February 1953

Urban traffic forum  How can cities save themselves from strangling in their own congestion? (p. 110)
New thinking on parking garages  Main street's ugly duckling puts on the architectural dog, offers a profitable answer to the parking problem.
A reference article with seven case studies (below and p. 120)
Drive-in bank  From the design of gas stations and tollgates: a new building type (p. 107)
Building engineering  Why does the space frame promise greater design freedom, and lower costs in the new era of building? (p. 150)
School-hospital-guardhouse  Design of Philadelphia's newest civic building is a triple tonic for juvenile delinquency (p. 101)
Our new crystal towers  Critical appraisal of the diverse uses of glass in the buildings of Frank Lloyd Wright, Eero Saarinen, Mies van der Rohe and Skidmore, Owings & Merrill (p. 142)
Walls in the Governor's Reception Room, California State Capitol (upper photo) walls, banquettes, chairs and bar of the Engineer's Club Cocktail Lounge, Dallas, Texas (lower photo) beautified with Kalistron, made by Kalistron, Inc., and distributed by U. S. Plywood Corporation and U. S. Mengel Co.

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NEW THINKING ON PARKING GARAGES

An analysis of the economic and design factors which have raised the garage from the lowly level of the stable to today's booming building type, including two ramp garages (Downtown Auto Park in Minneapolis by Larson & McLaren, architects; and Hecht's Department Store in Arlington by Abbott, Merkt Co.) and five mechanical garages (Porkomat, Pigeonhole, Bowser, Rotogarage and Alkro).

OUR NEW CRYSTAL TOWERS


MODULAR OFFICE BUILDING

Meat Board headquarters in Pretoria, South Africa is planned on a 3'-5" unit for flexibility and raised stilts to provide parking space. Architect: H. E. Stauch.

BUILDING ENGINEERING

Trend toward space-frame structure presages a revolution in architecture—a symposium featuring the experiences and opinions of England's Structural Engineer Felix J. Samuel and a score of other leading engineers and architects.

REVIEWS

PRODUCT NEWS

TECHNICAL PUBLICATIONS

208
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Functional use of daylight was achieved through window arrangement and purposeful positioning of the building. Built side by side, corridors and classrooms all have outside exposures. Classrooms face north utilizing diffused indirect north light. Corridors take the shape of window walls from floor to ceiling with a southern view and on one side open strips at the top of the inner walls of classrooms admit "borrowed light" from the corridor areas. Corridors become pleasing sun-lit passageways strikingly different from the dark tunnels so prevalent in central corridor schools.

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ARCHITECTURAL FORUM • FEBRUARY 1953
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FIGURE cost-per-use—and you’ll find Douglas fir plywood your most economical form material.

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When re-use, speed and cost count—specify fir plywood forms.

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- Plywood forms create smooth, finish-free surfaces
- Economical! Plywood forms can be used over and over
- Plywood forms speed work—save time and labor
- Plywood is strong, rigid—yet light, easy to handle
- Plywood forms are puncture-proof, water and mortar tight
- Plywood has superior nail and tie holding properties
- Plywood is easy to work with hand or power tools
- Plywood provides sheathing and lining in one material

PLYFORM
GRADE FIR PLYWOOD

These registered trademarks identify concrete form fir plywood. INTERIOR PLYFORM (highly moisture-resistant glue) gives multiple re-use. For maximum re-use, specify EXTERIOR PLYFORM (100% waterproof glue). Other panels, for maximum re-use plus smoothest possible surfaces, include new plastic-surfaced and hardboard-faced fir plywood, identified by the star-and-link industry hallmark of quality.

PANEL DISCUSSION
Plywood Concrete Forms
Speed Work On Rush Job

Plywood concrete form panels were credited with helping speed formwork time by up to 20 per cent in building the new Tracy Pumping Plant which furnishes the heartbeats of the giant California Central Valley irrigation project.

According to Fred L. Weiss, construction engineer on the job for Stolte Co., contractor responsible for all concrete work, speed was particularly important on the job because of a penalty clause in the contract. He credits plywood with speeding form construction and application time and costs by 15 to 20 per cent.

Interior PlyForm was specified by Bureau of Reclamation engineers for form work on the plant. Built-up plywood form sections, 20 to 40 feet long, were reused an average of five times on the walls. Interior PlyForm was also used to form floor slabs as well as water inlet channels beneath the plant.

Plywood Ideal Form Material
Reports Highway Builder

A typical use of plywood forms in highway projects is the six-lane Stanley Drive highway underpass in Northern California—built jointly by M and K Corporation and Eaton and Smith. The builders used 3/8" Interior PlyForm for all exposed surfaces for this half million dollar project.

"We wouldn't use anything but plywood for a job like that", says M and K Corporation President B. F. Modgilin. "As far as we are concerned it is the ideal form material. It forms clean, smooth concrete, saves time and labor, and re-use cuts costs considerably."

Forms 16-feet high, 2x4-feet wide at the bottom and 4-feet, 7 inches wide at the top were used for the ends of the bridge piers. Plywood was nailed across 2x4 and 4x4 studs, 12" o.c., backed by double 2x4 and 4x4 walerls. Panel's for road slab were placed across 2x12 joists.
Standard Tie-Hole Spacing Gives Extra Re-Uses

Careful planning of tie-hole spacing and use of varying-size plywood form sections is paying off in extra re-uses on the Clover Park School job in Tacoma, Wash. On the job, 8'-long Exterior plywood form sections were pre-built in 3', 4' and 5'-heights to form concrete walls of the school which range in height from 2' to over 16'. Necessity of drilling new tie-holes for each pour was eliminated by pre-drilling holes so that placement of tie-rods is standardized. Holes were made by stacking plywood and drilling with a template positioning guide.

The idea was developed by Roy Hartman, partner, Standard Construction Company, Tacoma. He reports that by eliminating drilling and form re-construction as the job progressed they were able to get better than 25 re-uses—and the plywood will give additional uses on subsequent jobs.

Plywood Girder Built For Half The Cost Of Steel Truss

Once believed suitable for spans up to only about 60 feet, plywood girders considerably longer are now being used successfully. One of the longest plywood girders currently in use is at the Chief Joseph dam powerhouse in Western Washington. The plywood girder on this job is used to support conveyor belts which carry aggregate to blending bins. It is 120 feet long, with a 90-foot center span and cantilevered ends.

According to Murray Johnson, plant design engineer for Columbia River Constructors, an affiliate of Morrison-Knudson Co., Inc., plywood girders not only cost less than steel trusses, but are far easier to handle and hoist into position.

Johnson estimates that including material and labor, the plywood girder cost only about half as much as a steel truss for the same job. They can be easily salvaged for re-use simply by cutting them in half for hauling and splicing as needed.

The girder on the Chief Joseph job is on the upper run of an incline going up to the hopper. It consists of two I-beams spaced 3' 3" apart. It carries a 30' wide rubber belt on the top flange, together with 2x6s bolted and glued on either side of the plywood to form the flanges. Plywood splice plates on both sides do double duty as web stiffeners.

Cast Smoother Concrete With Plywood Forms

Plywood's large panel size reduces joints and fins to the absolute minimum. That's one reason why concrete surfaces formed against plywood are smooth, uniformly attractive. With plywood, you get no unsightly board marks. Concrete is free of fins. Finishing is simple—often unnecessary—when you use plywood forms. That means savings plus smoothness!

And remember: new overlay panels of Douglas fir plywood now mean even smoother concrete surfaces—plus maximum re-use. See grade data below. For further information, write Douglas Fir Plywood Association, Tacoma 2, Washington.

Only Plywood Offers All These Advantages

- Plywood forms create smooth, fin-free surfaces
- Economical! Plywood forms can be used over and over
- Plywood forms speed work—save time and labor
- Plywood is strong, rigid—yet light, easy to handle
- Plywood forms are puncture-proof, water and mortar tight
- Plywood has superior nail and tie holding properties
- Plywood is easy to work with hand or power tools
- Plywood provides sheathing and lining in one material

PLYFORM GRADE FIR PLYWOOD

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DOUBLE-PEDAL MIXING VALVE. This wall-mounted, self-closing valve brings added convenience to many hospital fixtures. With the heel acting as a pivot, one foot controls both water flow and water temperature, leaving hands completely free. You get maximum water flow with only 1½" pedal travel. For easy floor cleaning, pedals can be suspended at 45° angle.

NEW DRESSLYN LAVATORY-DRESSING TABLE. This handsome unit is compact, yet spacious. The cabinet is made of moisture-resistant wood finished with enamel; the lavatory is genuine vitreous china ... both are available in white and 20 harmonizing color combinations. Counter top and splash back are enameled steel.

REMOTAIRE ROOM CONDITIONER. This remote type unit for multi-room installations heats in winter, cools in summer, filters and circulates the air all year 'round! Individually controlled units use chilled or heated water supplied through a simple piping system from a central water chiller and heating plant ... no unwieldy ductwork needed.

DUWELL SINK. This apartment-size, single-well sink has a built-in covered waste receptor with lift-out basket. The perforated basket drains into the waste receptor ... garbage can be emptied simply by removing the basket. The 25" x 21" sink is made of rigid cast iron coated with acid-resisting enamel.
Reavis High School chooses Leader fine lighting for schools is exemplified by the installations made in the recently completed Reavis High School, Oak Lawn, Illinois. Leader fixtures are completely "at home" in these school interiors which embody the latest ideas in modern design. The VARSITY, a luxury fixture at a budget price... the OFFICER, outstanding for efficiency and beauty... the CORRI-LITE, unique for attractive lighting of corridors... these are some of the Leader units chosen for this beautiful new high school building.

Check the details on these fine LEADER fixtures:

- **VARSITY** (shown above) — Steel channel, baffle-type steel louvers. Choice of steel or plastic side panels. 25°-35° shielding (other shielding angles on request). For 2 lamps, in choice of 48", 72" or 96" length.
- **OFFICER** — Steel channel, curved translucent plastic side panels. 40° x 40° shielding provided by injection moulded plastic louver. For 2, 3 or 4 lamps, in lengths from 48" to 96".
- **CORRI-LITE** — Channel and unusual style baffles of steel. For single Slimline lamp in 48", 72" or 96" length.

There's a Leader lighting unit for every school need... scientifically designed to provide abundant light output, correct shielding, ease and flexibility of installation, economy of first cost and maintenance. If you have school lighting problems, either in new construction or in remodeling, look to Leader for the best solution.

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LEADER ELECTRIC COMPANY • 3500 North Kedzie Avenue • Chicago 18, Illinois
WE LOST A $21,000 ORDER

The bronze plaque shown here was presented to the Rayen School authorities to mark the historic decision reached by the Ohio Board of Building Standards in making it legal to install UNIVENTS in Ohio Schools.

1921 — the installation of the now famous UNIVENT in the Rayen High School, pictured above... marked a new era in practical and healthful heating and ventilating in America's schools. The design of the UNIVENT provided "classroom climate" far superior to anything then available. Even today... these same units were found to be in perfect working order. The illustration on the left — shows one of the original UNIVENTS installed in 1921 — and still working perfectly.
This is a story . . . and a true one . . . of how Herman Nelson lost an order and liked it. This little story will also illustrate very clearly how advanced and how much better HERMAN NELSON equipment is . . . and always has been!

Way back in 1921 Herman Nelson engineers installed sixty unit ventilators—then called "Univents"—in the Rayen High School at Youngstown, Ohio. Those early "Univents" were engineered to rigid standards designed to solve the ventilating problems of a new school modern to that era. They were the best ventilators on the market—years ahead in design!

Thirty years later the Youngstown school authorities, as part of a modernization program, were ready to replace these pioneer "Univents" with new Herman Nelson DRAFT STOP units.

At this point Mr. S. R. Kreps—who had watched these Herman Nelson "Univents" give trouble-free performance all these years—decided to investigate. Mr. Kreps is Superintendent of Buildings and Construction, a veteran of 40 years in Youngstown schools.

His investigation and subsequent report found: The original, 30 year old "Univents" were still performing their daily task of heating and ventilating the school rooms economically and with complete satisfaction. They still met the best ventilating standards according to the needs of this older type school where window glass areas were smaller and draft problems not serious.

Here was the finest testimonial to the farsighted leadership of Herman Nelson equipment possible. It backed up what we have always claimed—that Herman Nelson equipment is years ahead in design. We were pleased with Mr. Kreps' report. We were happy to lose the order.

Of course if you are planning a new school—it will pay you to specify the successor to "Univent"—the Herman Nelson DRAFT STOP—as far ahead today as was the "Univent" thirty years ago. DRAFT STOP is a unit ventilator that cools as well as heats and at the same time performs this added task . . . it eliminates drafts characteristic of modern school-rooms with their large areas of glass.

If you are planning a new school or a school modernization program—it will pay you to choose Herman Nelson DRAFT STOP—the unit ventilator designed to keep children learning—in health and comfort. Please write Dept. AF-2, Herman Nelson Unit Ventilator Products, American Air Filter Company, Inc., Louisville 8, Kentucky.

1953—the typical modern classroom, pictured above, with its huge window areas presented new and complex heating . . . ventilating and cooling problems. Once again Herman Nelson provided the practical solution with the development of the now widely accepted DRAFT STOP unit ventilator . . . the finest heating, ventilating and cooling system ever designed!
Solid Olsonite seat Numbers 5 and 10 were specially designed for industrial and commercial installations. Extra-heavy, one-piece construction eliminates joints, seams, and crevices—no weak spots to break or crack. Hinges are covered with matching Olsonite, leaving no exposed metal to rust or corrode. Model Numbers 5 and 10 are available in either white or black, for regular or elongated bowls.

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Yes, you get plenty of action — fast action — out of ADSCO Water Heaters. They operate best when connected according to the typical piping arrangement shown above, with two ADSCO Y-type Strainers to protect valuable equipment and an ADSCO Dual Steam Trap to handle condensate efficiently.

ADSCO Water Heaters have only three parts: shell, tube bundle, and cover. All are made to ADSCO's high standards. Steel shells are seamless steel pipe, carefully cut and welded by skilled workmen. The shell flange is sturdy and accurately machined and all openings are precisely located. The tube bundles are made of pure, dezoxidized seamless copper tubes formed into U-bends. By means of electrically and automatically controlled equipment, they are rolled and expanded into carefully drilled tube sheets which have a diamond pitch arrangement for spacing of tubes. The semi-steel covers are high-tensile, fine-grain castings.

For further information, write for Bulletin 35-78 on Instantaneous Heaters or Bulletin 35-77 on Convertors.

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North Tonawanda, New York
Since 1877
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THE MAGAZINE OF BUILDING
Aggregate Transfer Method adds Warmth and Color to Architectural Concrete

Aggregate transfer is a simple, economical method that enables the architect to design enduringly beautiful buildings in architectural concrete with the added warmth of color. Information describing this method is available in a free, 12-page booklet distributed only in the United States and Canada.

Our technical staff will help architects obtain desired results from this method or any phase of concrete construction.

PORTLAND CEMENT ASSOCIATION
Dept. A2-7, 33 West Grand Avenue, Chicago 10, Illinois
A national organization to improve and extend the uses of portland cement and concrete ... through scientific research and engineering field work.

Aggregate transfer imparts a warm yellow to spandrels and floor edges (above) and entrance walls (below) of the Le Bonheur Children's Hospital, Memphis. The same colored aggregate and pigment were used in column concrete. Architect: J. Frazer Smith, Inc., Memphis. Contractor: Harmon Construction Co., Oklahoma City.
RECOMMENDS AND USES

GALVANIZED AND BONDERIZED

Galvanized, Bonderized steel is furnished only when specified because this highly corrosion resistant steel costs, on the average, fifty percent more than plain steel without this treatment, but the installed cost of toilet compartments of this material is only approximately ten percent more.

...Lasts three to five times longer

Galvanized, Bonderized steel is notable for: (1), the positive adhesion it provides for synthetic enamel when baked-on to the basic metal, and (2), for enduring resistance to corrosion. There is a considerable difference in durability or service life between a sheet of basic metal that has been galvanized and Bonderized and a bare untreated sheet of metal, or a sheet of metal that has been given only a Bonderized coating. A Bonderized coating applied directly to the basic metal, without a galvanized coating under it, does not provide the degree of corrosion resistance that Sanymetal considers to be necessary for the construction of toilet compartments. Sanymetal recommends and always uses galvanized and Bonderized steel when it is specified for toilet compartments with baked-on enamel finish.

...Costs less for extra years of service life

Whatever saving in first cost the use of a material, such as untreated cold rolled steel, may effect, it is likely to be entirely wiped out by: (1), the increased cost of maintenance and (2), by cost of a replacement required at an earlier period due to untimely depreciation of a material having a relatively shorter service life than galvanized, Bonderized steel. When a sheet of basic metal has been fully protected by a galvanized coating and a Bonderized coating, it is given a primer coat and finish color coats of synthetic enamel baked-on, which provide more protection for the basic metal and give a perfectly smooth, lustrous, protective finish.

*Treated with "Boniderite", a product of Parker Rust Proof Company.

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ACOUSTICAL MATERIALS AT WORK

ARIZONA STATE TEACHERS COLLEGE, Tempe, Arizona

Architect: Edward Varney
General Contractor: Daum-Donaldson Construction Co.
Acoustical Contractor: Barrett & Homes

Low-cost, functional design characterizes the new Administration Building at Arizona State Teachers College. In the lobby, the open architectural plan is made more practical by the sound-absorbing ceiling of Armstrong's Cushiontone. Cushiontone, a perforated wood fiber tile, has also been installed throughout the classrooms, laboratories, and hallways of the building. It's high acoustical efficiency and low cost made it a logical selection for the architect. Other important features of Cushiontone are its repaintability, high light reflectivity, and ease of installation and maintenance.

Armstrong offers the most complete line of acoustical materials available. Your Armstrong Acoustical Contractor will be glad to give you free, expert assistance with any of your sound-conditioning problems. For the free booklet, "How to Select an Acoustical Material," write to Armstrong Cork Company, 5402 Stevens Street, Lancaster, Pennsylvania.

ARMSTRONG'S ACOUSTICAL MATERIALS
Ikemen begin killing controls, try to cut federal construction

It was the biggest month of change for construction since the Korean war. In its first four weeks in office, the Eisenhower administration acted decisively to apply Republican ideas to the nation's economy:

- The Treasury, refunding $8.8 billion of the national debt, moved to let interest rates rise upward by exchanging 1 1/2% treasury certificates for $619 million of medium-term bonds at 2 1/4% and $8.1 billion one year certificates at 2 1/4%.
- Prices, wages and production were freed from controls that industry had cried so long were unnecessary (see below).
- Budget Director Joseph Dodge jarred the vast federal bureaucracy from top to bottom with a major economy drive (see p. 42). It included orders to review and reduce federal construction, clamped a semi-freeze on hiring.
- Charting the future, President Eisenhower recommended that rent control be allowed to die April 30 except in "so-called defense areas" (see col. 3). There seemed little doubt that Congress would agree, although the President's remarks were so vague there was confusion over exactly what he really meant.
- Yet none of the actions seemed likely to do much to push the US economy off what White House economists call its present "knife-edge." Eisenhower set the course in his state of the union address: "It is axiomatic that our economy is a highly complex and sensitive mechanism. Hasty and ill-considered action of any kind could seriously upset the subtle equation. . . . Action must be gradual."

Most economists thought a high level of construction was still an indispensable part of prosperity that the GOP must maintain or risk losing its political power.

**CMP open-ended; wage, many price controls die**

Said Dwight Eisenhower in his guidepost state-of-the-union message: "The weight of evidence is clearly against use of controls in their present forms. . . . Accordingly, I do not intend to ask for a renewal of . . . wage and price controls on April 30. . . . Meantime, steps will be taken to eliminate controls in an orderly manner. . . . Material and product controls should be ended except with respect to defense priorities and scarce and critical items essential for our defense."

The orderly elimination sped into being so fast it left bureaucrats gasping. Cried one officeholder: "I don't know where we're going, but we're damn sure on our way." In two weeks, the new administration made these sweeping changes in controls that affect construction:

**Prices**—Ceiling prices were abolished on all but 17% of the items (weighted by value) that go into BLS' cost of living Consumer Price Index. Over half the items on BLS' wholesale price index were freed from controls. Among them: building materials (except metallic products), property management, construction services, prefabricated housing and other buildings, scrap metals. (Scrap copper went up 5¢ a lb.) Price lids so far remained on steel, aluminum and copper. Decontrol policy, said officials of the fast-shrinking stabilization agencies, would be to mix both hard- and soft-priced commodities together in successive waves of decontrol orders to soften the over-all impact.

**Wages**—Salary and wage controls were abolished entirely. With most construction labor contracts coming up for renewal in the spring, this could have a big effect on building costs. AFI, President George Meany, a former building trades man, was already on record that restudy of contracts was in order. Asst Managing Director J. D. Marshall of the AGC, however, contended the end of wage controls would make little difference. One reason: "Union leaders felt if they did not get the maximum of the government's permissive increase, they weren't doing a good job for their members." Now, there will be no such goal.

**Materials**—The Defense Production Administration was abolished—so fast that several top DPA men from the old administration had no advance warning. Dismantling of the Controlled Materials Plan began as Acting ODM Director Arthur Fleming ordered CMP open-ended at once. That meant anyone willing to gamble on getting on a mill schedule could proceed with any kind of construction without federal permission.

Another effect of open-ending was to void NPA's main enforcement weapon against violators of CMP orders: a reduction in future allocations. With a chance to get metal from CMP's open end, violators' plight was far easier, although steel mill schedules were still fairly tight. Notably, ODM did not give up its control over the level of production of different kinds of steel. It announced production directives will continue through June 30, when the Defense Production Act expires.

The administration had not yet made up its mind what kind of new production controls law to seek from Congress. For political reasons, the name CMP would probably be abolished. But much of its technique might remain. Best guess: a limited reporting and allocating machinery for military and atomic use, perhaps including use orders and prohibition orders to control scarce alloys. The outlook for construction steel, copper and aluminum was no hindrance at all.

**Congress ponders what Ike meant on rent control**

What did the President want to do about rent controls? In his state-of-the-union message, he declared: "I recommend the continuance [beyond April 30] of the authority for federal control over rents in those communities in which serious housing shortages exist. These are chiefly the so-called defense areas. In these and all areas the federal government should with-
draw from control of rents as soon as practicable. But before they are removed entirely, each legislature should have full opportunity to take over, within its own state, responsibility for this function."

The puzzle revolved around what Gen. Eisenhower meant by defense areas—the 131 critical defense housing areas where full-scale rent controls were in effect, or these plus 130 more defense rental areas which by local action kept more limited rent control alive after last Sept. 30. The 131 defense areas (pop. about 12 1/2 million) were created to cope with Korean war-housing shortages. The others (pop. about 34 million) were what is left of World War II rent control.

With no clarification forthcoming from the White House, pressure mounted for continued strong federal controls. Rep. Barratt O’Hara (D, Ill.) introduced a bill to extend controls to April 30, 1955. The local administrator asked that rent bids be kept in Washington, D. C. Likeliest of enactment was Sen. Homer Capheart’s standby controls bill which included rent control. Hearings were set for late in the month. If Congress passes it, rent control would die April 30 in all 261 areas, but could be revived at presidential discretion.

### Most federal agencies cry 'who, me?' as budget boss demands economy in building

When the Eisenhower administration decided to make good on its promise to cut down on the cost of running the government, building men joined in the general applause. The order was tough and explicit. Budget Director Joseph M. Dodge forbade government departments from exceeding their January rate of spending without his approval, clamped a semi-freeze on hiring, demanded a review of “existing programs” to cut expenses.

On construction, Dodge announced: “It is the policy to proceed only with projects which are clearly essential, and on such projects to employ the strictest standards of economy. All proposed or authorized construction projects on which work has not yet begun are to be reviewed and construction initiated only on those projects which meet these criteria. All going construction projects are to be reviewed according to the same criteria and appropriate action taken, including action to stop the work if this appears advisable.” By March 2, department heads must report how they are retrenching.

### AGC approval. Typifying industry reaction was the response of AGC President Arthur S. Hornor: “We believe that it is sound procedure to examine all public works—and other federal expenditures—and proceed only with projects which are clearly essential. This will give further assurance to the public that funds . . . are expended economically.”

But there was an underlying feeling of uneasiness among construction quarters. How long would awards of federal construction contracts be shut off? The federal public works program totaled $5.8 billion for the current fiscal year—about one-fifth of the nation’s building. If no awards were made for several months, would the delay offset economies? Contractors faced with the prospect of not getting the go-ahead signal until later in the year, with less good building weather remaining, could be expected to raise their bids.

### Freeze in defense. First indication of how thoroughly Ike meant business came from the Defense Dept., whose construction had most often been criticized for waste by Congress. Secretary Wilson ordered the Corps of Army Engineers and the Navy’s Bureau of Yards and Docks:

1. Not to award any more construction contracts after Feb. 7; 2. to compile lists of all work underway or contemplated with recommendations as to what could be canceled without impairing the national interest; 3. submit to Director of Defense Installations Frank Creedon a tabulation of “essential” projects which were not more than 20% completed on Feb. 10; 4. take the initiative in halting any project already commenced not considered absolutely necessary.

During the freeze, the services would be permitted to continue design work. They could keep on advertising for and accepting bids. Where military work of the utmost importance was involved, they could submit special appeals to the secretary for permission to proceed before the general all-clear signal.

### Skin-deep change? As the services began carrying out the order, there were plenty of signs that economy-thinking had not penetrated far. The Corps of Engineers suspended new awards for military construction. But it deferred similar action on rivers and harbors work and flood control, long favored by Congress.

Said R. Adm. Joseph Jelley, chief of the Navy Bureau of Yards and Docks: “The Navy only has 150 construction projects that will reach the bid-letting stage in the next six months. Their total cost is expected to come to $300 million. It is doubtful that any of this work will be stopped after we have reviewed it.”

The AEC, which ranks next to the military services in direct federal spending, withheld comment. Its construction expenditures estimated at $1.1 billion for the current fiscal year and tentatively fixed at $1.6 billion in the farewell Truman budget, were expected to remain substantially unchanged.

### The Veterans Administration was taking another look at its hospital program but doubted that it could do much economizing. VA had 15 new hospitals and 3 major additions (est. cost $189 1/2 million) under construction. It relied on pressure from Congress and veterans’ groups to balk any real curtailment. It only had one new building ready to go—a 1,000-bed neuropsychiatric hospital in Cleveland.

### $2 billion backlog. The only other federal agency which spends big money for building, the General Services Administration, sadly noted that the moratorium for them began 12 years ago. Even before World War II, public building came to a virtual standstill because of the greater importance of defense. The job of providing new living quarters for government agencies across the nation has not really been resumed since, except for a few must projects.

One was the new general accounting office in Washington, completed last year and promptly grabbed by the DPA and NPA. At the last count, GSA had a $2 billion backlog of authorized projects.

On construction involving federal aid, there was an air of uncertainty whether much economizing could be managed until Congress goes to the mat with the new budget. The question: since such work is handled by state or local agencies and involves large amounts of their own money, would it be proper for the federal government to wench on its part of the deal? More-
over, city fathers were beating on the doors of the Civil Aeronautics Administration for more airport aid money—which Truman budgeted for an increase from $14 to $30 million a year in his farewell budget. Local pressures for more highway aid mounted as the US road network fell farther and farther behind the supply of autos.

**Public housing as usual?** If such reasoning was plausible for joint activities where states and localities chip in on a fifty-fifty basis, it was stretching things to view the public housing program on the same basis. Unabashed, PHA proclaimed that its program for the current fiscal year was un touchable since its 35,000 units permitted by Congress were already committed, even though local contributions are virtually nil.

On balance, how much would the re-trenchment drive really trim federal public works? For fiscal 1954, federal public works including loans and grants had been fixed at $6.6 billion by the outgoing administration. Realistic observers thought a 10% cutback would be optimistic. Many doubted there would be more than a token stoppage of work in progress. Moreover, the Air Force and AEC were readying still more construction plans to the tune of almost $2 billion. While these proposals would undoubtedly be drastically reduced by Ike men, would either the Budget Bureau or Congress take the risk of entirely banning new work military men claimed was urgent? It looked as if the Eisenhower administration would have its hands full cutting federal construction.

**ORS suspends three after 'fire-rehire' pay exposé**

In typical fashion, whispering Sen. John J. Williams (R. Del.) told the Senate he had caught the Democrats with their hand in the cookie jar again. He charged that the Rent Stabilization Office fired 49 permanent employees on June 25, 1950, paid them $86,260 annual leave due them, then rehired all 49 next day at their old salaries, same jobs.

Williams said ORS General Counsel Edwin D. Dupree Jr. got one of the biggest payments, $3,654. Others, he charged, ranged from $330 to $3,681. Although nobody was accused of breaking the law, ORS took prompt action. William G. Barr, taking over as acting rent director when James McI. Henderson resigned, suspended Dupree and two other agency executives.

Congress had unknowingly closed the loophole in the law which permitted the firing-hiring when it reorganized the system of annual leave last year. The change provided that bureaucrats cannot accumulate annual leave, cannot be rehired after leaving until their annual leave expires. For years the Defense Department had used a method of determining payments for professional architectural and engineering service that the AIA and the ASCE considered arbitrary and inadequate. Firms given military assignments were paid on the basis of their estimated costs plus 10%. Architects felt the armed services tended to underappraise items like overhead, partners' time, and contingencies. Moreover, since Korea, the design professions complained, some defense agencies were shifting to competitive bidding, putting architects on the same basis as nuts and bolts.

Last month, the Pentagon proudly proclaimed that the Army, Navy and Air Force construction agencies had adopted a uniform system that should make everybody happier. The sole criterion would be the professional qualifications of a firm—based on its history, location, capacity to finish on time, and existing volume of defense work. Procurement officers would list firms they think can handle each job, negotiate with them in order of preference.

