October 1953 SCHOOL ISSUE

Forum on school building
Architects, engineers, officials and consultants agree on 10 recommendations for building better schools at less cost (p. 117)

Case study schools
35 pages of the latest trends in cluster planning, loft planning, core planning and zone planning demonstrated by 19 schools of various sizes (p. 127)

Forum design standards
A new department to keep architects current on design details. This month, classroom design (p. 162)

School design
What should today's school look like: sleek international, shaggy American or what? (p. 166)

School building techniques
Roundup of new ideas in site planning, structure, heating, lighting and acoustics (p. 172)
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OCTOBER 1953

SCHOOLS

FORUM ON SCHOOL BUILDING
Architects, engineers, school officials and consultants at round table conference agree on ten recommendations for building better schools at lower costs.

CASE STUDY SCHOOLS

117

CLUSTER PLAN
In Darlen, Conn. by Ketchum, Gina & Sharp
In Port Arthur, Tex. by Caudill, Rowlett, Scott, Neff & Associates

127

128

132

134

136

138

LOFT PLAN
In San Mateo County, Calif. by John Lyon Reid
In Orem, Utah by William Rowe Smith

141

143

144

145

146

CORE PLAN
In El Sobrante, Calif. by John Carl Warneck
In Laredo, Tex. by Caudill, Rowlett, Scott & Associates

152

154

157

158

ZONE PLAN
In Worcester, Mass. by TAC & G. Adolph Johnson
In Hyde Park, N.Y. by Perkins & Will

161

162

SMALLER WINDOWS
In Hawarden, Iowa by Harold Spitznagel & Associates
In Minneapolis, Minn. by Magney, Tualer & Setter

174

179

184

188

192

200

204
Exclusive channeling guards against blistering and separation of felt and insulation

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Result—the handsome new Lafayette Elementary School illustrated here and the even larger Skoi-Yase (Indian for "bubbling water") Elementary School. With these new schools, and its existing buildings, Waterloo has solved its educational space problems for many years.

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THREE KEY ADVANTAGES
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1. TIME AND LABOR SAVINGS
Use of fir plywood forms for the striking architectural concrete of this school helped establish a new record for low school construction costs in Washington state. Allowing only half area* for the lower floor play area and maintenance rooms, Tacoma school officials give $9.91 per square foot as the complete construction cost, including taxes and fees. Architect Irvin E. Muri credits fir plywood forms with playing an important role in helping hold costs to this low figure—some 20 per cent below the average cost for schools in the state.

2. SMOOTH, FIN-FREE CONCRETE
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- **EXTRA FLOOR PROTECTION** — Total weight evenly distributed. Casters roll on plywood panel to prevent marring of floors. Easy access for under-the-stand cleaning.
- **STURDIER CONSTRUCTION** — Heavy duty I beams plus 2-inch structural douglas fir lumber mean greater strength.
- **SMOOTHER OPERATION** — Perfectly counter balanced so that one person can raise or lower bleacher. Minimum of moving parts. No hazards to catch fingers. Can be locked in open or closed position.
- **UTMOST SAFETY** — Every Beatty Rollway Bleacher rigidly inspected. Carries unqualified approval of state safety authorities and insurance underwriters.

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FOLDING ROLLWAY BLEACHERS & STAGES

OUTDOOR PORTABLE GRANDSTANDS
Steel or Aluminum Windows of

Time-tested Design for Modern or Traditional Buildings of all Types

Through 73 years of serving the construction industry Bayley has never been satisfied to build for quality alone. They also recognized the need for a fully cooperative relationship from the time of a building's inception to its occupancy. With that sense of responsibility, they pioneered during those years many of the most worthwhile developments in the design of metal windows.

The objectives of Bayley Window design have always been to improve natural daylighting, vision and ventilation with an enduring window, and to constantly develop products in harmony with advancing architectural trends.

The efficiency, quality and all-around economy of Bayley Windows—in either steel or aluminum—is evidenced by their use in outstanding buildings throughout the world. The nationwide Bayley Organization—through District Offices and local representatives—places on ready call a trained Window Engineer to work with you on any window requirement, from inception to completion of a project. Write or phone.

See Bayley in Sweet's. Complete catalogs on aluminum windows, 17 a/BA; steel windows, 17 b/BAL; Saf-T-Gard Hospital Detention Window, 17b/BAY.
Before you decide... here's a new low-cost way of heating you should know about.

There's just nothing to match it! Yes, the Norman Schoolroom Heater provides you with a far superior heating system at a cost... lower than ever before.

Here's the answer to real heating comfort in any schoolroom... not stale dry heat, but clean comfortable gas heat that introduces refreshing warm air into your schoolroom.

But that's not all! The Norman Schoolroom Heater brings you all the advantages of a central heating and ventilating system... with Norman's exclusive, compact, space-saving design that really cuts installation costs.

And what a pleasure to work with... so healthy and relaxing for students and children that you'll agree... it all adds up to better attendance... less absenteeism on cold winter days.

Preheated outside air mixes with room air as it passes through the Norman Schoolroom Heater. Flow of air can be adjusted with a damper, so that no expensive ventilation system is needed... and piping is completely eliminated.

Circulation of Warm Air eliminates "cold spots" in front of windows and prevents excessive drafts along floors. Room air is later drawn back through heater to mix with fresh outside air for continuous circulation of refreshing warm breezes.

Take a lesson... from the Norman School Heater. Send for illustrated literature and get the complete facts on low-cost gas heating with the Norman Schoolroom Heater. Or write direct to your Norman Dealer for your copy.

Norman Products Company
1150 Chesapeake Avenue, Columbus 12, Ohio

Manufacturers of a Complete Line of Gas Heating and Air Conditioning Equipment

Architects and Engineers agree it's tops in its class.

NORMAN SCHOOLROOM HEATER

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Architects and Engineers: We invite your inquiries. Please send folder, "Norman Schoolroom Heater"

Name:
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Announcing new additions to the money-saving family of Fenestra Building Panels!

Here's a whole new line of modern architectural "tools"—the latest advancement in the field of light-gage steel construction.

Each one of these new Fenestra Metal Building Panels is a multi-purpose package—structural and finish material. Each is long-span, steel-strong and lightweight, saving time, money, labor and materials. Fenestra Engineers are ready to give you thoroughly tested data on all of these products. Please call your local Fenestra Representative or write direct to the Detroit Steel Products Company, Dept. AF5, 2296 East Grand Blvd., Detroit 11, Michigan.

Fenestra's New "D" Panels for Floor, Ceiling, Roof

These rugged, rigid, long-span metal panels interlock quickly and easily to form subfloor, or combination ceiling and roof. They are easily arc welded to supporting structural steel. Wires, etc., can be run conveniently through the box beams. Pipes and ducts can go between cells. Panels are 24 inches wide, 1\(\frac{1}{2}\), 3, 4\(\frac{1}{2}\), 6, 7\(\frac{1}{2}\) inches deep, up to 31 feet long.

Fenestra's New "D" Panel Acoustical Ceiling

These panels are available with the flat, smooth side of the box beams perforated and with sound insulating material inside the box beam. Placed flat side down, the panels interlock to give you a beautiful finished ceiling. It's structural material and finished ceiling in one compact package. Fire-safe, maintenance-free. Same dimensions as "D" Panels for floors.

Add the new panel products, shown above, to this old, established family. Here is real latitude for architectural design.

"C" Insulated Wall Panels. Width 16". Depth is 3". Installed horizontally, or vertically.

Acoustical "AD" Panels for ceiling-silencer-roof. Width 16". Depths to 7\(\frac{1}{2}\)".
New Fenestra-Nepco "D" Panel Electrifloor
Here is almost unlimited electrical availability for the life of a building. Panel cells are 12" on center, a 27 sq. inch duct area for the 3"-deep panel. This is adequate for all cables, including coaxial. And for a two-duct system, outlets can be spaced 6" apart.

New Fenestra Econorib for Roofs
Here is 18 and 20 gage, 1 1/2" deep roof deck with a full 1 1/2" rib base for purlin contact when you weld the deck down. 24 inches wide for economy of handling and for increased strength. This balanced design combines economy and strength to the "nth" degree.

Fenestra's New Fluted Wall Panels
These 24"-wide insulated wall panels are available in galvanized steel, painted steel, aluminum or stainless steel—in lengths required by job conditions. The double 1 1/2"-deep hat sections have stiffening ribs for great strength and good architectural effect. Interlocking, telescoping ends eliminate intermediate flashings. Insulated with 1 1/2"-thick glass fiber, for a better U value than a 16"-thick brick wall! Quickly installed inside-outside finished wall in one package.

Fenestra's New Uninsulated Siding
An architecturally attractive, economical siding for use where high insulating value is not necessary. Available in 18 gage steel or 16 gage B&S aluminum. Quickly and easily installed. Fire-safe. 24 inches wide with 1 1/2"-deep hat sections.

Be sure to see the Fenestra exhibit at the A.I.A. Convention in Seattle, June 16-19

Fenestra
METAL BUILDING PANELS

Holorib Roof Deck. 18" wide—depth 1 1/2"—lengths up to 24'.

Acoustical Holorib for acoustical-structural roof. Width 18".
Depth 1 1/2".

Holorib Reinforcing Floor Forms. 18" wide—lengths up to 24'. Upturned pyramidal ribs reinforce concrete slab.
MODERN GRADE SCHOOL equips cafeteria for
planned lunch program . . . food-keeping facilities by Frigidaire

An outstanding example of functional grade school design is
the recently completed Pitcher Hill Grade School, ideally situ­
ated amid spacious, rolling lawns in North Syracuse, New York. Modern to the last detail, the school provides up-to-the-minute
facilities throughout for its student body and faculty.

As a case in point, the school's cafeteria is equipped with
a roomy 44 cubic foot Frigidaire Reach-In Refrigerator that
maintains the top nutritional value of the food it keeps, while
helping to make possible the smooth, fast service a school
lunchroom demands.

Frigidaire Reach-Ins, models from 17 to 62 cu. ft., provide
large, accessible food storage capacity in minimum floor space.
Flowing Cold refrigeration gives uniform food protection. Long
life, dependability and economy are assured by all-steel construc­
tion, sealed Meter-Miser mechanism and all-porcelain interior.

For further information on Frigidaire equipment suitable for
schools, hospitals or institutions, call the Frigidaire Dealer,
Distributor or Factory Branch that serves your area. See
Frigidaire catalogs in Sweet's Files, or write Frigidaire Division
of General Motors, Dayton 1, O. In Canada, Toronto 13, Ont.
Efflorescence is caused by soluble salts which are present in almost all masonry materials. When reached by water, these salts dissolve and may be drawn, by evaporation, to the surface of the wall.

Brixment is permanently waterproofed, during manufacture, with the most effective air-entraining waterproofing agent known.

Waterproofed Brixment mortar checks the passage of water and keeps it from percolating down through the wall, dissolving salts which may be in the masonry materials, and carrying them to the surface.

In addition to reducing the possibility of efflorescence, Brixment mortar gives you two other practical benefits:

1 HELPS PREVENT LEAKY WALLS
   Even under pressure, water cannot readily pass through Brixment mortar. Therefore, if the face brick are back-plastered with Brixment mortar, an effective barrier is set up against the passage of water to the inside of the wall.

2 GREATLY INCREASES DURABILITY
   Water cannot readily penetrate Brixment mortar. This prevents the mortar from becoming saturated — therefore helps protect it from destructive action of freezing and thawing to which it is subjected many times each winter.

Both these advantages of waterproofed Brixment mortar are fully described in other recent advertisements. Write for reprints.

Louisville Cement Co., Louisville 2, Ky.

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FIGURE 1

A To test Brixment and any other mortar for resistance to efflorescence, "cap" two brick heavily with the mortars, and let harden.
B Keep both brick for a few weeks in a shallow pan of water, as shown. See the difference with waterproofed Brixment mortar.

FIGURE 2

Prepare two slabs of mortar, one with Brixment and one with ordinary cement-and-lime mortar. After mortars have hardened, seal a lamp chimney to each of the mortar slabs, using wax or candle grease, and fill with water.

After 24 hours, note how much water has gone into and through the non-waterproofed mortar, and how little water has gone into or through the Brixment mortar.
LOOKS INVITING WHEN NEW...STAYS INVITING FOR LIFE

This entrance says "come-in" today. It will say the same thing years from today...and look just as handsome...because it's made of Republic ENDURO Stainless Steel.

Built-in beauty is one of the reasons why ENDURO stays so good looking...so long. It's solid stainless steel...all the way through...with a distinctive permanent lustre that lasts. Its smooth surface is easy to clean...and keep clean. And that's something clients like to know...in advance.

ENDURO actually makes open designs like this possible. It allows you to use thinner, lighter sections without sacrificing strength or durability. It's easy to fabricate, too. And it's so versatile that you can combine it with many other materials to obtain striking effects.

Does ENDURO Stainless give you an idea? File it with your future plans now. Sweet's will give you the details on this remarkable metal. For special help in developing your own ideas, write Republic.

REPUBLIC STEEL CORPORATION
Alloy Steel Division • Massillon, Ohio
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Export Department: Chrysler Building, New York 17, N.Y.

Other Republic Products include Carbon and Alloy Steels—Pipe, Sheets, Strip, Plates, Bars, Wire, Pig Iron, Bolts and Nuts, Tubing
Think of Spectators' Comfort
When Selecting Your Gymnasium Stands

Universal Roll-A-Ways Provide More Leg Room Than Any Other Leading Stands

When selecting or specifying gymnasium stands, it is quite natural for you to favor those which provide maximum seating in minimum space. But what about the spectators? Are you considering their comfort? Cramped seating facilities don’t encourage big turn-outs for basketball games or other events.

However, this need not be a problem. With Universal Roll-A-Way Stands you can meet all demands... for comfort as well as maximum seating in minimum space.

Thanks to improved design and construction, Roll-A-Ways provide more leg room than any other leading stands. The extra distance from seat board to foot board (18½”) and the centered position of vertical filler board beneath the seat permit every spectator to keep his feet and legs in normal position (illustrated at right). Continual comfort is assured.

Universal Roll-A-Way Stands are engineered to individual specifications, fit any space, and afford perfect visibility. When not in use, they may be rolled back to the wall, opening approximately 70% more floor space for regular gymnasium activities. They are ideal for large capacity or small; neat and attractive; exceptionally strong and safe.


ANOTHER PROMINENT UNIVERSITY SELECTS UNIVERSAL Roll-A-Way Stands have just been installed in the large new gymnasium at Vanderbilt University, Nashville, Tenn. Another proof of preference!

UNIVERSAL BLEACHER COMPANY
606 SOUTH NEIL STREET • CHAMPAIGN, ILLINOIS
Members eat in comfort and quiet under the ceiling of Travertone in the Club’s Dining Room. Travertone not only absorbs the clattering noise of dishes and utensils, but adds distinctive beauty to the room as well.

High acoustical efficiency rather than dignified appearance was the requirement for the sound conditioning in the Informal Lounge. Here, low-cost Armstrong’s Cushiontone, a perforated wood fiber tile, was chosen to do the job.

Armstrong’s Travertone overhead helps to isolate disturbing noise, keeps it from travelling through the large open stairwell into other parts of the building.

Quiet dignity dominates the decorating scheme in the distinguished Clifton Club. Furniture, carpets, draperies, and even the acoustical ceilings blend tastefully to provide attractive, restful surroundings for the members. The beautiful ceilings of Armstrong’s Travertone contribute to this atmosphere by absorbing disturbing noise, promoting comfortable quiet at all times.

Selected for its handsome, dignified appearance, Travertone is a highly efficient, completely incombustible mineral wool tile. It is easily, economically maintained. Travertone’s fissured surface can be repainted when necessary. Installation is by cementing or mechanical suspension.

There are many different acoustical materials in the Armstrong Line, and they offer a wide variety of product features to meet any sound-conditioning need. For full details and a free estimate, call your local Armstrong Acoustical Contractor. For your personal copy of the booklet, “How to Select an Acoustical Material,” write Armstrong Cork Company, 4210 Rooney Street, Lancaster, Pennsylvania.
More experts ponder '54 outlook

> BLS Construction Chief Riley predicts construction volume near $34 billion next year but sees no drop in costs

> AGC survey finds 49% of members expect drop in building volume in next six months as competition grows

This time a year ago, and for many months this year, 1953 was billed widely as the year for caution because business would probably experience a trying slide and readjustment. This month, when the President's Council of Economic Advisors reported on business activity through the third quarter of the year, it found that incomes, and just about every other yardstick but government spending (down $2 billion), had soared higher than ever. At the end of 1952, the gross national product rate was $361 billion a year. It rose to $362 billion the first quarter of this year, jumped to $372 billion in the second quarter, and eased off to $371 billion in the third quarter. Even so, GNP stood $25 billion ahead of '52's third-quarter rate. And construction got its full share from the cornucopia: expenditures through September were 4.7% ahead of last year's rate (p. 43) and would hit an all-time peak for the full year.

More of the same. This month the tenor of 1954 predictions was reminiscent of predictions a year ago. But construction sources usually agreed with Forum's forecast last month: there will be a descent from this year's pinnacle, but only a small one; 1954 construction outlays will probably be the second biggest in history.

Addressing the Producers' Council annual convention in Pittsburgh last month, H. E. Riley, chief of the BLS construction statistics division, offered his personal opinion that 1954 construction would be "slightly under $34 billion," compared with Forum's $33.3 billion prediction. Riley saw no particular decline coming in construction costs. (The annual BLS-Commerce Department estimate for next year will not be made until next month, but the joint [revised] estimate for this year's total volume is $34.6 billion.)

Reduced optimism. The AGC last month surveyed its members' market opinions for the coming six months. Heading into the winter season, their replies were not as overwhelming optimistically optimistic as in a similar survey last April. The contrast was greatest in the outlook for building. Contractors' expectations for different types of construction:

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<tr>
<td><strong>Building Construction</strong></td>
<td>April</td>
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<td>Expect greater volume</td>
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<td>Expect same volume</td>
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<td>Expect less volume</td>
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<td><strong>Heavy Construction</strong></td>
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<td>Expect greater volume</td>
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<td><strong>Highway Construction</strong></td>
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Stay out of debt. Realty Analyst Roy Wenzlick, father of the celebrated multicolored Wenzlick real estate charts, ventured a ten-year forecast on housing, construction and real estate this month for the Illinois State Chamber of Commerce. He still saw the day approaching when a prospective home owner could "buy an existing building for considerably less than the cost of constructing a new one." New home building is apt to shrink considerably at that point, he observed.

A cutback in construction of larger buildings, particularly office structures, would not occur so soon, he added, "as it is a peculiar fact that this type of building is generally built in larger quantities at the tail end of a boom or even after the boom is practically over."

His advice to realty investors: sell off poorer properties and use the proceeds to pay off the mortgages on better properties; avoid going into a deflationary period with large outstanding mortgage debt obligations.

Defense Dept. junking sq. ft. limits; Adm. Jelley to head construction

Military construction policies under Defense Dept. reorganization took firmer shape. After two months of sizing things up in his new job as assistant secretary for properties and installations, Franklin G. Floete created three new divisions in his office, named men to run two of them.

1. To head a construction division he appointed the Navy's ranking construction expert, Rear Adm. Joseph F. Jelley, chief of the Bureau of Yards & Docks since Dec. '49. Floete and Jelley promptly agreed to discard the most important work of Floete's predecessor, Frank Creedon: square foot or per man cost limitations on barracks and other repetitive service structures. They explained such curbs sometimes might hamper economy. If they must be bound by such cost formulae by Congressional mandate they would seek adjustments for different weather and building cost zones.

2. To head a realty management division Floete appointed Ira D. Beynon, Lincoln, Neb. attorney. His work will include functions formerly handled by the defunct Armed Services Housing Agency. He will supervise renting and purchasing policies.

3. Floete said he was shocked to discover that none of the service agencies could produce figures on the cost of maintaining their $165 billion plant. Maintenance, particularly on temporary buildings, can soar to fantastic rates. A maintenance and building operations division will be created to tackle this problem as soon as a director is picked.

The biggest job for Jelley's construction division, it appeared, will be launching the new naval and air base program in Spain. Supervision of this $200 million project was assigned to the Navy's Yards & Docks, where Rear Adm. John R. Perry, now in charge of Y&D's Pacific and Alaskan division, would succeed Jelley. Y&D apparently got the nod because most of the work will be naval bases. Some observers interpreted Navy direction as a slap at the Army Engineers because of the fumbling at Moroccan bases.

Architectural and engineering contract for the Spanish program was awarded jointly to: Pereira & Luckman, Los Angeles; Shaw-Metz & Dolio, Chicago; F. R. Harris Co., New York; and Metcalf & Eddy, Boston. The primary construction contract is not expected to be awarded before January, and efforts will be made to subcontract as much work as possible to local Spanish firms.

DIVISION CHIEFS Ira D. Beynon (I) and Rear Adm. Joseph F. Jelley (c) confer with Defense Dept. building boss Franklin G. Floete.
Could homebuilders trim costs in school building?

Biggest problem facing school building, as educators see it, is how to erect $10.7 billion worth of schools for only $5.8 billion. The higher figure, says the U.S. Office of Education, is what it would cost to bring the nation's schools up to par. About half of it would relieve today's overcrowding; half would replace obsolete classrooms. The lower figure is what communities could raise by stretching their resources to the limit. Moreover, enrollments are still zooming. The National Education Association now thinks the peak elementary school load will not arrive until 1959-60. The all-time high in college attendance is expected in 1964-70.

In the resulting push to cut school building costs, a few schoolmen were turning to an unexpected source: homebuilders. One Washington economist, Donald J. O'Connor, made headlines this month with a suggestion that elimination of structural steel beams, use of mass-produced homebuilding materials and single-story construction would cut the average cost of a school room from $40,000 to about $10,000. "We don't want to chisel on our kids," said O'Connor in advocating one-story, house-type structures for teaching, "but we shouldn't be taken for a ride on costs. A $40,000 classroom is a ride."

In booming Bucks County, Pa., when the Bristol Township school board found it could not afford $2 million to build the schools it had planned to serve the new Levittown, Builder William J. Levitt offered to form a nonprofit corporation, build two 20-classroom schools for $800,000 each and lease them to the board for 20 years at $40,000 annually. After that, the schools would revert to the township. Local officials accepted Levitt's idea enthusiastically. And near month's end Dr. Francis B. Haas, state superintendent of public instruction, added his preliminary approval to the lease idea. Under Pennsylvania law, the state department of public instruction must approve all school plans to qualify local communities for 50% reimbursement of the cost. Levitt hoped to find a mortgage investor for the schools; if not, he told schoolmen he would put up the construction money himself.

Chicago school costs hit; private architect named

Chicago public schools, said the Sun-Times in a critical series of articles in August, not only are viewed as "stodgy from the design standpoint" by private architects, but also cost more than comparable parochial schools in Chicago or public schools in the suburbs and in St. Louis and Milwaukee. Average cubic-foot cost of Chicago public schools this year: $1.39 (range: $1.28 to $1.53). Parochial schools cost 75c to $1.28 per cu. ft. Suggested remedy: let private architects design schools instead of the board of education's staff.

This month, the board of education heeded the advice, prepared to hire Perkins & Will to design a $3 million elementary and high school. Moreover, the private architects will let bids and supervise construction—jobs formerly done by the board's staffs.

British school to be built with 2" plastic wall panels

Lumber-shy Britain usually builds with brick or concrete. This month, an Edinburgh court approved construction of a $269,000 school with load-bearing walls of a plastic made from compressed, resin-impregnated paper. Architects George L. Walls and George P. Duncan expected speedier erection and reduced maintenance to offset the initial high cost of the material. It comes in 4' x 8' panels 2" thick, with doors and window frames factory-installed. The panels are fastened together with aluminum alloy stanchions. Glass or wood will provide insulation between inner and outer panels, which the architects called nonflammable and impervious to water and vermin.

"Said Walls: "It is not possible to say at present whether there is any saving over conventional methods of construction, apart from time, because we do not know yet how long the building will take."

Sidelights

Foreign buildings shake-up

State Dept.'s Foreign Buildings Office is due for a shake-up. Its able boss, Leland W. King, now on a European inspection trip, will be kicked upstairs into an advisory job. State Dept. brass say King and his predecessor, Frederick Larkin, ran the office as a "one-man show." They would have more committee meetings, procedures, analyses before building, and perhaps would offer US plans to local officialdom abroad for approval before construction—all procedures which architects know tend to produce mediocrity instead of good design. Masterminding the shake-up is Edward T. Wailes, deputy undersecretary of state, a 24-year veteran with the department. Advising him is New York Builder Nelson Wailes. AIA may be asked to form a panel to advise on the program. Some topflight design men intimately connected with the foreign buildings program privately call King's ouster a "dirty trick." Ironically, an exhibit of the work King did was attracting favorable attention this month at Manhattan's Museum of Modern Art, along with expressions of surprise that such cleanly styled architecture could be for the government.

Tax aid for bomb shelters

The Office of Defense Mobilization awarded its first 100% rapid tax write-off certificate for protective construction. A $550,000 allow-
**HHFA chiefs woo public housers**

- At NAHO meeting, Cole says he wants to make Housing Act of 1949 "work"; most cities need US subsidy

- Commissioner Slusser says he will "fight" for program, would like it to provide single-family houses

Was hate turning into love? At the annual convention of the National Association of Housing Officials in Milwaukee this month HHF Administrator Albert M. Cole and PHA Commissioner Charles E. Slusser gave public housing a bold embrace on behalf of the Republican administration. Said Cole, wooing the New Deal's beguiling housing widow:

> "There is no intention on our part of curtailing federal help under the authorities given us. ... I did not oppose the public housing section of the 1949 Act because I object in principle to any kind of program of federal assistance for decent housing for low-income families. I think we should have an effective program in this particular area of housing need.

> "I thought [the public housing section] was defective. ... I think it should be restudied and changed to whatever degree is needed to remove [the] defects, and ... make it work.

> "Decent homes have to be provided for slum dwellers. If those families cannot afford such homes on the private market, then a program is necessary that will enable them to be housed decently. ... I do not see how in most cities housing for such families can be provided in sufficient quantity without some subsidy aid from the government."

At a press conference, Cole gave as his own the public housers' definition of "low-income families": "families unable to obtain good housing by reason of their low income."

He confirmed that administration policy makers are studying what job-making role public housing could play during recession.

No liquidation. Commissioner Slusser was just as ardent. Said he: "I am dedicated to the original concept of the 1949 Act ... 'of using the funds and credit of the United States ... to remedy the unsafe and unsanitary housing conditions injurious to ... the citizens of the Nation'. ... I would like to get one message over to you. ... The late Bob Taft did not recommend me for this job and President Eisenhower did not appoint me for the purpose of liquidating the low-rent public housing program.

> "I am going to fight for it—not for its mistakes, not for its apologists, but for the great good that it has done—the great good that it will do—and for the people who so greatly need it."

At a press conference, Slusser elaborated his view of public housing mistakes. The worst: overprogramming that has caused vacancies in some localities (which he refused to identify), high-handed action by some local housing authorities in jammed-through programs without adequate regard for the views of other local interests (i.e., politicking).

**Detached houses?** Former real estate man Slusser said he discounted NAREB and NAHB attacks on public housing as "propa-
Sure you can match grains all around the room! Use FLEXWOOD

Flexwood is made by slicing the finest, rarest woods so thin that there are more pieces out of each section of log. Therefore you can match grains over a larger area. And because it is flexible, you can wrap Flexwood around even the thinnest columns or sharpest curved walls—on any firm, dry backing—to create superb, original decorative effects. Flexwood meets any fire code requirement—can be installed over a week-end if necessary! Over 25,000,000 feet have been sold. Learn all of Flexwood’s remarkable advantages by mailing the coupon now.

Flexwood is manufactured and marketed jointly by United States Plywood Corporation and The Mengel Company.
Winston of Baltimore typified those more inclined to accept Cole at face value. Cole's advances, or what Chicago's Sun-Times last month called Cole's "conversion" to public housing.

President Ira S. Robbins of the National Housing Conference, public housing's chief lobby group, gave NAHO his estimate the next day. Cole, said Robbins, had spoken in "clear, but mistakable terms." Robbins insisted there must be some hidden "gimmick" behind Cole's surface affection. Cole demanded greater "local" approval and support for public housing, Robbins noted, and perhaps the "gimmick" would emerge as mandatory local referenda or dollar-for-dollar federal subsidy matching by each locality for any further projects—both likely to block or cripple prospective programs. Said Robbins: "Now that [Cole's] 'shirt-sleeve conferences' [to seek ideas on federal housing policies] are over, it's time to get into our 'shorts and gloves' and really start fighting."

Incoming NAHO President Oliver C. Winston of Baltimore typified those more inclined to accept Cole at face value. Reasoning: there is no point in fighting the administration before it discloses its housing recommendations to Congress; if the administration is going to urge more public housing than Congress is likely to vote for, public housers would only defeat their own aims by fighting the administration.

**Title I changes?** Cole told newsmen he favored an "expanded, aggressive" Title I urban redevelopment program, with its greatest emphasis remaining for the present on housing, rather than nonresidential improvements. But at a NAHO luncheon, James W. Follin, HHFA's new slum clearance and urban redevelopment director, said he hoped "that without any lessening of our concern about housing" the program eventually can be freed of its pervasive link to housing.

Norbler Builder Ralph E. Bush gave an urban redevelopment session one pointed reason why homebuilders should support the Title I program: half the residents in the Area B Washington, D.C. site for which he was awarded a redevelopment contract have incomes above public housing limits, and will thus become new home or apartment prospects as soon as they have to move.

The convention approved changing NAHO's name to the National Association of Housing and Redevelopment Officials. It will become NAHRO as soon as the formality of a mail ballot vote is completed.

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Citizen advisors criticize slab design for Penn Center

New York's Uris Bros. were elevated to angelic status in Philadelphia last May, when they leased a block in the Penn Center redevelopment project, announced they would erect two buildings, the first a 20-story office structure (AF, Sept. '53, News). This month their halo was knocked askew when a preliminary sketch showing the structure (above right) was displayed. Members of the Penn Center citizens advisory committee called it "dull and unimaginative."

"Clear but mistakenable. Public housers were uncertain how to accept Cole's and Slusser's advances, or what Chicago's Sun-Times last month called Cole's "conversion" to public housing."

President Ira S. Robbins of the National Housing Conference, public housing's chief lobby group, gave NAHO his estimate the next day. Cole, said Robbins, had spoken in "clear, but mistakable terms." Robbins insisted there must be some hidden "gimmick" behind Cole's surface affection. Cole demanded greater "local" approval and support for public housing, Robbins noted, and perhaps the "gimmick" would emerge as mandatory local referenda or dollar-for-dollar federal subsidy matching by each locality for any further projects—both likely to block or cripple prospective programs. Said Robbins: "Now that [Cole's] 'shirt-sleeve conferences' [to seek ideas on federal housing policies] are over, it's time to get into our 'shorts and gloves' and really start fighting."

Incoming NAHO President Oliver C. Winston of Baltimore typified those more inclined to accept Cole at face value. Reasoning: there is no point in fighting the administration before it discloses its housing recommendations to Congress; if the administration is going to urge more public housing than Congress is likely to vote for, public housers would only defeat their own aims by fighting the administration.

**Title I changes?** Cole told newsmen he favored an "expanded, aggressive" Title I urban redevelopment program, with its greatest emphasis remaining for the present on housing, rather than nonresidential improvements. But at a NAHO luncheon, James W. Follin, HHFA's new slum clearance and urban redevelopment director, said he hoped "that without any lessening of our concern about housing" the program eventually can be freed of its pervasive link to housing.

Norbler Builder Ralph E. Bush gave an urban redevelopment session one pointed reason why homebuilders should support the Title I program: half the residents in the Area B Washington, D.C. site for which he was awarded a redevelopment contract have incomes above public housing limits, and will thus become new home or apartment prospects as soon as they have to move.

The convention approved changing NAHO's name to the National Association of Housing and Redevelopment Officials. It will become NAHRO as soon as the formality of a mail ballot vote is completed.

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Philadelphia Realtor Frank G. Binswanger said unidentified Philadelphia and New York interests were ready to pay the city $6 million for the park, erect a $25 to $30 million building and large underground garage on a lease-purchase arrangement so the property would revert to the city in 25 to 30 years.

Binswanger suggested the city could use the $6 million cash it would receive for Reynburn Plaza for repairing and rehabilitating the present City Hall.

Smog is blamed for a death and LA goes into a flap

Is smoke more than just another form of urban blight? Los Angeles doctors have long been convinced that their city's tear-jerking smogs actually shorten the lives of patients suffering from heart or lung ailments. But not until this month did one of them say so on a death certificate. Dr. John V. Barrow, a former president of the county medical association, recorded that Mrs. Gertrude Call, 69, died of a heart attack "due to heat and smog." A patient suffering, as she was, from damage to the heart muscle, needs lots of fresh air, said Dr. Barrow, but "in this case it would have made the condition worse to open the window."

Barrow was deliberately trying to raise a fuss in the hope it would speed Los Angeles' fumbling efforts to do something about smog. He got the rumpus he wanted. Mayor Norris Poulson asked the state to take over smog fighting from the county, which spends $500,000 a year on the program but, in the opinion of the League of California Cities' local division, has been "ineffective" in combating smog and has "no satisfactory program" to eliminate it soon. Chief cause of Los Angeles' smogs, say air-pollution detectives, is gasoline. Some 900 tons a day of unburned fuel are spewed in the air by Los Angeles' 2 million autos. Another 500 tons of vapor come from oil refineries, 120 tons more from bulk storage tanks and 120 tons from evaporation as gasoline is pumped into service station and automobile tanks.
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THE MAGAZINE OF BUILDING
Does the attack on urban blight get at its causes?

- Economist Miles Colean, in a new book, underscores the danger that only symptoms will be treated
- Roots of city decay lie in bad government, unfair taxing methods, traffic and slum profits, he says

In the nation's growing attack on urban blight, thinks Economist-Architect Miles L. Colean, there is a serious danger that action will be aimed at symptoms instead of causes. This month, in a book written for the Twentieth Century Fund (Renewing Our Cities, 181 pp., $2.50), Colean points out the all-important difference between the two with scholarly insight. He also offers a sweeping analysis of how to cope with the entire problem of saving the urban centers which represent more than a quarter of the Nation's $830 billion assets.

Warns Colean: "Decay and stagnation are evidences of deep-seated maladjustments in urban organization and development. They are not the maladjustments themselves. Efforts simply to repair or to tear down deteriorated structures and build new ones without seeking out and mastering the underlying troubles are likely to be both costly and fruitless."

The overriding need, thinks Colean, is for agreement on "what our cities should be." Today's confusion over objectives (new towns vs. urban sprawl, low buildings vs. skyscrapers, suburban centers vs. downtown shopping) tugs cities hither and thither instead of in any one direction. Moreover, mobile Americans, like the Indians they supplanted, find it easier to abandon a befouled camp than to clean it up. "A good physical cleanup," says Colean, is one of the best ways to "awaken a community's faith in itself" for rebuilding. Redevelopment in Pittsburgh and St. Louis, for instance, "appears to date from the beginning of effective smoke control."

Two problems, not one. But though slum cleaning (i.e., rehabilitation) can trigger renewal of cities, slum cleaning and renewal are two problems, not one, as Colean sees it. Says he: "We are not likely to make real progress with either . . . if the present confusion exists." A city area is ripe for renewal, Colean holds, if there is no demand for it as is and conversion would be uneconomic, or if it has grown so obsolete or deteriorated that it is uneconomic to repair it to today's standards. A slum, on the other hand, involves structures "so overcrowded and so carelessly kept that [they] menace health and safety." Moreover, warns Colean, while renewing cities hinges chiefly on economic questions, slums are "basically a problem of attitudes and behavior of people and of indifference of the community to neglect and victimization of the underprivileged."

Slum cleaning (such as the Baltimore Plan) is a vital part of any serious effort to end slums, Colean points out. Reason: it helps destroy one cause of slums—their vast profitability. For the poverty-stricken slum owner-occupant, Colean advocates philanthropic aid to finance needed repairs (like Baltimore's Fight Blight fund). For the nonresidential owner, he has no sympathy: "The plea, frequently heard, that tenants are unable to pay sufficient to warrant safe and sanitary maintenance, is without merit. In the first place, it is unreasonable to expect to recoup in a short period the cost of long years of neglect. Second, if tenants are not forthcoming to pay rents reasonably required to maintain the property decently, then either the property is not worth an economic return (and should be taken off the market), or prospective tenants are too poor to pay an economic rent—a situation that calls for family relief and should be treated as such and not made the excuse for further neglect."

Demolishing roadblocks. Coping with the far broader, more complex problem of renewing cities is largely a matter of removing the roadblocks inhibiting rebuilding, says Colean. These cover the gamut of bad municipal housekeeping, preoccupation of state legislatures with farm problems, and federal legislation (Title I) which props up land values that depend on illegal or antisocial uses.

Colean calls traffic the No. 1 problem. He recommends it as a place to start renewing cities because solving traffic problems leads to total city planning and even beyond to recognition of "the need for some method of integrating the physical structure and political functions of the metropolitan area." He warns: "Citizens of parasite suburbs should be convinced that their efforts to establish self-protected residential refuges cannot succeed indefinitely; sooner or later the cost of providing alone the services they want will exceed the resources of even the richest of them. . . . The problems of crime and poverty in one place must be seen as a problem to all, as are the problems of smoke, slums, traffic and highways, water supply and sewerage, health and education, race and segregation."

One of the unfortunate aspects of the nation's still-fumbling efforts to renew its cities, thinks Colean, is that Title I redevelopment focuses on specific clearance projects instead of addressing itself to the "over-all aspects" of the problem. One result is that land prices are too high, because most redevelopment projects lie on land where 1) land -lords have packed in tenants and 2) cities have not acted to make such crowding "expensive by rigorous law enforcement." Warns Colean: "The granting of subsidies does nothing to bring these unsocial values down. On the contrary, the very offering of subsidies tends to encourage hold-outs against the redeveloper."

For 15 projects where calculations could be made a year ago, reports Colean, the average federal subsidy was running close to $80,000 an acre, on the basis of resale to redevelopers at 50 to 85% of the purchase price. Says he: "When land is worth so much less than the price that has been paid for it, there is, economically speaking, something wrong with the transaction. . . . The answer would be to end the indulgence and immunities granted to owners of neglected and deteriorated property and to blast the hope that holding out can be advantageous." In no other undertaking, notes Colean, "is it necessary to subsidize the offender in order to eliminate the offense."

Aid to investment. If private capital is ever to finance renewing US cities (and Colean plainly does not think any government can afford to do it), equity investment in downtown rental housing will have to be made far more attractive than it is today. Colean notes that an insurance company can invest in utility bonds in 45 min., but that putting an equal sum into real estate takes about two years, largely because of government red tape. Moreover, the political threats of rent control and discriminatory taxation discourage investment. Colean suggests: 1) changes in federal tax laws to give equity investors a better break, 2) changes in local tax structures to ease the load borne by real estate, 3) regional land-planning which prevents undue concentration inside a single metropolitan area, 4) for the same uses, 4) building code overhauls, 5) making cleared areas available on a lease basis (with option to buy later), and 6) faster methods to assemble land in blighted areas for redevelopers.

