can't or shouldn't drive, the poor who can't afford to drive and children too young to drive. Not including the poor, whose transportation problems might best be solved by income supplementation, transit dependents represent a fair number of people, perhaps a quarter of the nation's population over 10 years old. Until recently, theirs has been an invisible problem. The elderly and the handicapped haven't complained much, and the young accept immobility as their lot in life until they can qualify for a driver's license.

Because the automobile has spread out the city, and because many people who need transport cannot walk great distances, what's basically needed is some kind of public transportation system that can, if necessary, operate from door-to-door. This eliminates most systems by definition. You can't have a train or a bus stop at the doorstep of every physically handicapped old man to take him where he wants to go. So fixed-route systems, whether new fangled people-movers or old fashioned buses and subways, are irrelevant to the problem discussed here.

Again by definition, a system that really is a door-to-door system must use existing highways and local streets which, of course, is where the doors are. This narrows the range of solutions to rubber-tired vehicles which are compatible with the automobile system. We have such a rubber-tired system now—it is called

taxi service. Taxis have a lot going for them; they now carry 40 percent more passengers than all other transit companies in the United States, and they do so at no cost to the general public. Well, then, what's wrong with taxis? Basically two things:

1. Taxis are unreliable because they are usually not in a system that can be held accountable to specified performance standards. More of this later.

2. Taxis are too expensive for many of the people who need to use them. One way to solve this problem is simply to subsidize the fares for transit dependents. The Urban Mass Transportation Administration is about to fund a demonstration of this idea in Danville, Ill., to the tune of $314,000. Subsidies are easier to give if taxi fares are low—which means that costs must be low. So let's tackle the taxi cost problem first.

About the only thing you can do to reduce the cost of a door-to-door taxi system is to increase the load factor of the vehicle and spread the cost among the riders in the vehicle. And the only way you can do this is to group riders going to and from about the same places. That is what dial-a-ride tries to do. So far, dial-a-ride hasn't been too successful, however, in offering real-time, on-call group riding services at a reasonable cost. In general, the systems have had too few vehicles to give prompt service.

Ironically, the largest dial-a-ride system implemented to date failed because it was "too successful." The Santa Clara County system, tried to do so with too few buses, too few phones and too low a fare. At 25¢ per ride—10¢ for those over 65 or under 18—the system generated so much demand that 100 vehicles just couldn't handle it properly. Phones were swamped; people couldn't get through for hours. And once they did get through, they had to wait several more hours for the bus. In order to expand system capacity, Santa Clara County figured that it would have to subsidize the system at $4 per ride. Nobody, of course, wanted to do that. But neither did Santa Clara want to raise fares to cut demand to a manageable size.

Had Santa Clara County started "from the top," so to speak, it would have built its dial-a-ride system from an integrated taxi system. Group-riding taxi fares would have been lower than regular fares, but they would still have been relatively high, and demand would have been correspondingly low. The next step would have been to stimulate more demand by cutting group-riding fares gradually for tax-dependents—the elderly, the young and the handicapped. Santa Clara County would still have had to pay a subsidy to make up the difference between what these people could pay and what the service actually cost. But that would have been far less than individual taxi fares, because it would have been based on shared cost through group riding. Certainly, it would have cost less than $4 per passenger.

Dial-a-ride should start as a "GRITS" (Group Riding Integrated Taxi Service), rather than from a bus system. There are two reasons for this:

1. Door-to-door services resemble taxi services more than they resemble conventional bus services. It is far easier for a taxi system to evolve into a group-riding system than it is for a conventional fixed-route system to evolve into a door-to-door system.

2. Taxi systems can be made up of independent owner operators. That tends towards low overhead and good management—and thus probably low cost.

Another cost-related reason to start with taxis is that taxi drivers are generally paid much less than bus drivers. That probably won't last forever and is therefore a short term consideration. Nevertheless, it could be an important factor in getting the system started at a cost low enough to be attractive.

For example, in Davenport, Iowa, the most successful dial-a-ride system to date is based on the taxicab and has been operating at the lowest vehicle cost per hour (between $3.60 and $4.90). In marked contrast, dial-a-ride elsewhere has been costing as much as $15 per hour. Some back-of-the-envelope calculations show that if Davenport carries as few as five passengers per hour the average fare to break even would have to be only $1. Otherwise the break-even fare would have to average as high as $3. Both of these fares can be reduced by subsidy of course. But it is one thing to cut a $1 fare down to 50¢ and quite another to cut a $4 fare to the same level. The voters might accept the former but not the latter.

Right now, dial-a-ride cannot evolve from taxis because taxi business in most cities is highly fragmented. It is necessary for taxis to be integrated into a system so that a central dispatcher can be sure that each member of the system is doing what he is supposed to do. At present when it rains or snows taxi drivers do what *they* want to do; they disappear from the streets. It is virtually impossible to be sure that calling a cab will result in a cab showing up. Complaints about taxis refusing to service low-income areas are widespread and virtually impossible to do anything about in the current fragmented situation. The problem is to integrate taxis into a system and at the same time permit them to be owned and operated by individuals. In that way the public can get the best of both worlds. Integrating taxis into a system however, is not easy; the last time taxis acted in concert to achieve a specific goal was at the Battle of the Marne in 1914.

The taxi industry is already integrated to some degree in some cities. In Los Angeles, the Yellow Cab Company is the sole operator for the whole city. In Boston, the Independent Taxi Operators Association (ITOA) has behaved something like a single operator for many years. It paints its cabs the same colors and utilizes central radio dispatching, while having its ownership spread among many small entrepreneurs and independent operators. Thus, to a large degree the many independent Boston cabs behave as if they were in a single firm but with the productivity characteristics of a small entreprenuer, which is an advantage. But Boston's taxi industry is not a transportation system which can be held accountable to performance standards. To do so would require either a top-heavy administrative structure or some new technology.

The needed technology is now in sight in the form of the automatic vehicle monitoring (AVM) system, which will shortly be demonstrated in Los Angeles.

The AVM computers will be capable of keeping track of the location of a fleet of vehicles within several hundred feet of where each vehicle is—and do it automatically.

The fleet need not be in single ownership. An unlimited num-

ber of companies and individual operators could become "members" of an AVM system, getting their calls from a central AVM dispatcher told by the computers which taxis were closest to which customers. This would facilitate grouping of riders and, since AVM could automatically account for the disposition of and response to each call, allow the local regulatory agency to be sure that all elements of the system were performing according to its norms.

Energy: Making a Million Electric Cars

The mythology of mass transit alleges that it can help solve the energy problem by substituting directly for automobiles. The allegation is not entirely unfounded: Some motorists can be attracted to mass transit to save some energy. The trouble is that, given the magnitude of the energy problem, transit simply can't attract enough riders to make a serious dent in automobile and energy use. Unless automobile use is directly restrained, because of a worsened energy crisis or for other public policy reasons, most people will continue to use cars for almost all their travel—except possibly for work trips to the CBD at rush hour.

In any event, there isn't all that much energy to be saved by substituting transit trips for automobile trips—and saving that energy would cost a lot. Government studies show that doubling ridership of mass transit would save 18 million barrels of oil per year. Doubling the size of mass transit operations to accommodate this new ridership would cost $61 billion. That's a capital expenditure of $3,400 for each barrel of oil saved per year. The trouble is that simply doubling the size of transit systems will not necessarily double ridership—which means that the policy would be ineffective.

The most powerful way to save urban transportation energy is to improve the energy efficiency of the internal combustion engine and scale down and otherwise redesign automobiles. The Federal Energy Administration estimates that a 40 percent increase in new-car fuel economy would save 233 million barrels of oil per year.

Beyond developing cars and engines that guzzle less gas, savings in urban transportation energy might be attained through encouragement of the development and use of vehicles that would operate on electric power rather than on liquid hydrocarbon fuels. Such a policy would make us less vulnerable to manipulation by the oil cartel—at least to the extent that the policy resulted in gasoline savings. How much gasoline might be saved if electric vehicles were substituted for conventional vehicles?

A study funded by the Environmental Protection Agency estimated that 17 percent of the cars in the Los Angeles region—a million of them—could be electrically powered without requiring their owners to change their patterns much. Assuming that the average conventional vehicle replaced would have traveled 30 miles per day at 15 miles per gallon, approximately 18 million barrels of gasoline per year would be saved—about the same as the hoped-for transit saving. One million electric vehicles would cost about $3.1 billion, which translates into $160 per barrel saved per year. Thus, developing one million electric vehicles is a more cost-effective policy than encouraging a shift from automobiles to transit. What's more, it probably can be achieved through government financial incentives rather than direct public outlays.

Getting motorists to substitute electric for gasoline vehicles won't be easy, given the present state of electric vehicle technology. An electric vehicle can be designed and manufactured to serve adequately the patterns of metropolitan driving—most of which are made up of short trips with one other passenger. But such a vehicle will cost at least as much to run per mile as a conventional vehicle—and will give much poorer performance.

After reading a recent article in *Consumer Reports,* few people will want to own either the Citicar or the Elcar, whose performance and safety standards proved far too low for urban use. The shortcomings of both cars stem partially from the fact that they are not mass produced; in order to keep the purchase price down and the range up, they were designed with performance that was too poor and bodies that were too light. In order to produce a higher-quality, higher-performance car at reasonable cost, manufacturers would have to produce electric cars in runs of a million. And that means that a mass market must be developed for them.

The mass market for electric vehicles will be limited for some time by the relatively primitive technology of electric vehicles. Even so, the technology is adequate to the requirements. For example, present technology (i.e., lead acid batteries) would permit the design of a two-person subcompact with performance characteristics that almost matched those of a 1954 Beetle. That is, the electric vehicle could accelerate at three miles per hour per second up to 30 miles per hour, its top speed. Its urban driv-

ing range would be about 35 miles—although in very hilly terrain, cold weather or near the end of battery life that range would be considerably less. Such a vehicle might look like a Honda Civic, weigh about the same and cost approximately $3,000, less batteries.

The batteries are estimated to cost an additional $440. But that's not the whole story. Alas, the user must shell out that sum to replace his batteries every 20,000 miles or so. That drives up the life cycle cost per mile to somewhere near 11½¢ per mile. (Including maintenance but not including taxes, insurance or parking.) Much of the per mile cost (3.5¢) is in the battery replacement.

A conventional subcompact seating four people with higher performance and unlimited range, costs about 10.2¢ per mile—a difference of 1.3¢ per mile. Electric cars might close both the cost and performance gap after 1985 or so when either the zinc chlorine or lithium sulfur battery becomes available. Given the long lead time necessary, we should immediately encourage the mass manufacture and use of electric vehicles at their current state of technology, designing them so that they can accept better batteries later on. The very existence of a large number of electric vehicles will create a strong market pull for improved battery technology and higher performance vehicles. And that will expedite the substitution of electric vehicles for conventional automobiles faster than government sponsored research and development programs.

By as early as 1978, a state-of-the-art electric vehicle could be developed to handle most urban driving needs except those involving freeways. Granted this is a severe limitation, but it is not a crippling one. The average conventional car now runs up about 30 miles per day, mostly on short business and family business trips no longer than 10 miles or so. Most trips are entirely on urban streets with speed limits of about 25-30 miles per hour. And most urban trips involved 1.6 passengers per car. These trip patterns can be met by a two-seater electric vehicle with a 35 mile range and maximum speed of 30 miles per hour. Such a vehicle, however, could not handle social and recreational trips which cover greater distances at higher speeds with more passengers. Thus, the electric vehicle must be used as part of a two-car strategy, one for business and one for pleasure.

The potential inherent in the two car market is great enough: Over 30 percent of the households in the country own more than one car. The question is: How can a million or more people who own two cars be motivated to substitute for one of them and electric vehicle with higher per mile costs and lower performance and range characteristics? The answer may lie in how the electric vehicle purchase is financed. For better or worse, people buy cars not on a life-cycle cost basis but on a monthly payment basis.

A number of electric vehicles advantages can be wrapped into a monthly payment plan. For example, electric vehicles have a life of about 20 years, as compared with conventional vehicles which last 10 years. So electric vehicles can be financed for six years rather than three.

Since there are external benefits to be gained through the wide use of electric vehicles, they might be financed at 8 percent (the current government borrowing rate) instead of 10 percent (the current market rate). And since electric vehicles will probably travel no more than 6,000 miles per year, their insurance rates can be proportionally lowered.

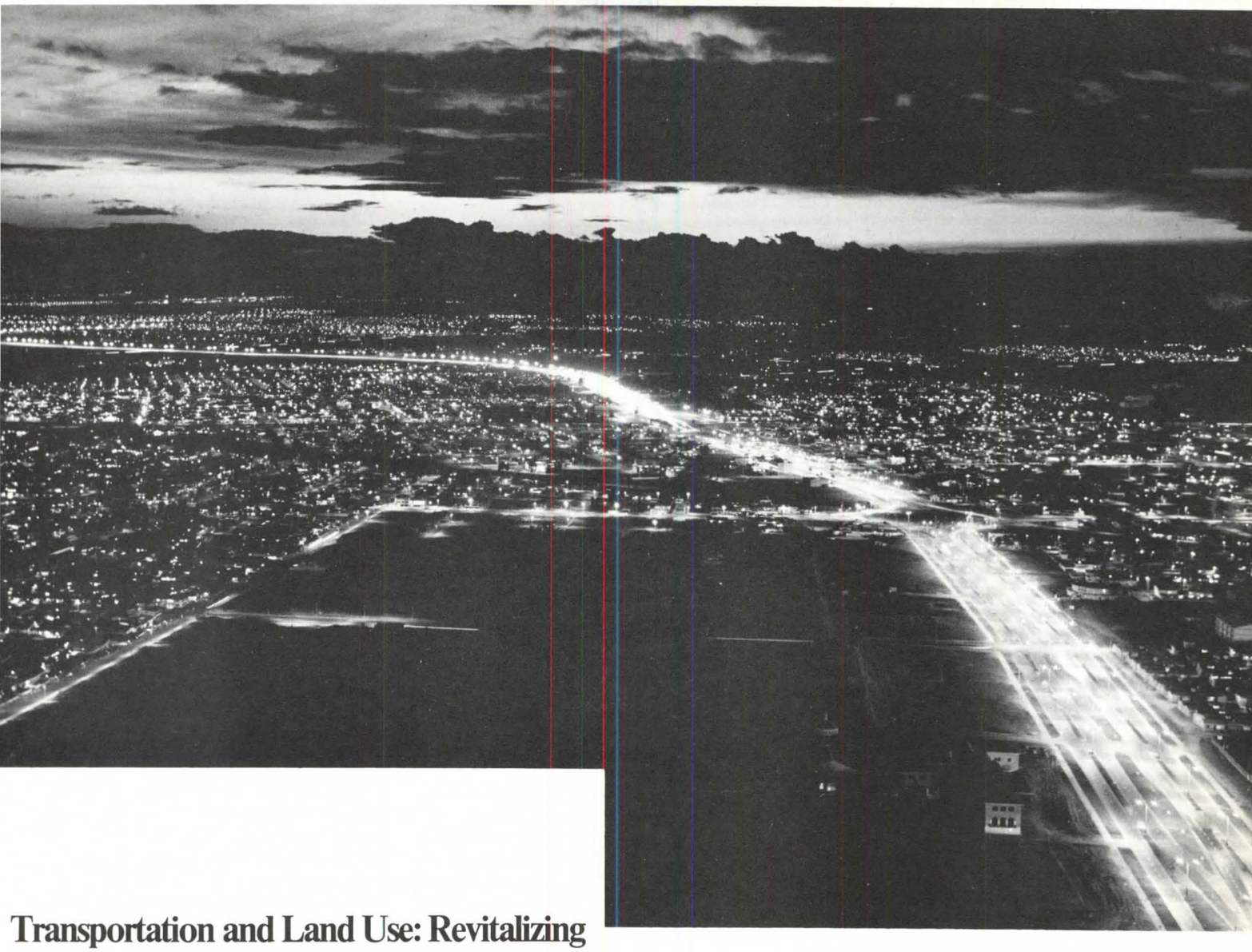
Battery technology is likely to improve dramatically after 1985, so an electric vehicles program can start by renting the lead acid batteries and including the rental charge in a flat monthly payment which need not change even when the new batteries become available. Better still: Since a substitution of electric power for gasoline by some people would assure the supply of gasoline for other people, a cross-subsidy is in order. Specifically, a percentage of the federal gas tax could logically be directed to cover the high cost of using the interim lead acid batteries. For a million electric vehicles, the total battery cost would be $440 million. That represents one-tenth of the amount of fuel tax contributed to the Highway Trust Fund in 1974.