But when architects and engineers took a close look at the Defense Department orders on how to negotiate fees, doubts arose that the deal was really new. The new plan was built around cost curves that the Corps of Engineers and Bureau of Yards & Docks had been preparing for years. Included was a sliding scale for fees, starting below 10% for easier jobs and going somewhat above it for difficult ones. But the military clamped secrecy on all the details, pleading that this would hamper their bargaining. For work that could not be related to previous construction experience, such as foundation surveys or master planning, the individual appraisal method would still be followed. A lot of architects were still unhappy.

**AIA begins 3-yr., $100,000 public relations program**

AIA's three-year, $100,000 public relations program got into motion last month. Its twofold aim: making the public more familiar and more appreciative of architects' work; educating architects in the fundamentals of good public relations.

The education began Jan. 22-24 at sessions of the Gulf States regional council, New Orleans chapter and Louisiana Architects Assn. Walter Megronigle of Ketchum Inc., Pittsburgh public relations firm hired to direct the national program, explained how Ketchum representatives will circulate among regional AIA groups and eventually individual chapters to advise them of techniques, arrange workshops and clinics, issue information sheets and publicity instruction packets. Reported Gulf States AIA Director Walter Eichenbaum: listeners were "inspired," called the sessions "one of the finest instances of the institute serving members."

Megronigle helped the regional council plan the theme and pick its fall conference speakers for best public relations results. Sample: he persuaded them to change the conference's title from "Regionalism" to "Serving the People of the New South through Architectural Progress."

Chairman John W. Root of AIA's public relations committee declared: "We hope to work with any one of the national committees that has a public relations program. The national program should be a program of good public relations, a program that touches the people and it will touch them. If we can do that, we will be happy."

**National program**

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relations committee said Ketchum will supplement rather than take over activities performed at institute headquarters. No direct national advertising will be undertaken by AIA, he said, but it is anticipated that Ketchum may be able to persuade materials manufacturers and other national advertisers to salute the profession, describe its achievements in some of their copy, broadcasts and TV shows.


Ohio city refuses water for suburban shopping centers

The struggle between city and suburb touched Elyria, Ohio. The city council refused to sell water to two multimillion dollar shopping centers going up in nearby Sheffield township. Reason: the council feared the competition would steal trade from Elyria stores. Moreover, it noted the shopping centers would pay Elyria no taxes.

Winner loses, all but kiss

When Mrs. Shirley Howdeshell Malone, 17, Muskogee, Okla. high school senior and bride of three weeks, was adjudged winner over 17,000 other contestants in NAREB's essay-writing contest, she got a free trip to a gala reception in Washington.

But as Shirley read her essay on "What the Bill of Rights Means to Me" before NAREB's annual banquet, somebody thought it sounded familiar. Checking, NAREB soon discovered nearly nine-tenths of it was cribbed from a magazine article by Dean Russell in 1948 and subsequently reprinted by the Foundation of Economic Education. "Highly embarrassed," NAREB canceled what was left of Shirley's reception, took her entry powers. Hereafter, when a tenement owner claims that a tenant controls a portion of his property, inspectors can hold the tenant in violation of the regulation if he refuses permission for them to see it.

Chicago housing court. Other rehabilitation developments:

Chicago opened an emergency building and neighborhood conservation court to help check deterioration by speeding consideration of serious fire, health and building law infractions. The city's regular building and housing court, in operation since 1906, was clogged with thousands of lesser violations. The city awarded contracts for demolition of 21 decrepit buildings, would sue the owners for the costs if they failed to reimburse the city.

Miami, the first city in the US to establish a slum clearance department (AF, Oct. '52, News), began operations on a budget so small ($29,000 a year) that Director F. A. Kelly and five aides were still chiefly building files and marking time. Kelly, 52, a retired New York policeman, came to the $7,500 post from city's building division.

Redevelopment plans aired in Boston, Philadelphia

Plans to build new life into two of the US's oldest big cities were divulged this month.

Boston started toward redeveloping 28 acres of surplus Boston & Albany railroad yards into a Rockefeller Center-type commercial complex in the middle of the crowded city. Roger L. Stevens, one of the trio that bought the Empire State Building in 1951, signed an agreement to buy the property for $41.5 million. His preliminary plans envisioned a hotel, two skyscraper offices, a convention hall, theater, underground garage, at least one store building and possibly a physicians' building. Estimated cost: $73 million. Bostonians figured it could become the biggest thing there since Paul Revere's ride.

Philadelphia was shown an "adaptation" of its planning commission's Penn Center redevelopment plan for the Broad St. Station-Chinese Wall area (AF, June '52), now being torn down. The scheme (see cut) was prepared for the Pennsylvania Railroad.

New NAREB president warns time grows short for private industry to clear slums

In the ballroom of Washington's Statler Hotel, Charles B. Shattuck of Los Angeles last month took office as NAREB president, threw out a sharp challenge to fellow realtors in his inaugural talk: "Either we come up quickly with worth while programs for building an even better America and make those programs effective for all the people, or we may never again have the opportunity or be able to justify keeping the federal government out of our individual private affairs." Shattuck urged every local realtor board to make elimination of substandard housing conditions its No. 1 project for 1953. (At their Chicago convention, homebuilders had already pledged a "crusade" for enforcement of local housing laws with the same aim.)

Rehabilitation council. To back up his words, Shattuck announced formation of a Build America Better Council headed by former NAHB president Fritz Burns. Council objectives: more speed for the rehabilitation drive; enlisting widespread civic support for aggressive enforcement of ordinances that outlaw sub-standard housing conditions; planning means for promoting privately financed neighborhood conservation, reclamation and redevelopment; recommending local, state and federal tax assistance to encourage this work; solving traffic and parking problems that often worsen blight.

NAREB also urged making tenants subject to fines when they are responsible for housing and sanitary offenses. Moving in that direction, the District of Columbia adopted regulations effective next month giving health inspectors greater right of entry powers. Hereafter, when a tenement owner claims that a tenant controls a portion of his property, inspectors can hold the tenant in violation of the regulation if he refuses permission for them to see it.
The new 25 million dollar Los Angeles Statler Center is the eighth link in the famous hotel chain. Completely air conditioned by Carrier, this first West Coast Statler is more than a hotel. In addition to its 1273 guest rooms, Statler Center includes 70,000 sq. ft. of shops and a 13-story office wing with 150,000 sq. ft. of rentable space. Why the office building? First, Los Angeles needed office space. Second, the Boston Statler had demonstrated that such space could provide very welcome extra revenue . . . an anchor to windward. Air conditioning this anchor on Figueroa Street is a Carrier Conduit Weathermaster* System. Outside air for ventilation is cleaned and filtered, humidified or dehumidified in a central apparatus. This primary air and chilled water from a central refrigeration plant are sent through small diameter air conduits and water pipes concealed within furred-in columns to Weathermaster units beneath the windows in each room.

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Pennys President Walter S. Franklin called Dowling's plan "very attractive" but said there was "no deal" with anyone yet. Dowling, John Galbreath of Columbus, Albert Greenfield of Philadelphia and Equitable Life appeared still in the running as prospective bidders for the property or construction rights. There was some honest doubting whether the city should permit skyscrapers on the site. Scowled the Inquirer: "We should not swap one Chinese Wall for another."

**Baltimore slum plan told in documentary movie**

As the Baltimore Plan for slum rehabilitation became a rallying point for private industry's fight on urban blight, a documentary movie was an obvious answer to the need for explaining its complexities to people in other cities. Two years ago, Baltimore businessmen and the University of Chicago each put up $15,000, and Encyclopedia Britannica's film division began shooting.

The resulting 20 min. sound film was premiered this month in Baltimore before an audience of 1,000 who paid $1 apiece which was contributed to the "Fight Blight" fund. The city's reaction was one of restrained enthusiasm. Said the Evening Sun: "As the film is shown to ever widening audiences the same old debate is certain to arise: how good is the Baltimore Plan in actual practice? The film does not provide the answer; it is too early to measure the permanent effects of the 27-block cleanup... But the Baltimore Plan, for those who view the film without prejudice, is not presented as a final answer to the slum problem. The plan is not a plan but an approach, and one that has constantly changed to meet new needs. The film shows innovations that six years of experimentation have brought forth, from establishment of a housing court and a special squad of police sanitarians to organization of a businessmen's group [Fight Blight Fund] to help finance repairs by impoverished home owners who cannot afford the plumbing and carpentry which housing law enforcement necessitates."

Final answer or not, the movie showed immediate signs of becoming a hit. By the time it had been screened on TV in Baltimore and New York a week later, President V.P. Arnpiger of Encyclopedia Britannica Films reported he had requests for it from as far off as Halifax. The film sells for $95 ($100 after April 1) or can be rented for $4.50 for three days.

**HHFA approves New York redevelopment where site costs $35,536 per family unit**

New York's Mayor Impellitteri, fighting to keep a 10¢ fare for a 17¢ subway ride, vainly begged Albany this month for more state funds to ease the city's annual financial crisis so he could avoid raising taxes. In Washington, Construction Coordinator Robert Moses had more success at money-raising. Five days before the Republicans took office, Moses got a $5.2 million HHFA slum clearance and redevelopment grant for his "predominantly residential" coliseum and housing project in which the housing will cost about $6 million, a convention hall $20 million.

As slum clearance the project was fantastically expensive. Figures confirmed by HHFA show it would cost an average of $36,536 to clear each of 234 families from the site excluding 362 hotel and rooming house occupants. US taxpayers would foot the bill for $24,356 per family, City taxpayers would pay the other $12,180, and also make up a net loss of another $82,000 a year in taxes if the coliseum obtains the exemption normally accorded the Moses agency that will build it.

**Contrasts in expenses.** For another project approved at the same time (Morningside-Manhattanville), the city obtained a $3,026,935 grant under Title I. Average total public cost for moving each family from the site, excluding 382 persons in single-occupancy accommodations, was only $3,777. Comparable figures for another four typical projects, based on HHFA data:

- Corlears Hook, N.Y. $6,270
- North Harlem, N.Y. $5,449
- Lake Meadows, Chicago $4,950
- West Side industrial, Chicago $6,506

The fabulous cost of the coliseum project, cried Architect Robert C. Weinberg of New York, was not the only flaw. He charged the plan did not meet the federal requirement of conforming with a city master plan. Said Weinberg: "If New York through Moses is going to get away without providing an over-all plan for large scale redevelopment, which is the basic purpose of Title I, it would be setting an unfortunate precedent."

**Constructors group notes drop in jurisdictional strikes**

The National Constructors Assn., whose 20 members account for $2 billion a year in oil, steel and chemical construction, reported at their annual meeting in New York last month that the problem of jurisdictional strikes has shrunk into insignificance. Re-elected President John J. O'Donnell (shown 3rd from I presiding over an executive committee meeting) said association members lost 200,000 man-hours in jurisdictional disputes in the last six months of 1951. Prejob conferences with union leaders cut this to 100,000 in the first six months of '52. After the AFL banned picketing in jurisdictional disputes, NCA stopped compiling statistics on hours lost because they were "negligible."

Past NCA President J. F. Pritchard (I), head of his own Kanaas City firm, chats with J. H. Sharpe of Cleveland's Arthur G. McKee & Co.
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Joint jurisdictional board change voted by AFL meeting in shadow of union shooting

Reorganization of the National Joint Board for Jurisdictional Disputes to promote greater impartiality was approved by the AFL Building Trades Council's quarterly meeting in Miami Beach Jan. 28-31.

The board now consists of impartial Chairman John T. Dunlop and four members each from labor and industry. Four alternates from each side would be appointed to replace regular members on cases involving their own interests.

Approval expected. The proposal now goes to the 19 construction trades internationals and the four contractor groups represented on the board, the AGC and the specialty, mechanical and tile contractors. Final adoption is expected next month.

The council has been "very pleased" with the results of its ban on picketing in jurisdictional disputes last July, declared President Richard J. Gray. This has even helped reduce the number of industry-labor differences before the joint board, said Secretary Joseph D. Keenan.

Attempted assassination. But only five days after the building council had adjourned, while most members remained for the national AFL executive council meeting, a Miami carpenters-laborers dispute led to a gangland-style attempt to shoot business agent George L. Mitchell, 46, of the local carpenters district council.

No charges have been filed, but police questioned Max Caldwell, alias Max Pollock, former Capone mob racketeer who moved to Miami several years ago after the Chicago retail clerks' union he had been running turned up $900,000 short in its accounts. In Miami, Caldwell became agent for AFL laborers local 1040.

Fisticuffs and firearms. On Jan. 19, Caldwell's efforts to force all nonunion building workers into his laborers local took him to a Hialeah housing project, where he engaged in an argument with superintendent Royce V. Mock, a member of the AFL carpenters union. Upshot: Mock was struck in the left eye so severely he may lose its sight. Caldwell and his assistant, Joseph Severino, were charged with assault and battery.

Mitchell convened Miami's four carpenters locals in special session. They asked the Dade County Building Trades Council and Miami Central Labor Union to expel the laborers local until it purified itself of Caldwell and his aides. The council suspended the local on Jan. 27, the central union on Feb. 3. Two nights later, two shotgun blasts were fired at Mitchell as he stepped from his auto into the porte-cochere of his home in Hialeah. Mitchell was unhit, fired two shots of his own from a .25-caliber pistol with unknown results at an automobile that sped from the scene.

Two more senators assail waste in military building

Last Aug. 5-Sept. 15, Sens. Russell B. Long (D. La) and Wayne Morse (Ind. Ore.) made a 30,000-mile tour of 60 military bases in the US and overseas to see what the nation was getting for the billions it was pouring into military construction.

Their subcommittee report, released in mid-February, threw a new barrage of rocks at "high level planning" and waste in construction arising from bad organi-

New York employers celebrate record in labor peace

Fifty years ago amid chaotic labor conditions, New York City contractors formed a Building Trades Employers' Assn. They persuaded the AFL to set a unique joint mediation and arbitration program giving employers the final say in jurisdictional disputes. Last month, celebrating its half-century anniversary with a $28,500 dinner for 1,184 members and guests at the Waldorf-Astoria, BTEA could be well satisfied with the results: an unparalleled record for keeping jurisdictional strikes to a minimum.

The heart of the well-oiled machinery is its mediation board (shown in session above). The board consists of Chairman Peter Eller (r) of BTEA's board of governors, Howard McSpedon (l), head of New York's Building Trades Council, and Miami Central Labor Union to expel the local carpenters district council.

BTEA Secretary Arthur Riehl and local union representatives involved. The mediators get cases that McSpedon cannot settle himself. If the mediators fail to agree, the dispute goes to BTEA's 14-man executive committee, with Ellen presiding, for final determination. Its decisions, now numbering some 300, are so respected it even gets cases from nonmembers. But usually, interunion conflicts do not get to arbitration. Last month, the BTEA board of arbitration settled its first case in two years. It involved the nation's first jurisdictional row over prestressed concrete.

BTEA awarded dock builders, not ironworkers, the right to place prestressed concrete stringers to support the deck of New York's Pier 57. Not a day's work was lost over the dispute.

CONSTRUCTION STRIKES IN '52

Eleven of last year's 54 work stoppages of 10,000 or more workers affected construction (more than occurred in any other industry) and caused 6,682,500 man-days of idleness. The national loss from all labor stoppages totaled 55 million man-days highest since 1946, the Labor Department reported. The 11 major construction halt alone constituted 12.1% of the national loss.

Five of the largest construction strikes were at Atomic Energy Commission projects. Three were among the year's six strikes that cost more than 1,000,000 man-days: a 60-day strike by 35,000 San Francisco Bay area building workers; a 32-day stoppage by 45,000 in northern and central California, and a 23-day strike by 70,000 in the Detroit area. The long steel strike cost 23.8 million man-days, or more than the total of 22.9 million from '51 stoppages.

zation, confusion and over-designing. But the building industry could take comfort from the fact that the two senators had not a harsh word for the private contractors carrying out armed forces' plans.

Global net of cities. Cried the subcommittee: "In some instances our nation has spent hundreds of millions of dollars developing defense bases where our allies will have every right to tell us to leave within a year. . . . Taxpayers are un-
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suspending the virtual building of small Arctic Circle waiting for a war units of 2,000 to 5,000 sitting idly in the investment of over 8100 million each, at which we hope to avoid."

They were sharply critical of construction organization in the Defense Dept: "It is difficult to determine in some commands and base headquarters who is responsible for construction work and who is running the job—the Air Force, Corps of Engineers, architect-engineer, or a foreign government. It is assumed that the construction contractor might also be thoroughly confused. . . ."

Roads too wide. The senators assailed the Air Force for paving its primary roads at Limestone, Me, 48' wide, secondary roads 24' wide. That was a sample, they declared, of criteria "considerably above requirements." They criticized British "restrictive labor practices . . . supported by government sanctions," noting that an American asphalt-laying crew at one base put down "almost five times as much in a day's work as a British crew.

Family housing, they reported, was "well out of hand" in "all foreign countries," a situation they said called for new rules covering how much, what type and where it will be provided.

The Pentagon reaction: no comment.

Supreme Court to review anti-Red oath in public housing: bonds hit money trouble

Six months after the law went on the books, public housing authorities across the nation were beginning to enforce the Gwinn amendment requiring a loyalty oath from tenants. Almost immediately, they ran into legal trouble.

The amendment, included in an appropriations bill signed into law July 3 by former President Truman, made membership in any of the 200 organizations on the US Attorney General's subversive list, or refusal to swear to nonmembership, grounds for evicting tenants from federally aided public housing.

High court intervenes. In New York, the International Workers' Order, Inc., fraternal insurance firm which was on the list, filed suit charging the oath violated tenants' constitutional rights. A federal judge rejected the suit. But an appeal to Supreme Court Justice Robert H. Jackson brought an order forbidding the New York Housing Authority from enforcing the oath until the Supreme Court rules on the case, Jackson's order bound only New York. Nearly everywhere else, public housing authorities could continue to enforce the oath.

In Newark, N.J., the American Civil Liberties Union brought a similar test suit challenging constitutionality of the oath, won a temporary order from a state judge restraining the Newark Housing Authority from evicting nonsigning tenants. Of the Newark Authority's 3,019 family heads required to take the oath, only 11 (including two officials of the New Jersey Communist Party) had refused to sign, received eviction notices when the suit was filed. That was about 0.3%. Most observers expected the percentage of nonsigners to run under 1% everywhere.

Tight money headaches. The Public Housing Administration's fifth offering of permanent local authority bonds Jan. 21 bumped into higher interest rates. In an effort to pare the interest, PHA cut the term from 40 to 30 years, offered only 70% of their borrowing needs to private investors. Despite such efforts, the $127 million in income tax-exempt bonds brought an average 2.396% interest, only a slight drop from last September's average rate of 2.544%. For the other 30%, public housers tapped the US Treasury, paid 2.5%. The Treasury cannot borrow for 30 years at 2.5% on this winter's money market. If the Treasury deal was permanent financing, it was a new, substantial subsidy.

Marble bids to substitute for lead as atom ray shield

Protecting hospital technicians from the lethal cumulative effect of X-rays, shielding scientists in atomic laboratories against deadly gamma rays generally requires a thick and expensive shield of lead. This month, the Marble Institute of America announced that tests by Oak Ridge physicists show marble can be used just as well.

Besides conserving scarce lead for other uses, marble protection is cheaper, the institute asserted. When specifications for the walls of two rooms in the University Medical School and Teaching Hospital under construction in Jackson, Miss, were changed from lead to 4" of marble, it saved $2,700.

Afer a test at the institute's request, Dr. Marcel Brucer of the medical division of the Oak Ridge Institute of Nuclear Studies reported that cesium radiation similar to the radiation from a 1-million-volt X-ray machine was reduced to 1/10th its original value after passing through four inches of marble... "therefore 41/4" of marble is just as good as 3/4" of lead for protection from a rather high energy radiation."

Geoffrey I. Gleason, Oak Ridge manager of Abbott Laboratories reported using 8" marble walls that gave about the same gamma ray protection as 2" of lead.

Marble weighs about 170 lbs. per cu. ft., according to the institute. So a 41/4" shield would weigh about 731/2 lbs. per sq. ft. or just about 50% more than a 3/4" lead shield of 48 lbs. per sq. ft. But wall uses would save furring-plastering weight and costs.

Survey finds capacity for structural highs - on paper

A survey by NPA and DPA shed a little more light this month on the controversy over whether producers are neglecting construction's need for structural shapes (AF, Aug. '52).

On paper the industry's maximum annual heavy structural and piling capacity next year (when the rapid amortization defense expansion program is completed) will be 9,560,000 tons. This will be more than double its actual net shipments of 4,591,000 tons in 1950, a little less than double peak postwar shipments of 5,321,000 tons in 1951. On wide flange beams and bearing piles, two of the scarcest structural items during the Korean steel pinch, 1950 shipments were 2,000,000 tons, 1954 capacity should be 2,645,000 tons.

Defense officials noted, however, that: 1) facilities to produce structural steel also can be used for other products, and 2) during emergencies the government may order their output diverted to nonconstruction uses. Thus structural capacity is only theoretical, gave no assurance to either construction or the steel industry that production would even come close to it. The situation, commented one defense construction official, only accentuates the pressure for construction to adapt substitute materials and methods. Said he: "This ought to be quite disconcerting to structural fabricators, who might have more run for their money if the capacity for structural steel was somewhat greater than appears at present."
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PEOPLE: Contest develops for AIA president as Ditchy, Wischmeyer are nominated; Ralph Tudor gets Interior post

AIA's Seattle convention June 16-19 may see a fight over a successor to President Glenn Stanton. By rarely upset custom First Vice-President Kenneth E. Wischmeyer of St. Louis is in line for the job. But last month three New York, Kentucky and Michigan chapters completed formal nomination of Clair W. Ditchy, FAIA, of Detroit. He became an AIA officer about 1938, has been secretary (mostly an honorary position) since 1944. But both Ditchy and Wischmeyer are regarded as conservatives. Neither would be likely to satisfy the groups frustrated in the 1949 AIA presidential contest between New York's Ralph Walker (elected) and Dean William W. Wurster of the University of California's architecture school. Many an architect expected their opponents to make the most of any division among the conservatives. The outlook was for still more nominations before election time.

Appointed this month as Undersecretary of the Interior, second highest position in the department; construction expert Ralph A. Tudor, 50, chief engineer for the San Francisco–Oakland Bay Bridge during its construction period, and planning and construction supervisor for all California state buildings at the 1937 Golden Gate International Exposition. West Pointer Tudor served in the Army Engineer Corps 1923-29, was recalled to active duty in World War II and directed completion of Bonneville Dam. In 1945-47 he was a vice president of Morrison-Knudsen International, later opened his own consulting office in San Francisco.

Other new and old faces in the Washington transition: Lloyd A. Mashburn, 55, California State Labor Commissioner, member of the AFL Wood, Wire and Metal Lathers Union and former Los Angeles Building and Construction Trades Council secretary-treasurer, appointed as Undersecretary of Labor; Arthur S. Fleming, serving as Acting Defense Mobilizer (ODM boss) succeeding Henry H. Fowler, resigned; Stephen W. Burns, advanced to acting assistant administrator in charge of NPA's facilities and construction bureau succeeding Rufe B. Newman, who resigned to take charge of the Commerce Department office in his home city of Jacksonville, Fla; Henry L. Bodoux, advanced from deputy director to head the NPA construction controls division in place of Burns; deputy director William G. Barr, 33, named temporary head (and possibly liquidator) of the Office of Rent Stabilization succeeding James Mcl. Henderson, resigned Truman appointee.

Structural Clay Products Institute appointed Henry E. Bollman, 37, to a newly created post of executive director in its Washington headquarters. Bollman received an architectural engineering degree at Iowa State College in 1940, joined the institute's Iowa regional office in 1948, was appointed its Rocky Mountain regional director in 1950. SCP Research Foundation Director Robert B. Taylor and Mason Contractors Assn. President William F. Nelson announced plans for joint research on lowering the cost of masonry buildings.

Urban Land Institute trustees this month elected John McC. Mowbray of Baltimore as president for 1953 succeeding Philip W. Kniskern of Philadelphia. Mowbray is president of the Roland Park Co., builder of the Roland Park, Guilford and Homeland communities in Baltimore, where he also is president of the Fight Blight Fund and formerly was real estate board president. Former NAHB and NAREB President Robert P. Gerholz and Waverry Taylor, Washington, D. C. builder, were elected first and second vice presidents succeeding Warren L. Morris, of Cleveland and F. Poche Waguespack, of New Orleans. The institute hired Robert B. Garrabrant from the US Chamber of Commerce construction and civic development department in Washington as secretary of its industrial council.

Marble veneer received Frank Lloyd Wright's tongue-in-cheek blessing at an International Cut Stone Contractors' and Quarrymen's Assn. meeting in Houston. Said Wright: "Plywood had released the beauties of wood ... is supplanting lumber. I use it constantly when I can't get lumber, and I can't get it very much. ... So what you stone men can do is to slice stone into slabs. Not necessarily 4' x 8', but thin slabs. ... Go into the country and develop quarries of finer, more precious and beautiful material now that you are luxury men and selling a luxury material, ... Why, you can put a little slab on the face of 2' x 4's and get a marble building. Good enough for Americans, in this stage of their development."

Released in December by the Frank Lloyd Wright Foundation at Taliesin: a series of long-playing phonograph records of FLLW talks to and with the Taliesin Fellowship and some of his addresses elsewhere.

NAMED: Prof. Paul Zucker of Cooper Union as recipient of the AIA New York chapter 1953 Brunner scholarship, a $2,400 grant to advance his projected book, The Square: Its Significance in City Planning; Charles A. Blessing, for the last five years planning director of the Chicago planning commission, as director of the Detroit planning commission; Louis H. Gerdinger, 50, Ottawa, Ill. institutional buildings specialist, as Illinois state supervising architect, and Edwin A. Rosen-
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Ohio town fights permit for tax-free gov't. plant

For years, big cities and little towns alike have fretted over the swelling burden of tax-free land held by the federal government. Last month, the village of Cuyahoga Heights, Ohio (pop. 752), challenged the Eisenhower administration to do something about it. By a 3-3 vote, the village council declined to grant Alcoa's application for a building permit for a $40 million Air Force-subsidized plant to house one of its giant new aluminum forging presses.

Nationalized industry? Explained Village Solicitor Paul Walter (who has been, Taft's campaign manager in northern Ohio for years): "We want to know whether the new administration is going to continue the policy of nationalizing industry. We want a review of the whole question of whether it is proper for government to use taxpayers' money to build a plant from which private industry will make a profit, and then load another burden on the taxpayer by not paying taxes. Alcoa could use the plant commercially while producing for the Air Force. We believe Uncle Sam should assume a fair share of supporting communities through payment of taxes."

Mayor William R. Gerdon, who refused to cast a tie-breaking vote, said he did not want to see his town "in the same fix as Brook Park Village," a neighboring Cleveland suburb. Brook Park gets no taxes from General Motors' government-owned tank plant but must provide police and fire protection. If Alcoa builds the Air Force plant, Gerdon warned, Cuyahoga Heights stood to lose the $33,000 which would be the plant-site's share of property assessments for an interceptor sewer. Already, tax-free property in the village included 27 acres owned by Cleveland, 100 acres occupied by Cleveland sewage disposal plant and several hundred more for a new state-county freeway.

Problem for Ike. Within the week, the problem typified by Cuyahoga Heights landed in President Eisenhower's lap. Leaders of the American Municipal Assn., calling on the chief executive, protested that "many local communities" across the US "are overrun by armed service installations or defense plants" which cut local revenue at the same time they raise demand for police, fire, health and water services. Eisenhower told Sherman Adams, his top aide, to see what can be worked out. NAREB said it was going to study the problem, too.
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EVENTS TO COME

Built in USA—exhibition at the Museum of Modern Art, New York City; continuing through Mar. 12. Includes 43 postwar buildings selected for quality and contemporary significance shown in models, color slides and photos. (See review elsewhere in this issue.—Ed.)

Fellowship—Princeton's School of Architecture announces the Lowell M. Palmer Fellowship in Architecture ($1,200) to assist a student of unusual promise to undertake the advanced study of architecture at Princeton. Applicants must be US citizens, holders of a bachelor's degree, less than 27 yrs. old on Oct. 1, 1953. Application and supporting documents are due by Mar. 1. For further details and application blanks, address: The Secretary, School of Architecture, Princeton University, Princeton, N. J.

Associated General Contractors' annual convention, Miami, Mar. 23-28.

European study tour of interest to professionals and students of urban planning, housing and architecture, June 15-Aug. 16. Sponsored by Planning & Housing Div. of Columbia's school of architecture. Applications must be approved before Apr. 1. For information address: Prof. J. Marshall Miller, 504 Avery, Columbia University, New York 27, N. Y.

Building Officials Conference of America, 38th annual convention, Apr. 6-9 at the Baker Hotel, Dallas, Tex.

Competition—Ponderosa Pine Panel Door Design Competition to obtain designs for interior panel doors suitable for mass production methods and consistent with current standards of architectural design. Prizes total $7,000, including $1,000 in student and school awards. AIA approved; closes Apr. 27. For program write: Ponderosa Pine Woodwork Competition Headquarters, 2907 W. Pico Blvd., Los Angeles 6, Calif.

Competition—Beaux-Arts Institute of Design announces competition open to all students in accredited schools or recognized architectural workshops. Problem: a municipal library to serve as the cultural center of a town. Freedom in design and presentation will be encouraged and entries may be accompanied by detailed written explanation. Object of competition is to test and compare different design approaches and educational procedures. Program ready about Mar. 1; entrants allowed 5 wks. only, closing not later than May 1. Address: Special Design Competition, BAI, 115 E. 40th St., New York 16, N. Y.

Store design competition in connection with National Store Modernization, Building & Maintenance Show, June 9-12, Madison Square Garden, New York City. Awards total $10,000; classes include suburban shopping center, suburban branch department store, supermarket and various specialty shops. AIA approved. For particulars write: Caleb Hornbostel, AIA (Professional Advisor), 80 W. 40th St., New York, N. Y.