Colean's study touches only briefly on the trickiest part of urban renewal: redevelopment often disperses racial ghettos, hence is covertly opposed because of racial prejudice. Colean lists ending racial ghettos among his fundamentals of a "consistent, long-range, continuous drive for urban renewal."

For renewing cities, says Colean, there are "no ready-made formulas that will assure a spontaneous process." Subsidy will not solve the problem alone, although some may be needed. His formula: "unmitting action along many fronts—religious housekeeping, physical and financial planning, political reorganization, public improvements."

Industry's adviser. Unmitting action along many fronts is a familiar formula for Miles Lanier Colean. In a sense, it has been the story of his career. His contributions to
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An excellent example of such design and construction is the apartment building shown above. It is the 10401 Wilshire Boulevard Building in Los Angeles, designed by Architect Martin Stern, Jr. R. R. Bradshaw was the structural engineer. Both are from Los Angeles. Inasmuch as Los Angeles building ordinances require provision for resistance to seismic forces reinforced concrete construction was a logical choice. In addition the use of concrete architecturally resulted in an attractive appearance and such important advantages as durability, fire safety, low maintenance expense and low annual cost.

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Congressional economy thwarts clearing temporary offices from Washington’s Mall

For years, the expanding federal government has been a star boarder in office buildings in Washington and elsewhere across the nation. This fall, office landlords will find things different. The reason: a little-noticed gimmick in the Independent Offices Appropriations Act ordering the government to trim its leased space more than one-third (from 21,973,000 sq. ft. to 13,435,000 sq. ft.) by next June 30. By the end of December, the lawmakers demanded a cutback of leased office space to 17,787,000 sq. ft. To make sure the General Services Administration carries out the mandate, Congress cut rental funds from $59.8 million last fiscal year to $50 million this year.

Reprieve for temps. Large-scale reductions in the federal bureaucracy will ease the resulting squeeze on space, but will by no means solve it. One result, GSA chiefs disclosed this month, will be that chances for tearing down Washington’s ugly crop of temporary federal offices have gone by the boards again. In fact, the much decried temps will have to fill the gap.

If the prospect was one to make architects and civic-minded groups unhappy (see below), it made them no unhappier than it did W. E. Reynolds, commissioner of GSA’s public buildings service. Reynolds repeatedly has reminded Congress that temporary buildings cost an average of $74 per sq. ft. a year to maintain, compared to 67¢ for the average permanent building and 53¢ for an efficient block-type structure like the mammoth new General Accounting Office (AF, July ’51, News). As soon as he can, Reynolds vowed this month, he would start at the Lincoln Memorial reflecting pool (which is surrounded on three sides by eyesore temps), and “roll up the temporaries like a blanket.” Said GSA Chief Edward F. Mansure: “We are as anxious as anyone to get rid of the temporaries, but we are faced with the practical proposition of utilizing every bit of available government space since Congress has reduced our appropriations.” Reynolds figured it would cost about $200 million to build ten structures to rehouse the 46,000 federal work­ers now in the capital’s 54 temporaries.

Lease-purchase solution? One long-range solution that would avoid big outlays for new construction and also keep the government from becoming a perpetual tenant is the lease-purchase bill approved by the House last session. Chairman Edward Martin (R, Pa.) of the Senate public works committee favors the measure, intends to prod it toward enactment in the upper chamber. The bill would let the government buy office buildings out of rentals on a 10- to 25-year installment plan.
Plaster fights for its lost market

- Two AFL unions join plaster contractor group in pledge to end labor gouging, excess profits
- With unions footing part of the bill, they start bureau to promote plaster-work, watch its quality

In the building boom of the 20s, 90% of America's new homes were built with plaster walls. Today only about 50% are erected with fully plastered interiors. Nonresidential construction also has cut its use of plaster.

For plastering contractors and unions, the handwriting on the dry wall was clear: "You are being driven out of business by cheaper, speedier innovations." Complete dry-wall cities like the two Levittowns were rising around the country. At Park Forest, Ill., American Community Builders, Inc., and apartments switched to substitutes.

This month in Chicago, a National Bureau for Lathing and Plastering was created to start a drive to recapture, if possible, the plastering market in new construction. The bureau represented a unique example of labor-management cooperation. The Contracting Plasterers International Assn. and two AFL unions—the Wood, Wire & Metal Lathers International and the Operating Plasterers & Cement Masons Assn.—will split costs of the new bureau. And they agreed on a program designed to eliminate practices and feather-bedding that were pricing them both out of jobs.

Promotion and reform. The drive will involve newspaper, magazine, radio-TV and trade publication advertising for more use of plaster, starting in January. Outlays may run as high as $500,000 a year. Ads will be financed by a $1/4 an hour deduction from workers' wages ($1/2c for bureau headquarters in Washington, 21/2c for bureau offices promoting plaster locally).

The program also involved a revolutionary pledge by both contractor and union groups to squeeze extra costs out of plastering. They adopted a Standards of Performance (i.e., code of ethics) with these main points:

- All materials and workmanship shall comply with nationally recognized quality and performance standards. (Conforming contractors may display bureau certificates. Nonconforming contractors will not have this privilege, and union locals may refuse to work for them.)
- Contractors will charge only a reasonable profit. Craftsmen will work a full day for a full day's pay, without bonus payments and unreasonable travel time and expense. Contractors and mechanics agree to employment on a straight hourly basis. Limitation of the daily production will be eliminated.
- Contractors and labor will agree on reasonable time schedules for completion of work. Contractors will man jobs only with qualified foremen. Unions will supply sufficient competent mechanics and apprentices. Apprentice training programs will be increased.
- To regain the favor of architects and builders, schedules and completed work of other trades must be respected, and material and equipment handled to assure normal project progress. Completed areas will be cleared of scaffold and other equipment and made ready expeditiously for the next craft.
- Lathing and plastering must be kept attuned to new designs, methods, techniques and materials developed in construction. Members must cooperate by using them without restraint when their value has been established and approved by the bureau.

Operation cooperation. Brainfather and president of the bureau was Edmond Venzie, head of the contractors' group, which employs about 90% of the nation's union lathers and plasterers. Venzie, 47, who employs as many as 1,500 plasterers at a time, is one of the US's largest plastering contractors, with offices in Philadelphia and Dayton, Ohio. To get trade and labor support for his idea, he spent three years of missionary work, finally persuaded the employer association and the AFL convention orders council to draft plan for curbing reckless jurisdictional disputes

Last month's St. Louis conventions of the AFL and its building and construction trades department produced the strongest evidence yet that labor leaders are genuinely worried that whopping pay demands and jurisdictional disputes are costing them the broad public support that helped unions grow strong in the 30s and 40s.

For a labor chief, President James Brownlow of the metal trades department was remarkably critical of labor at the building trades meeting. Once a picket line used to be the sign of an honest labor dispute or inability to get together with an employer, said Brownlow. But today, he charged, there are too many instances where a business agent "proves inept or unable" in negotiating with an employer and recklessly "resorts to the picket line" without telling his membership "everything that went on" and without any consideration for "the people who are concerned, not only the members of his own organization, but members of other organizations who may be denied their right to work."

"Some of these picket lines," said Brownlow, "are established for reasons so ridiculous that they would make anybody who gives them some thought wonder whether they were there for subversive reasons; then again, whether there was some particular interest of either the employer or the business agent. If we are going to hold the picket line as something worth defending in a legislative way before the courts of our land, and publicly, then we should not abuse this privilege . . . . [but] retain it only to protect the interests of the people who work." The full AFL convention, warned by its building department that today's "crazy-quilt jurisdictional pattern" threatens "open warfare" between unions, moved to snuff out interunion strife. It ratified a two-year no-raiding agreement with the CIO to go into effect Jan. 1. It instructed its executive council to develop within six months a plan to halt AFL jurisdictional rows.
**BUILDING STATISTICS**: plywood prices skid, rebound; building costs flatten

West Coast mill prices for plywood fell to a postwar low of $68.59 per M sq. ft. this month, putting many producers in the red. The new price was $21.41 (23.8%) below the $90 that leading mills charged from February through late August, when BLS recorded prices for 1/2" AD index grade as averaging $85.56 (see chart). Behind the price slashing lay shrinking late summer orders, while production climbed to an average of 63 million sq. ft. a week for the year so far, compared with 53 million in the same period last year.

By month's end, however, prices rebounded to around $72.20 net after jobbers' discounts ($76 list). Reasons: 1) as prices tumbled they attracted larger orders, which rose from 59 million sq. ft. the week ending Oct. 3 to 76 and 72 million ft. the next two weeks; 2) new production lagged, because many marginal mills could not operate at the low prices.

Equally important, although not so sharp as plywood's plunge, was the long and steady decline in Douglas fir 2" x 4" mill prices (see chart). From last year's (May) high of $75.80 per M bd. ft., the BLS average for fir 2" x 4"s fell steadily to $61.50 last month—an 18.8% slide. Prices for larger Douglas fir dimension have been firmer, as have prices for southern pine lumber.

Labor also took note of the economic facts of life in plywood and lumber. At its Vancouver convention this month, the CIO International Woodworkers of America, representing most Pacific Coast loggers and many sawmill and plywood workers, decided not to ask for more pay next year "unless lumber prices improve."

Metal prices also were slipping. Steel producers held to list quotations, but began to absorb freight charges to give customers "savings." Copper prices remained firm as strikes and slowdowns hampered ore productions, but began to absorb freight charges to give customers "savings." Equally important, although not so sharp as plywood's plunge, was the long and steady decline in Douglas fir 2" x 4" mill prices (see chart).

**NEW CONSTRUCTION ACTIVITY**

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**PUBLIC**

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**GRAND TOTAL**

* Minor components not shown, so total exceeds sum of parts. Data from Dept. of Commerce and Labor.

**CONSTRUCTION EXPENDITURES** began their seasonal decline in September. Total outlays of $3,310 million, however, were only 0.4% below August's all-time monthly record of $3,323 million and were almost 5% ahead of Sept. '52 expenditures. Commercial building outlays rose 6% from August to September. They were a whopping 81% greater than Sept. '52, for the first nine months of the year, 55% ahead of the same '52 period.

**MATERIALS PRICES** charted by the Bureau of Labor Statistics fell for the second successive month in September (to 120.4, from 121.3 in July and 120.8 in August). Plunging plywood and sliding lumber prices (see separate chart and story) more than offset slight increases for steel pipe, paints, structural clay products, concrete ingredients and asphalt shingles.

**PLYWOOD AND LUMBER PRICE TRENDS** since Jan. '52, are reflected by BLS estimates of average F.O.B. mill charges per M sq. ft. for interior AD 1/4" x 48" x 96" Douglas fir plywood, and per M bd. ft. for #1 green random-length Douglas fir 2 x 4s. The chart's October plywood price ($67.76) was projected by FORUM. It puts plywood $17.80 below the BLS average of $85.56 that prevailed from February to August. It is based on sales at $72.20 (after jobbers' discounts) late this month by leading producers—$17.80 below their $90 quotations throughout the summer, when the BLS average was charted at $85.56. Before stabilizing around $72.20, net prices after discounts dropped as low as $68.59.

**BUILDING COSTS** for commercial and factory structures and apartment, hotel and office buildings, as compiled by E. H. Boeckh & Associates, rose almost imperceptibly from July to August. The commercial-factory index figure rose from 255.2 in July to 255.3; the apartment-hotel-office figure rose from 255.1 to 255.5. Among the other construction cost indexes, Smith, Hinchman & Grylls' was down 0.7% for October. AGC's average construction costs rose a shade, from 416 to 417 (1913=100), from August to September. The contractors' construction wages index rose from 581 to 584, while its materials cost index remained at 306.
Armorply* Chalkboard—without trim—makes attractive, low cost installation

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PEOPLE: Zeckendorf buys Chrysler Building in $52 million deal; AGC picks MacLeod and Koss for top posts

It was harder and harder to pick up a newspaper without tripping over a report on another project involving ubiquitous William Zeckendorf, president of Webb & Knapp, Inc. Five of the larger operations by Zeckendorf last month and this:

- With $8 million cash, and $40 million in financing (see cut), Webb & Knapp acquired three hefty midtown New York office buildings: the Graybar, the Chrysler and the new Chrysler Building East. The deal involved $52 million, topping the previous biggest New York real estate deal (the Empire State sale in 1951) by $500,000.
- For an undisclosed sum, Webb & Knapp bought the James McCreery department store building at 5th Ave. and 34th St. in Manhattan from Associated Dry Goods Corp., which will close 116-year-old McCreery's in January.
- Still embryonic, but subject of much Manhattan talk, were plans for a service post office behind the city's main post office. Still needed to make the deal click: a long-term post office lease for one-third of the space.

A contract for Webb & Knapp to build approximately 100 retail buildings for lease to Safeway Stores Inc. Total cost: $30 to $35 million. After construction, Webb & Knapp would retain some, sell others to investors.
- Purchase of Charlie Chaplin's old Hollywood studio and lot for $650,000 cash. The studio will be rented to TV and film producers. The vacant land will be developed with a large shopping center and parking lot.

Big deal: For William Zeckendorf to buy the Chrysler Building East. The deal involved $52 million, topping the previous biggest New York real estate deal (the Empire State sale in 1951) by $500,000.

NAMED: Brig. Gen. Emerson C. Itschner, North Pacific Division Engineer since Apr. ‘52, as the Army's Assistant Chief of Engineers for Civil Works, succeeding Brig. Gen. Claude H. Chorpening; Col. Raleigh M. Edgar, 55, chief of the construction division, as the VA's assistant administrator for construction, succeeding Col. Frank H. Dryden, who supervised $700 million of hospital design, construction and conversions during the past seven years and who now will establish a private consultation service; California, Hawaii and South Carolina businessman Charles F. Honeywell, as head of the Business and Defense Services Administration, which is in charge of the residual NPA controls; John A. Kervick, New York field office director for PHA since 1949, as vice president of Paul Tishman Co., Inc., which has erected more than 6,000 private and public housing apartment units in New York.

Unopposed nominees for 1954 officers were announced by the Associated General Contractors: for president, John MacLeod, 59, of Paramount, Calif.; for vice president, Charles E. Maloney.

Frank Lloyd Wright exhibits 60 years' work

Eighty-four-year-old Frank Lloyd Wright celebrated the completion of his first New York buildings this month: a temporary pavilion housing an exhibit of his 60 years' architectural work and an adjoining Usonian House embodying his contributions to house design. The house and pavilion lay on the site of Wright's projected new Guggenheim Museum, which is still stalled by provisions of New York's building code. The pavilion (which went up under the code's gospel tent section) was delayed, though not stalled, by the city's code-enforcing Department of Buildings. It insisted on testing the pipe structure by loading it for two weeks with twice the load it was designed to carry. Meanwhile, work had to halt.

The pavilion was roofed with alternate bands of sandblasted wire-glass and gray asbestos cement panels. Delighted photographers found it provided a setting literally as light as day for the 16 models of FLLW buildings plus scores of 8' square photographs, floor plans and drawings representing his work from the Charnley House of 1891 to such recent projects as the Guggenheim Museum, Price Tower in Bartlesville, Okla., and Johnson Wax building in Racine. As he proudly showed his first guests through the prairie-type house, first guests through the prairie-type house, which first appeared in 1900, Wright paused in the dramatic living room (sunken fireplace, a glass wall facing a landscaped terrace, 12½' ceiling), waved his cane and said: "I think this has the old colonial on the run."
How to pick the correct walls for the buildings you design

If you are designing a building, you can pick the correct wall by matching the function of the structure against the Robertson Q-Wall products shown here. These modern walls save construction time and money and give many extra years of maintenance-free service. They can be demounted and reused to keep pace with plant expansion. Q-Walls weigh less than 1/16th of the equivalent masonry wall.

1. Galbestos. Ideal for standard industrial plants. Galbestos has the highest resistance to corrosion and weather of any protected steel siding or roofing you can specify. For mill buildings, warehouses, or any other industrial structures that do not require full insulation.

2. Insulated Galbestos. Perfect for a dry-occupancy industrial building that must be heated. Non-combustible insulation is installed on the job by the Robertson Top-Speed fastening method, and Galbestos applied over. Its heat transmission factor (U-Value) is 0.16 BTU per sq. ft. per hr. per degree of temperature difference, F.

3. G-Type Q-Panels. This is a field-assembled wall made up of an interior steel vapor barrier, a layer of incombustible insulation, and an exterior of tough, long-lasting Galbestos. The proper combination for an industrial situation which requires both temperature and humidity control. U-Value—0.16 BTU.

4. Q-Panels. A quickly erected, factory-assembled panel combining strong, dry, lightweight construction with architectural beauty. Well adapted to air-conditioned buildings of all sizes, and obtainable with various exterior surfaces, either metal coated steel, stainless or aluminum. U-Value—0.16 BTU.

5. H-Type Q-Panels. Differ from standard Q-Panels essentially in that they contain twice as much insulation. Ideal for cold storage warehouses, refrigeration plants and structures subjected to Arctic conditions. U-Value is 0.08 BTU. Write for complete details.

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Offices in All Principal Cities World Wide Building Service

George C. Koss, 48, of Des Moines. MacLeod, who will advance from the vice presidency, would succeed C. P. Street, of Charlotte, N.C. He heads the Macco Construction Co., in Los Angeles County, which he organized in 1929. During World War II his firm handled $350 million in military contracts for airfields, bases and docks (AF, Oct. '52, News). Koss, born in Des Moines and schooled at Phillips Exeter and Harvard, is president of the Koss Construction Co., of which his father George W. Koss, is board chairman. Its principal work: paving and airports. The nominee was AGC Iowa chapter president in 1940, and has been a national AGC director since 1947. He directed the Des Moines United Campaign drive last year and for this and many other civic activities received last year's Des Moines Tribune "most public-spirited citizen" award. Dog-lover Koss is partial to English setters. (From 1945-52 he headed the Animal Rescue League.)

Gilbert E. Morris, superintendent of Los Angeles' department of building and safety and a leader in the city's rehabilitation drive, was elected president of the Pacific Coast Building Officials Conference at its annual convention in Pasadena this month.

CONGRATULATIONS: To New York City Public Works Commissioner Frederick H. Zurmuhlen for receiving the National Sculpture Society medal of honor this month for "vision and achievements in reintegrating sculpture and mural painting with civic architecture" (preserving the Appellate Division Court para-pet sculpture in Manhattan and arranging for entrance sculpture for the new Domestic Relations Court in Brooklyn); drug manufacturer George W. Merck, chosen to receive the industrialist-of-the-year award of the Society of Industrial Realtors at the annual NAREB convention in Los Angeles next month; Robert H. Hose, architect-engineer partner of Henry Dreyfuss, elected president of the Society of Industrial Designers; John W. Brown, dealer sales vice president of National Gypsum Co., elected president of the National Mineral Wool Assn.; Brooklyn's Adolph Goldberg, elected president of the NY State Assn. of Architects; John W. Hargrave, of Mont-
NEWS

How molten metal helps give Galbestos its superiority

Robertson Galbestos has the greatest resistance to weather and corrosion of any protected steel roofing or siding obtainable anywhere. This position of broad superiority is made possible by a unique manufacturing process exclusive with H. H. Robertson Company.

First, the steel sheet is pickled... then given a coating of molten zinc. Asbestos felt is then pressed on so that as the molten metal hardens in cooling it grips the felt fibers in absolute bond. The asbestos is then impregnated with a special asphaltic compound and, finally, given a tough weatherproof coating. Galbestos can be furnished flat or in the 3 well-known corrugations: Standard, Mansard, and V-Beam. The resultant material is so durable, it may be sheared, bent, rolled, crimped and riveted in the field as easily as ordinary unprotected steel. It will withstand the greatest possible extremes in weather temperatures without deterioration, and will actually retard fire better than naked steel. For an industrial roofing or siding that requires no maintenance under the most severe corrosive conditions, specify Galbestos.

Long Service Life. Galbestos will give longer maintenance-free service under the most severe weather and man-made corrosive conditions. Even salt air cannot penetrate its tough coatings to destroy the steel core.

Not Fragile. Galbestos' strong steel core sheet guarantees against breakage—during shipment or during erection.

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Goes Up Fast. The exclusive Robertson Top-Speed method of attaching Galbestos to structural steel speeds up erection for quicker occupancy.

Resists Flame. Leading testing laboratories have made exhaustive tests on the fire resistance of Galbestos and have published the results. Copies of these reports are available for study.

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(NEWS continued on p. 54)

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(NEWS continued on p. 54)
The Little Red School House was Never Like This!

"PROGRESSIVE EDUCATION" IN
PURIFYING AND RE-USING AIR
SAVES $5,000 YEARLY ON HEATING

PUR AIR odor-removal, air freshening units in the new East Hartford High School at East Hartford, Connecticut will pay double dividends. First, students will enjoy cleaner, fresher, more healthful air, and second, savings on the fuel bill will be a substantial $5,000 annually. By recirculating and purifying confined air thru Pur Air, Activated, Coconut-Shell Carbon Adsorbers (filters), less re-heating of outside air is needed. Projected over a 20-year period, the estimated $100,000 savings would pay for the Pur Air installation many times over. For complete details on the story of Pur Air, Activated, Coconut-Shell Carbon for odor-removal, call your local Pur Air representative, or write:

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MERCK AND COMPANY, INC.
Rahway, N. J.
The Ballinger Company—Architects
Fred J. Brotherton, Inc.—Builders
In Cafeteria Building No. 86, Architectural Terra Cotta, 16" x 16", was specified as a colorful, sanitary facing for lobby, cafeteria, service dining room, service pantry, kitchen, dishwashing room, vegetable preparation room, and service counters A & B.

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See . . . compare . . . and consult FEDERAL SEABOARD!
Every way you look at Architectural Terra Cotta, or Ceramic Veneer, these versatile building materials offer outstanding advantages. You can specify any color under the sun ... select just the right texture ... and design in large units or small, for interiors or exteriors. You will keep initial costs in line and maintenance at a minimum. The original richness and beauty of the fire-hardened, glazed surface can be retained indefinitely by simple soap-and-water washings. Whether you're designing housing or hospitals, industrial plants, schools or business buildings, consult Federal Seaboard today.

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Sanymetal ACADEMY Type Shower Stalls and Dressing Room Compartments provide the utmost in sanitation for gymnasiums, stadium dressing rooms, Y.M.C.A.'s, clubs, trailer camps, tourist motels, etc.
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The toilet room environment that stays new is the toilet room in which the most suitable type of toilet compartment available has been installed. Toilet compartments usually dominate a toilet room, influence the toilet room environment and emphasize the utility of fixtures and appointments. The bare functional type of toilet room is inadequate according to today's standards.

Sanymetal offers several different types of toilet compartments for creating the most suitable toilet room environment for each type of building. Sanymetal also offers and recommends Two Full Purpose Metal Base Materials which combine colorful attractiveness with long years of service life and effect important, day after day, savings in cleaning and maintenance cost. These Two Full Purpose Metal Base Materials—Sanymetal "Tenac" (galvanized, Bonderized steel), a highly corrosion-resistant material; and Sanymetal "Porcena" (vitreous porcelain on steel), the ageless and fadeless, rust proof material—represent years of engineering research and skillful adaptation by Sanymetal engineers of corrosion-resistant steels to the fabrication of new and different types of toilet compartments. Ask the Sanymetal representative in your vicinity for helpful suggestions for planning suitable toilet room environments.

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Sanymetal Toilet Compartments embody the results of specialized skill and experience in fabricating over 500,000 toilet compartments for all types of buildings. Ask the Sanymetal Representative in your vicinity for information about planning suitable rest room environments that will always stay new. Refer to Sanymetal Catalogs in Sweet's Architectural File for 1953 and Catalog 46 in Sweet's Industrial File for 1953.
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Architect groups meet at Biloxi, Lake Placid

One hundred and ninety architects of the Gulf States Region pulled into Biloxi, Miss., for a conference held in honor of second AIA Vice President Howard Eichenbaum, "the man who conceived the idea of regionalism within the AIA and made it work." The group enjoyed itself in sea and surf, visited Louis Sullivan's Ocean Grove cottage, pulled in a formidable panel of experts to try to comb out the complex threads of regionalism in architecture. In the end threads were still tangled, but interesting remarks had been made. By Hodding Carter, editor-publisher of the Delta Democrat Times, Pulitzer Prize winner, and well-known author on the South: "The time of Southern isolationism is past, but regionalism remains strong. It rests on a homogeneous population and tradition, not just on climate, and the Southern citizen of the US is more often of solid yeoman ancestry than cavalier."

Said Richard J. Neutra, visiting California architect: "Does not regionalism depend rather on a fixed society and is not the new industrialism bringing flux?"

Neutra's theory: people living in southern climes develop more savoir faire, a greater love of all the arts. They have the mission of transmitting culture to more northern neighbors as did Greece to Macedonia, as did Rome to Northern Europe. Said Architect Paul Rudolph of Sarasota, Fla.: "The Harvard house, the same in Australia as it is in Boston, is no real answer for the South. Our materials and equipment may be national but our forms are best local."

The jury found itself giving awards in pairs to three firms: To Sherlock, Smith & Adams for their "cow coliseum" and a tractor plant at Montgomery, Ala.; to Architects Curtis & Davis for their proposed Tommy Lafon School and for their development houses for Builder Fred Laucks in New Orleans; to A. L. Aydelott & Associates for their office at Memphis and for their L. T. Hord house.

Over 400 architects of the Empire State registered at the New York Association of Architects meeting at Lake Placid, creating a regional meeting all by themselves. So bright was the weather, it was a good session when more than 50 heads could be counted. Architect Dan Schwartzman was, meanwhile, reported to have painted golf balls red for use in snow. Intensely businesslike, the New York architects concentrated on such subjects as the progress of the statewide building code, the question of requiring a loyalty oath for architects seeking registration (it was referred back continued on p. 60
OTIS SETS A GOAL
for a second century of progress

100th Anniversary statement to the employees and stockholders of the Otis Elevator Company by the President, LeRoy A. Petersen.

The year 1953 is for Otis both an end and a beginning. It is the end of a century during which the name, Otis, became synonymous with the word, elevator; it is the beginning of a second century of continued Otis leadership and development in the field of vertical transportation.

During the past hundred years, the men and women of Otis have, by hard work, trial and error, and occasional flashes of genius, built a company and a product of which we today have just reason to be proud and, in the doing, they have contributed greatly to the building of their country.

(continued on next page)
the Otis heritage

During this first century, there evolved an Otis organization whose character reflects the composite character, judgment and ideals of those leaders of the past who, generation after generation, selected and trained and inspired this organization. It is an organization whose roots go deep into the past, and which has a tradition of loyalty to the Company not easily understood by those who are not a part of it.

Similarly, the organization of the future will, to a considerable degree, reflect the judgment, character and ideals of those who now have a voice in the selection and training of those who will follow us. Clearly, it is our obligation to pass on to our successors an organization no less qualified for their task than the organization which we inherited and with which we have had the privilege of working.

During the past century, Otis established and maintained a reputation for designing, manufacturing and installing the best elevators available. At the same time, we built a reputation for trustworthy performance and fair dealing, which resulted in our becoming not only the world’s largest producer of elevators but also a producer whose product commands a premium price.

That this position is not the result of chance, but rather is the result of a deliberate policy and of a conscious goal, is evident from the objectives outlined by Charles Otis in 1877:

“It should be our aim”, he said, “to make our work satisfactory to our customers, not alone until we get our pay for each particular job, but until we get paid for every job we ever intend or expect to do for anyone, to the end of time; to get every customer we can and to keep every one we get — both for his work and for his influence.

“We must keep in mind”, he said, “that the great objects of doing business are (1) to give occupation, (2) to achieve success, and (3) to make money, and that we shall not accomplish very much of the first two of these objects if we fail in the last.”

SOME OTIS FIFTS OF THE FIRST HUNDRED YEARS

1853—Elisha Graves Otis invented the first safe elevator. It was equipped with a safety device to prevent the elevator from falling if the ropes should break, which was a frequent occurrence in those days. Until a safe elevator became available, buildings and cities had grown vertically only as high as people were willing to climb stairs.

1878—The first high speed hydraulic elevator, introduced by Otis Brothers and Company made the first “sky scrapers” economically possible. These elevators were capable of higher speeds than the then existing methods of control made it practicable to use, and car speed was, therefore, limited to 700 feet per minute.

1889—The first Otis electric drum elevator was installed in New York City. The application of electricity to elevators made possible many new types of control, and the use of electric door interlocks added greatly to elevator safety.

1892—The first elevator to be controlled by variable voltage supplied by a separate motor generator was installed by Otis Brothers and Company in New York City under license from Ward Leonard. This type of control, which is now used on all high speed Otis elevators, provides smooth and rapid acceleration and retardation and contributes immeasurably to the quality of operation.

1900—The first Escalator was exhibited by Otis Elevator Company at the Paris Exposition and was awarded a grand prize. Until 1950 the word “Escalator” remained an Otis trademarked name, but is now in common use as a part of the English language.

1903—The first electric gearless traction machine was developed and installed by Otis. Gearless traction machines can be used for any desirable speed and rise and are extremely durable. To our knowledge, no Otis gearless machine has ever worn out.

1915—The first self leveling, or Micro-Drive, elevators were developed by Otis engineers and enable passenger and freight elevators to be brought to an accurate stop at floor landings and to maintain this level automatically. This development saves time, eliminates the stumbling hazard and permits trucks to run smoothly on and off an elevator platform.
our goal for the future

At the beginning of our second century of operation under the name of Otis, it is appropriate to consider what we now regard as our purpose and objective and what we now believe to be the justification for our continued existence.

Without attempting to be epigrammatical, it seems to me that our objective should be:

To build the best products in our field; to continually improve these products in design and in method of production and installation so that they can continue to be sold at a profit sufficient to

(a) permit payment to investors of a return on their investment which will furnish an adequate incentive to save and invest in this or other useful competitive enterprises,

(b) permit stable employment of a carefully selected and trained organization,

(c) make possible such wages, salaries and working conditions as will result in the maximum incentive and capacity for production for the ultimate good of the greatest number.

This objective is based on the belief that the greatest good for the greatest number can result only from maximum production of useful goods equitably distributed. It is also based on the belief that maximum production is obtainable only through competitive enterprise, with such incentives as are necessary to prompt capital to provide the required tools and to stimulate all types of labor to the greatest possible productive effort consistent with their spiritual and physical well being.

It will be noted that, in common with Mr. Charles Otis, it is recognized that, first and foremost, the purpose of a business must be to satisfy its customers to the end that they will continue to buy the product at a profitable price. Failing in this, all other objectives must be abandoned— including the fundamental objective of continued operation.

Obviously—a successful business must provide for its own future existence, if it is to accomplish anything else. However, mere existence is the minimum requirement. The real justification for a company's survival must be measured by the contribution which it makes to the general welfare.

In common also with Mr. Otis, we recognize the importance of providing employment—but only when employment results in, or contributes to, useful production or gratification of human needs. Employment which merely wastes time is a criminal waste of human lives and human energy and is grossly inconsistent with the objectives of a legitimate business.

our personal obligation

The ideal for which we should strive is a company which provides every person in its organization with frequent opportunity to test his maximum capacity and which provides a constant incentive to increase that capacity and to devote it to useful ends.

There is so much in this world that requires doing and the doing of it requires so much human energy and intelli-
gence that we cannot tolerate that which wastes this energy and intelligence and which stultifies the ambition which is necessary to make it do useful work. We must measure our own individual success not primarily by the position we attain but by the extent to which we are utilizing to the utmost the talents and capacity with which we are individually endowed and also by the extent to which we make it possible for others to do the same thing.

the role of competitive enterprise

The United States has reached a position of world leadership primarily, I believe, because, throughout the greater part of its history, emphasis has been laid upon the importance of the individual and upon the importance of maintaining individual opportunity and powerful incentives for individual effort and accomplishment. The resulting competitive enterprise has produced a standard of living and a capacity for production the like of which the world has never seen.

Nevertheless, there has arisen a contrary philosophy, backed by the ruthless power of a foreign dictator state, and the American system of living and producing is on trial before the world.

the challenge to American business

Now, at long last, the American people have once more called upon American business men to restore the faith of the country in the basic principles upon which our nation was established and to stage such a demonstration of the advantages of democratic competitive enterprise that the fallacy and folly of socialism and communism will be self evident to all the people of the world who are free to learn—and, ultimately, even to those behind the iron curtain.

It is a crisis greater than any previously faced by the American people and a challenge to the business men of the country which they must accept or fail miserably in the defense of the principles in which they have professed a profound belief.

our share of the job

As a part of the business world, we share in the obligation to demonstrate the superiority of our system of democratic competitive enterprise in providing for the general welfare.

Our share in this demonstration is to so work and so manage the affairs of our Company as to help raise the level of accomplishment of the business community. Then confidently, aggressively, persistently and intelligently we must acquaint, first of all the people of our own country and then the other people of the world, with what business is, has done and can do and the vital part which business has played and must continue to play in building up and maintaining the standard of living, way of life and defense of our country.

The Otis Elevator Company is to thousands of employees, stockholders and customers a representative of business and an example of the operation of the competitive enterprise system. It should be our purpose to make that example a good one.

L. W. Austin
President
again... **Careystone** Corrugated
cuts construction
time
and costs...

New Superior Foundry Co. Building
with Sidewalls of **Careystone**... **BUILT IN ONLY 6 WEEKS!**

"Raze our old frame building and erect a new building with 60,000 square feet of floor space on the site. Do it fast to hold our production 'time out' at a bone-bare minimum! And do it within our budget!" That's the job engineers Christian, Schwarzenberg and Gaede and general contractor Sam W. Emerson were asked to tackle by Superior Foundry Company, Cleveland, Ohio. And — they did it! In record time! In a mere six weeks a new steel, brick and Careystone building was humming with production. A perfect example of the miracles American ingenuity can accomplish. And an eye-opening demonstration of Careystone's many virtues.

Careystone — made of asbestos and Portland cement — posed no "availability" problems. Corrugated for great structural strength, it is quick, easy and inexpensive to apply... comes in big sheets that cover fast, can be applied over wood or steel framing. It won't burn, rust, rot, corrode, nor can termites or rodents damage it. Exposure to weather actually strengthens it! Thus Careystone loaned these many virtues to the need for speed... will provide fire-safety and protection for the life of the building, without one cent for maintenance!

If there's a new plant in your plans — or additions to facilities you own — give serious consideration to the advantages only Careystone can deliver. Ask your Carey Industrial Sales Engineer for our new fact-filled manual. Or, if you wish, fill in and mail the coupon for your free copy today!

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**Carey**
The Philip Carey Manufacturing Company, Lockland, Cincinnati 15, Ohio

In Canada: The Philip Carey Co., Ltd., Montreal 3, P. Q.

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**VALUABLE CAREYSTONE MANUAL**
... YOURS FREE ON REQUEST!

84 fact-crammed pages listing uses for Careystone Corrugated, erection details, estimating procedures. Hundreds of "how to" diagrams. Send for your FREE copy right away.

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FROM THE HOUSE OF CAREY • SERVING INDUSTRY SINCE 1873
Built-up Roofing • Super-Light 85% Monolithic Magnesia Insulation • Careyduct Asphalt Paints and Coatings • Industrial Flooring • Elastite • Careystone Asbestos-Cement Flat and Corrugated Sheets

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Department AF-10
Lockland, Cincinnati 15, Ohio

Please send me a FREE copy of the Careystone Manual. It is understood that this will not obligate me in any way.

NAME

FIRM NAME

ADDRESS

CITY ZONE STATE
When you're figuring pipe specifications for schools—Remember...

"It's Better to Do It Right Than to Do It Over!"

This poor boy doesn't know how to add... he's like a lot of people who make the mistake of using the wrong piping materials. They forget that the real cost of the installation is first cost plus repairs... and that the only real yardstick of economy is the cost per year of service.

The smart people, those who really know their arithmetic use BYERS Wrought Iron pipe for corrosive applications. In the home... commercial and institutional buildings... in plants and factories. Remember—it's never good economy to do a job over. By using Byers Wrought Iron pipe to begin with, your piping problems are solved from the start.


BYERS WROUGHT IRON

to the chapters), and public relations.

Said George Bain Cummings on public relations: "An architect can promise to meet the cost equation if, and only if, he is given control of one of three terms that enter the equation: quantity, quality and cost. For example, given a quantity of building to be achieved at a price, he can raise or lower quality to match; given a quality and quantity of building, he must be free on cost; given a quality and cost, he can determine how much can be built."

**AIA approval for ads asked again in Michigan**

At AIA's Seattle convention in June, the resolutions committee headed by Paul Gerhard of Chicago was criticized for pigeonholing several proposals, one of them a Michigan recommendation to ease the institute's prohibition against paid advertising.

Last month at its annual conference in Detroit, the persevering AIA Great Lakes regional council blueprinted another attempt to modernize this institute rule. It adopted a resolution to go to the AIA board of directors urging approval for limited advertising under the following substitute rule:

"One may enter into paid advertising in a publication issued on behalf of the owner of a project on which he was architect, provided that copy is devoted entirely to promotion of the interests of the profession as a whole, of such a nature as to inform the public of the beneficial services architects can render to society, and that no mention is made of the individual architect or firm, except for the signature."

For background the resolution stated that a similar proposal "was dealt with rather summarily at the Houston convention (1949) despite the fact that opinion, to say the least, was divided." It also declared "the institute should take a more realistic view of this phase of advertising, as it has done with respect to advertising in publications sponsored by it and its components."

In many instances, said the resolution, the present rule creates a condition that "tends to give the impression the institute is not realistic, progressive or businesslike." Example: an architect designed a newspaper plant addition, but when the owner asked the architect if he would take space in a special edition featuring the building, the architect had to reply that he was forbidden to do so. The resolution said the limitation to publications "by or for the owner" should still protect the architect "against solicitation from other publications of a purely commercial nature."

Last May the AIA Journal printed a short, "opinions are solely those of the author" article by Architect Herman Charles Light of Los Angeles: "Is Our Code of Ethics Contemporary?" Wrote Light: "Paid advertising is a real headache. Have you ever really studied this rule? Can the paid public relations counsels of many large offices qualify?" continued on p. 62
Rolling Steel Doors

Standard or Automatic Underwriters' Labeled Types!

Manually, Mechanically, or Power Operated

Below you see three Mahon Automatic Underwriters’ Labeled Rolling Steel Doors installed on fire-wall openings of an enclosed shipping dock. These doors normally remain open, but are equipped with mechanical chain-gear operators which permit closing or opening at will. If a fire should occur while they are in the open position, they automatically close and prevent the spread of fire through the openings. This is one use for one type of rolling steel door. Many types are produced by Mahon to meet virtually any door requirement. Mahon quick-opening, quick-closing power operated rolling steel doors offer more desirable features than any other type of door . . . the vertical roll-up action utilizes no usable space either inside or outside the door opening. There are no overhead tracks or other obstructions to interfere with crane operations. No other type of door offers these advantages of space economy and compactness in operation. In addition, rolling steel doors are permanent—their all-metal construction assures a lifetime of trouble-free service and maximum protection. When you select a rolling steel door, check specifications carefully . . . you will find many extra-value features in Mahon doors. See Sweet’s Files for complete information including Specifications, or write for Catalog G-54.