Putting it all together makes a package which looks good compared with the monthly payments to finance a conventional $3,000 automobile. Payments on such a car, assuming a $400 down payment and 10 percent interest for three years, are about $95 per month, including insurance. If the electric vehicle were financed for six years with smaller insurance payments and slightly less interest, the payments might be as low as $69 per month. The difference of $26 per month may be attractive enough to induce some people to buy electric vehicles.

A much more attractive package can be put together if the lead-acid battery can be loaned without charge to the electric vehicle purchaser through the cross-subsidy scheme suggested above. In that case, the total monthly payments might be about $56. Will either low payment plan induce people to buy an electric vehicle slightly ahead of its "technological time?" Nobody can answer that question for sure. Recall, however, what happened to the housing market when 10- to 15-year mortgages were stretched to 20 and 30 years.

Given the uncertainty of future demand, tooling up for a million cars is risky. Even the prospect of an attractive financing package is unlikely to induce manufacturers to take such a risk unless other means can be devised to encourage them. Loan guarantees and subsidies from the general fund come to mind, of course. But the Administration is cool to these. Besides they may not be needed. What is needed is a fail-safe strategy that will cost the government nothing but will generate a strong market pull.

Such a pull can be generated by opening up a brand new market for electric cars only. If it should turn out that low performance electric vehicles don't sell in sufficient numbers, we could license 15-year-olds to drive them on streets and highways other than freeways where high performance is needed. That will tap an exclusive market of 3.5 million individuals. Presumably, safety is the only reason to exclude 15-year-olds from driving. It should be pointed out that 15-year-olds now operate such hazardous contrivances as motorboats and tractors. In any event, if it should turn out that 15-year-olds driving low performance electric vehicles are too frequently involved in accidents, the program needn't be extended beyond one year.



Transportation and Land Use: Revitalizing The City and Reorganizing the Region

Fixed rail transit systems are expensive, inflexible, do not in themselves reduce automobile use or traffic congestion (and therefore do not ease either the energy crisis or air pollution). Those cities that have had rail systems for some time, moreover, are finding it hard to keep them running.

Yet in the past several years new rail systems have been proposed or planned in cities across the country in unprecedented numbers (*see* 25). Why?

One reason may be that the idea that autos are bad has been coupled for so long with the idea that rail transit is good in the minds and preachments of planners and environmentalists that they have become an inseparable duality.

Another more tangible reason for the rail transit boomlet is that planners and the local governments they serve are looking to rail transit systems to achieve purposes beyond transportation per se. Specifically, they are turning to rail transit to (1) strengthen the central city and especially the CBD in the face of the proliferating attractions of suburbia, (2) give the poor of the city access to the expanding job opportunities in suburbia, and, most ambitiously, (3) facilitate the virtual reorganization of metropolitan areas and the halting of the hated phenomenon of sprawl.

Despite the rhetoric of urban decline, the first of these objectives might be the one offering the most immediate promise. For there are new demographic forces at work, and a new economics of housing in prospect, that raise new hopes for the vitalization of the central cities.

The demographics have to do with the growing number, and changing nature, of new households in formation. The progeny of the postwar "baby boom" is of an age to be going out on its own. But this no longer automatically means marriage and child-rearing, with the husband going out to work and the wife tending the offspring.

More of these new households than ever before are singles, swinging or otherwise, and those that are couples, married or not, are not as likely as before to have children. Add to these young, small households the numbers of the elderly (also growing as life expectancy increases) and you have a sizable market for the kind of housing—and close-at-hand services—that the city best provides.

At the same time, the housing industry is taking a new look at the city—partly because it perceives this market, and partly because it is no longer finding the pickings so rich and easy in the suburbs. The slow-growth movement is spreading in surburbia, and where localities are not barring or limiting new housing developments outright they are asking the developers to bear more of the cost of infrastructure and services. This is changing the economics of housing in favor of *rehabilitation* of the existing in-city stock.

To capitalize on these trends, and to resume growth without choking, the cities will need dense networks of public transpor-

tation lines. Even here fixed rail transit has its limitations. While it can move people rapidly around the city, a system extending into the suburbs allows people to live further and further from their jobs downtown, thus possibly siphoning off some of the prospective new city-dwellers.

Alternatives include bus lines if traffic is sufficiently controlled to allow the buses to operate in congestion-free streams; intracity light rail (streetcar) systems on semi-private rights-of-way; and door-to-door systems such as the earlier described GRITS. A combination of these might better serve the needs of the cities themselves in most cases than would a full-scale regional fixed rail system.

What of the utility of such a regional system in terms of the second objective, increasing job opportunities for the urban poor? At present it is limited because employment centers, like everything else, are so scattered in the suburbs that only a relative few could be touched by a linear system.

Which brings us to the third objective, the reorganization of metropolitan regions to counter scatterization and sprawl. The planners' favorite antidote to sprawl is the organization of growth into regional subcenters, with greater density and a wider range of facilities and activities than found in spreading suburbia. Rail transit, they argue, is necessary to encourage and serve denser development, and to link the new subcenters to each other and to the core city.

Implicit in this argument is the idea that rail systems in themselves, or in concert with land use plans, can determine land use patterns and the nature and direction of development. There is remarkably little hard evidence to support this idea.

Granted, in the days before the ubiquitous automobile, rail systems did help shape the cities that built them. The classic case is, of course, New York, where the subways are credited with creating a dense land use pattern. It is often forgotten that a dense pattern was there to begin with. Indeed, the intended purpose of the New York City subway system was to decrease that density and decant the population of Manhattan, which in 1910 was 2.7 million. It did just that. Today, Manhattan's population is 1.4 million.

In the post-auto era, however, the effects have been much more ambiguous. For example, the Yonge Street subway line in Toronto is often cited to show how rail transit can affect urban development. Other factors are overlooked, however. The Yonge Street development is due in part to the lifting of a 20-year restriction on development north of the nearby city limits. Even this must be seen in perspective; most of Toronto's recent development has occurred well beyond easy access to the subway. And virtually no changes have taken place in the older working class neighborhoods along the subway lines.

Similarly, land use changes in response to the imminent completion of Washington, D.C.'s metro system have been ambiguous. Anticipation of the subway certainly stimulated development along 18th Street and Connecticut Avenue, especially around Dupont Circle and Van Ness Center. It has, if anything, over-stimulated development in the Friendship Heights area where private investors wanted more building than the community would permit. Beyond that, the lack of response to Metro construction is so notable in other parts of the CBD and at the suburban stations that the *Washington Star* ran a series of articles commenting on it.

San Francisco's BART also has stimulated a good deal of private investment in the CBD's of San Francisco and Oakland—but not much anyplace else. A recent study found that new office buildings constructed in downtown San Francisco since 1962 exceed $850 million in value. And they're still going up. That seems like a lot of money until it is compared with BART's $1.6 billion cost to date.

These observations are buttressed by a recent study of metropolitan planning by David E. Boyce, Norman D. Day and Chris McDonald of the University of Pennsylvania. The study indicated that changing transportation policies *alone* did not produce any significant differences in land use patterns. The authors suggested that one reason might be that metropolitan areas are so interlaced with highways that all parts of them are highly accessible. This fact indicates that there are so many opportunities for sprawl that simply introducing a rail system will not induce a more concentrated form of development.

What implications does this have for national transportation policy? At present, the federal government stands ready to help localities fund the most cost-effective transportation system necessary to serve the needs of their populations.

Since localities without rail systems have densities low enough to be served by buses; since bus systems cost a tenth of rail; and since we have observed that rail systems do not in themselves have the power to change land use patterns—does the test of cost-effectiveness suggest that federal aid to rail transit should be abandoned?

Only if narrowly applied, for there is more to urban life than transportation cost-effectiveness. According to U.S. Transportation Secretary Coleman's latest policy announcement, the federal government should help localities develop systems which meet local needs. And local needs go beyond getting people from here to there.

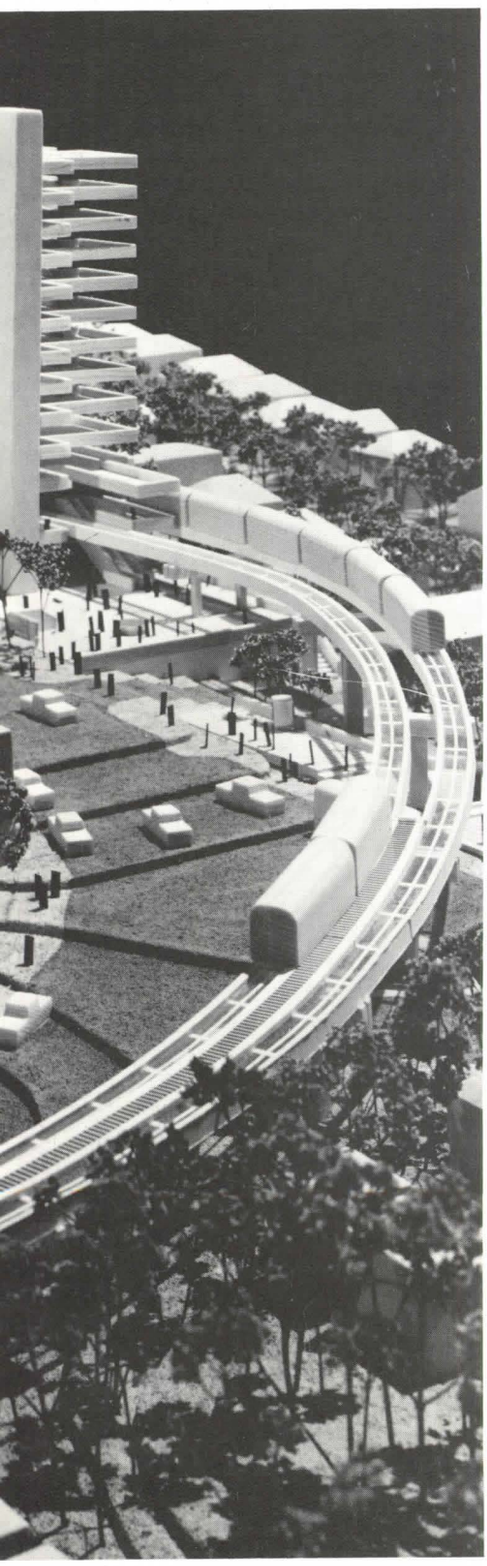
Localities which decide that they no longer want to pay the costs of sprawl may well need a rail system to help create alternative patterns of growth and development—the operative word being "help."

Given their high cost and permanence, the federal government is right to take a hard look at requests for aid in building rail systems. Specifically, it should require that localities applying for such aid demonstrate (1) that rail systems are essential to achieving their land use objectives, and (2) that they are prepared to take other steps to achieve these objectives.

These steps must go beyond the mere drafting of a land use plan. There needs to be a positive development *program* of which transportation is only a part. And the program needs to have sufficient tools and teeth to make the land use objectives attainable.

Given the billions of federal dollars involved, seeking such assurance hardly seems unreasonable. After all, who would fund the building of an elevator without firm assurance that the floors it is to serve will, in fact, be occupied? □

After a Half Century Hiatus, A Spate of New Transit Systems



In the early 1960s, work began on the Bay Area Rapid Transit system, and it held the attenion of planners across the country. It was the first major regional transit system to be built in 50 years and promised the salvation of the San Francisco area from the auto. BART also chose space-age technology, which was to computerize and automate the system and make it speedier and more efficient than its predecessors could have hoped to have been.

Today, BART has been in operation for three years with mixed success and a checklist of failures. It runs, and, on the whole, the people who ride it—125,000 a day—like it. But BART didn't solve the problem of traffic congestion in the Bay Area; its technology turned out to be less-than-perfect, and the system doesn't pay for itself. BART is, indeed, suffering huge annual losses.

However, by the time all this was known, there was nary a sizable city that hadn't at least thought about some form of rapid transit. In fact, the federal Urban Mass Transportation Administration (UMTA) reported recently that it had more than $4 billion in requests for rapid transit funds. Rapid transit systems range from heavy fixed rail systems like BART to lighter slower rail systems to rubber-tired systems which run on a concrete guideway to grade-separated roadways for buses only. By definition, rapid transit is a system, usually a fixed system, which operates on its own grade-separated right-of-way.

Some cities want rapid transit because they have experienced phenomenal growth. Some cities want it because their population has declined. Some cities want it because rapid transit encourages economic development. Some cities want it because they have too many cars downtown.

A limited and somewhat chronological list of the larger systems looks like this: BART is open and running. Metro, in Washington D.C., is scheduled to open the first six-mile segment of its planned 98 miles in February, but is beset with financial and political problems, not the least of which is an unmitigated inflation rate that has pushed the cost already from $2 to $4 billion and still climbing. MARTA, in Atlanta, has begun construction of its first line, but is also suffering from inflation and a handful of legal problems over contracts. Ground was broken for a rail system in Baltimore, but, as a fallout of the Metro and MARTA experiences, the Maryland Mass Transit Administration (MTA) is in the process of paring down and cutting costs for an already diminished 8.5 mile rapid transit line. In Pittsburgh, work on a smaller-sized, rubber-tired guideway system was begun and then stopped by local political pressure, and PATransit there is awaiting recommendations from an independent consultant. In Miami, an extensive planning job for a rail system has been completed, and Dade County is expecting a verdict from UMTA on final design funds to come soon. Denver has completed a lengthy, two-year alternatives analysis, and has settled on a medium-sized, rubber-tired system, similar to the one stopped in Pittsburgh. Buffalo is planning, as are Dayton, Detroit, Honolulu, Los Angeles, Rochester and San Juan.