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LETTERS

NEW THINKING ON AIR TERMINALS

Sirs:
I liked your article, "New Thinking on Airport Terminals." (AF, Nov. '52.) The comment about most airport terminals being "dull monuments to a misplaced civic pride—instead of handsome buildings designed for the efficient handling of planes, people and baggage," is excellent.

You can get everything at an airport—gifts, newspapers, food, drinks, peep shows, or whatever you want—but you can’t get your baggage. If some architect or engineer would design a system which would enable reasonably efficient airline employees to deliver baggage from incoming planes 5 mins. after they landed, he would earn the undying gratitude of millions of passengers and quite a few airline presidents.

G. T. BAKER, president
National Airlines
Miami, Fla.

Sirs:
Congratulations on the interesting feature on airport terminals. This comprehensive analysis certainly offers some interesting solutions to our current airport problems, and I hope every airport manager will have an opportunity to study the article as he plans his future construction program.

C. E. WOOLMAN
President and general manager
Delta Air Lines, Inc.
Atlanta, Ga.

Sirs:
Interesting, informative and constructive...

HERBERT H. HOLLWEE JR.
Regional airport architect
Civil Aeronautics Administration
Jamaica, N. Y.

Sirs:
Your article on airport terminal buildings should stimulate thinking on this subject. I found it most interesting and well presented.

GLENN E. MARKET, assistant secretary
American Airlines
New York, N. Y.

Sirs:
Congratulations on the excellent verbal and graphic presentation of the latest thinking on airport terminals.

P. A. HAHN, chief airport engineering division
Civil Aeronautics Administration
Department of Commerce
Washington, D. C.

Sirs:
Congratulations on your fair and accurate appraisal of the many difficulties facing the designer of airport terminal buildings.

THE MAGAZINE OF BUILDING
Your “six fundamental questions” are a shrewed analysis of the basic problem. I certainly wish all the stations served by Capital Airlines had been designed with these questions in mind. It would have made our passengers and our operations people a lot happier.

You are probably right in saying that pressures exerted by the airlines have been one of the designer’s troubles, but I don’t think that is as true now as it used to be. The airlines have discovered that it is to their ultimate advantage to help the architect produce the most functional building rather than merely competing for a favored location for a ticket counter. In fact, it has been our experience that, in some instances, the airlines have been more concerned with reasonable circulation flow and economical construction than has the architect. We have encountered architects, some of whom rank high in their profession, who seemed more interested in producing a monument to civic pride than they were in learning a little about the kind of building required by modern air travel.

Fortunately, the terminals currently being planned exhibit a much more intelligent approach to the problem.

I take issue with your writer on one point—that the centralized terminal evolved from the unit-type plan. Actually it was the other way around. After the war, when the airlines foresaw the problem of getting more and bigger planes close up to a central building, the unit system was devised. It was tried out in Chicago’s “temporary” terminal at Midway Airport. Needless to say, the disadvantages of this system were amply demonstrated. I think few airlines would favor this solution now.

The airlines agree wholeheartedly with your statement that “profitable concessions help make a successful terminal” and with what you say about the dangers of overestimating the number and size of concessions. In fact, it should be pointed out to all designers that the food concessionaire cannot make money if his kitchen is on one floor, his coffee shop on another floor and his main dining room on still a third level. The same goes for the airlines. When our offices are scattered about the building on several floors, they are bound to create built-in expenses.

J. H. CAR MICHAEL, president Capital Airlines Washington, D. C.

Sirs:
The article, “New Thinking on Airport Terminals,” has been reviewed by members of our staff and we generally agree that it is an exceptionally interesting and well-written presentation of many of the problems encountered.

Certainly, the successful terminal must comply with each of the six fundamentals for design mentioned in the article. Failure to do so...

continued on p. 78
Modern, money-saving sidewalls
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 Builders of power plants as well as all other types of industrial and commercial structures are rapidly coming to realize the advantages of Q-PANEL sidewall construction. Q-PANEL walls provide true economy for the following reasons: 1. Q-Panels are permanent construction, dry, and noncombustible, yet may be demounted and re-erected elsewhere with 100% re-use. 2. Q-Panels are light in weight (7 pounds per square foot) thus reducing the load-bearing necessity in framing and foundations. 3. Q-Panels have high insulation value...superior to a 12" masonry wall with furred plaster interior. 4. Q-Panels are quickly installed because they are hung, not piled up. An acre of wall has been hung in 3 days with only 25 men. 5. Q-Panel walls are handsome. The exterior surface can be of various forms and either field painted, galvanized steel, stainless, aluminum or Galbestos®, thus providing a wealth of decorative combinations. We have a booklet available giving complete details and showing modern, lightweight, quickly-installed Q-Panels in use in many buildings. Write for it without obligation.

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**AND HIGH WATER-RETENTION IS ESSENTIAL TO WELL-BONDED, WATERTIGHT MASONRY**

Water-retaining capacity is the ability of a mortar to retain its moisture, and hence its plasticity, when spread out on porous brick. High water-retaining capacity is of extreme importance in mortar. If the mortar does not have high water-retaining capacity, it is too quickly sucked dry by the brick; the mortar stiffens too soon, the brick cannot be properly bedded, and a good bond cannot be obtained.

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Below: MAUDE ARMITAGE ELEMENTARY SCHOOL, MINNEAPOLIS, MINNESOTA
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LETTERS continued

so detracts materially from the efficiencies of airline operations, resulting in disgruntled passengers and higher costs to the carriers due to increased space rentals and handling charges.

We note with regret that the article states that a part of the failure to build successful terminals has resulted from public officials becoming "ill-qualified architectural critics" overnight and from "pressure exerted by the airlines." Obviously the public airport officials and the airlines have a vital concern with sound terminal design and can properly be expected to become architectural critics and to exert pressure if their terminal requirements are not recognized and satisfied...

We are pleased to note that through the medium of the Forum the best architectural thinking is being focused on these problems and it is our hope that the result will be greater conveniences for the public, lower costs for the communities, more efficiency for the airlines, and new standards and artistic satisfaction for the architects.

R. S. DAMON, president
Trans World Airlines, Inc.
New York, N. Y.

- FORUM agrees that airport and airline officials must protect their interests as far as the terminal's functional design is concerned. Too often, however, they also dictate the terminal's architectural appearance, a job for which they are seldom qualified.—Ed.

CHURCHES

Sirs:

It would seem that Frank Lloyd Wright has done it again. The exterior of his new Unitarian Church (AF, Dec. '53) is clearly an invitation to worship. However, upon entering the chapel, I am given the feeling that we are being asked to worship Frank Lloyd Wright.

To my mind, the cleanliness of the Thorschov-Cerny Chapel (AF, Dec. '53) is closer to Godliness.

LYNN GRAHAM
New York, N. Y.

Sirs:

Congratulations for a very inspiring series on churches in the December FORUM. Such an article is most timely when so many congregations are preparing to build.

The photography was especially commendable in the way it captured the spiritual atmosphere of these fine edifices...

JOHN D. FELTER
Dearborn, Mich.

Sirs:

In your December issue you have exactly what I have been looking for in the way of an informal type of church. It is the Warren Memorial Chapel in Monteagle, Tenn. by Architect Edwin A. Keeble. But I cannot locate Monteagle on the map.

continued on p. 82

THE MAGAZINE OF BUILDING
Stop worrying about bruised walls!

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**82 THE MAGAZINE OF BUILDING**

**LETTERS continued**

How can I contact the church board and especially the architect?

I have scoured the Forum for two years but this is what I have been looking for. I compliment you for your fine work; it is unsurpassed.

REV. JIMMY BUCHANAN
Asheville, N. C.

- Monteagle is about 80 mi. SE (as the crow flies) of Nashville. Architect Keeble's address is 2000 Glen Echo Rd., Nashville.—Ed.

**Sirs:**

Your article on FLLW's Unitarian Church was very interesting, instructive and inspiring. Your presentation was excellent.

In the editorial, "Anarchy in Our Churches," why was there no mention of the New Jerusalem Church Lloyd Wright designed? This certainly was a great contribution to architectural progress.

In regard to the UN buildings, I would like to ask one question. When is the funeral?

DELTON D. LUDWIG
Gardenia, N. D.

- Not yet—see below.—Ed.

**UN DESIGN CRITICISM**

**Sirs:**

While I have no burning desire to engage in the lively discussion of the architecture of the UN General Assembly Building (AF, Dec. '52), I think the finished building is terrific. A great landmark has been added to our civilization.

My hat is off to Wally Harrison.

JED S. REISNER
Reisner & Urbahn, architect
New York, N. Y.

**Sirs:**

Have architects in general taken a "hypocritical" oath to divide and defame another man's work?

The December Forum with its nauseous comments from men of stature in this profession is a poor commentary on one's right to give just criticism of another man's work and effort. First it was the Junior Chamber of Commerce building; now the UN. Have we degenerated to a position where we cannot approve any but our own works? It is no wonder that architects are having a tough time with public relations if we agree in substance that "there is no good design but my own."

CHARLES E. BOETTCHER, architect
Rockford, Ill.

**Sirs:**

Congratulations on the work of your magazine, particularly in its role of impartial criticism and in the subtlety of its criticisms.

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LETTERS continued

architecture is not self-conscious and has vitality; and to provide space for their frightful struggles with the English language in the attempt to explain in words what their buildings do not say; and to show them, being rebels without a cause, finding it necessary to invert universal fundamentals for effects.

BERNARD HEATHERLEY, architect
Penfield, N. Y.

Sirs:

I have no business spending my Sundays writing letters to the editors of the FORUM, but you are doing a swell job and I want to support you, at least, in keeping this issue before the profession. I only hope that Wallace Harrison can take it. Is this sort of criticism limited to his UN buildings, or can we find some strictly domestic subjects for it?

Googy International may be explained, as the FORUM has so tactfully done, but it can hardly be justified as the expression of "hidden impulses that motivate the people." The subject is indeed worth thinking about. What people and what impulses? Certainly there are today many international impulses such as the urge for freedom and the longing for a dramatic relief from mechanization and drudgery. But is it the role of the architect to interpret the urge for freedom by monumental disunity in forms? If one shock is dramatic, can a series of unrelated shocks produce a drama? Or even a good show?

It is a little pathetic to see the frantic effort being made by exponents of the international box to disclaim kinship with this new and "bulid" version of their family. Legitimate or not, it is still their baby and can hardly be passed off as "new empiricism" or "popular baroque" in spite of its obvious deviation tendencies.

The FORUM raises a moral question: since the Old Guard seek to stop the new international UNESCO building in Paris—which they link to the UN in New York—would it not therefore be wise and prudent for contemporary American architects to support, or at least not criticize, the New York example for fear of hurting the cause of contemporary architecture? I don't think so. There is another course which would a) make our critical standards better understood by the public, and b) recognize, after some 25 yrs. of experience, the limitations of a so-called international architecture in either France or USA. Someday, when there is far more unity among peoples than exists today, we may have an international way of building, but with strong regional variants. In the meantime, haven't we learned enough to focus our attention on the regional variants and to design in a contemporary way for the people who must live with our buildings?

BUFORD PICKENS, director
School of Architecture
Tulane University
New Orleans, La.
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These Weldwood Stay-Strate Doors, in the Fitkin Memorial Hospital, Asbury Park, N. J., combine birch faces on one side with walnut faces on the other. The addition of walnut moldings was all that was necessary to give traditional paneled effect. Architects: Ferrenz & Taylor.

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The Wilmette Public Library (upper right) is an excellent example of a Daylight Wall insulated by Thermopane. The clear glass is used from sill all the way to the ceiling and from wall to wall. This design admits maximum light. The lines of the ceiling continue unbroken into the outdoors, creating a sense of spaciousness.

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For the Williams Country Club at Weirton, West Virginia, the designers chose Thermopane walls for comfort in summer and winter, for light, sunshine and view the year round.

uld there have been any advantage in walling out the light, shine and view like this?
Architects Holabird & Root & Burgee of Chicago used Thermopone Daylight Walls for the Wilmette Public Library, Wilmette, Illinois.

Note the confining effect when Holabird & Root & Burgee's design has been retouched to show what opaque walls would do to the library.

Loebl, Schlossman and Bennett of Chicago specified walls of Thermopone for Lucien Lelong Inc. The salon now has a living mural. It also has thermal insulation for winter and summer, acoustical insulation, plus natural daylighting, sunshine, and a great feeling of freedom—the joy of not being "cooped up".

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Associate Architects—Altenhof & Bown and Mitchell & Ritchey, Pittsburgh, Pa.
Consulting Engineer—Edward E. Ashley, New York City
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Windows in children's rooms are unbarred, but are secured by the barrier of height.

**HOSPITAL, SCHOOL, GUARDHOUSE**

Stern three-in-one design gives this youth detention center pleasant security, gives Philadelphia a modern civic building.

Photo: (below) Charles Arnold; (others) Ben Schauli.

Groups by Sculptor Waldemar Roemisch will stand before blank lower walls of facade shown above.
Design of this building was a job of juggling paradoxes

The building had to be:

- a lockup without bars,
- a monument without munificence,
- a kindly symbol of non-punititive authority,
- plus a structure to please the dignified Art Commission of Philadelphia and at the same time confine a restless crew of delinquents, some of whom can escape through openings considerably smaller than this page.

A detention center receives delinquent boys and girls, holds them temporarily (for 10 to 16 days) and acts as a stage on which to study them and decide what to do next. Not a reform school or a psychiatric hospital, this is a little of both, with schoolrooms added.

The architects were given a full market basket of ingredients that are difficult to cook into a good design. For instance, the site is almost the geographic center of the pattern of juvenile delinquency (ranging from truancy to homicide) in Philadelphia, yet it is also on the Benjamin Franklin Parkway, one of the Quiet City's noblest avenues, so the structure had to be a civic landmark. But because the basic trouble with most of the children who are dragged in is that they have had "too much authority without love," the interiors of the building had to be warm and friendly.

Overleaf is a breakdown of some specific problems and how they were solved—efficiently and architecturally:
CARROLL, GRISDALE & VAN ALEN, architects
SHERWOOD NORMAN, consultant
SEVERUD-ELSTAD-KRUEGER, structural engineers
A. EARNEST D'AMBLY, mechanical engineer
McCLOSKEY & CO., general contractor

Classroom's high wings need no bars

Children and outsiders never meet in circulation, except by prearrangement. Children are brought in through court entrances, while others use main entrance on this side of administration building in section, left.

Youth Center presents its administrative wing (below) to minor street. Row of classrooms is on top; 12' wall encloses playground.
HOSPITAL SCHOOL, GUARDHOUSE

How did the architects invest this penal building with a character that fits a parkway site?

First by using a large simple shape, and sheathing it in a venerable material, limestone. • By omitting bars from all windows. • By routing traffic so all unloading of delinquents is done inside a court, between two wings of the building, shielded from view by 12’ stone walls. • By allowing the very size of this structure to make it seem institutional. The mass was not resisted or diminished; the buildings were allowed to stand as a stern but civilized symbol of authority. • By including two handsome groups of statuary (p. 101) which are to be added to the lower facade along Benjamin Franklin Parkway, to take the curse of bleakness off the necessarily blank walls at that height. (Inside are gymnasium, toplighted.)

How is the interior traffic handled so that boys, girls, parents and plaintiffs do not mingle at the wrong time?

Very intricately, and very efficiently (see drawing, right, and plan, next page). Children go from the interior court in (and up) the far ends of the administrative wing (girls east, boys west). They are checked in, then girls and boys go across separate double-decked bridges to the separated ends of the habitation wing. On the lower level of this wing are showers, clothes-issue depot, examination rooms and other receiving facilities.

After processing, they go upstairs to supervised “neighborhoods” containing a maximum of 12 bedrooms. They go to and from classrooms on the administrative wing’s top floor via the top level of the bridges.

For hearings, the children go to the administrative building on the lower level of the bridge, and are held in anterooms between the end of the bridge and the hearing rooms.

What precautions were taken against escape?

First, a design which permits constant but not brutal supervision and control, even when children are sleeping. (See text below for more details). • By building the structure for moderate security, then adding maximum security screens after some of the kids nearly escaped. More precisely, by adding spring shock absorbers around the stainless-steel mesh that covers the movable windows in the children’s rooms. • By walling the area. This is not too obvious, because the buildings themselves are used as walls. But there is a frank and handsome 12’ wall around the outdoor playgrounds. • By using tempered glass in all security windows. • By making all doors and other utilities (lights, elevators, etc.) work only by key. Astragals had to be added to some locks to prevent picking.

How is the interior warmed up and made cheerful?

With color. The architects used bright, strong colors. Not specially mixed, they came straight from the manufacturer’s cans to permit easy and accurate future maintenance. The building is not painted with garish whimsy; a consistent structural color vocabulary was used. For this and for the selection of furniture the architects were awarded the 1952 award of the Philadelphia Chapter of the Home Fashion League Inc.

How is control maintained at all times?

In classrooms, in gymnasium, in traffic around the building, this is the responsibility of overseers. They are assisted architecturally by the absence of hidden corners, and on stairways, by having the entire run visible from any step. • There are glass control booths centrally located in each of the “neighborhoods” of the habitation building (see enlarged plan, p. 106). Visibility is complete: the overseer can look down the hall and see any child leave his room; at night, a light on the overseer’s control board lights when any door is opened.
Slanted skylights light classrooms evenly, but sometimes create a cooling problem. In plans of first and typical floors (right) girls occupy the near end of habitation wing, and boys the far end. Boundary can be shifted to adjust for heavier occupancy by either sex (normal is ½ boys, ½ girls). Children are not visible to stares of outsiders at any point, meet them only at hearings in second-floor ends of administration and school wing.

Entrance lobby is set behind two stories of glass (interior left).
opens even an inch. If the overseer wants to see what is going on in a room, he can look in a glass panel in the door; this panel is set forward so that no part of the room is obstructed from his vision. From the control room, complete visibility is afforded into the recreation rooms, both active (games) and passive (reading). Half the rooms have their own plumbing, so that they can if necessary be used as complete lockups. (This, however, is viewed with horror by authorities, who provided these rooms for children psychologically blocked from mingling, particularly in toilets.)

**How much did the building cost?**

Total, $2,027,250; $17.75 per sq. ft.; $1.53 per cu. ft. The building contains a total of 1,325,000 cu. ft.
Trailer bank, parked next door to police station where cash was kept, was used by York National to test the Old Orchard Beach market before building the new drive-in bank.

Circular glass structure fits any lot,
exploits best features of gas station,
tollgate and showroom

York National is Maine's oldest bank. With a real tradition of 150 years securely behind them, its directors have always felt free to be one step ahead of the crowd—witness the trailer-bank experiment (below) and the new glass bank above.

So they went to New England modernist Carl Koch for this rather special building in a rather special community (pop: 5,000 in winter, 30,000 in summer). In its design Koch solved three problems common to many other jobs and places: 1) how to develop a new building type so universal that it will work almost anywhere; 2) how to make a fine art (murals) practical (on a bank vault); and 3) how to develop a convenient system of detailing, unfettered by traditions or modern dogma.

**New building type: the drive-in bank.** In our spread-out, motorized way of life, the drive-in movies, hot-dog stands, laundries, stores, showrooms and now banks are all part of an increasingly popular trend. Like all radical innovations, these structures have few antecedents, pose new problems that call for new answers.

Here are the problems of a drive-in bank and the way Koch solved them: **Problem No. 1**—motorists must be able to drive into, around and out of a drive-in bank. **Solution:** make it circular, surround it with a high curb, let traffic flow around it like a merry-go-round. **Problem No. 2**—motorists must notice the building as they go by at 40 mph. **Solution:** make it all glass, turn the whole building into a display case, light it up at night. **Problem No. 3**—the building must convey a sense of stability in spite of all the glass.
Plan shows 36' diameter cylinder; stair behind vault leads to storage basement

Solution: make a big, attractive, solid-looking feature out of the vault. (Said one Old Orchard Beach resident: "That's where I'm going to keep my money—I can stand on the sidewalk and keep an eye on what's happening to it.")

Koch's logic produced a bank that is not only good in this particular spot but (being circular in plan) could be a good solution for almost any site; cars could enter any lot on one side, drive around the building to the teller's window, and leave on the other side. Like the standard gas station or the standard tollgate, this bank has a plan that would work anywhere.

New functional art: the porcelain mural. As in the Fitchburg library (AF, July '51), architect Koch called upon MIT's professor and painter, G. Kepes, gave him this problem: how to keep the vault from looking too bulky for this graceful little building?

Solution: camouflage the big mass of concrete the way the Army camouflages a pillbox. Kepes sheathed it with porcelain enameled steel, baked a small-scale abstract mural into the surface. The spectacular result is shown opposite. Said one local resident: "Few people understand modern art, but this is easy. There are 'sums' scattered over the surface of the vault, addition, multiplication and percentage signs—just as if some banker had been doodling. Light bounces off this surface and sparkles on the glass walls. It looks swell!" (See opposite.)

New detailing: using convenient materials. What makes Koch's details so interesting (and justly famous) is that he is no "purist." He will use just about any material, gadget or device that happens to come in handy. In this building he mixes steel, wood, glass, plastics, stainless steel, plywood, porcelain enameled. When he wants to make a thin wooden mullion strong enough to act as a doorjamb, Koch simply hides a steel plate inside his millwork (see details on this page); and when he needs to brace a light steel structure against wind loads, he uses diagonal tie rods (exposed or concealed). This makes for a flexible architecture and low-cost building.
How can big cities save their downtown districts from strangling in their own congestion?

Congestion at the heart of America's great cities is one of the most pressing problems facing the architectural profession and the building industry today.

This report is, we believe, the first joint statement ever approved by top-flight spokesmen from all the groups most deeply involved in the problem and its solution—groups ranging all the way from architects to department store owners, from city planners to parking garage operators, from traffic experts to truck fleet operators, from city officials to automobile manufacturers. It was drafted at a two-day forum sponsored by this magazine.

Obviously, such a brief statement cannot explore every facet of so complex a problem, but we believe it will contribute importantly to the thinking of our readers.—The Editors.

13 Answers: 1. By clearer thinking aimed at realistic goals

Much clearer thinking and much broader understanding are as necessary as much more money spent if America is to save the center of her cities from strangling in their own traffic.

We can help that clearer thinking and broader understanding only if we restate this very complex and difficult problem in the simplest possible terms—even at the obvious risk of oversimplification.

One reason the problem is so difficult is that it involves so many component problems which must all be solved together. For example, little good can come of costly new expressways to the downtown district unless better parking facilities are created for the cars brought in by faster access. Conversely, little good can come of easier parking if it attracts more cars than streets and highways can accommodate. Both the improvement and the timing must be integrated.

An equally important difficulty is that traffic relief is just one facet of the much bigger problem of urban development and redevelopment. Any attempt to cure traffic congestion "in the street" would treat the symptoms rather than the disease. No solution will prove lasting unless zoning sets reasonable limits to central city density. No solution should overlook the traffic benefits that might be planned into redevelopment of the blighted area which almost always adjoins the busiest district.

All these manifold problems must be met separately, so we have agreed on certain specific recommendations for attacking each of them in turn. But all of them are so interrelated that they must also be solved together. Consequently, our first and strongest recommendations are these:

1. Every city struggling with congestion should fix in the Mayor and the Planning Commission responsibility and authority broad enough to face the problem whole and coordinate the activities of all the municipal agencies among whom various functions impinging on congestion are now scattered; viz., the Police Department, Building Department, Highway Department, Public Works Department, Traffic Engineer, etc.

2. Every city should also have a municipal agency or authority to cope directly with its parking problem. This agency should have the right of eminent domain to acquire land when and where necessary for additional off-street parking so located that the new facilities will not create bottlenecks in the streets.

3. The city's efforts to solve the downtown congestion problem need the support of a determined and well-financed citizen's group representing the entire community rather than any special interest. The model for such a citizens' group might well be the Allegheny Conference on Community Development whose activities are the principal reason why Pittsburgh is making such dramatic progress toward the solution of its municipal problems.

Even with the best organization no solution to the traffic and congestion problem of our big cities can succeed without first setting realistic limits to the goal. All of us would like to help make possible freer use of the downtown streets by private automobiles, but we are up against two hard questions:

1. Can our cities afford the space to provide at their centers the unlimited parking that is possible on their outskirts? To park all the cars whose owners would prefer to drive downtown, Boston found it might have to tear down 1/2 of all its downtown buildings. Suburban shopping centers try to provide 4 sq. ft. of parking area for every sq. ft. of rentable area. Downtown we fear the best that can be hoped for is a parking ratio 1/15th as high.

2. Can our cities afford the money needed to provide highways and parking space for so many cars—an investment which at least one city estimates at $4,000 for each added rush-hour car commuter? This is three or four times the investment per commuter that city would need for the most expensive form of rapid transit—an underground or elevated railroad.

Few large cities can solve their traffic and congestion problem without relying heavily on mass transportation rather than the private car.

Good mass transportation made the centralized big city possible, and good mass transportation is essential to preserve it.
2. By using the price mechanism to ration street use

Perhaps the first thing everybody should understand about downtown congestion is that we are dealing with an almost limitless demand pressing on street and parking facilities which must continue strictly limited. Most American families already have a car; a very large proportion of them would prefer to drive to work or shop. The number of private automobiles on the road has increased 65% since 1945 and is still soaring higher. Even a five-fold increase in street and parking facilities at a cost of perhaps $50 billion might soon be overtaxed, for every betterment in these facilities stimulates still greater demand.

Today that demand is controlled and limited only by congestion—by the amount of delay, annoyance and inconvenience motorists are willing to put up with to use their own cars on the downtown streets. This rationing-by-congestion operates on a first come, first served basis, so a high percentage of the curb-side parking space within 500' of the downtown core is apt to be taken up by all-day parkers who arrive before 9:00 A.M. It is high time our cities worked out a more intelligent way to allocate or ration the use of their downtown streets.

Better use of the price mechanism offers perhaps the one best hope of rationalizing the use of our downtown streets, just as the price mechanism has proven the one best means to balance supply and demand in every other line. Today the price mechanism is not allowed to function at all on this problem. Not only is use of the streets for moving traffic completely free. Use of the sidewalks for loading and unloading goods is also free even on the most congested streets at the busiest hours.

Use of the streets for parking is priced at only a small fraction of its true cost. As a result, millions of people elect to drive downtown in the often mistaken belief that this is cheaper than carfare; most motorists balk at paying even the most reasonable charge for off-street parking; and shippers have no profit incentive to relocate in uncongested districts or to cooperate in getting trucks off crowded streets at busy hours.

What would happen if all the various urban services and land uses necessary to move people and goods were repriced on a more economical basis? We believe people should be free to choose their means of transportation, but they should be willing to pay some approximation of its true cost.

We believe many people would redistribute their use of transportation services and parking facilities if they were repriced so that for example, more people could see that mass transportation is the cheapest way for them to travel. We believe far more people would be willing to pay for off-street parking if curb-side parking were not almost free. We believe fewer people would insist on parking so near the busiest corners if they saw the saving offered by walking two blocks more to cheaper parking sites. We believe there would be fewer trucks jamming busy streets if trucking rates reflected the true cost of curb-side pickups and deliveries during busy hours on overcrowded streets.

We believe that repricing various services would also encourage uneconomic users of downtown buildings to relocate in other areas more quickly, thus freeing space for parking.

3. By constructive decentralization of some activities

Business concentrated in the center of our growing cities for one principal reason: the center was the easiest point for the largest number of people to reach. Basically, there are two types of business for which a central location is still apt to be very important:

1. Executive offices, government offices, main offices of banks, law offices, sales offices—i.e., any office which needs quick and easy accessibility to a maximum number of people.

2. Big stores whose principal competitive advantage is their ability to carry a more complete line than any small store or any suburban branch. These big stores must be so located as to attract crowds big enough to justify their large assortment. They must be located close enough, one to another, to make competitive shopping easy for customers.

Around these two central magnets many other activities have gathered downtown. The business offices have attracted service trades and service industries. The big stores have attracted hundreds of smaller stores seeking to profit by the crowds of shoppers drawn by their big competitors.

As all these businesses have grown they have generated still more business downtown. Recent surveys show that although congestion is slowing down the increase in downtown retail trade, the concentration of executive offices, law offices, etc., and their attendant service industries is, if anything, accelerating.

On the other hand, there are other business activities for which decentralization is proving profitable. Specifically:

1. Merchants are finding suburban shopping centers a highly profitable way to increase their sales.

2. Certain businesses to which economical handling of a large volume of goods is more important than easy accessibility to people are beginning to seek locations where trucks can move more freely; wholesalers are beginning to separate their sales offices from their warehouses; department stores are beginning to set up outlying warehouses from which to deliver goods ordered downtown.

3. Many manufacturing industries now located downtown as a matter of historical accident rather than because proximity to the center was important to their distribution are beginning to move out.

This kind of decentralization is highly desirable and should be encouraged wherever possible. But decentralization offers no solution to the problems which traffic congestion is creating for those types of business for which a location easily accessible to large numbers of people is essential.
4. **By separating car and truck traffic in time and space**

Traffic delays have become a major element in the cost of big-city trucking. Every minute a big truck is held up in traffic costs the truck owner 10¢ to 15¢. Conversely, trucks lined up at the curb or trying to squeeze through crowded streets have become a major element in downtown traffic congestion. It is clear to all of us that it is costly for the trucking industry and bad for the city to have trucks competing with passenger vehicles for the same space at the same time on inadequate downtown streets.

There are three possible solutions to this problem, all three of which should be encouraged:

1. **Separation by location**: Businesses which involve large movements of goods should not be located in the most congested district.

2. **Separation by off-street improvements**: i.e., provision of adequate off-street facilities for the loading and unloading of trucks so that they will not block the streets by loading and unloading at the curb.

3. **Separation in time**: Trucking would cease to create any congestion problem at all if all pickups and deliveries in the central business district could be made before or after the crowded hours. The trucking industry is already partially organized on the basis of night and day operation and could adjust its schedules still further in that direction if stores and other buildings would have personnel available to handle early morning and early evening shipments. The truckmen’s overtime or higher night wages could be largely offset by the time saved by easier passage through the streets.