THE R. C. MAHON COMPANY
Detroit 34, Michigan • Chicago 4, Illinois • Representatives in all Principal Cities
Manufacturers of Rolling Steel Doors, Grilles, and Automatic Closing Underwriters’ Labeled Rolling Steel Fire Doors and Shutters; Insulated Metal Walls and Wall Panels; Steel Deck for Roofs, Partitions, and Permanent Concrete Floor Forms.

MANUFACTURERS OF ROLLING STEEL DOORS, SHUTTERS AND GRILLES TO MEET EVERY REQUIREMENT

ARCHITECTURAL FORUM • OCTOBER 1953
No needle to thread...

with BYRNE doors!

How often truckers complain—"It's like threading a needle to back to their loading dock"! Not with Byrne Doors, however!

Byrne doors are designed especially for your industrial building applications and to meet any size requirement. They are motor operated, upward acting, suspended by cables which transmit dead loads to compact counterweights. They offer lifetime economies to industrial management by providing:

SWIFT OPERATION using minimum operating power.

SNUG WEATHERING permitting reduced initial investment in heating plants and effecting substantial fuel savings.

MINIMUM MAINTENANCE costs which have run less than \( \frac{1}{4} \) of 1% to 1% per annum over periods of 15 to 20 years.

SPACE SAVING permitting full use of enclosed floor area and forming canopies, which add to the effective working space during mild weather.

COMPLETE SAFETY of multi-cable, balanced suspension; rigid construction to withstand hurricane wind velocities; automatically self-locking operator mechanisms and overload relays.

BYRNE TYPE B CANOPY DOORS...

are recommended for openings up to 120' wide. They are restrained by jamb guides and overhead tracks.

For other Byrne Door applications consult Sweets Catalog or write directly for free brochure.

Dept. 1-1
BYRNE doors, inc.
1421 East 8 Mile Road, Ferndale, Detroit 20, Michigan

AIA polls its chapters on social security coverage

For years the AIA has opposed extension of social security coverage to architects. But now it realizes its members are of two minds and is polling its chapters to learn the majority viewpoint. Armed with this information it will testify for or against a new Administration proposal to bring under the act more than 10 million self-employed persons, including architects and engineers.

Results of the poll have come in slowly and AIA cautions that the first 20 chapters to reply are too small a percentage of the membership to be conclusive. Among these, however, 12 are in favor of coverage for architects, eight opposed.

Architect opposition frequently stems from the provision that rules out the payment of monthly retirement benefits to a 65-75-year-old person as long as he continues to earn more than $75 a month; after his 75th birthday, however, he can earn any amount and still be eligible for benefits.

Says one spokesman for the opposition:

"Many of us reach our maximum earning power at 60 to 65 and many, if not the majority, can continue a useful practice for some years after 65, in which case we would receive no retirement benefits.

"Most important, an architect may be able to obtain social security coverage through employment before 65 with some other business, which even under present law, would permit him to draw social security benefits and still practice architecture after 65.

"Social security benefits are not large—a maximum of $1,500 a year for a married man whose wife is over 65—but they are tax exempt, which makes them equivalent to $1,800 to $3,000 of income from other sources."

Greatest advantage of social security for many persons, particularly for younger people, is its survivorship payments. These can become effective after paying taxes for only 18 months and can give a widow and dependent children under 18 up to $1,900 a year. If she has not remarried, a widow over 65 or upon reaching 65 can also draw about $750 a year, even though she may have received widow and dependent children payments many years earlier.

Full information about the program and formulas for determining retirement or survivorship payments are available at local social security field offices or the social security board in Washington.
These Young Unit Heaters are Heating "Specialists"!

FOR GENERAL PURPOSE REQUIREMENTS

Here's an all-purpose unit for most general heating requirements . . . Young "SH" Type horizontal Unit Heater, available in fourteen models, for use with steam and hot water systems. Heavy-duty casings are made of braced and welded furniture steel with rounded corners, durable baked-on gray enamel finish, and individually adjustable louvers. Features include quiet, rubber-mounted motor, spring-suspended mechanically bonded tube-and-fin heating element, plus 15 other design advantages.

Young Gas-Fired Units, with horizontal delivery, are especially suited for installations not requiring a boiler. Available in eight physical sizes these units feature aluminized steel construction. Molten aluminum is permanently bonded to steel base metal in both combustion chambers and heat exchanger, to withstand the corrosive effects of gases and high temperatures. Approved by the AGA for use with either natural, manufactured, mixed and LP gases.

FOR DELIVERING HEAT FROM HIGH CEILINGS

Where direct, downward distribution of heated air is desired . . . above cranesways and other high-ceiling installations . . . Young "Vertiflow" Unit Heaters should be specified. Seven models, for use with steam and hot water, may be equipped with several types of adjustable diffusers and Anemostats for various heating patterns. Exclusive ventilating stack surrounds motor with cooler room air, prevents failure due to overheating. Features quiet operation, mechanically bonded tube-and-fin heating element, etc.

FOR WARMING COLD SPOTS WHERE APPEARANCE IS IMPORTANT

Lobbies, vestibules and similar installations require unit heater performance, plus an attractive appearance. For these Young offers Cabinet Units with three sizes in each of three cabinet styles for use with steam and hot water systems. With accessories, these units may be wall-hung, inverted wall-hung, ceiling mounted, free-standing, with ducts, inlet grilles, etc. Features quiet operating blower assembly with entire unit designed for ease of installation.

For further information, including ratings, dimensions, construction features, etc., see your nearest Young Representative or write for free catalogs.

YOUNG RADIATOR COMPANY

Dept. 603-K • Racine, Wisconsin
Plants at Racine, Wisconsin and Mattoon, Illinois
Sales and Engineering Representatives in All Principal Cities
The architect for this fine, new Hutzler Brothers Store in Baltimore, Maryland, employed Peelle Motorstairs both functionally and decoratively. Off-the-street parking with entrance at the basement level was made possible by Peelle Motorstairs, and these handsome stairs were also used effectively as a design element.

In well-planned buildings everywhere, the Peelle Motorstair is furnishing smooth, safe, economical floor-to-floor transportation. It is based on an advanced engineering design which results in many years of smooth operation with a minimum of maintenance.

The new Type "C" Motorstair illustrated can be furnished in twelve color combinations. The exclusive Peelle all-metal safety handrail adds a striking two color accent to the beauty of the entire stairway. Write for details.

PEELLE MOTORSTAIR DIVISION
THE PEELLE COMPANY
47 STEWART AVENUE, BROOKLYN 37, NEW YORK — OFFICES IN PRINCIPAL CITIES
Time after time, research into why a new building has Lupton Metal Windows reveals that the architects have "used them before . . . liked Lupton Windows . . . liked Lupton service . . . and liked Lupton prices".

Such was the case with the new Peirce-Phelps buildings in Philadelphia, with their 329 Architectural Projected Windows in the offices and the 378 Pivoted and Fixed Windows in the warehouse.

In the air-conditioned office section, costs were reduced by using a modified Standard Projected Window. Standard Lupton Projected Windows have two ventilators—a larger one opening out in the upper section and a smaller open-in ventilator below. By keeping only the lower ventilator and using a solid sheet of glass in the rest of the window, savings were made in window construction costs.

Helping you save costs in planning your window layouts is a Lupton service . . . through using standard units in unique ways.

You know what a reputation means . . . Lupton's has been growing for over forty years. It's built on quality and service. See the full line of Lupton Metal Windows in Sweer's. There's a standard unit ready, or adaptable, to any building you design . . . and Lupton Window Design Engineers are at your service.

MICHAEL FLYNN MANUFACTURING COMPANY
700 East Godfrey Avenue, Philadelphia 24, Pa.
Member of the Steel Window Institute and Aluminum Window Manufacturers' Assoc.

LUPTON
METAL WINDOWS
Sellers makes five water heaters—each designed for a particular job. These two are the direct fired Sellers Immersion type—one the famous Immersion Automatic Water Heater, the other is Sellers well known Blast-Immersion Water Heater. Both are large volume heaters famous for freedom from scale—because it's cracked off as tubes contract and expand. They both employ the system of immersion firing—pioneered by Sellers. Gas is entirely burned inside the firing tubes which extend horizontally through the shell—completely surrounded by water.

The Sellers Blast type is recommended where required recovery capacity is greater and flue conditions are doubtful. However, when these conditions are not a problem, it's recommended that the Sellers Immersion Automatic Water Heater be installed—with reasonable care, the initial efficiency is maintained year after year. Sellers is famous for this kind of service.

We'd like to tell you more about these widely known Sellers heaters. Send for bulletins . . . 1200 and 1201.

Send For Your Free Copy of "THE FACTS ABOUT HOT WATER!"
Before you buy any water heater—send your letterhead for this informative story on water and how to heat it. It's free—no salesman will call.

Industrial realtors foresee sustained factory building

Theme that emerged from an Eastern States Regional Conference of the Society of Industrial Realtors in New York this month: construction of large modern industrial plants should continue in very great volume through the next decade despite any dip this year or next from the peaks of the huge tax-assisted expansion that started in 1950.

Some indications of the outlook:

- Former national SIR President Aime V. Carkhuff of Newark, N.J., cited a client who was operating in 13 separate buildings in one location with its own power and water supply. Continued operation in this old plant, however, would be a staggering 41% more expensive than in a new one-story modern plant now being erected for the company. (Future of the old plant? It obviously would be no use to any other single-occupancy producer. It could only be sold to a speculator who would sell or lease single buildings or single floors to concerns requiring very small quarters.)

- Frederick B. ("Puff") Martin of St. Louis, current national SIR president, estimated that two-thirds of the nation's industrial plants are obsolete and subject to replacement within ten years. The trend to large regional plants will continue to give the South, as well as the Southwest and West Coast, a progressively greater share of the nation's industrial capacity, he added.

- New York's "package deal" plant specialist, James H. Burns, looked at the intensified competition industry faces in the next few years. His conclusion: if labor, material and other costs are very rigid, "a more efficient plant may be the only place where major economies can be achieved." In other words, many producers will not be able to survive unless they buy or build new, efficient modern plants and achieve the kind of savings outlined by Realtor Carkhuff.

Samuel R. Walker, vice president of Robert W. Dowling's City Investing Co., predicted that the pattern of future industrial location will be inland locations equally accessible to a number of large metropolitan markets by fast overnight or 24-hour transportation.

He cited the creation of the tremendous, strategic military supply depot at Horseheads, near Elmira, N.Y., during World War II. This facilitated virtually overnight shipment to any port or city from Boston to Norfolk as convoy loading needs dictated. Recently he started to make an industrial survey in the West, said Walker, and he quickly came to the conclusion that the best place for many plants (except for local needs) would not be Los Angeles, San Francisco or Portland, but Salt Lake City, quickly accessible to all of them without being engulfed by any of them.

continued on p. 70
When you specify Stark Glazed Facing Tile for school interiors, you can rest assured that your original design concept will retain its freshness for years to come.

A color scheme built into the walls with Stark Glazed Facing Tile will stay bright as new—this glass-hard surface will never fade, crack or craze under rough school usage. And Stark’s colors are “engineered” to fit a wide variety of school needs—ranging from glare-reduction to high light-reflection for a brighter environment.

Stark Glazed Facing Tile pays for itself many times over in maintenance savings, too. It washes sparkling clean with plain soap and water, completely eliminates the inconvenience and expense of refinishing big wall areas. It’s a multiple-duty material—provides a fireproof wall and a decorative finish in one cost-cutting operation.

Our new brochure on Modular Masonry contains full specification data. To obtain one, just write us on your letterhead. Our reference in Sweet’s Catalog is 4f-St.
CUT COST IN

A NEW ANACONDA PRODUCT
MAKES A BETTER JOB — FASTER

Now — something new in radiant panel piping. It’s ANACONDA Panel Grids® (PG’s). These action pictures show how easily PG’s install. No more awkward “stringing up” of coiled tubing. The job is done easier and quicker with PG’s. These handy and adaptable panel grids are conveniently packaged ready for installation. The machine-made prefabricated grids eliminate on-the-job bending and the expense of special panel-forming aids.

PG’s are supplied in one standard size, consisting of 50 linear feet of ⅛ in. Type L copper tube. At normal 6 in. spacings, PG’s are rated at 1800 Btu/hr. This simplifies estimating and layout. PG’s may be extended or contracted by hand to serve panel surface areas from 22 ½ to 60 square feet. *Pat. applied for

For full details we’ll be glad to send you an informative booklet that will answer almost any question you have about this new Anaconda product. Use coupon, or write for Anaconda Publication C-6 to The American Brass Company, Waterbury 20, Connecticut.

ANACONDA® PRE-FORMED
COPPER TUBE PANEL GRIDS
2. PG's are readily laid out to the required spacing.

RADIANT HEATING

3. PG's are easily put in place. Trim, straight and true, they fasten tightly to the ceiling and require only normal plaster thickness.

4. PG's save fittings—one end of the tube is expanded so that grids can easily be connected in series by soldering or brazing.

The American Brass Company
Waterbury 20, Connecticut

Please send me Anaconda Publication C-6, describing PG's.

NAME ............................................................
FIRM NAME ..................................................
ADDRESS ..................................................
CITY .................................................. ZONE .............. STATE ..............
New medical college will have novel teaching rooms

Ground was broken this month for the first three buildings (above) of the $25 million Albert Einstein College of Medicine of Yeshiva University, the first new medical school established in New York City since 1898. These will be a modern gray brick and glass ten-story teaching and research center, a fan-shaped auditorium, and a connecting three-story administration and library unit. An innovation in the central building, according to B. Summer Gruzen, head of Kelly & Gruzen, architects, will be large multipurpose home-room laboratory-classrooms so faculty, rather than students, will move from one lecture room to another.

Additional buildings to be erected later will house schools of dentistry, nursing, public health, a graduate school and a professional building for the college’s 300 full-time and 400 part-time instructors. The faculty will be large because the college made an agreement with the city to staff completely two hospitals in the adjoining $40 million, 1,400-bed Bronx Municipal Hospital Center now nearing completion.

Radioactive cobalt used to X-ray huge steel beam

Radioactive cobalt 60 from the Oak Ridge, Tenn. AEC plant was put to work X-raying welded joints in a huge steel beam. Instead of heavy X-ray equipment all that was required in probing through a 1 1/2" section of steel (above) was a small capsule of cobalt 60 weighing less than a gram, and an X-ray film on the underside of the metal. Supervising Architect E. L. Stuuffer of the University of Illinois used this method to check the safety of a 60' square underground room to accommodate 260 persons in a campus building, and at one point discovered a welded joint cavity that required correction. Professor George L. Clark of the University’s chemical department has been advocating extensive safety X-raying of this type on all steel construction. X-ray Inc. of Detroit made the actual tests.

continued on p. 74
Educational opportunity in America today is founded upon adequate buildings, properly equipped and staffed. The tremendous responsibility of providing these fundamentals rests with school boards, school administrators and their architects.

The activities in today's modern school buildings are many. The buildings are truly neighborhood and community centers. Wise planning and thrifty management are necessary in order to receive the greatest return from every budget dollar.

That is why the well-planned Northeast Intermediate School at Midland, Michigan, is equipped throughout with a planned-for-the-purpose, installed-for-the-purpose Johnson Dual Temperature Control System. Here, 62 Dual room thermostats control unit ventilators, convectors and central fan ventilating systems to provide comfortable occupancy temperatures in rooms that are in use, while reduced economy temperatures are maintained in unoccupied spaces.

Here again, as in thousands of other schools, Johnson engineers have worked hand in hand with thrifty planners, in order to provide the best in automatic temperature control for greatest possible fuel saving. They know full well that the completed structure will stand as evidence of how well the planners did their job.

If you are planning a new building or modernizing an old one, have your architect consult a Johnson engineer about your temperature control problems. There is no obligation. JOHNSON SERVICE COMPANY, Milwaukee 2, Wisconsin. Direct Branch Offices in Principal Cities.

JOHNSON  Automatic Temperature and Air Conditioning CONTROL
NEW SHREVEPORT MUNICIPAL AIRPORT

GETS LASTING ROOF ECONOMY

WITH TRUSCON FERROBORD® STEELDECK

This lightweight steel decking comes in units long enough to span three or more purlin spacings. Members are designed for full-length interlocking—a principle which increases carrying capacity as much as 25%. Long spans and full-length interlocking mean important first-cost savings in trusses and structural framing.

Lightweight Ferrobord is easy to handle, easy to place. Welding contacts are flat. Work is done from above. No need for scaffolding or movable stages during erection. More first-cost economies.

When laid, Ferrobord is a smooth unbroken surface, ready for insulation and built-up waterproofing. Its life expectancy is long. We'll arrange a worthwhile demonstration that takes about two square feet of Ferrobord and twenty minutes of your time. Just write:

TRUSCON STEEL DIVISION
REPUBLIC STEEL CORPORATION
1102 ALBERT STREET • YOUNGSTOWN 1, OHIO
Export Department: Chrysler Building, New York 17, N.Y.

TRUSCON® a name you can build on
When you choose a builder, it's important to consider his capacity for teamwork.

He must be able to work smoothly and effectively with the other members of the building team — architects, engineers and owners. His organization must be skilled in the close teamwork needed to build soundly, on schedule and within the budget. His men and methods make the difference between waste and economy, between time lost and time gained in completing the job.

The George A. Fuller Company's belief in the importance of good teamwork is reflected in its record: 72 years of excellent relations with architects and owners, thousands of varied construction projects satisfactorily completed throughout the U. S. and in many foreign countries.

Many architects have profited by Fuller's ability to provide estimates, studies and "know how" to help the building team produce the best structure for the money. These services are available from the first stages of planning — and throughout construction in the field.
Wall St. area cheered by plans for new skyscraper

Lower Manhattan has had no major rental office construction for the last two decades. Concentration of new, modern space in the midtown Grand Central-Rockefeller Center area has made it difficult for owners in the aging downtown district to rebut reports that the area was doomed to succumb soon to galloping obsolescence.

This month the shipping-financial-commercial district got its best news in years. Real estate's famous cross-continent partners, short, dynamic Jack D. Weiler of New York, and San Francisco Hotelman Benjamin H. Swig, had leased the lower Broadway Produce Exchange blockfront facing Bowling Green. In place of this 69-year-old structure that still has rope-pull elevators they will erect a $25 million 30-story air-conditioned rental building with 1 million sq. ft. of floor space from plans by Architect William Lescoe. Other features: a 300-car garage; moving stairs from lobby to second floor; 50,000 sq. ft. floors from the 3rd to 11th stories; tower floors of about 18,000 sq. ft.

While downtown owners rejoiced at the real estate investment significance of this long-awaited construction, not everyone was happy. Renowned Talbot Hamlin, FAIA: "One of the unforgettable pictures on Manhattan . . . [includes] the red brick front of the Produce Exchange, with the powerful rhythm of its marching arches. . . . Designed by George B. Post . . . for nearly three-quarters of a century [it has] been one of the distinguished landmarks of our crowded island. "There seems thus something peculiarly unfortunate in the proposed unnecessary destruction of this building, so striking in its color, so powerful in its design, so expressive of its time. Historically, too, it is important, for its court wall is the earliest example of metal-framed construction in New York and one of the earliest in the country. Is the city and its inhabitants such slaves to economic pressures that they can have no say in what they see, no power to preserve what they love?"

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LETTERS

MENDELSONH'S EULOGY

Forum:

The last services were held for Eric Mendelssohn on Sept. 17. I was honored, and the School of Architecture was honored, that Mr. Mendelssohn in his will requested that I speak the eulogy.

It seems appropriate that I send you a copy of the eulogy as a memorial to his memory.

WILLIAM WILSON WURSTLER, dean
School of Architecture
University of California
Berkeley, Calif.

"Eric Mendelssohn 1887-1953"

"We... honor a great spirit. This spirit ever turned to youth, and I speak for his students at the University of California, in fact, for all the students who have been inspired and freed by his genius."

"I think of his vitality, which swept aside all the usual material and psychological props, not with disdain for he knew and used their value, but he also knew the greater needs of the spirit of man. He was ever ready to rebuild his life and this has been necessary, for the framework of his existence has been constantly changing — the reasons for the move from Germany in 1933 would have embittered most of us. But Eric Mendelssohn has always had a deep faith in the dignity of man which could not be weakened or corroded by exterior forces."

"I think of a meeting in 1942 when a young group of Bay Area planners and architects asked him to speak to them. This was the Telesis group, who were busy seeking knowledge for the planning of our environment. I was amongst the guests. Many, many times when I've been discouraged this meeting comes to mind. There stood a man who had been surrounded by all the success possible in our professional world—but a man I'll read to make a new start in another continent—yet he never once mentioned times past; he only spoke of the wonderful future for him and for all those young people. Instead of impressing us with the authority and importance of his own world-wide experience and great contributions to architecture, as he well might have done, he opened up fresh horizons for all architecture. I believe this gives the clue to his character and his building.

"In a day when narrow proprietary dogmas threaten to stifle and dehumanize the modern movement in architecture even before it has come to its maturity, Eric Mendelssohn stood for freedom, imagination and creative indi...continued on p. 86
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LETTERS continued

vidual leadership. As an artist he always sought to make his life richer. He had a large-scale vitality and exuberant optimism which made him, perhaps more than any other architect, akin to the great personalities of the baroque cities.

"As a teacher he stretched the students' imaginations and ever conveyed the deep importance and excitement of being an architect. Students and staff are happy that he worked with us. We will miss him in the School of Architecture at the University of California."

WHAT CAUSES SLUMS?

Forum:

The News story, "Rat-Bite Decision," in the July Forum shows how unfortunate it is that in so many cases a tragedy must occur before proper action is taken. That the Chicago Daily News has undertaken an investigation of the appalling conditions in slum areas is most encouraging. That the greed and selfishness of some property owners contribute in a great way to these conditions cannot be denied. That slums are actually caused by people and not buildings, however, is a most obvious point which apparently has been completely overlooked...

While it is entirely probable that many property owners may not make necessary repairs to prevent their buildings from deteriorating; and while it is certain that many slum dwellers do not contribute to these conditions in any way, but are the innocent victims of their neighbors' way of life; it would appear, nevertheless, that the Daily News should report the whole story instead of just finding a few scapegoats, even though this phase of research may not "produce the flashy sensation of a crime exposé."

While this is not intended to mitigate the evils of the property owners who may be involved nor to lessen their responsibility, we have reason to believe that some people could make a slum out of the White House if they were permitted to live there. While substandard housing may contribute to slums, it does not effect this condition without a certain amount of help from the tenants. The Lincoln family was not wealthy to begin with, but no one could say of Abraham Lincoln's log cabin that it fell into the slum category, even though there was no 20th Century plumbing installed.

While the Daily News exposé may be very helpful in placing a large portion of the blame where it belongs, wouldn't it be in order if some newspaper reporter would advise the tenants just once that they have some responsibilities also?

JOSEPH WILLARD WELLS, architect
Norfolk, Va.

• The Daily News series did not focus on the contribution that slovenly tenants make to the deterioration of property, except for printing several interviews with slum landlords who gave that story. The fact that tenants help make slums is certainly

continued on p. 90
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LETTERS continued

not news. But it is news when a newspaper catches the building department of the nation's second biggest city in neglect of one of its primary duties.

—Ed.

HARA-KIRI BY VAN DER ROHE

Forum:

Your pictures and commentary on "Mies van der Rohe's Theater for Mannheim" (AF, July '53) desolate me. I feel as naked as an Arkansas farmer after the tornado has passed.

But I am glad to see someone has achieved the nirvana—has permanently locked Pan- dora's box and thrown the key away. A universal building has been designed, and since "instead of fitting the building's skin to the building function as a glove fits a hand, he would create a vast and simple space—something like a big airplane hangar—and then place all his functional elements into that protected space," it would surely follow that size shall be the only variable.

The container Mies has designed is not influenced by function (even as airplane hangars are); consequently, the services of any other architect, and for that matter, Mies himself, are no longer necessary. Mies has committed hara-kiri and carried the rest of us with him. All a would-be client needs to do is decide how much money he has available and how much space he needs, and then the various engineers will inherit all the headaches.

W. JETER EASON
Eason, Anthony, McKinnie & Cox, architects
Memphis, Tenn.

Forum:

Several parts of Mies van der Rohe's Mannheim Theater (AF, July '53) leave me in doubt about it:

Functional. The public rooms do not appear to be in proportion to the auditorium; the paint shop is somewhat small to be used for making scenery as big as the large stage would require.

Financial. The capacity of the auditoriums is small for a covered space of 266' x 533'. The expense of enclosing it would be great.

Esthetics. There is no doubt concerning the form, for it is simple and unified—good characteristics of all the works of this great master. Is there not a precedent in the traditional theater for surrounding the fan-shaped form by a different form of enclosure?

RUBENS MEISTER
Curitiba, Brazil

CHURCHILL ON PUBLIC HOUSING

Forum:

I respect Henry S. Churchill and his views on "What Changes Must Be Made in Public Housing" (AF, July '53). I believe, however, that he has not yet related cause and effect. In this regard he has plenty of company.

He says that the core of the trouble is that "there has been no new thinking, no accept-

continued on p. 94
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THE PROBLEM
A few years ago, engineers in the heating and ventilating industry were faced with the problem of engineering, designing and then building a system of unit ventilation capable of trapping and controlling the downdrafts of cold air pouring off the much larger window areas used in modern classroom designs.

THE INVESTIGATION
Backed by many years successful experience building unit ventilators—Herman Nelson engineers tackled the task presented by the new, and still "modern" classroom designs. During the period of investigation—many ideas were discussed and discarded. A few reached the planning stage. Still fewer were tried out. The search narrowed to three major ideas. From these three, one system, DRAFT\STOP, was selected. The engineering department made its report in March, 1950. This was before any of today's systems for controlling downdrafts were on the market!

IDEA "A"—THE CONVECTION SYSTEM. This idea proposed the use of strip convectors, of limited capacity, placed in back of the cabinet, releasing heated air along the window at the sill.

The system worked, to the extent that it worked at all, only when the classroom as a whole needed heating. It failed to maintain control of the window draft—when cooling was required! This idea also increased installation costs without providing justifiable improvements in performance.

It was discarded by Herman Nelson engineers.

IDEA "B"—AIR DISCHARGED INTO PLENUM CONDUIT. This idea was a unit ventilation system that relied on the unit ventilator to discharge air into a plenum duct. Again heating was its prime function and it had the same weaknesses as the Convection System plus an increase in power requirements and in costs.

This idea was also discarded by Herman Nelson engineers.

THE SOLUTION
IDEA "C"—THE DRAFT\STOP SYSTEM. Here the fundamental weaknesses of the first two systems, were overcome. This system differs from all other types of schoolroom ventilation by intercepting the air cooled by the window before it has a chance to spill out into the classroom and cause drafts! Once captured, the cold air stream is never permitted to flow back into the room. And since the DRAFT\STOP system does not attempt to fight the cold downdraft problem by adding heat, except when such heat is actually needed—it works equally well under all conditions and at all times: permanently blanking out the downdraft from the window as a source of classroom discomfort.

DRAFT\STOP is the one system that offers a "perfect classroom climate" without drafts in any season—or in any part of the country. This system was introduced to the American market in September, 1950. Architects and engineers, the country over, have since put the "Mark of Leadership" on DRAFT\STOP by specifying and installing it in thousands of classrooms.

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Make every room more usable, flexible, completely efficient—at far less cost! Use FolDoor—the famous fabric-covered folding door that puts every inch of floor space to work!

FolDoor saves swing space over ordinary doors, saves stack space over other folding doors—and every cubic foot you gain, cuts construction costs!

FolDoor serves as both door closures and movable walls. It divides the space to suit the need—makes a large room into smaller ones—provides privacy for small groups, spaciousness for large ones. The many FolDoor fabric colors harmonize with any interior, lend dignity to all surroundings.

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letters continued

There is no point in my arguing about whether or not new thinking will help. To argue that point would be to agree to the possibility that public housing, as a policy, is correct. I have no doubts on that issue.

Mr. Churchill referred only indirectly to charges of socialism in housing by saying "... and you never hear any kicks about FHA subsidies or complaints that FHA is socialistic or subversive to private enterprise. ..." I will make such a complaint a matter of record, herewith.

My chief complaint, however, is the failure of architects generally to note their inconsistency in supporting public housing while declaring government plan bureaus. They are remarkably astute in their assaying of the faults and shortcomings of government architectural service. At the same time many architects take the view that it is perfectly agreeable for government to own and operate houses and hospitals provided that private enterprise architects plan them. There is no difference in private home owners and hospital administrators saying it would be entirely satisfactory for government architects and construction bureaus to plan and build their buildings provided they (private enterprise) can own and operate them in the end.

What we have to face up to is the fact that a thing which is wrong in principle is wrong however it may be applied. And it will fail when so based no matter how nice people we are, no matter how good are our intentions and regardless of the excuses we make for it when it fails.

Public housing, it is rumored, has been dealt its death blow. I doubt it. However, if by some miracle it should die, it will still be some 20 years late.

E. W. Dykes
Lawrence and Dykes, architects
Canton, Ohio

Forum:
Public housing is a necessity in our economy because:
1. Private enterprise historically has never been able to supply sufficient housing for all needs, and consequently some public agency had to step in, just as public subsidies had to help schools, railroads, highways, shipping, religious institutions, farmers, exporters, veterans and so on. What you say is true, of course: one thing leads to another and it's a shame Horace Mann ever got away with starting public schools in the early 19th Century. However, housing subsidies are essential, both PHA and FHA varieties, because a high level of construction activity is vital to our economy.

2. Housing of any kind is not a matter of "supply and demand" in the old Smithian sense any more, but a matter of supply and demand of new ideas...
Would you spend $50 to protect this home against moisture menace?

That amount or less makes the masonry in this home Watertight when you use MEDUSA WATERPROOFINGS!

- The greatest enemy your construction encounters is moisture menace. Yet you can protect a home like this against water for as little as $50. This is the added cost of protecting average masonry by using Medusa Waterproofed Gray Portland Cement (or when not available Medusa Waterproofing Paste or Powder as an ad-mixture) in a concrete basement floor, in mortar for masonry walls and a waterproofed cement plaster applied to the outside of the foundation. The use of Medusa Waterproofings as an integral part of all concrete would of course be slightly higher.

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ALL Ruberoid AND A FREIGHTYARD WIDE

Six football fields could be tucked under the broad expanse of Ruberoid roofing at the Santa Fe Railroad’s new Chicago freight station. That’s a lot of roofing but that’s what it takes to protect the heavy traffic at the eastern terminus of the Santa Fe system. From six tracks, 156 freight cars can unload their goods simultaneously at this modern depot.

On big jobs like this, architects turn readily to Ruberoid for assistance in their roofing problems. They know that no other company offers the same wealth of experience and knowledge dating back to the first roll of asphalt roofing ever produced. They know that they can find roof specifications to meet every set of conditions in Ruberoid’s Built-Up Roofing Book. For this freight station, approximately 3000 squares of Coal Tar Pitch, Tarred Felt and gravel surfacing were applied by the Ruberoid Approved Roper.

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DESIGN: Functional—clean, simple lines.
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HENRY S. CHURCHILL, architect
New York, N. Y.

Forum:
Henry Churchill's timely "shot" at public housing in your July issue has the ring of hope of its survival, subject to certain reappraisals. That public housing needs such is not questioned, but his one-track architectural approach avoids the main point, e.g., that public housing is a social (welfare) medium with a live social purpose. It is the recognition of that fact that will revive it. That issue has been straddled too long.

The whole trouble with the program has been that it became a project-building operation and its architectural opportunities crowded out the original reason for its being. That many of the architects "missed the boat" cannot be charged entirely to the bureaucrats but to the fact that some of them, at least didn't have either sufficient courage or vision to stand up for their ideas—possibly risking canceled commissions.

Since some, including Henry Churchill, feel that public housing done as it should be is good business (AF probably won't agree), then let's begin over by recognizing its primary purpose. Public housing as a social factor should help to meet the challenge of bad environments in cities and towns, admittedly one of the causes of the problems with which the social agencies have to contend and for which we generously (?) provide Community Chest funds—without recognizing that the slum areas get most of them.

Public housing didn't begin as Henry Churchill suggests from "the smell of rich and redolent pork" but as a means of helping relieve the then serious unemployment situation. Fortunately, there was currently the dream on the part of certain of the early housers, at least, that getting rid of some of the bad slum housing (with which all were familiar and had deplored but had done nothing about) was possible to be realized.

The need now is to get back to first principles, namely, that since bad home and neighborhood environments are contributing factors (not sole causes) of many acute social
It happened recently in Dallas, Texas. J. W. Bateson Company, Inc. began erection of the sleek, new Corrigan Tower Building (right) on July 1, 1951, and completed the job exactly 10 months later, on May 1, 1952.

How did they do it? By using Cofar corrugated steel forms, which also serve as reinforcement, J. W. Bateson Company completely eliminated the costliest, most time-consuming element of concrete floor and roof construction—wood forms. Cofar sheets arrived at the site cut to fit the building frame. In one quick easy operation, 30 square feet of form and reinforcing steel was placed and immediately provided the required reinforcement per square foot and a working platform for plumbing, electrical, and other trades. Concrete was then placed. Result: A safe high-strength floor.

Cofar makes concrete floor and roof construction a one-stage operation, provides all the structural concrete slab, completely eliminates wood forms, and saves weeks in building time. For advice, estimates, and costs on your building project, write either home or district office, attention Department AF-1.
"Janitrol gas unit heaters helped us build within our budget"

By using Janitrol Gas Unit Heaters instead of a central heating system, we saved enough to build within our budget. Installed in September, the 17 Janitrol Unit Heaters have proved highly satisfactory!, said Mr. Dawson.

The teachers, too, are very happy with this heating system. Each room being thermostatically controlled, each teacher can maintain any desired temperature.

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a case in point

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For only $1\frac{1}{2}$% more than the total cost of the building, this new school will receive absolute roof fire protection and a permanence for the life of the structure which indicates the very minimum of maintenance cost. These architects are particularly adept in solving the numerous problems of modern school architecture and realize the economy of tile on their cleverly designed roof construction.

Obviously, for schools there should be no compromise with quality and quality is the very essence of economy. Ludowici Tile Roofs cannot be equaled for economy first and last. We invite architects to consider tile roofs as the immediate solution in modern school architecture for protection and permanence. Samples and estimates will be gladly furnished on request.

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ARCHITECTURAL FORUM • OCTOBER 1953
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problems—the replacement of the bad with good (or better) is worth doing, human-wise and tax-wise. If private capital will do it, fine; if not, government (federal, state, local) should. Delay is costly.

This civic and social need should be the architect's inspiration, guided by the leadership of the social agencies and the enthusiasm of the houseors, who incidentally should be following the lead of social forces—not the reverse. It is from the resulting understanding of the problem that a worthy architecture can be expressed.

There is one more thing, strangely and unexpectedly touched upon by Alan Brockbank in his report on the nation's slums in the September issue of House & Home. He wrote:

"You can't eliminate slums just by tearing down old buildings and replacing them with new ones. It [the problem of slums] is basically a problem of people."

That is management's part in this drama—the one too soon forgotten—in the mad rush for structures. Housing projects are living, dynamic, hence beautiful things designed by raising the standards in particular localities to contribute to the level of living of the whole community—not just shelter. As architects keep that in mind their designs will cease to be sterile, as Henry Churchill regrets, whether they are projects, integrated units, multiple-story buildings, single-family houses on vacant land or slum clearance.

It's the purpose, not the product, that needs reapproaching.

B. M. PETITT, chairman
Committee on housing
San Diego Community Welfare Council
San Diego, Calif.

P. S. It can be, for it has been done.

* Reader Pettit was the former director of the Housing Authority in New Haven, Conn.—Ed.

FORGOTTEN MAN

Forum:

In your article, "The Need for Better Planning" (AF, June '53), I was impressed by the first sentence: "Good planning before construction starts is more important today than ever before." However, I was very surprised when looking over the names of these outstanding men of the panel that not a single landscape architect was present.

The landscape architect plays a very important part in planning today's living. I have found that if the architect consults with me, then the client is more aware of the cost of landscape development and is prepared to set aside a fund for outdoor living areas as well as further developments later.

H. Derward Thompson, president
Texas Landscape Assn.
Athen's, Tex.
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*put it anywhere in the plan—

Now, for the first time, the superior daylighting of Wascolite Skydomes — with ventilation added! You can revolutionize home, school and plant layouts — yet allow adequate daylighting and air circulation for all interior areas. And all of these radical changes can be planned without designing special roof, curb or flashing construction!

The Wascolite Ventdome — the first and only unit of its kind commercially available — is completely prefabricated. Easily installed over a simple roof opening. The Ventdome consists of an acrylic plastic dome and an insulated curb with built-in ventilating unit — power driven or with adjustable louvers. Available in aluminum, copper or galvanized iron, with domes of clear colorless or white translucent acrylic plastic. Nine standard sizes.

Wascolite Ventdomes are the product of the Wasco Flashing Company — makers of the famous Wascolite Skydome and pioneers in the field of toplighting.

For further information see Sweet’s Catalog or write:

WASCO FLASHING COMPANY
89 Fawcett St., Cambridge 36, Mass.
The entire job of erecting the outside walls of this 26-story office building was done in 6½ working days. The conventional masonry construction originally planned would have taken eight weeks or longer. Alcoa helped develop the materials and the methods which made this record possible.

The first plans of the $14,000,000 structure being erected by Tishman Realty & Construction Company, Inc., were redrawn as a result of careful study of the Alcoa Building. The pioneer use of aluminum curtain-wall construction in the Pittsburgh headquarters of the Aluminum Company of America forecast the building economies dramatically proved by this walls-in-a-week record.

The 1800 exterior panels were prefabricated, each complete with two windows, by General Bronze Corp. within a period of three months—two stories high and over 4½ feet wide, they were trucked from the assembly line to the building and stored on the floor they were to enclose. Three crews installed the panels from inside the building without the use of exterior scaffolding.

The economies of modular, curtain-wall construction with lightweight, low-maintenance aluminum panels are available to you for new construction or modernization of existing buildings. A phone call to your local Alcoa sales office, listed in your classified directory under "Aluminum", can acquaint you with full details. Make the call today. Or write: Aluminum Company of America, 1887-K Alcoa Building, Pittsburgh 19, Pennsylvania.
Walls and Top Surfaces

cost less... clean easier... last longer

ask the Architect who specifies LAMIDALL

The architect would tell you that the walls in these rooms have a beautiful future. They're LAMIDALL. These structurally strong 1/4" thick plastic laminate panels cost less, too. The simplicity of application and the proved durability of LAMIDALL combine to keep the price low and practical. Small wonder so many of the men who specify wall materials specify LAMIDALL.

ask the Builder who installs LAMIDALL

For different but no less important reasons, builders and contractors are equally enthusiastic about LAMIDALL. Its installation time and costs are low. The 4' x 8' panels are cut to size on the job, quickly and easily applied. The walls and gleaming lavatory top surface illustrated here are a beautiful case in point.

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Corridor walls in hospitals take a never-ending beating. It's only natural the superintendent of this hospital is well pleased with the durable, practical walls of LAMIDALL. Maintenance time is negligible, for LAMIDALL cleans with a damp cloth. Its hard, smooth surface stubbornly resists stains, hard wear and ordinary abuse. Years from now these walls will look new.