It is the best and worst of times for rapid transit. The public ethic, spurred on by gasoline shortages and increasing prices and a new awareness of ravages of auto-exhaust pollution, is favorable toward mass transit for the first time since before World War II. But construction costs have skyrocketed at an unprecedented rate, and transit systems have a deficit everywhere (with the sole known exception of the Lindenwold line running from Philadelphia to New Jersey). And although the federal rapid transit coffers are fatter than ever before (at $1 billion a year, from a $7.8 billion six-year appropriation), the money barely begins to fill the demand. In fact, of that $7.8 billion, according to UMTA, all but $2 billion is committed to systems under construction.

Last year, Congress passed a bill enabling states to transfer Highway Trust Fund money to transit, but, since that is a local decision—and a difficult one for most areas—it has had limited impact on transit construction so far.

The upshot of all this is that UMTA is scrutinizing each application much harder than ever before. And new UMTA administrator Robert Patricelli has said he will analyze very carefully each proposed sys-

As some cities plan big new rail systems, others look to such old standbys as buses and trolleys.

tem for its impact on energy conservation, land use and environmental protection. And, he has said a community which has not done a thorough planning job, examining all the alternatives, will be less effective in competing for those federal dollars.

As a result, the planning of rapid transit systems is becoming a much better defined art. The job done in Miami for its proposed almost-all-aerial system is an example of the exhaustive planning to which rapid transit systems are now being subjected.

Done by Kaiser Engineers and six consultants to Dade County, the task included 434 public meetings attended by 15,000 citizens over 14 months. The Miami planning process had eight steps, or "milestones," which ranged from an initial definition of the county's transit needs to the selection of vehicle technology to specific route selection to land use, relocation and design.

"What we did here is unique," said Roy Minchu of Connell/Metcalf & Eddy, who worked for Kaiser as the architect for the system. "We looked at criteria from all over the country and put it together in a form which was presentable to the public."

In selecting routes for the transit system, Kaiser first looked at land uses, traffic patterns and population. Kaiser suggested corridors for a system; the citizens suggested others, and Dade officials suggested still others. From there, said Eugene Stann, Kaiser's project manager, "consensus corridors" were chosen.

The choice of these corridors was a serious one for Miami, because it meant determining in part what shape the city would take by 1985, identifying major activity centers and planning new smaller centers in conjunction with the transit system. Although the task was factual (numbers of trips downtown, overloading of highways), it was also conceptual. And the conceptual nature of this spilled over into the station planning and design work.

That job was done by Connell/Metcalf & Eddy of Coral Gables, Fla. The firm first developed broader concepts—public orientation, community influence, atmosphere, appearance and circulation. From these concepts, Connell/Metcalf & Eddy developed criteria for 553 specific elements for the stations and station environments ranging from pedestrian access to graphics, and these were then subjected to citizen scrutiny. "Whenever anything was vague or not too well designed we were challenged," said project manager Ray Nelson. "I think we benefited. It's good for an architect to be challenged, good to be asked 'why did you do this?' "

The work resulted in a recommendation for open, airy stations, related one to another in design but with room for variety. At the outset, said Nelson, people resisted a concrete structure because of the tremendous amount of "speculative architecture" which has gone on in south Florida but became convinced that concrete could be attractive. Likewise, people wanted a "sort of Spanishy or Mediterranean" architecture for the stations (much of the more elegant old construction in Florida is of Spanish/Mediterranean influence), but the scale (600-foot platforms) made that impossible.

The best result of the preliminary planning of the Miami system was that people have begun to get a grasp on where Dade County is going. "Florida is not transit-oriented," said Nelson. In fact, for many native Floridians the only transit experience has been the monorail at Disney World. "Miami is dispersed, has grown rapidly and haphazardly with no master plan. And the transit program has been a great planning tool."

Miami's planning job—one of the most thoroughgoing to date—was predicated on transit experiences, good and bad, throughout the country. In Baltimore, community planning has been carried out on a more localized basis, in the neighborhoods through which the transit system would run. Because of funding limitations by UMTA, the original 28-mile almost-regional Baltimore system, has been pared down to an 8.5-mile first phase of subway and grade transit.

The system will run on railroad rights of way, for the most part, which made it necessary to take only 30 houses and a few small businesses. However, the system runs through a variety of residential neighborhoods as well as downtown. To help relate the stations to the particular communities they serve, nine different local architects were hired to design them. "The principle we're working on is different from Washington (*see* p. 38)," said Constantine A. Courpus, staff architect of the MTA. "Our stations will not be monumental, but solid and recognizable. We decided that the station should reflect the character of the neighborhood." The MTA and its chief consultant—Daniel, Mann, Johnson & Mendenhall—established basic criteria for the stations, including, said Courpus, "as many open spaces as possible, well lit for safety without nooks and crannies and with durable finishes aimed at a 100-year life." Seven of the stations will be underground, and three above ground. After the basic criteria were established, the designers took over and began their task with community meetings. In one case, that of the Laurens Street Station, the firm chosen for the design work, Nelson & Salabes, has also been the architects for the urban renewal project above ground. Similarly, on a grander scale, RTKL Associates—principal designers for Charles Center, the city's 30-plus acre downtown renewal project—are designing the Charles Center subway station.

The attitude toward the development-promoting potential of transit is less strong in Baltimore than in Atlanta where the planners of MARTA see a chance to encourage development and shape growth. Outside of Atlanta, MARTA is criticized for having done a less thorough job of preliminary planning with citizens (although planning before-the-fact with citizens is a quite recent phenomenon in transit brought about by highways which ended up going nowhere and transit systems which were stopped because the political and community homework hadn't been done). But MARTA—a 60-mile, two-county system— will run mostly on a preordained route, railroad rights of way, and the subsequent planning and involvement of the citizenry more than compensates for earlier oversights.

The city has assigned a planner to each of the 27 station areas within the Atlanta municipal limits, and the seven-county Atlanta Regional Commission, working with MARTA and the city, has

produced detailed station area plans for each of the 41 stations. Some of these plans deal with already-developed areas, but others look at opportunities to develop housing, commercial facilities and offices, thereby focusing new population centers around the stations. Like Baltimore and like BART (*see* p. 44) Atlanta is using a wide variety of architects for its stations.

MARTA planners look at the transit system not only as a development tool but as a means of starting to pull back to the center the region's sprawling population. Atlanta has grown phenomenally in the past 20 years, and planners see the system as a shaper of future urban land use.

Each of these cities can justify building a large fixed rail system on grounds of ridership, densities, traffic congestion and expected economic benefits. The doubters will say (and will probably be proven right) that none of these systems will pay for itself, at least in early years of operation and will not make a noticeable dent in traffic congestion. The believers will say (and will also probably be right) that each of these systems will speed riders to their destination, providing better and faster transit than ever before, and will create jobs and promote development.

But the costs are high, from $30 million to $80 million a mile. And the high costs of rail rapid transit systems have encouraged other later-comers to the transit planning scene to look hard at alternatives.

One of these is light rail, which used to be known as trolleys. Until the late 1950s, most older cities had trolleys (or streetcars or interurbans). And by the late 1960s, most of the trolleys were gone, fallen prey to the automobile. Trolley lines are extant in Boston, Philadelphia, Pittsburgh, Chicago, New Orleans, San Francisco and Seattle. In part reaction to the high costs of heavy rail and in part nostalgia, many people like the notion of light rail these days.

Dayton, Ohio, is the first city to apply to UMTA for money to build a new trolley system. The first phase, which would cost an estimated $48.2 million, would run 12.2 miles connecting the city's downtown with southerly suburbs. Unlike earlier trolley systems which ran on city streets and stopped at intersections, this would more resemble a rapid transit system with 15 simple stations along a former railroad line. The attraction here is cost—$3.3 million per mile—and the use of "off-the-shelf" technology. What makes larger, denser cities shy away from such a highly economical prospect is that light rail is slower, can run less frequently, stops at cross streets and carries fewer people. But the Dayton system's planners (the county is 610,000 people and the transit program is intending to serve 350,000 of them) see their plan as a model for smaller-to-medium-sized cities.

Los Angeles is a much different situation. With 680 miles of freeway and the highest percentage of automobile ownership in the country, Los Angeles was for years considered a lost cause. But by the early 1970s, things began to change. The first plan, for a massive regional rail transit system, was thrown way off schedule by the defeat of a sales tax referendum in November 1974, and transit planners are now trying to achieve a consensus for a single starter line. In the meantime, however, the Southern California Rapid Transit District has made arrangements to run a commuter train on Amtrak tracks from San Diego into Los Angeles, and has begun developing a system of grade-separated busways. The first of these, the 11-mile El Monte-Los Angeles busway, is now carrying almost 12,000 people daily.

Theodore Hardy, chief designer for the now hung-up Pittsburgh Skybus system, has come to believe that after the current

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Architecture in Transit

Washington's Metro

Underground, soaring vaulted spaces and unadorned surfaces.

From the street, the entryway to the Judiciary Square Metro Station will be, at best, inconspicuous. A single bronze pylon bearing the letter M will guard the escalators which will take passengers down to what the station's designers call a city street underground.

It doesn't really feel like a city street, though. The new (to be unveiled to the public next year) Washington, D.C., Metro subway stations are cavernous and too sleek, too smooth and too uncluttered to be a city street. To a lone visitor right now the prospect is awe-inspiring: a sweeping, vaulted space with a long vista down through the train tunnel.

And yet, at the same time, it all seems manageable. There is direction, and everything you need will be right there—the fare machines along the wall, the information booth and fare gates straight ahead and, beyond them, the escalators to the train platform.

The rush of commuters heading for trains will, for sure, diffuse some of the feeling of vastness, but some of it will remain. The shape of the station is almost classical, and the volume is lofty.

Judiciary Square is one of 86 stations (53 of them underground) planned for the $4-plus billion, 98-mile Washington Metro. And, oddly enough, the most distinguishing factor of the two families of stations is that all in each family look alike. No two stations are identical, but the shape, concept and architectural vernacular are repeated throughout.

There are two basic reasons for this: the hiring of Harry Weese & Associates as the sole designing architect for all of the stations and the subsequent thinking of that firm.

"If you have 86 stations, you don't hire 86 architects, especially if you're designing a transit system as a system," said Cody Pfanstiehl, Metro's community services director. The apocryphal story about the Washington Metropolitan Transit Authority's decision to hire the Weese firm goes this way: Other contenders for the contract came in armed with charts, plans and documents; Harry Weese came in, put his feet up on the table and asked "what kind of people live here?"

Not exactly true, said Stanley Allan, AIA, who heads the Weese firm's Washington office, "but we talked a lot about people—how they were going to feel and how they were going to use the stations." "From the start," said Pfanstiehl, "they talked the most about the human warp and woof and fabric."

From the system's standpoint, however, the unusual part about the hiring of Harry Weese & Associates was that for the first time in a modern American transit system the architects were given parallel authority with the consulting engineers, in Metro's case, DeLeuw Cather & Associates. "This made a fundamental difference,"said Allan. The popular rule of thumb, in fact, is that a subway system is 90 percent engineering and 10 percent architecture. Which means the consulting engineer is hired first and the architects are hired after the preliminary engineering is well under way.

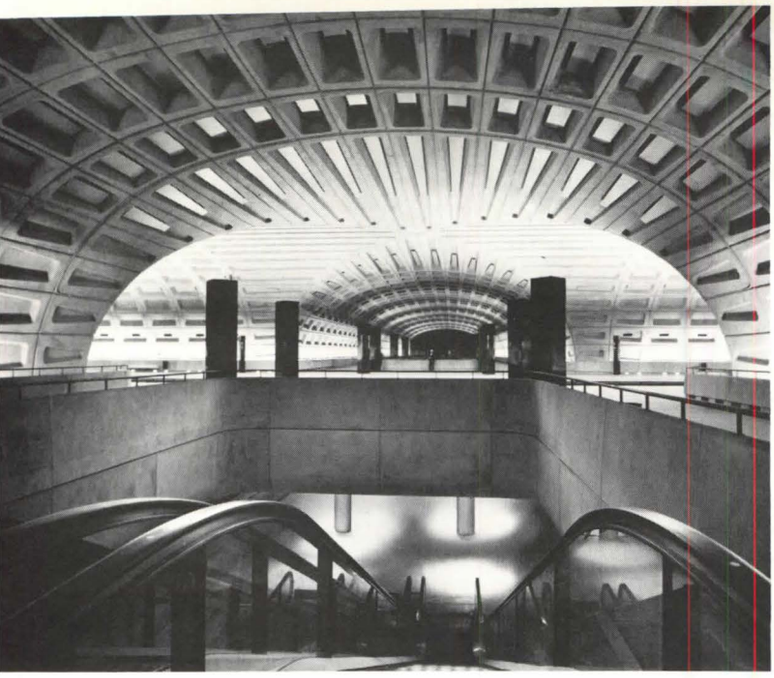
As Metro evolved, says Weese, "We looked at BART and others and decided we didn't want to go that way—sort of a world's fair of station designs."

In deciding which way to go, Weese firm members traveled to Europe to look at subway systems and learn. "Most important," said Allan, "we learned that the best spaces were column-free." From there, the concept for the vaulted underground stations began to emerge.

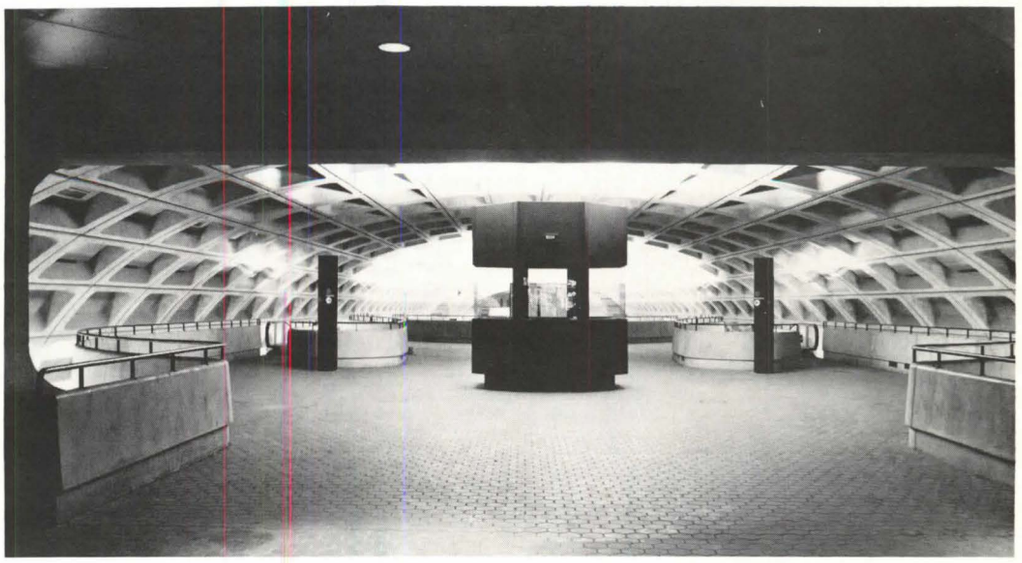
The vault, for all of its obvious drama, was an early source of controversy. WMATA called in an independent engineer to contrast the column-free vault with a conventionally-framed box, and the engineers concluded that with the amount of overburden, the vault would cost less. "The vault was more economical, dignified and monumental," said Allan. "We wanted it because we thought the Metro system shouldn't end up being something cute."