Separation in time is probably the best of the three possible solutions, but it is also the most difficult. It would require a change in working hours by hundreds of different buildings and hundreds of different shippers, and it would result in higher rather than lower trucking costs unless all shippers would cooperate, for there would be no economy in picking up goods from one shipper in the early evening if the same truck had to make a daytime pickup next door.

*Every reasonable municipal aid should be given to hasten and encourage all three of these solutions, but there are obvious limits to what government can do.* For example:

- The city should (and usually does) enact zoning ordinances which would keep warehouses and other large handlers of goods from locating in congested central districts, but what about warehouses already there?
- The city should (and usually does) enact building standards requiring off-street loading in any future building, with adequate receiving rooms and adequate elevators, but what about existing buildings? Some cities already make these requirements retroactive. Others feel the remodeling cost would be too great. At the very least we believe every present building should be forced to provide an adequate ground-floor shipping and receiving room to minimize the time trucks must spend at the curb.
- The city can (and in some cities already does) encourage early morning and late afternoon delivery by reserving curb space exclusively for trucks in these off hours. But how much further can government go along this line? What would happen if trucks were forbidden to enter or park in the busiest district during the congested hours?

*We believe private enterprise must play a larger part in solving the truck congestion problem, and this is another case where it would be well to put the price mechanism to work.*

As things stand now, trucking prices do not accurately reflect trucking costs. State and federal regulatory bodies apply the same charges for pickup or delivery anywhere in the city. This gives the shipper (or receiver) no incentive to provide personnel for shipping or receiving goods before or after hours, no incentive to undertake the capital costs required to provide adequate off-street facilities, no incentive to move to locations which trucks could reach more easily (and therefore more cheaply). Only on local shipments is the trucking industry free to reflect in its charges the great difference in its costs for making deliveries, which often vary greatly, not only from district to district but from building to building.

We suggest the time has come when trucking companies should ask permission to apply penalty charges or maintain differential rate structures which would share with shippers and building owners the savings the trucking industry could achieve by not wasting so much time in traffic delays—differential rates which would encourage owners to provide personnel for after hour or early morning pickups and deliveries, encourage the creation of off-street loading facilities, encourage larger shippers to locate outside the most congested areas. Lacking any such profit incentive to do otherwise, many shippers deliberately locate in old downtown buildings with inadequate loading and elevator service just because these old buildings offer them the lowest rents.

5. **By intelligent redevelopment**

No solution to the downtown traffic problem should overlook the very great possibilities offered by the wisely planned redevelopment of blighted areas which almost always adjoin the heart of town. In this redevelopment one of the first objectives should be to take advantage of some of the cleared land to provide broader streets leading to the central districts or expressways leading around it, to finding low-cost land for all-day parking, and to the possibility of so developing the land in superblocks around more adequate parks, etc., that more people who work in the central district would wish to live there near their jobs.
6. **By encouraging mass transit to carry more people faster**

Since there are such clear limits to what can be done for private cars on downtown streets, we are all agreed that greater use of mass transportation must be encouraged.

Today the mass transportation industry finds itself in a critical position which should be a matter of serious concern to every community whose center is dependent on the continuance of good mass transportation. Some of these troubles result from rapidly rising costs. Others trace directly to the automobile, which has: 1) added to the transit companies' costs to the extent that it has contributed to congestion in the streets and so slowed trolleys and busses down; 2) taken away many of their passengers, especially the mid-day passengers which are the most profitable of all.

Ever since World War II, mass transportation has been losing passengers. In 1951 it carried 7% less than in 1950; in 1952 it carried 4% less than in 1951. But even today more than 60% of all persons entering downtown districts of cities over 100,000 population rely on mass transportation—more than 40% for cities from 100,000 to 500,000, 63% for all cities over 500,000, 80% for big cities like New York and Philadelphia. These 60% of the persons are carried by 6% of the vehicles. Contrary to general belief, the transit companies are still carrying 15% more passengers than at the end of the depression.

Faster decisions by Public Service Commissions on applications for higher fares to offset rising costs would certainly help the transit companies, but higher fares alone will fall far short of solving the problem. Too many transit companies have found that higher fares drive too many passengers to competing means of transportation and so produce little increased revenue. The transit companies cannot hope to regain prosperity by providing less and less service for more and more money.

In large measure the future of mass transportation will depend on what the transit companies do to help themselves. But here are some important ways in which the community can help too:

1. Transit companies should no longer be burdened with special taxes and charges dating back to times when mass transportation was a highly profitable monopoly. They should not be asked to carry the full burden of maintaining portions of the street, nor should they be asked to carry school children at inadequate special fares.

2. More consideration should be given to mass transportation needs in designing highway systems. (New York City, on the contrary, forbids busses on most of its highways.)

3. Every aid should be given to help mass transportation move faster through the streets. As traffic is speeded up to the point where time savings can be reflected in schedules, operating costs will drop and transit companies will be that much better able to improve their service and attract more riders.

4. Bus lines should not be required to undertake unprofitable extensions, and more turn-around service should be permitted.

5. Adequate parking facilities should be provided at key points along transit routes and tied in where practicable with special express service, in order to encourage more persons to leave their cars outside the congested districts. The city will find it much cheaper to provide parking there than downtown, and such parking facilities when wisely located have been proving their value in many places.

6. Zone fares, which are now universal all over Europe, should be brought into more general use. Lower fares for short trips would attract more passengers. Higher fares for long trips would more nearly cover the cost on long runs.

7. Every effort should be made by both the city and the operating companies to speed up service by more use of express busses, alternate block stops, etc. One bus route in Cleveland tripled its passengers by inaugurating express service.

8. Wherever possible mass transportation should be given preference on certain major streets, automobile traffic preference on the nearby parallel streets. Busses and automobiles rarely flow smoothly together through the same traffic stream, particularly in many narrow downtown streets. Such a sensible separation might be a good way to attack some wasteful route patterns based not on present need but on inheritance from old franchises and corporate structures.

9. Curb-side parking should be forbidden during daytime hours on all but the widest downtown streets heavily used by mass transportation lines.

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7. **By relating zoning to traffic**

Traffic does not occur in a vacuum. Its amount and character are determined by the way land along the streets is developed and redeveloped. Thus, every city should re-examine its zoning ordinance to determine in what respects it promotes traffic congestion, and should revise the ordinance to coordinate its revision with the traffic capacity of the streets, or with the increased capacity for which the city is willing to pay.

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8. **By eminent domain if needed**

Public powers to condemn, lease and regulate land for parking purposes are essential to proper planning, location and operation of an adequate parking system. Private enterprise cannot always obtain necessary sites to achieve a proper balance of parking and street capacity; nor can private enterprise, without such aid and control, achieve a proper balance between short-term and long-term parking facilities.
9. By banning curb parking or fitting its price to its cost

Most obvious single factor in the traffic congestion which is now strangling the center of so many cities is the way cars are allowed to park along the curb of so many busy streets, often in flat defiance of “no parking” signs.

Not more than 20 cars can park along a 200' block—ten on either side. But those 20 cars often block the passage of 500 moving vehicles, cutting traffic flow from 1,200 cars an hour to 700.

There is no good reason why all curb-side parking should be banned downtown, for the street pattern of most cities developed long before the automobile, and there are still many downtown streets whose traffic flow is small enough to permit parking. But there are also many busy streets where no parking should be allowed at any price.

The most expensive possible place to have cars park is on street space needed for moving traffic. Widening a busy street to permit this curb-side parking without obstructing traffic might well cost from $10,000 to $50,000 per parking space created. Permitting such parking without widening the street may cost still more in terms of business diverted and man-hours lost through traffic delays.

But here is the paradox—in many cities this most expensive of all parking space is still free to any motorist lucky enough or early enough to find it. Even where parking meters are installed the charge is strictly nominal. The rate on 99% of all meters (915,000 of them, to be precise) is 5c an hour; only 1% (9340) charge 10c an hour; only a handful charge more. In brief, there is an almost complete divorce between cost and price, and curb-side space which really costs far more than off-street space is priced much lower.

A few cities have now begun charging 25¢ an hour (5¢ for 12 min.) for curb-side parking at very desirable spots, and few of us can see any good reason why charges higher than the 5 to 10¢ an hour maximum now customary should not be inaugurated in all cities. (Note: in some states the courts have held that their purpose must be to help regulate parking and traffic rather than to raise revenue.)

In this connection it is important to note this fact: the average motorists' disregard of “no parking” signs is notorious, but he is usually very honest about parking-meter charges.

The downtown parking problem will never be solved until motorists, merchants and all other interested parties recognize the obvious fact that parking space costs money—whether it be off-street or at the curb—and someone has to pay for it. It will never be solved as long as motorists are encouraged to consider free parking an almost inalienable right.

As long as curb-side parking is available to motorists at a small fraction of its true cost, motorists will be tempted to cruise looking for space at the curb, and the problem of providing adequate off-street parking will remain difficult. Off-street parking cannot be provided at the heart of any sizable city for less than 15¢ an hour, and there are few instances where the price is not higher still. Pittsburgh's new public garages, despite tax exemption, find it necessary to charge 35¢ for the first hour, as do the Boston garages erected by private capital on state-owned land.

Most of us believe that competition of free or very cheap parking at the curb is a major reason why venture capital has not yet met the demand for reasonably priced off-street parking.

10. By enticing the all-day parker away from the city center

The parking problem is really not one problem but two: 1) parking for people who drive to work and keep their cars downtown all day; 2) parking for shoppers and others who drive downtown for a short time only.

Too many people (including, unfortunately, too many downtown merchants) fail to understand that most downtown parking spaces are taken up by all-day parkers who line the curb early in the morning and leave very little space for shoppers. A Philadelphia study found 85% of all curb spaces usually filled by all-day parkers.

Research shows most short-time parkers object to walking much more than 400 feet to where they want to go, but there is no good reason why all-day parkers should feel similarly entitled to leave their cars right next to where they work. This is a problem which many cities are meeting satisfactorily by providing cheap parking at 25¢ or less for all day 800' from the most congested district and then charging higher rates for parking space close in. A transient can well afford to pay more than 10c to park an hour or two, but an 8-hour parker will hesitate to pay 80c (10c an hour) to save a little walk at the end of his drive.
11. By encouraging private capital into the garage business

Many hundreds of millions of dollars must be invested in off-street parking facilities if the downtown congestion problem is to be solved without imposing more restrictions than the public is likely to tolerate on the use of downtown streets by private automobiles.

All of us hope this money can and will be supplied by private investment for profit without any investment of public funds whatsoever.

But most of us are discouraged by the past failure of private capital to meet the need and question whether, in the future, private investors will be willing to provide more than the most profitable fraction of the necessary space, leaving public investment stuck with the problem of any parking which cannot command premium rentals. And spokesmen for municipal parking authorities feel they need the profit on high rent space for transients to cover their deficits on low rent space for all-day parkers.

To this spokesmen for private parking answer:

1. Ninety-eight per cent of all present off-street parking is provided by privately owned facilities;

2. The best postwar record for added off-street parking has been made by cities like Washington, San Francisco, Minneapolis, Oklahoma City and Allentown, Pa., in which all, or almost all, the increase has been provided by private investment encouraged and co-ordinated by municipal cooperation;

3. Private investors can and do get better garages built cheaper, and private negotiation can usually acquire sites cheaper than public condemnation;

4. The threat of competition from publicly owned parking lots and garages subsidized by parking-meter revenue and/or by tax exemption on both their real estate and their bonds has been a major deterrent to private investment in the parking field.

Whatever the merit of these arguments, no city should decide that private capital cannot meet its off-street parking need until it has carefully explored the reasons for private investment's past failure, in the hope that correction of those reasons and perhaps the provision of positive incentives might make private capital ready, willing and eager to provide adequate off-street parking for both transient and all-day parkers.

In most cities there have been two obvious reasons: 1) the price that can be charged has been kept too low by competition from free or almost free parking at the curb; 2) the cost of providing new parking garages has been too high.

In the closing section of our recommendations we shall report evidence that new design, construction, and management methods permit such economies that parking garages now offer a highly profitable field for investment.

The one type of off-street parking facility on which we believe private enterprise will find it hard to compete with publicly owned facilities is fringe parking lots for all-day customers on land too cheap to justify the cost of decking; i.e., land costing less than about $5 a sq. ft. On such lots the city has a great advantage in not having to pay the cost of an attendant, for they can be operated very cheaply with parking meters and an occasional visit from the neighborhood patrolman to make sure the meter charges have been paid. (In these meters it should be possible to deposit enough coins at one time to pay for all-day parking.)

In many cities the large amount of land available for this type of cheap municipal parking will prove a major limitation on the opportunity for profitable parking ramps.

12. By building better roads to and through the downtown section

Almost all of our cities need a wholly new expressway or freeway system. Such a system should include a loop around the downtown business district, and usually an outer loop around the suburban belt, and several radial freeways connecting the two loops and running out into the metropolitan hinterland. In large metropolitan centers as many as four loops and as many as six or eight radials may be needed. Freeways should have modern limited access, uninterrupted flow, and high-speed design characteristics. They should include special design facilities and features for bus or other mass-transit services at terminals and along rights of way.

The national deficiency in modern metropolitan highway systems is so great that many years will be required to build an adequate system. Its cost will run to so many billions of dollars that present gasoline tax revenues will not pay even debt service on these and other highway requirements. An increase in these and other auto-use taxes would help accelerate construction schedules and provide funds for maintenance and control.

The outer rings and outer radials of the urban highway system might well be built first. Right-of-way costs will be less expensive in such areas now than they will be later. Suburban and intercity travel will be facilitated while the necessary adjustments in intracity parking and land use are made. Traffic now going through central areas will be encouraged to bypass them. Finally, this program will encourage the decentralization to suburban sites of marginal users of downtown property, thus opening the way for the reconstruction of central areas.

After the outer rings and radials of our expressway systems have been completed, and as land use and parking adjustments are made in central areas, the inner radials and rings should be completed. Even with a complete system of modern freeways, however, our central cities will continue to be congested, unless mass transit carries a large proportion of all visitors to central business districts. No highway system can be devised which will serve adequately all the people who desire to drive into high-density downtown areas. This only re-emphasizes the importance of coordinating all plans for parking, highways, land use and transit. It makes essential a realignment in the prices of downtown highway, parking and transit services.
3. By reducing the cost of parking garages to $1,200 per car

This question is already being answered by many architects and many private-parking garage sponsors. Their answers cover every aspect of cost—construction, land, operation and taxes.

**Low construction costs**—In many cities first-class multistory ramp parking garages have been built in the last five years for construction costs as low as $900 to $1,200 per car space. Variations in construction costs from one part of the country to another is not enough to explain a city-to-city differential of much more than this $300. If a first-class parking garage can be built in Los Angeles for $900, it should be possible to build a first-class parking garage in any other US city for around $1,200 (about $4.50 a sq. ft. for less than 300 sq. ft. per car).

If bids come in for substantially more than $1,200, either somebody is making too much money on the construction contract, or the design is inefficient, or the garage is being erected on a difficult or inadequate site, or else the building is being overloaded with costly unnecessary requirements, like sprinkler systems, or excessive floor load allowances, or enclosure against the elements, or fireproofing on steel framing. One very important way the city authorities can help solve the parking problem is by cutting out all these costly waste requirements at once.

Parking garages erected at a cost of $3,000 or more per car (and such wasteful and extravagant construction is still common), are not likely to prove profitable for private enterprise at rates low enough to satisfy motorists and so attract customers. But parking garages erected for $1,200 per space can be amortized in 25 years at 5% interest by a constant payment of $7.02 per car space per month. This capital charge is less than 30¢ a working day.

**Low land costs**—In recent years architects and private garage owners have also found the answer to the high cost of land for downtown garages by reserving the street floor for retail use and getting enough rent from these retail stores to cover most of the ground rent for the entire garage. In Pittsburgh, for example, the public parking authority is getting $30,000 a year rent from its ground-floor retail tenants—a 6% return on the $500,000 cost of the land. Some private operators report even more profitable ground-floor leases.

In this connection four points should be noted carefully:

1. The more valuable the land the higher these retail rents;
2. Even in a highly congested district like the Chicago Loop, two-thirds of the land area is not profitably developed today above the ground floor. The upper stories, if any, are occupied at very low rents by small manufacturing or warehousing operations which could better be conducted elsewhere;
3. Putting first-class retail stores on the ground floor under garages upholds and improves the character of a shopping district, whereas a parking garage with no stores along the street interrupts shopping continuity and creates a dead spot which is bad for all the stores around;
4. The rule of thumb that most of the ground rent burden should be carried by ground-floor tenants is already applied to hotels, office buildings and many other land uses.

**Low operating costs**—Architects and garage owners are already developing ways to make it easier and more attractive for car owners to drive their own cars up and down the ramps. For example, they are installing escalators in large garages to make access to upper floors easier and more attractive. Most parking garages have a special problem in the number of employees needed to handle cars early in the morning and late in the afternoon. If these peaks can be reduced by such expedients as escalators, much of the remaining labor cost can be recouped from the profits of servicing parked cars during the day.

Labor cost for parking now runs 15¢ per car or more in ramp garages, figuring a $40-a-week employee can average eight cars in and out in an hour.

**Low tax costs**—We are almost unanimous in recommending that under certain conditions that will protect the public interest, the city should be willing to recognize the parking garage as an extension of the street and as such give it complete or partial tax exemption. Does it make sense that off-street parking should be tax exempt if it is provided by some government agency, but if the same facility is provided by private investment it must expect to make a substantial contribution to the city treasury in taxes, which now consume from one-fourth to one-third of gross revenue of many privately owned garages?

We do not recommend that all off-street parking should be tax exempt. For example, we do not suggest that temporarily vacant lots should be given tax exemption if cars are allowed to park there, though such exemption might be the quickest of all expedients for harnessing the profit motive to provide more off-street parking. Nor do we suggest tax exemption for parking garages unless their location conforms to a well-considered city plan or unless the sponsors: 1) agree to hourly charges which would reflect their tax-exemption savings; 2) obligate themselves to continue the facility for a term of years.

Perhaps a third requirement might be that in return for tax exemption the garage should revert to the city at the end of an appropriate period. This is now the practice in Massachusetts.

Our principal reason for suggesting tax exemption for the privately owned, off-street parking garage is that it must now compete with what is, in effect, municipally subsidized parking at the curb. We believe the equalization of this competition will do much to stimulate private enterprise to enter the parking garage field on a large scale.

**We believe that parking garages, erected at a cost of not more than $1,200 per car, and with their ground rent largely covered by the retail development of the street level, should prove one of the most profitable ways by which private enterprise can redevelop large areas of run-down property still left right in the heart of the average business district. And we are pleased to hear that some large insurance companies are showing increased readiness to advance money for such structures.**
Some of the things they said (excerpts from the forum proceedings)

Is the center of the city worth saving? If so, how can it be rescued from traffic strangulation?

Prentice: There are a great many things that are now in the center of the city which have no particular reason for being there and which cause congestion.

For example, only about one-third of the ground area of the Chicago Loop is developed above the ground floor. Above the ground floor it is largely given over to light manufacturing, warehouse or storage operations, which could just as well be located elsewhere, but which are generating a considerable traffic problem in the city.

Hammond: How about having our planners tell us whether or not the centers of our cities should be saved? Some of them may think they should not be saved.

Mitchell: A couple of years ago, in connection with Philadelphia’s Planning Commission and the Bureau of Public Roads, we participated in a couple of studies. One, on the nature of the activities in the central district of the city, tried to measure what would be the space requirements of the different kinds of activities over future years so that the planning agency could more accurately determine what sorts of traffic, transportation and other services were necessary for the district. The other survey tried to relate the kinds of activities going on in the city and the amount of traffic, movement of people and goods that take place.

We found that the nonresident activities within a little less than a two-square-mile area were about equally divided into thirds among manufacturing and wholesaler stocks, retail trade, business and personal services. We found that those activities that are most concerned with movement of goods are decreasing while those activities having to do with the assembly of people are increasing.

It was expected that retailing will, in total volume, stay about the same or increase somewhat. Although many large suburban centers are being established, the center of the city still feeds a very tremendous population that stays in the city. Some of the manufacturing is of a kind that apparently needs to be downtown. There are small enterprises related so closely to each other and to their markets that, of necessity, they have to continue in their present locations.

Wheaton: Speaking for the mayors, with all due deference to the honorable planners, there is the little matter of money to run these cities that is quite important, and I think you will find that the money comes from the downtown area. Somewhere near 90% of the money that furnishes all of the city’s services comes, directly or indirectly, from the center of the city, the business area of the city, and it is quite important to us to save the centers of the cities.

Howard: With due deference to the cities, if an individual business establishment or industry finds it can do business more efficiently and at greater profit outside the business district of the central part of the city, the city’s need for tax income is not going to keep that business there.

Hale: If you provide the adequate and safe transportation facilities into the downtown area, the downtown area will save itself. If it doesn’t, it isn’t worth saving.

Prentice: What sort of activities are functionally appropriate to downtown districts, and what are the trends there that we the people could perhaps do a little about?

Wheaton: It would vary from city to city, but there will be a trend toward increase in office, managerial, financial and other functions which are peculiarly central in their character; a stable and very slow increase in retail functions; and a decline in many miscellaneous functions, including wholesale and manufacturing. The latter cannot compete effectively for business sites and stay, in many cases, for historical reasons. They were justifiably there 50 years ago, but are not able to compete today on equal terms. It is the manufacturing, wholesaling and miscellaneous functions of that sort that will come out.

Evans: Selective decentralization is a good thing for these downtown districts. That is getting the funeral parlors, food stores, drugstores, hardware stores, light industry, etc., outside the central business district as a positive sort of thing other than thinking of decentralization as a loss.

Hamilton: The selection is going to be done by competition. If you can’t meet the competition downtown and you can save money by going somewhere else, you are going. If you feel that the added cost of your present location is worth-while to your organization because of the peculiar nature of your function, you are going to stay.

Fairbank: It isn’t a question of whether we think the downtown area ought to survive or whether we think we can do anything to make it survive. There isn’t a planner in this country who can do anything to make the downtown center survive if the downtown center does not want to. That is a matter of the choice of many people.

Sawyer: It is an American habit to go to the center of the city to do shopping where we can get a greater selection of merchandise. Even though we have decentralized some of the shopping areas, it is still more desirable to shop downtown.

We have a problem of redesigning our cities. We must take into consideration that every American city was built 100, 200 and 300 years ago for horse-drawn vehicles and bicycles, and in 50 years we have dumped over 50 million automobiles on these cities and expect them to carry that load.

If this answer is in elevated sidewalks, or in sunken roadways, or in reclamations of certain areas, or if it means selective decentralization, then we should recommend such improvements over the existing system.

THE MAGAZINE OF BUILDING
Can the streets handle both parking and traffic? If not, how can the curbs be cleared?

Prentice: Let's talk about private automobiles. Let me start the discussion by asking if the existing street system of the cities would be adequate, except for access purposes, if so many of our existing streets were not used for parking? My impression of New York City is that most of our traffic congestion is due to the fact that we have about 60% of the streets available for vehicles in motion, and the other 40% is dedicated as parking garages.

Blucher: In the interest of research which could be very quickly done, I got on an express bus ten miles from downtown Detroit in the morning rush hour. It cost me 20c. For the ten miles, I stood. In that ten-mile distance, we passed a considerable number of automobiles headed downtown, and a considerable number of automobiles passed us. In that ten-mile distance, there were exactly eight automobiles that carried more than the driver.

I give you that illustration merely to point out that if we are going to encourage that kind of driving pattern, then the existing streets, even without parking, will not be adequate to handle the cars that want to use them.

Wheaton: In almost every city, at least half of the people now going into the business district go by mass transit, and presumably, of that half, another half, or 25% of the whole, would drive if the streets were not congested. If you add that volume of automobiles to almost any street system, your downtown district blows up.

Clark: You can't discuss parking requirements of a city without considering whether the access highways should be designed to bring in more people or less people. The demand on your streets for moving traffic and the demand for off-street parking facilities depends a good deal on whether there is a policy of encouraging or discouraging people from bringing their cars into the city. I do not see how you can divorce the two questions.

Prentice: We have to consider the question of why he wants to use his private car.

Hyde: If the problem is simply one of too many automobiles, why are we trying to solve it by putting more automobiles downtown?

Newman: The ingrained desire of the US citizen to be able to go to whatever point he wants to accounts for the 53 million vehicles on our roads.

Kelley: You just can't stop the flow of automotive traffic.

G. Richards: Every home owner is an automobile owner; he builds his own street and pays for it by assessment.

Mayer West: The automobile problem is too many vehicles not hauling enough people.

Where does the taxi fit in the pattern of transportation?

How does it fare compared with busses and trolleys?

Sawyer: It may be refreshing to note that the taxi cab industry is not looking for subsidy.

I have some astonishing figures for you, and I think you will be very interested when you hear them.

In 1951, taxicabs carried 1,577,781,044 passengers or an increase of 13.42% over 1946, while the motor busses carried 7,438,000,000 or an increase of 3%, as compared with 1946.

Prentice: Are you telling me taxis carried a fifth as many passengers as busses?

Sawyer: That's about right.

Streetcars carried 2,171,000,000 passengers in 1951 as compared with 6,867,860,000 in 1946, or a decrease of 68.3%.

Rapid transit carried 2,041,000,000 in 1951, or an increase of 19% as compared with 1946.

Trolley coaches carried 1,231,000,000 in 1951, an increase of 35.3% as compared with 1946, which would indicate that the trolley coaches are becoming the most popular of the mass transportation carriers.

Taxicabs took in $881,841,464 in gross revenues: or an increase of 81.5% as compared with 1946.

McGavin: No wonder you don't want a subsidy.

Mitchell: We understand the taxis are not subsidized, but do you know what proportion of the amount they got was paid for out of expense accounts? [Laughter.]

Sawyer: Here is a complete tabulation of these figures and the trends since 1946:

Public transportation methods compared—1951 and trends since 1946

<table>
<thead>
<tr>
<th>Method</th>
<th>Passengers in millions</th>
<th>Units operated</th>
<th>Miles traveled in millions</th>
<th>Gross revenues in millions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taxis</td>
<td>1,578 ± 13%</td>
<td>78,764 ± 57%</td>
<td>4,877 ± 79%</td>
<td>$882 ± 82%</td>
</tr>
<tr>
<td>Busses</td>
<td>7,438 ± 3</td>
<td>57,660 ± 25</td>
<td>1,993 ± 18</td>
<td>789 ± 60</td>
</tr>
<tr>
<td>Streetcars</td>
<td>2,171 ± 68</td>
<td>10,960 ± 60</td>
<td>388 ± 57</td>
<td>284 ± 41</td>
</tr>
<tr>
<td>Rapid transit</td>
<td>2,041 ± 19</td>
<td>9,644 ± 6</td>
<td>424 ± 9</td>
<td>207 ± 43</td>
</tr>
<tr>
<td>Trolley coaches</td>
<td>1,231 ± 35</td>
<td>7,074 ± 106</td>
<td>209 ± 71</td>
<td>130 ± 131</td>
</tr>
</tbody>
</table>
What is the quickest way to double a parking lot? (p. 122)

How have building-code changes in Los Angeles, Washington and Minneapolis lowered garage costs? (p. 130)

How far from his destination will a motorist park? (p. 126)

Why is the sixth level the top limit for ramp garages? (p. 128)

Why should mid-city garages be based on built-in retail space? (p. 128)

How to build a top-notch garage for only $960 a stall (p. 134)

How does the world's largest garage entice motorists up its three-story ramp? (p. 139)

Why is 105' the dividing line between ramp and mechanical garages? (p. 126)

How does a 2 h.p. motor make a whole garage floor revolve? (p. 140)

How can you park 68 cars on 1,700 sq. ft. of ground space? (p. 137)

"A few architects have been designing garages and parking terminals but the surface has barely been scratched . . . millions of dollars will be spent on off-street facilities in the years to come."—AIA Bulletin

In the history of building, 1953 may well go down as the "Garage Year," for at long last action is replacing talk about off-street parking facilities.

**Item:** more public money will be spent on garages this year than ever before: Denver, $4 million; Chicago, $21 million; Hartford, $2.9 million; Philadelphia, $7 million.

**Item:** private capital entering the garage field will top $75 million compared with $15 million in 1952, according to the newly formed National Parking Assn.

**Item:** more new office buildings will provide parking space for tenants than ever before: a Denver building, 400 spaces; a New Orleans building, 800 spaces; one in Hartford, 200; and another in Atlanta, 250.

**Item:** mechanical garages, largely experimental a year ago, have begun to pay off. The Bowser system (p. 139), for example, will go into two new buildings in Denver, two in Houston, one in Mexico City. One large store has shelved expansion plans for its ramp garage to study an even more advanced mechanical garage.
Today's garage boom springs from the fact that more people have more cars, sending car registration up to 43.9 million in 1952 from 29.5 million in 1941. Result: increased traffic pressure on inadequate city streets.

While few experts think cities will actually die of traffic strangulation, many fear that productivity of mid-city areas will fail to keep pace with rising taxes, wages and other business costs. The problem: how to make it easier for more people to drive to the city's center to shop or transact business and thus stimulate downtown productivity.

**Signs of pain**
As traffic pressure mounts, more and more symptoms of internal disorder become apparent:

- Fear of less tax revenue from falling real estate values (a condition that has not actually appeared) has prompted Realtor William Zeckendorf to call for absorption of commuting towns around New York into the city's tax structure.
- Several large businesses in Manhattan have pined so for traffic-free suburbia they have given up desirable central locations, moved bag and baggage to greenbelt areas.
- Shopping centers have sprouted in suburban areas. Some experts claim they result from muddled city traffic; others describe them as part of the sheer growth of cities. Best bet: a combination of both.
- More and more cities have had to enter the parking field. Today, nearly half of all US cities over 10,000 population are running parking lots; a dozen operate garages.
- To encourage turnover at the curb, parking meters have been installed throughout the US. More important for the garage industry, the public has accepted the idea that it can no longer park free in the downtown district.