WANTED

Forum:

Two architects and I are establishing an architectural and engineering practice. We are interested in building up our reference files and would like to have your advertisers advised that we are interested in receiving their catalogues or brochures on product information.

John Wendell Anderson, engineer
Port Allegeny, Pa.

LETTERS continued

ARCHITECTURE WITHOUT RELIEF

Forum:

Your caption writers are even more ignorant of the art of landscape than architects in general. On p. 109 of your August issue, a new low has been reached in speaking of a "curved terrace that relieves the rectangularity of the building."

Since when has rectangularity had to be relieved?

Landscape Architect Halprin has done better work than this (p. 121, same issue) and, as landscape, the work of Sert and Wiener (pp. 124-131, same issue) deserves high praise: it expresses their building, which, if it needed relief, would not be architecture.

James Fanning, landscape architect
New Canaan, Conn.

VENEZUELA'S PATIOS

Forum:

The article "Can Patios Make Cities" in the August Forum contains work done by our firm and presented without proper credits. We feel obliged to make the following clarification of the facts:

1. Oficina de Planificacion y Vivienda, Caracas, whose principals are Francisco Carrillo Batalla, Carlos Guinand Baldo, Moises Renzerraf, was contracted by the Orinoco Mining Co. (a US Steel subsidiary) to do the planning and architectural work at Puerto Ordaz and Ciudad Piara, the new Venezuelan cities. Town Planning Associates of New York, Paul Lester Wiener and Jose Luis Sert, were consultants to us for this work.

2. Likewise, Oficina de Planificacion y Vivienda was contracted by the Banco Obrero (Venezuelan Housing Agency) to do the planning and architectural work at Pocono project in Maracaibo, Venezuela. Town Planning Associates was also consultant to us for this work.

3. The hospital shown on p. 129 will be built in Maracaibo for a private owner and not in one of the steel towns as stated in the article.

Francisco Carrillo Batalla, director
Oficina de Planificacion y Vivienda
Caracas, Venezuela
Tru-Perimeter* Heating for Schools!

Webster Walvector stops down-drafts in modernized Garfield School, Maywood, Ill. Heating installation by Total Heating & Ventilating Co., Inc. with the approval of Chiari & Chiari, Architects and Engineers, school architects.

**New School Building from Old**
Maywood, Ill. . . . Public school officials here have extended the usefulness of the old section of the 53-year-old Garfield School by comprehensive modernization. Outstanding feature was replacement of obsolete hot air system with forced hot water using Webster Walvector.

Rejuvenation of the old section of the Garfield School in 1951 involved such things as fresh, light-colored paint, sanitary asphalt floor tiles and modern, movable desks. These improvements would not have been long-lasting with the obsolete duct-type hot air system. Hence, Webster Tru-Perimeter Heating and Webster Walvector were vital to the plan.

---

Solves Heating Design Problems in 500-STUDENT HIGH SCHOOL

The designers of the new Norfolk Catholic High School were able to attain long sought objectives by using Webster Walvector Radiation and forced hot water for the basic heating need, supplemented by Webster Convector and Webster-Neshutt Unit Heaters.


Norfolk Catholic High School, Norfolk, Va. Auditorium wing at left, gymnasium wing at right. Cafeteria wing in rear.

Economy in first cost was helped by the simplicity of Webster Walvector with its reduction in distribution piping and use of only limited space, well illustrated in the auditorium view.

Comfort was assured by spreading the heat the full length of the outside wall. Minimum operating costs were obtained by division of the installation into five zones.

Webster Walvector in kindergarten is completely safe for children. Nothing too hot to touch.

Here's what Joseph Lorenzo, Building Superintendent, says: "We like the new system. Heat is spread evenly along outside walls and under all the windows with a minimum of piping. It is much more economical than our old system."

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*What is Webster Tru-Perimeter Heating?*

Webster Tru-Perimeter Heating uses Webster Baseboard, Webster Walvector, or a combination of both, to replace the heat at the perimeter where heat loss occurs. Heating elements are mounted close to the floor along outside walls, spreading the heat the entire length of the exposed walls. Webster Tru-Perimeter Heating warms the air within a room, warms the floors, and warms the inside surface of outside walls where a normal coolness occurs during the winter months. Gently moving warmed air is drawn to floor level and across the floor into the inlet opening of the radiation. Radiant heat rays strike the floor along the full length of the exposed walls. Floors are warm and comfortable even with slab floor construction.

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**Functional Schools**

Perkins and Will, nationally known Architects and Engineers specify "perimeter" heating for comfort and economy . . .

Many of the schools designed by this Chicago firm feature large glass areas. To offset resulting heat losses, the consulting engineers, E. B. Gritschke and Associates, have specified Webster Walvector, Tru-Perimeter Heating.

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Library in Cascades School, Jackson, Michigan. Heated by Walvector with steam.

Webster Walvector gently warms the exposed walls of a building. Heating-up is quick and easily controlled. Less piping is needed than in conventional radiator systems. No fans, blowers or filters are used.

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If you want more information about Webster Equipment for school heating, write us. Address Dept. AF-108.

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WEBSTER WALVECTOR
For Steam or Hot Water Heating
Power is supplied at 13.8 kv to:

(A) ALL SPOT NETWORKS throughout the project. Three feeders serve each power center. Should one fail, the other lines still serve all loads. If two fail, all nonessential load is dropped. If the third fails, all loads are dropped and only designated ones are supplied by a 5000-kva emergency turbogenerator set, located (B) IN THE POWERHOUSE. There, both 2400-volt and 480-volt service is available for power loads. (C) IN THE MAIN HOSPITAL, five spot networks feed all loads through bus duct risers.
WORLD'S NEWEST RESEARCH HOSPITAL

U.S. Public Health Service's new National Institutes of Health at Bethesda, Maryland, is an excellent example of advanced hospital design—based on a sound functional program that covers both present and future requirements.

The entire architectural plan, in fact, reflects the Institutes' critical mission: to conduct research on virtually every known disease. All buildings have been designed specifically for that function. Result: ultimate in research and treatment facilities.

The key in this plan is the 500-bed, air-conditioned main hospital building, upper left. Here, treatment efficiency dictated floor layout. Practically every patient's room has been located adjacent to laboratory facilities.

Future hospital requirements have also been adequately covered in the original plan. Without any additions to the building, present facilities can be expanded to 2500 beds in an emergency.

What makes a Functional Electrical System

Function again became the guide when a method for distributing electrical power was selected. After a complete analysis of the Institutes' vital assignment, the project's engineers adopted a spot network system, described at left. And, by matching it with the unitized distribution equipment covered on the next pages, the National Institutes of Health is assured uninterrupted electrical service in all areas with adequate provision for future expansion.

The construction application engineer in your nearest Westinghouse Office offers this same kind of planning help to you and your engineers. Call him for complete details. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

YOU CAN BE SURE...IF IT'S

Westinghouse

MAIN HIGH-VOLTAGE SWITCHGEAR feeds and protects 19 spot networks throughout the 15-building research center.
CONTROL CENTERS...FOR FLEXIBILITY...a vital factor

In the powerhouse, grouped motor control—in Westinghouse centralized control centers—contributes substantially to smoother operation of the hospital. All motor starting and circuit protective devices are housed in a neat bank of unitized, easy-to-service structures. In just a few steps, then, one man covers the extent of motor control for all air conditioning and other important service facilities. As a result, trouble-free and more efficient operation of these services is assured.

Complete flexibility of electrical components, as well as modular-constructed units, gives the Westinghouse Control Center ability to expand to any future needs of the research center. This type of structure may hold as many as five motor starter units and can be added to, moved anywhere, or repositioned as needed. Arriving at the National Institutes of Health completely assembled, wired and tested, the control center was ready to operate after a minimum of installation effort.
Modern power centers can be located at the center of load for most efficient and economical power distribution. At right is switching portion of power center.

Lower right. Here is transforming section of power center, showing the low-voltage network protectors.

HIGH SERVICE CONTINUITY AND ECONOMY...designed in

Electrical distribution facilities at the National Institutes of Health are matched to functional needs. The project's engineers designed a system that provides all research areas with exceptionally reliable service—and it does this economically.

Primary 13.8 kv feeders are carried throughout all buildings to spot network power centers. This reduces wiring costs and minimizes power losses.

One to five "spot-network" units have been located in every building to transform the high voltage down to utilization level. Each network contains three transformers. Should trouble develop on one, the other two carry the load. This not only assures excellent service continuity, but also spells out further savings. Since the transformers in the individual networks share one another's peak loads, smaller size units are permitted.

YOU CAN BE SURE...IF IT'S

Westinghouse
Sound, modern, compact

BUS DUCT IS FLEXIBLE

The power arteries of this hospital are Westinghouse Low-Impedance Bus Duct. It was a sound choice. For bus duct is the ultimate in modern, flexible power distribution.

Due to greater current-carrying capacity, bus duct required considerably less space than cable and conduit . . . carries power more efficiently. Standard, prefabricated sections coordinated perfectly with building plans . . . were quickly and easily installed. Bus duct is smart, modern in appearance . . . runs and risers blend smoothly into the interior design of the hospital. Best of all, bus duct is flexible—meets changing load demands; provides sufficient reserve capacity to handle future loads without expensive rewiring.
Space, safety, added load with

PLANNED-IN PANELBOARDS

The final, functional link in this hospital's unique electrical distribution system is provided by Westinghouse De-ion® Circuit Breaker Panelboards. Built to one unvarying standard of quality and performance, each Westinghouse Panelboard was, nevertheless, individually engineered to match the requirements of specific, local electrical services.

Critical space was saved—because Westinghouse Panelboards are compact. Safety was gained because Westinghouse De-ion Circuit Breakers in these panels can be operated without danger... will not interrupt vital hospital services needlessly. Future additions or changes in load will be easily accomplished—because extra circuit capacity has already been provided.

YOu CAN BE SURE...IF IT'S
Westinghouse

Tripped circuits can be seen at a glance—because all Westinghouse De-ion Circuit Breaker handles assume central position on automatic tripping.

Panelboards are mounted in wire closets on each floor. They provide for centralized control of electrical services.
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Whatever the load pattern, a planned G-E cable system will help cut wiring costs and give your client a dependable and efficient power supply. G-E engineers will be glad to help you with the planning. For more information, write Section W100-104, Construction Materials Division, General Electric Company, Bridgeport 2, Connecticut.

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CHILDREN, said FORUM in its 1949 School Reference Issue, “were the greatest output of the US during World War II.” And it reported estimates that 7 million children added to the school population in 1949 to 1960 would call for $10 billion in public schoolhouse construction.

Alas, both as to numbers and costs, these predictions turned out to be classics of underestimation!

Of those 7 million children expected to greet teacher over a period of 11 years, 4.6 million had already showed up in school by 1953.

Latest census data have caused the US Commissioner of Education to up his estimate to a total gain between 1949 and 1960 of 11.6 million school children instead of 7 million. There will be 7 million between now and 1960. (Today’s staggering predictions are distressingly accurate compared with 1949’s because of the intervening schoolhouse survey of the US Office of Education.)

And, costs have skyrocketed, too.

Upshot is this colossally extended calculation of school need:

Backlog of classrooms needed but not yet built... 345,000
Add new classrooms needed by 1960........... 425,000

**Total need** ................. **770,000 classrooms**

At an average cost of $44,000, including land, this means that new schoolhouse construction, properly carried out in the right places, will cost about $34 billion

Under such heavy need, is it any wonder some US school boards are already staggering, and economy becomes the top theme?

To help, FORUM called a rounded group of experts together in New York for a schoolhouse economy forum (p. 118).

And it sent an SOS to school architects for schools with their best economy ideas—then culled literally hundreds of plans for the selection that begins on p. 127.

Aware that FORUM’s earlier editors set a high tradition that FORUM school reference issues call the turns (in 1935 starting the main wave of modern design and the California finger plan; in 1949 predicting the end of finger-plan dominance and a new era of design experiment, plan freedom), the editors have done their best to watch for new trends today:

- In plan freedom we are already marching out with cluster plans, loft plans, zone plans, core plans (p. 127).
- In design too we find a new branching, a new stress at one end on “little house” domestic scale, at the other end on a new kind of institutional treatment (p. 166).
- In lighting we find a new challenge to the big window, experiments with electric light, a whole new vocabulary of top daylighting (p. 184).
- In heating we find a new stress on cooling and the advent of the practical heat pump (p. 179).
- In construction the gimmicks are many (p. 174).

This issue is dedicated to all who would have the best the US can produce for the only Americans there are going to be—today’s children.
SCHOOLHOUSE ECONOMY

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THE MAGAZINE OF BUILDING
FORUM: A roomful of experts tackle the problem of costs, agree on ten major ways to stretch the schoolhouse dollar

Against the challenging background of a growth in school population of 7 million during the next five years and a need for 770,000 more classrooms at a cost of $34 billion, the editors invited a group of distinguished schoolmen, administrators, architects, consultants and engineers to explore every possible avenue of schoolhouse economy.

The stature of the men who participated in this forum and the urgency of the problem they discussed commend their findings to every school board—and to all others concerned with the future of America, which lies in the future of her children.

On this the forum agreed:

School building economy has become urgent because of what is called a great "wave" of children; but we now expect the new higher birth rate to be less like a moving wave than a permanent new high plateau. This year some elementary schools suddenly found their enrollment tripled by children born in 1946-47; between 1953 and 1959 the US school plant must care for an expected increase of 7 million pupils; no slack-off is in sight.

America's schoolhouse financing problem could be compared to any banker's problem in advancing capital for a major expansion to an industrial operation that will be immensely productive—but needs 14 years before its new productivity will start paying off. In the same way our children will be productive and will enrich the much bigger society that will exist after they grow up and have their education. The sudden expansion explains the sudden strain placed upon the school resources and the credit of a country which until World War II had been geared to a declining birth rate, and moreover had not been compelled to set aside any large share of its current income for defense and survival.

Inherited limitations on bonded indebtedness are no true measure of what we can prudently finance

Gloomy assertions that our $34 billion estimated need in new school plant up to 1959 must be trimmed to the much smaller total debt limitation of municipalities are based on arbitrary assumptions. The debt limit itself is arbitrary, based on earlier expectations which counted neither with the explosive needs of a new generation nor with its later explosive expansion in capacity to repay.

Clear thinking is required to avoid confusing a momentary strain (while climbing the plateau) with an imagined need for skimping. Every youngster of the new generation is a potential new producer, and he will contribute to the new, *Of which the construction cost is about $25 billion.
The American economy has been able thus far to finance bountifully whatever America really wanted... be it cars, fancy foods, television sets—or an investment in school or college education. When a higher want arises, the very act of satisfying it (in our economy) produces not only added prosperity but also greater economy in producing the higher quality of goods. It would consequently be a major mistake to resign ourselves to building shabby schoolhouses in “economy’s” name when the very act of producing good schoolhouses will operate to make these better ones cheaper.

If the American people really want economical school buildings, here are ten ways to get them:

1. Larger administrative districts to spread the tax base

The public school building job is directed by 77,000 local school districts responsible to local communities. We agree that the first major step toward schoolhouse economy lies in enlargement of a great many undersized school districts as administrative units. All across the US consolidation or centralization of districts, and cooperative action between districts, are already under way, but they have far to go. South Carolina has just reduced 1,600 districts to 103 larger ones; Michigan, it is estimated, could do better with 250 to 300 districts than with the 4,500 she has inherited from an earlier day when the small district really functioned; New York, Massachusetts, Pennsylvania are among states whose existing boards have joined together to act as regional or consolidated bodies; 43 other states have studies under way looking toward similar action. Major economies result through balancing out taxes, through putting together enough people, enough space, enough personnel, enough available funds to engage on correlated instead of chaotic building programs, avoiding the stupid reduplication of school buildings each of which (having too small a district to call upon) is inadequate.

Enlargement of the administrative district does not necessarily lead to building larger schools—it may result in building a good many smaller ones—but it does allow more shifting of pupils and adjusting of staff and arrangements.

Adjustability among schools. There is no magic or sacred point at which a child must go to a junior high instead of an elementary school, to a senior instead of a junior high school. A district large enough to possess a number of buildings can shift a grade here and there to meet the ebb and flow, so each building gets fuller utilization and less construction is needed. The junior high school, in addition to its own individual purpose, has the advantage of being a buffer between elementary and high school.

The too small high school is perhaps the chief symbol of inefficient reduplication where small communities vie with one another instead of joining forces. The National Citizens Commission for the Public Schools found in North Carolina that 100 high schools would have sufficed in place of the present 800, if an enrollment of 300 were accepted as the minimum on which an efficient high school could be built. This does not mean that the 100 buildings would cost one-eighth as much—since each would be larger—but it means that labs, special rooms, gyms, etc., could be made adequate instead of being skimmed or omitted altogether, and a big share of their cost could be saved by avoiding reduplication of basic classroom space from one town to another.

Small-town chamber of commerce loyalties are often behind the idea that “our town must have its own high school.” But there are many communities in which local patriotism has in fact been just as well served by focusing on an intermediate school instead. Where an inadequate too small high school building already exists it can often be converted into the nucleus of a good new elementary or intermediate school (which requires less elaborate facilities), thus salvaging the existing plant. Then the most expensive type of building, the fully equipped high school, can serve a much larger area with a larger tax base.

Building schools costs actually less today in comparison with other goods than it did in 1936! To supply his child with a schoolroom, the taxpayer gives up less wheat, fewer theater tickets, fewer cars in 1953 than he did in 1936; and since the quality of school buildings has meanwhile greatly risen (as has the standard of teaching) economy defined as higher value received for less money is already at high level. Indeed, schoolhouse costs have stayed low compared not only to other kinds of goods but to other kinds of buildings, due to cheaper financing, better planning, more sensible design fostered by educators together with architects.

It would be a major error, therefore, to seek further economies by first, or exclusively, taking a negative cheeseparing approach, especially if cheapened quality results in higher operating and maintenance costs.

It would be most wise, in our opinion, to start first with a constructive approach, seeking full utilization of all available resources and combinations through better brainwork, better programming, better administration, better planning. Indeed the greatest economies will be effected before the school architect even touches pencil to paper.

These opportunities involve a whole series of people and agencies: the school board, superintendent, principals and teachers; local, state and federal officials and legislators; educational consultants; architects and engineers, builders and manufacturers in the building industry; code officials and even insurance underwriters.
Here are 50 ideas for schoolhouse economy

that came out of the forum. They are expanded on adjoining pages.

1. Combine small school districts into larger ones, or arrange for joint action, so the building program can avail itself of existing and new buildings in a more efficient pattern.

2. Abandon the too small high school. Turn it into an elementary or intermediate school, build only fully equipped new high schools, centrally located, serving a wider area.

3. Re-examine school schedules for full utilization of the building.

4. Stop department heads from demanding overspecialized space.

5. Re-examine educational dogmas that lead to building waste.

6. Plan the school for evening use and use it over the whole year.

7. Acquire land early. Get state aid in holding it for the school district which has adequate funds of its own.

8. Prevent slow processing which allows land speculation to take place between the time a site is named and the time it is actually bought.

9. Make early contact with land developers creating new developments. Convince them how important the school is to them, get them to cooperate in setting apart good sites. Otherwise use legislative or planning powers.

10. Try lease-sale arrangements whereby the builder puts up the school—but only with school board retaining every control.

11. Make the school part of a correlated civic plan—so the cost of auditoriums, gymnasiums, playing fields, etc., can be shared and waste cut down.

12. Make joint arrangements with the park board so there is joint use of land for school recreation areas and park.

13. Go through the existing school listing every part that contributes nothing direct to education—cupolas, parapets, columns, fancy touches.

14. Build no basement if you can avoid it.

15. Build no upper floors if they can be avoided. Remember, fire-safety requirements make them more expensive.

16. Use the out-of-doors for all possible learning, including nature study.

17. Use the unbuilt out-of-doors for all possible sports. It may be cheaper than an elaborate gymnasium.

18. Where possible build sports facilities which require only a wall and no roof, or roof and no walls.

19. Remember not all classrooms need be bounded tightly with four walls. Adapt such public space as cafeterias so corners can be used for teaching.

20. Look at your corridors. Used only for passage they are largely waste. Get multi-use by incorporating corridors with the classroom as alcoves or adjuncts.

21. Eliminate the corridor if you can. Doors from room to room are serving some elementary schools well.

22. Think twice about your proposed cafeteria. Modern food serving may make it unnecessary.

23. Think twice about that tremendous gym. Is it primarily for the school or for spectators of the team? A smaller one may serve every educational need.

24. Consider several smaller gymnasiums, playing fields, etc., that can be shared and waste cut down.

25. Beware, however, of overdoing "multipurpose" planning. If its dual use as a gym knocks out proper use of the auditorium, economy is false in operation.

26. Look out for that vastly oversized heating plant, designed for the coldest night of the year, at 4 a.m. when nobody is in school.

27. Be sure your engineer is using the less extreme values given for "design temperature" in the newest ASHVE handbook.

28. Remember the main problem is not heating but cooling. And that climate control allows use of the sun to help heating.

29. Examine whether your state needs that elaborate school code, piling up costs through rigid regulations. Connecticut and Texas are making fine progress with none.

30. In any case get your state off the list of those insisting on statutory codes; they are sheer cost-raising nonsense.

31. Demand performance codes in school-building if any. They prescribe what is to be effected but leave invention and imagination free to find more economical ways how.

32. Demand that your city abandon silly local codes which multiply confusion. Get adherence to those national codes which result in standardization, an important source of cost savings.

33. Get your state governor to call a meeting with architects and fire marshals, to comb out the nonsense likely to be found in most fire-marshall regulations.

34. Make sure whether fire regulations are figured to save the building or to save the children. Some regulations merely save the shell, like a stove whose contents have been burned clean.

35. Insist that money-saving structure which protects children fully be permitted. There is criminal folly in state codes that forbid the well-planned wooden one-story school.

36. Demand that insurance companies give credit for safety deriving from new invention. There is no excuse for charging the same rates for all of today's schools as for yesterday's.

37. Look to sprinkler systems as an inexpensive method of protecting children.

38. Avoid the "economy" trap of the stock plan. Only 10 states now have them and 12 states have already abandoned them. They produce schools that are never really good, never really cheap to operate and maintain.

39. Back every move toward dimensional standardization, whether by AIA, BRAB, ASA, or any other research organization.

40. Seek standardization of parts over a large number of schools—stock doors, window sash, etc., that can be bought cheaper in big quantity.

41. Try if possible to get several schools using the same stock parts bid at once to obtain the economies of quantity purchase.

42. Avoid standardized thinking, however, by architects or engineers. A man who has done large numbers of schools may have high merit or may have had only stock ideas, which are always expensive.

43. Choose professional help with care. The fact that schools have risen in cost less than any other building type is due primarily to architects, educational consultants and engineers with imagination.

44. Avoid the false economy of getting cheap professional help or dispensing with it altogether. No plane can fly that has not had the benefit of science; and the flight of education is vastly more important, more complex.

45. Try occasionally taking in a young architect or an architect who has done no schools. His ideas will be fresh, and you can avoid paying for mistakes by getting him to associate with a more experienced man.

46. Remember, in no field of schoolhouse construction is imagination more important today than in the financing.

47. Watch the bond market like hungry hawks. The difference between 2% interest and 3% interest is something like 20% of the cost of the building.

48. Do not feel confined to the bonded debt limit. Work with all other good men to get it lifted. It was humanly made, and long ago for an earlier condition now nonexistent.

49. Investigate the various new methods of lease-purchase if you cannot get out from under the bond limitation.

50. Remember our children are the purest gold we have, and no economy is real that tarnishes their chance for a magnificent future. The future of these children is America's future.
Long-range planning to reduce the high cost of land acquisition

Land has one steady characteristic: its price seems always to rise as population becomes more dense.

No school board can dodge its responsibility for acquiring land at the earliest possible moment, but this requires long-range planning and a district large enough to have a range of choice.

Major savings have accrued to districts acquiring land well ahead.

State aid. So that districts financially less opulent may acquire land ahead we recommend state provisions similar to those of California, where the state advances funds to districts announcing their need for a new site in a new area, holding the site in trusteeship for the district up to five years.

The scandalous situation in large cities such as New York, where the school board must give advance notice of sites chosen and then wait often a year or more for processing by a whole string of city agencies, thereby against its will giving a field day to land speculation on the site in the interval, must be removed from the realm of possibilities.

School boards must work early with land developers. Because fresh subdivision on raw land so often creates a roaring need for new schools, it is a galling condition for school boards to have had no forewarning of the development and to find no adequate provision made for schools by land developers. Too often land must be condemned at high cost because new houses are on it.

Some relief is imaginable, where a really large new subdivision is held in single hands, through ordinances which require an arrangement for suitable school land to be made before the city will furnish services. Yet the vast majority of US subdivisions have 20 houses or less, and any statute making so small a developer responsible for school land is unthinkable. Boards will be better advised to make a habit of contacting developers as early as possible to educate them on the importance of good schools to their own success. Cases are known where such a direct early appeal has led developers to set aside not poor "unbuildable" land but adequate school sites.

Where residential "redevelopment" is done in existing urban areas, aided by city, state or federal funds or benefits, there is no excuse for failing to make provision for an adequate school site in advance of reconstruction. Most unhappily, this has happened in our largest cities.

Lease-sale arrangements are a new device worth exploring, whereby the developer builds and rents the school to the district which thereby gradually acquires title without stretching its bonded debt. But greatest care must be used so the board retains full control over the details of planning and construction, appointing its own architect and consultants with full power.

Sharing of land and buildings with other civic enterprises is an opportunity grossly neglected today. An extreme case was an eastern community where a school for 2,000 pupils lived for many years on a cramped 3½-acre site before anybody thought of using the 30-acre park across the street, owned by the city, for its playground.

We recommend to all school boards that they attend to the example set by Grand Rapids, where the board of education and the city have a standing agreement covering joint purchase and joint development and operation of combination school and park sites. Where such joint action is undertaken it is important that the cost be equably shared, lest the school board seeking an economy end instead with an extravagance.

Similar savings can be effected by correlated civic building programs. Many a town thoughtlessly though enthusiastically supports the construction of separate auditoriums for the city hall (for rare political hearings), for the veteran's organizations (whose meetings are intermittent), for scouts or firemen or lady's aid societies. We recommend as a model the planning of the Canadian town of Kitimat, where a correlated survey has been made for economical construction of all civic halls for maximum use. If the decision is that the best place for an auditorium is the school, then other civic organizations should help the school board in financing it. Let school boards also explore the advantage of the "capital budget," thus associating school-board needs in an agreed-upon integrated plan.
3. Better programming to make classrooms do a full day’s work

The great waste we are aiming at here is the “dark classroom.” Supposing that the best possible programming of the school day results in use of classrooms 90% of the time, then a classroom that is “dark” and unoccupied 50% of the school day represents a building dollar spent for only 55% of obtained value. “Dark classrooms” are chiefly due to the following misconceptions which we join in urging school superintendents and teachers to combat vigorously:

- **Overspecialization.** Said a superintendent member of the forum: “Three years ago I was shouting for teacher participation in school planning. Today I fear such participation because the method has so often been wrong.” Department heads in high school in particular can greatly overexpand the total plant by fighting, each for his own department. Only the superintendent can wisely guide departmental planning into channels of cooperation and concern for economy of the whole.

- **Unexamined educational dogma.** Though this forum has no intention of prescribing or advising on methods of education, it yet must point out that some of these lead to high building expense. For example, in a case now in progress, insistence of principals that every high school student start the day in a standard classroom used as a “home room” means that a school will accommodate 1,200 instead of 1,500 pupils—in other words, the cost will be a full 25% higher. Is this not a high price to pay for the privilege?

- **Thoughtless scheduling.** The art of balancing schedules to secure the best, both in educational effectiveness and in building utilization, is complex. Different ways of handling schedules can lead to wide differences in building utilization, hence in economy. Here the educator can lose more than the architect can possibly save.

- **Wasting “spare hours.”** Schools built so they can be used only by day, never for night classes or adult education; school programs that pay no attention to the three summer months between mid-June and mid-September—these may yet be with us for a long time but they spell waste.

4. Restudy of the building to see what can be subtracted and added

There are two ways to approach real economy in planning and designing the building itself, both good. The first is subtractive: to start at the top of the existing kind of building and see what can be taken away without really impairing education. The second is additive: to start at the bottom with zero and decide to build only what we really need, where frills will automatically be left out.

We recommend that both approaches be taken and checked against one another; but with the added note that the second, the additive, method is the most promising and yet the least tried.

**The subtractive process, starting at the top, involves these steps:**

- **First to go:** cupolas, parapets, fancy roofs. An upstate New York firm of school architects of long experience sadly buried its founder three years ago but gladly buried with him the repertory of cupolas, parapets, columns, urns, “adjuncts” that he and his school-board patrons had so dearly loved. The firm found at once that it could now build schools for 15% less. And the new schools were no less handsome, either.

- **Second to go, the upper floors.** We make no recommendation for the universal abolition of upper floors but merely say that where it has been possible to plan schools on a single floor these have generally been less expensive. Last year 76% of all schools built were one story and the proportion is rising. Safe upper floors require fire-safe stairs and most costly Class A or B fireproof or fire-resistant construction, whereas a ground-level, one-story school offers instant evacuation of pupils and may justify use of less precaution in the structure. (For insurance, see later discussion.)

The contention that a second floor saves by sharing the same foundation and roof seems to be erroneous because of the extra fireproofing and the extra areas needed for stairs and circulation.

- **Third to go, the basement.** Again we make no recommendation for universal abolition of space below grade but observe that today’s structural methods generally favor the basementless building and a great many buildings are being thoughtlessly planned with basements that introduce less desirable space at no cost saving or even a higher cost.

**The additive process,** starting with zero construction, begins as one member of the forum said, in “the cow pasture” and progresses to the multi-use corridor:

- **Not necessarily must all education take place under a roof!** In rural areas in particular, and in all schools, the out-of-doors is an almost wantonly neglected educational resource today both for learning and for sports. With a wealth of environment all around them our children are falsely taught to observe only what they see in books, and many a wall we build isolates children...
from education instead of furthering it. The classical story of the boy graded down for answering that robins appear in October instead of May is a case in point. He had been printed in New England but he lived in the South—and he was being discouraged from believing what his own eyes had faithfully seen!

Again, in areas rich with opportunity for outdoor sports all year, whether warm-weather areas favorable to year-round outdoor games or cold-weather areas favorable to skiing, skating and hiking, not necessarily does an effective health-building program at elementary school age demand an elaborate gym.

> Not necessarily does all education requiring shelter require walls also—it may require only a floor and roof. No comprehensive survey yet exists of what can be done with “outdoor” shelters.

> Not all classrooms need be walled in on all four sides. Emergencies have taught us that some teaching can be done in corners of rooms marked on the plan as “cafeterias” or “gyms” or “auditoriums.” Such teaching would be better if the architect had it in mind in his initial plans. Again, in some Texas schools teachers have reported favorable results from throwing together two rooms, leaving only low barriers of furniture.

> Not every passageway needs walls. This is a major source of possible savings. Long since, warm-climate architects have designed “corridors” as outdoor passages sheltered only by an extension of the roof. Yet that is but a beginning. Even in New England, advanced architects are now planning schools wholly anew, as “campus plan” groups of clustered “little houses” where the only connecting link is a mere rain canopy. The brief exposure while moving rapidly from class to class is not a health hazard, especially compared with the danger of wearing warm clothing in overheated rooms.

And in the Detroit area the walls have gradually been melting around indoor corridors. First, teachers decided they needed only glass between the room and the passage; then that not even glass was needed; finally that the passage area might better be absorbed as an extension of the classroom! This raises some problems of safety of exit but they are easy ones. (See p. 161.)

Adding such challenges together, teachers and planners may end with a school “built up” to a mere fraction of earlier ones and yet not worse but better for purposes of education. The wallless corridor, for example, becomes the multi-use corridor.

> Not every school that is getting a cafeteria really needs it. Shocking though it may be to many an older school man to think of the “mess” of children eating in their own rooms, modern invention in food heating and food serving makes it possible to give children this sociability and this educational experience; and modern classroom furniture minimizes the mess. We by no means advocate abolition of all school cafeterias but urge a selective policy in determining how food is to be served.

> Not every school, and especially not every elementary school, needs the big auditorium that is now being planned for it. In elementary schools a too big auditorium is in fact directly contrary to educational benefit. And where a high school does build an elaborate room, not merely for its own use but for that of the town, the school board should not be asked to act as an elemosynary body but the construction cost should be shared. Again, in many a town the high school might better use, at least temporarily, existing auditoriums that stand vacant most of the time. There is, as we have already remarked, great need for more correlated over-all civic planning.

> Not every school, and especially not every high school, really needs the big double gym that is being planned for it. In many a US community it is an open question whether the town builds the high school primarily for education or for training up the young gladiators called the Basketball Team. Where education is primary, a smaller gym can sometimes make the school possible instead of not possible, and boys and girls can be rotated in using the same floor. Though one member of the panel emphasized the value of competitive sports, no one has yet advocated building bleachers in classrooms to rouse competitive spirit.

> On the other hand, despite much recent talk about multi-use of all common facilities, so the cafeteria doubles as class or rumpus room, and the gym as auditorium, we advocate caution lest the economy prove false and lest education suffer.

5. Intensive use of nonclassroom facilities to save square footage

Not only parents but also experienced school men may be shocked by realization that not over one-fourth or one-third the total area of many a school is devoted to “classrooms.” The rest is given not only to administration and circulation but to gyms, auditoriums, cafeterias and their adjuncts. Despite recent thinking on “multi-use” of such features, there are other avenues toward true economy.

> Not every school that is getting a cafeteria really needs it. Shocking though it may be to many an older school man to think of the “mess” of children eating in their own rooms, modern invention in food heating and food serving makes it possible to give children this sociability and this educational experience; and modern classroom furniture minimizes the mess. We by no means advocate abolition of all school cafeterias but urge a selective policy in determining how food is to be served.

> Not every school, and especially not every elementary school, needs the big auditorium that is now being planned for it. In elementary schools a too big auditorium is in fact directly contrary to educational benefit. And where a high school does build an elaborate room, not merely for its own use but for that of the town, the school board should not be asked to act as an elemosynary body but the construction cost should be shared. Again, in many a town the high school might better use, at least temporarily, existing auditoriums that stand vacant most of the time. There is, as we have already remarked, great need for more correlated over-all civic planning.

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> On the other hand, despite much recent talk about multi-use of all common facilities, so the cafeteria doubles as class or rumpus room, and the gym as auditorium, we advocate caution lest the economy prove false and lest education suffer.
6. Careful study to bring mechanical equipment in line with need

Today's schoolhouse is composed up to 35% of mechanical equipment, as compared to the early school that depended on a stove, a pump and a pair of outdoor toilets.

Overdesign of mechanical equipment is a major source of waste. Overdesign of heating plants can add as much as 10 to 15% of needless cost. How many mechanical engineers know that the ASHVE Handbook lists "alternate" values for winter design temperatures for most US cities 10° to 12°F higher and consequently less costly? How many mechanical engineers have acquired a clear understanding of the difference between heating schools and other kinds of buildings? What sense does it make to supply boilers sized to produce comfort on the coldest night of the year when nobody is in school? The problem is how to have the building warm enough when children arrive at 9 in the morning. After school opens, so much body heat and often so much electric-light heat is given off that the usual problem is how to keep classrooms cool rather than how to keep them warm. How many engineering designs acknowledge this? How many avail themselves of solar heat that can pour into the classroom, properly oriented, in the morning? Is there recognition of the difference in metabolism between adults and children? Are not schools designed for adults, not too warmly clad, rather than for vigorous children? Further economies in heating could be achieved if educators were willing to accept gymnasium heating standards that meant sacrifice of the gym on the very few days of excessive cold. Questions of ventilation and of plumbing are dealt with in the next section.

7. Revision of obsolete codes to protect, not exploit, the child

We call attention of the American public to the fact that school boards and their architects must today climb a veritable mountain of codes before they can start digging a foundation. This begins with city building codes, continues through fire marshal regulations, underwriters' codes, insurance ratings, and concludes with state school codes. Eternal vigilance is required to prevent codes, which are an essential safeguard against ignorance and skulduggery, from becoming the very matrix of ignorance and skulduggery. There are a certain few politicians, certain few manufacturers, certain few labor leaders just as ready today to exploit children as were the early despised exploiters of child labor.

Generally speaking, however, state school codes are administered by devoted men hampered by broad misconception of other people.

We believe all states must depart from the "statutory" form of school code, as a great many already have. This form makes every regulation a subject of separate legislative enactment, so men who do not understand the technicalities involved not only set the rules but make them impossibly cumbersome to correct.

The recent emancipation of Connecticut's boards of education from restrictive codes is not expected to result in less safe, less usable, or less economical school structures. We recommend that legislatures not only delegate the details to administrative officers under broad definitions of policy, but also that such administrators be instructed to set standards of performance and not dictate the expedients so long as performance is attained.

For example, all will agree that adequate and well-distributed light is of utmost importance both to health and learning; and objective standards of good lighting quality have been agreed to by the American Standards Assn., the Illuminating Engineering Society and the American Institute of Architects together. Yet the pursuit of such quality is best left to architect and engineer. When a state code requires, as many do, that room ceilings must be high for the sake of better lighting, then such codes are merely insisting on a method predicated on early unilateral daylighting design which antedated the wonderful improvements in multilateral daylighting design, in new kinds of glass and plastics and in the electric lighting of the past two decades. No motor engineer could improve engine efficiency with a legislator at his elbow dictating stroke and piston displacement!

Again, fire safety is universally desired. Yet the many states which still apply to one-story schools the same rigid fireproofing
that made sense for yesterday's three-story schools are raising costs to no purpose. If children are the primary concern (as they should be!) then the instant escape possible at ground level directly from the classroom makes a properly designed and planned one-story school built of wood actually safer for the child than the best fireproofed three-story school. Again, if children are the first concern rather than the structure, even the best fireproof building must be considered a stove which can stand unharmed while the contents burn freely. The principal loss of life in recent fires has come from noxious fumes released from the wall covering and other flammable contents which are present inevitably. Again, if extreme precaution against fire is considered necessary even in a one-story wooden building, then it should be recognized that a wooden building with sprinklers is safer than a completely fireproof building without sprinklers.

Fire marshal regulations concerning schools are in many cases conceived in dense ignorance of children and their behavior and some of them would be actually murderous in the case of fire. To every state governor concerned with undue school costs we suggest calling a meeting of the best school administrators and architects with the fire marshal to cut out the finespun theoretical nonsense from the fire regulations.

Insurance rates and fire regulations are interwoven and we ask all forward-looking insurance companies as a patriotic duty to meet similarly with school administrators and forward-looking responsible architects with a view to reducing rates where advancing techniques of design have reduced the actual risk.

Ventilating requirements of a great many states are so antiquated as to rest on theories of health found incorrect in 1888. The demand in some states for 30 cfm of fresh outside air per pupil fails to note that this is more air than a track champion could breathe after a 2-mile race. Today's maximum demand for ventilation is in the interest of adequate cooling for the room, not of fresh air for occupants to breathe, and although large quantities may still be desired, there is no need whatever for all this air to be fresh and heated, with the enormous added heating load which this creates.