"The underground coffer became a great economic marriage between structure, civil engineering and architecture," said WMATA architect Manuel Tavorah.

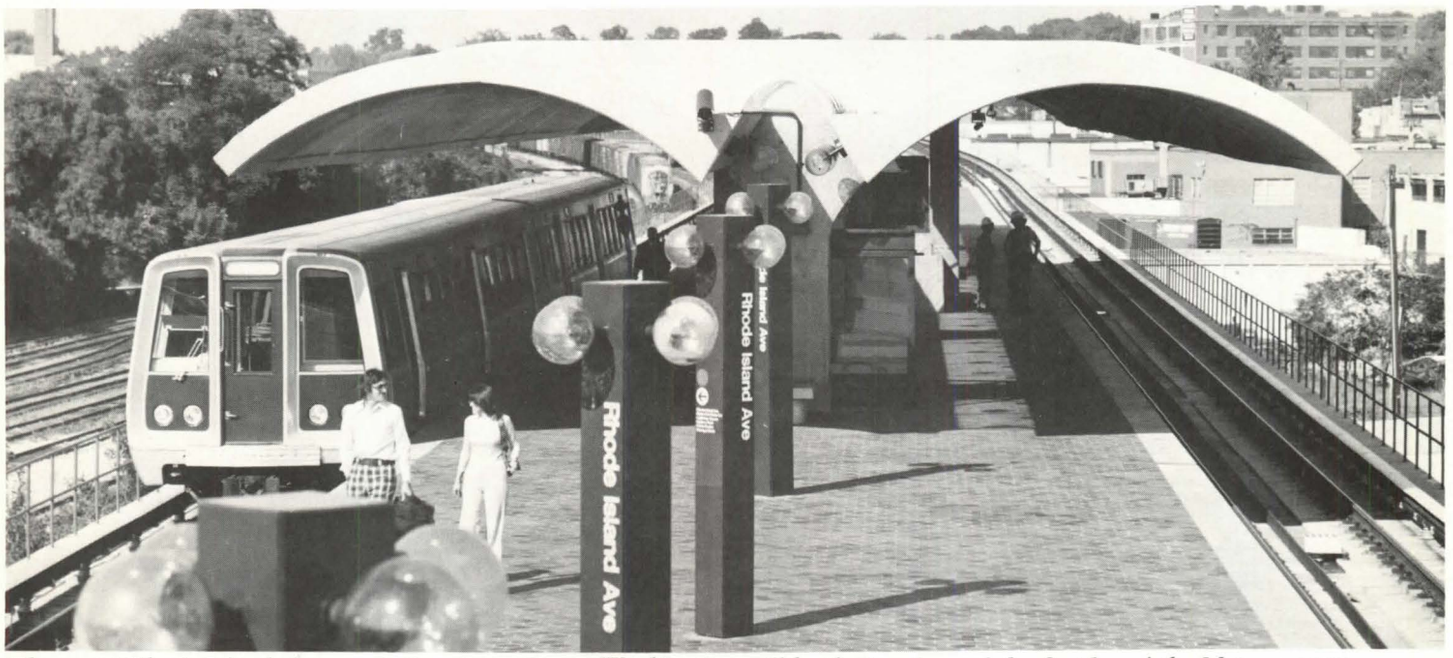
Another marriage was between the concepts of monumentality and humanity. "We had to be conscious that this is the nation's capital," said Sprague Thresher, WMATA's chief architect. "The design



he mezzanines and escalators are free standing, at arm's length from the offered walls, their curved lines echoing the arc of the vault. The vertical ements above are pylons bearing signs.



For elevated stations, concrete gull wings, singly or in pairs.



The aerial Rhode Island Avenue station, in northwest Washington, will be the terminus of the first leg of the Metro system.

had to be something that is reasonable for evermore. And yet we had to avoid making it so god-awful monumental that people wouldn't want to go near it."

The role here of the blue-ribbon Fine Arts Commission, the guardian of the capital's aesthetic and then headed by Gordon Bunshaft, FAIA, is denied by no one involved in the station design. "We gave them three alternatives, cheap, expensive and imperial, and the Fine Arts Commission chose the one that belong to all the people—imperial," said Weese. "But these things are forever, and that does make a difference, I suppose. . . . At least they didn't make us put marble on the walls."

The challenge of making the stations monumental and at the same time human stems from the basic paradox of the Metro system—and the city of Washington itself. When it opens, Metro will serve a dual constituency—city residents and commuters and visitors to the nation's capital from around the world. The stations had to be designed to be impressive to the visitors but at the same time to be efficient and even inviting for local riders.

Thus the two basic station schemes—the waffle-vaulted underground station and the gull-wing aerial station, so called because the canopy resembles a gull in flight (even though a pigeon in flight would be a more appropriate urban metaphor).

Within these basic configurations there are many variations—side platforms, center platforms, routes crossing, parallel routes, double gull wings, and single and half gull wings. But the essential pieces—the architectural vernacular and the sociological vocabulary—are always there.

To choose these pieces was the key task. The stations had to provide comfort, security, cleanliness and convenience, and, most of all, bridge the psychological barrier that makes people feel nervous underground.

Just as the Weese firm chose to view the vault as a city street underground, it decided to "treat the envelope as the sky," in Allan's words. To achieve this the train platforms and mezzanine (housing fare vending machines, fare gates, telephones, system maps and an information kiosk) are free-standing, set away from the walls of the vault.

A result of the European tour is that the stations use only escalators and no stairs. (Elevators for the handicapped and for emergencies were added after the basic design was finished.) The escalators begin the motion of the station.

"Our whole bag was motion," said Pfanstiehl. "There's nothing to interrupt or distract and no place to tarry around." Said Allan: "There's a sleekness to it that moves you right along. There's a tremendous sense of direction."

The motion of the stations was a happy blend of an architectural concept and the need to avoid confusion. When you enter the station there's only one way to go—through the mezzanine and to the trains. When you step off the Metro, there's no question about how to get out of the station, which, the architects hope, will eliminate the distressing turned-around feeling people have when they lose their horizon.

Because no business but the business of getting on or off the subway will be transacted, there's no reason to linger. There are no nooks and crannies. There will be no vendors or other activities. "A transit station," said Allan, "should look like a transit station and nothing else, we decided. It should not look like a department store or a library or a supermarket."

The absence of any ancillary activities involving money will, it is hoped, deter

robbers. Also for security there will be a station monitor in the center of the mezzanine with a clear view of most of the station and closed circuit television cameras. Bathrooms are provided for emergencies only and will be locked.

Since the mezzanine and waiting platforms are freestanding, the waffled walls of the vault are always beyond arm's reach, even on the escalators, making it a long stretch for the graffiti artist or vandal.

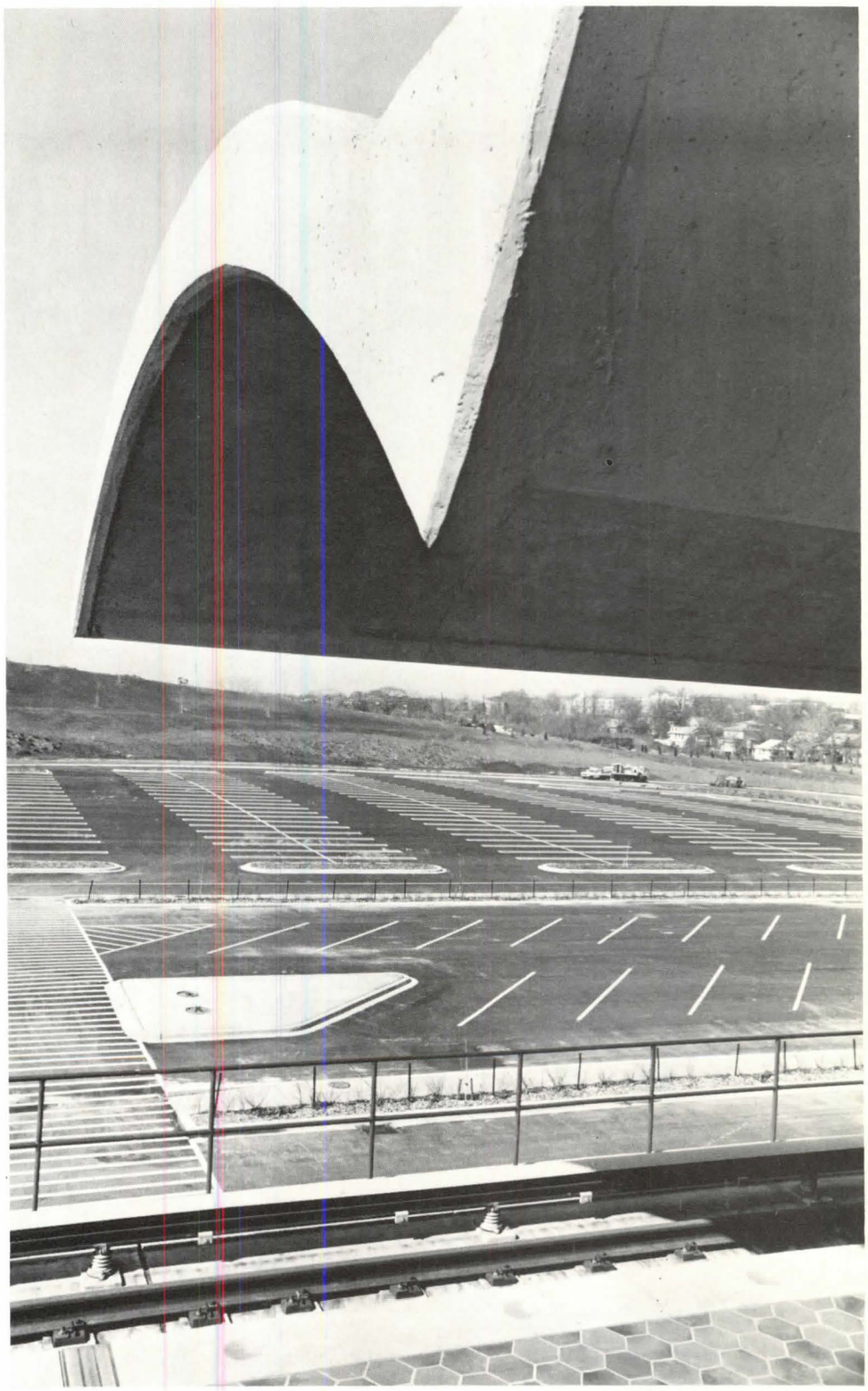
The stations will be air-conditioned in the summer, not a necessity in many cities but almost a must in Washington where the summers make you feel like you're in a swamp and not a city.

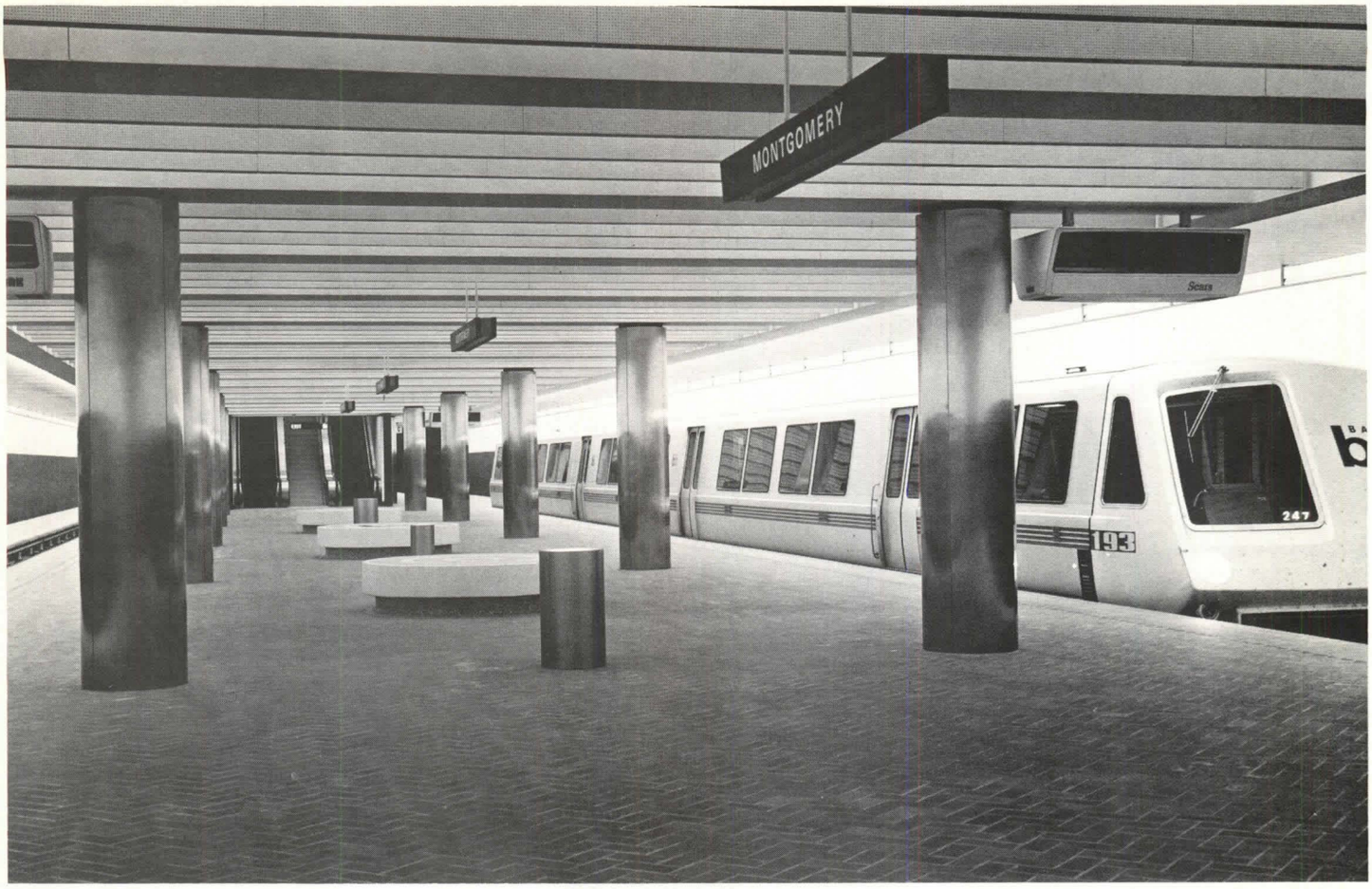
The lighting system is mainly indirect; lights are set below the train platforms and the mezzanine. Additional lighting will come from the top of a second bronze pylon, the subway symbol, which will stand on the platform and identify the station.

The graphics, limited to the pylon, have been the one before-the-fact source of criticism. The station name will be written vertically on the pylon, and many people contend it will be too hard to read from a moving train.

The waiting platforms themselves are the source of great pride to the station architects, mostly for their subtle translation of psychology into architecture. The concrete platforms slope up ever so slightly toward the tracks in a way that it can be felt better than it can be seen. They are edged with about 12 inches of granite, a change of texture apparent to a blind person. Set in the granite are lights, which will be on all the time but will pulsate as the train approaches. "The lights define the edge for 600 feet, and the flashing makes the train arrival a dynamic thing," said Allan.