**More garages: curse or blessing?**
All these facts feed the garage boom. Although garage rates are higher than meter rates, the shortage of curb space in nearly every city center fills garages. Will more garages attract still more cars to mid-city areas and produce still more congestion? Not if other measures are taken, such as modernizing mass transit, prohibiting curb parking, regulating truck movement.

In any event, because they are needed and profitable, more and more garages will be built.
Today's parking garage had an unfortunate ancestor, one that passed its sins on to its progeny so that even today garages are considered social affronts in grade-A locations. The ancestor, of course, was the livery stable and the reasons for its low esteem are obvious. As cries of "get a horse" faded from the US vocabulary, many stables were converted into garages.

In 1916, for example, New York City zoning laws classed garages with stables. From the use of stables as garages came the idea that a garage could be any type of building. Result: more and more loft buildings were turned into garages in second-rate areas.* First important improvement on the converted building garage came in Boston in 1933 when garage owner Sam Eliot asked himself an important question: Why enclose a building full of cars and then have to spend money ventilating it? There was no logical answer, so he built the Cage Garage, first open-deck garage in the US and still in profitable operation.

Like many a radical innovation, the first open-deck garage did not find immediate acceptance, and three years passed before the second open-deck garage was built by Kaufman's department store in Pittsburgh. Better designed than its predecessor, the Kaufman garage set the pace for open-deck ramp garages for the next decade.

Meanwhile a new garage type was created. In various and often bizarre forms (right and p. 136) the automatic or semi-automatic elevator garage began to emerge. As early as 1937 Westinghouse experimented with a mechanical garage that operated on the principle of a Ferris wheel. Cars slung in special racks were raised up one side of a steel frame structure, passed across the top and lowered down the other side. This and similar experiments proved impractical and, for the time being, efforts to develop a truly mechanical garage got nowhere.

As ramp garages gained favor they moved closer and closer to the heart of retail centers—and closer to a major hurdle. In many cases as much as a block of perfectly good retail space would be devoted exclusively to parking and this tended to destroy the retail character of the neighborhood. To preserve essential retail continuity as well as for more direct economic reasons (p. 128) garages began leasing ground-floor space to retail shops and restaurants. One of the simplest solutions to this problem is found in an unpretentious parking lot in Dayton. Show windows of the adjacent store simply extend across its front, leaving only enough space for an entrance to the lot.

For many years codes forced garage builders to fireproof their steel at considerable expense. Fortunately the fire record in garages has been so good that, today, cities have begun to relax codes, permitting garages of exposed steel. Best example: the Medical Center garage in Beverly Hill (right). Cleanly designed, it is built of demountable modular steel units so that if the land is required for another use, the garage can be taken down, moved and re-erected without scrapping expensive steel.

More modest in scope is a design by Engineer Hewitt Wells in Washington, D. C. His demountable modular steel units can be moved onto a parking lot and put up to increase its capacity at a cost of $3 to $3.50 per sq. ft. Time required: one week for an average lot. Architectural treatment of the spandrel areas can be as simple or elaborate as desired.

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Latest development in concrete garages is lift-slab construction. A project of this kind for Louisville went out for bids last month.

Improved mechanical garages are finding increased acceptance. Today, three types are in operation, two of which are fully automatic (see p. 136). These pioneering successes are profitable operations that have broken the jinx surrounding the development of mechanized garage.

* Even today the garage still suffers from its lowly origin: Four projected mid-Manhattan garages—which could supply 750 much-needed parking places—have met opposition by nearby New Yorkers. One of their protests: the garages were unnecessary, would bring noise and gasoline fumes into the area.

1916 Ford boasts small turning radius for use in "crowded thoroughfares."

1933 Cage Garage (Boston) pioneered open decks.

Old buildings like this became makeshift garages.

Even stables were used as garages.
Second open-deck garage was built by Kaufman's (Pittsburgh) in 1936. Architect: William Hoover.

Pioneer mechanical garage put up by Westinghouse in 1937 was complex, proved impractical.

How windows across front of Dayton parking lot help preserve street's retail character.

Retail continuity of whole block is preserved by ground-floor shops of this Richmond garage. Architect: Carneal & Johnston; Consultant: Ramp Bldgs. Corp.

Modular steel units form Beverly Hills garage. Architect: Pereira-Luckman. (AF, March, '52)

Prefabricated steel parts turn lot into garage in a week.
Public garage in Bridgeport, Conn., built on $1 million work of ground, pays no taxes, offers self-parking for 500 cars at low rate of 25¢ for four hours, 5¢ each additional hour as public service. Private lot operators in midtown area cannot offer such low rates, pay taxes on their land and still profit. Building cost: $2,500 per car stall. Over half capacity is sold on monthly basis; remainder is for shopper parking. Part of lower floor provides bus stop, public waiting room. Facilities are lush with 10' high floors, a 24' high ground floor, concrete grillwork on exterior walls (which could have been left completely open), long straight ramps, moving stairs between all floors. City raised $1.25 million for garage with bonds. Any deficit would be made up from general tax revenues from garage users and non-users alike. Architects: Lindsay & Johnson.

PUBLIC vs. PRIVATE

Profits for both city and garage operator lie in cooperation

Today's new garages range from wholly municipal projects to those developed entirely by private enterprise. At one extreme are Evanston, Ill., which has used its parking meter revenues to provide 11 parking lots, and Grand Rapids, where the parking authority has issued bonds to build and operate three garages. At the other extreme is Indianapolis. After years of fruitless discussion over whether the city or private enterprise should build garages, businessmen got together and built the first project, a 577-car garage.

Between these two extremes is Baltimore where public and private interests cooperate. The city has made $15 million available for 2½% loans to private enterprise for garage construction. In New Brunswick, N. J., this situation was reversed. Both public and private interests recognized the need for parking. Businessmen agreed to buy 300,000 of noninterest-bearing bonds from the city parking authority so it could acquire and construct three parking lots.

The public vs. private argument about the development of off-street parking facilities runs like this:

Public: Off-street parking facilities are a natural extension of the city's street system.

Private: Such logic would lead to the claim that driveways, service stations and even hotels are natural extensions of the street and sidewalk system—and are therefore subject to public control.

Public: The parking problem is so tangled with mass transit, through-way development and truck movement that a centralized control is necessary to bring order from chaos—and only the city can supply that control.

Private: Certainly the city should develop an over-all plan for traffic movement and parking but it does not follow that the city should go into the parking business.

Public: Where parking demand is great the city can use its power of eminent domain to acquire necessary sites denied private buyers.

Private: —And usually pay through the nose in the process. In many cases, acquiring sites through eminent domain costs more than private negotiation because a property owner threatened with city action will put a premium price on his property which must be paid or fought expensively in the courts to be reduced. In only extreme instances is use of eminent domain justified.

Public: Without the profit motive we can offer lower rates to the public.

Private: You mean without the tax problem. Not having to pay taxes is what makes lower rates possible.

Public: Revenue from city garages will retire bonds so the projects will not cost the public a cent.

Private: But curb parking-meter revenues often must be put behind the bonds or they don't get sold. Then meter revenues are not available for use elsewhere in the city budget. It will cost the taxpayer in any event because the city garage removes tax revenue producing property from the city's lists. In particular it costs the taxpayer who does not own a car or who does not use the municipal parking garage. Nearby merchants benefit from municipal garages at the expense of more distant—though equally taxed—businesses. Are you going to build garages for everyone or, to keep matters fair, reduce the taxes of merchants who do not benefit from municipal parking facilities?
Private garage of J. L. Hudson Co. in Detroit takes whole city block (54,000 sq. ft.). Though not built with maximum economy (cost: $1.5 million) it nonetheless parks 850 cars at a cost of $1.265 per car stall. Rates are comparable to competing lots and garages: 30¢ first hour, 10¢ each additional hour; yet they are not so high as to discourage shopper parking. Income from lease of 14 retail shops on ground floor goes far to pay land cost—taxes from which augment city revenue. In addition, the shops preserve the retail character of the mid-city location. Cars are parked by attendants. Banked ramps and man-lifts help raise turnover to nearly three. Six entrances feed cars in from one street, three exits discharge them on another. In rush-closing hours, three of six entrance lanes can be turned to exits, speed departing customers. Designed by Ramp Bldgs. Corp.

Public: Municipal garages would insure permanence of off-street parking space where it is needed most. Private interests might later convert a garage site to other purposes.

Private: City administrations change and adopt different policies. A new administration might decide to do something else with the site, too.

Results of cooperation
However heated the argument becomes, proponents of both public and private garaging agree that true cooperation can produce more results than continued warfare. Here is a striking example that shows effects of cooperation: In Washington, D. C., the parking commission has surveyed traffic trends, charted parking demand, helped acquire sites, and encouraged private investment in off-street facilities. Through the parking commission’s efforts, 22 changes were made in building codes so private garages could cut costs, provide up-to-date garages. (Chief changes: elimination of exterior walls, reduction in sprinkling and ventilating system requirements.) Result: a net gain of 20,600 spaces in six years. No city with a public parking authority which considers all off-street projects to be within the government’s domain and makes little real effort to encourage development has challenged that record.

Profits for private investment
The history of the garage business until the end of World War II has not been one to make cautious investors take the plunge. In the Thirties, haphazard location, costly building (partially demanded by unrealistic building codes) forced many garage ventures into bankruptcy.

Since the war, however, expert analysis of parking demand, careful attention to garage location and more economical garage design have turned the garage business into a profitable industry. Allentown, Pa. is an outstanding example of how private interests—the retail merchants of the city—have not only solved the city’s downtown parking problem but also created a profitable business. Called “Park & Shop,” their organization today operates lots with space to park 1,200 cars. Last year Park & Shop made a profit of $26,000—which is only the direct profit; indirectly the 82 merchants in the organization have made much more in increased retail sales which have risen over 60% since 1945. And, with easier parking in Allentown, no suburban shopping centers have mushroomed.

Below is a table summarizing the operating costs and profits of four typical garages serving different kinds of parkers and charging different rates.

<table>
<thead>
<tr>
<th>OPERATING COSTS AND PROFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>per month per car space in typical garages</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type of patronage</th>
<th>Capacity</th>
<th>Rate structure</th>
<th>Gross revenue</th>
<th>Operating cost</th>
<th>Interest</th>
<th>Profit</th>
</tr>
</thead>
<tbody>
<tr>
<td>90% Short-time</td>
<td>300</td>
<td>20¢—1 hr., 10¢—1/2 hr.</td>
<td>$24.70</td>
<td>$14.85</td>
<td>$4.25</td>
<td>$5.55</td>
</tr>
<tr>
<td>70% Short-time</td>
<td>500</td>
<td>25¢—1 hr., 15¢—1/2 hr.</td>
<td>$25.50</td>
<td>$22.50</td>
<td>5.50</td>
<td>2.45</td>
</tr>
<tr>
<td>50% Short-time</td>
<td>350</td>
<td>35¢—1 hr., 15¢—1/2 hr.</td>
<td>$36.90</td>
<td>$25.40</td>
<td>5.25</td>
<td>6.25</td>
</tr>
<tr>
<td>30% Short-time</td>
<td>350</td>
<td>35¢—1 hr., 15¢—1/2 hr.</td>
<td>$33.30</td>
<td>$20.90</td>
<td>4.70</td>
<td>7.70</td>
</tr>
</tbody>
</table>

* Balance of percentage in each case represents all-day parkers

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LOCATION

Where to site a garage and how the site affects design

It has taken 20 years, a depression-inspired collapse of the garage business and today’s bumper-to-bumper congestion to prove that location is the key to success or failure of garage operation:

- Location determines the type of garage to be built.
- Location determines, to a great extent, the rate structure.
- Location determines the type of parker drawn to the garage.
- But what determines location?

Three recent surveys help answer the site question:

1. A survey by the American Automobile Assn. documents the desire of drivers on brief errands to park correspondingly close to their destination (see chart). How strong is that demand? Strong enough to make them cruise for five or ten minutes looking for a place to park within two blocks of their goal.

2. A private study of parking habits in five mid-Manhattan garages reveals this parking-time pattern:

<table>
<thead>
<tr>
<th>Parking Time Desired</th>
<th>1-2 HRS.</th>
<th>2-3 HRS.</th>
<th>3-4 HRS.</th>
<th>4-5 HRS.</th>
<th>OVER 5 HRS.</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-1 HRS.</td>
<td>11%</td>
<td>23.6%</td>
<td>21.7%</td>
<td>10.9%</td>
<td>11.1%</td>
</tr>
</tbody>
</table>

3. Cleveland’s recent block-by-block parking survey analyzes parking demand versus supply (see map). Although the downtown area as a whole shows an actual surplus of parking space, all this surplus is too far out for short-time parkers.

These statistics suggest 1) that garages in high-demand areas should have higher rates and cater exclusively to short-time parking; 2) that fringe-area lots and garages should have a lower rate structure designed to attract the all-day parker; and 3) that . . .

Garage type is determined by location

There are two general garage types: ramp and mechanical. A choice is influenced by the location, size and cost of the lot.

Mechanical garages use elevators and dollies to stack cars up as many as 20 levels on sites as small as 24' x 24'. Frontages required for mechanical types range from 24' to 100'. Hence this type garage can go where sites are scarce, small and expensive.

Ramp garages are of four types: straight ramp, staggered floor or split ramp, spiral ramp and sloped floor. Of these the staggered floor takes the least frontage to park a profitable number of cars. This minimum frontage is 105'—just about where mechanical garages stop. In this system, floors in one section of the garage are offset half a level to cut ramp lengths in half. Even so, staggered floor ramps of 10% slope run 34'. With an 18' aisle on each level plus an 18' row of cars beyond each aisle, the total distance is 106'. Stalls can be squeezed to 17'6" which leaves 105' frontage needed for this type garage. A straight ramp type with floors extending unbroken from wall to wall would take twice the ramping length and would bring the frontage requirements up to 140' with no increase in capacity. Spiral ramps can be used to reduce this 140' requirement but parking space is sacrificed as the center of the circular ramp is inaccessible. Sloped-floor garages turn the whole floor—including parking spaces—into a ramp that corkscrews up in rectangular sections to the roof. The necessarily gentle slope takes more frontage than a short-run ramp.

Since ramps of all types require more land than mechanicals, their greatest usefulness is in the center of cities of under 200,000 population or outside big-city business centers.

Underground garage at Union Square, San Francisco is expensive, needs subsidy to be feasible. Note heavy columns to hold up earth for park. Architect: T. L. Pfleuger.

Built-in garage is featured in Washington's Cafritz Building. Sloped-floor garage occupies largely unrentable interior space, is designed for tenants and their clients who step from their cars to surrounding offices. Architect: Le Roy L. Warner.

Independent garage in mid-Pittsburgh serves a large retail area. On expensive land, it might more economically have been a mechanical type. Architect: Hoffman & Crampton; consultant: Ramp Bldgs. Corp.
Mechanical garages, by their nature, have fixed plans that admit little rearrangement or selection of interior elements. Ramp garages, however, are as varied as the traffic conditions, street systems, site dimensions and operating methods to which they must conform. No two garages are identical since no two have to meet exactly the same conditions. Yet each successful garage design can teach something to all garage designers. Here, keyed to the photos above, are check points and ideas from today’s best garages:

1. **Six levels** above the ground floor mark the upper practicable limit in ramp-garage development. Two operating details have determined this limit: 1) From higher floors cars cannot be delivered fast enough during rush hours; 2) In self-park operations customers balk at driving up a ramp system, however well laid out, beyond a sixth level. While it has sometimes proved profitable to use basement space for parking, the cost of going farther down to a sub-basement generally exceeds the gains.

2. **Open decks**, by eliminating walls and windows, obviously save money in construction, ventilation and maintenance. And in customer-park operations there is less resistance to driving up open-deck garage ramps than to maneuvering in closed buildings. (Probable reason: claustrophobic.) Trouble from snow in northern locations has not materialized. Says one northern garage operator: “The cars themselves bring in more snow than blows in.”

3. **Staggered floor levels** waste a minimum of space on ramps. Pitched at 10° they require only 3′ of horizontal space (two car lengths) for the ramps themselves, compared with 68′ for a straight ramp system of the same slope. Less frontage is required for a given capacity garage in this system than any other.

4. **Sloping floors** comprise the most efficient ramping system for customer-park operations. In this system, the whole floor is the ramp. Cars are parked all the way up on both sides of the aisleway. The slope is so gentle (about 4°) that customers parking their own cars hardly realize they are circling upward.

5. **Ground-floor shops** have become almost a necessity to defray high mid-city land costs. Where the land is leased rather than bought, ground-floor rentals may more than pay for the land—letting the garage itself operate rent free.

Ground-floor development, in fact, can mean the difference between life and death for a garage venture. Studies for a projected municipal garage in one large eastern city showed that,
7. **Ramps** should be wide enough to permit parking either by customers or attendants.

8. **Aisle width** affects efficiency of operation.

9. **Three stalls per bay** is normal basis for determining column spacing.

10. Elevators should be installed in self-park garages over three levels above ground. Expense of moving stairs is apparently not justified since they rarely operate at capacity. Man-lifts to carry employees between floors consist of little more than hand and foot rests on vertically moving endless belts.

11. **Curbs around columns**, not yet proved necessary, may well become common as more and more ramp garages find customer parking pays better than attendant parking. These curbs prevent drivers from scraping their cars on columns, reduce damage suits against the garage.
CONSTRUCTION

How to lower garage costs

In the face of constantly rising building costs, more and more thinking in garage design is directed at the economics of the structure. Here are the ways in which garage costs are being lowered:

Building codes in most cities add unnecessary cost to garages—as they do to most building types. In cities like Washington, Los Angeles and Minneapolis, however, codes have been revised—after much struggle—to permit intelligent economies. Among them: elimination of ventilating systems in open-deck garages, use of exposed steel, elimination of sprinkler systems (except in basement or gas-sale areas), lower floor-loading requirements, reduced ceiling heights.

Exterior walls have been reduced nearly to the vanishing point with nothing left except a curb and metal guard rail around the floor slab edge (right). Where standard steel construction is used, spandrel facings are made of light metal extending to the top of the guard rail. Masonry facing for spandrels can be much more expensive than the admittedly higher installation cost. Reason: bumpers hitting the masonry guard rails loosen it, requiring expensive maintenance.

Flat slab floors in place of standard fireproofed steel construction reduce costs. With the now-standard 7' floor to ceiling height, flat floor slabs bring the floor-to-floor height down from 9'-6" to 7'-6"—a 2' saving in each level. Floor loading requirements, which in many cities range from 75 to 150 psf or more, can keep savings from flat slab-floor construction from being realized. However, with tightly written specifications, flat slabs with a 50 psf loading can be safely used. (Pan or troff' er construction with that loading cannot be used.) Cracks appearing in some slab floors in northern climates have permitted winter slush with its de-icing salt to drip through to damage cars below. Use of air-entrained concrete and thicker slabs eliminates this nuisance.

Exposed steel garages have the advantage of being demountable and salvageable and are worth consideration for garages on leased land. Steel floors have the disadvantage of letting water drip on cars below. Fire insurance rates are higher for exposed steel but since insurance costs are a very small part of operational expenses, the higher rate is not a major drawback.

Low bridge. One construction trick used in a Midwest garage produced an indirect economy. Entrances were designed with 7' clearance so no trucks or busses could enter the garage. This guaranteed that the garage could store only private cars and the insurance company allowed a substantial rate reduction. Reason: heavy trucks—especially those with unknown and possibly flammable contents—are a greater hazard than cars.

The not inconsiderable cost of replacing extended aerials broken in low-ceiling garages could be materially reduced by placing a trip wire 7' above the garage entrance. It could activate a squawk box and alert attendants before the damage was done.

OPERATION

Two garage goals:

In fully automatic garages, the big managerial problem is to see that the machinery is in working order. One full-time engineer may solve this problem.

Toward the one-man garage. Ramp garages are another matter. If attendants park the cars, the manager has to schedule and direct as many as 30 employees. With a good 2.5 turnover, 20 attendants in a 550-car garage handle only 68 cars apiece during a ten-hour day. Labor costs run as high as 40% of gross.

Such high labor costs are pushing ramp garages closer and closer to self-park operation, which requires only one man per floor (called floorman) to direct traffic, plus the manager and one or two attendants to handle the ground-floor check-in-check-out operation. Analysis of one attendant-park project shows that a switch to self-park operation would save 51% in labor costs if only floormen and ground staff were used and 62% if only the ground staff were retained.

A dividend from "breakage." Most profitable of all garage customers are the short-time parkers—usually shoppers who park from one to three hours. They supply the all-important "breakage" that supplies the profit to many operations. Breakage is simply the gain to the garage when 1) a parker leaves before the first hour is up but pays a full first-hour price, or 2) leaves during some part of a subsequent hour but pays that full hour's price. It adds an average of 25% to income from short-time parkers over a period of time. For example, a 500-car garage with a two-time turnover, an average parking time per car of two hours and a rate structure of 35¢ first hour plus 15¢ each additional hour would gross $500 a day. Breakage brings the gross to $625.

Rate structure can be used to attract or repel different types of parkers. For example, a rate of 25¢ first hour, 20¢ each additional hour will pull short-time parking, repel all-day traffic. An attractive all-day rate with a stiff hourly rate will do the reverse.

Supplemental activities can add security to any parking venture. Car wash, gas, oil and grease service and even sale of car appliances provide the margin of profit in some operations,
Today's garage, like this Miami open-deck type by Architect Robert L. Weed, is little more than floor slabs held aloft by columns. Metal guard rails form only vestigial walls. Competed in 1949, this is still the nation's most handsome garage.


Customers park cars on sloped floor of garage for General Petroleum employees in Los Angeles. Attendants turn them around to make exit easier. Result is a semi-attendant operation.

Complete self-park operation is envisioned in this project developed by Architect Hermann Herrey. Foolproof one-way lanes direct customers up spiral ramp system to angled parking stalls. Turn of meter key locks front wheels in stall. On return, customer deposits charge shown on meter which unlocks wheels. All lanes lead eventually to down ramp and street.
TWO RAMP GARAGES

1. WORLD'S LARGEST GARAGE helps motorists park their own cars by providing five big floors, served by six big ramps. Result: more customers for an attached department store

The garage on these pages is the largest in the world. It measures 216' x 570', has five levels totaling 640,000 sq. ft., provides (along with nearby curb space) 2.8 sq. ft. of parking space for every square foot of selling area in the store. It cost $4.50 per sq. ft. ($1,800 per stall), holds 1,600 cars.

Like most department store garages, it was not built primarily for profit (as its 5¢-for-three-hours rate suggests), but to attract customers. It does this by providing parking space within an average walking distance of 300' of the store, which is accessible from every level of the garage. The second-level arcade is flush with the store's first floor; other levels connect to store floors by stairway.

Angle parking, recommended for customer-park operations, is used on the reinforced concrete decks to put three 8'-3" stalls between columns spaced 30' o.c. Floors cantilevered 13' to 15' beyond outside columns provide a row of parking spaces along the edge of each floor. On each side of the garage, an entrance ramp connects all levels, while each level has individual exit ramps on one side, interfloor travel ramps on the other.
A five-level garage covers 570' x 216' site, adjoins main store of 18-acre Parkington Shopping Center in Arlington, Va. Capacity: 1,600 cars.

Three ramps serve each side of garage. Top two-lane ramp is for entrance to all levels and exit from roof. Others are one-way.
2. LOW COST OPEN DECKS
bring profit to downtown merchants,
solves parking problem at no expense to city,
explodes three myths about off-street parking

Myth No. 1: Private enterprise cannot or will not solve the problem.

The city of Minneapolis planned to build this garage with revenue from a bond issue. When downtown merchants heard of it they offered to supply the 1,800 off-street spaces recommended by a survey. They formed Downtown Auto Park, Inc. and raised $600,000 equity capital to build two garages that would supply 1,354 of the needed spaces.

Myth No. 2: Leading institutions will not go into garage ventures.

Downtown Auto Park, Inc. negotiated an insurance company loan of $1.5 million—a fat 71% of the capital—to build the garages.

Myth No. 3: Restrictive codes cannot be changed to take advantage of modern garage designs.

Three code revisions made this garage a reality: elimination of sprinkler system above grade; omission of exterior curtain walls on street sides (rear walls of each garage are enclosed with corrugated wire glass panels); use of exposed steel columns above the ground floor.

As a result of their efforts, Downtown Auto Park, Inc. have two profitable garages that cost $3.79 per sq. ft. and the city's parking problem is more than two-thirds solved at no cost to the city.

This garage, the smaller of the two, holds 535 cars in 8'-wide stalls, cost $1,034 per stall.* It has staggered floors, one-way ramps, four levels above the ground floor and occupies a 156' x 157' site. During its first year of operation it has achieved a two-time turnover with the help of a generous 20-car ground-floor reservoir. Designed for attendant parking, the garage has man-lifts to take attendants up and down through the building. Rates are 25¢ first hour, 15¢ each additional hour for 435 transient spaces, and $12 to $23 for 100 monthly spaces. Gas sale, lubrication and wash service are provided.

Structure is flat slab-reinforced concrete. Floor slabs were made 12" thick of air-entrained concrete to prevent deterioration from salt brought in on cars and cracking due to wide temperature range in that northern latitude. Slabs are cantilevered 14' beyond columns with a slight taper to the edge, which is faced with stainless steel.

Only the waiting room and basement grease-pit areas are heated. The entire basement is ventilated by a unique system which reverses the usual exhaustion method. Ducts introduce fresh air which raises the pressure and insures over-all ventilation. Air escapes up the open ramps to the outside.

* Due mainly to its larger size the unit cost in the other garage was only $940 per stall.
FIVE MECHANICAL GARAGES
for small, expensive mid-city sites

In the turbulent history of garages, no group has had a rougher ride than the men who believe in mechanical garages. For one thing, mechanical-garage experiments have attracted a lot of crackpots whose Rube Goldberg schemes have overshadowed the efforts of serious engineers. On top of that, America's delight in gadgets has prompted magazine editors to display many such schemes, hailing them as the answer to the parking problem. Since World War II, however, most of the gadgeteers have departed, leaving the field to a handful of designers who have developed workable mechanical garages. Today, three types are in operation; at least two others possess sound ideas that may soon be tried. All five are detailed on the following pages.

Where mechanical garages fit in
Mechanical garages differ radically from ramp garages in several important respects:

- They can be put on high-cost land that prohibits ramp operation. Rising higher than ramps, they park more cars per square foot of ground area.

- They require little space, which adds to their ability to operate in high-land-cost locations. Ramps cannot be efficiently designed for lots less than 105' wide but mechanical garages are suited for frontages from 100' down to a minimum of 24'.

- They permit higher turnover rates than ramp garages. They have hit a four-time turnover where best ramp operations vary from 2.5 to 3.

- They are essentially for short-time parkers where ramps are better suited to all-day trade.

- They cost more per stall than ramps, due to the machinery's initial expense and maintenance.

- They require a smaller labor force than ramps (which balances higher machinery and maintenance costs). Full automation may permit one man in a mechanical garage to handle 150 cars compared to five men for 150 cars in a typical ramp garage.
1. FIFTEEN- STORY ELEVATORS

on 25' lot park 265 cars a day in less than 2 min. each

Tallest and narrowest industrial building in Washington, D. C. is a fully automatic parking garage. It is 16 stories high, occupies a 25' x 67' site. A single operator—who never leaves the ground floor—parks and de-parks as many as 265 cars a day (8 A.M. to 6 P.M.) by simply pressing a button on the master control panel. The unit holds 68 cars (72 with ground-floor “magazine” full). On a larger site, multiples of the basic unit could be used.

Park-O-Mat has hit a 3.9 turnover, cost about $2,000 per car space. It can be built into office buildings, hotels, or apartment projects, where its cost would be less since a separate building would not have to be built to house it.
2. **LOW-COST STEEL CAGE**

*with track-mounted car carrier fits on 50-100' lots, but achieves high turnover*

Ten automatic garages like this are already in operation and four others are being constructed. They consist of a multilevel steel framework of 15' x 19' stalls each of which holds two cars. A 20' carrier running on railroad tracks and a dolly automatically lift and deposit cars in assigned stalls.

While this garage can be erected on lots as narrow as 50', a width of 100' increases efficiency of operation. Six levels are recommended for all but highest demand areas where as many as eight or ten levels can be used. Operating records: to park a car in the most remote stall in a 144-car garage took 1 min. 22 sec.; five-time turnover was reached in a 72-car unit.

Pigeon Hole costs are phenomenally low; some garages have been put up for as little as $400 per car space. Its low cost, which competes with the most economical ramp structures, makes the system usable on low-cost land and in towns with as little as 35,000 population. Its simple bolted steel framework and decking suit Pigeon Hole also for operation on leased land; the steel can be moved inexpensively to another location when the lease expires.
3. OVERHEAD CRANES in garage 32-90' wide can de-park cars without electrical power

This mechanical garage system has been operating in Des Moines for over a year. In principle, it is similar to Pigeon Hole (opp. p.) but the carriers or moving cranes are hung from rails at the top of the structure. The Des Moines' garage has eight levels above grade, one below, holds 430 cars.

An attendant drives the car onto the elevator platform, presses a button on the control panel, which starts the elevator upward and the carrier sideways toward the desired stall. On arrival, the attendant parks the car. Time to deliver a car from the farthest point: 1 min. 20 secs. Turnover is more than two.

Frontage required for the system ranges from 32' minimum to an optimum of 90'. A basic, one-elevator unit has a capacity of 135 cars; as many units as necessary can be combined to meet the demands of the location. Protection against power failure lies in over-counterweighting the elevators. When empty, they rise and can be manually stopped at a desired level. With a car on them, they coast down to ground-floor level. Cost of Bowser units is approximately $1,300 per car space for a 500-car garage.
4. ROTATING FLOORS
align 500 stalls with four elevators in this 100' x 100' garage

This projected, fully automatic system overcomes the two most obvious limitations of most mechanical garages: 1) crudely accomplished horizontal movement with heavy carriers, 2) restriction of horizontal movement to the reach of the dolly. In the Rotogarage, horizontal motion is provided by revolving floors, which bring the car stalls to the elevators as they rise to the assigned levels. Circular steel tracks bearing 28 stalls are roller-mounted on floor slabs. A small motor turns each floor (see photo). Maximum parking time in a 650-stall garage: 1 min. 24 secs.