City and state codes further complicate the search for economy, and cities which have yielded to entrenched interests are now hoist with their own petard. Not only do many state statutory codes insist, for example, on more toilets than even an epidemic could demand, but on top of that almost every community has a local plumbing code which makes all plumbing—including plumbing for schools—cost far more than is necessary.

A great many communities have plumbing codes whose requirements are in excess of those developed by the leading sanitary engineers, the US Public Health Service, the Department of Labor and other authorities for the new National Plumbing Code. The school plumbing bill runs more than 10% of the total construction bill and most communities will find adherence to the National Plumbing Code one of the quickest ways to reduce school construction cost.

A great many communities have an electric wiring code whose heavy requirements are in excess of the safety requirements of the National Electrical Code. There is no excuse for this.

A great many communities have construction codes that are far behind the times and forbid architects to take advantage of many good new materials and construction economies. These communities could cut their school costs and all other construction costs by adopting one or another of the standard codes and keeping updated each year by reference or renewal.

The waste caused by mischievous codes is much greater than the sum of specific little wastes which the codes require. By far the greatest waste imposed by obsolete and conflicting codes is that they block the progress of standardization and the development of standard prefabricated parts and assemblies of parts that have been the greatest source of economy in every other industry.

8. Standardization without loss of self-respect

—not stock plans

It would be a mistake to blame all waste and all lack of standardization in school construction on conflicting codes and antiquated state requirements. A great many opportunities to economize are being missed by failure to capitalize on standardization already possible or available. We sympathize with the aims of those hardheaded businessmen and legislators who have been seeking adoption of "stock plans"either in the form of ready-made prefab schools or in the form of plans drawn by bureaucratic designers for whole states or districts. It is notable, however, that in 53 cities of over 200,000 population surveyed by the AIA school committee, 18 school systems use private architects exclusively; 23 systems use private architects but have staff architects to coordinate their work or to perform maintenance or repair work. Four are a combination of the above, and only 5 use staff architects exclusively.

Our first count against the entire stock plan idea is that it is just the not too good first notion of how to achieve economical standardization and not the best latest idea. The people now backing stock plans could serve themselves better with a slightly more knowing approach. Among the states, only ten states have stock plans available—for limited use for small one-room, two-room, or rural schools; 23 states do not use or never have used stock plans; 12 states that formerly used stock plans have now abandoned them.

continued on p. 192
CASE STUDIES of the latest trends in

Cluster planning... below
Loft planning... p. 141
Core planning... p. 145
Zone planning... p. 151
Smaller windows... p. 157
Multi-use corridors.. p. 161

CLUSTER PLAN—the “little house” or “campus” idea

Instead of gathering classrooms together along corridors, this plan breaks them into separate houses of from one to eight rooms. It usually puts general activities, administration and the like into a main house.*

The cluster is 1953’s biggest news in schoolhouse planning (forecast in AF, Oct. ’52). This is the approach that pioneering thinkers in design and education are exploring today beyond all else—for all kinds of different reasons as shown by the cluster case studies that follow.

Here is what the idea has in its favor:

Educationally: Child-size scale; intimacy; uninstitutional, unregimented atmosphere; grouping into “age neighborhoods”; semi-isolation of disparate activities. Most elementary school teachers who have had experience with the plan (mainly, so far, in actual houses with partitions removed, as a temporary expedient) seem to like it for roughly the same practical and psychological reasons that most mothers would rather live in a house than a housing project.

Economically: Simplicity.

* Note that this point is an especially radical change in high school planning, in which general activities areas are customarily scattered on the periphery of a unified classroom area.

Biologists like to point out that big animals are not big because they are complicated; they are complicated because they are big. Same with schools. “Little house” planning automatically simplifies lighting, ventilating, grading, framing and provisions for expanding. It lowers ceilings and cuts out corridor. It invites bids from a wider range of contractors. It is also a natural in isolated communities for residential-type heating plants using hot air—a possibility that a few finger-plan schools are already trying and that gives promise of economies in sprawled-out plans.

Against the idea are length of utility runs, problems of snow removal in some climates and (in some communities) reluctance to accept the idea of children going outdoors to get about the school. (This objection is raised most seriously for high schools, although the campus plan is old hat to New England’s famed prep schools.)

One complaint: Esthetically most cluster plans thus far (Oak Manor and Heathcote, p. 140, are exceptions) look as if their designers had followed too literally the notion of “an institution broken into its parts.” The clusters have an air of being separated chunks of something bigger, rather than the different things—little houses—that they are. Here is unused scope for imagination. How about some (economical) romanticism? It seems appropriate both to the form and its users.
In Darien, Conn., the cluster plan offers a classic study in
Cluster-type planning has only begun, but already it has produced a design that for economy and amenities looks like one of the classic additions to elementary school thinking. Bids came in 10% below the budget and the town vote for the bond issue was unanimous! This school is so useful as a reference point for these three reasons:

1. It is “generalized”—first requirement of any good prototype. No special conditions determined this solution—only the general problems of a moderately uneven site and the need for reconciling stringent construction and maintenance economy with top-notch teaching space.

2. It strikes a practical balance between dispersal and concentration, getting all the advantages of the first (such as “little schoolhouse” scale and use of existing contours) plus many of the advantages of the second (such as relatively short pipe runs and indoor circulation for the youngest grades).

3. It follows the “little house” idea to logical practical conclusions, therefore is full of sensible innovations ranging from 9' classroom ceilings (possible because of bilateral lighting) to three-purpose vestibules (p. 130). This kind of thinking cancels out the supposed disadvantage of “all that perimeter.”

Some figures: because of lower ceilings and grade-hugging this design has 17,943 gross sq. ft. of exterior wall, compared with 19,616 sq. ft. for a more conventional single-loaded corridor plan worked out for the same site to the same program. This design has only 49 gross sq. ft. of floor area per student, against 71 for the last two elementary schools (double-loaded corridor buildings) built in Darien; but 80% of this school’s floor area is used for education (39.5 sq. ft. per student) against 56% (39.8 sq. ft.) in the two previous schools.
Classroom vestibule treatment solves three cluster-plan problems: how to get economy with multiplicity of slop sinks and of toilets; how to keep many entrances clean. Vestibule floor, backwall and base are tiled, can be hosed. Slop sink is replaced by low faucets and floor drain for bucket filling. Eliminating separate toilet vestibules makes scheme more economical than battery toilets. Washstand and drinking fountain will be bright yellow against chocolate-colored tile. Note (above) the wardrobe doors which slide up to cover the high windows in the visual-aids area.
In Port Arthur, Tex., clustered classrooms enjoy light and air under big, inexpensive umbrella

Because of torrential Gulf Coast rains the architects did not want roof breaks or toplighting in this school. (And rain falls on every US school.)

Because of Gulf Coast heat, they wanted ventilation and plenty of it. (And natural ventilation is good for schools in many other areas.)

Because of economy they wanted natural lighting and compactness. (And economy is a prime requisite everywhere.)

Their solution—a big umbrella with light and air entering between and around the classroom clusters—merits study for drier and cooler climates too; wherever ideas for simplicity of construction and economy of lighting and ventilating are sought.

It does impose one condition that will seem peculiar to many school boards—classrooms with windows looking directly into one another. This is not new for the Southwest and many educators there favor it; they say it gives students a feeling of interclass community and interest, has proved no distraction.

For a very neat idea on how to harness the wind, study the architects' "pressure walls" in the diagram at right.

### PHYLLIS WHEATLEY ELEMENTARY SCHOOL

### ECONOMIES
Outside corridors which double as rain shelter, sun and sky control. A Compact four-classroom back-to-back cluster with central heating and plumbing core. A Repetitive structure. A 9' ceilings (possible because of floor-to-ceiling biangular windows). A Simple umbrella roof with no breaks, parapets, gutters.

### COST
$117,947; $9.12 per sq. ft. A $16,850 total building cost per classroom. A $472 per pupil.

### CONSTRUCTION

### FEATURES
"Pressure walls" facilitating natural ventilation. A Sill forming continuous exterior concrete bench.

### CREDITS

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Four-room groups exploit cluster economy with central cores and peripheral open corridors.
Multipurpose area (view above is toward library shelves over pull-out stage) can be converted from dining to assembly seating 136 in 20 min.; to assembly seating 232 in 45 min. For rare whole-school assemblies, neighboring junior high will be used. School will also experiment with bringing food from junior high in hospital-type carts. (If satisfactory this may lead to central kitchen for town school system.) Teak wall standards for multipurpose area and classrooms bring a merchandising idea to school: they will take 4' shelving or tackboard, chalkboard and acoustic panels. Placement of acoustic panels on walls and vertically from ceiling will be determined by meter tests after construction.
Light for four center classrooms enters through big breezeway bisecting the school. Diagram at left, below, shows light-meter readings with test model. Diagram at right shows poorer results with toplighting and masonry storage cupboards at corners. Toplighted design without cupboards gave test results (not shown) almost identical with final scheme.

“Town common in a breezeway”: Ample outdoor space sheltered from frequent heavy rains is appreciated by adults when classrooms are used for community or parent meetings. Note sill-bench.

Ventilation test results (above) with model show how breeze, meeting mechanical-room wall in breezeway, is deflected into classrooms. Final scheme (see plan and below) has “pressure walls” also at sides.
In Groton, Conn., cluster planning breaks

SENIOR HIGH SCHOOL
Groton, Conn. 26 classrooms, 650 students.

ECONOMIES
Dispersal using existing contours ($75,000 to $100,000 saved).
A Few corridors. A 83% of gross area for educational use.
A Repetition of classroom "houses" (all variety achieved with interior partitioning).
A "Double-duct" air system eliminating steam pipe tunnels ($18,000 saved).
A Light troffers for luminous panel ceiling cast in roof slab ($3,200 saved).
A Painted slab for finished ceiling ($10,000 saved); acoustic treatment on walls.
A Loose-weave curtains for window light control.

COST ESTIMATE
$823,000. A Per sq. ft.: $14, main building; $11, classroom units; $12.65, average. A $31,654 total construction cost per classroom.
A $1,265 per pupil.

CONSTRUCTION
Slab on grade. A Reinforced concrete structure integrating air heat ducts and luminous panel lighting.
A Glass walls with aluminum sash.
A Brick and cinder block walls.
A Lally columns and rigid steel frame in gymnasium.

FEATURES
Classrooms are outlying elements, special rooms are central (instead of usual reverse).
A Cafeteria equals "town common," doubles as gallery, informal meeting place, equates eating with sociability, leisure.
A Classrooms grouped according to pupil use, not departmentalized by subject.

CREDITS
Warren H. Ashley, architect.
Marchant & Minges, engineers.
Charles Currier, site planner.
Engelhardt, Engelhardt & Leggett, educational consultants.

THE MAGAZINE OF BUILDING
Campus plan for senior high school has classroom units of identical size and construction, varied by interior partitions. Rendering shows main building and four “learning units” to be built in first stage; plot plan shows eventual addition of four more units. Eliminating most corridors gives an astonishingly high (83%) proportion of total area for educational use.

a senior high into 150-student neighborhoods,

creates a hedge against obsolescence

The educational revolution that began transforming elementary schools 20 years ago has never been followed up in the high schools. Educational Consultants Engelhardt, Engelhardt & Leggett suspect it will be. They fear that most of the plants to go up in the coming high school building boom will feel like so many strait jackets in another two decades.

Clusters at Groton’s senior high are calculated to avoid such educational obsolescence, come what may. The Engelhardts and Architect Ashley think they will accommodate gracefully any kind of setup—orthodox classes in amiable isolation one from another or thoroughgoing “core curriculum” (projects integrating various subject matters); lone teachers or teacher-teams; or any mixture of methods. In any case, they like the idea of breaking the bewildering and amorphous senior high mass into 150-student “neighborhoods” related to a “community center.” As enrollment grows, more “neighborhood units” will simply be added at a cost of about $80,000 each.

Ashley reports that, equipped and ready to operate, the school will cost about $120,000 less than any other Connecticut high school of equal size to date.
In New Orleans, classrooms are clustered in detached two-story units to make most of cramped site and construction economy.
How to get 107,000 sq. ft. of building (not counting outdoor corridors or overhangs) on 90,000 sq. ft. of land?

This is the kind of problem every big city faces; the obvious (and usual) answer is a compact block of a building with the open land thus saved becoming a pathetic token of a school yard.

New Orleans has made a bold and admirable departure. This cluster plan uses token leftover land to give maximum visual relief in a slum area that badly needs the sight of green and open patches among buildings.

These two-story classroom clusters proved remarkably economical too, a fact that also recommends the idea for sites with more elbowroom than this. They add the economy of two-story construction to the cluster’s innate simplification of lighting, ventilating and construction problems. The design seems not to take full advantage of cluster possibilities however; it ignores the interesting and tricky problem of how to get fullest economy of corridor space in a multi-story cluster.

**The four two-story classroom clusters** are at right in the model photograph, the F-shaped unit for special and elective facilities runs down the center, and “noisy” facilities are at left. A public park with playfields is across from the “noisy” units; eventually street between school and park will be closed.

**Below: view of classroom cluster** as seen from the second of the three corridors linking “electives” building with the classroom groups. Classroom walls are set 3' 6" behind the rear face of columns; on south and west side (as seen here) metal louvers are hung outside the wall, between columns, for sun control. Windows are awning type except for the top pane, between beams, which is fixed. Opaque portions of the wall are cement asbestos.
In Fairfax, Calif., the rooms are clustered in

**OAK MANOR ELEMENTARY SCHOOL**
Fairfax, Calif. 270 students, 7 classrooms.

**ECONOMIES**
Laminated wood arches, Y-shaped, use only one post instead of two for equivalent rigid frame (cost of Y-arch $500; cost of conventional laminated arch to do same job, $575). Open corridors. Multi-use room doing quintuple-duty as lunchroom, assembly, indoor play, rainy-day activity rooms and theater; total area of this unit is less than 4,000 sq. ft. (separate lunchroom, playroom, theater would have required 4,900 sq. ft. more plus connecting corridors at $60,000).

**COSTS**
$199,141. $13.80 per sq. ft. $28,410 total building costs per classroom. $740 per pupil.

**CONSTRUCTION**
Y-shaped, laminated wood arches (see section), three-hinged, 12'-3" o.c., span 28'. 2" x 8" framed stud partitions between classrooms, finished with plywood. Roof-ceiling of acoustic tile. Pitched roof framed with 2" x 8"."

**FEATURES**
Very intimate appearances; it looks as if every classroom were a little red schoolhouse all by itself. Fire rating of laminated timber structure as good as, or better than, light steel, at lower cost. Excellent bilateral lighting and good acoustics due to roof pitch. Flexibility of class-rooms greater than in usual masonry partition schools. Independent use of each school unit easily possible.

**CREDITS**
Beautiful setting, at foot of hill and among bay and oak trees, suggests a pleasant country school. Wavy roof line echoes silhouette of hills. Low-hanging branches were preserved to encourage tree-climbing.

three separate units
to reduce scale and cost

This "school of many gables" is of special interest because it so neatly combines the educators' "little house" ideal with an engineer's ingenious invention. And on top of that it is as charming a piece of architecture as the year is likely to bring forth.

Architects of elementary schools, where rooms are almost certain to stay fixed for keeps, have always had their choice between building the supporting structure either lengthwise to the building or crosswise to it. The advantages of a school made up of a series of cross walls are these: 1) the walls are usually of masonry and sound insulative, 2) the roof is spanned from wall to wall and no supporting members have to be built in with the glass, and 3) the school can be designed if desired with a series of little gables making each classroom a little house. (Architects seem never to have thought of this.)

In this school architect John Lyon Reid worked a double change on the cross-wall little house school. First, in place of the usual bearing walls between rooms, he made his structure of a series of rigid frames of laminated wood. Next he built these rigid frames themselves in a highly original and completely logical cost-saving manner. The usual wood frame arch is composed of two boomerang-shaped posts that meet overhead. But Reid made his posts Y-shaped. Each post, instead of helping to frame the classroom on only one side, now helps to frame a classroom on either side, contributing half an arch to each. These Y-shaped posts are not only balanced (unlike the boomerang) but can be made lighter because they are cantilevered both ways and compel the side thrust of one gable against that on the opposite side.

Kindergarten wing is two "houses" with glass gable ends. Redwood siding fogs up to screen separate toilet facilities. Architect Reid says that special sash in gable ends was somewhat costly, but laminated arches more than compensated for extra expenses.
More clusters: 1. One-room schoolhouses extract 100% educational use from a little site in this design by Architect John Carl Warnecke. It is for a kindergarten and primary annex to an existing school across the street in San Carlos, Calif. Warnecke tied the units together with a skylight-covered open corridor which becomes an integral part of the roof where it intersects the buildings. The scheme gives each room both its own yard and access to covered outdoor space, and beautifully satisfies a requirement that "each classroom provide a transition between school and the child's familiar home and yard."

Construction is almost completed; in a forthcoming issue FORUM will present the finished school in detail, together with the thinking behind the design.

2. Patriarch among cluster plans is Perkins & Will's Heathcote elementary school at Scarsdale, N.Y. It is a young patriarch indeed, with construction only now nearing completion. In a preview of Heathcote one year ago FORUM pointed out that Perkins & Will's seemingly startling notions bear watching as forecasts (AF, Oct. '52); the fact that their dispersed clusters of classrooms were then almost unique is a commentary on how fast design is moving.

Perkins & Will settled on this scheme not for economy but for educational value, were able to give each cluster the benefit of an activities corridor.

Another commentary on rapidity of school design change: a year ago the idea of leaving connecting corridors open in the Middle Atlantic climate was too radical to consider.

3. British variation on the cluster-plan theme is this cross-shaped school by Architects F. R. S. Yorke, E. Rosenberg & C. S. Mardall for a primary school at Kidderminster. Austerity has made British school architects past masters at eliminating non-educational space; ways of achieving child-size scale has long been a livelier topic there than new wrinkles in lighting or heating. One result: this cluster-like plan with circulation cut to a minimum. Non-educational space savings beyond austerity regulations have gone into bigger classrooms.

The building is prefabricated with 4' plastic sheathing panels. Extruded aluminum shapes form edging strips and columns to carry 2" x 9" roofing timbers; a second series of 2" x 9"s crosses the first at right angles with bolts at intersections. Construction of this unusual school addition is now under way.
THE LOFT PLAN

—economy of compactness

This kind of planning puts the school into a compact, short-periphery block and uses economical toplighted interior space. The first loft plan was a hypothetical scheme commissioned of the late, brilliant Matthew Nowicki by FORUM as a new approach to economy for its 1949 School Reference Issue. Rarely has a hypothetical solution proved so fruitful or borne out so well the economies expected of it.

All the major possibilities of loft-plan economy were encompassed in the “FORUM school”: absolutely standard bays, short perimeter, short communication lines, corridor put to double use. But as shown by the case studies following, the advantages of loft planning are not dependent on theoretically pure exploitation. For instance, while Reid (below and p. 142) does use the repetitive bay, Smith (p. 143) has put his classrooms into structurally separate groups, then roofed over the common space between. Smith does use the interior for circulation and general activities, while the school by Caudill, Rowlett, Scott & Associates (p. 141) separates activities and circulation (and thereby manages to keep toplight out of the auditorium). And Reid, while adopting the fundamentals of compact block, toplight and repetition, has created a school unlike any dreamed of (at least articulately) before.

Two principal problems of the loft plan are noise control and circulation. Smith’s and Caudill’s designs exemplify opposite views on noise. Caudill points out that much of the time windows of adjoining classrooms will be open and that this gives only a 25- or 30-db reduction in sound; ergo, why aim for more in interior partitions if the noise will come in anyway? Smith (whose activities space backs right up to classrooms) uses bearing-type partitions with insulated cavity, backed up by cabinets. For three very different treatments of loft circulation and toplighting, see the case studies.

In Hillsdale, Calif., the economical loft plan is pushed to the limit and divided with a central court into twin blocks

The academic block of this 1,750-student senior high will test the loft-space idea on the biggest scale yet. For that reason and because Architect John Lyon Reid uses toplighted interior space not for general activities areas, as in other loft schemes, but for classrooms, this is one of the most controversial schools in years.

Reid’s big academic rectangle is completely flexible—movable interior and exterior partitions plus space for adding more rows of 28’ square bays make all kinds of arrangement possible, including pushing courts into or through the mass. The school will not go out for bids until December, but already Reid’s rearrangements of his flexible loft space on paper demonstrate some fundamental points about big-block school planning.

When FORUM previewed this school a year ago Reid’s classroom area was a single 82,320 sq. ft. block—7 bays wide, 15 long. His final scheme now bisects the block with a two-bay-wide covered
court, lobby and open garden area. This gives him in effect two classroom blocks of 41,160 sq. ft. each. The total academic rectangle is now 17 bays long instead of 15.

Reid made the change "for two reasons of equal weight: cost and amenity."

By bisecting the block, he was able to go from Type I construction (required for fire safety in the first version) to Type IV. This saving will at the very least cancel out the over-all addition of 10,976 sq. ft. of covered and open court. And although the number of interior bays remains the same, there is a gain of about 5,000 sq. ft. of classroom area because of saved corridor space in the two smaller enclosed blocks.

A glance at the two plans shows what Reid means by "amenity." The final scheme is more in accord with human scale, will be infinitely easier to navigate and gains immensely from the spaciousness of the central court.

What about those inside classrooms? Well, at the University of Michigan where the lighting studies were done, they have a full-size model of an interior classroom. Reid spent two full days in it to see if he got claustrophobia; he did not. Other visitors have not only made no complaints on that score; they have professed themselves delighted with the room's pleasingly lit, airy atmosphere. (For detailed accounts of the integrated toplighting-heating-ventilating units, see AF, Oct. '52.)

Cost estimate:

Total building cost . . . . $3,217,925.00
Per sq. ft.
academic area . . . . .15.37
shops and boiler room. 12.22
cafeteria, little theater. 12.92
gymnasium . . . . .15.20
music department . . . .17.00
auditorium . . . . .19.94
average . . . . .14.90
Total building cost per classroom . . . . .51,900.00
Per student . . . . .1,839.00

Plans at right contrast old and new schemes for big, loft-type academic block. The new scheme is bisected by a wide entrance court and central corridor, sketched below, which has square gardens down its unroofed center.
In Orem, Utah, the block plan saves land, gets sound and circulation control with eight stubby entries

"Instead of thinking of this compact scheme as a large unit (1), we started thinking of it as a group of small units (2) backed up on a common area. Roofing the common area gave a large space economically. Each classroom's entry (3) leads both to the common area and to the outside."
In Electra, Tex., bulldozers dig down inside the block plan to get **dropped multipurpose space** under a cheap, simple roof.

**ELECTRA JUNIOR HIGH SCHOOL**
Electra, Tex. ▲ 13 classrooms. ▲ 383 students.

**ECONOMIES**
"Geometry of compactness," horizontal and vertical, cuts out about one-third of usual area. ▲ Loft plan with deep class-rooms, educational use of in-terior. ▲ Pitched roof embrac-ing in one gentle slope every-thing from 7' overhangs to high assembly space. ▲ Additional central cubage bulldozed out of ground. ▲ Bids came in so low, air conditioning (for summer community use) and an extra bay for gym were added.

**COST**
$317,323.40. ▲ $9.83 per sq. ft. ▲ $24,409 total building cost per classroom. ▲ $828 per student.

**CONSTRUCTION**
Slab on fill. ▲ Pipe columns. ▲ 5' x 12' wood beams over classrooms, wide flange sections over gym and auditorium. ▲ 2" x 12" wood joists throughout.

**FEATURES**
Low and intimate child scale. ▲ Entrance court for outside dining, milling around. ▲ Library-dining space (compatible furniture) serving also as lobby-lounge and assembly overflow for graduation or Christmas crowds. ▲ Kitchen (and cooking odors) pulled back from multi-purpose areas. ▲ Ingenious natural ventilation for activities space, corridors and all but one classroom (see diagram). ▲ Big outdoor covered play shed, protected on north. ▲ Tackboard (cork) on 2" x 6" studs doubles as partitioning for one wall of each classroom.

**CREDITS**

**Wind test** shows how corridors take in breeze, pass it to classrooms through low wall vents. Corridors also pass light to classrooms through glazed upper walls.

Photos: Elric Moore—Dallas
In an effective maneuver to defend their building budgets, a number of US architects (particularly in southern climates) are grouping their classrooms on a central service stem, or core. The plan is a modern parallel to Kipling’s hollow-square regimental defense against the enemy in that it presents a tightly grouped set of classrooms, back to back, side to side, with a shortened ring of exterior wall. In the center, on the stem, are vital services like plumbing, heating, electrical lines.

With a few blocks you can discern the great advantage of a central service core.

Think of these as six classrooms, each 25' x 36':

Lighted and ventilated in the conventional way around the periphery the classrooms will probably have to be arranged this way:

Call the exterior wall 316' long in this case.

But if you can depend on the center of your wing, the spine, for services like light and ventilation, you can arrange your classrooms this way in plan:

You have saved 22' of exterior wall length; and you have discovered the great advantage of the core scheme. With a wing of 12 classrooms the advantage really amounts to something: 16\% of exterior wall.

You may also have saved considerably by consolidating and thus shortening your pipe runs, and you will probably save every winter on your heating bill because the shorter exterior wall area will lose less heat. On the other hand, the latter savings will probably be eaten up by the extra cost of lighting the interior end of the deep classrooms electrically or by skylight.

The core idea, in its simplest application is this, in section:

It is a typical classroom wing of De Anza high school by Architect John Warnecki*, which will be built in El Sobrante, Calif., with a pipe trench running down the middle of the finger-plan school between the back-to-back classrooms.

A more sophisticated application, the Foster junior-senior high school in Seattle by Architect Ralph H. Burkhard (AF, May '53) has an actual service-core corridor built into the structure.

There is one small worm in the core plan, especially for cold climates. Really to exploit the idea, exterior corridors should be used, and this is a hard thing to do in multistory schools.

But for a resplendent example of how good a core school can be, see the next five pages.
In Laredo, Tex., a school is built around a plaza, although this school sprawls luxuriously around an expansive central plaza, it is not an expensive school. To balance the genial atmosphere of hospitality which they brought to this design by including the pleasant open patio for between-class society and community functions, the architects had to develop an ingenious cost-killing utility system which justifies all the design aspects of the structure. For, postponing the problem of utility, they first had visualized a school as cheap as they could make it good.

To do this, they 1) set the classrooms back to back the short way and used outdoor corridors, cutting the expensive perimeter 14%, and 2) pushed the ceiling down to 9'-3" height. Then they refused to accept the normal penalties of both these moves.

The first penalty should have been lack of classroom ventilation. Short of an interior partition that could stop sound but not air movement there was no answer to that. So they invented the breathing service core shown on the opposite page.
LAREDO JUNIOR HIGH SCHOOL
Laredo, Tex. • 25 classrooms. • 800 students.

ECONOMIES
Deep back-to-back classrooms with low (9'-8") ceiling and flat roof; savings, compared with double-loaded corridor arrangement with long wall to exterior: 368' of exterior wall plus 4,220 sq. ft. of floor and roof plus 630' of interior wall finish plus 26% of cubage over usual 12' ceiling. A Integration of partitions and teaching aids into "teaching space dividers." A Outdoor corridors. A Compact service core.

CONSTRUCTION

COST
$631,591.95. A $10 per sq. ft. A $25,260 total building cost per classroom. A $800 per student.

FEATURES

CREDITS

Service core consists of ventilating "corridor" atop a shallow pipe trench.

nourished with a low-cost service core

A service core that breathes. Down the center of each classroom wing is a 2½' hallway that no one but the plumber walks down. Adding only 5' of exterior periphery to each wing, it performs all the services noted above, and is completely accessible. The most ingenious of its abilities is sound baffling. Air enters the core high on the windward side, has to go through a sound chamber before it emerges to circulate through the leeward classroom. The tested decibel reduction is equal to the solid partitions siding each classroom, a 34-db loss (low, but only sensible in warm-weather schools, say the architects). But this is just part of the original thinking in this slick new Caudill, Rowlett & Scott school, the 47th they have done in the last five years. Turn the page for more details.
Lift-slab construction is clearly expressed in corner of school above. Round structure of partially pierced brickwork is a storage shed for garbage waiting collection.

Within the plaza, grass patches are rounded deliberately to contrast with angularity of the rest of the design. Plaza is gathering place between classes, is also used for community affairs. Landscaping is still to be added.

The service core and the structure

The architects pushed to take advantage of their ingenious central-service avenue by jacking up their lift-slab to a ceiling height of only 9'8", but that raised the problem of lighting the inner recesses of the low shoe-box-shaped classrooms. Solution: plastic bubbles.

The perforated lift-slab is expressed beautifully by the exterior vertical walls, which all turn to glass a foot or so short of the slab, proving that they carry no weight. Design of the entire building is very planar except for 1) the half-theater, half-gymnasium vault, which is supported on laminated timber arches; 2) the handsome punctuation mark of a round brick garbage-gasoline storage shelter beside the school.

The architects found that the lift-slab method was $24,000 more expensive than the usual steel frame with wood joists and deck, but picked it as a better fire risk. In this and several elementary schools that Caudill, Rowlett & Scott designed for Laredo, the firm hit the budget estimate within \( \frac{1}{2}\% \).
The service core and the classrooms

The most noticeable feature of the novel service core is the large ventilating grille set in the back wall of each classroom, but there are bigger effects both direct and indirect. The most direct, of course, is the room shape. An economically deep room is permitted. But the service core also pulls all built-ins such as sinks to the rear wall and frees the partitions to become what the architects call...

Vertical teaching surfaces. There are no partitions as such. Instead, Caudill, Rowlett & Scott have transformed all the room dividers into surfaces just as useful—according to the teachers—as the classroom desks. They are made of corkboard, chalkboard, pegboard, or dowelboard, and—most important for fiscal reasons—are not mounted over a wall, as the usual schoolroom aid is, but are nailed directly to the studs, even the corkboard. An estimate of the money saving involved:

Cost comparison of teaching surfaces:
(floor-to-ceiling vs. 4' band)

<table>
<thead>
<tr>
<th>Finish</th>
<th>8' high</th>
<th>4' band &amp; Extra per</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chalkboard</td>
<td>$6.00</td>
<td>$5.10</td>
</tr>
<tr>
<td>Tackboard</td>
<td>6.48</td>
<td>5.16</td>
</tr>
<tr>
<td>Perf. hardboard</td>
<td>4.16</td>
<td>3.16</td>
</tr>
</tbody>
</table>

When teaching surface runs from floor to ceiling it is assumed that the plaster can be eliminated.

The architects let the contract for these teaching space dividers separately from the rest of construction and established that their cost was only 4% of total construction cost. Another advantage: they can easily be demounted and shifted to meet changing demands of fluctuating enrollments. Disadvantage (in more confined climates): doubtful acoustical value.
**Auditorium** under vault supported by laminated timber arches is simple in finish but dignified. View right is from stage. Crown of vault was deliberately broken for acoustical reasons, to prevent focusing of noise down center.

**Gymnasium** is structural continuation of auditorium. It adjoins the plaza (see below) and has an unusual feature (particularly unusual in an economy school): an exterior wall that folds up and disappears.

**Broad plaza**, lying across the middle of the school (below), is a continuation of a Southwest tradition. To the rear of this photo is the vaulted gymnasium with its disappearing wall.

*Photos: Udo Meisel—Dallas*
ZONE PLAN helps control noise, traffic and children

Every plan—whether it is for a house, office building, hospital or school—is zoned. But while zoning is not so very important in a spread-out, articulated plan, it is a "must" in any concentrated, compact layout.

The two schools shown on the next five pages are compact in plan. They have a few wings that shoot off here and there, but, by and large, their plans are highly concentrated. Both are examples of clear zoning that made the difference between a workable school and a nightmare of inefficiency.

Zoning in schools means three things:

1. **Zoning for noise**—isolates noisy areas, separates them from quiet classroom wings (p. 152).

2. **Zoning for use**—links areas of related use, such as the auditorium, the music and art rooms and the shops; or the gym and the athletics field (p. 153).

3. **Zoning by age groups**—separates (in elementary schools) the kindergarten crowd from older children, and the first to third graders from the fourth to sixth (p. 154).

Zoning can be achieved both horizontally (all on one floor) or vertically (by changes of floor level). The TAC & Johnson school on p. 152 is zoned in a horizontal plane only—with noisy areas placed far away from areas used for quiet study and with "related use" areas bunched together. The Perkins & Will school on p. 154 is zoned vertically as well as horizontally, for its split-level plan efficiently separates different age groups, and its "spoke" or "finger" plan keeps noisy areas such as the kindergarten out of the way of classroom wings.

No zoned school can be a prototype—for each school represents a new zoning problem, depending upon site conditions and the local educational program. But these two schools are examples of clear zoning as compared with the fuzzy zoning that marks plans conceived carelessly or hastily. They are also evidence that good zoning need not mean costly decentralization.
In Worcester, Mass., the zoned plan

1. Main facade: has low glazed entry and office wing center

2. Noisy zone: Beyond row of shade trees is one-story cafeteria in a separate wing with the gym connected to the two-story main classroom building (left, below) by a 65' long glazed walk.
helps produce a **fully equipped junior high** for only $15 a sq. ft.

**CHANDLER ST. JUNIOR HIGH**
▶ 37 classrooms or shops.

**ECONOMIES**
Two-story classroom wing with double-loaded corridors. ▶ Highly concentrated plan (perhaps too tightly concentrated resulting in some plan congestion). ▶ No plastered ceilings in shops; steel structure exposed (estimated saving: $3,560, or 25¢ per sq. ft.). ▶ Precast concrete slabs on second floor (estimated saving over poured slab on steel: about $4,500). ▶ Omission of toplighting in second-story classrooms was necessary to reduce the construction bid.

**COSTS**
$1,576,000. ▶ $15.61 per sq. ft.
▶ $42,600 total building cost per classroom. ▶ $1,750 per pupil.

Note: in such a well-equipped school in New England these costs, which include all built-in equipment, are remarkably low.

**FEATURES**
Unusually complete junior high school plant. ▶ Good zoning of plan — all noisy areas are grouped together (auditorium, shops, music rooms at one end, gym and cafeteria at the other). ▶ Quiet areas similarly isolated. ▶ Despite very tight concentration of plan, individual units were planned for separate use — auditorium for community use, gym for use in connection with outdoor athletics area, etc. ▶ Close plan relationship of potentially related areas — auditorium near shops, music and art.

**CREDITS**
Split levels fit the site, are bridged by handsome stairs. Admittedly a slightly more expensive detail, glassy stair shaft is just the kind of thing that sets this school apart from run-of-the-mill institutions.

Ralph R. Smith Elementary School
Hyde Park, N. Y. 596 students, 17 classrooms.

ECONOMIES
Double-loaded corridors. Floor levels closely follow changes in grade. Local stone, taken from nearby wrecked building, cost only 50¢ more per sq. ft. than fine brick, helped to give school a luxurious, well-finished look.

Good materials will reduce maintenance costs.

COST
$1,000,000. $19 per sq. ft. $58,000 total building cost per classroom. $1,840 per pupil.

Because they were opened at the peak of the Korean war, the bids were high. (Another reason: a concrete roof, expensive in a “steel” area, was used to eliminate “critical” steel.)

FEATURES
All finger-plan advantages plus advantages of “spoke plan,” shorter circulation radiating from administrative center.

Only three spokes mean wide, spacious re-entrant angles around central core. Links between wings articulate building, separate different age groups (as do split levels), permit excellent control and separate use of each wing. Glass over lockers (see section) lets corridors borrow light from classrooms.

Kindergarten at the end of one spoke is well separated from rest of school. Glassed-in secondary stair is handsome, practical. Lower-level auditorium is small in scale to suit children.

Clever use made throughout of inexpensive, good-looking materials where they count to take away any “institutional” drabness. Classrooms nearly square in shape for more flexible use.

CREDITS
Perkins & Will, architects.
W. W. Kingston & Co., Inc., general contractor.
In Hyde Park, N.Y., a zoned school uses radiating classroom wings around an administration hub.

A tough break against architects is the fact that the public thinks that good-looking buildings must be expensive, that ugly buildings must be cheap. This discourages ingenuity, lowers pride. Here is a school whose most handsome features add little or nothing to cost. And it has a well-zoned plan to boot: its four wings are spread wide apart to keep the noises of the gym or the kindergarten from the classroom areas; a system of split levels (that closely follow the contours of the site) helps separate other noisy areas (such as the cafeteria) from spaces that demand quiet; and all this has been achieved in a “spoke plan” whose spokes are so arranged as to avoid the usual, ugly, tight re-entrant angles.
Kindergarten looks like a big living room. Stone fireplace, curtains, flowerboxes outside windows make children feel at home. Glass around fireplace increases sense of spaciousness.

Auditorium is deliberately informal to make children feel at ease. At same time, slanting of walls and arrangement of lights help focus their attention on stage. Walls are paneled with pine boards; ceilings are acoustic plaster.

Classroom wings were designed with double-loaded corridors. Section shows usual bilateral lighting achieved through the type of clerestory on which Perkins & Will have generally standardized after much experience (one advantage: it balances solar heat gains). Note unusual device for lighting double-loaded corridors: fixed glass panel between tops of lockers and corridor ceilings permit corridor to borrow light from bright classrooms. Backs of lockers are used for tackboards to display children's paintings.
The movement to limit glass in office buildings is already in full swing. That a similar movement may be starting in school buildings will come as a shock to many of the uni-, bi-, tri- and quadrilateral architects of the country, but here are two examples.

The location of both these schools is northern, and cost is the biggest of several arguments in favor of less glass: 1) there is less heat loss, 2) lights must be on most of the time anyway, 3) less glass maintenance is required, and 4) multistory schools are easier to build with small windows.

But in this economic regionalism is also a hard heart of conviction, particularly for high schools: light with electricity and you will know how much light you can always count on. Glare can be controlled easily. Over-all uniformity in heating is easier to achieve when you cut the unbalancing influence of glass. Circulation can be brisker in an artificially lighted school because the design can be more compact.

FORUM questions this development not on its economics, not on its convictions, but on its architecture. Schools are not basically built for money, or for efficiency, but for children, and enforcing a totally artificial environment on young children may be stealing something from them. School is at best an enforced regime; to tighten this regime architecturally with small-windowed schools may move against the main trend toward relaxed and comfortable educational buildings. FORUM has for some time been interested in smaller windows for office buildings, welcomes the experiment in schools, but is still the man from Missouri.

### In Hawarden, Iowa, low windows, low heat bills, low overhead

Hawarden, Iowa, needs 17 new classrooms, but has only a $233,000 maximum taxable base to pay for them, an alarming fact of life considering classrooms in that climate generally cost $20,000-25,000 per unit.

But bids are in for the new design and it looks as though Hawarden will get the classrooms without exploding its tax structure. Architect Harold Spitznagel designed a straight, simple structure that cuts two cost corners:

1. It has vision strip windows only 4' high and relies for its lighting on fluorescent ceiling fixtures masked with acoustical baffle board (tested light level with shades drawn, 63.6 foot-candles, on desk top with new lamps; 50.5 foot-candles two years later without lamp replacement or cleaning). Disregard for daylighting saved money by permitting classrooms almost square in plan and by allowing selection of lowest cost scheme for exterior wall. From sill up, including porcelain fascia, this wall would cost $26.93 per lin. ft. (see detail) against glassier alternates up to $76.93 per lin. ft.