Some criticism of the "system-system" concept and the plainness of the stations is anticipated. Although the stations are dramatic, they are, as Thresher points out, "not lavish." Besides the warm beige concrete, the materials used are simple—brick flooring tile in the mezzanine, granite and bronze. "People may say they're antiseptic," said Pfanstiehl, "but if I'm going to err, I'm going to err on the side of simplicity." *B.D.*

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Architecture in Transit: BART

Allan Temko

On this and following pages are shown some better-than-representative examples drawn from the mixed bag of BART stations.

On the concourse level of Skidmore, Owings & Merrill's downtown San Francisco stations, directional terrazzo paving leads passengers toward the escalators to the two train levels below. In these stations, SOM clad the columns in stainless steel, and used a hung luminous ceiling. Both of these details were contributed by the firm; others, such as stainless steel waste baskets, escalators, information booths and fare collection equipment, are standard throughout the system. In the concourse, SOM used structural glass barriers topped with aluminum and hexagonal-glazed tiles for the walls.

The train platforms are paved in herringbone brick and furnished with round terrazzo benches, among the trimmest seating arrangements in the whole system. The ceilings in the train levels are metal acoustic baffles with integral lighting, and trains are announced by directional flashers hanging above the platform edges. Between trains, the flashers carry ads.

During the 1975 holiday season, as an unexpected gift to disgruntled taxpayers, the Bay Area Rapid Transit District's silver trains have finally begun running late at night and on Saturdays, gliding into stations that now give some idea of how well they may perform if the 75-mile system ever starts to operate at full capacity. Whatever the virtues and shortcomings of this wildly uneven group of 38 stations which have been designed by no less than 15 different architectural firms of very mixed abilities, their faults seem almost negligible when compared with the disastrous mechanical breakdowns that still prevent BART—half a decade behind schedule and hundreds of millions in the red—from providing swift and reliable service every day of the year.

For even though BART's most dangerous problems seem to have been solved, such as the opening of doors while trains are traveling at full speed, stoppages remain frequent, shutting down the entire system for an hour or so at a time and causing a good deal of nervousness among passengers stuck in the tunnel beneath the bay. But at least the brakes appear to work now, so that the luxurious airconditioned cars—furnished almost to airline specifications with upholstered seats and carpeted floors—no longer roll past the 700-foot platforms without stopping.

Nevertheless, because the automatic controls can't be trusted, intervals of two stations must be maintained between trains. No train leaves a station until assurance is given by telephone that the tracks are clear ahead. This method is about as efficient as having an aged brakeman on the last car, swinging a red lantern. Travelers are thus accustomed to long waits on the platforms: a minimum of 12 minutes, but often more, instead of the 90 second headways between trains once loftily promised by the engineers.

All this is not by way of banter at the expense of hapless technocrats, but crucial to any discussion of the architecture of the stations themselves, which are basically the work of the same engineers who perpetrated BART's technical calamities and crushing expense. Although BART's publicity makes much of the diversified team of architects, some with considerable reputations, who ostensibly designed the stations, these worthies discovered soon after they were hired that their job was mainly to apply finishes and install entrances to structures whose basic configurations had been frozen years before.

BART, in fact, has always had not 15 different architects, but a single faceless master designer: Parsons, Brinkerhoff, Tudor, Bechtel, a consortium of three enormous engineering bureaucracies which set the parameters for station design back in the 1950s. At that time supposedly preliminary concepts for prototypical stations were published to help sell the voters the largest local bond obligation in history, amounting to $793 million.

But the crude sketches, which took almost no cognizance of the personal experience of the traveler beyond his simple physical movement from place to place and still less notice of the tremendous impact the stations would have on the surrounding urban fabric, somehow hardened into very nearly final designs. Apart from relatively minor features, such as the opening of light wells in underground stations and capping of some elevated structures with rather silly roofs, the finished stations of the 1970s bear an eerie resemblance to their ghostly predecessors of 20 years ago.

Sic transit gloria mundi, or at least the potential glory of Bay Area transit.

Yet when this is said, it must be granted that—by the standards of older systems—BART's stations, like the gleaming, malfunctioning trains themselves, appear positively opulent. But, then again, the Bay Area is not the Bronx. There may be more marble in Moscow, more granite in Montreal, and for all I know more mosaics in Mexico City, but nothing like this array of stainless steel, high-performance escalators, closed circuit TV, special lifts for the handicapped, and—most striking of all—lavish allocations of space.

There cannot, for instance, be many more elegantly-detailed—or, for the pres-

Mr. Temko was for many years architectural critic of the *San Francisco Chronicle*. He is an architectural historian and author of *Notre Dame of Paris* and *Eero Saarinen*.


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BART
MACARTHUR OAKLAND

In the 19th Street BART station in Oakland, Gerald McCue, FAIA, of McCue Boone Tomsick, has used tile in profusion. McCue designed this and a second downtown Oakland station and the two differ primarily in the color of tile used—one is red and one is blue. In both of these stations, tile is used on almost every surface except the floors, covering columns, walls, benches, balustrades and even telephone booths—a neat way of reducing the bulk of the heavy underground structures.

In the 19th Street station, horizontal beams running from the entry level balconies cut through the long rectilinear view, and the horizontal movement is repeated in the beamed ceiling. Lighting strips run between the beams in the ceiling and graphic directional signs are suspended below them. Metal guard rails run along edges and overlooks, and separate stairways.

ent emptier—concourses than in the very finest BART stations, such as Skidmore, Owings & Merrill's Montgomery and Powell street stops in downtown San Francisco. Some 80 percent of BART's passengers pass through these big multilevel facilities, which serve the financial, shopping and entertainment districts of the metropolitan core.

Eventually they will be joined by thousands of commuters from outer San Francisco neighborhoods who now use surface trolleys and buses, which were supposed to be replaced already by new vehicles of the Muncipal Railway (now officially called Muni). Unfortunately that violence-plagued organization is even more badly managed than BART and more woefully behind schedule, so that its new trains—which are just undergoing preliminary tests—will certainly not begin running on the intermediate level, just above BART's, for another couple of years.

Perhaps SOM's stations will then come into their own, with large crowds following directional patterns of the fine terrazzo paving, and admiring the round columns (of which I'll have more to say later) sheathed in stainless steel, as well as whole walls of stainless steel and hung luminous ceilings—almost as suave as an office building's—which now extend in seemingly endless perspectives, like a de Chirico anxiety painting with their festive multicolored concessionaire's booths closed, and many of the pay telephones removed from their handsome mountings, for want of business.

But SOM's was only one of many approaches to BART station design, even though it is by all odds the most polished. Unlike Washington, D.C., where Harry Weese is unifying the whole system in a consistent structural and spacial idiom whose monumental power is by no means inappropriate to the baroque national capital, BART has carried on a Bay Area tradition—dubbed "humanism" by local regionalists—of staging an architectural free-for-all. In political terms this is also called splitting the pie.

Quite deliberately, with the blessing of BART's officialdom, each of the 15 firms has gone off on its own tack (within the limits, of course, of the largely decorative role assigned to them by the engineers). There are certain standardized elements common to all the stations, to be sure, such as the quite decent stainless steel information booths and refuse containers, done by the late Tallie Maule when he was BART's in-house architect. So, too, are the escalators and all of the fare collection equipment, including ticketing and change-making machines which at first are baffling to operate, even for people who can read, but on which IBM nevertheless did a very creditable job of physical presentation.

Most of the standardized graphics, especially the directional signs by Ernest Born, are also extremely civilized, even though the suspended signs, fitted with bulbous swivel joints because of seismic code requirements, should have been studied more carefully. The maps are pleasantly legible and have been well-mounted in many different ways throughout the system, sometimes outstandingly well, as in SOM's luminous piers that also contain concealed utility lines.

Apart from these common features, however, it has been every architect for himself—good, bad and indifferent—and often with a vengeance, as if to exemplify Mies van der Rohe's dictum (paraphrased slightly) that one can't "invent a new kind of transit architecture every Monday morning." But the Bay Area architects have done their damnedest to try. Each of them has concocted a different warning strip for his platform edges, for example, none of which approaches the distinction of Weese's standard granite detail in Washington.

One wonders what BART might have been had an architect of stature been invited, like Harry Weese in Washington, to participate in its planning and design from an early conceptual stage onward. For surely, this vast project reveals nothing so much as the prevailing uncertainty of the architectural profession which is further aggravated when even gifted practitioners use trivial gestures—over-blown spaces, melodramatic roof structures and bewildering assortments of surface materials—which clamor for admiration but leave one with the impression that the architect has attempted to pit his oversensibility


CIVIC CENTER

On the train platform walls of Reid & Tarics' Van Ness Muni station (done under a BART contract), tile has been used as if it were brick. The platform floors are white terrazzo, with black terrazzo inserts along the warning strip. Here and in the Civic Center BART station, below, the escalators are sheathed in stainless steel.

Reid & Tarics used similar brick-shaped tiles on the walls of the BART station; the tiles are gray to match the stone used in the Civic Center. In this station, the floors are paved in marble, with black marble rectangles creating a warning strip at the edge of the platform. The columns are clad in black marble.

Unlike SOM's stations, the Civic Center station has only one set of columns on the lower levels. Reid Tarics chose deep expressed steel girders for the ceiling treatment, including a huge girder running between the shiny black columns.

against insensate engineering, and lost.

Now that the damage has been done, it is painful to consider how much better BART might have been if its fate had not been sealed so early by the engineers. Curiously enough, there was a fascinating last-ditch effort in the 1960s to inject serious conceptual thought into the diagrams of the technocrats. Don Emmons, partner in the preeminent "regionalist" firm of Wurster, Bernardi & Emmons, had been named chief architectural consultant to BART. (Mark the ineffectual title: He was never a supervising architect with strong independent powers.)

Emmons had relatively little experience in civic design on the order that a mammoth transportation system required, but he nevertheless realized that BART had committed colossal errors of omission. To his great credit, he engaged a young group of theoretical architects from the University of California at Berkeley, led by Christopher Alexander, to investigate what might be done even at so late a date. Their recommendations should now be a permanent part of architectural literature.

The Alexander team called for a complex set of linkages between the "closed" system of the transit line and the "open" cityscape so that the two could interpenetrate in a broad variety of spaces and structures: plazas, buildings, kiosks.

The research group also freshly examined BART's arbitrary design assumptions including the fixed lengths of platforms and concourses, dimensions which had been largely culled—for no clear reason—from ancient subway systems elsewhere in the country.

In particular, the researchers questioned the necessity for the tremendous mezzanines in underground stations which now provide such forlorn vistas. They also publicly raised an issue—on practical grounds of ease of circulation and actual safety in case of panic or disaster—that had privately concerned the station architects for esthetic reasons: Why, if BART's engineers were "the finest in the world" (as they were dubbed by their flacks), could they not dispense with their forest of columns, and instead clear span the stations?

This was too much for the engineers. At their behest, the searching young architects were dismissed. But Emmons himself, weary of his ride on the tiger, and under attack in the press, resigned afterwards. (He was replaced—if that is the word—by a new architectural "special advisor": the elderly John E. Burchard, dean emeritus of humanities at MIT.)

The city of San Francisco, alarmed by the timid engineers of the major stations, asked Professor T. Y. Lin to review their designs. His verdict was that they could be clear spanned for a fraction of the extra $3 million each that BART insisted column-free space would cost. ("Take away a zero" said Dr. Lin.) Nevertheless, the columns remained.

The public found itself confronted by a bureaucracy as arrogant, obstinate and in some ways more brutal than the state highway engineers who have devastated large parts of California. Only a town with exceptional environmental awareness such as Berkeley was able to oppose BART with some success. Understandably reluctant to split its increasingly integrated multiracial community by an elevated structure running down its main street like a "Chinese wall," which would have had the added disadvantage of blighting its business district, Berkeley easily proved that BART's estimates for the undergrounding of its part of the system were outrageously inflated by engineers who could scarcely explain their own stubbornly defended figures.

The citizens of Berkeley voted to pay the comparatively modest cost of undergrounding themselves, and have never regretted it, and their central station by Maher & Martens turned out better than most, set in a pleasant little brick plaza with a domed skylight capping its main entry. But this was a rare victory.

Unlike Berkeley, most places along the 75 miles of right of way—far too many miles, incidentally, for the initial phase of a regional system—lacked the sensitivity and the political know-how to resist designs that epitomized the conventional wisdom of a previous generation. Every community receives the architecture it deserves, as Lewis Mumford has said, and that, alas, is what the Bay Area has been given by BART. □

In Defense Of Density— And of Cities

The relationship of transit to population density is one of mutual dependency. Dense development patterns require transit to avoid choking on their own flow of people and goods. Transit, in turn, requires such patterns to supply it with ridership.

A discussion of the need for transit, therefore, raises questions of the need for and advisability of density. There is little doubt that the majority of Americans would respond to such questions in the negative.

Millions already have delivered their answers by moving from the dense cities to the greenery and breathing space of suburbia. They are abetted in their choice by the intellectuals who, following America's long-held tradition of antiurbanism and extrapolating broadly from animal research, argue that density breeds crime and other social and personal pathologies.

This argument has been challenged by Columbia University psychology professor Jonathan Freedman in his new book *Crowding and Behavior* (San Francisco: W. H. Freeman & Co., 1975, $4.50). Says Freedman: "My view of the effects of crowding is obviously optimistic. . . . The cities of the world are not doomed. They are not necessarily condemned to high crime rates, riots and violence. As the population of the world increases, there will not necessarily be an increase in aggressiveness and antisocial behavior and a general breakdown in society. Homo sapiens is not doomed to extinction because of population density; the race will not destroy itself because it will be crowded."

According to Freedman, high population density has been unjustly maligned: "People who live under crowded conditions do not suffer from being crowded. Other things being equal, they are no worse off than other people. . . . People who experience high density are just as healthy, happy and productive as those who experience low density."

The other major conclusion of Freedman's book is that the effects of high density depend on other factors in the situation. Under some circumstances high density may make people more competitive and aggressive, but under others, it can have the opposite effect.

Freedman's conclusions from these findings are that if the world cannot conveniently blame its problems on overcrowding, it will be forced to look elsewhere for causes. "In addition, it will be possible to plan cities more rationally, using high density where appropriate and not using it elsewhere."

Before investigating human reactions to crowding, Freedman challenges the more widely accepted notions about the effects of crowding on animal behavior—upon which most assumptions about human behavior are based.

He begins by refuting the myth of the suicidal march of the lemmings into the sea, presumably because of overcrowding. He recounts; "These rodents, which are essentially mice with fur, live on the cold, inhospitable tundra of Norway. Their . . . colonies grow and grow until there are huge numbers of lemmings roaming about. At some point they begin to wander far from their usual habitat, and at the same time their population begins to drop sharply. Their wild, frantic wanderings eventually take them to cliffs overlooking the sea. It seems to witnesses that they deliberately head for these cliffs and that, presumably in a state of severe depression or because of some internal, instinctive urge toward self-destruction, they throw themselves into the water and are drowned."