At $2,500 to $3,000 per car space, Rotogarage is best suited to high demand areas in cities of over 250,000 population where an estimated six time turnover can be expected. A 500-car unit requires a 100' x 100' site.

ROTOGARAGE
Albert Buranelli, designer

Proposed garage for Manhattan occupies small (100' x 125') plot of costly ground, parks 400 cars in its cylindrical tower.

Friction drive mechanism, powered by a two-horsepower electric motor, rotates floors.

Floor rotates around elevators in conventional shafts in this fully automatic system. Any stall can swing into position in front of any one of four elevators to receive or discharge a car. Dolly on elevator parks and de-parks cars. Each floor has 28 stalls mounted on circular steel tracks with three stalls for all-day parkers in angles between elevator shafts.
5. FORK-LIFT DOLLY

parks cars sideways to reduce
minimum garage width to 24'

Outstanding feature of this experimental system is the mechanical dolly designed to deposit cars sideways into stalls. Basic idea is that of two sets of precisely spaced bars offset so that one set (on the dolly) meshes with the bars of the other set (in the stall).

Designed for cities of over 100,000 population, Alkro anticipates operation in structures as high as 35 levels with a seven-time turnover on high cost land. Estimated time required to park and de-park a car from the most remote location: 1 min. 16 secs.

Alkro's chief advantage is that the dolly system moves cars laterally instead of forward or backward as do the other systems. This reduces dolly travel, speeds operating time and permits use of a smaller site.

Since a minimum unit can be placed on a 24' x 24' site, this system is more adaptable than any other to use in apartments, offices and hotels.

Operating cycle of dolly (right) shows how cars are transferred. Top bottom: Bars of dolly slide between stall bars below car wheels. When fully extended dolly bars are raised, lifting car from stall floor. Dolly retracts to elevator platform bearing car. Lateral motion stacks cars on narrow site (sketch below) with minimum dolly movement.
OUR NEW CRYSTAL TOWERS

Working mainly with the same material—glass—four architects come out with four widely different interpretations

CRITICISM by an anonymous contributor, based on the current "Built in USA" exhibit at the Museum of Modern Art

The discovery in New York’s Museum of Modern Art is glass towers. How recent these towers—all crystal—really are! They are postwar. Not since the cast-iron fronts of that other postwar period after the Civil War has glass been used so radically downtown; but those were fronts only. Even Paxton’s magnificent Crystal Palace of 1851 and Kahn’s glass factories were designed for a single floor. These towers are glass, and glass all the way around, and tall, and for the first time.

Let’s then forget the rest of the show and concentrate on four towers; and let’s postpone detailed discussion of how practical they are. Each is a little world; and the fascinating thing is that four men, all using the same material, should have suggested worlds so different.

What causes this age to be so fascinated with glass? Utilitarians say glass admits more light while keeping out weather—and Paxton had genuine need of daylight for his vast interior. But we need far less for our smaller floors, electrically lighted! Has the fascination perhaps something to do with the desire of our age to see, to see through? Glass removes visual boundaries while it preserves a fragile enclosure, where formerly the two ideas were one. What was opaque is rendered transparent to searching eye and mind. The man atop a glass tower has split-second access at least visually to the farthest galaxies of stars. There’s a greater sense of power in being able to savor the full height built by human effort—and this is coupled with thrill because the protection is so slight.

Glass as a material is moreover of all our materials most sensitively alive. In a day which finds that things are but the interrelated surrounding events, constantly changing. Glass is real yet unreal, a thing yet nothing, hard yet liquid in effect, empty yet with a color, its transparency disturbed by reflections and these distorted, teasing us with mystery.

But enough of this. What of these towers, these separate little worlds?

New York’s Museum of Modern Art has selected these 23 buildings* of “quality and significance” for presentation in its new book and current show entitled

Built in USA: Postwar Architecture

MIT Senior Dormitory, Cambridge, Mass., AF, Aug. ’49
Altar Altos with Perry, Shaw & Hepburn
High School Stadium, Atlanta, Ga., P/A, June ’49
Richard L. Ack & Assoc.
Elementary School, West Columbia, Tex., AF, Oct. ’52
Donald Barcelome & Assoc.
Equitable Building, Portland, Ore., AF, Sept. ’48
Pietro Belluschi
Vassar Dormitory, Poughkeepsie, N. Y., AR, Jan. ’52
Marcel Breuer
Red Cross Building, San Francisco, Calif., AF, Feb. ’49
Gardner A. Dailey & Assoc.
Bluebonnet Plant, Corpus Christi, Tex., AR, Nov. ’49
W. K. Ferguson Co.
Harvard Graduate Center, Cambridge, Mass., AF, Dec. ’50
Walter Gropius, The Architects Collaborative
Alcoa Building, Pittsburgh, Pa., AF, Nov. ’49 and Apr. ’52
Harrison & Abramovitz
UN Secretariat, New York, N. Y., AF, June ’49 and Nov. ’50
Wallace K. Harrison and consultants
Eastgate Apartments, Cambridge, Mass., AF, May ’51
Kennedy, Koch, DeMars, Raymond & Brown
High School, San José, Calif.
Ernest J. Kump
Elementary School, Vista, Calif., AR, June ’51
Maynard Lyndon
Maimonides Health Center, San Francisco, Calif., AF, Feb. ’51
Eric Mendelsohn
Lake Shore Drive Apartments, Chicago, Ill., AF, Jan. ’50 and Nov. ’52
Ludwig Mies van der Rohe
Boiler Plant, 1111 Chicago, Ill., AF, Nov. ’52
Ludwig Mies van der Rohe
GM Technical Center, Detroit, Mich., AF, Nov. ’51
Saarinen, Saarinen & Assoc. with Smith, Hindman & Grylls
Opera Shed, Stockbridge, Mass., P/A, Mar. ’47
Saarinen, Swanson & Saarinen
Lever House, New York, N. Y., AF, June ’50 and June ’52
Skidmore, Owings & Merrill
Johnson Wax Co. Laboratory, Racine, Wis., AF, Jan. ’48 and Jan. ’51
Frank Lloyd Wright
V. C. Morris Store, San Francisco, Calif., AF, Feb. ’50
Frank Lloyd Wright
Wayfarers’ Chapel, Palos Verdes, Calif., AF, Aug. ’51
Lloyd Wright
Visitors’ Information Center, Portland, Ore., AF, Aug. ’49
John Yeon

* Twenty houses were also selected for the book and exhibit, 16 of which had been, or will be, presented in FORUM or HOUSE & HOME.
In his Johnson Wax Tower at Racine, Architect Frank Lloyd Wright has held industrial civilization at arm's length. He has held it to human scale at a modest height of 134', softened its contours, reduced its contrasts, wrapped it in a mantle of textures and colors natural to materials, harmonious with Nature. Here glass is used not in the familiar big flat sheets but as a shimmering fabric of water-green tubing wound like thread around a huge mandrel or spool to produce a silken sheen. The brick bands are salmon. T-square is in evidence only for vivid contrast at the base. This is a Japanese lantern glowing in a neon world.

Architecturally these rounded contours and silken surfaces are humanly grateful, suggest animate not crystalline forms, modeled to the hand not the machine. Yet the handling is firm and the form is dynamic: within the silk cocoon the interior shows dimly like some giant crankshaft stood on end, an impression of repose gathered for powerful action.

Technically the building cuts across industrial rules. Science has been allowed to shape the parts and a share of the methods, but not the architecture. The building has an individual, not a standard form—individual not standard treatment of glass as a material. The laboratory plans are a new creation and so are countless elements such as the taproot foundation.

The symbolic interpretation of industry that the building gives is accordingly not of industry as it is, powerful yet ruthless, but of industry as it might be. The very metaphors that come naturally in describing the building illustrate the triple allusion. The columns at the base, carried over from the famous adjacent administration building, can be thought of as valves (industrial) or masonry umbrellas (the tradition of building) or water lilies or morning glories (out of Nature). So too, Wright has written of his tower as a conversion of our “rampant industrial system” from “weed into flower.” To create buildings that foreshadow this translation of industry into a full human and natural life instead of an intruder requires a timeless, and somewhat Oriental, sophistication. But there is only one Wright. The imitators produce googie.
Mies van der Rohe's twin glass towers on Chicago's 860 Lake Shore Drive are totally different: the Doric order for the age of steel.

Mies has used materials rectilinear, hard and cold along with methods sharp, standard, precise, based on universal industrial practice in the same degree that Wright's tower is special and rounded, using materials in a warm natural form.

Yet it would be a great error to say the Mies result was cold. Many who have seen the buildings on the ground declare them far better than the pictures: the "industrial black" paint of the steel turned into velvet by the air and by rich contrast with soft, creamy shantung drapes; the hypnotic multiplication of standard parts; the noble proportions and grave restraint; the exact right weight that gives rhythm to marching robust details. Through personal magic those very instruments of industrial impersonal power—glass and cold steel—that have so frozen our age have been captured and made welcome through beauty.

Mies has stayed rigidly in T-square discipline for a typical tall building, a universal glass tower. The order is Greek. The steel-rail "mullions" which "express" the cage serve a mingling of function and expression exactly like the classical pilaster.

Mies's basic unit is, however, not the pilaster but, unlike the classical orders, a unit of deep floor space: the standard bay. It approaches to being interchangeable, highly convertible, is therefore intensely industrial and urbane.

Such a world rests in serenity and reserve, asks that the leader do what the community does—but with expressive perfection. Because small differences come to have enormous value where all are working so precisely alike, the weaker imagination will make such a repeated world unspeakably dull and any clumsiness will show like a flaw in a diamond. "Impersonal architecture" demands highly personal art.

With Lever House in New York, designed by Gordon Bunshaft of Skidmore, Owings & Merrill, the world of Mies can be said to have come into a second generation. Gone is the weighty emphasis of steel rails as an industrial expression. Of all the towers this is most nearly crystalline, airborne. People say this effect is "clean" and "functional" but it is far from artless. The idea of hanging an elegant, airy screen of blue-green glass, aluminum and stainless steel around the steel frame is functionally just as arbitrary as welding on some stout steel-rail mullion pilasters. And fully half the glass is not for view but used deliberately to make the whole tower a mirror. This is the crystal kite among office buildings.

Like all these towers, Lever House seems to stand off the ground; but Lever House alone makes this a positive virtue, since the nice esplanade underneath (as yet unfinished) is genuinely usable. Just as the glass melts boundaries between "building" and sky so the open esplanade melts the boundaries between "building" and surroundings. The human being as a pedestrian here gains a fresh freedom of movement, out of our advances in an "industrial" art.
General Motors Technical Center has laid its glass towers on their side. Though not all glass, Eero Saarinen's buildings are of materials all glazed, give the all-glass effect. If, in Mies's "860," the US meets the order of Greece, here Detroit meets the glow of Persia.

On the "Detroit" side, Saarinen has used the remarkable technicians of the motor city to achieve an industrialism beyond that of an older generation: where Mies modularized the shell, Saarinen has incorporated the whole plexus of modern services in his modular network so that wall and roof, partitions and sprinkler system, lighting, acoustics, air conditioning—all fit the brilliant kaleidoscopic pattern.

But the most fascinating aspect of the GM Center occurs beyond this adjustment of chassis and motor, art and production, design and feasibility. For suddenly "Detroit" comes to a stop, literally at the ends of the buildings, and Persia takes over. These brilliant glazed-brick end walls, in reds, blues, tans and chartreuse at full intensity, their color baked in for keeps and set against a rich calculated landscape of grass and trees and lakes under the sun—all take us back to that earlier splendor. The wealth engendered by metal and mechanism lets the architect have his fling with art and handicraft, doing things mechanism will never do.

These diversities are not yet fully blended; but the result is beautiful and wonderfully fresh.

From just outside Detroit, the very citadel of modern ugliness, the fortress of violence, of excess, comes our new industrial landscape. Buildings of fully "industrial" character, but of human scale and human rhythm, are set in wide-open space among trees and waterways of what was once called our "promised land."

The choice of only four towers does injustice to others, e.g. Belluschi's Equitable Building, Harrison's UN Secretariat, and others unknown. But perhaps the main point has been established: one material, glass, used on one form, the tower, can result in four worlds as diverse as our Steel Doric, Crystal Kite, Persian Parallel and finally, our Oriental Prophecy, examples. Our critics are too often ready to proclaim just one world they think "human," deploring all others. Every artist creates a world; all together fill our world with wonderful new possibility.
Viewed from rear driveway, office building is at left, garage at right, curved board-room building beyond. Cars drive under raised building to get to garage.
MODULAR OFFICE BUILDING

It was put on stilts to create parking space
and put on a 3'-5" grid to promote floor-plan flexibility

This beautiful and deceptively simple office building in Pretoria, South Africa, appears to be little more than a box on columns. Like all truly simple solutions, however, it is the result of much detailed planning and looks the way it does for three good reasons: 1) its site is small, 2) sunlight control called for louvers, and a plain building mass called for additional surface patterns, and 3) its floor plan is changeable.

Location of the small site in a residential neighborhood limited the height to three levels above grade. This restriction accounts for the long, low character of the building; the smallness of the site (which left little space for parking lots and roads) suggested the openness of the ground floor to provide covered parking (11 cars) and access to the back-yard parking (nine cars). The generous landscaping (note the garden to the rear in plan below) keeps the building from intruding on the residential neighborhood and at the same time produces a pleasant atmosphere for workers.

LOCATION: Pretoria, South Africa
H. W. E. STAUCH & PARTNERS, architects

Below: walls of louvered glass and solid masonry meet at southwest corner of building.
Bottom picture: visitors' parking is under office building proper.
Inside and out, design was affected by a desire for light, colorful offices. Front and back walls are mostly glass, shielded by exterior fins and adjustable louvers. These precast vertical and horizontal sunshades are faced with white mosaic on areas exposed to weather. Set behind them are precast spandrels faced with contrasting bright blue mosaic. Precast concrete facing panels for end walls and coping are gray. Walls of the lower ground floor and retaining walls along boundaries and driveways sport dark purple facing brick. Exposed columns on the shaded ground-floor level are brightened with yellow mosaic facing.

Finally, the plan of the building was dictated by the client's need for office space with maximum flexibility. This produced a 3'-5" module to which interior plan and exterior wall treatment conform. This particular module was chosen because, when multiplied by three, it (less a wall thickness) produces a comfortable 10'-wide office; one module provides for door-openings up to 3'-0"—maximum size needed for normal office use. The 3'-5" spacing of external vertical fins expresses the modular treatment with a definite rhythm and permits all office partitions to be 100% interchangeable. Thus, offices can be expanded or contracted as work requirements change.
Parabolic board room is in semi-detached one-story building at rear of site. Isolation of this block insures quiet and privacy.
Space-frame enthusiasts marshal many reasons for predicting it is. Among the reasons: greater

- With all our vaunted engineering, why are so very few of today’s best buildings structurally as efficient and economical as the Eskimo igloo and the Neocene wattle hut?

- Why do none of our new building types match the economy of the Gothic vaults?

- How soon will builders erect the 1” thick floor slabs which engineers are learning to design?

To frame a typical 20’ x 20’ bay in steel for a 200 lb. floor load requires from 10 to 15 lbs. of steel per sq. ft. because conventional design first runs all loads in one direction to the beam, in another direction to the girder and then transmits them at right angles to the column. The same bay could be supported with only 3 to 5 lbs.
This 20th Century version of a 13th Century vault is Architect-Engineer Nervi’s 340’ x 135’ hangar near Rome, with only six supports. Each rib is a precast concrete truss, 10’ x 3’ high, with joints welded and grouted.

design freedom, lower building costs, more exciting structure

of steel if it were designed in three dimensions as is Engineer Nervi’s spectacular concrete hangar roof.

For years this waste of steel has been justified on the grounds that US construction labor is so expensive that it is cheaper to frame a bay with five or seven big wasteful members than to frame it efficiently with a multiplicity of small members. But recently welding has been changing the dollars and cents balance between small-member and large-member framing. For example, the General Motors Technical Center (AF, Nov. ‘51) used its so-called “Zeppelin” trusses to get a stiffer frame at no extra cost.

Last summer one of England’s foremost structural engineers, Felix J. Samuely, read to the Royal Institute of British Architects an extraordinary paper on the success and economy of three-dimensional design. Excerpts of this paper, defining the promising technique of space-frame design, are presented on the next page.

Curious to find no reference to US buildings among the score cited by Samuely as spaced-frame illustrations, FORUM editors set out to survey space-frame construction in this country. Not only did several such buildings turn up, but many top US engineers and architects proved quite knowledgeable and vocal on the subject. Their comments (along with their buildings) are presented on pp. 153-160 in the form of a symposium on the merits and implications of three-dimensional design.

Like Samuely, these leading professionals agree in pointing to three-dimensional space construction as the framework for tomorrow’s buildings and suggest that the design revolution is already underway.
Ribbed vault of Chalon cathedral in France is a fine example of three-dimensional design. Ribs were built first and all stones are in compression. Visualize a space construction as a structure a giant could lift—like a piece of porcelain, it might crack but it would not disintegrate.

As the name implies, a space construction encloses space. More than that, it shares loads between at least three supports to avoid concentrated stresses at any one of them. Reactions are controlled within the space construction to result in only vertical loads upon the supports.

Both space frames and skin structures are space constructions. A true space frame is a three-dimensional structural skeleton, while a skin structure is a shell or slab which contains no columns or beams and whose skin is its own structural support. Thus a space frame is not necessarily a skin structure, but a skin structure is always a space frame.

Skin structure roof of Copenhagen theater is doubly-curved shell concrete. Smooth outer shell is 4 3/4" thick, inner shell 2 1/2" thick and undulated for acoustic purposes. Architect: Wilhelm Lauritzen.

There are two kinds of space constructions: space frames and stressed skin structures. Both can be developed from star beams—beams having at least three supports in space. Consider a simple star beam having three arms rigidly connected in the center and supported at the three extremities (see sketch). Raise the center point and the beam becomes a space frame shaped as a three-sided pyramid. Now, assume the surface of this figure to be made solid with the star beam removed, and the skeletal space frame becomes a stressed skin structure, consisting basically of three "slabs" leaning one against the other. Similarly, if you take any star beam and raise one part of it, the skin between the framework becomes a structure that is capable of carrying itself over wide areas of considerable size and any desired shape.

So that our buildings can be put down easily on the drawing board, each structural member together with its load is usually considered in one plane. This has necessarily restricted both architects and engineers. In medieval times, when buildings were not developed on paper to the extent that ours are today, the tendency to use structural members in only one plane was not so apparent. The Gothic vaults were really three-dimensional space constructions. Since that time and especially since the advent of iron and steel, simple plane constructions have been more or less the rule.

During recent years, space constructions have gradually begun to reappear. As a result, I believe we are on the eve of a great revolution. Hundreds of years hence, people will look back on this time as the one when construction changed over from "plane" to "space" and saw the birth of a new architecture.

Space constructions cannot be conceived in one plane: they have to be shown in their entirety either in several planes or in isometric. As we shall see, such design opens up entirely new fields of construction and planning.

Development of star beams into space frames.

Principle of skin structures: Load is resolved into components acting in direction of slabs.

Latticed steel space-frame assembly hall of Woodberry High School in London. Engineer: F. J. Samuely. Similar concrete structures have been built in US and Europe.
This lightweight structure in Belgium is no ordinary saw-tooth roof. It is a skin structure with columns 80' and 186' apart, composed of lattice trusses in the sloping roof planes with lateral diaphragms only in the end walls. Other typical profiles are shown in the diagrams above.

The art of skin structures therefore is to arrange the members so that forces occurring at right angles to the skin can be resolved into components acting in the plane of the skin.

The closer the folds of intersecting slabs, the smaller become the local bending moments, for the load is transmitted to the folds of the slab. When the edge of the system is finally reached, there is normally no line of intersection with a further slab. Here an edge beam or row of columns must be provided or an additional slab may be cantilevered out to create a beam at the last line of intersection.

Developing this principle, almost any shape of roof can be constructed to suit the architect's requirements. It is just as easy to construct a roof that is concave as one that is convex. Concave roofs are sometimes very valuable for acoustic purposes in halls and theaters. (Two of the outlines that can be adopted are sketched above. Note the diaphragms which can be seen quite plainly at the ends of the structures.)

The system will not stand up without a diaphragm or tie member. The diaphragms, which are shaped to follow the outline of the roof, can either be solid or latticed, of concrete, metal or timber. The skin structure and the diaphragms act together as one unit. Where a roof consists of more than two slabs, a tie member at the end is not as effective as a diaphragm. Each intersection beam should be supported at the ends. A diaphragm supports all beams, whereas a simple tie holds only the two beams to which it is directly connected.

Any of these prismatic or hipped roofs can be built in latticed steel, aluminum, concrete or timber. Reinforced concrete engineers have been most active in advancing stressed skin structures and have exploited the principle in a wide variety of flat and curved shell surfaces. In recent years shell concrete construction has become so commonplace that there is a danger of architects considering it the only possible skin structure.

In all skin construction shear is of paramount importance. In most cases this must be carried by steel. Reinforced concrete is therefore unsuitable for wide-span skin structures, unless it is prestressed to reduce diagonal tension. I predict that, when latticed skins are more developed than they are now, ordinary reinforced concrete will be preferred for spans only up to about 30' and that latticed steel and prestressed concrete will be used for all larger spans.

The space frame frees planning from the influence of construction. Buildings are generally planned with an axis because normally the structure requires it. The open theaters built by the Greeks looked entirely different in plan from the theaters built later which had roofs over them. This indicates clearly that the need for a roof construction influences the planning. With space frames and skin structures the architect need not consider this, and planning can start from an entirely different aspect. By a form of prestressing, it will be possible to have thin slabs spanning large distances.

To give an instance of what will become possible, take an ordinary round bowl and place a towel over it. The towel can not now carry any load, but stretch the towel tightly, hold it firmly in position and it can then carry certain loads, although it is the same towel.

Nothing of this nature is being constructed at the moment, but I have calculated that in this way it should be possible, although not economical at present, to span a 1' slab over an area of 20' x 20' without supports. I am not putting this forward as a recommendation but as a pointer for the future.
SPACE FRAME DISCUSSED

A symposium on its present uses and future implications by 19 space-conscious engineers and architects*

ISADORE THOMPSON

"Without question, it is time that space construction is seriously considered by the architect. Its many architectural advantages such as space unencumbered by columns, improved lighting, simpler ventilation, easier maintenance and provision for higher ceilings without extra cost—thereby permitting lower walls—all make for better building at less cost."

DR. WALTER GROPIUS

"You may be right. The great modern engineers like Freyssinet in France, Maillart in Switzerland, Nervi in Italy, Ove Arup and Samuely in Britain, have laid the scientific foundation for a new structural space concept of the future architecture. Such structural systems can be used only by those who have comprehended fully their three-dimensionality. The present training of the architect—too theoretical and without the balancing influence of direct practical experience in building—has resulted in 'drafting-board architecture,' developed in the 'flatland' of plan and facade."

DR. J. J. POLIVKA

"Today we have two separate building professions, architects and engineers. In most cases a building is commissioned to the architect and the engineer is not called in until the general design is completed, after which he must prove by calculations that the design of the architect actually represents a multiple of the loads to be supported. In other words, we do not have an actual 'division' of labor; rather, we are faced with a 'superimposition,' a duplication and triplication of labor. This is about as economical as if three men carrying a piano would perform their task by climbing on each other's shoulders, with the top man actually holding up the piano. This may seem ridiculous; yet, this kind of circus act is performed by most of our structures. "Some half-hearted attempts at a proper division, rather than duplication, of labor have been introduced through the use of 'two-way' slabs and the like. Nevertheless, while a certain amount of superimposition seems inevitable, it is by space-frame construction that the optimum strength of a structure is achieved."

PAUL RUDOLPH

"The forms which grow logically from Samuely's conceptions have not yet been fully developed. All too often they are thought of in terms of spanning space alone rather than as complete structures. Thus, many times the ele-

E. F. MASUR

"The case in favor of the new structural techniques advocated by Samuely is an impressive one. In order to realize this, it is necessary to understand the basic absurdity of the common stringer-beam-girder-column construction. Under present construction methods, the loads are carried by the stringers and transferred to the beams, thence to the girders, and are finally brought down to the ground by means of the columns. While this 'division of labor,' at first glance, appears reasonable, the total of all loads carried by all members of the structure actually represents a multiple of the loads to be supported. In other words, we do not have an actual 'division' of labor; rather, we are faced with a 'superimposition,' a duplication and triplication of labor. This is about as economical as if three men carrying a piano would perform their task by climbing on each other's shoulders, with the top man actually holding up the piano. This may seem ridiculous; yet, this kind of circus act is performed by most of our structures. "Some half-hearted attempts at a proper division, rather than duplication, of labor have been introduced through the use of 'two-way' slabs and the like. Nevertheless, while a certain amount of superimposition seems inevitable, it is by space-frame construction that the optimum strength of a structure is achieved."

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* THE PANEL

Isadore Thompson, Consulting Engineer, San Francisco, Calif.

Dr. Walter Gropius, Consulting Engineer, Cambridge, Mass.

Dr. J. J. Polivka, Associate Professor of Civil Engineering, Ill. Tech.

Paul Rudolph, Architect, Sarasota, Fla.

Prof. K. Hrubin, Structural Engineer, Brno, Czechoslovakia.

John J. Driskell, Structural Engineer, Pasadena, Calif.

Prof. Walter C. Voss, Dept. of Building Engineering & Construction, M.I.T.

Prof. J. M. Garretts, Dept. of Civil Engineering, Columbia University.

Edward A. Verner, Structural Engineer, San Francisco, Calif.

Prof. George Winter, College of Engineering, Cornell University.


R. Le Ricolais, Structural Engineer, Paris, France.

Ronald Wachman, Head, School of Design, Illinois Institute of Technology.

Fred N. Severud, Structural Engineer, New York.

Eduardo Catalano, Acting Head, School of Design, North Carolina State College.

SUMMATIONS


Lamella roof in timber over Eugene Sports Arena, Ore., uses diagonal grid to distribute loads uniformly to buttress supports. Architects: Lawrence & Halford; engineers: Blood & Williams.
Triangulated steel space frames span 60' in factory at Byfleet, Surrey, England. Three-sided pyramidal units are welded together and each truss is erected as a complete unit to make temporary bracing unnecessary. Architect: H. J. Spiwak; engineer: O. Safir.

Molded plywood, like all sheet materials, develops remarkable strength when corrugated. Under the guidance of Architect Paul Rudolph, students of the U. of Penn. have designed a system of vaults from prefabricated panels made of ⅜" insulation between two ⅜" plywood sheets. These are shaped into two-hinged arch bays, 5'-2" wide, 10' high and spanning 32' with thrust taken by tie-rods set in a concrete floor slab.

Warehouse in Africa by Engineer Le Ricolais is framed with bents 32' apart. Use of three-dimensional structural panels permitted 700 sq. ft. of roof structure to go up each day and required minimal materials. Side sections were assembled on ground raised in place; center section was built in place.
vations and their treatment bear little relation to the structure as a whole. The Mondrian-like pattern of so much of our current architecture will be ruled if architects find answers to Samuely’s proposals. Samuely has dealt Mondrian a mortal blow!"

PROF. K. HRUBAN
"There were times when a three-dimensional ceiling construction was considered an essential part of the architecture of an interior. Up to the 18th Century not only cathedrals, palaces and town halls, but also ground floors of inns and larger houses were generally conceived in space.

"Only with the development of reinforced concrete was it possible to exploit three-dimensional design without the structures becoming too heavy and too expensive. The difference in weight between ancient and modern domes is striking. For instance, the 140’ span at St. Peter’s, Rome, weighs 10,000 tons, while the dome roof of a new factory hall in Jena, Germany, also 140’ span, is of shell concrete only 2.56’ thick and weighing under 300 tons—i.e. 3% of the former. Costs of these two domes would be in a similar proportion. How far this renaissance of three-dimensional systems will go will depend, in my opinion, upon the development of fresh fabrication methods and construction site procedures."

PROF. WALTER C. VOSS
"One reason why folded-slab concrete construction (called 'hipped-plate' construction here) has not spread very rapidly is, no doubt, due to our lack of any adequate practical method of stress analysis. One important question still to be resolved is the magnitude of secondary stresses due to joint displacement. Both theory and tests of metal models indicate that the secondary stresses may be quite large and unpredictable except by much involved and time-consuming analysis."

PROF. J. M. GARRELS
"In the U.S we have frequently used space structures without giving much publicity to them. One of the greatest difficulties seems to be in the making of satisfactory connections and, in regard to hipped-plate construction, with the control of shear at the bottom edges of the slabs.

J. J. DRISKELL
"We have successfully employed folded-slab construction out West, with the complete elimination of beams and girders. The first of these was a church roof 53’ wide by 97’ long built of two 6’ lightweight concrete slabs, leaning one against the other at an inclination of 3 in 12 and having full continuity down the 97’ long ridge to form a two-hinged arch.

"It was amusing to hear the workmen on this job explaining to each other that such a crazy structure with no beams or columns couldn’t possibly stand up once the shores were removed. Yet maximum vertical deflection of the ridge under dead load was only 9/16’, and the cost of the slab in place (completed 1950) was under $1 per sq. ft.

"In March, 1952, I had another chance to design a stressed skin space structure, with 5” thick pitched slabs for a roof 45’ wide by 117’ long using 3,000 psi lightweight concrete (95 lbs. per cu. ft.). It seemed logical to prestress the slabs and we prepared alternate designs for prestress vs. conventional reinforcing. The bids came out 40% in favor of prestressing. Cost of the prestressed job was under $1.50 per sq. ft.; maximum deflection at the ridge under dead load, 3/4”.