2. It has a low-cost heating system. Based on the principle of pre-heat and reheat, its central tunnel-plenum supplies 60° air to underfloor ducts made of sewer tile; the air is then introduced into each classroom, through individually controlled reheat coils near the windows. The return is through a hung corridor ceiling plenum.

Bids: General contract—$173,785; heating, plumbing and temperature control—$23,939; ventilation—$8,950; electrical—$21,530.

Says Spitznagel: “Observation of the older buildings had convinced us that most teachers drew the translucent shades to the mid-point of the old double-hung windows and lit the lights, which burned constantly irrespective of the intensity of the natural illumination. We therefore concluded that we would draw these shades permanently by so constructing the building, and thus eliminate the initial cost of the larger glass area, the heat loss and the heat gain resulting therefrom and the maintenance which a glazed area requires.”
In Minneapolis, Minn., a university tests economies of less glass in a cold climate under electric light.
This winter in Minneapolis’ newest high school the lights will be on every school day all day. Reason: in this school the windows are only 3’ high. In no classroom is natural light considered as any part of the source of illumination. Many other schools may also be running their lights constantly this winter—especially if their weather prediction is as dour as Minnesota’s (December, for example, is expected to be completely overcast 16 days, clear 7 days, partially overcast the rest).

But the special point of this startling design is that the lights will still be burning in these classrooms next April and May, when they are turned off in most other modern schools.

This is a glove thrown squarely in the face of most advanced US school design theories and it is not thrown casually. The new high school is the training high school for the School of Education at one of the great US universities, and the decision of these educators to turn away from daylight illumination was not mere whim. Their reasons can be divided into those of 1) economy, and 2) conviction:

Economy. The cramped site on the crowded campus of the giant University of Minnesota, necessarily near the other Education buildings, and the required large number of classrooms made it obvious that rooms would have to be stacked in a multi-story structure. Another demand of the program: square “activity-type” classrooms. That ruled out overhead natural lighting and raised another problem: Minnesota’s requisites for daylighting from the side wall would call for a glass height one-half the depth of the room. This meant a 14’-6” ceiling.

This was turned down in favor of a 9’-6” ceiling with artificial lighting,* and the architects estimate that the reduced volume saved $2,920 per classroom, figuring the omitted cubage at 75% of average. (An estimate by an independent appraiser would place this saving closer to $732, figuring in glass, extra partitions and a $200 allowance per classroom for stairs, columns, pipes, etc.)

Cost of lighting and otherwise maintaining the low-ceilinged, electrically illuminated classroom also was investigated by the

* Classroom 29’ x 32’, 9’-9” high, is lit by two rows of 4’ T fluorescents with leading and lagging tubes for stroboscopic correction mounted on 8’ channels and shielded by a lower bottom (upward component, 194 foot-lamberts on ceilings; downward, 5-5 foot-candles at task level).
designers. Their figures (still using the 75% cubage computation):

Classroom with vision strip—as built
1. Lighting costs per year (electricity at $.013 per kw-h), interest at 3%, 50-year amortization
   a. Owning cost ........................................... $38.70
   b. Operating cost ...................................... 32.20
   c. Lamp cost ........................................... 6.67
   d. Cleaning cost ........................................ 10.80
2. Heat cost (fuel at $1.00 per million Btu delivered).. 31.14
Total cost, heating plus lighting per year ....................... $119.51

Classroom with glass height equal to one-half classroom depth
1. Lighting costs
   a. Owning cost ........................................... $25.80
   b. Operating cost ...................................... 14.26
   c. Lamp cost ........................................... 2.99
   d. Cleaning cost ........................................ 7.20
2. Heat cost .................................................. 64.60
3. Additional building cost per year includes increased amount of radiation and of glass, also blackout shades, plus 4' increased story height. The 50-year amortization of these costs: $2,920/1.000 x 38.87 .............. 114.00
Total cost, heating, lighting plus extra building cost, per year ........................................... $229.05

North elevation does not need baffles on windows.
Stair wells project from flat classroom facade.

Closed-circuit TV system replaces usual glass-enclosed observation booths beside classrooms for university student-teachers studying teaching operation.

Conviction. But it was not all a matter of money. Even if a more spacious site had been available, the designers would have made this school a three-story structure with double-loaded corridors. Principal M. W. Stout and Architect Richard F. Hamel question "whether the type of circulation inherent in high school class scheduling as opposed to that in elementary schools indicates the desirability of a one-story rambling structure."

A determination to avoid glare also contributed to the decision to use only a vision strip. There are no brightness contrasts in classrooms in excess of one to ten; even the small windows are masked with blinders (see picture) to block anything but a straight-out glance outdoors.

Inside stair well, big windows emphasize fact that these architects think glass can be used liberally in non—teaching areas.
MULTI-USE CORRIDOR

Early experiments in economy put hall space to multi-use; now they put it in the classroom

One of the easiest ways to cut the cost of a school is to make part of it do double duty. Here are some experiments in getting double use out of corridor space—100 to 250 sq. ft. per classroom, which is normally used only for circulation.

1. In 1949 FORUM introduced the subject of making economical dual use of corridors by presenting this pioneer school plan by Architect Walter Bogner for Dedham, Mass. (AF, Oct. '49).

2. Starting from Bogner’s design, FORUM gave the late Matthew Nowicki the problem of incorporating the multi-use corridor in a theoretical school, “FORUM’s school for the ’50s” (AF, Oct. ’49).

3. About the same time, Architects Eberle Smith & Associates found that, before glass was installed between corridor and classrooms of Ferndale, Mich. school, corridor was used for class space.

4. In the 1952 addition to the same Ferndale School, the architects omitted the glazed partition, rearranged the work counters, wardrobes and planting boxes to make corridor use deliberate (left).

Meanwhile, Architects Perkins & Will in their pioneering cluster-plan school at Scarsdale created lozenge-shaped corridors for deliberate use as social space connecting the clustered classrooms (p. 140 and AF, Oct. ’52). And, Architects Eberle Smith & Associates eliminated the corridor altogether in their school design for Plymouth, Mich.:

The idea of multi-use corridors is capable of further development. Its economy is not one of penny-pinching, but of enhancing classroom use at little or no cost. Warning: while some multi-use corridors have appeared in architect’s drawings cluttered with furniture, arrangement of furniture must be such that a passage is always clear for emergencies.
DESIGN STANDARDS AND DATA

FORUM introduces a new department by the co-author of Architectural Graphic Standards to help keep architects current on new design details

Beginning this month FORUM updates the most thumbed book in every architectural office: Architectural Graphic Standards by Ramsey & Sleeper. Each month this new department will present several new pages of design standards and data developed by Architect-Author Harold Sleeper for future publication in a companion volume.

The three pages of school details that follow are the first in this monthly series of plates. They are additions of important new material not covered in Graphic Standards. But, like the plates in the book, these present only accepted standards, checked with appropriate authorities, associations, manufacturers and architects. The cost sheets to be included in the series will be prepared from data furnished by Carleton F. Rosenburgh, vice president and chief estimator of Turner Construction Co., one of the nation’s largest contractors.

Subsequent plates, already being prepared by the Sleeper office, cover such timely subjects as store fixtures, church details, motel planning, layout of architects’ offices, suspended ceilings, comparative roofing and flooring costs, sunshading devices and a unique table that will permit anyone to calculate easily and accurately the size of sunshade required for any kind of window, for any orientation, for any part of the country. This table is based on 5,000 separate calculations.

Meanwhile, FORUM’s sister publication, HOUSE & HOME, will present a similar series of house design standards and data by the same author.

FORUM believes its readers will find this new department as useful as they have found the book it supplements—the book Architect Ralph Walker, past president of AIA, has praised as “an encyclopedia of all sorts of building information that is tested and true . . . a part of architectural practice and a reference for all of us who work in architectural and allied fields. . . .”

NOTE: If clipped on the dotted lines, these pages will fit handily in an ordinary 8 1/2” x 11” file folder.

HAROLD R. SLEEPER is an author of note as well as an architect of broad experience. His books include Architectural Graphic Standards, which he co-authored with Charles G. Ramsey, The House for You, which he co-authored with his wife Catherine, and Architectural Specifications, which he authored alone.

Sleeper’s architectural career began in Cornell (BA) and New York University, and has included successive associations with several of New York City’s prominent architects: Starrett & Van Vleck, Trowbridge & Ackerman, Charles G. Ramsey and Daniel Schwartzman. Today, on his own, he is at the head of an office of 12, applying the knowledge gained in a broad architectural experience that has covered everything “from barns to banks, from comfort stations to colleges, from asylums to apartments, from public housing to houses.”

When not busy with his books and buildings, Harold Sleeper may be seen at New York’s Architectural League (of which he is past president), at Columbia or Princeton or the New York School of Interior Design (where he lectures), at AIA’s Octagon (he is a fellow and a member of the important public relations and education committee), at a manufacturer’s office (where he may be consulting on product development or product literature) or at FORUM’s offices discussing his new series of design standards and data.
### Classroom Shapes and Sizes

**Square Classroom**

<table>
<thead>
<tr>
<th>Size (ft.)</th>
<th>Square ft.</th>
<th>Area per pupil</th>
</tr>
</thead>
<tbody>
<tr>
<td>28 x 28</td>
<td>784</td>
<td>26</td>
</tr>
<tr>
<td>30 x 30</td>
<td>900</td>
<td>30</td>
</tr>
</tbody>
</table>

**Elongated Classroom**

<table>
<thead>
<tr>
<th>Size (ft.)</th>
<th>Square ft.</th>
<th>Area per pupil</th>
</tr>
</thead>
<tbody>
<tr>
<td>22 x 36</td>
<td>792</td>
<td>26</td>
</tr>
<tr>
<td>22 x 43</td>
<td>930</td>
<td>30</td>
</tr>
</tbody>
</table>

**Rectangular Classroom**

<table>
<thead>
<tr>
<th>Size (ft.)</th>
<th>Square ft.</th>
<th>Area per pupil</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 x 36</td>
<td>900</td>
<td>25</td>
</tr>
</tbody>
</table>

**Deep Classroom**

<table>
<thead>
<tr>
<th>Size (ft.)</th>
<th>Square ft.</th>
<th>Area per pupil</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 x 28</td>
<td>840</td>
<td>26</td>
</tr>
<tr>
<td>32 x 28</td>
<td>960</td>
<td>30</td>
</tr>
</tbody>
</table>

**Advantages of the Rectangular Classroom**

- Structurally economic
- Not divided into teaching areas
- Easy of supervision

**Advantages of the Deep Classroom**

- Economy of perimeter wall & corridor
- Ease of supervision

**Irregular Classrooms**

- "Irregular" classrooms are isolated examples. The others are in general usage.
- A plan type does not call for a specific method of daylighting, except that two sources of daylight are recommended for rooms over 25'0" deep.

**Covered Walk**

- Counter Work Space
- Study

**Corridor**

- Lockers in Corridor
- Study

**Visual Display Area**

- Study

**Flexible Storage & Activity Grouping**

- Work

**Outdoor Classroom**

- Covered Walk
- Corridor
- Flexible Space

**Lockers in Corridor**

- Work

**Hexagonal**

- Similar to Westhooe School, New York
- Perkins & Will, Architects

**PROJECTING EL**

- Similar to Crow Island School, Illinois
- Perkins & Will, Architects

**Copyright 1953 by HAROLD R. SLEEPER, F.A.I.**
CLASSROOM DAYLIGHTING

UNILATERAL DAYLIGHTING

#1 Structurally economic
   Alternate - glass block diffuses and directs light to ceiling
   Glass block
   Optional louvered overhang
   #3 Acoustically excellent
   Toplight protected from weather
   Structurally relatively economic
   Good drainage
   Glass block
   Optional louvered overhang
   #4 Eastern version of #1 permits double-loaded corridor

#2 Lower scale effect

BILATERAL DAYLIGHTING

#5 Thermal gains and losses better balanced than #1
   Allows bilateral lighting with economy of double-loaded corridor
   Glass block
   Covered walk
   #6 As compared with #5 - wider span by truss
   Effect of lower scale
   Permits single or double-loaded corridor
   Light-diffusing grid
   #7 Wide span by truss
   Unbroken ceiling
   Permits single or double-loaded corridor
   Light-diffusing grid
   #8 High ratio of glass to floor area
   Covered walk
   #9 High ratio of glass to floor area
   Covered walk
   #10 High ratio of glass to floor area
   Covered walk

CENTRAL SKYLIGHT

SUPPLEMENTARY DOME SKYLIGHT

USE OF NEIGHBORING SCHOOL WING AS SKY CUT-OFF
Should the design of today’s school be domestic

ERNEST KUMP, 42, who rose to national architectural fame after World War II, is a restless, searching young California professional who is impatient with most other architects and contemptuous of narrowly confining styles. In designing factories, residences and many schools, he has nurtured the seeds which have grown into these two different designs. At present Kump is, on typically Kumpian impulse, taking time out of his practice to “study architecture” in Italy.

Two answers to the same question by the same architect in the same school district

Children in the San José school district live their elementary school days in a warm, friendly redwood building tucked among the forest of FHA-financed homes in the Willow Glen–Lincoln section.

But when the time comes for high school there is as abrupt an architectural change as could be imagined within the range of today’s accepted “good” architecture. From a woody atmosphere the children enter a brick-glass-and-steel world. They get out from under the wide sheltering overhangs which ward off sky glare in the Broadway elementary school, and go into San
or institutional?

José high school behind straight vertical sheets of glare-effacing glass that deal with the sun problem flatly, without extra parts. They are torn from the womb of natural architecture (or perhaps they leave willingly) to enter the cool, formal world of sophisticated modern structure.

That the same architect designed both of these schools is interesting on several counts:

» It is an effective demonstration of a plain truth which recently has been obscured in the wrangling between adherents of various design styles in the US. For most practicing architects, the styles are servants, not masters. Most working architects today pick and choose among design styles and vary them (and are accused by some serious critics of vacillating), trying to make the solution fit the program not only in plan and materials but in spirit. Basically it is the materials that should set the manner of assembly.

» It is an indication of a generality in school design: as children mature, the architecture around them can also mature. But, although there is nothing new about putting up a high school that looks frankly institutional, like an industrial or office building, it is still relatively new anywhere in the country to find one that looks like a good industrial or office building. Why?

» It is a demonstration of regionalism in reverse. The differences between these two schoolhouses state in chorus that you can solve the same general space problems in a way that looks scientific or in a way that looks home grown—and each can be an adequate physical solution. This regionalism is less geographic than mental. Or more specifically it is the "regionalism" of age groups.
It is a denial of the common assertion that people do not even notice the difference. In the San José high school, they requested a difference; the school board wanted something more "monumental," the same thing that many prominent architects and critics have wanted for a long time.

Finally, it is probably an excellent example of the confusion which has resulted in the architectural profession from too early and too specific a labeling of styles. It is this that has led to a premature choosing up of several teams to defend the same general goals of good modern architecture.

In the physical details of the two buildings, there are numerous differences, but also a surprising number of similarities.

**Sites:** The elementary school is smack in the middle of a residential community of houses, and fits so well that it hardly even interrupts its neighborhood. It actually is built in the hollow interior of a king-sized residential block with very little street frontage. The traffic is straightforward except for one good trick: kindergarten children are picked up at their own entrance.

In strong contrast to the smaller school, the high school not only is surrounded by streets, but also straddles one. A heavily traveled arterial street slashes between the main school area and one of the athletic fields. The two areas are connected by a broad, well-lighted tunnel. And the high school, in strong, deliberate contrast to the elementary school, is a notable landmark.

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**The soothing shelter of wood...**

Elementary school has finger plan, with what the architects call a "spinal" corridor cutting through the classroom wings. Elevation below is of one classroom wing with the open corridor cutting through it.
or the solid strength of masonry?

High school also has finger plan for its classroom wings, has the "spinal chord" corridor too. Elevation drawing is of part of one classroom wing. Photo inset of administration wing shows how Kump, for clarity, deliberately separated structural frame and pattern of fenestration.
Elementary school has a double-pitched roof, penetrated at peak by a long, continuous skylight; there also is a high window up under eaves on side not shown in above photograph.

Slanted ceilings patterned with a wooden grid . . .

Plans: Despite differences in size and character, plans of both schools are really much the same. They are finger plans, with outdoor “corridors” connecting the wings of classrooms.

Materials: Both schools have rigid steel frames. The little school has walls of 1" x 8" redwood vertical shiplap on 2" studs with horizontal blocking. Inside finish: 5/8" Douglas fir plywood. Partitions are 2" x 6" studs, 16" o.c. with 1/2" fiberboard on each side and 5/8" plywood finish. The high school places more emphasis on maintenance, with masonry finishes.

Costs: These are not comparable according to the builders because the elementary school was started in 1947, three years before the high school, which was built at a cost peak. Cost for the elementary school, $9.10 per sq. ft.; for the high school, $15.25.
or straight, clean, right-angular planes?

High school has more formal atmosphere, but also is well daylighted. High window on circulation side is heat-absorbing, glare-killing glass. Low-maintenance materials were stressed in this design.

Detailing is distinctly different. Elementary school (left) has fixed- and awning-type sugar-pine sash. High school window walls are steel sash in steel plate frames. Note how high school classroom doors swing nearly to wall of corridor.
TECHNIQUES

The genesis of attractive, economical schools is intelligent site planning

by Carl Feiss

Sound site selection and site planning together may provide school economies as great as any other combination of factors affecting costs. But everyone concerned with school policy or planning should know that economy in site selection is not a matter of acquiring the cheapest land available. By this time it should be clear that obsolescence of site is a major factor in the increased rate of schoolhouse obsolescence.

Town fathers have often banked on schools to prevent the downgrading of neighborhoods; unfortunately they have often been wrong. Residential neighborhoods inadequately protected by planning and zoning or by enforcement of building and housing codes are deteriorating so fast that it is common to find sound old—or even brand-new—schools stranded in the tide of residential blight and the encroachment of business and industry. There is no economy in this for anybody.

In New York, for instance, school sites have often been selected primarily to avoid the loss of tax ratings. Bad sites are frequently the result. The taxpayer takes a double lambasting.

If the school board has good sense, the architect, as well as the local planning board, will be asked to help choose a site for a new school. A good real estate consultant should be asked to help too. The general or master plan of a locality should and usually does contain reference points on which the basic success of any school development program rests.

Use the site's resources

Once a site has been selected, its resources must be exploited to the full. The site plan may make or break a school no matter how good the architecture of the structure. Actually, of course, good architecture includes the landscape and schools is a sign of inefficiency, particularly in the one-story school. And here again the landscape architect is indispensable. Space between and around buildings—parking lots and loading plats—has value. The professional landscape architect's services to the modern open school plan are as essential as the services of the structural or heating engineer. Trees cut both direct light and sky glare and reduce the cost of forced air and air-conditioning equipment. School yards need the sound control that shrubbery provides. Erosion control of slopes is important. Children love to slide; either provide a slide on the slope or plant it with thorny shrubs or vines. Preserve existing trees and shrubs.

5. Soil and space together form the foundations of the broadened architecture of the open school. And here again the landscape architect is indispensable. Space between and around buildings—the courtyard and the distant view—is not just empty air. It is a solid to be designed by the expert technician in out-of-doors architecture.

6. Streets are one of the vital man-made resources to consider, particularly for high schools. Children come on foot, roller skates, bicycles; in jalopies, street cars and buses. All of them use public rights of way which are frequently substandard in design. Safety and convenience both demand careful planning of access paths and roads into the site, drives, parking lots and loading platforms.

8. Orientation for sun and wind remains important even though the techniques of light, ventilation and temperature control have advanced to the point where the architect can accomplish physically nearly anything he wants.


10. Zoning map and ordinance.

EARMARKS OF A GOOD SCHOOL SITE:

1. Residential neighborhood.
2. Quiet adjacent and access streets. No school should ever be on a major highway.
4. Proximity to parks and other permanent open areas for light, air, quiet views. Examples: church grounds, cemeteries, lakes, rivers and hospital grounds.
5. Sufficient land area for a complete school plant.
6. Planning and zoning protection of the amenities of surroundings.
7. Relation of site location to present and future child population densities. Some excellent grade school sites today may become appropriate high school locations in ten years.
8. General attractiveness. There is a very real economy in beauty. A school which does not inspire affection and pride is doomed to careless or malicious treatment. (So beware of the "Mary Anne" back too.)
9. Low cost of land acquisition, if possible.
10. Low site-development costs: accessibility to utilities, favorable soil conditions and topography.

Sound site selection and site planning together may provide school economies as great as any other combination of factors affecting costs. But everyone concerned with school policy or planning should know that economy in site selection is not a matter of acquiring the cheapest land available. By this time it should be clear that obsolescence of site is a major factor in the increased rate of schoolhouse obsolescence.
The good site plan uses natural resources; for instance...

The activities unit of Darien elementary school (Ketchum, Gina & Sharp, architects) sits on a ridge while the play porch and most classrooms are dropped anywhere from 1 1/2' to 8' down the slope. This variation enhances the "little schoolhouse" scale and without sacrificing economy gives the level areas to play and parking. Another good point: sufficient land; when this site was acquired for the junior high, the elementary school was not yet planned but an eventual need to expand the junior high was foreseen. Eventually this new elementary school will be a junior high annex; meanwhile the site is a godsend to the elementary system. The plans nicely separates students of the two schools. The strip of land between the lots the school could not acquire gives elementary school children their own pathway from the rear of their site (see also p. 126).

The site of Hillsdale high school (John Lyon Reid, architect) slopes down its long axis and the buildings step down with it. Note (sketch) how the slope was used to provide bleachers in the court above the pool; in the same way, the boys' playfield and football field are separated by bleacher stairs. Other good points: placing the lowest-ceilinged unit (academic block) on the highest ground, the tallest elements (auditorium and gym) on lower land and the medium-high elements (cafeteria, little theater, shops) in between, gives only gentle steps in roof line and helps integrate this big plant visually (without, on the other hand, pushing it into monotony). Community-use portions of the buildings are nicely planned for public access (see also p. 141).

The buildings of Oak Manor elementary school (John Lyon Reid, architect) were carefully placed to leave ample play space around a clump of low-branching live oaks because the architect realized these were wonderful climbing trees, better than any artificial jungle gym. And the photograph of a classroom south window shows how pleasantly and economically a tree-covered slope helps control glare (see also p. 138).

Ventilation test models of Port Arthur's elementary school (Caudill, Rowlett, Scott & Associates, architects) showed how important a slight turn in the building can be. With the breeze at right angles to the building, as in diagram at left, room 8 got a very bad deal. Even the "pressure wall" at right angles to the room did not force in sufficient air. But turning the building 30° gave every classroom a good, stiff air stream. The next step was to tinker with windows to improve breeze distribution inside the rooms, which simultaneously cut down interior velocity. For results of the 30° turn plus refinements, see p. 146.

At Groton high school (Warren Ashley, architect) only the most rudimentary path system (doubling as a seldom used service drive) will at first connect the scattered buildings of this campus plan. The students are being depended upon to create short cuts; then those empirically determined paths will be paved. Other good points: location of the main building limits vehicular penetration of the campus to the less desirable eastern slope. Classroom units, on the brow of the hill, parallel to contours, get a handsome panoramic view of Long Island Sound. Slope between classrooms and playfields is used for an outdoor theater (see also p. 134).
Structural economy—where can most savings be achieved?

Economical school structures in steel, timber and concrete are shown on the succeeding pages. However, no structural system can by itself produce low-cost school construction. Framing costs form only part of total costs (ranging from 8% for nonfireproofed steel to 15-18% for fire-resistant concrete), thus a 10% economy in framing might result in only a 1% saving in total costs.

Prime essential for low-cost school construction is to determine exactly where each building dollar is being spent and where the effort to reduce costs might most usefully be directed. This calls for rigorous cost analysis, such as the process outlined below. It was used by Architect Lawrence Monberg to achieve 28% savings without sacrificing space or quality.

In 1951 Wisconsin Architect Lawrence Monberg ran full tilt into the perennial obstacle that makes school design so much more difficult than the design of warehouses or office buildings. His initial plans for a 450-pupil, 43,000 sq. ft. Central high school at Kenosha, Wis., were bid at $560,000, or $120,000 over the budget ($442,000, excluding $50,000 for equipment) set by the school district's bond limit. He now had to find a way to cut costs by 21%. Any economy meant either sacrificing some of the 95 sq. ft. allocated per pupil (possible by more efficient planning) or finding a way to reduce drastically the unit construction cost of $13 per sq. ft.

Architect Monberg chose not to squeeze the pupils into a smaller school plant. Instead he sought through rigorous cost control to cut a few cents per square foot from each element of the construction. He used a twofold process. First, cost analysis of each element: walls, floors, framing, plastering, etc. These he expressed functionally in terms of cost per square foot of school area, and carefully examined them to see which parts of the construction appeared unduly expensive or showed promise of economy. Second, cost planning to combine the various elements in such a way that the total construction cost falls within the target—in Monberg's case with $442,000, or to $10.30 per sq. ft.

This cost study proved more than satisfactory. Final cost of the Central high school was cut 28% to a bid price of $419,349, or $9.50 per sq. ft., while the new area was actually increased to 44,200 sq. ft. (98 sq. ft. per pupil) without sacrificing any quality in construction. Typical of the many economies achieved are these two cases:

- Light-gauge, welded, acoustic steel deck, a double-duty factory-built material, saved 59¢ per sq. ft. ($26,000 in all). It was erected in only ten working days, replaced separate roof deck and framing and eliminated acoustic ceilings and plastering.

- Dry-built storage walls between classrooms saved an estimated 22¢ per sq. ft. ($10,000). The back-to-back lockers with sound insulation between them cost no more than plastered block walls, eliminating plastering and separate locker construction (photo p. 178).

Although such rigorous cost control is not new, it takes on new importance when studied in relation to the whole building process. There is no quick panacea to lower building costs without sacrificing quality. The savings that can be made are generally small but added together they become substantial enough to justify the considerable work involved.

In effect, this is the first step toward industrialization of the building process. Having established which elements of the construction appear expensive, it is comparatively easy to examine the construction sequence and determine whether the high cost is due to materials or labor. The next step is to see whether some other material might be more suitable or whether time-consuming processes can be avoided by more prefabrication. In his latest Wisconsin schools, Architect Monberg aims to eliminate "come-back" time, whereby subcontractors are delayed by other trades and forced to return to the job again and again.

Cost control is a necessary prelude to prefabrication and modular control, which, for successful application to school construction without dull standardization, should be considered with three principles in mind: 1) the module must be flexible, permitting wide variations both horizontally and vertically—Monberg now uses a 4' grid; 2) it should reduce site labor, relying on prefabricated standard components; and 3) it should produce permanent high-quality construction, which is possible when the components are designed with proper specifications and skill.
Framing with steel

Until the fall of 1952, steel was not generally available for school construction. Since then steel fabricators have produced welded rigid frames and easily erected light joists for very low cost framing. The interlocking joist system shown below, for example, cost $1.50 per sq. ft. in place for both steel frame and an 18-g. welded deck (materials cost $1.20 per sq. ft., labor another 30¢). However, where Class A fire-resistant construction is demanded (as it is in 60% of the nation’s schools) the steel has to be separately fireproofed, which slows up construction and absorbs most of the savings.

The high strength of steel makes it particularly useful for long spans or heavy loadings, but the need for frequent painting is a factor to be carefully evaluated. In some cases the more expensive aluminum frames favored in England might prove economical here since they are light, quickly erected and need no painting.

Welded rigid frames in Newton, N. J. school by Architects J. C. von Nuy’s & Associates carry steel deck on lower flanges. Speedy erection of a covered frame having a flush ceiling for direct application of acoustic tile helped cut bid price to $13.90 per sq. ft. Exposed steel is mothballed with sprayed plastic to simplify flashing (above). Model (right) shows how simple framing actively defines sheltered outdoor corridors in classroom wings on steep site.

Erector-set space-frame is the latest development of the industrialized school (AF, Nov. ‘51). This steel classroom frame at the University of Michigan is loaded with 60 psf of water (contained in plywood bulkheads). Strain gauges showed that the three-dimensional bolted truss, made of light uniform members, has tremendous strength. Weight of finished roof: 16 psf.

Modular interlocking joists permitted entire frame of West Lanham Hills, Wash. school (Architect Ronald S. Senseman) to be erected and roofed with a welded deck within a week without expensive hoisting equipment. Joists are raised by pulleys mounted atop columns. Construction cost: $12.25 per sq. ft.
Framing with timber

Laminated timber is becoming more and more economical, even in the eastern industrial area where timber construction costs average 14% more than in California (in the southern states it runs 6% less). Main advantage for timber is that rapid, dry construction is made possible. Most of the work can be done by the general contractor with consequently more efficient organization and elimination of many subcontractors’ profits. While timber often means comparatively high insurance rates (up to 80¢ per hundred on the West Coast), in the 111,000 sq. ft. Seattle school, right, Architect Johnson was able to cut insurance rates 25% by putting in two concrete fire doors. Obsolete rulings still prevailing in some states (including New York) that a wood-framed school cannot be bonded for more than 15 years while Class A construction can be bonded for up to 30 years often make timber construction too expensive taxwise.

Modular control holds the key to efficient timber design. At Johnson’s Seattle school it is estimated to have cut costs 15%, while framing costs ran only 8% of total construction costs.

Exhibited laminated beams on 7 centers span 26’ in this Dearborn, Mich. school by Architects Jahr & Anderson. Double 2” x 12” joists frame corridors to north of classrooms. Construction cost: $14.94 per sq. ft.

Modular design speeds construction of Seattle, Wash. school by Architect Wm. A. Johnson and Engineer H. A. Boteach. Laminated timbers on 8’ centers (based on 4’ module) were fully prefabricated, including bolt holes, holding costs to $10.87 per sq. ft. Classroom section (below) shows two continuous laminated beams spanning 32’ classrooms and 16’ corridor.

Y-shaped laminated bents, connected at ridge in each classroom, saved 13% framing costs at Fairfax, Calif. school by Architect John Lyon Reid (see p. 138). Erected cost of each bent was $500 compared with estimated $575 for two-hinged arches. Construction cost: $13.50 per sq. ft.

Inverted truss in Compton, Calif. school by Architect H. L. Gogerty is achieved with low-pitched laminated beams. Vented attic space is available for utility ducts and piping while sloping ceiling gives excellent lighting and acoustics. Construction cost: $14.62 per sq. ft.
Clusters of concrete bents were precast together at Palmetto high school, N.C., by Architects Lyles, Bissett, Carlisle & Wolf. In all, 200 framing bents were precast for an average $176 each, producing low construction cost of $7.50 per sq. ft.

Framing with concrete

Where durability and fire-resistant construction count, concrete is still supreme. To reduce the high labor costs of concrete construction engineers are trying to cut formwork costs by greater use of precasting techniques, including tilt-up and lift-slab construction. They are also trying to cut finishing costs after the member is cast, by paying more attention to the design of durable forms that leave a satisfactory texture in the cured concrete. At the Central elementary school in Seattle, for instance, Architect John Graham precasts the exterior walls of each classroom on the floor slab as a unit, complete with window sill, overhang and a framed saw-tooth roof line which support the clerestory north lights in each classroom, then tilts each panel into position. Construction cost of this school: $13.25 per sq. ft.

Slabs poured on plowed clay by Architects Caudill, Rowlett & Scott. Pier footings are poured first, then slab is poured on clay fill covered with building paper. Clay settles, exerts no pressure.

Concrete sprayed over balloon might produce economical classrooms for "cluster-type" schools. Designer Eliot Noyes estimates these 32' square classrooms, with reinforced concrete shells comprising a layer of insulation between two layers of concrete and complete with foundations and radiant-heated floors, could be built for $6,000 each ($6 per sq. ft.).
Glazed-faced blocks produce a finished wall in a single operation. Cost of 4" single-faced wall: $1.10 per sq. ft.

**Partitions or storage walls.** This 3" light-gauge steel partition (above) at a school in Peoria, IL (Architect Carter E. Hewitt) has an insulating value of 30 db, its cost: $2 per sq. ft. Another approach (below) is to erect storage walls, as Architect Lawrence Monberg did in Kenosha, Wis. (see p. 174). Storage walls cost little more than partitions, and separate cabinets are eliminated.

**Interior walls**
A great part of the building dollar is spent on interior walls and finishes. Thus more attention is being given to prefinished materials that eliminate plastering (saving 25¢ per sq. ft. for three coats) and painting (saving 2¢ to 3¢ per sq. ft. per coat).

Light-gauge steel and aluminum panels, some of them painted or enameled and insulated with a wide variety of materials, are on the increase but the cost is yet comparatively high at $2 plus per sq. ft. (compared with $1.20 per sq. ft. for 4" block plastered both sides). Also, about the best sound insulation given by the prefabricated panels is around 30 db, through which ordinary speech can be heard; partitions with the 40-db insulation of the 4" plastered block wall are usually preferred between classrooms.
Low-cost school heating

Can it be attained by lowering minimum ventilation requirements and raising the velocity of warm air to blast proportions?

—by Henry Wright

Today’s school heating and ventilating system is up against four tough criteria:

1. It must bring in cool air in sufficient quantity to handle the classroom’s surprisingly big cooling load.

2. It must heat a room quickly enough to meet the classroom’s rapidly changing heating requirements.

3. It must provide for natural ventilation to prevent overheating in warm weather.

4. It must be prepared to handle the cold surface and draft problems created by today’s big classroom windows.

Against these criteria, Henry Wright, in the following article, measures the success of various heating systems.

It is now widely recognized that the school “heating” problem is largely a problem in controlled cooling.

Like other buildings, schools require heating, and plenty of it, to bring them up to a comfortable temperature in the mornings and to hold them there throughout very cold days when solar gain is at a minimum. But this is less than half the problem. In fact, the latest research shows that school classrooms may require cooling (by admission of outdoor air) 80 to 90% of the time they are in use (AF, May ’52, p. 118).

Unfortunately, cooling a classroom satisfactorily is much harder than heating it. Air that is cooler than room air, especially if it is in motion, creates a real “draft”—even if it is not much cooler than room air and is not moving very rapidly. Yet large quantities of cool air must be introduced into the average classroom much of the time if its temperature is not to rise to a point that slows up the learning process by inducing drowsiness and inattention.

Schoolrooms are a good deal like theaters and auditoriums: once they have been brought up to temperature, body heat from the occupants goes a long way toward satisfying their heating requirements, supplying (from the average class of 30 pupils) about 6,000 Btu’s an hour whether it is needed or not. Schoolrooms are also a little like offices, since their lighting systems chip in another 6,000 or so heat units every hour they are on. And classrooms—especially the kind of classrooms being built these days—are a great deal like solar houses. A south-facing classroom with 250 sq. ft. of window area may receive as much as 50,000 Btu’s per hour from direct sunshine on a clear winter day, and from 5,000 to 7,500 Btu’s from diffuse solar radiation even when the sky is overcast.

In contrast, 1,000 cfm of air entering the room at 60° (with the room temperature at 74°) has a cooling effect of about 6,700 Btu’s per hour, and the same quantity of air at 55° provides a little over 9,000 Btu’s per hour in cooling. Thus a classroom may often require more cooling than the usual system of mechanical ventilation is able to provide, and a good deal more cooling in mild spring or fall weather than can be obtained by opening the windows.

Winter “air conditioning”

When confronted with such a problem in summer cooling, air-conditioning engineers introduce cool—but not too cold—air into the upper part of the room in such a way that it will mix with room air before reaching the occupied zone, and thus reduce its temperature without causing perceptible drafts. Cooling a schoolroom with outdoor air in winter is no different. To do the job properly it is necessary, first, to mix the incoming outdoor air with indoor air until it is within 10° or 15° of the prevailing temperature; and second, to blow it into the upper part of the room where it can continue to mix with warmer air, losing its kinetic energy and gaining heat before reaching the occupants.

In mild weather this cooling job can be done by just opening the windows, but whenever outdoor temperatures fall below about 55° such “open window” ventilation is bound to create drafts. Conversely, when the outdoor temperature goes above about 60°, most systems of mechanical ventilation are incapable of supplying enough air to do the cooling job; in that case best results are obtained with “natural” cross-ventilation. But when the outdoor temperature is low, mechanical ventilation is essential not only to avoid drafts, but also to ensure that the proper amount of air will be admitted to maintain favorable classroom temperatures despite constantly changing heat gain from the pupils, the lighting system and the sun.
Odor control

In addition to temperature control, classroom ventilation has another and more obvious job: the control of classroom odors and humidity. Most state codes require the constant admission of from 10 to 20 cfm of outdoor air per pupil whenever classes are in session. Such codes are stepchildren of the thoroughly outdated and erroneous notion that the air in crowded rooms becomes toxic unless "fresh" air is admitted. In the late twenties, when the scientific knowledge that this was not true finally percolated to the level of state authorities, codes were revised to require the admission of some fraction of the 30 cfm per pupil of outdoor air formerly called for—usually one-third or one-half of the former figure. At the same time, the code writers usually retained the figure 30 cfm per pupil as the amount of air to be circulated within the room, for no very good reason except that it had obtained in the past.

Is the "fixed minimum" obsolete?

Actually, the concept of a "fixed minimum" outdoor air requirement has very little basis in fact, since an east classroom, for example, which has been receiving large quantities of outdoor air for cooling purposes during the morning, is unlikely to become odoriferous or excessively humid in the course of a single afternoon if the outdoor air supply is cut off entirely. On the other hand, there is no doubt that classrooms without positive ventilation do become stuffy whenever their heating equipment is unable to keep up with a continuing drop in outdoor temperature and the windows are kept tightly closed for a day or two at a time.

Ideally, the "perfect" ventilating system would admit sufficient outdoor air to meet cooling requirements, mixing this air with a sufficient amount of room air to bring it within 10° or 15° of the room temperature, and then admit "tempered" outdoor air to prevent the build-up of humidity and odors during periods when cooling was not needed. Control of this "tempered" air might be based upon relative humidity.

To attain such ideal conditions either more air would have to be circulated than the standard 30 cfm per pupil usually required, or the classroom would need to be protected more carefully from solar gain. Moreover, during heating periods, considerably less fresh air would be admitted than most codes now call for, with consequent fuel savings. In cold climates, where the required 10, 15 and even 17½ cfm per pupil frequently drives the indoor humidity to abnormally low levels, a relaxation of code requirements would both improve pupil health and save fuel. Equipment would last longer, too, since in such climates wooden tables and desks have a distressing habit of splitting with excessive drying of the wood.

Calculate the heat gain

Since codes cannot be changed overnight, the "fixed minimum" ventilation requirement will probably remain with us for some time in areas where it is in force. However, we can ensure sufficient "maximum" ventilation to do the kind of cooling job our present school designs call for. First, school designers should make a habit of calculating heat gain as well as heat loss, using the excellent data developed for air-conditioning work. With the probable maximum heat gain, a known quantity of ventilation could then be provided to maintain optimum classroom temperatures at all times without releasing into the room air colder than 60° or, at the very least, 55°. For a classroom with an anticipated maximum gain of 15,000 Btu's per hour, this would mean providing a means for admitting at least 1,600 cfm of 55° air in place of the usual 1,000 cfm per classroom.