Says Freedman: "This is touching and romantic, but the true story is less baffling and unusual (though no less fatal to the lemmings)." What actually occurs is that the lemming population increases as long as there is sufficient food. Exhausted and weakened by hunger, they reach the sea, "and perhaps maddened by hunger, some fall in."

Turning his attention to the most studied and observed of rodents, Freedman says that the normal behavior patterns of rats do indeed begin to break down under conditions of crowding. However, 'it does not appear to be the amount of space that is crucial but rather the number of animals in the cage. . . . It is having to interact with all those other animals." Freedman further maintains that crowding does not negatively affect "emotionality or susceptibility to disease."

A widely accepted explanation of the effects of crowding on animals is that of Conrad Lorenz and Robert Ardrey, which holds that because of an instinctive urge toward territoriality, crowding produces aggresive and other destructive behavior. To dispute this, Freedman argues that if territoriality is instinctive, if animals "need" a certain amount of space around them and have an innate tendency to defend it, aggressive behavior should occur whether or not food is available. "Far from needing a certain amount of space around them to invade," observes the author, "rats will huddle together even with an enemy." While this may be an extreme example, "in virtually all situations they seek out rather than avoid physical contact with other members of the species." Animals like physical contact and studies show that those living in groups are physically and emotionally healthier than loners. Moreover, says Freedman, "if there were an instinctive need for space, reducing the area would have clearly negative effects, and it does not."

J. J. Christian and others have argued that high density is stressful to animals because of its effects on their physiology. Freedman's answer, based on laboratory research, is that, yes, animals in groups

Research on the impact of crowding on animals has been misinterpreted, a psychologist maintains.

tend to be more excited and active, which will be reflected in increased adrenal levels. But this is not the same as saying that they suffer more stress and tension. "If presence of other animals produced tension, animals in groups would be more susceptible to disease, would get ulcers more easily, and would have shorter life spans . . . and no such consistent effects have been found."

Moving now to the human animal, Freedman sets out to show that similar to rats, people do not respond to crowding either with an instinctive territorial imperative nor with a physiologically-determined arousal of aggression.

He says that evidence indicates no effect of density on crime rates or mental, physical or social pathology. In fact, in suicide and homocide, "the higher the density, the lower the rates of these two measures of pathology." He contends that only one study of density and crime has demonstrated a relationship between high density and high crime rates; all others have failed to find a positive relationship. Freedman also asserts that a reverse relationship has actually been found between density and juvenile delinquency in low-income areas. What accounts for differences in crime rates, he says, are "income, educational levels and ethnic background of the people." Density simply makes no difference.

His explanation for the inverse relationship between crime and density is taken from Jane Jacobs' book, *The Death and Life of Great American Cities*. Busy streets "have eyes" that watch and protect, says Jacobs. High density can thus have the positive effect of making a neighborhood livelier and therefore safer.

As Freedman points out, there is a still simpler argument against the crowding-causes-crime thesis: The population and density of almost all American cities have remained about constant or have actually decreased over the past 20 years, yet the crime rate has skyrocketed. "Clearly the increase in crime is not due to an increase in crowding, since that did not occur."

In discussing the effects of brief exposures to intense crowding, Freedman recalls, first of all, that people of different cultures have different attitudes toward being physically close to one another. "Whites in the United States, Canada and England stand far apart, Europeans stand somewhat closer, and South Americans stand still closer." Moreover, there is no automatic negative response when someone is close. "Instead, the appropriate distance depends almost entirely on such factors as the relationship among the people, the setting and the personal characteristics of those people."

The author recounts that recent studies on reactions to isolation (in particular those done in conjunction with the space program) show that people can endure being cooped up together in small spaces for long periods of time. And, according to Freedman, the few studies in which density was varied found less hostility when there was less space.

Freedman's own studies "started with the familiar naive assumption that crowding is 'a bad thing'. . . . If, as we supposed, crowding produces stress, it should interfere with performance" on tests. His experiments required that students perform a variety of tasks representing a range of skills and abilities. They were tested for three hours a day for three days, with all variables being eliminated except the amount of space in which the tests were given. "After running hundreds of subjects for thousands of hours, we discovered that crowding had no effect on performance on any of the tasks." To double check his findings, he duplicated the tests with a very different type group; but the results were identical. Freedman's conclusion is that "crowding does not arouse people's drives or cause them to be tense or hopped up." He uses studies with children to further show that it does not increase the level of aggression.

What then are the effects of crowding? "I propose that crowding by itself has neither good effects nor bad effects but rather *serves to intensify the individual's typical reactions to the situation.*" Whatever a person's predominant feelings might be—good, bad, angry or sad—they will be experienced more intensely under conditions of high density.

What implications does this theory have for urban problems? The author's answer is: "It certainly indicates that moving people out of the cities is not the answer, except possibly for some communities that simply cannot support the number of people living in them."

Furthermore, he says, there are good reasons why cities—with their high densities—should be preserved. It would be a great misfortune, he says "for anyone to think that the solution to society's problems lies even in part in depopulating the urban centers. On the contrary, the great vitality of the cities is one of the most important resources any country has, and once it is lost it is most certain that industry, culture and life in general will begin to decline."

From an economic point of view, a high concentration of people is required to support "certain types of enterprises that the world would be poorer without. Active, successful theater, for example, can exist only in a densely populated area."

In his concluding chapters on specifics of planning and design of cities and their buildings, Freedman is on less sure ground. The value of his book is less in these specifics than in his challenge to the "urban planners, social philosophers and strong forces in the American government who have thrown up their hands in despair and written off the cities as hopeless."

Andrea O. Dean

Continued from page 37
batch of systems under construction, the country may not build any more heavy rail systems for a while. But, he said, the important step to take now is to buy the rights of way and use them for busways. Pittsburgh currently has a busway under construction which will have its own right of way and could be adapted to a fixed system at a later date. In this way, said Hardy, rather than making the expenditure all at once, the land for the transit system will be there and the riders will be there already, riding on their exclusive busway. A modified version of this has become quite popular—a bus and carpool lane running down the center of an expressway. The first of these, on the Shirley Highway running from Washington, D.C., to suburban Virginia, has been operating successfully for the past five years.

Transit and city planners are also looking at smaller scaled systems primarily for downtowns and mainly aimed at eliminating center city congestion and encouraging growth. These smaller systems, known as people movers or personal rapid transit, have been put into successful operation at two airports, Tampa and Seattle-Tacoma, less successful operation at a third airport, Dallas/Fort Worth (although that is a Texas-scale 10-mile version and complicated enough to have BART-type technology problems), and one is in operation at Busch Gardens, a large new amusement park in Virginia. Besides airports and amusement parks, however, there is but one example of a people mover system, more accurately considered personal rapid transit, which has just begun partial operation—the problem-bedeviled system at the University of West Virginia in Morgantown, W. Va., which was a federal experimental system. This system, which will cost more than $100 million when finished, is designed to carry up to 20 people at a time along a concrete guideway connecting the university's two campuses and downtown.

A number of cities are examining the possibility of using a small people mover as a circulation system for the center city. Norfolk and Atlanta have begun pondering the idea, and the architectural firm of Kahn Kappe Lotery Boccato is examining it as one of several possibilities for the Bunker Hill renewal project in Los Angeles.

But many transit planners are not sold on the idea that little systems can do the job alone. "The difficulty is that if you can't get into the center city, there won't be enough people to circulate around in the circulation system," said John T. Mauro, executive director of the San Mateo, Calif., transit district.

"If you look at the whole nation," said Mauro, "we have an over abundance of capacity on our highways, except for four hours a day—two hours in the morning and two hours in the evening. And we can't build more highways, so you have to start moving up the scale toward rapid transit. One bus can do the work of 35 automobiles, and one rapid transit train can do the work of at least four buses. But the crushing demand is for the same four hours, so transit can't do the job alone. We need to stagger work hours and begin rebuilding the center cities for living as well as working so that people don't have to rely on the highways alone."

Beth Dunlop

Transportation as a Market

Transportation—from highways to guideways—has more often than not been the province of the engineer. Yet, a number of architectural firms have begun to find a market for their skills in transportation-related work. Part of this stems from the recent requirement for environmental impact statements for public works construction projects. A second factor in increasing opportunities for architects is that many communities—big cities and suburbs and small towns—have begun to seek alternatives to the auto and are looking at new circulation systems, pedestrian streets and various kinds of mass transit.

Dalton, Dalton, Little, Newport of Cleveland has found a wide variety of transportation work. In 1965, the firm acquired a transportation consulting firm—Beiswanger, Hoch, Arnold & Associates—and with that inherited a cadre of transportation architects and engineers and a contract to do preliminary work on the Cleveland Transit System's rapid transit system to the airport. Since then the Dalton firm has had contracts ranging from state transportation plans (from Ohio and Utah) to portions of new transit systems to highways, bridges and traffic engineering.

"We have found that you have to be willing to get some people involved who aren't traditionally considered architectural types," said James Wood, of the Dalton office. For example, the firm has hired a behavioral scientist with expertise in community planning and has found that to be a selling point for station design contracts and other urban design jobs which require public participation.

Dalton, Dalton, Little, Newport has also found that emphasizing the firm's design skills can give it a distinct advantage over engineering firms. "In transit," said Wood, "there is really very little besides the stations that is pure architecture, so we've taken a new look at what we call the 'background buildings.' " As a result, the firm has designed electrical substations for transit systems in both Philadelphia and Chicago, jobs which could have gone to an electrical engineer. The Dalton firm ended up putting a Philadelphia substation underground and designing pedestrian park areas above them and turning the fronts of the Chicago substations into bus shelters.

The Dalton firm is big and diverse, with architects, engineers and planners, and has hired a number of transportation experts, including the former directors of two big-city transit systems, for this kind of work. But a firm need not be big to do transportation work.

Take the case of Kahn Kappe Lotery Boccato of Los Angeles, a small (12 person), young (six-year-old) firm which has a major contract for a circulation distribution program for the central business district and the Bunker Hill urban renewal project in Los Angeles. The job came as a result of a limited partnership with a transportation consultant on a transportation link into Bunker Hill. From there, the firm was given a contract for the circulation study from the Los Angeles Community Renewal Agency, and the contract grew. "What was to be a $40,000 study has been getting bigger and bigger," said Rex Lotery, AIA. He said the study differs from others because it embraces broad questions of urban design and social issues and looks for "creative land use opportunities."

The contract is unusual not only because of the size of Kahn Kappe Lotery Boccato, but also because an architectural firm is the prime contractor and hired a large consulting engineering firm, Kaiser Engineers, as a subcontractor. More often than not, it is the other way around. The Bunker Hill/CBD circulation study has also meant coordinating a wide range of citizen involvement, including a formally-structured citizens advisory panel.

The kind of work Kahn Kappe Lotery Boccato is doing on this contract could provide a model for other firms. Many of the tasks, like bus patronage studies, financial analysis and engineering work, are being done by consultants. But the architectural firm is identifying activity centers, studying land use, preparing service area maps, working on community plans and doing the urban design work, among other things.

Transportation is a field which many architectural firms have not tapped. And yet, given the nature of much of the work, it is a field in which architects with their design skills and problem-solving capabilities could find they have much to contribute. *B.D.*

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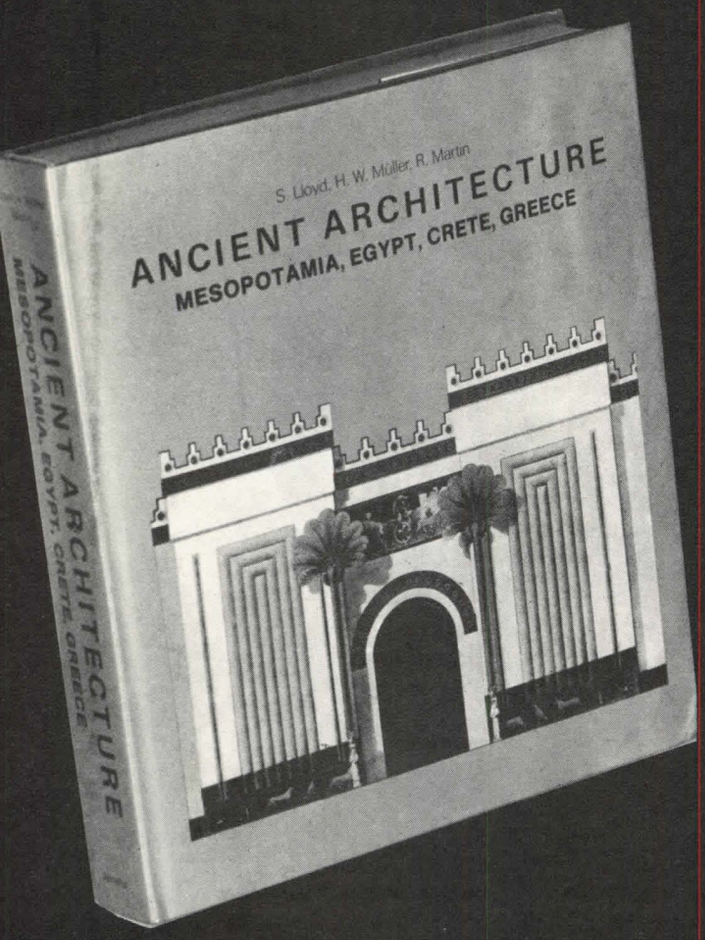

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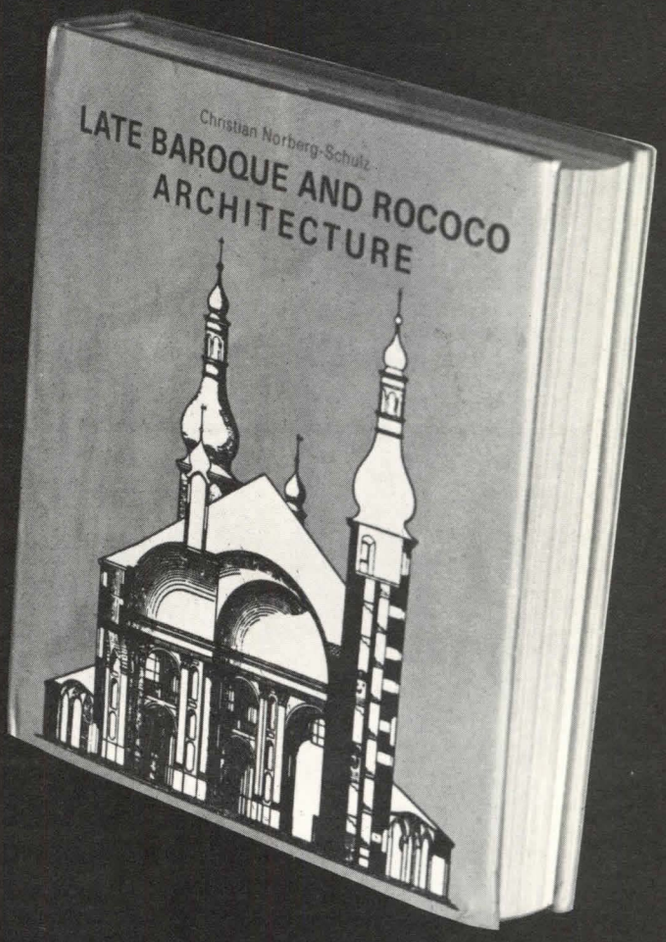

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Architecture's 7 Weaknesses And 7 Strengths

Robert Lawton Jones, FAIA, AIP

We are continually reminded by coaches and sports writers that games are won by the team which makes the fewest mistakes. This is true. But it would seem to be a rather negative approach to producing a quality effort. Nonethless, the fact remains that neither flurry nor tour de force can overcome a costly accumulation of errors. We see this in science, art and about everything that comes under Ralph Nader's watchful eye.