EDWARD A. VERNER
"In 1938 we built a gymnasium with spans of 36’ x 60’ using pitched plate construction, although the undersides of our slabs were ribbed. Our practice in working out unit diaphragm shear at gable ends of such a pitched roof is to divide the total vertical load by eight times the rise. This seems to work out quite well.

"Samuely’s star beam arrangements reveal a saving in weight of 5 to 10% when compared with conventional orthogonal framing, while moment stiffnesses (independent of torsional) are the only problem of the designer beyond devising the moment connections at angular joints."

J. J. DRISKELL
"My own experience confirms Samuely’s opinion regarding shear in pitched-plate construction. Incidentally, in his book, Design of Prismatic Structures, A. J. Ashdown recommends that such roofs be not more than about 4” thick, which would limit the spans to about 40’ wide and 60’ long. However, he appeared to be thinking of standard concrete instead of the lightweight concrete we have successfully used. From our experience with lightweight concrete we believe the optimum pitch to be 4½ in 12 and that the maximum economic size of such roofs is about 60’ wide by 120’ long.

"We have also designed a multiple-span roof structure for a five-acre industrial building, again using pitched-plate construction. Our lightweight concrete slabs will be 5” thick spanning 64½’ for five continuous bays with columns 50’ apart along the valley lines. End diaphragms will be above the plates on column lines for all interior bays and below the plates in exterior bays. Two contractors have given preliminary estimates on this design, both under $1.10 per sq. ft. The roof will be prestressed in two directions.

"Regarding pitched-plate roofs of latticed steelwork, they appear to be considerably more economical than main steel framing members unbraced in the third dimension, but our cost estimates still ran about 30% more than for the equivalent structure in reinforced concrete."

F. J. SAMAUELY
"I am rather interested in Driskell’s economic comparison. I quite agree that with reinforced concrete the same loads can be carried more cheaply than with steel, but we find that with roof construction the concrete work..."
is so much heavier that steel becomes much cheaper for long spans.

"Several wide span-lipped roofs have been built in England using a latticed steel girder in the plane of each slope, an arrangement which permits great flexibility in column spacing and top lighting. In London, a 76' span school assembly hall of this construction has the roof rising from the sides to a center ridge. Only the eaves beam is latticed and is suspended by hangars from the gable ridge. This is equivalent to latticing the whole area. The latticed girders disappear into the roof itself and are less obtrusive than in conventional construction."

**PROF. GEORGE WINTER**

"It seems to me that the school assembly roof Samuely describes is likely to be cheaper in standard truss-and-purlin construction. It appears to be supported by the sloping members which represent either single or two-span beams of about 40' span. The diagram (p. 152) shows they weigh 44 lbs./ft. run, more than 7 lbs./sq. ft. Compared to this, in standard truss construction the purlins might weigh 3 lbs./sq. ft., the trusses another 3 lbs./sq. ft., making a total of 6 to 6½ lbs./sq. ft. Thus this roof appears to be considerably heavier than regular construction."

**F. J. SAMUELY**

"I am afraid that I have not given sufficient information on this roof and I have misled Professor Winter into making a comment that is prima facie correct and yet de facto incorrect.

"If I had had complete freedom in designing this roof, the sloping members which weigh 44 lbs./ft. would have been replaced by trussed beams, as used for instance in a workshop in Lancashire. Such trussed beams would have weighed only 15 lbs./ft. but would have been 24' deep. The architect, however, purely for reasons of lighting, insisted on having a false ceiling not more than 12' below the roof, and so the depth of the beams was reduced to 12'—a waste of 4 lbs./sq. ft. if considered from a purely structural point of view. The roof weighs 10 lbs./sq. ft. and would have got down to 6 lbs./sq. ft. if it had not been for the architectural requirements, which in any case are incompatible with trusses. The weight could have been further reduced if we had been allowed to produce a roof with three 'kinks' instead of only one in the center."

**J. H. WHITNEY**

"These pitched roofs described by Samuely might be likened to a corrugated slab with the corrugations acting as beams."

**R. le RICOLAS**

"Space-frame construction is not limited to pitched slabs working under bending moments. The same principles can be employed to develop geometric forms of great rigidity and light weight. Buckminster Fuller's very wide span, aluminum geodesic domes weigh only 1 lb./sq. ft. of area covered. Using similar three-dimensional timber construction for warehouses in French Equatorial Africa (see p. 155) we achieved 35' spans with only 0.7 lbs. of metal and 0.1 cu. ft. of timber per sq. ft. of area covered. Our three-way modular design and construction made for great economies in building time as well as in materials; the entire 66,000 sq. ft. warehouse went up at the rate of 700 sq. ft. a day."

**R. BUCKMINSTER FULLER**

"Samuely's star beams demonstrate the basic structural unit of 'energetic geometry,' because the tetrahedron (a three-sided pyramid) encloses the least space with the most surface and is the stiffest form against external pressures—just as the sphere encloses the most space with the least surface and is the stiffest form against internal pressures. Using such tetrahedrons as modular space-frame units, they can be welded into a three-dimensional floor truss that acts in the same way as flat-plate construction in concrete, and would similarly eliminate the need for edge beams or caps over column supports. All members are of equal length. Stresses are equally distributed to all members in relationship to their distance from a point load and consequently are distributed in concentric circles, which facilitates analysis of the structure. Such a truss was built at the North Carolina State College and demonstrated that 20' x 20' floor bays could be built with only 4 lbs. of steel per sq. ft. of area covered as compared with the 10 to 15 lbs. used in more conventional beam and girder construction (AF, Nov. 52, p. 149).

"Indeterminate structures such as these prove highly economical because all the structural units and their connections are standardized throughout, and each distributes loads proportionately to all other units. Consequently, if high local stresses occur at any one point they are relieved by the rest of the frame, and although stresses at some points may exceed nominal stated limits, the collapse load of the whole structure is considerably greater. This characteristic of space frames has long been appreciated by aircraft designers; it seems a pity that we cannot yet do the same in building."

**KONRAD WACHSMAN**

"In space-frame construction an entirely new thinking must take place. Basically, all vertical supports, columns, etc., seem to be inadequate. A space structure works best if all structural members, because of their highly redundant characteristics, are reduced to small elements evenly distributed over a large area. One can hardly design these structures on paper alone, but must work with elaborate three-dimensional models."

"After we have dissolved buildings into a new space articulation, after we have separated skin from structure, space-frame construction will enable us to dissolve the heavy structural members themselves into a greater number of small units, which in theory can be further broken down into even smaller units, which in practice can be further broken down into even smaller units."

**Space-frame demonstrations:** The School of Design at North Carolina State College, under the guidance of Acting Head Eduardo Catalano, developed the striking space-frame designs on these two pages. Right is a roof structure based on wrapped surfaces—composed of the precut concrete units shown above and erected with a minimum of formwork. First the edge beams are positioned with the aid of column supports and cable bracing, then precut units are hoisted into place, the joints grouted and in two days the shores are removed, leaving a rigid roof structure.
This roof structure is designed from a system of hyperbolic-parabolic curves arranged to eliminate bending moments. It could be built in either metal, timber or precast concrete.

Saddle structure in model form was tested under a variety of direct and eccentric roof loadings. It successfully withstood wind loadings equivalent to a 100-mph gale.

Arch composed of a series of identical saddle-shaped structural forms is calculated for a span of 118'. Units are 18' x 12' and 3.15' deep.
elements. Enormous possibilities lay ahead by introducing methods of prestressing either of individual members or of the entire structure. The impact of space-frame construction in architecture will be enormous.”

E. F. MASUR

“Nor is this all. As every engineer knows, most beams and girders are proportioned to enable them to ‘carry the bending moment.’ Actually, of course, the function of the structure is not to carry bending moments, but loads and forces, the loads being the undesirable by-products of our conventional modes of construction.

“The fact that bending moments are undesirable has been recognized for a long time, but conclusive remedial steps are rarely taken. Perhaps the most determined attempts to reduce parasitic bending moments are represented by the arch and the suspension bridge. Other, less basic, efforts consist in the introduction of statical indeterminacy, which leaves the over-all picture unchanged but reduces local moment peaks. It is primarily the space frame which permits the full utilization of the strength of each element and provides a more rational division of labor among the elements.”

FRED N. SEVERUD

“In most of our buildings we create space the hard way, utilizing relatively thin members in bending. One of the first space frames I had occasion to develop was an octagonal-shaped tower supporting the cupola in a Russian church. We used eight inclined members spanning between a tension ring at the bottom and a compression ring on top.

“Another useful type of space frame uses the principle of the camp stool—a ‘stemming’ action where space is provided by the use of catenaries (the canvas seat) whose pull is resisted by inclined compression members (the legs of the stool). Fluttering is eliminated by anchoring the catenaries by others running across the first. This stemming principle was employed by the late Mathew Nowicki in his pavilion at Raleigh, N.C.”

(AF, Oct. ‘52.)

EDUARDO CATALANO

“Following the research begun by Nowicki, our work at North Carolina has gone far beyond the Raleigh Pavilion in the study of both space structures and repetitive spatial structural systems. As shown by the models, these have led to interesting structures:

1. A stadium designed with a spherical space-frame construction—the 4'-thick double shell, or bowl, is composed of modular, precast Y-members and the structure stabilized by either a steel tension ring around the grandstand or a doubly curved tensile skin. Prestressed reinforcing is concentrated around the four supports. Entry is via stairs leading through the supports, where the horizontal space between the shells increases to allow room for players’ rooms, administration and storage rooms.

2. The exploitation of hyperbolic-parabolic structural surfaces to cover the greatest area with the least material through the avoidance of bending moments. Such structures have actually been built by the Italian engineer, Giorgio Baroni, the most outstanding being 150’ x 160’ clear span roofs built in 1942 for an Alfa-Romeo factory using warped concrete surfaces only 1/316” thick.”

(E. F. MASUR

“In defending conventional construction methods, most American builders confine themselves to one argument, which is as worn out as it is false: materials are cheap in this country (they argue) while labor is high, thus making the proposed changes uneconomical and therefore unnecessary. Even if the obvious reduction in material cost, can be achieved through the introduction of standardization, prefabrication, etc.”

SUMMATION BY LEONARD MICHAELS

The story on these pages culminates a development which began with the advent of steel. The key which opens the door to the structures illustrated and to many others yet uncreated is tensile resistance. Appreciation of this simple fact not only leads to an understanding of present structural trends in relation to the history of building structures, but also is a prerequisite for future creative development of three-dimensional structures.

No single reason can explain why early steel and reinforced concrete construction followed the simple principles of post and lintel, and why this practice still predominates. However, the passive nature of this system certainly makes it easier to design and simpler to erect, with one unit following another as in masonry construction. In the past, however, builders were forced by the limitations of their materials to develop a more dynamic system of thrust and counterthrust to achieve larger spans, thereby creating forms which used gravity to maintain their stability.

Now, as in the heyday of masonry construction, we are realizing the advantages of structural patterns created with interdependent members, where the tightening of the last turnbuckle may act as the arch keystone did in the past. The temporary support, such as is required in poured concrete construction, can just as easily be extended to steel or even wood structures until the members have been connected to act in unison.

The arches and vaults of former times were space structures only in the sense that they were three-dimensional in form. They were still dependent on external counterthrust to retain their shape and position, and they could transfer forces only in one direction. With the tensile resistance of steel, the thrust of arched, vaulted and otherwise shaped structural systems can be resisted within the system itself, thereby distributing forces in two principal directions and creating a self-contained three-dimensional structure. With tension rods, tension rings, compression rings, cables, etc., and the geometric properties of members designed in three dimensions, a great field for imaginative construction lies open in wood, steel, aluminum as well as in shell concrete. With all our technical ability, can we not create economical structures which will be at least as dynamic and imaginative as those of Gothic times? Some have already been achieved and certainly justified themselves, economically, esthetically and functionally.

SUMMATION BY F. J. SAMUELY

I have been interested to note from this discussion that quite a considerable number of skin structures have been erected in the US, but I also see that, as in Europe, progress from standardized construction is to be found more in reinforced concrete than in steel.

I would not like it to be thought that skin structures and space frames are the right answer to all of these problems. I am fully aware that so far only certain structures can be advantageously designed in this way, notably roofs, staircases, galleries, theaters, and so on. It is always dangerous for any new idea to have too many supporters and to be applied in the wrong place.

Some part of the discussion referred to my remark that the difficulty of imagining space is to be blamed for a tendency to adhere to two-dimensional constructions. I am still of the opinion that this is so. The necessary mathematics have been available for a considerable time and, at least in lattice construction there are no complicated differential equations involved at all. When the newest experience and theories of plasticity are taken into account the mathematics are anyhow often of dwindling importance. But I believe today it is essential that every engineer should be schooled to imagine things in space and not depend on plan and elevation for the solving of his problems.
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Howard: Must we wait for a crisis before we can get leadership from the natural leader of the community?

Sawyer: You can't change a public habit, and the great American public habit is door-to-door transportation.

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TRAFFIC FORUM continued

Allentown, Pa. has a primary hard core which we call our commercial parking area for business, or for merchants, or for lawyers, of only 800' from the main street. Within the area we have 1,400 curb meters—every curb spot that is not a bus stop. There is no parking on the main street at all, but every point within that primary zone is metered. There are 30 off-street spaces which are under municipal authority. There are 200 spaces that are owned by two of the department stores. In addition, there are 1,200 spaces in off-street lots which are owned by our merchants' organization, making a total of 3,100 spaces.

Hammond: Do you make money?

Miller: Yes, we made $26,000 this year. Theoretically, we turn over our merchant lots three times, our curb meters seven times, our department store lots four times, giving us about 14,500 spaces per day. Six years ago when we set up our plans, we drew a 1,000' circle, and said we would work within that. We found that the three lots we own at the edge of the circle did not prove satisfactory for commercial parking, or for store customer parking, so we drew our circle down to 800'. Outside of that we have a municipal authority that has meter parking for two bits all day on the theory we can't give a two-bit all-day service on a parking lot if we have a man-power cost.

Hyde: A recent survey of parking in Cleveland shows that in the peak parking period from 1:30 to 2:00 o'clock, the number of cars parked was 24,000, and the number of spaces was 29,000. And there is still a demand for more parking. The answer to that, of course, is that some of that parking isn't within 100' or 200' of where people want to do business.

West: Are we trying to provide more downtown parking to encourage people to park downtown? Or, should we try to deter downtown parking on the theory that downtown parking adds to traffic congestion and thereby hurts the downtown business?

Welch: May I give some figures that might shed some light on that? In the last Eno Foundation Traffic Quarterly I have helped set certain criteria as to the relationship of parking spaces to gross square feet—a so-called parking index, a ratio of the number of parking spaces per 1,000 gross sq. ft. of floor area of building.

Now, it is very simple arithmetic to show that in any central business district, with a tremendous investment necessitated in structures, you can never, in a large city, reach a parking index of .50. In medium-sized cities, we would be tickled to death if we could hit a parking index of .75.

Prentice: Can some way be found to bring private enterprise financing into the garage
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Fenestra Hollow Metal Flush Doors cost less to buy because they are mass produced on special jigs that cut out a lot of expensive time and labor. This system was born of Fenestra's years of metal fabricating experience.

You save on installation cost because these handsome doors come complete with strong, prefitted, prime-painted, steel frames and shining hardware. Again time and labor are saved. There's no cutting or fitting—the door is in and in use a lot more quickly.

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Clark: The most efficient traffic system will be of only temporary relief unless it is related to land development along the streets.

Adams: We can't solve downtown problems without solving them for the whole city.

Barnes: People didn't know if we helped traffic but we sure scared the natives.

Welch: When you are creating a supply that is 25% of the demand, you can make a profit on parking facilities.

Miller: There is no great mystery why private enterprise capital has not been drawn into the parking business on a large scale. It is just arithmetic. Parking has not proved to be a very attractive investment. High land costs, the lack of the power of eminent domain to assure the acquisition of land areas at the right places, high manpower and handling costs, rate limitations due to the competition of free parking, low-cost parking at the curb—all combine to promise only a modest return, if any, on capital.

Adams: If the parking business in fringe areas is not profitable, private people will not touch it, and the government will have to do it.

Stanton: Private enterprise can do fringe-area parking under a system now in operation in Norfolk, Va. There we have fringe-area lots. You park yourself, and the stalls are sold on a monthly basis only. You pay three months in advance, so there is no credit problem, no collection problem, no expenses, no attendant. A name is put on the stall and it is respected by the public. The cars that are infrequently parked there without authority are hauled off to a garage, and the owners have to pay their way out of that garage. That happens rarely: the system works successfully. It is $4 a month, just three blocks from the heart of downtown, and it is run by private enterprise.

What are the roles of private enterprise and public agencies in providing parking lots and garages?

McGavin: During the past seven years there has been created in the public mind the idea that tremendous parking progress is being made through municipal undertaking. In 1951 and 1952 I went through 44 cities; I have walked from one end of each city to the other to see what they have actually accomplished. Not plans, projects, beautiful sketches, press releases; I wanted to see existing places. The cities that have produced the least have the city talking too much. On the other hand, the private enterprise policy that we have followed in Washington, D. C. has produced, over seven years, a net gain of 20,300 spaces.

Kelley: Mr. McGavin, if you carry this principle of free enterprise, which I certainly agree with, to its logical conclusion, wouldn't that leave you with the question of whether, if parking people in a city can't handle its parking problem on a satisfactory basis, there continued on p. 168

FREE BOOK ON LAMINATED STRUCTURAL MEMBERS

INDEX

<table>
<thead>
<tr>
<th>TANGENT ARCHES</th>
<th>PAGES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uses: Churches, chapels, schools, gymnasiums, auditoriums, theaters</td>
<td>4, 5, 6, 7, 8</td>
</tr>
<tr>
<td>PURLINS</td>
<td>9</td>
</tr>
<tr>
<td>BEAMS</td>
<td>10, 11</td>
</tr>
<tr>
<td>Uses: Schools, gymnasiums, stores, theaters, industrial buildings</td>
<td></td>
</tr>
<tr>
<td>RADIAL ARCHES</td>
<td>12, 13</td>
</tr>
<tr>
<td>Uses: Gymnasiums, auditoriums, field houses, hangars, skating rinks, bowling alleys, commercial buildings</td>
<td></td>
</tr>
<tr>
<td>BOWSTRING TRUSSES-TIED ARCHES</td>
<td>14, 15</td>
</tr>
<tr>
<td>Uses: Warehouses, factories, garages, stores, bowling alleys, skating rinks, hangars</td>
<td></td>
</tr>
<tr>
<td>UTILITY ARCHES</td>
<td>16</td>
</tr>
<tr>
<td>Uses: Gymnasiums, theaters, community buildings, warehouses, hangars</td>
<td></td>
</tr>
<tr>
<td>FABRICATED STRUCTURES</td>
<td>17</td>
</tr>
<tr>
<td>Timber Trusses and Girders</td>
<td></td>
</tr>
<tr>
<td>FARM BUILDINGS</td>
<td>18</td>
</tr>
<tr>
<td>SPECIFICATIONS</td>
<td>19</td>
</tr>
<tr>
<td>SERVICES</td>
<td>20</td>
</tr>
</tbody>
</table>

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TRAFFIC FORUM continued

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AIR CLEANING AIR TEMPERING
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TRAFFIC FORUM continued

...would be a natural tendency for the traffic to go to the suburbs? Past experience indicates that the flow of automotive traffic tends to seek the least congested areas, wherever possible.

Hamilton: Mr. McGavin has painted the city folk as being blackguards, trying to drive the parking-lot people out of business. Our philosophy is: encourage private enterprise to do it, let them do it. If they show the initiative, the courage, and the finances, and the faith in their industry, which they have indicated in the last year or so, sure. But, if our citizens complain, and if private enterprise fails to alleviate the situation, then by virtue of the pressure, political pressure if you will, on the City Council, it becomes incumbent on the cities to seek a solution to the parking problem. Because, after all, it is a municipal problem closely related to the public safety, welfare and commerce.

Marsh: If you will divide this up into four parts—planning, site acquisition, construction, and operation—and then think of who ought to do what about them, I think you will get along a lot faster.

As far as planning is concerned, the interest of the people ought to be that you have a community-wide program, and whereas in Oakland and in Allentown, and a few other places, the merchants seem to have taken a very progressive stand, I have personally visited a large city in the Midwest where a site was shown to me for a 1,000-car garage, and very proudly boasted as the answer to the problem. It was the answer to that merchant's problem, off on one side. It was not a community answer. So, if we want a community answer, we certainly ought to call on our public servants to produce the community plan, and I do not see how anybody can challenge that.

Then, when it comes to the site acquisition, we know that the community must come into the picture very frequently because of its power of eminent domain, or condemnation.

Wheaton: Obviously, if the City of Chicago needs 25,000 parking spaces, the first 5,000 spaces can be provided at a very handsome profit. But the parking problem will not be solved, and the merchants and the community may suffer.

McGavin: The trouble is there are so many threats from City Hall that "we are going to..."
First, no window is more rigid or rugged than a steel window. Fenestra* windows are steel windows... built by men whose job it is to keep Fenestra the largest steel window manufacturer in America.

Second, no window requires less maintenance than a Fenestra Super Hot-Dip Galvanized Steel Window. The test results illustrated above show you the tremendous difference between Fenestra galvanizing and ordinary galvanizing.

Test shows why Fenestra
Super Galvanized Steel Windows cost
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Two galvanized steel sections were bent, then straightened. On the one that was galvanized by the common method, the strain caused the coat of galvanizing to crack clear to the bare steel.

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Fenestra SUPER HOT-DIP GALVANIZED STEEL WINDOWS from the only plant in America especially designed to Hot-Dip Galvanize steel windows
McGavin: There have been so many threats from city hall that it has driven private enterprise underground.

Barnes: It certainly has in Denver.

McGavin: Private enterprise is not going to come out under those conditions.

Forster: The whole issue on curb parking is, shall we or shall we not permit it?

W. Richards: The transportation problem is a combination of mass transportation with the free-wheeling automobile, off-street parking and traffic control.

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Forster: The whole issue on curb parking is, shall we or shall we not permit it?
Meet changing office space requirements with

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YOU CAN REARRANGE existing offices or partition new space quickly and economically with Johns-Manville Asbestos Movable Walls.

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Has horizontal freezer, 9 ice-cube tray capacity, inner door shelf. In 27 3/4" combines refrigerator, sink, storage drawer and 3 gas burners adjustable to natural, manufactured or bottled gas. Also available with electric burners for 220 v. or 110 v.

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by combining sink-refrigerator unit with any 20" apartment range. 4 cu. ft. capacity, inner door shelf, horizontal freezer, storage drawer, and topped by 1-piece porcelain sink, drainboard and back-splash.

COOK ON YOUR REFRIGERATOR
General Chef is now standard 36" height. Requires only 5 sq. ft. of space. As shown, 3 electric burners (220 v.). Also available with 2 electric burners (2ES-1004) for 110 v. plug-in use; or 3 gas burners (RS-1004).

TRAFFIC FORUM continued

Clark: I think I heard Mr. Ecker say that some of these parking lots, or garages, were producing traffic problems on the street through the entrance and exit of vehicles. That would seem to me to imply that unless there are some controls over where you locate your parking facilities, you might solve the parking problem but it also might create a problem in the traffic flow. Did I understand you correctly?

Ecker: That's correct. I think there should be some control in locating these things so they will not conflict with the street use.

Prentice: Do you believe that the parking garages in volume can be provided by private enterprise without any help from government in the form of a tax deal, or acquisition of land, or anything else?

McGavin: I am confident that it can.

Prentice: If it can, then why isn't it?

McGavin: It has only been profitable in the last six years.

Prentice: What has made it profitable in the last six years?

McGavin: Prices have gone up. People were not educated to the fact that they should pay for parking a few years back. The parking meter accomplished that one thing. It got people used to the idea of paying. Now, they are getting educated to the idea of going on street though there is a disparity between cur parking rates and off-street parking rates.

Pomeroy: The various subjects we have discussed should be fitted into a concept of the complete functional pattern of the city and of the entire region. Our approach to the whole subject should go beyond a comptometer and a slipstick.

Clark: I would like to make this point more specific. The traffic problem cannot be solved solely by what is done in the way of engineering or enforcement of traffic regulation in the streets. The most efficient traffic system, the most advantageous use of mass transportation will be of only temporary relief unless land development along the streets is related to the traffic plan.

The type and intensity of land development along the streets is a major determinant of the amount and type of traffic the streets must handle. Control of this development comes under the heading of zoning. At the present time most zoning ordinances are being restudied and revised, but very few recognize the relationship of land use to the traffic capacity of the streets that serve the land. A zoning ordinance and street traffic plan must be related so that whatever plan is worked out will continue to work reasonably well, and the city will not just wind up with congestion on a greater scale.

continued on p. 174
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From the heavy deep section steel bars, to the final thorough inspection, a Lupton Architectural Projected Window represents quality at mass production prices.

Ventilator corners are riveted, then welded for additional strength and rigidity. Excess weld metal is trimmed off and the exposed surface is finished flush. Carefully balanced ventilators permit finger-tip control, assure snug fit. All operating hardware is solid bronze, in a smooth mat finish. Completed windows are Bonderized for better paint adhesion, and prime painted in one continuous operation.

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TRAFFIC FORUM continued

If rapid transit is not rapid enough, how can it be speeded?

Prentice: It is impractical to provide enough parking facilities and enough streets to get everybody downtown by private vehicle.

G. Richards: A study made in Detroit shows almost 75% of the people drive to work in their personal cars and only 25% use public transportation. The percentage coming to the downtown area, however, is about 50-50.

Prentice: In Philadelphia, what is your percentage of the people who come downtown by mass transportation?

Mitchell: A little over 80%.

Evans: Here are figures on what percentage enter business districts by public transit. For 19 cities under 100,000 population, the average value was 17%. Between 100,000 and 500,000, it ran 40%. Over 500,000, it ran 63%. These figures are from the Traffic Engineering Handbook and are based on the results of city traffic surveys.

Swift: A cordon count in Memphis shows that 60% of the people came into the business area by mass transportation, using only 6% of the vehicles.

Clark: In Manhattan, the most recent figures show 80% of the 3,750,000 people come into the area south of 61st St. on an average business day by mass transportation. Rapid transit brings in 64%; busses and trolleys, 8%; railroads, 7%; trucks, 3%; and pedestrians (by ferry), 1%. That leaves 17% coming in by automobiles.

Swift: A lot of people do not realize how many people mass transportation carries. When given in percentages, it sounds small, but we carried 16,125,000,000 passengers in the cities' operations during the course of last year. That is nearly 45,000,000 people a day. To transport that many people would require, using the 1.7 figure, 13,235,300 more automobiles on the streets, if we were not in existence.

The person who makes the greatest contribution to the relief of traffic congestion is not the traffic engineer, is not the city planner, is not the designer of freeways, but is the bus rider, who sits upon one bus seat, and uses from 4 to 10 sq. ft. of street space rather than sitting in an automobile, which requires 70 sq. ft. of street space.

Contrary to the general thought, we are not, as an industry, making a lot of profit. We have gone along, most of us, by the skin of our teeth. We are not a monopoly. I think our industry has to be thought of in the same light as other businesses—the retail store, the steel
buildings go up like MAGIC
when ALLIED is on the job

Speed is usually a very important consideration in the construction of stores, super markets, and shopping centers.

Three large fabricating shops operating as the Allied unit contribute to speed in getting the steel on location for such buildings. And even when the tonnage is not large, it is comforting to architects and engineers to know that such exceptional facilities are working for them.

On location, skilled erecting crews take over. The same short-cut methods used in erecting large industrial buildings and HUGE bridges count when schedules are tight.

If you have projects of any size under way, where fabricated structural steel is specified, you will find it advantageous to know more about these facilities.

Consult us, or send your plans and specifications to be estimated.

Fabricators and erectors of structural steel for highway and railroad bridges; industrial, office, school, and government buildings; airport structures; harbor facilities.
ROUND TABLE continued

business, the milkman, and the corner drug store. We are manufacturers or retailers the same as the rest of the people, but we manufacture the most perishable product made. That is a bus ride. It has to be used while it is being made. None of you ever heard of a slightly used, or second-hand bus ride for sale that's a cinch.

Now, on my own property, a typical example: 19.93% of the basic fare goes for special taxes not levied on other industries and in addition to normal taxes. The basic fare is $8.44; these special discriminatory taxes account for 1.6¢ of our fare, or 19.93%. When you buy jewelry, you pay a 20% luxury tax. But is a bus ride a luxury?

If we could have the same consideration in connection with street use that is given to automobiles, and relief from special discriminatory taxes, I believe that we would do a better job. If we were encouraged, and the use of our vehicles is encouraged, you would find a large part of your traffic problem alleviated.

Hammond: In the US Chamber we realized that the businessmen were not as conscious of public transit and its importance to their welfare as they should be, so recently we brought it to their attention more forcibly by putting out a little publication. It makes seven points to the businessmen that we think are pretty pertinent:

1. We would like to have the businessmen encourage the use of one-way streets, a ban on curb parking, the restriction of turning movements, and the use of modern traffic-signal systems. All those items will help move all traffic and public transit much faster, therefore making less congestion.

2. We would like to see the businessmen encourage the transit companies to use more limited stops, more turnbacks, more express service. And, I will throw in a recommendation of my own, more zone fares.

3. We think that the businessmen ought to discourage unwarranted extensions of transit lines and other unprofitable services which might affect the financial stability of the transit companies.

4. We think that the business firms can do a lot to encourage their employees and their customers to patronize public transit. There are a lot of schemes being used today to encourage that. They give their employees a free ride home, for example.

5. We think, too, that there are many large firms that could help spread the transit load by opening and closing their offices at different times than normal, going back to somewhat the same thing we had during the war when we used staggered hours.

6. The utility commissions, I think, with the encouragement from businessmen, could do a lot to expedite their rate decisions. Sometimes a transit company has to wait a year or more before action is taken on its requests for continued on page 178

THE MAGAZINE OF BUILDING
The All-Purpose All-Aluminum MIAMI AWNING WINDOW

First by actual test—Pittsburgh Testing Laboratories Air Infiltration Tests 0.069 C.F.M. per cu. ft. up to 25 MPH.