Such a means of mechanical ventilation should be capable of doing three things, regardless of the type employed:

1. Mix outdoor and indoor air to control the minimum temperature at which the ventilating air—either for cooling or odor control—enters the classroom.
2. Regulate the temperature of the mixture in a room-by-room or zone basis to suit the momentary cooling (or heating) requirements of each classroom or bank of classrooms—preferably the former.
3. Distribute the ventilating air without creating drafts.

"Blast heating"

Provision of really adequate air circulation pays an economy dividend by making heating an extremely simple matter. In the morning schoolrooms often need a great deal of heat in short order. This is easiest to provide by adding a heating element (needed anyway to warm the incoming ventilating air in cold weather) to the forced system of air circulation. Architect Alonzo Harriman's schools in northern Maine have been relying solely on such "blast heating" ever since 1938. Such systems have been found very satisfactory in performance and economical to install and operate. Again, the virtual elimination of thermal "lag" in a blast-heating system makes possible precise temperature control.

Thus, the true performance criteria of school heating and ventilation systems, in all but the mildest or cloudiest climates, are these:
1. Can the system introduce sufficient cooling air into each classroom, at a predetermined minimum temperature, to do the required cooling job? This depends more on the quantity of air circulated than on the pattern of circulation used.

2. Can the system add heat to the room quickly enough to meet the changing needs of a light structure having widely varying solar heat gain and large heat losses through big window areas? This depends first on the heat capacity of the heating element and then upon forced air circulation.

3. Is good "natural" ventilation available to prevent overheating of classrooms in warm weather? It can be achieved by large-capacity exhaust ventilators or clerestory windows opposite the main window wall, as demonstrated in the excellent studies on warm-weather natural ventilation by William W. Caudill and his associates at the Texas Engineering Experiment Station (AF, Jan. '52, p. 150).

The "cold glass problem"

These criteria leave unanswered one big question that is also a determining factor in classroom comfort: the question of the cold-weather effects of big glass areas, including skylights and clerestories. In winter, even when the classroom requires cooling and even when huge quantities of solar energy are coming in through the glass, the big glass areas are often a source of "cold." Thus, if cooling air is blown toward a big window in winter, the air becomes colder and the draft problem is aggravated.

Many engineers attempt to counteract the cooling effect of big glass areas by installing continuous convectors or long air-delivery slots beneath the windows. In schools, however, where the classrooms often require cooling rather than heating, a better approach is to locate the ventilating returns in this position, so as to draw off the air which has contacted the window and keep it out of the classroom until it has been mixed with warmer room air. In addition to being technically correct, this is obviously the most economical solution.

Thus, the fourth criterion of classroom ventilating systems is that all such systems should be evaluated in terms of the pattern of air distribution produced in relation to the disposition of the glass. Creating a draft-free pattern of air distribution, especially during periods of cooling, calls first for the introduction of cooling air into the upper, unoccupied portion of the room either by a central duct system or by unit ventilators and, second, for the withdrawal of air from beneath the windows, so as to intercept and control window downdrafts.

"Central fan" systems by Architect Warren H. Ashley and Engineers Marchant & Minges illustrate one way to satisfy the cooling requirements of the modern classroom. Above, each classroom is fed with tempered air from fan room. Return ducts serve banks of rooms, drawing air from beneath windows to trap downdrafts. Photo shows second-floor return ducts being laid prior to pouring of floor slab around them (see also p. 177).

Typical unit ventilator contains a continuous duct from which air is blown upward in front of the glass. Another type has continuous finned-tube convectors located beneath windows to provide an insulating blanket of warm air to overcome drift from a cold window. A third solution is to draw off air falling from the glass and to mix it with room air before readmitting it to the ventilating system.
Here is the first report on the pioneering use of the heat pump in schools. Highly successful in office buildings and fast gaining popularity in houses, the heat pump cracked the school market last September when pilot systems went into six Florida schools.

These heat-pump installations were made in the Pinellas County school system's new elementary schools in and around St. Petersburg for three good reasons:

1. **Lower first cost.** Total cost for these heating systems averaged 2 to 5% less than alternate bids for conventional heating. (Moreover, heat-pump operating costs are running virtually neck and neck with the bills for oil heat in similar schools.)

2. **No fire hazard.** Since these heat pumps are powered solely by electricity there is no flame, no fuel to store and no need to get rid of gases.

3. **By-product air conditioning.** The same heat pumps can be switched over in hot weather (the local temperature tops 90°F spring through fall) to air-condition such spaces as cafeteria and auditorium—an added benefit that tipped the scale in favor of heat pumps. (In the deep South bigger units are needed for air conditioning than are needed for heating only.)

**Heating design.** St. Petersburg's 74th St. elementary school is a good example of how these heat pumps work. This 360-pupil, $225,000 school has three parallel wings finger-planned to a common corridor, each wing containing four classrooms. An administration building and a combined cafeteria-auditorium flank the three wings as shown on the next page.

Five 7 1/2-hp heat pumps are used, one each for classroom wings, administration offices, and "cafeteria." Individual units were selected because they were cheaper than one big heat pump for the whole school. An important point is that these are water-to-water type heat pumps; extensive coils are not buried in the ground; nor are auxiliary electric resistance heaters needed. Here the main heat source is well water.

Each unit, basically a standard air-conditioning compressor, actually cools 20 gal. per min. of 78°F well water to 70°F. In other words, 8°F of heat is extracted from every gallon. The units also generate substantial compression heat which when lumped together with well-water heat adds up to an output of 120,000 Btu's an hour per unit.

**Radiant heat.** Classrooms get their heat by means of a secondary water circuit, entirely separate from the primary well-water supply. Pipes run from the heat pumps directly to a network of radiant coils in the slab floor. Each unit supplies 25 gpm of 113°F water to a classroom wing; floors are maintained at 81°F to 85°F.

Although many school architects shy away from radiant systems because they are prone to overheat, these schools count on three facts to lick this problem:

1. All classroom wings are aligned on an east-west axis with big windows on the north and overhangs on the south. Thus sun heat is minimized in the first place. (Windows, of course, can be opened practically every day of the year for ventilation, an advantage peculiar to the South.)

2. To make up for the storage of heat in the slab, outdoor thermostats anticipate the weather so the floor temperature is regulated as the outdoor temperature changes.

3. Slab pipes are buried only 1" below the floor surface and consequently the floor temperature responds quickly to its water supply temperature; i.e., there is relatively...
Classroom wings of this typical Pinellas grade school are heated by hot water pumped to radiant slab coils. Cafeteria-auditorium building top right is air conditioned by means of ductwork. Location of individual heat pumps is shown on plot plan (right).

Ground water map of US shows where chances are good, fair and uncertain for obtaining adequate well water to operate heat pumps.

little time lag due to the concrete mass. With conventional boiler systems the pipes must go at least 2" to 2½" under the floor.

Air-conditioning design. Unlike the classrooms, the "cafetorium," which is often used for public affairs, is air-conditioned, and this dictated the use of ductwork instead of radiant pipes. The coil of the air-conditioning unit for this 2,380 sq. ft. space is fed either hot (120°) or cold (46°) water piped from the 7½-hp heat pump. Air blown through this coil is heated or cooled and then channeled through the ducts to the air-conditioned space. And during a hot spell the heat pump works like any other air-conditioner: well water is used to carry heat away from the building.

If the classrooms are later air-conditioned, similar cooling coils can be added easily. Architect-Engineer Philip Kemnard, designer of these Pinellas schools, estimates that cooling could have been originally provided using the same heat pumps with ducts instead of radiant heating for as little as $125 extra per classroom. (Classrooms and offices were not mechanically cooled because officials feared that taxpayers might consider this amenity a luxury.)

Initial costs. Excluding the wells, radiant heating by heat pumps averaged 91¢ a sq. ft. installed vs. $1.00 a sq. ft. bid for oil-fired boilers and fin-type convectors. Cost for the wells is balanced off against the savings on boiler room and chimney. (Where air conditioning is also provided, however, total cost is naturally higher than for heating alone.) Total heating costs for all six schools (66 heat pumps) averaged 2 to 5% less than the bids for conventional heating.

Operating costs. Using 2¢ per kw-h electricity, the heat pump is competitive with oil at 14¢ a gal. according to the Florida Power Co. For 1952-53, heat-pump operating costs at the 18,702 sq. ft. 74th St. school was $385, or 2.05¢ a sq. ft. At the same time a similar school six blocks away was heated with 14¢ a gal. oil for 1.9¢ a sq. ft. With allowance for the fact that the electrical bill includes the cost for all testing when the heat pumps were first turned on, it is apparent that net operating costs are virtually equal.

In these six schools the heat pump has proved so successful that bigger installations are now under way in three Pinellas high schools. In these bigger schools, however, it has proved cheaper to install a large centrifugal compressor for all classrooms and individual units for other spaces than to use all individual units.

Is the heat pump economically feasible for schools elsewhere in the country? For large slices of the US engineers say yes. First, well water is abundant in many areas as shown by the ground-water map (left). Secondly, many electrical utilities encourage use of the heat pumps; e.g., the American Gas & Electric Service Corp. system offers a complete engineering service at no charge. In the last analysis, however, economical use of the heat pump will depend on local power rates and how the pump can be adapted to a specific school.
Thirty foot-candles with economy through luminous walls and ceilings, fluorescent lighting, low-cost high-voltage wiring and an array of new toplighting methods.

Five recent studies of eye problems among several thousand school children from New York to Colorado have established that, from kindergarten through high school, the need for eyeglasses increases from 5 to 25%. This underlines the importance of good visibility in schools. While the American Standards Assn. recommends a minimum of 30 foot-candles at desk height, most schoolrooms are still lit by the old globes delivering under 10 foot-candles. To obtain 30 foot-candles during school hours every day by daylighting alone, is theoretically possible in one-story schools, though expensive in many areas. In spite of its greater initial cost, fluorescent lighting can be more economical than incandescent due to greater efficiency and cheaper wiring. After careful tests the New York City Board of Education employs 40 foot-candle fluorescent lighting in its new public schools for all rooms used over 6 hours a day where the cost of electricity is over 3¢ per kw-h, even though the initial cost of fluorescent is over double that for incandescent (90¢ vs. 35¢ per sq. ft.).

Other noteworthy developments:

- **Luminous plastic ceilings**, installed at Glendaal and Glen Worden schools, Glenville, N.Y., by Architects Sargent, Webster, Crenshaw & Folley, provide a uniform 55 foot-candles of light but cost only $1,300 per classroom ($1.97 per sq. ft.). In several other schools the architects halved lighting costs with a luminous panel covering only the inner half of the classroom, the outer half using daylight from windows.

- **Partial luminous ceilings** at the Western elementary school, Naugatuck, Conn., by Architect Warren Ashley are even more economical. Three 22'/4" long lighting troffers, 3" wide and 12" deep, are cast in the concrete slab above each classroom (perpendicular to the windows). Two fluorescent tubes are set along each troffer with 3" wide corrugated plastic diffusers flush with the ceiling below each troffer (see p. 177). This ingenious design provides an average 38 foot-candles at desk height at an installation cost of $695 per classroom (78¢ per sq. ft.).

- **High-voltage wiring**, the new 277/480-v. 3-phase 4-wire system, only recently approved for schools by the National Electrical Code, effected installation savings of $20 per kva (approximately $1,500 in all) through reduced cost of distribution wiring in the 82,000 sq. ft. Twin Falls high school, Idaho, by Architects Paradise, Evans & Lash.

- **Daylight by toplights**, using plastic bubbles at $10 per sq. ft., corrugated plastic at $1.50 per sq. ft., light-directing and diffusing insulating glass block at around $6 per sq. ft. or heat-absorbing, glare-reducing wire glass at $2.10 per sq. ft., is being boldly exploited. The best examples strive to provide not only adequate, but also high-quality, stimulating lighting; the best of these are illustrated on the next two pages. (Further details on p. 212.)
Integrated lighting design for Darien, Conn., school by Architects Ketchum, Gina & Sharp exploits welcoming value of morning sunlight (view looking southeast). Design includes diffused overhead lights, cove lighting and spotlighting to give maximum variety and stimulation. (See also p. 128.)

Brightness without glare results when this luminous ceiling of corrugated plastic merges with all-glass wall. Fluorescent tubes are hung above plastic diffusing panels. (See text.)

Higher voltages cut wiring at Twin Falls (Idaho) high school; 3-phase, 4-wire system gives power at 460 line volts (for 120-v. plug-in circuits) and 277 phase volts for fluorescent lighting using 24-v. remote-control switching.

Corrugated plastic walls, used as fixed windows, eliminate glare and cut breakage in Liverpool, N.Y. schools. In this and another school, Architects Sargent, Webster, Crenshaw & Folley report savings of $5,000 in installation costs over original glazing bids.

Plastic roof bubbles admit extra daylight to classrooms and center corridor of elementary school in Ottawa, Kan., by Architect Joseph W. Radotinsky. With sky brightness of 1,000 foot-lamberts, each bubble gives 40 foot-candles immediately beneath and 12 foot-candles 7 to one side. Cost: $10 per sq. ft. including flashing (see also p. 212).
Prefabricated panel skylights going up at new Middleville, Mich., school (Architect Louis C. Kingscott) are made with light-directing glass block set in aluminum frames. Block transmits north light and low winter sun but reflects high summer sun (AF, Mar. '53); erected cost: $7 per sq. ft. Right, interior view of skylights. (See also p. 212.)

Photos: Kimble Glass Co.; M. J. Humphrey; Bonita Partridge; Martin Meyer

Double-glazed plastic skylights cover inner third of classrooms and extend 1' into center corridor at high school in Grand Marais, Minn., by Architect Myron M. Kehne. School was built with laminated timber frame for 78¢ per cu. ft.

North-light monitors give good lighting over desks at Architect John Graham's elementary school in Seattle, permitting economical short side of classrooms along exterior window wall. Chalkboard, however, appears dark and might benefit from the kind of spotlighting shown in Durien school (top, opp. p.4).

Glazed roof over two-thirds of elementary school annex at San Carlos, Calif., designed by Architect John Carl Warnecke, stimulates children by high brightness and wide use of primary colors. Heat-resistant wire glass is set in aluminum frames for $2.10 per sq. ft. erected.
For years the trend in classroom design has been toward more and more daylight. This trend is now challenged by Architects Kenneth C. Welch and H. G. Daverman of Grand Rapids, who have analyzed the costs of various kinds of classroom lighting and come up with the discovery that electrically lighted classrooms may be as much as 6% cheaper to build and no more expensive to operate and maintain than classrooms which use big windows, clerestories, skylights, etc., to minimize the need for artificial light.*

In brief, this conclusion is based on these three facts: 1) Even a daylighted classroom must have stand-by electric lighting. 2) The devices for admitting daylighting boost construction, maintenance and heating costs. 3) The electrically lighted room may put one of its narrow ends (rather than one of its long sides) to the outside, thus reducing building periphery, corridor length and square footage. The tables show the statistical reasoning and detailed conclusions of Welch and Daverman. Below is their discussion of their findings.

**Lower construction costs.** Our figures are based on a double-loaded six-classroom wing with heating costs prorated on a square-footage basis by estimating the additional square footage required for a kindergarten, administrative area, toilets and boiler room.

Costs exclude plumbing since some schools use the self-contained classroom with individual toilets, while others use gang toilets. Costs also exclude built-in cabinets or lockers. Roof drains are included, together with conduits ending 5' outside the building. (More detailed specifications for the five-classroom types are listed on p. 220.)

Cost per square foot is less for the electric light school even though there is less square footage over which to distribute the cost. The cost per square foot of classroom area gives a clearer picture of the possible savings of electric lighting because of the more compact plan. This also shows up in the cost per classroom. These costs are below the standard $13 to $15 per sq. ft. usually used to budget school costs, because the buildings being considered here are stripped and since plumbing is excluded. (Unit costs listed are for fluorescent lighting; there would be a slight decrease for incandescent lights.)

**Low operating costs.** A saving in capital costs for an electrically lighted school alone does not justify this design. What happens to maintenance and operating cost is of equal importance. These costs (based on the assumptions listed on p. 216) are shown in the lower half of the tabulation.

With the exception of the glass-blocked school (type 3), the electrically lighted school has the lowest maintenance and operating costs.
School acoustics—careful planning with new double-duty materials gives more efficient noise control at less cost

In the past it has been customary first to build the school and then, as funds permit, to smother noisy areas with sound absorptive tile. Nowadays this hit-or-miss method has given way to closer cooperation between the architect and his acoustics engineer from the very earliest stages of the design. Together they plan the layout, separate the noisy gymnasium and workshops from the quiet study areas, ensure maximum sound insulation between the two areas, and make full use of prefabricated roof decks and partitions that combine strength and durability with sound insulation or sound absorption and, where required, heat insulation too. They still use separate acoustic tile, but use it more intelligently on only part of wall and ceiling surfaces. (For the standard rectangular classroom, they recommend acoustic tile only above the chalkboard upon two adjacent walls and around the perimeter of the ceiling; the rest of the walls and ceiling are left as hard, reflective surfaces to aid sound distribution.) Noteworthy instances of the new approach:

- Architect James A. Mitchell cut his acoustic materials cost 50% and achieved good acoustics in his Lincoln school at San Mateo, Calif., by balancing sound-absorptive with sound-reflective surfaces. Patches of acoustic tile cover only half of the sloping ceilings and upper walls (see picture); most of the tile on the walls is below the chalkboard level to bring the control down to voice level.

- At the Fairview school, Elk City, Okla., Architects Caudill, Rowlett, Scott & Associates go even further. Their east- and west-oriented classrooms contain no sound absorptive materials at all. Sound distribution is improved by exposed steel framing and wide, vertical window baffles inside the window wall (illustrated). Made of cement asbestos, these panels also keep direct sunlight out of the classrooms.

- Many schools are being built with acoustic roof decks made of wood fiber and cement, having a noise-reduction coefficient of 80% and a heat-insulation value of 0.23 for a 2" deck. At his West Columbia elementary school in Texas, Architect Donald Barthelme uses such a deck laid upon exposed steel joists. Cost of the deck is $60 per sq. ft., excluding a lightweight concrete topping. At the Grandview school continued on p. 224
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The drastic saving in construction time, dramatized by this building, is, of course, only one of the dividends offered by metal curtain wall construction. In addition to obtaining much earlier rent returns, owners benefit from the increased floor area made available for rental by the thinner exterior wall. The durable aluminum skin also cuts maintenance costs to a minimum, is more weather-tight and less subject to deterioration than other types of construction. Six-foot high, vertically pivoted, reversible aluminum windows, with stainless steel weatherstripping, are incorporated in the building panels to greatly reduce the expense and danger of window cleaning — they can be cleaned easily from inside the building.

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SCHOOLHOUSE FORUM

continued from p. 126

9. Professional know-how to solve each school's differing problems

The distinction to be made is this: there exist no two schools and no two school sites in the US whose needs are genuinely identical in toto. There exist countless schools, however, that can use identical parts: all the way from identical windows, doors, chalkboard panels, lights, heating elements to identical or nearly identical plans for at least the structure of individual rooms such as classrooms and gymnasiums.

As a model of efficiency we recommend to school boards a study of the joint building program now under way for a group of hospitals for the Welfare Fund of the United Mine Workers (AF, Aug. '52, p. 132). Every building will be different, and three firms of architects are working each in its individual style to produce variety and to give the program the benefit of individual imagination. Yet all have agreed on standard details, so the purchase of doors, windows and countless other parts will be made in huge quantities through a central purchasing bureau. It is such quantity purchase that brings down the cost by creating efficiencies of manufacture and marketing for the producers which are passed on to the large-scale consumer. Where a contractor is bidding simultaneously on identical details in several schools these savings apply, and under competitive bidding he is likely to pass on a good share of them.

We already possess, in the joint work of the AIA committee on schools and the National Research Council through its Building Research Advisory Board (BRAB), the instrument needed for the study and promotion of dimensional standardization, for study and promotion of manufactured parts designed to fit into economical design correlation at highest performance. The continued on p. 196
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SCHOOLHOUSE FORUM continued

gist of what they are seeking and achieving needs only be translated into nontechnical language so school boards made up of intelligent laymen can understand it.

Our second count against the stock plan is that it saddles the community permanently with loss of self-respect. Those pupils, for example, who are assigned to schools in mean, cheap, "temporary" buildings feel that they are being secondhanded by mean, cheap parents; and they are taught by teachers who are made to feel mean and cheap like chattel servants. Nor does it help any if the outer wall is tinny and shiny.

Our third count against the stock plan is that the low standard it accepts is a positive bar to progress. The lowering of cost that has hitherto been attained in schools has been attended by the highest plan ingenuity and the heightening, not the lowering, of standards. For example, where imaginative architects have omitted the partition between classroom and corridor they have done it in such a way that the classroom, far from being harmed, has been made more useful; where they have faced limited city lots they may have put the school on stilts, gaining sheltered play space with no loss of classroom space. America is far from the status where it must produce second-rate buildings for bargain children.

It is a great regret that we are unable to come up with some one brilliant scheme—some unprecedented school plan, some miracle material, some Ponzi stroke of finance, that would solve the school economy problem in one swoop and send everyone happy to the ball game. Yet we tend to school boards this report in itself as evidence that professional men, and professional men only, can view the problem as it is, ramifying and interrelated. The worst misconception of all, parallel with the stock... continued on p. 200
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Marcus Y. McEvoy, Superintendent
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Youngstown, Ohio
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Slim, trim and functional in appearance, the Garcy Starliner lends itself beautifully to contemporary styling. When surface mounted, its shallow contour economically simulates built-in lighting.

Yet within its compact design, this luminaire embodies every wanted feature. Side panels of Corning’s Alba-lite glass are attractively framed in protective metal rails...promote efficient light distribution while contributing to proper brightness control. Garcy’s louver design provides 30° x 40° shielding.

The Starliner is superbly made...note the round edges on end plates and side rails. Economically installed, easily maintained. Available as two-lamp or four-lamp units in 4 ft. or 8 ft. lengths for standard fluorescent, rapid start or slimline lamps. Write for Bulletin L-134.

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SCHOOLHOUSE FORUM continued

plan misconception, is the notion that more economical schools can be built adequately by dismissing professional skill and turning the problem over to local carpenters. School-teaching and the buildings to house it are at least as important to the survival of the US as an atom research program—and nobody is proposing economy in this latter field by dismissing all trained scientists.

The experience of New York City is indicative, where the employment of trained private architects effected instant savings averaging 10% compared to the previous work of bureaucratic employees—and with better schools, too.

Again, there is no way under the sun of getting rid of the function performed today by the educational consultant; somebody will have to try to do it if he does not; and although an individual board may think it can get by in a parasitic manner by profiting from the past thought of such consultants elsewhere, the pay-off can easily be as much as 25% of hidden extra costs through having nobody present to resolve the conflicting ideas of board and staff members as to the educational program.

At the same time we must admit to our sorrow that not all architects are equally good, nor are all consultants: there are a few members of both professions whose ideas are strictly stock, pulled out of a drawer just as readily as cheap makeshift in any other field of endeavor. And some of these men have profited from gullibility to the extent of their own very considerable enrichment from undertaking literally hundreds of schools. Yet these are but the racketeers whom wisdom avoids in any sort of operation; the vast majority among these professional men are devoted to their task.

The compass of this report does not allow advice on how to choose professional help; we can only refer the amateur school-board member to such advice on how to pro-

continued on p. 204

Clapp and Cocking
MOTIF'D ACOUSTONE mineral acoustical tile brings you extraordinary beauty with unusually effective sound control. The well-known Striated pattern shown here is just one of many MOTIF'D design creations available in ACOUSTONE, America's most distinguished acoustical tile. Decorative possibilities become almost limitless with MOTIF'D ACOUSTONE, exclusive with U.S.G. It is incombustible, highly light reflective—truly the beautiful way to quiet a room.

Sound control is a job for experts.

For complete drafting room details and other information or assistance, contact your nearby ACOUSTONE tile contractor, or write United States Gypsum, Dept. 136, Chicago 6.
Warren, Knight and Davis, architects and engineers, realized that large exposed glass areas, typical of school buildings, created a need for Honeywell Customized Temperature Control in the Charles B. Glenn Vocational High School. Other participating firms were: General Contractor, Richardson Construction Company; Mechanical Contractor, H. L. Eskew and Sons. All firms are located in Birmingham.

New high school demonstrates need for Honeywell Customized Temperature Control even in mild climate of the South

Birmingham’s Charles B. Glenn Vocational High School features individual room temperature control

In developing the new school you see here, an enterprising architectural-engineering firm and an understanding school board are leading the way to greater comfort and more efficient learning for thousands of southern teen-agers.

And a Honeywell Customized Temperature Control installation is helping them provide these benefits for Birmingham students.

In the case of the Glenn School, the Honeywell installation is in the form of individual room temperature control—a thermostat in each classroom. The floor plan at right gives the location of the thermostats.

Today, in this school, teachers may keep temperatures right for most efficient learning—simply by adjusting a dial.

If the wind blows cold against the windows of their individual classroom they can easily adjust for the extra heat loss. And if during certain periods of the day the room is crowded, or the sun is hot, they can as easily lower the temperature.
In winter months, even in the South, classroom windows are a major source of heat loss. Chill winds reduce their temperature greatly — and this "draws" heat in large quantities. But with an adjustable Honeywell thermostat in each classroom such heat loss is easily compensated for. Above you see a typical modern classroom in the Charles B. Glenn school.

For Comfortable, Even Temperature in New or Existing Buildings — of any size — Specify Honeywell Customized Temperature Control

Whether it’s a school, office, factory, hospital, apartment, store, garage — or any size building — new or existing, Honeywell Customized Temperature Control can help meet your clients’ heating, ventilating, air conditioning and industrial control problems.

Once equipped with Honeywell Customized Temperature Control, they’ll have an ideal indoor "climate" — and save fuel besides.

And with a complete line of pneumatic, electric and electronic controls to choose from, Honeywell Customized Temperature Control offers you the greatest flexibility in design. Then, too, when it comes to performance, Honeywell-built controls assure years of trouble-free operation. And they’re backed by the finest service organization in the controls industry.

For full facts on Honeywell Customized Temperature Control, call your local Honeywell office. There are 104 across the nation. Or mail the coupon today.

H. L. Eskew, heating contractor of Birmingham, says: "More and more in the South we’re coming to realize the importance of proper temperature control and adequate heating methods. I think the Charles B. Glenn High School job is good evidence of that.”
Space-saving vertical action and "coil-away" storage make Kinnear's famous curtain of interlocking metal slats an ideal shutter or closure for all counter openings.

Slats for this versatile closure are available in various metals, in a choice of styles and sizes to suit any need or preference.

Proved in service openings of every kind for more than half a century this Kinnear curtain has many advantages.

It clears the opening from jamb to jamb as well as from top to bottom. It coils compactly above the opening--doesn't block light from above. All surrounding space is fully usable at all times--no swing-space needed. Wind can't slam or damage it. It is easily raised or lowered from inside the opening. It provides rugged all-metal protection against wind, weather, and intrusion . . . resists fire and accidental damage.

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(The Kinnear Rolling Grille, an upward-coiling assembly of metal bars and links in an attractive open-work pattern, is also widely used as a barricade for counters and doorways.)

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10. Imaginative financing to gain the easiest, biggest saving of all

The tiny figure of 1% sounds so small that an inexperienced board may miss its enormous importance in school bond financing. Yet a community that pays 3% instead of 2% on its bonds—a 1% difference—must realize that this is equal to paying about 20% more for land and construction! This is an error which impatience has brought continued on p. 208
It was the “perfect fire” except for one thing

“This fire didn’t happen... it was planned! Planned so shrewdly and thoroughly that the North & Judd plant might have burned to the ground that night”, said Mr. Frederick L. Morrow, President, North & Judd Mfg. Co., world’s largest manufacturer of buckles and fastening devices, in New Britain, Connecticut.

“It was back in the 1930’s. At that time, we had leased floor space in several of our buildings adjoining the main plant.

“One evening as our night watchman was making his rounds, he opened a door on one of these floors. Suddenly, flames raced across the room toward the machines. They never made it. In seconds, heat from the blaze set off a sprinkler head which checked the flames, preventing a disastrous fire.

“Gasoline cans, we discovered, had been planted near each machine. A path of sawdust, gasoline-saturated, wound from the cans to the doorway. The door frame had been thoroughly soaked with gasoline. And two exposed wires were cleverly twisted around one of the hinges on the door so as to cause a spark the moment the door opened. “Here was the ‘perfect crime’. A building destroyed so completely by fire that no one would ever know how it happened. The scheme mis-fired only because one important detail had been overlooked — our automatic sprinkler system.”

Most fires, of course, start accidentally. But no matter how they start, Grinnell Sprinklers stop fire at its source, wherever and whenever it strikes, night or day, automatically. 75 years experience proves this.

The time to act on Grinnell Protection is now... before fire burns you out, or cripples your business. Remember — a Grinnell Sprinkler System often pays for itself in a few years through reductions in insurance premiums. So if you have fire insurance, you’re probably paying for Grinnell Protection anyway... why not have it? Write for booklet on Grinnell Automatic Spray Sprinklers — new in method, spectacular in performance. Grinnell Company, Inc., 250 West Exchange Street, Providence, Rhode Island.
RUSCO FULVUE WINDOWS Offer Important Advantages for School Fenestration

Available in 4-panel and 3-panel-high units, in a wide size range.

May be joined in multiples with Rusco's simplified non-load-bearing mullions.

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- **MAXIMUM LIGHT** Rusco's streamlined tubular steel construction gives great strength without excessive bulk or weight in frames. 3-panel-high and 4-panel-high design, plus narrow mullion for joining windows in multiples, permits exceptionally large glass areas.

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- **MINIMUM MAINTENANCE** Rusco windows reduce maintenance costs in three ways:
  1. Made of hot-dipped galvanized steel, bonderized and finished with baked-on outdoor enamel, they are highly weather-resistant.
  2. They have no sash cords, weights, balances or chains to get out of order.
  3. Glass inserts are removable and interchangeable. Consequently "spares" can be carried for immediate substitution when breakage occurs.

- **SAFETY** Rusco Fulvue Windows are vertical-sliding, with positive spring bolt locking. They eliminate the dangers of projecting vents, accidental dropping, swinging, etc.

- **EASIER SHADING AND SCREENING** Vertical-slide construction simplifies window shading and darkening for use of visual education materials. Rusco's Fiberglas Safety Screen (optional equipment) cannot rust, rot or corrode and never needs painting—is ideal for cafeteria areas and other applications where screening is desired.

- **CONTROLLED VENTILATION** All Rusco Fulvue window styles have vertical-sliding ventilating panels. Available also with insulating sash which permits controlled rainproof, draft-free ventilation.

- **DESIGN FLEXIBILITY** Rusco offers a variety of sizes and styles in the Fulvue window. This fact, coupled with the simplified mullion feature for joining units in series, permits wide flexibility in fenestration design.

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New multi-stage, forced draft, secondary air control on the burner provides a constant velocity air stream to the combustion zone. Resulting high turbulence, high turn-down ratio and high CO₂ content give you high combustion efficiency.

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The Kewanee-Ray Boiler-Burner Unit is complete. Boiler, burner, all automatic controls and accessories as specified. No special foundation is required. All refractories are integrally mounted at the factory. And a built-in forced-draft fan eliminates need for high stacks.

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The complete boiler is shipped from Kewanee, the burner including windbox and control panel from Ray . . . so each shipment can be timed to arrive when you want it. The boiler should be on the job site before the new plant walls are up. (Exposure to weather does no harm). The shipment of the burner can be delayed until the new building is enclosed. Arrival of unit in two separate shipments is another important advantage when Kewanee-Ray is specified.
about all too often. No architect, no school consultant, no engineer, and not all three in combination, can easily make up such a loss of funds; and successful boards must watch the bond market with hawklike sharpness.

The wretched problem of working against a set bonded indebtedness limit has been met in states such as Georgia and Pennsylvania by the creation of "school authorities" as independent corporations, who rent the school to the board under a lease-purchase arrangement. We are divided as to the validity of such a procedure. All agree that it involves a clear and present danger when the authority which supplies the funds assumes control over the details of the program.

In the US there exist a large number of nationwide advisory bodies and helpful agencies, all the way from the US Office of Education to the private associations such as the National Education Assn., and its affiliated groups, the National Council of Schoolhouse Construction (composed of state school construction officers), the National Citizens Commission for the Public Schools, the US Chamber of Commerce and various research bodies. Yet all are auxiliary to the school board, not superior to it.

America may have lost quite a bit of efficiency by insisting that ultimate control over its schools must rest at home, in the parents and teachers and superintendents of those particular children, among the businessmen whose children go to school alongside the children of the workmen who build them. Yet no efficiency of remote control can make up for the loss it brings of intimate responsibility by those who will care for their children because these are their children and they love them.
It's simple...it's flexible...it's easy to install! It’s the ceiling suspension system that was an immediate hit with architects. Introduced only nine months ago, the Gold Bond "J" System is now one of the most widely specified methods of building suspended acoustical ceilings. In the 140,000 sq. ft. application shown here, the Gold Bond "J" System hides ductwork and utilities above a suspended ceiling of Gold Bond Travacoustic. The result—a strong, level, incombustible acoustical ceiling with the appearance of expensive travertine stone.

The Gold Bond "J" System is installed only by approved Gold Bond Acoustical Contractors. Write today for Technical Bulletin No. 577.

SIMPLE! The Gold Bond "J" System is made up of these three basic parts—channel, clip and spline. It can be used equally well over large or small ceiling areas. It is competitive in cost with conventional metal suspension systems. Compared with building a preliminary base ceiling of lath and plaster, the "J" System is an economical method of installing acoustical materials.

FLEXIBLE! Completed offices in the new Sinclair Oil Building will have handsome, sound-absorbing ceilings like the typical Travacoustic installation shown here. The Gold Bond "J" System, used with kerfed and rabbeted Travacoustic, is adaptable to designs that include recessed light troffers and complex stepped ceiling assemblies. It can also be used with gypsum board bases to which acoustical materials may be applied.
This combination opens the way to major savings in the over-all cost of a building!

A battery of American-Standard Wall-Type Toilets installed with the Zurn System provide all necessary facilities up to the drainage stack. The Zurn System of installing wall-type toilets simplifies rest room layouts, and opens the way to major savings in the over-all cost of a building.

Important savings in quantity of materials and in time costs can be obtained when decisions on rest room equipment are based on the installation of American-Standard Off-The-Floor Plumbing Fixtures installed with the Zurn System. Such an installation effects many substantial savings in construction costs; permits use of any type floor construction and any type of wall construction; permits reduction in height of ceilings; eliminates need of furring-in drainage lines; eliminates caulking to floor; simplifies drainage and vent piping layout. Off-the-floor plumbing fixtures insures against untimely obsolescence and reduce cost of rest room maintenance to an all-time low. American-Standard Off-The-Floor Plumbing Fixtures installed with the Zurn System afford a practical and simple method of effecting major savings in the over-all cost of a building.

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These booklets present up-to-date factual information for planning Modern Rest Rooms. The ideas presented are the result of experiences of engineers, architects, general contractors and plumbing contractors who have specified and installed American Standard Off-The-Floor Plumbing Fixtures installed with the Zurn System.

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Model "L"—For work table or sink installation in small kitchens or for multiple installations where a disposer is required. This is the only full 1/2 h.p. disposer in the low price field. Cone adapters available to fit present metal tables.

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Complete installation data on all Salvajor products is available. Write for your complete file on these space-saving products today.

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ELECTRIC LIGHT continued from p. 187

erating costs even though it requires less initial capital expenditure. The former has a $42.40 lower yearly maintenance cost, but it is necessary to spend $4,274 more initially to achieve this. This is a return of slightly less than 1% and therefore is not justifiable.

The operational costs of fluorescent compared to incandescent lighting quite readily prove the soundness of installing fluorescent fixtures. For example, in the electrically lighted school there is a difference in operating and maintenance costs of $245.50 per year in favor of fluorescent, although the original investment is $1,700 more—or a return of 14.4% on the additional expenditure. This is more than twice the usual 7% figured for interest and amortization of capital investment. At the same time fluorescent fixtures produce 5 foot-candles more at night and 4 more in the daytime.

Design for electricity. In the design of electrically lighted classrooms, lighting equipment is selected and distributed to create the best possible total brightness environment. The fixtures selected have about a 50% up-component and 50% down-component. There should be this amount of totally indirect light to control brightness environment and to produce a necessary amount of total diffused illumination. There is enough direct light to create the necessary highlights and shadows. Along the chalkboard wall, by removing one of the side reflectors, a planned brightness can be created and this vertical task illuminated as you would an art-gallery wall (see cut).

We are fully aware of the desirability and necessity of controlling the brightness ratios in the field of view but not to the point of continued on p. 216

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THE USE OF versatile Seaporclad building panels is finding increasing architectural recognition. A lamination of Seaporcel porcelain with thermal and sound insulating core, Seaporclad has been chosen for the 20,000 square feet of colorful spandrels for the Hartford Statler, the newest addition to the Statler Corporation's national chain of quality hotels.

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UNAFFECTED by weather, fire and corrosion-resistant, Seaporclad keeps maintenance costs at the vanishing point. It is fabricated for a variety of uses in conventional sizes and in any thickness or shape... and is available in the fullest scope of textures and colors.

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lends itself perfectly to fine workmanship

- Carrara Glass is mechanically ground and polished, has a smooth, lustrous surface that gives to your most important designs a glowing, reflective beauty no other material can equal.

It lends itself perfectly to fine workmanship. Each block fits evenly with adjoining pieces, without gaps, overlapping, or special backing adjusters. The big pieces of Carrara are easy to handle. They go in place readily, are firmly held by an easy-to-apply, quick-setting mastic; need no exposed fasteners of any kind.

the quality structural glass

Pittsburgh Field Club, Fox Chapel, Pa.
Architects: Francis A. Bemer, Pittsburgh, Pa.

Pittsburgh Plate Glass Company
IN CANADA: CANADIAN PITTSBURGH INDUSTRIES LIMITED

PAINTS • GLASS • CHEMICALS • BRUSHES • PLASTICS • FIBER GLASS
scientific monotony. The control of the sky brightness that comes within the total vision of the child seated nearest to the window is obviously the most difficult. In addition to a reasonable overhang, this can best be done by coordinating the planting and landscaping with the design of the building. The more the indoor-outdoor environment becomes a reality, the more this coordination becomes essential—and why not? If for some reason this cannot be done by landscaping, it is necessary to introduce some of the more conventional controls so that sky brightness, particularly to the south, can be controlled from the interior viewpoint.

**Behind the operating costs.** Operating costs shown in the table are based on experience in the Grand Rapids area. In this area there are 100 days each year in which less than 30% of the sky is covered by clouds, and an average of 160 days in which more than 70% of the sky is covered. School is in session from Sept. 15 to June 15, or for 275 days. Of the 160 cloudy days, at least 140 occur during the 275 school days, or roughly half of the days during the school year are cloudy days in which the sky is more than 70% covered by clouds.

School is in session in this territory from 8:45 to 11:30 A.M. and from 1 to 3:30 P.M. During December, January and February it is still relatively dark at 8:45 in the morning and tends to get dark again by 4 P.M. This further reduces the hours under which daylight can be depended upon. School is in session 180 days at 5 1/4 hours per day for a total of 945 hours a year. It can be safely assumed that the lower grade classrooms are in use 1,000 hours per year.