As we observe today's work, some problems recur so frequently that they deserve special emphasis. Architecture that avoids the following difficulties will produce a new level of quality:

ERROR	SPECIFIC CONCERN
1. Inadequate programming (problem seeking)	Framework for investigation Research and analysis Definition of planning objectives Communications
2. Failure to test alternatives (problem solving)	Judgment criteria Exploration of possibilities
3. Insensitivity to user needs	Individuals Groups Community
4. Conflict with nature	Energy consumption Conservation of resources Site accommodation Life-cycle costing
5. Contradictions between structure and form	Nature of structures Material usage Construction technology
6. Inappropriateness of form/structure	Fashion and novelty Complexity Lack of consistency
7. Failure to respect time and money	Economic constraints Delivery process Inadequacy of documents Limitations of manpower skills

The names of many of history's great architects are unknown to us; only their buildings remain. After centuries of continuous use by man, they still stand.

Recently, we have discredited the work of 19th century traditionalists who offered nothing more than eclecticism to meet the challenges imposed by a rapidly industrializing society. Yet, they created grand spaces and worked with color, form and texture very well. Truth of the matter is, they could spot raw silk at 25 paces.

Still their approach to architecture doesn't meet the needs of our time. And we must ask serious questions of the architecture of our own period.

The overall quality of contemporary architecture is impressive. Many of today's architects will survive into tomorrow. Some of the following attributes are important as we approach our work:

Mr. Jones is a principal in the architectural, engineering and planning firm of Murray Jones Murray in Tulsa, Okla.

QUALITY	SPECIFIC CONCERN
1. Sensitivity	Awareness of individual needs, the community and the natural environment
2. Comprehensiveness	Vision beyond the immediate task Alertness to implications of interlocking decisions
3. Selectivity	Identification of relevant issues Prioritizing of objectives Direct approach to problem solving Immunity to fads
4. Objectivity	Aggressive pursuit of alternatives Understanding the forces of our time Rejection of personal expression
5. Openness	Unwillingness to arrogantly impose building inadequacies upon users Being flexible and amenable to change
6. Consistency	Search for order upon which unity depends Organization of the parts into a cohesive whole
7. Decisiveness	Decision-making capability Ability to implement concepts

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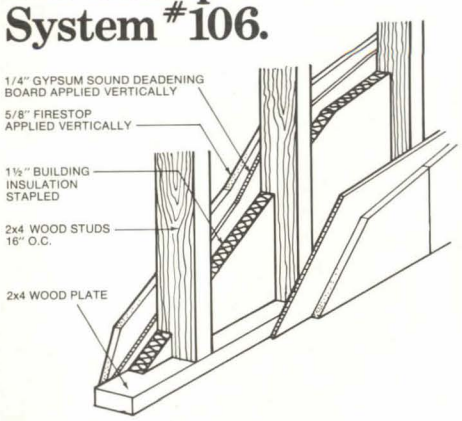

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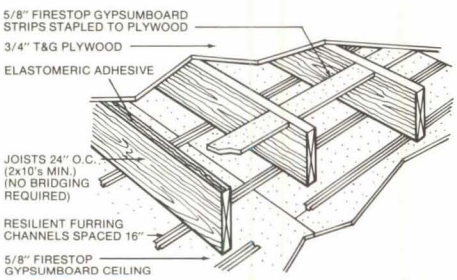

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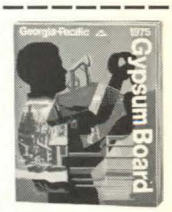

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BOOKS

Planning and Design of Airports. 2nd edition. Robert Horonjeff. New York: McGraw-Hill, 1975. 460 pp. $24.95.

Among the very limited number of useful publications on airport planning, the first edition of Professor Horonjeff's book, published in 1962, was the undisputed mainstay. For many years it was virtually the only source in existence; what could not be found between its covers could only be gained through years of direct experience.

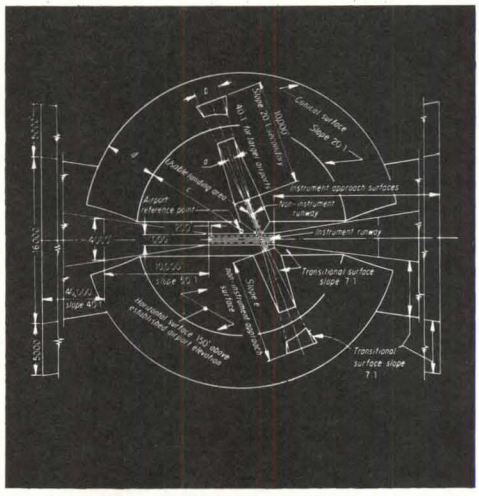
This second edition, thoroughly revised and updated, complements the first. Its format and content are consistent with the earlier version although several new chapters have been added, including such topics as airfield capacity, the effects of delay and passenger terminal design. Like the first edition, the primary concerns are airport and airfield related planning; the effects of aircraft characteristics and air traffic control upon airport facilities; the importance of site selection, lighting, marking, signing, pavement design, drainage, etc. Each of these subjects is dealt with as it affects airport as a ground property related to other environs.

The subject of passenger processing facilities, sketchily dealt with in the first version, is still lightweight by comparison with the detail in other chapters and with current and forthcoming Federal Aviation Administration publications on the subject. Apart from passenger processing facilities and a chapter on heliports and STOL ports, other on-airport building types, such as cargo terminals, maintenance and fueling facilities, are by-passed.

The discussion of airport financing is a particularly valuable and a necessary part of the total airport picture. Although their responsibilities may not encompass these problems, architects and planners too often appear to have little knowledge of the financial aspects of the facilities they design. This chapter includes a complete and updated survey of the availability of federal funding for certain parts of the airport. (How much is available and for what.)

A further addition might have been an outline of the traditional revenue-producing patterns established over a period of years at large U.S. airports by major tenants, such as concessionaires of all types and tenant airlines, but this is not included. Neither is there reference to the percentage of revenue-producing space necessary to a self-sustaining passenger processing facility. This information is particularly useful to a planner. These patterns may often differ, but their existence and integration during the early stages of planning are essential to an acceptable and realistic design solution.

Aside from the broad scope of this publication, perhaps its most useful aspect concerns the complete definition of terms



contained in each chapter. A complete explanation in layman's terms precedes the more technical treatment of each subject. This makes it possible for the novice reader to experience a greater degree of involvement than otherwise would be possible due either to his limited interest or his technical responsibilities in the total airport planning program. While the text establishes a broad understanding of each subject, the choice in level of detail is the reader's.

In summary, Professor Horonjeff's revised text is a realistic and necessary addition to the library of all airport planners and of architects who may be involved with airport facilities. This is especially true with regard to the scope of airfield-related items which complement recent FAA publications as a reference on airport building. *E. G. Blankenship, Architect and Author of The Airport: Architecture, Urban Integration, Ecological Problems (1974)*

CRSI Handbook: Based upon the 1971 ACI Building Code and 1973 and 1974 Supplements. 2nd edition. Chicago: Concrete Reinforcing Steel Institute, 1975. 816 pp. $20.

Amendments to the American Concrete Institute building code were issued as supplements in 1973 and 1974. This handbook has been revised to meet the requirements of the supplements. Among the revisions: changes in lap slice tables; simplification of the entire section on splices; inclusion of *Two-Way Slab Design,* formerly a separate book, as supplement; expansion of the section on foundations to include design tables for pile caps and drilled piers; new materials on short-cut design for column slenderness effects; new tabulations of earth pressure in the section on retaining walls.

Emerging Trends in Courthouse Planning, Design, Administration and Funding. Ann Arbor, Mich.: The Institute of Continuing Legal Education, 1975. 227 pp. $10, plus postage.

This book is a transcript of the proceedings of a conference sponsored by AIA, the American Bar Association and the National Center for State Courts held in 1974. It contains a number of informative papers on how court administrators, lawyers and judges, consulting architects, citizens and funding agencies view the problems of courthouse planning and design.

A particularly interesting portion of the book is given over to a description of visits made by conference participants to selected courthouses. Comments are made by both architects and judges about these specific structures.

Perhaps the most useful section of the book for the practioner is the one which covers the conference workshops. Here attention is given to the general planning and funding of court facilities; specialized court requirements; courthouse design criteria, and court administration. The appendix, prepared by Walter H. Sobel, FAIA, contains sketches of American courthouses.

The book is available by mail from ICLE, 418 Hutchins Hall, Ann Arbor, Mich. 48104.

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LETTERS

Precarious Position of Architects: I read with interest the article in the September issue titled "Survey of Firms Charts Decline in Employment." While I take no issue with the accuracy of the figures quoted, it is my feeling that the results are misleading in that the survey shows the decline in employment starting with the last quarter of 1973 as a base point rather than earlier.

The fees and contracts committee of the New York City chapter/AIA recently completed a limited spot survey to determine the extent of increase in overhead multiples for firms in the New York City area from 1972 to the present. To serve as a point of departure and to expedite receipt and analysis of input, 20 firms of varying size were selected; responses were received from 11 of these firms.

In order to properly evaluate the overhead data, our survey also requested input of the number of persons employed in the firm for each of the years 1972, 1973 and 1974, as well as present employment as of July 1975. While the primary purpose of our study was the change in overhead multiples, the drop-in-employment information was an added dividend. Of the firms responding, the cumulative drop from 1972 to July 1975 averaged 52 percent.

While we are aware of the statistical shortcomings of our very limited survey, it is the belief of our committee that this does indicate the true state of conditions. With a worsening financial condition in New York City as of mid-October, the drop could be closer to 60 or 65 percent.

It is hoped that AIA might consider a more comprehensive overhead study on a national rather than a regional basis to determine realistic overhead multiples for cost-based compensation work. If so, we would strongly advise that employment size for each of the past three years also be included, as we have done, in order to give a closer picture of the magnitude of the drop in employment. The article does not really convey the seriousness of the condition.

Roy Friedberg, AIA
Chairman, Fees and Contracts Committee
NYC/AIA
New York, N.Y.

Architects as Human Beings: I beg to differ with the naive, simplistic and pseudo-socio/psycho evaluations of architects expressed in the article "Examining the Nature and Value of the Endangered Species Architect" in the September issue.

It is unfortunate that many of those who are so adept at *writing* about architects—especially our pseudo-intellectuals—are not themselves working professional architects. If they were, I'm sure we would not be beleagured with such introspective balderdash!

While it is necessary to understand our rapidly changing world—as most reasoning people do—it is not necessary to further complicate the issues through inferences of subjective guilt derived from pseudo-intellectual analyses.

As architects, we are continually being reminded that in order to achieve we must feel guilty and inadequate with respect to our profession. From every quarter, we are told that the deficiencies within the profession, within the environment and within ourselves make us completely inadequate to cope with our tasks and responsibilities. In fact, more often than not, whether right-handed or left-handed, we are more than capable of meeting limited needs of our society.

I, for one, highly resent being categorized, microscopically examined, sorted, evaluated and classified by pseudo-experts who claim to know—but seldom do.

Unless our "endangered species" becomes obliterated beforehand, perhaps our profession will learn that subjective critical analysis is no substitute or excuse for objective responsible achievements.

We are human beings—not insects.

Norbert J. Blum, AIA
Cohoes, N.Y.

Interior Design at Texas A&M: In the article in the July issue titled "Interiors as Architecture—and as a Market," the statement is made that only six architectural schools offered programs in interior design in 1974-75. Texas A&M University was not listed among the schools.

Texas A&M University has had an interior design program for the past five years in its graduate school. The students receive masters of architecture degrees, with majors in building design, urban design, interior space design, construction management and systems development. All graduates are qualified to become licensed, depending upon the route which they pursue following graduation. Edward J. Romieniec, FAIA, is currently head of the interior space design option.

Dudley Watkins, AIA
Head, Building Design Option
Department of Architecture
Texas A&M University
College Station, Tex.

EVENTS

Dec. 31: Postmark deadline, Library Building Awards program. Contact: Maria Murray, AIA Headquarters.
Dec. 31: Postmark deadline, Plywood Design Awards program. Contact: American Plywood Association, 1119 A St., Tacoma, Wash. 98401.
Jan. 15: Postmark deadline, Construction Photo Contest. Contact: Richard T. Haas, Associated General Contractors of America, 1957 E St. N.W., Washington, D.C. 20006.
Jan. 15-17: AIA Grassroots East, Statler Hilton Hotel, Washington, D.C.
Jan. 18-22: National Association of Home Builders annual convention-exhibition, Dallas Convention Center, Dallas. Contact: NAHB, 15th and M Sts. N.W., Washington, D.C 20036.
Jan: 22-24: AIA Grassroots Central, Marquette Inn, Minneapolis/St. Paul, Minn.
Jan. 24-28: Solar Heating and Cooling Workshop and Product Exhibit, Hyatt House, Los Angeles International Airport. Contact: Solar Energy Industries Association, 1001 Connecticut Ave. N.W., Suite 632, Washington, D.C. 20036.
Jan. 26-28: AIA Grassroots West, Hyatt Hotel on Union Square, San Francisco.
Jan. 29-30: A/E Federal Programs Conference, San Francisco. Contact: Marshall E. Purnell, AIA Headquarters.
Jan. 29-31: Iowa Chapter convention, Fort Des Moines Hotel, Des Moines, Iowa.
Feb. 1: Registration deadline, international competition for architectural students for design of a model community. Contact: John Bland, Professional Adviser, School of Architecture, McGill University, P.O. Box 6070, Station A, Montreal, Canada H3C 3G1.
Feb. 1-5: Concrete and Aggregates Show, Astrodome and Astrohall, Houston. Contact: Concrete & Aggregates Show, 900 Spring St., Silver Spring, Md. 20910.
Feb. 2-5: Seminar on solar energy technology and opportunities, conducted by U.S. Department of Commerce, Houston. (Repeat seminar on Mar. 1-4, New York City.) Contact: Heidi Kaplan, New York Management Center, 360 Lexington Ave., New York, N.Y. 10017.
Feb. 3-6: Annual conference, Reinforced Plastics/Composites Institute, Shoreham-Americana, Washington, D.C. Contact: RPCI, 355 Lexington Ave., New York, N.Y. 10017.
Feb. 8-13: Conference on Energy Storage User Needs and Technology Applications, Asilomar Conference Grounds, Pacific Grove, Calif. Contact: Engineering Foundation, 345 E. 47 St., New York, N.Y. 10017.
Feb. 8-15: International Furniture Show, London.
Feb. 26-27: Conference on Mandatory Continuing Education for Professionals, Pick-Congress Hotel, Chicago. Contact: Don Moore, 114 Illini Hall, University of Illinois, Champaign, Ill. 61820.
Mar: 31-Apr. 2: Conference on the Conservation of the Older Courthouse, St. Louis. Contact: Cheryl I. Krieger, National Trust for Historic Preservation, 507 S. Dearborn St., Suite 710, Chicago, Ill. 60605.