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ARCHITECTURAL FORUM • FEBRUARY 1953

177
Swift: We can't buy a half-price bus for half-fare school children.

Ketchum: If you do not spend as much on operating expenses, it is that much money in your pocket.

Swift: We cannot buy a half-price bus for half-fare school children. In Washington, we have a three-cent school fare which was set up in 1933 by Congress. At that time, it was approximately half the prevailing rate for the ordinary fare. It still exists, while the cash fare is now 17¢ and the token fare is 13¢.

The riders of the community are carrying these school children who use the service on a reduced rate. There is no more reason, in my opinion, for that than for the milk company to supply school children with reduced-price milk or free milk.

Swift: We are the only industry that is asked, not only to pay school taxes, but to subsidize the education of children by carrying them at a reduced rate.

The insurance companies don't recognize the children as a half-price risk. They are full-price risk. The bus manufacturers don't recognize the children either. We can't buy a half-price bus for school children.

Prentice: Isn't it a fact that the slowing of the so-called rapid transit is one reason for people's preference for coming downtown by car or taxi?

Hyde: I think it is, but I think there is something more fundamental. People who ride in transit are merely passengers, and they aren't going to carry the torch. So, you have maybe one, two or three transit companies in the city that are trying to do something to speed up their operations; on the other hand you have thousands of individual motorists who are asserting their rights as individuals, and putting pressure on public officials to put in a light here, and change this, and put in a restriction there.

If we can move our public vehicles faster, you can't tell me there aren't many, many thousands of people who won't be riding the transit, just as they did before.

Howard: One effective attack on the downtown traffic and parking problem could be applied more widely than it has been, in cities that have or can have express or rapid transit service. It is to develop attractive parking areas at outlying express terminals, and continued on p. 18.
Who says a reinforced Concrete Building can’t be Destroyed by Fire...

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When the smoke cleared away... damage to this “fireproof” warehouse, and the 150,000 tires and tubes it contained, fell just short of the four million dollar mark! What a terrific price to pay for the lesson, already well-known to many, that “fireproof” buildings often serve merely as good stoves for flammable contents.

A Grinnell Automatic Sprinkler System could have prevented this costly fire. Grinnell Sprinklers offer any building... whether it is “fireproof” or not... positive protection against fire.

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Why Karnak? Because it has the Membrane System of waterproofing that holds secure against hydrostatic head or any water condition.

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Karnak fabric is packed in a sturdy corrugated carton for protected shipping and storage. It keeps the fabric in perfect condition until used...cuts fabric loss.

ROUND TABLE continued

at the same time to plan highway improvements to make these places more accessible than downtown. This would bring triple economies: to the traveler, to the community and to the transit system. It obviously costs less per car to provide parking space at outlying terminals than in downtown lots or garages. Checking the increase in traffic flow to downtown would cut the need for many miles of multimillion-dollar downtown expressways. The most costly parts of our street systems. The increase in transit riding might ease the deficits that are now endangering these essential services. And the traveler himself would make his journey from home to destination as quickly or quicker than by driving all the way. And a terminal, he would probably get a seat, and would willingly pay a premium fare. He could even pay a parking charge, and still save money—unless alternative downtown parking were subsidized. This kind of solution, with its triple savings, clearly requires triple co-ordination: among the city planners and highway builders, the transit operator, and the private or public parking developers. But it is obviously advantageous that I cannot see why it has not been more fully tried in more cities.

What must be done

to take trucks out of traffic,
to speed deliveries and
to reduce distribution costs?

Evans: We have been talking about movement of passengers and people. The other side of the coin is movement of goods. After all, the business district is the place for interchange of goods and services, and it takes both people and goods.

We all know the truck problem has been growing faster than the other problems of urban traffic. Truck registration has increased 101% since 1940, whereas automobile registration has only increased 60%. Probably that trend will continue.

So, we come down to a competition between passengers and goods on the streets. Faced with this competition, goods cannot move to another form of transportation, as in the case of passengers. Instead, there is an increase in the cost to the merchants and to the consumers of the goods.

We know that of the total trip time in local cartage, unnecessary delays run about 40%. In trying to get the goods delivered, the problem of delays in moving through traffic and in loading and unloading becomes a significant factor in the cost of moving the goods. Here are five solutions that have been worked out for this problem in the pick-up and delivery of goods.

continued on p. 182
— So You Want To Reduce Construction Costs
But You Don’t Want a Standardized Steel Building—HERE’S YOUR ANSWER

Here’s a Structural System made of five standardized members, available in three standard bay sizes—but YOU are still the architect.

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Architects, across the country are investigating the design possibilities of V-LOK. Building contractors are making new records in construction time. Owners are receiving income at earlier dates. V-LOK is truly a miracle of modern construction.

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STANDARD BAYS
20’ BY 20’
20’ BY 30’
20’ BY 40’

STANDARDIZED STEEL BUILDING PRODUCTS
MACOMBER • INCORPORATED
CANTON, OHIO
V BAR JOISTS • LONGSPANS • BOWSTRING TRUSSES • STEEL DECK
Banks: One of the trucker's biggest problems is the lack of freight elevators.

Simon: Investment in highways is not a burden on the economy; it is an investment in prosperity. Adequate roads don't cost money; they save money. Smith; Owen: We have done a poor job of pricing transportation.

ROUND TABLE continued

We contacted quite a cross-section of people in this field to get their ideas and have condensed them under five headings:

First of all, there are things that can be done on the truck itself for improved handling of goods. The truckers themselves are to blame in many cases for not properly routing their drivers, and in some cases for not having a helper along when he is needed. In other words, they can speed up their deliveries themselves in the placement and manipulation of the goods in the truck and in the scheduling of deliveries.

Second, we come to the truck-loading space at the curb or in alleys. When the truck gets there, too often there is no place for it to stop, so it must stop in the traveled area. This is a matter for the city to handle in most cases; it must see that space at the curb and in alleys is set aside and kept free of other vehicles so that trucks can load and unload.

Third is more efficient use of the street through traffic controls, one-way streets, restrictions on turns, load consolidation. Truck terminals prove helpful, where big trucks can unload into smaller units and deliveries can be consolidated. One Boston businessman has told of 17 trucks calling in a single day to pick up what could have been handled by two trucks operating fully loaded and destined for a central terminal. St. Louis truckers have worked out a load-consolidation plan that is working out very successfully.

Fourth is in the provision of off-street space for loading. More and more cities are making that compulsory in new buildings, and the last count, in 1951, showed 167 local governmental units doing this (97 cities, eight counties, two townships). This is a slow process for remedying the problem, since such zoning ordinances are not made retroactive. But in my estimation it is one of the most promising and effective solutions.

Finally—and this may be a little more controversial—there is the matter of decentralization or a spreading out of points of delivery and receiving of goods. The building of branch stores in the suburbs instead of adding to the downtown store is an example. This solution to the problem is a last resort, however, in my opinion.

Pick-up and delivery delays are costing consumers money. The average total cost for a truck operation in traffic is 5¢ to 10¢ per min., including operating overhead and wage costs. So, a 20-min. delay in pick-up while driving around looking for a spot to unload or an extra half-hour taken in making delivery, which is not at all unusual, represents $2 to $3 added cost to that particular delivery.

Barnes: We have worked out a satisfactory solution to this problem in Denver. We eliminated parking in about a two-square-mile area.

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about the doors you specify
for your clients

YES NO
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discomfort for customers and em-
ployees?

Does the entrance prevent wasteful
heat loss, on cold blustery days?

With air conditioning, does the en-
trance keep out heat, to minimize oper-
ating costs?

Does the entrance assure orderly
flow and prevent traffic jams during
rush hours?

Is the floor space completely usable,
right up to the entrance?

Does the entrance keep out dust and
dirt, to reduce frequency of redeco-
rating and cleaning, and merchandise
spoilage in sales areas?

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of these questions, you owe it to
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advantages of a revolving door entrance.

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answer "YES" to all these questions!

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IN CANADA: International-Van Kannel revolving doors are availa-
ble through Eastern Steel Products, Ltd., in Toronto and Montreal.

Write NOW
for your
Free Guide
to Planning
Better
"Packaged
Entrances"

ROUND TABLE

area on the numbered streets of Denver. We began with a plan that
there would be no parking of delivery vehicles on those streets
before that plan went into effect. It has been in operation, which
over a year now, they are writing
or four tickets per day for or for
and many of the trucking companies
the larger haulers and the produce
—the commission-type sales
truck, the meat truck, and so forth—making their deliveries in the
morning, pull up to their store-door delivery, and rarely see a truck in the
making deliveries after 11 a.m.

Prentice: There is another
factor that has to do with the fact
the streets are not used. The
jury certainly operates nights.

Hammond: Freight elevators

Evans: And labor contracts.

Banks: One of the biggest prob-
yes City is the lack of freight
and commercial buildings. Another
a lot of areas in New York City,
inesses have sprung up. They are
ightly packed into small areas
greatly increased the number of
commercial buildings. Many of
in this building,

They work so close with their
and their finished products,
them actually have to move out
for production.

When you break deliveries of
they have to put more
area.

Trying to better conditions
York City garment area, we ex-
plore to work early. It was the.
element that defeated the plan.
the boss, the fellow that ran the
the one who checked the del-
did everything, and he'd be doing
going to come in at an earlier
goods into his place.

The only way you are going
coordination and do a better job
more people make distribution,
and I think it is a problem.
It is certainly a problem for the
Ever have a 2-way roof deck problem like this?

A. M. CASTLE & CO.

"Everything in Steel." Founded in Chicago in 1890, the company has steadily expanded to nine distributing plants. Above is shown the Baltimore plant.

Architect: Lucius R. White, Jr., Baltimore
General Contractor: Goodman Construction Co., Inc.

THE PROBLEM. How to provide a permanent, economical roof deck for this steel warehouse that meets two requirements: summer and winter living comfort for the office (1)...fire protection for the warehouse area (2).

SOLUTION. Over the office space, Gold Bond Insulation Formboard was laid to give the needed insulation. Over the warehouse, Gold Bond Gypsum Formboard was laid to give low-cost fire protection. Then Gold Bond Gypsum Concrete was "Poured in Place" to form the roof deck. Besides Insulation Formboard, and fireproof Gypsum Formboard, Gold Bond Econaoustic Formboard can be used to insulate and sound-condition.

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ARCHITECTURAL FORUM • FEBRUARY 1953
A distinguished new St. Louis office building

Another Day-Brite lighted architectural achievement

This is the new home of the Brown Shoe Company. It stands in Clayton, Missouri, a suburb of St. Louis. The Brown Shoe Company is one of the pioneers in the movement toward decentralization of manufacturing headquarters in the St. Louis area. Company officials feel there are invaluable advantages in a less distracting, more comfortable environment for their executive, sales and office people. A $3 million investment in the building and grounds speaks for the courage of their convictions.

The building design is contemporary but in keeping with the trend of architecture in the community, there is a skillful blend of Colonial.

From the dominant entrance rotunda throughout the office space inside, there is everywhere evidence of far­sighted planning and sound specifying.

Extreme flexibility of interior design permits easy and quick rearrangement of offices, if and when needed. The whole building is air-filtered and air-conditioned. More than a mile of glass enclosed Day-Brite troffers provide one of the finest office lighting installations you've ever seen.

Ten years from now ... yes, twenty years from now ... the Brown Shoe Company headquarters will still rank with the best lighted office buildings in the nation. That's one of the reasons for Day-Brite's selection. There's a premium of extra years of trouble-free service that comes with Day-Brite.

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We invite your request for more complete Day-Brite information.
The handsomely appointed Board Room is featured by an interesting lighting layout, as are all executive offices. Here, an area of recessed panels is fitted into the beamed ceiling for general illumination. Cove lighting adds luxurious richness.

In the large office areas, Day-Brite glass enclosed troffers produce excellent visual comfort for the Brown staff as well as plenty of light for close work (40 footcandles maintained). Notice the flexibility of the lighting layout, too. Bays may be partitioned from floor to ceiling without rearrangement of the fixtures.

In the large office areas, Day-Brite glass enclosed troffers produce excellent visual comfort for the Brown staff as well as plenty of light for close work (40 footcandles maintained). Notice the flexibility of the lighting layout, too. Bays may be partitioned from floor to ceiling without rearrangement of the fixtures.

Sample show rooms merchandise the Brown shoe line through good display and good lighting. A combination of troffer illumination and incandescent spots is used. This sample room features "Buster Brown," one of Brown Shoe's nationally famous lines.

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An architect will be building for his most sensitive and critical audience when he designs a mental hospital. The acutely disturbed sensibility of a patient will be affected, for better or worse, by the smallest structural detail—the lack of a closet, difficult access to the grounds, a forbidding facade. The problem of atmosphere is as delicate a one as that facing a scene designer for "Swan Lake."

Equally responsive to the successes or failures of the building will be relatives and friends of the patient who, in most cases, are prejudiced against mental institutions and afraid of them. Yet these people—and doctors wisely agree—are the architect's real clients and it is their wants and feelings which must be satisfied by the design of the building.

But those who "design for therapy" are required to answer to yet another serious challenge. At a conference of the American Psychiatric Association, of which this book is a summary report, Dr. Ralph M. Chambers put it this way: "Present-day mental hospitals are inadequate and more or less obsolete . . . principally because buildings are, of necessity, too permanent for types of occupancy having a high rate of change in methods and space requirements." What is called for is "flexibility for week-to-week variations in use," as well as provisions for major alterations and/or expansions.  

Design for Therapy, made up of discussions and papers by architects, hospital administrators and psychiatrists, is a good beginning. The specially convoked conference called for a close collaboration between architects and psychiatrists that they may exchange information and work together in the building of mental hospitals. The book cites needs and problems. Its proposed solutions, however, are only tentatively sketched in.
modern design calls for

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CHITECTURAL FORUM • FEBRUARY 1953

AF-53
ARCHITECTURAL DETAILING. By Caleb Hornbostel and Elmer A. Bennett. Reinhold Publishing Corp., 330 W. 42nd St., New York 36, N. Y. 221 pp. 9" x 12". Illus. $12

This is an extremely well-presented and well-organized reference book that shows the sort of architectural details (165 of them) that you will not find in standard reference manuals. This fact gives the book its principal interest; it also accounts for some of its weaknesses.

It is probably fair to say that you can tell a good architect by the detailing that goes into his buildings. This detailing is the architect's personal handwriting, just as much as his plans, facades and ideas about space, volume and mass. In fact, after the first impact of a building upon the onlooker has worn off, it is the detail of a railing here or a window mullion there which will continue to arouse interest and testify to the designer's consistency and competence.

Now this means that the "handwriting" you can find in an architect's details is a very personal thing—just as personal as his real handwriting. A special detail (like a large sliding wall, for example) is therefore not just a special piece of installation in itself; it becomes a very special design problem in the hands of each individual architect. Nobody knows this better than Architect Richard Neutra, who has written a stimulating foreword to this book, for his own file of stock details is as famous as it is distinctively "Neutra." In other words, it was compiled to fit into a Neutra building; it would never fit into a building by Frank Lloyd Wright, say, or by Carl Koch.

The details collected by Messrs. Hornbostel and Bennett are, therefore, fascinating specimens of different people's architectural handwriting. This means that many sensitive and original designers will not find these details directly applicable to their own work. True enough, it is worth anybody's time to study a store detail by Ketchum, Gina & Sharp; a suspended stair by the Hunters; or an aluminum window wall by Belluschi. But unless your name happens to be K., G., S., H. or B., chances are that you would not do the same thing in your own building.

This is not to say that there are no universal details in this book; there are. But by and large, the details are special and easily identified with one particular designer's way of doing things.

The book is organized in two sections: first comes a discussion of certain building types (offices, labs, banks, stores, bars, schools, auditoriums, residences and miscellaneous small structures). In each category some fairly typical problems are shown, together with the details used by different architects to solve them. Second is a section on basic details (those relating to sun control, ventilation, lighting, signs, bathrooms, kitchens, stairs, fireplaces, doors and windows). In every case a photograph of the finished job accompanies the detail drawings.

Three minor points of criticism: Each subsection is prefaced with an index to the details subsequently shown, together with a discussion of the problem and the solution. It would have been better if these had appeared on the same page with the actual detail, as a long caption, perhaps. Second, it might have been interesting if the authors had added a note stating, quite frankly, how well the detail had worked out in practice. There are a few details shown here that many architects would question seriously. Finally, there are some glaring omissions in certain categories and readers of this magazine may find them as puzzling as this reviewer.

If the above criticism seems too harsh, it is only because this is such a really good and useful book; and, like all good and useful things, it makes you ask whether it couldn't have been just a little better.
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GYPSUM AND PAPER SANDWICH: low-cost partition can be molded at job site

At $35 per sq. ft. installed, Sico's fire-resistant partition should make a big dent in the high-priced clique of interior wall systems prefabricated for offices, factories, hotels and apartment buildings. Unlike its more sophisticated honeycomb cousins which have metal, plywood or cement board faces over resin-impregnated paper cores, the Sico sandwich is made of plain gypsum board bonded to a plain paper center with plain plaster. Instead of requiring an intricate process to weld core and facing materials, the Sico units are laminated on a simple press. Because of the fragility of preassembled gypsum board in transit, it might be feasible to make the panels on the job. Sico will license the patent-covered process to local contractors.

Erected, the walls look much like interior residential dry-wall construction. Not visible is this essential difference: studs are wedged between butted panels (recesses are made to receive 2 x 3's sideways during the forming) every 4' instead of being nailed in a frame 16" o.c.

A single thickness of 3/8" gypsum wall board will take a 20 min. fire test; the Sico panel received a 1 hr. fire rating in private laboratory tests. Its fire resistance can be increased by filling the honeycomb core with perlite or similar material.

Measuring 3/8" thick (two faces of 3/8" board over a 25/64" paper core), a single section can take a six-ton vertical load and has withstood transverse loads of 250 lbs. Although not designed as load-bearing walls, exterior panels (made by a similar process but with asbestos cement panels and a portland cement binder) will help hold up the roof—which, by the way, can also be made of Sico units.

Manufacturer: Sico Inc., Newton Ave., Portsmouth, N. H.

continued on p. 196

To build a partition, the first 4' x 8' panel is set between floor and ceiling run­ners, and the half-stud which comes with the panel is taken out, nailed to the wall and the panel slipped over it. The second section is then put in place next to the first and its removable half-stud nailed to the first's bonded half-stud.

Two men, working with $350 worth of equipment in a small garage, have turned out enough Sico panels for five buildings in New England during the past year.

Standard 2' x 8' roof-deck sections come in three thicknesses—13/16", 5/8" and 3/4". The planks are reinforced with steel mesh and can be used over 8' spans in most parts of the country.
THE WASHINGTON POST'S new 7-story building is heated by a combination of a hot blast ventilating system for the inside areas and convective radiation along the outside walls. The steam distribution system is divided into two sections, one supplying the fan blast coils at 3 lbs. to 5 lbs. pressure and one supplying the radiation at 3 lbs. to 5 lbs. pressure.

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ASBESTOS DUCT for air conditioning costs less, is quieter than metal

Current attempts to utilize labor-saving materials and to conserve metals are reasons enough for giving lightweight Careyduct asbestos conduit the twice-over. Unfamiliar to many air-conditioning engineers and specification writers, the duct is nonetheless an economical building material. It has been around for quite a while—14 years in fact—and has seen service in some notable installations, the Pentagon for one. But because of the reluctance of ductwork contractors to offend their sheet-metal men, Careyduct is not used as widely as its positive points might suggest. Basically, it is a laminate of smooth pressed asbestos sheets over a core of corrugated asbestos which provides both thermal and acoustical insulation. The latter is especially desirable where the whoosh of high velocity distribution needs hushing.

Careyduct sections are available in more than 60 stock rectangular dimensions from 2½ by 5½ up to 23½ by 23½, and in 15 round duct sizes from 4” to 30” in diameter. All come in 3’ lengths and are easily cut and shaped on the job. Pronged clips, tape and a fire-resistant adhesive are used to connect the sections. Static pressure and velocity characteristics for the various sizes are about the same as for metal. (An accurate conversion table may be obtained from the manufacturer.)

Besides costing about 20% less than metal (installed with accessories Careyduct averages
Penetrating rain and water seepage can cause serious damage to masonry copings. Especially in cold climates, where heaving occurs when water within the masonry freezes and expands.

If this trouble, which may dangerously weaken the parapet construction, is to be avoided, the copings should be covered. This work can be done better with copper and with assurance of long-lasting protection. Use copper of cornice temper (cold rolled) and of suitable gage. For installations of the sizes illustrated, 20-oz. copper is recommended. It is important that edge fastenings be free to slide, and that expansion joints be provided at intervals of not over 24 feet.

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It combines a modern freshness with the traditional warmth of wood . . . making it just the material for exposed panels, for walls, screens, partitions, built-ins and fine furniture of many types.

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ARCHITECTURAL FORUM • FEBRUARY 1953
PRODUCT NEWS

Made of asbestos, the air-conditioning duct is lightweight, easy to install.

I. J. Fox, Seln
Jamaica, N. Y.
Architect: Richard M. Perlman, N. Y. C.

PLASTIC TUBING: friction-free cover for prestressing strands in concrete

One tricky problem in the post-tensioning of prestressed concrete is how to prevent concrete from adhering to the cables or rods. Grease is not always adequate protection, and paper and tape coverings take expensive labor time. Total cost of applying paper around a 5/8" diameter strand runs about $20 per foot. A new plastic cover, Aeroflex Split Tubing, is available which is both leakproof and friction free, and can be applied for about half as much as paper. Aeroflex comes in 10 lengths in sizes to fit snugly over cable or rod with standard diameters from 5/8" up. The tubing has a 1/2" corrugated overlap which helps keep concrete from seeping in. It is not affected by chemical reaction in setting concrete nor by rain or frost; it may be applied and left in open forms before pouring concrete.

Manufacturer: Anchor Plastics Co., Inc., 36-36 36th St., Long Island City 6, N. Y.

continued on p. 204

THE MAGAZINE OF BUILDING
Putting up a good front is only smart business

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Lorenz and Williams, Architects
Cincinnati Store Fixtures, Formica Fabricator
4631 Spring Grove Ave., Cincinnati, Ohio

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PRODUCT NEWS

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Manufacturer: Robbins Floor Products, Inc., Tuscumbia (Muscle Shoals), Ala.

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Manufacturer: Mechanical Products, Inc., Jackson, Mich.
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TECHNICAL PUBLICATIONS

ACOUSTICAL MATERIALS. Sound Control Products. Look to Fiberglas, Owens-Corning Fiberglas Corp., Toledo 1, Ohio. 44 pp. 8 1/2" x 11"

Look to Fiberglas contains installation finished application pictures of various kinds of Fiberglas acoustical and sound control products in use. The other booklet includes technical data on noise reduction coefficients, application details, and specifications for perforated, perforated and plastic-faced acoustical tile; ceiling board; baffles; and perforated insulation and insulating wool.

PORCELAIN ENAMEL STEEL. Davidson Architectural Porcelain Enamel. Davidson Enamel Products Inc., Architectural Division, Division P-53, Lima, Ohio. 12 pp. 8 1/2" x 11"

Illustrates typical construction details of architectural porcelain enamel, and shows before and after views of remodeling jobs as well as photos of new buildings utilizing the durable colorful building material.

X-RAY FACILITIES. Planning the X-Ray Processing Facilities and Equipment. Medical X-Ray Sales Div., Eastman Kodak Co., 343 State St., Rochester 4, N. Y. 88 pp. 8 1/2" x 11"

A comprehensive survey of data on X-ray processing facilities. Among subjects covered: general layout, light-tight entrances, wiring, ventilation and temperature control.

TOOLS. Portable Cutting Tools, Catalogue 1252. Manco Mfg. Co., Bradley, Ill. 4 pp. 8 1/2" x 11"

Lightweight hand cutters and high-strength bolt cutters for steel rod, wire and strapping.

LIGHTING. American Standard Practice for Industrial Lighting, All-1-1962. American Standards Assn., 70 E. 45th St., New York 17, N. Y. 40 pp. 8 1/2" x 11". 50c

A revision of the 1942 Recommended Practice of Industrial Lighting, this new standard reflects a decade of progress in lighting concepts as well as techniques. In the lighting recommendations are based on analyses of individual seeing tasks and environments. Lighting quality and quantity are discussed, and topics such as daylighting, maintenance, supplementary lighting and lighting systems are covered in detail. Tables itemize values of illumination and lighting requirements for specific industrial visual tasks.

continued on p. 208
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TECHNICAL PUBLICATIONS

CONSTRUCTION. Pacal High Tensile Steel Bolts, Bulletin No. 600, Paper, Caimenson & Co., Dept. 611, St. Paul 8, Minn. 8 pp. 10" x 6"

Advantages and economies of using high tensile steel bolts in place of rivets in assembling structural steel.

PARTITIONS. Mobilwalls, Virginia Metal Products Corp., 1112 First National Bank Building, Pittsburgh, Pa. 8 pp. 8½" x 11"

Illustrated details on flush and semiflush-type steel partitions, panel and industrial type partitions, movable partitions, and wainscot. A steel tile acoustical ceiling is also pictured and described.

STEEL DOORS. VMP Steel Doors and Frames. Virginia Metal Products Corp., 1112 First National Bank Building, Pittsburgh, Pa. 8 pp. 8½" x 11"

Detail drawings and descriptions of steel doors and frames, single-swing and double-acting doors, sliding door and units, fire doors, as well as door units engineered for use with the VMP partition system.

PARTITIONS. Studless Metal Lath and Plaster 2" Solid Partition. Technical Bulletin No. 2, Metal Lath Manufacturers Assn., Engineers Building, Cleveland 14, Ohio. 4 pp. 8½" x 11"

Specifications and instructions for building 2" studless metal lath and plaster partitions carrying a 1 hr. fire rating.

TUBING. Spiratube-A and R, Catalogue C2-4. Flexible Tubing Corp., Guilford, Conn. 8 pp. 8½" x 11"

Reinforced fabric tubing for ventilation, fume and dust removal, and materials handling. The highly flexible lightweight duct is made of helical coils of spring wire wound with plies of coated fabric.

LIGHTWEIGHT AGGREGATES. Fireproofing with Perlite. Perlite Institute, 10 E. 40th St., New York 16, N. Y. 8 pp. 8½" x 11"

Summarizes basic details of 32 approved fire retardant constructions using lightweight plaster and concrete made with perlite aggregate. Diagrams illustrate required thickness of perlite plaster or concrete, furring details, and other elements necessary for listed fire ratings.

PLYWOOD. Met-L-Wood, Bulletin 521. Met-L-Wood Corp., 6755 W. 65th St., Chicago 38, Ill. 16 pp. 8½" x 11"

How metal is bonded to plywood to make Met-L-Wood and how and where it is used. Suggested applications include X-ray room wall panels, escalator panels and gangways.

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Advertisers index:

Page: 218

Advertisers index:
163, 16.5, 167, 169
Cover in Eljer Co.
194, 195
Cover II
98, 99 Libbey-Owens-Ford Glass Company
200 Litecraft Manufacturing Corporation
180 Lewis Asphalt Engineering Co.
40, 86
72, 73
204
184
202
189
15,36
26
855
206
216
215
211
209

Cover IV

Page: 212

207 Loomis Machine Co.
210 Louisville Cement Company, Inc.
92, A, B, C, D
Ludman Corporation (Auto-Lok Aluminum Awning Window)
181 Macomber Incorporated
24 Mahon, R. C., Company, The
188 Marlo Coil Co.
65 Mengel Company, The
277 Miami Window Corp.
176 Miller Company, The
68, 69 Minneapolis-Honeywell Regulator Company
219 Mississippi Glass Company
84 Multi-Vent Division (The Pyle-National Company)
80, 81 National Electric Products Corporation
36 National Garages, Inc.
183 National Gypsum Company
30, 31 Nelson, Herman, Division of American Air Filter Company
61 Nesbit, John J., Inc.
17 Otis Elevator Company
211 Raynor Mfg. Co.
220 Reynolds Metals Company
206 Rigidized Metals Corporation
166 Risco Laminated Products, Inc.
74 Robertson, H. H., Company
9 Rochester Products Division (General Motors Corp.)
62 Roddis Plywood Corp.
161 Rowe Manufacturing Co.
14 Ruberoid Company, The
72, 73 Russell & Erwin Div. (The American Hardware Corp.)
38, 39 Sanymetal Products Co., Inc., The
215 Scott Paper Company
196 Seaporcel Metals, Inc.
214 Sedgwick Machine Works, Inc.
54 Sellers Engineering Co.
6 Servel, Inc.
201 Sharon Steel Corporation
211 Sissakraft Co., The
18 Sloan Valve Company
202 Smithcraft Lighting Division
58 Standard Dry Wall Products, Inc.
70 Stanley Works, The
216 Summerbell Roof Structures
32 Swedish Crucible Steel Company
91 Titus Manufacturing Corp.
12, 13 Trane Company, The
203 Tremco Manufacturing Co., The
97 Truscan Steel Company
202 Tyler Fixture Corp.

Cover II

Union Carbide and Carbon Corporation (Bakelite Company Division)

Page: 211

20, 21 United States Gypsum
44, 94, 95, 199 United States Plywood Corporation
79 U. S. Plywood Corp. (Kalistron, Inc.)
198 United Steel Fabricators, Inc.
178, 203 Unit Structures, Inc.
213Unistrut Products Company
183 Universal Corporation
59 Usable Rock Asphalt Company
48 Walworth Company
83 Wason Flashing Company
64 Wash Racks, Inc.
36 West Coast Lumbermen's Association
52, 57 Westinghouse Electric Corporation
198 Wiley, R. & W., Inc.
170 Will-Burt Company, The
214 Wiremold Company, The
89 Woodall Industries, Inc.
25 Young Radiator Company
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