Deaths

William A. Bowles, Charlotte, N.C.
Robert J. Brocker, FAIA, North Huntingdon, Pa.
Philip P. Cazale, Metarie, La.
Douglas W. Freeth, Honolulu
Joachim W. Hilton, West Orange, N.J.
R. Maxwell James, Buffalo
Richard Jordan, Ramsey, N.J.
Albert Micklewright, Trenton, N.J.
Clyde C. Pearson, FAIA, Montgomery, Ala.
Jasper Russett, Anchorage
Jack Shapiro, Flushing, N.Y.
Charles S. Spector, Great Neck, N.Y.
G. S. Voinovich, Cleveland
Horace M. Weaver, Trussville, Ala.
Addison Worthington, Annapolis, Md.

Loring H. Provine, FAIA: A member of AIA's board of directors in 1943-46 and chairman of the committee on awards and fellowships, Provine was head of the department of architecture at the University of Illinois at Urbana/Champaign for 35 years. He died on Oct. 19 at the age of 95. He was a pioneer in education for fire protection and was instrumental in the establishment at UIUC of the nation's first fire college, serving as its director for many years. He was a consultant to the National Board of Fire Underwriters and was a major contributor to several editions of the board's building code. Active in professional and civic affairs, he was president of the Association of Collegiate Schools of Architecture from 1945 to 1947 and for 20 years was chairman of the Illinois architects' examining committee.

Carlos Raul Villanueva, Hon. FAIA, was called the dean of Venezuelan architects. He was best known, perhaps, for his design of the campus and buildings of the Universidad Central de Venezuela in Caracas, where he founded the school of architecture and planning and taught design for many years. He received medals, prizes and honors for his designs, not only in Venezuela, but also in Europe and throughout the Americas. Born in England and educated in France, he made a major contribution to the new Venezuelan architecture in the post-World War II years and had a profound influence on several generations of students and architects. When he died on Aug. 16 at the age of 75, Venezuelan President Carlos Andrés Pérez declared three days of national morning in tribute to an outstanding citizen. He was founder and president of the Venezuelan Association of Architects, honorary president of the College of Architects of Venezuela and president of the National Board for Historic and Artistic Protection and Conservation. He was a founder and director of the National Planning Commission, and directed the design of public housing across the country.

Newslines

Harry A. Anthony, AIA, professor and chairman of the department of urban planning, school of environmental design, has been named outstanding professor for 1975 at California State Polytechnic University, Pomona.

Ernest Langford, FAIA, who served Texas A&M University for half a century and was head of its school of architecture for 32 of those years, was recently honored by the university's board of regents when a major facility now under construction was named the Ernest Langford Architectural Center. For 24 years, he was mayor of College Station, where the university is located.

The University of Florida is seeking a dean for its newly formed college of architecture. The new college is an outgrowth of the previous college of architecture and fine arts, which has now been divided into two entities. Applicants may write to the chairman of the search committee, Bill G. Eppes, AIA, College of Architecture, 101-C AFA Complex, University of Florida, Gainesville, Fla. 32611.

The New York chapter/AIA is seeking applicants for its 1976 Brunner scholarship award, which is open to any U.S. citizen engaged in the profession of architecture and its related fields. The successful candidate will be awarded up to $5,000 to finance his or her study in the "practice, teaching or knowledge of the art and science of architecture." Application forms are available to Jan. 16, 1976 from: New York Chapter/AIA, 20 W. 40th St., New York, N.Y. 10018.

Over 100 fellowships for women are offered by the American Association of University Women's educational foundation. Twenty fellowships will go to women in their final year in professional fields, such as architecture and environmental design; another 80 fellowships are aimed at helping women complete dissertations at the doctoral level or to follow postdoctoral study. For the 1975-76 academic year, AAUW awarded $454,000 in fellowships to 104 women; five of the recipients are working in architecture and environmental design. Deadline for applications for 1976/77 is Jan. 2, 1976. Information may be obtained from AAUW Educational Foundation Programs Office, 2401 Virginia Ave. N.W., Washington, D.C. 20037.

There is an opening for the position of chairman of the department of architecture, school of fine arts, at Miami University, Oxford, Ohio. Qualifications include a master of architecture degree or equivalent; architectural registration or professional equivalent; administrative or managerial experience, and teaching experience in an accredited architectural program. The credentials deadline is Jan. 15, 1976. Address inquiries to: Charles L. Spohn, Room 113, Hiestand Hall, Miami University, Oxford, Ohio 45056.

Rural America, Inc., is the name of a new nonprofit organization formed "to encourage and carry out research, educational and technical assistance programs and other activities designed to promote the economic and social welfare of people living in small towns and rural areas." The organization grew out of recommendations made at the first national conference on rural America held in April. For more information, write Rural America, 1346 Connecticut Ave, N.W., Washington, D.C. 20036.

Louis Sauer, FAIA, of Philadelphia, recently participated as a panelist in a seminar on "Planning and Building the Interior Environment" in conjunction with the U.S. exhibition on "Technology for the American Home" in Moscow. The program, sponsored by the U.S. Information Agency, was the first of its kind in the field of housing and was designed to provide an interchange of information and understanding between the U.S. and the U.S.S.R.

The Annual Fire Protection Reference Directory is a comprehensive guide to fire protection products—and who makes them. The 1975/76 edition is now available from the National Fire Protection Association, 470 Atlantic Ave., Boston, Mass. 02210. The price is $10 per copy, with discounts for orders of 25 or more.

The 1975 edition of "One and Two Family Dwelling Code," published by the nation's three model code organizations, is now available. Orders may be addressed to Building Officials & Code Administrators International, 1313 E. 60th St., Chicago, Ill. 60637 ($7 for BOCA members; $8 for nonmembers).

Training courses in conservation/restoration are offered annually by the International Centre for Conservation in Rome. The courses include a six-month program in architectural conservation beginning in January which is open to architects, architectural historians, archaeologists, engineers and planners. The program emphasizes "methodology, teamwork and comprehension of the problems involved in conserving historic centers as living parts of the urban environment." Applications received by Jan. 15, 1976, will be considered for 1977 courses. For information, write International Centre Committee, 1522 K St. N.W., Suite 1030, Washington, D.C. 20005.

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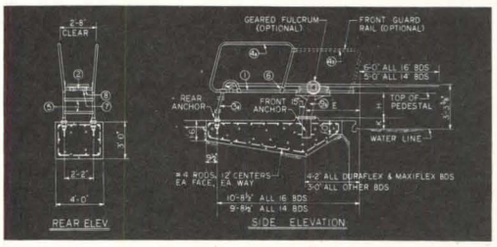

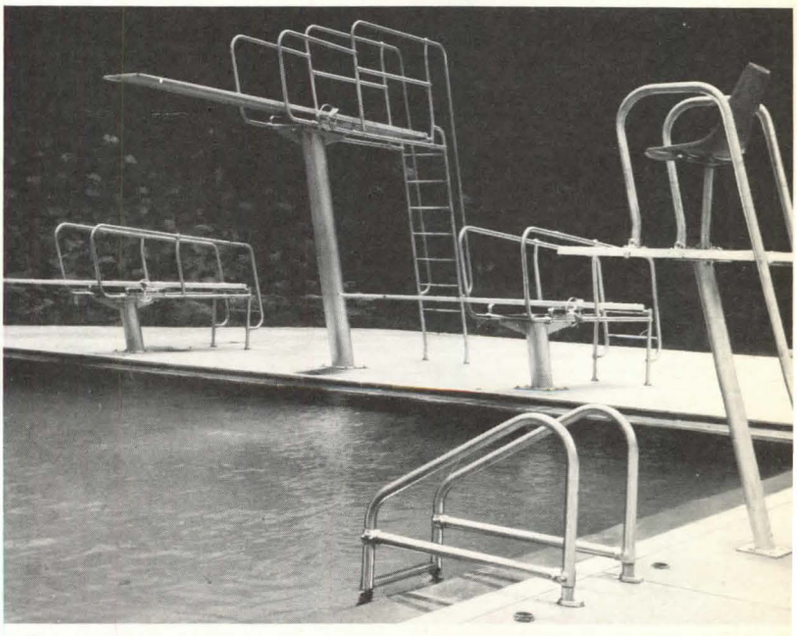

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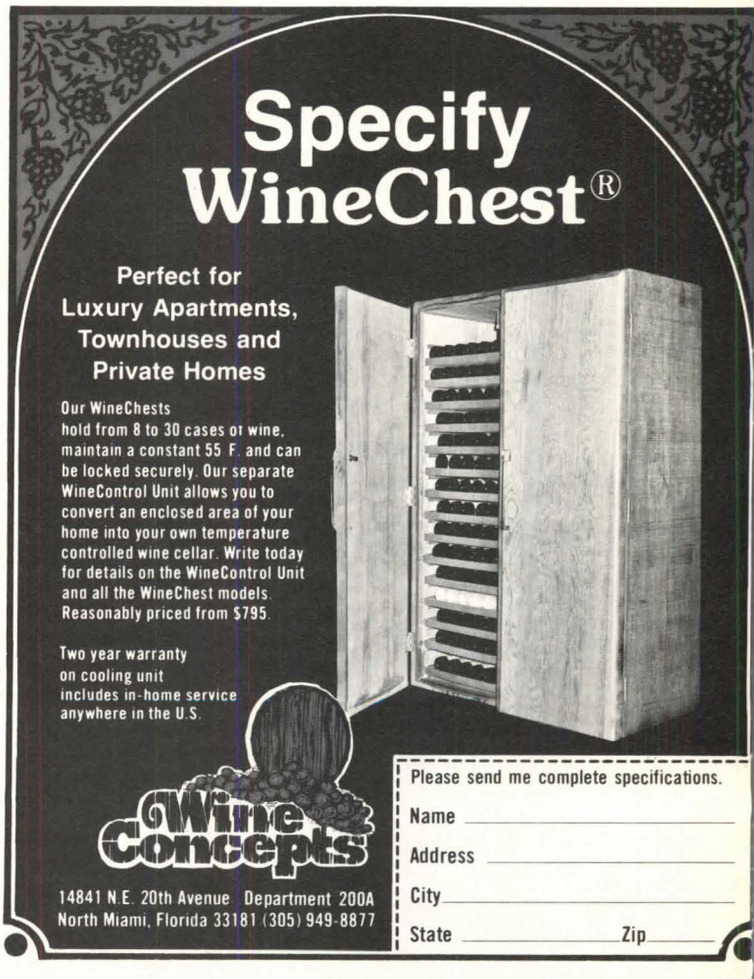

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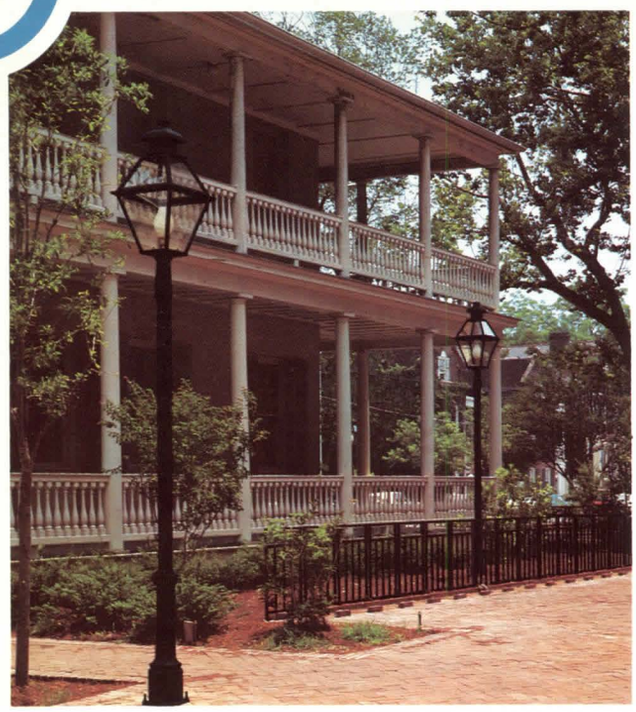

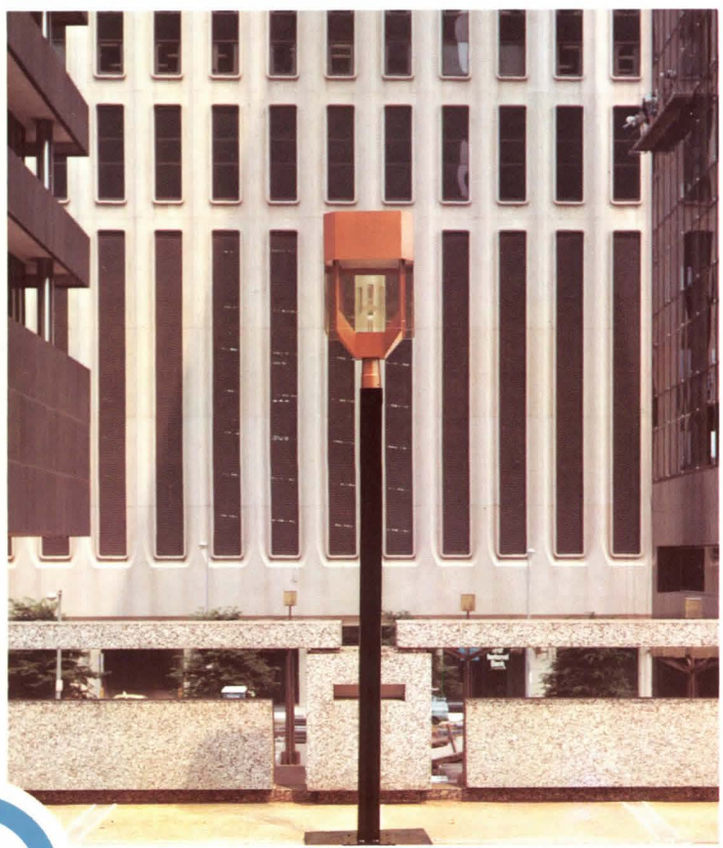

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When Jack W. Blumenfeld and Company planned Timberlake, a luxury apartment community, they wanted to create a great place to live at a price everyone could live with. That's why they chose open web steel joists.

Located in East Norriton Township, outside of Philadelphia, Timberlake consists of two eight-story structures, each L-shaped, with 318 units now under occupancy. An additional two seven-story structures are being built by Neil Construction Company. Bernard Schwartz and Associates are the structural engineers.

Three hundred tons of steel joists went into each structure. According to estimator and purchasor Anthony R. Laudadio, steel joists were chosen because "they're very economical. Plus they give more flexibility in electrical and mechanical installations between floor and ceiling."

The story isn't new, but it keeps on growing. Across the country, builders choose open web steel joists for economy, design flexibility, fast erection, ease of future expansion and convenient installations.

We have complete details on the many advantages of steel joists. Get the complete facts in our latest edition of Specifications and Load Tables for Open Web Steel Joists, Longspan Joists and Deep Longspan Joists.

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Please send me your new copy of Specifications and Load Tables.

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