In the electrically lighted classroom it is assumed that the inner row of lights will burn 800 hours per year, the middle row and chalkboard lights 600 hours, and the outer row of lights will burn 400 hours per year. For types 2, 4 and 5 it is assumed that all lights will burn 500 hours per year. In type 3 with unilateral lighting glass block, it is assumed that the inside row of lights will burn 800 hours per year, and the outer row of lights will burn 500 hours per year. It is assumed that corridor lights burn 1,000 hours per year—all the time that the school is in use.

Maintenance costs are an assumed cost based on experience records and cover cleaning the fixtures once a year. A rate of $1.50 per hour was used. Lamp replacement costs are based on manufacturer's standard lamp life and cost to the school of continued on p. 220
Schoolrooms built while you wait! 

... and you don't wait more than a few seconds either when you use "Modernfold" doors. Note how this Junior High School does it. When there's a need for another small, private schoolroom, the "Modernfold" movable walls fold quietly together to separate library from lecture room.

And when it's necessary to get a large group together, the "Modernfold" doors quickly fold all the way back against both walls to form one huge classroom.

Your ideas come to life ... for life 
with "MODERNFOLD" doors

For every room division or door closure problem, there's a simple, economical, space-saving solution. That's "Modernfold," the original folding door.

Specifying "Modernfold" doors keeps clients happy. For these steel-framed, vinyl-covered doors can't be equalled anywhere for quality of design . . . for quality and strength of materials.

And because this line is complete, you're sure to save time and get exactly what you want when you specify better looking, easier operating, longer lasting "Modernfold" doors.

Better Looking
Fabric covering conceals all operating mechanism. No cornice needed. Adjustable trolleys keep doors hanging flush to jamb.

Longer Lasting
Balanced hinge construction both top and bottom. Trolleys attached at hinge intersections. No sidewise twist or pull.

Better Background
Over 100,000 "Modernfold" doors now in operation—a backlog of space engineering experience that's your guarantee of satisfaction.

YOU CAN'T GET MORE IN A FOLDING DOOR

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New Castle, Indiana

Please send full details on "Modernfold" doors.

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State

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New Castle, Indiana
The 10-story Cafritz Building, just two blocks from the White House in Washington, D.C., is the only building in the world with parking facilities in the center of each floor. Tenants drive up ramps inside the building, step out of their cars and into their offices in keeping with the Cafritz slogan: "Park at your desk." But this convenient parking feature is only one reason why Cafritz tenants renew their leases. The Cafritz Building, like more than 200 other multi-story buildings all over the world, makes its own indoor climate with a Carrier Conduit Weathermaster* System. This Carrier system of air conditioning (1) provides year-round comfort through under-the-window Weathermaster units individually controlled in each office, (2) saves space by using small, high-velocity air conduits, (3) cuts costs because of its simplified installation and centralized maintenance. So successful is the Cafritz Building that another will be started before the end of the year. Carrier equipment can meet the most exacting requirements whether your plan involves a new kind of office building or a modernized old building. Carrier people founded the air conditioning industry more than 50 years ago. All this experience is yours to command. Look for Carrier in the Classified Telephone Directory. Or write Carrier Corporation, Syracuse, New York.

General Contractor: Cafritz Construction Company
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"Teamwork Does It,"
SAYS ARCHITECT, C. MELVIN FRANK

THE ARCHITECT, THE BUILDER AND YOUR LOCAL MACOMBER REPRESENTATIVE MAKE A TEAM

Architect C. Melvin Frank, A.I.A. of Columbus, Ohio has specified and used Macomber Steel Building Products for many of his projects.

He has found a winning team in working with the Don M. Casto organization and the Howard S. Sterner Co., the Columbus Macomber representative who has expedited his steel and assisted all along the line as Consulting Structural Engineers.

Working together, this team has completed one large shopping center after another and expanded those completed in recent years to accommodate the patronage centered in these attractive units.

To any Architect and Builder anywhere, there is a message that pays dividends in the teamwork you can expect from your Macomber Representative. Call him for valuable assistance on your next steel building project.
PHOTO shows how entire interior of an R-W No. 833 Multiple-Action Master Control Door Wardrobe is instantly accessible, instantly exposed for airing, simply by opening master door.

Richards-Wilcox SCHOOL WARDROBES

We had Johnny in mind when we designed R-W school wardrobes. Johnny's health, comfort and convenience—not to mention his occasional frivolous moods—were all factors to be considered.

For instance, the problem of achieving maximum hygiene and comfort was solved by a unique system of doors. This system allows fresh air to circulate through the clothes. It helps reduce musty odors, keeps the wardrobe sanitary and allows damp clothes to dry quickly. And R-W Wardrobes have no inaccessible walls and corners. Cleaning's a snap, and they're easy to keep clean.

And what could be more convenient for youngsters than doors that open at a touch, with knobs and inside hooks easily accessible to even the smallest child.

The rugged construction of R-W School Wardrobes is designed to withstand heavy usage—especially those days when Johnny and his friends are "feeling their oats."

Richards-Wilcox School Wardrobes are manufactured according to three standard principles of operation:

1. Individual Door Operation—fully receding
2. Pair Door Operation
3. Multiple Door Operation

For complete information about Richards-Wilcox School Wardrobes, write to:

Richards-Wilcox Mfg. Co.
110 THIRD STREET, AURORA, ILLINOIS

ELECTRIC LIGHTING continued

de these units. No maintenance costs are figured for replacement of parts, since this is a very minor item and hard to judge. Power costs are based on the rate in the Grand Rapids area of 3¢ per kw-h.

Heating costs are figured with oil as the fuel. Purchase price is 12.3¢ per gal.

Outline specifications of the five classroom types:

1. Standard-size 28' x 32' classroom with narrow end to outside wall. Glass carried to ceiling to eliminate steel lintel and brickwork. Ceiling height 9'6". Fluorescent fixtures: 2 tubes 96" T-8 200 M.A. 8' above floor. Incandescent: 300-w. 3-ring silver bowl 8' above floor.


5. Toplighted with 4' x 20' directional glass block, outside wall glass. Ceiling height 9'6". Fluorescent fixtures: 2 tubes 96" T-12 425 M.A. 8' above floor. Incandescent: 500-w. 3-ring silver bowl 8' above floor.

The following basic details are standard for all five types: 1) concrete footings 3' below grade; 2) reinforced concrete walls to floor level; 3) interior walls concrete block exposed and painted; 4) exterior walls same, faced with brick outside; 5) 4" reinforced concrete slab on earth covered with ½" asphalt tile; 6) steel bar joist spanning between division walls, 2½" gypsum deck on gypsum lath, 1" rigid insulation over gypsum deck with 4-ply tar and gravel roof, $1/4" gypsum lath and brown coat of plaster with $1/2" acoustical tile; 7) unit ventilators with wall-to-wall air intake strips and cabinets complete with individual room temperature control, plus day and night temperature control.
Fenestra Awning-Type Windows in Clemson College (Chemistry Building), Clemson, S. C.

Contractor: Industrial Builders Inc., Anderson, S. C.

This school was designed for the students!

Seems unnecessary to say that, but so many schools are not.

So many look cold, closed-in, dead-gray. But not these classrooms. Look at those wonderful, wide-open areas of clean clear glass. They brim-fill the rooms with eye-easy daylight. They make the whole atmosphere bright and cheerful and alert. And you and your students have the freedom to see out.

These are Fenestra Intermediate Steel Windows. You get extra clear glass area because Fenestra's frames are designed to be strong and rigid without being bulky.

Out-projecting vents serve as canopies, shedding rain to the outside while providing abundant fresh air.

Windows can be washed and screened from inside. They are available Fenestra Super Hot-Dip Galvanized... no painting necessary.

Fenestra has been first for almost a half century. Don't settle for lesser windows. Not when you can get the best for so little money. Call your Fenestra Representative, listed in the yellow pages of principal city phone books. And write for your free copy of Better Classroom Daylighting. Detroit Steel Products Company, Dept. AF-10, 2296 East Grand Blvd., Detroit 11, Michigan.

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Strongest material in relation to weight now being manufactured!

- It's AIRCOMB... an exciting development of the Douglas Aircraft Company. AIRCOMB is a honeycomb structure of Kraft paper impregnated with a phenolic resin. In use it is sandwiched between faces of thin material such as aluminum, wood, plywood, stainless steel or magnesium. It is shipped pre-cut in any thickness from 1/16" to 5".

In panels, this high-strength material is 16 times as rigid as an equal weight of steel! It is durable, fire-resistant, pest-resistant and has excellent insulation and soundproofing properties.

Illustrated at right are some present and potential uses of AIRCOMB. Engineering advice on how to adapt this superior structural material to your needs is available.

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Please send descriptive brochure and a sample of AIRCOMB.

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IN CANADA — International-Van Kannel Doors are available through Eastern Steel Products, Ltd., Toronto and Montreal.

ACOUSTICS continued from p. 188

addition in the Catskills, N.Y., Architect Henry L. Blatner uses a similar deck 4" thick spanning 8'/4" between exposed welded steel beams; the deck costs 70¢ per sq. ft. in place.

† Acoustic roof decks are also made of light-gauge steel welded into hollow box sections that double as framing members. At the Union Free High School, Kenosha, Wis., Architect Lawrence Monberg uses 16-g. prefabricated box sections, 6" deep, spanning 23' across classrooms. Each section contains sound-absorptive material and the steel underside is drilled with 1/8" holes, giving a noise-reduction coefficient of 80%. Cost of this deck is $1.67 in place.

† In the two-story lift-slab limestone Township High School, Peoria, Ill. (AF, Sept. ’53), Architects Hewitt & Bastion used precast, light aggregate hollow blocks as formwork for their slabs. Left exposed in the finished slab, the blocks cut noise 50%.

Cost of slab: $2 per sq. ft.

Insulation and absorption

There are two distinct facets to the problem of noise control in schools. First, the reduction of noise transmission between rooms, which calls for the use of sound-insulating materials; then the control of noise within a room using sound-absorptive materials. These two materials are quite different. Sound insulation is dependent upon weight and, roughly, doubling the weight adds about 5 db to the wall construction, thus:

<table>
<thead>
<tr>
<th>Material</th>
<th>wt. per sq. ft. trans.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2&quot; block plastered</td>
<td>35 lb.</td>
</tr>
<tr>
<td>4&quot; block plastered</td>
<td>40 lb.</td>
</tr>
<tr>
<td>6&quot; brick plastered</td>
<td>115 lb.</td>
</tr>
</tbody>
</table>

Note: discontinuous construction, with an air space or sand fill between the two faces of a partition, is considerably more efficient.

In contrast, sound-absorptive materials are porous, designed to take in and absorb sound energy, but give no insulation. The place for sound-absorptive materials is in the noisy areas of the school—in gymnasiums, handicraft shops, typing classrooms. If possible these should be physically separated from the more quiet study areas—best of all, in distinct building groups separated by planting. Normal speech is easily heard through a 30-db partition wall, consequently a minimum of 40 db is usually specified between classrooms. Adjoining open windows or ducts might be a source of noise leakage; solutions: a solid, impervious baffle between windows, acoustical linings for the ducts.
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AS AN INTEGRAL DESIGN ELEMENT IN MERCY HOSPITAL

The new Mercy Hospital in New Orleans is a credit
to the architects who designed it . . . another of a
-growing number of really fine medical centers to
come from architects' boards in the last decade.

Mercy Hospital is a good hospital because its de-
signers rejected half-answers to problems that came
up during its planning.

The lighting, for example. It might easily have been
overlooked and underplanned because of the maze
of specialized and difficult problems that always con-
front the hospital designer. It wasn't.

In Mercy Hospital, the lighting helps tremendously
to create a pleasant, cheerful and comfortable atmos-
phere for the hospital staff, patients and visitors. The
architects have used good lighting as a tool to
heighten the value, efficiency and workability of a
well-conceived circulation pattern. In each of its
many applications, Mercy Hospital's lighting system
was given a major job to do . . . and it does it well.

Favrot, Reed, Mathes & Bergman chose Day-Brite to
get the one line of lighting equipment that matched
the quality of their conception.

★ ★ ★

Good lighting is a basic element of any form of good
architecture.

The Day-Brite line is not a substitute for the thought
and planning you give your lighting problems. But
it is the one line of modern lighting equipment with
the versatility . . . the clean, simple design . . . the
quality of engineering and construction . . . the ex-
tremely low maintenance factor . . . that guarantee
the effective results you want.

We invite your thorough investigation of Day-Brite
equipment . . . and the claims we make for its
superiority. We think your opinion—and decision—
will be mutually beneficial to both of us.

The dean, smart lines of continuous rows
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cheerful and distinctive appearance to the
hospital entrance and corridors.

Day-Brite bed lamps provide soft, com-
fortable illumination in patients' rooms.
These direct-indirect units are designed
especially for hospital installation.

Service areas in Mercy Hospital are lighted
with the famous Day-Brite VIZ-AID®
fixtures. These modern, all-white units are
efficient and easy to service and relamp.
In major operating rooms, Day-Brite troffers provide peripheral lighting around the operating table to keep down brightness and shadow contrasts for surgeons.

In the hospital's kitchen, Day-Brite CFI DAY-LINE® industrial fixtures were used. Slotted reflectors permit 10% uplighting to reduce brightness contrast.

TOPLIGHTING FOR CLASSROOMS

Illuminating engineers reveal new technical data on use of plastic domes and glass-block skylights

Among the many papers presented at the National Technical Conference of the Illuminating Engineering Society last month in New York, three on toplighting were of particular interest to school architects and school officials. Excerpts from these three papers appear below.

Daylighting with plastic domes *

Plastic domes have been found to be effective for complete daylighting of an interior and as an adjunct to side-wall windows. With unilateral side-wall fenestration, the illumination is at a maximum near the window and decreases as the distance from the window increases. With a daylighting fixture such as the dome, the daylight can be put where needed, so as to result in a uniform illumination distribution.

Domes fill in with daylight where the side-wall illumination drops off. Where the classroom is not deep in comparison with the window continued on p. 232

*B By Bernard F. Greene, consulting engineer of New York, based on studies sponsored by Wasco Flashing Co.

Woodward Iron Company does not manufacture pipe, but we supply leading Cast Iron Pipe foundries with high grade foundry pig iron from which pipe is made.

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Weldwood fire doors and Stay-strate doors keep the schools you build safe

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If properly installed, will not warp or stick in summer.
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BRIDGEPORT, PENNSYLVANIA
MAKERS OF LEES CARPETS AND RUGS
Lighting Completely Installed

in 85 minutes!

costs cut 27% with
UNISTRUT®
channel and fittings

New fluorescent lighting was recently installed in 18 classrooms at Lincoln School, Eau Claire, Wisconsin, in record time at a huge savings in cost over conventional methods. "Before and after" photos prove how fast the job was done. In first photo fixtures are just being unpacked at 2:03 p.m. At 3:28 p.m. second photo shows installation of three 24 ft. rows completed, room cleaned, tools and accessories moved to next room for installation there. Total time 85 minutes.

This job* is just one of hundreds where the UNISTRUT system has helped produce the maximum in lighting efficiency while saving installation time and money.

PERFECT ALIGNMENT
UNISTRUT channel is rigid, straight and strong — gives true alignment that servicing can’t disturb.

ADDED SAFETY
UNISTRUT installations are safer. Continuous row becomes a single integrated unit — weight is equally distributed along all suspension points.

COMPLETE FLEXIBILITY
UNISTRUT installations are made in spite of ceiling irregularities. Stems can be attached at any point along channel.

LOW COST
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It’ll pay you to find out how the UNISTRUT system will help solve your lighting installation problem — faster, better, at lower cost. Contact your nearest UNISTRUT distributor or dealer today — he’s listed in your telephone directory.

Assuming a sky brightness of 1,000 ft. lamberts, one 4' square translucent dome distributes light up to 31'.

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... make your building outstanding at minimum cost

School building budget limited? Mount Airy Granite for entrance feature offers you the desirable combination of distinctive beauty and lifetime durability to make your building outstanding—PLUS big savings in using other materials for the balance of the structure.

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Toplighting with glass block*

To assist the lighting engineer in planning proper toplighting panels, some "rules of thumb" have been developed. For example,
World's Smallest Complete Kitchen!

Only 27% inches wide!

Perfect for Motels, Hotels, Apartments, Offices, Factories, Institutions, Small Kitchens, Trailers, Patios.

General Chef complete kitchen units fit in 5.4 square feet. The ideal solution wherever space and dollars are important.

Sink: One-piece porcelain top of heavy gauge steel. Faucets and all hardware triple-chrome plated. Units also available without sink.

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Freezer: Holds 9 ice cube trays, or 12 standard frozen food packages.

Storage Drawer: Ample storage space for pots and pans.

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Every General Chef Unit is guaranteed in writing to give trouble-free service for 5 years!

WRITE for complete information and specifications if you are building, remodeling, designing — you will be interested in the space and money you can save with General Chef units. Several models are available. Fully guaranteed. WRITE TODAY for complete information and specifications on all General Chef units. We will also send you name and address of distributor nearest you.

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For over a quarter century, hardware consultants and architects have specified Glynn-Johnson door devices and specialties for efficient operation and protection of all types of doors in all types of buildings.

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Builders' Hardware Specialties for Over 25 Years
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Refer to G-J Catalog for complete line of door holders, bumpers, and specialties...for all types of doors in public and commercial buildings.
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with the powerstat
Wallbox Dimmer

Here is the ultimate in home lighting — a light control designed to replace the ordinary ON-OFF wall-switch . . . to permit the selection of any amount of light from darkness to full brightness. Simply by turning a knob, light can be set to any brightness to suit each seeing task, every activity, all occasions. Operation is smooth and silent. Installation is easy. The powerstat WALLBOX Dimmer is Underwriters' Laboratories Approved. A variety of knobs and faceplates are available to blend with any room decor.

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for corridors up to a maximum width of about 10', a skylight composed of 12" square blocks spaced every 2' will give adequate corridor daylighting under a wide range of exterior conditions.

For complete toplighting of enclosed spaces, it has been established that the number of glass block required, for most conditions, is about equal to the floor area in square feet divided by 6. This figure applies for most critical seeing areas, such as classrooms, offices, libraries, etc.

For service areas such as corridors, storage areas and rest rooms or where the panels furnish a secondary source of light, such as in deep classrooms, the number of glass block should be about equal to the floor area in square feet divided by 12.

Where several skylight panels are to be used to daylight an enclosed space, these panels should be located approximately on centers equal to the ceiling height for uniform illumination distribution, a rule of thumb quite familiar to most lighting engineers. For maximum daylight utilization, it is suggested that the “shafts” between the skylight panel and true ceiling line be kept as shallow as possible and that the shaft walls be maintained at high reflectance, preferably above 80%. As with all good lighting, the reflectance of the floors, desks or other furniture should be kept high, preferably above 30%.

To minimize brightness contrasts between the glass block and the concrete joint, and as an aid in raising illumination levels when the concrete web is large in area compared with the glass, it should be maintained at 80% or higher reflectance. (See also AF, Mar. '53, p. 158.)

A new kind of functional skylight *
The Hillsdale High School of San Mateo, Calif. (see p. 142) follows a design that has been under consideration for several years. The unique plan of this school is its flexibility; that is, all interior partitions are to be movable to allow rearrangement of classrooms, laboratories, etc., to suit the changing needs of the school. ... It is apparent that such an arrangement of rooms throughout the school allows for an appreciable concentration of building area. This plan calls for each 14' x 14' unit to be self-sufficient in daylighting, heating, ventilation and supplementary artificial lighting; these facilities to be supplied through the ceiling and attic space. ...

continued on p. 240

* By R. A. Boyd of the University of Michigan Daylighting Laboratory and Architect John Lyon Reid, with the cooperation of Kimble Glass Co.
Introducing a complete line of desks, tables, chairs and cots... all based on the stacking principle... designed to implement the most varied program from pre-school to upper grades! Built to exacting requirements of day-to-day school use... as imaginative in concept as contemporary school architecture! A parallel development with the nationally acclaimed hollow block furniture and play materials of our affiliate company Creative Playthings, Inc. Write for comprehensive 32-page catalog, just published.

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Modulating Controls Cut Coal Bills! Combustioneer Modulating Controls are fully automatic. They feed coal and air to the fire at variable rates, starting slowly, accelerating, tapering off, stopping, in accord with load requirements. This levels off peaks and valleys in feeding, prevents over-firing and waste of coal. The agitating transmission keeps the fire-bed always open, free-burning. And the automatic respirator controls air delivery for maximum combustion efficiency, and smoke-free stacks. As a result, Combustioneer stokers get more heat from a ton of coal. This means less coal consumed, lower heating costs.

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-237
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Illumination data for 30' x 30' classroom shows how glass-block skylight panels maintain relatively even lighting of room. Its window wall is also glass block.

Problems associated with the daylighting of this school were solved by the development of factory-assembled skylight units using glass blocks designed to transmit north light and low winter sun, but to reflect high summer sun (AF, Mar. '53, p. 158). Since such a plan represented a considerable departure in school design and construction, a typical classroom of the proposed school was constructed. . . . This mock-up has a floor area of 26' x 26' and a ceiling height of 12'; that is, it represents four of the basic units of the school. . . .

Measurements of the daylighting of this mock-up have been made periodically since it was completed on Feb. 9, '53. The average reflectances of the room are 80, 72 and 45% for the acoustical ceiling, walls and floor, respectively. The average working plane illumination is 40 foot-candles for an overcast day that provides 1,000 foot-candles on an exterior vertical surface and 2,500 foot-candles on an unobstructed horizontal surface. The ratio of maximum illumination to minimum illumination is less than 2.0, the maximum being directly below one skylight and the minimum near one corner of the room. On a clear day in February the average working plane illumination at midday was 120 foot-candles, the diversity being substantially the same.

The quality of the daylighting is high for all exterior conditions; the maximum brightness ratio being 10 to 1 between the sides of the wells and the adjacent ceiling. The brightness ratio between the top light and the sides of the well is 2 to 1 for an angle of view of 45°.
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Romantic is a word that has frequently been used to describe Pietro Belluschi's architecture and the work of other architects which has even a faintly sensual flavor. But the appellation is really more a comment on the state of today's architectural design in general than on Belluschi. It indicates how narrow and specialized in their efforts are most of the other acknowledged "good" architects, how much they have become limited, repetitive stylists of one particular kind or another, very easy to label. Belluschi differs; he goes out after a variety of effects. But since everyone has to be categorized these days, he must too.

If, however, Belluschi really deserves this rather distrustful tag of romantic in an unromantic world, then a professional's belief in emotion is romantic too. This new book indicates how strongly this belief is at the root of Belluschi's work, in his expressed conviction that architecture should be sympathetic, that it should take forms which laymen will "feel" and enjoy. The text unabashedly talks about Architecture, capitalized, but the core of its conversation comes through as his aspiration to comfort and protect people with fine buildings, not make a brave show of design:

"Man is a very complex animal, full of strange emotion and illogical desires. He is swayed by prejudice, love and hatred. He is a being pervaded by both idealistic and materialistic motives. He can be both gregarious and misanthropic, altruistic and selfish. No one can possibly know enough about man to draw immutable laws, sound conclusions or certainties; I think that planners and architects, just like politicians, must have their ears to the ground and listen: . . . their creativeness must spring from human understanding and even love. A painter, a sculptor, a composer may be haughty, detached and even arrogant, but not an architect, because he has a social task to perform.

"We have taken away many of the established forms, so cherished by our ancestors, and have replaced them with stark utilitarian ones, which give little nourishment to the senses. We have taken away from the man in the street all the stereotyped little ornamentals, cornices, cartouches and green fake shutters, but we have not been capable of giving him back the equivalent in emotional value. The fact is that after three decades of rather cold functionalism, we have come to the realization that emotion is a great force in our everyday world; it pervades our actions, our political motives, our very happiness—yet emotions have not been given the
Top lighting in schools...

IN THIS ISSUE:

SAN JOSE HIGH SCHOOL
San Jose, California
Ernest Kump, Architect

WHITE OAKS SCHOOL
San Carlos, California
John Carl Warnecke, Architect

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guidance they deserve, although they are the very soil in which both architects and public may grow to creativeness and understanding. . . .

"Our immediate task, it seems to me, is to show our concern for the emotional needs of our clients and to show them that we are not reluctant nor unable to impart richness to the background of their lives, or to provide the kind of emotional fullness which played such an important role in the great periods of the past. . . .

"... We architects, of the common working variety, who must be front-line men, facing frustration and compromise; we, who must understand, absorb, and give visual form to so many of the forces which make our world move, must not be ashamed to listen nor to understand what lives around us... not disdainful, temperamental stars—but men of vision among men."

A philosophy like this demands versatility in style, not inflexible dogma, and Belluschi has done more than talked this. He has built it. Witness the contrast between his Equitable Building in Portland, first of the post-war American metal and glass buildings, and one of his churches (see p. 242).

Today the earnest, Italian-born Belluschi is only 54 years old. At present he is steering the architectural department at Massachusetts Institute of Technology (a very unromantic spot) and collaborating in the Boston Center design (little romance, much real estate). It is a safe assumption that teaching, he is still learning, that this important architectural career is still in the ascent.

65,000 sq. ft. Building Erected in 60 Days with LACLEDE CONSTRUCTION STEELS

Laclede Steel service and construction know-how combined to give Ritepoint Company of St. Louis a new permanent-type building in a hurry. The short completion time resulted from using Laclede steel joists, reinforcing bars and welded wire fabric.


Although it displays little architectural good taste, this collection of new fire stations should prove helpful to anyone confronted with the problem of designing or building such a structure. Each of the 70 stations is illustrated with a floor plan and a photograph or rendering, and many are briefly described.

Among the best stations selected is Toledo's new fire department headquarters by Architects Bellman, Gillett & Richards, which will be presented fully in a subsequent issue of Forum.


Prepared as a basic text on the design of statically indeterminate structures, Professor Andersen's new book concentrates upon the behavior of actual designs under load. He shows how to evaluate linear and angular displacements of strategic points in a structure and how to apply these methods to indeterminate beams and trusses. The slope-deflection and Cross's moment-distribution methods are explained in detail. The final chapters deal with the design of three-dimensional space-frames, a new field of structural design that has yet to be exploited in steel construction in spite of the immense progress achieved in shell concrete structures.

SIR CHRISTOPHER WREN. By John Summerson. Published by The Macmillan Co., 60 Fifth Ave., New York 11, N.Y. Illus. 5" x 5½". $1.75

The author expounds the architectural genius of Sir Christopher Wren in this ninth book of Macmillan's Brief Lives Series.


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PLAY SCULPTURES made for school children to climb, burrow, romp over, in and around

In staid Philadelphia last month 2,000 park and recreation officials, gathered for the National Recreation Congress, raised favorable brows over the huge spheres, spirals and lumps displayed by Creative Playthings Inc.'s new Play Sculptures Division. These dynamic and pleasant forms melt the stiffest resistance to abstract sculpture, primarily because they function in a most wonderful and irresistible way: they are play places in and on which children can exercise muscle and phantasy. They provide hidden hollows, slides, secret steps, and hanging-on places—environment usually denied the urban child, and, even where executed by nature, not always so safely engineered. Built of sundry contemporary construction materials—reinforced concrete, plastic and glass fiber, tubular steel framing—the models pictured run $2,000 to $3,500. Other sculptures start at $300.

This break from traditional playground equipment design is no casual one. Internationally known artists and architects, such as Isamu Noguchi of the U.S., Egon Moller-Nielsen of Sweden, Henry Moore of England, and A. Vitalli of Switzerland, were in on the coup. Modern school architects and educators both are being offered exciting vehicles for combining the aesthetic with the useful.

As further stimulus to designers and to promote public interest, the manufacturer is co-sponsoring—with New York's Museum of Modern Art and Parents Magazine—a National Play Sculpture competition. Prizes totaling $2,000 will be awarded for the playground equipment judged to fill best the energetic and art needs of children. Details and entry blanks may be obtained from the Museum.

Manufacturer: Creative Playthings, Inc., Play Sculptures Div., 5 University Pl., New York, N.Y.

LATEX BASE ENAMEL: rugged finish, easily applied

Walls, wainscoting and woodwork exposed to constant finger smudging are the areas for which Glidden has developed Spred Gloss, a latex base enamel. Like its flatter predecessor, Spred Satin, the new coating dries in a short time to a tough, washable finish. It has no odor and can be applied in a closed room without disagreeable effects. Produced in a full range of colors, it sells for $6.95 per gal. One gallon covers about 450 sq. ft.

Manufacturer: The Glidden Co., Union Commercial Bldg., Cleveland, Ohio.

continued on p. 248

THE MAGAZINE OF BUILDING
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Contemporary daylighting comes to old classroom (left) with installation of woven glass-fiber panels set at an angle along the windows to diffuse harsh sunrays.

Architects & Engineers: Giffels & Vallet Plumbing & Heating Contractor: W. J. Rewoldt, Inc.

SPELL COMFORT FOR STUDENTS AT THE NEW CODY HIGH SCHOOL

A far cry from the little red schoolhouse is Detroit's modern new Frank Cody High School. Students in this magnificent building enjoy educational facilities undreamed of a generation ago.

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SAINT LOUIS 10, MISSOURI

GLASS CLOTH PANEL makes effective, low-cost daylight diffuser

With its woven glass yarns acting as myriad tiny diffractors, this simple shade device converts intense sunrays into soft, glare-free light, distributing it evenly throughout the room. Suitable for budgeted installations in existing classrooms as well as in new schools with large window areas, the diffuser panel is quite easy to construct and install. The glass-fiber cloth is tacked taut over a wood frame and mounted at an angle on the window sash.

Durable, fireproof and rot-resistant, the white fabric needs only an occasional washing in warm water and soap. The lightweight weave (for north and east exposures) costs about 17¢ per sq. ft.; the heavier weave (suitable for south and west orientations) costs about 23¢ per sq. ft.

Manufacturer: Owens-Corning Fiberglas Corp., 16 E. 56 St., New York, N.Y.

MODULAR WINDOW FRAME molded of plastic

Rot, rust, termites, fungi and the ravages of weather have met their match in the unique Plyco, a plastic window impervious to the ills which may beset many wood and metal units. Made of plastic resins combined with asphalt and asbestos and reinforced with steel, the molded frame and sash need neither painting nor refinishing. Packaged with the unit are a glazed sash and combination storm and screen sash. Each sash is molded in one piece and has easy-to-clean rounded corners. Joints on the frame are mortised for dimensional sta-

bility. A reversible model is available which opens from either the top or bottom. Designed for use in industrial buildings, barns, garages, the window can be installed singly, in tandem or stacked. Measuring 32" x 16" high it fits readily into openings in walls constructed of standard 16" x 8" masonry block and is suitable as a ventilator in a wall of 8" glass block. Used in the latter application, the Plyco unit's $13.60 price is considerably less than that of a metal counterpart.

Manufacturer: The Kohl Co., Elkhart Lake, Wis.
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STAGE-ON-WHEELS is easily set up, easily stored
A boon to the flexible schoolroom is the Horn folding stage, a completely portable unit with a select fir floor mounted on a sturdy steel understructure. The stage is merely rolled into position and secured with floor stops. When no longer needed, it can be accordioned into a compact bundle and wheeled away to free the area for other purposes. Heights of 15" and 24" and widths of 6' up to 16' are available. Each size can be purchased with from one to 19 folding sections; each section is 22" wide and folds into a space 3½" deep. Average prices run about $4.50 per sq. ft. for the 15" height and $5 for 24" height including delivery.
Manufacturer: The Brunswick-Balke-Collender Co., 623 S. Wabash Ave., Chicago, Ill.

BIG TABLE AND BENCH SET folds up, rolls away
Seating capacity for 40 tots or 32 teenagers is supplied by Mobil-Fold, a set of two 14' tables and four freestanding 14' benches which fold out of a steel caster-equipped truck. For speedy refolding, the set is used attached to the truck, though the six pieces also may be completely removed and rolled around at will.

When not in use the set can be kept against a wall or in a corridor. Made of tubular steel, with plastic-faced ¾" mahogany plywood tops, the set is well suited for rigorous school service. It sells for $350 FOB Detroit.
Manufacturer: Schieber Sales Co., Detroit, Mich.

PRIMER made for porous masonry
While concrete blocks made with lightweight aggregates are becoming popular because of their good insulating qualities and easy handling, their interesting texture has posed a paint problem. Now a good finish job on porous masonry is said to be assured by using Medusa's Rail-Seal cement paint, a prime coat developed principally for lightweight aggregate masonry. The manufacturer recommends that it be worked into the surface with a scrub brush and, for best results, cured like regular cement paint with a fine fog spray of water. Available only in white, it retails at $5.75 for a 25 lb. package.
Manufacturer: Medusa Portland Cement Co., 1000 Midland Bldg., Cleveland, Ohio.
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CLEAR GLASS AND GRAY PLASTIC SANDWICH keeps glare out of classroom

Taking two layers of window glass and laminating them around a sheet of transparent gray vinyl, Pittsburgh Plate has produced Dusklite, an effective yet inexpensive glare-control product. (Actually the process is the same as that used for making auto safety glass except that the plastic layer is pigmented.) Designed primarily for use in ribbon windows and ventilator units in conjunction with light-directing glass-block panels, Dusklite is said to eliminate the need for blinds, louvers and other shading devices. Price to the trade is about $1.50 a sq. ft. in sizes up to 15 sq. ft.


ALUMINUM DOORS put together with bolts resist impact and vibration

Expanding its line of aluminum building products, Kawneer announces a moderately priced series of aluminum doors incorporating bolted construction. The new units, available in sizes from 3' x 7' up to 6' x 7' in single- and double-acting models, feature plastic glazing channels which, by eliminating putty, are said to cut glazing costs. The bolts connecting the corners through top and bottom rails are held securely by vibration-proof locknuts. Each door unit is equipped with pull handle and push bar, concealed floor-type closers, threshold, and standard 1-5/32" lock cylinder. Installed cost of a single-acting door is about $215.


PLASTIC LEVEL takes hard knocks without breaking

The properties of plastic are put to good use in Level-it, a 24" surface and plumb level which is shatterproof and noncorrosive, does not scratch tile nor conduct electricity, and weighs but 12 oz. The instrument's glass bubble vials are imbedded in acrylic sheaths, which provide protection during rough handling, magnify the bubbles and also, by eliminating metal guards, make the level easier to read from any direction. This model is priced at $5.98; Level-it is also available in smaller sizes.

Manufacturer: Creative Plastics Corp., Stony Brook, L.I., N.Y.

continued on p. 254
Now... THE ONLY GYPSUM INSULATING LATH YOU CAN IDENTIFY IN PLACE

One More Reason for Specifying BEAVER Insulating Gypsum Lath

To make your job a little easier when checking construction on a lathed-out building, Beaver Insulating Lath, as shown, is clearly marked on every piece. It is there for positive identification. It is a quick, sure way for you to tell insulating lath from regular when the lath is in place and to make certain that specifications have been followed. It is a feature that only Certain-Teed's Beaver Insulating Lath offers you.

Beaver Insulating Gypsum Lath, with aluminum foil back, provides an effective barrier against heat, cold, vapor and fire. It is strong—crack resistant; will not swell, buckle or shrink. It provides a perfect plaster base. It combines in one product a highly efficient reflective insulation and vapor barrier with all the advantages of well-known Beaver Gypsum Lath. Whenever you specify insulating lath, make certain it is Beaver Lath.
NEW PRODUCTS continued

One of Wyandotte’s laboratories showing Kewaunee Equipment with KemROCK Tops.

KemROCK is one of our TOP salesmen!

- Back of every piece of Kewaunee Equipment is nearly 50 years of constant advance in design, construction, and working convenience that has kept pace with the progress of Industries, Hospitals and Educational Institutions.

- And when it comes to Tables, Sinks and other Laboratory pieces requiring “Tops” defiantly resistant to acids, alkalis, solvents, heat and abrasion—KemROCK steps into the picture as one of Kewaunee’s “Top” salesmen. For example, back in 1941 Wyandotte Chemicals Corporation first ordered Kewaunee Equipment with these “Toughest of all Tops.” Now after 12 years of experience, Wyandotte again specifies “Kewaunee with KemROCK Tops” for their modern Research Building.

- KemROCK is an exclusive Kewaunee product made from natural stone (free from veins and seams)—impregnated and coated with a synthetic resin—then baked. It is jet-black—takes a high polish and adds much beauty as well as amazing extra service to Laboratory pieces.

New Free Folder on KemROCK
sent on request. Remember, too, that Kewaunee field engineers are available to you without cost or obligation.

Kewaunee Mfg. Co.  J. A. Campbell, President
Representatives in Principal Cities  5086 S. Center St. • Adrian, Michigan

FACTORY-FORMED COPPER GRID knocks 4¢ per lin. ft. off cost of radiant panel; one size adaptable to entire system

Packaged prefabricated, ready to fasten to ceiling or wall, the Anaconda Panel Grid substantially cuts labor costs on copper-coil radiant heating systems. Supplied in one size that can meet all panel design requirements, the new PG units are fabricated from 50' lengths of 3/8" type L water tube. Somewhat harder than the soft annealed copper that contractors purchase in 60' and 100' rolls and form into sinuous coils on the job, the type L metal has enough give to allow a workman to squeeze or stretch the grid by hand to fit various spacing needs. Leftovers from partially used panels can be straightened out easily for runouts to supply and return lines and for interconnections.

Fewer fittings, less bulk. The trim, straight panels are secured snug to the ceiling in less time and with fewer fastenings than site-formed coils, reports Pennsylvania Heating Contractor Wallace Huebner. After using 100 of the Panel Grids in three complete jobs, he stated that the PG installations averaged 4¢ less per lin. ft.

Opened up from its bowknot shipping shape so the tubing lines run parallel with 6" spacing along the centerline, a PG section measures about 56" wide x 60" long—large enough to serve a 30 sq. ft. ceiling or wall area. (The manufacturer plans to have preformed 1/2" tubing for concrete floor slab layouts on the market shortly.) Effective Btu rating for the 6"-spaced grid is 1,900. Over windows and doors and along perimeter walls where there is considerable heat loss, the PG units may be compressed to 4½" spacing. Toward inner walls where less heat is required, the grid can be expanded up to 12" spacing. Thus the single-size PG can be compressed or extended to comply with intricately engineered specifications for a complete radiant panel system.

One end of each section is swaged so the grids can be soldered in series without special fittings. The panels can be attached to rock lath or wood joists above metal lath with U straps, or tied with wire beneath metal lath. More than skin deep, the neatness of application makes it easier for the plasterer to trowel on a smooth, finished ceiling.

Manufacturer: The American Brass Co., Waterbury 20, Conn.

continued on p. 256

THE MAGAZINE OF BUILDING
MENGEL Mahogany FLUSH DOORS WILL DELIGHT YOUR CLIENTS—

YET COST LESS THAN MANY DOMESTIC WOODS!

Mahogany! — the very word suggests the ultimate in luxury, beauty, good taste, desirability.

Now The Mengel Company offers you the magic of Mahogany — doors of genuine African Mahogany — at less cost than for comparable doors faced with most domestic woods! Get all the facts today!

Door Department
THE MENGEL COMPANY
Louisville 1, Kentucky
Three separate items found on the conventional classroom door (left) are integrated in the Com-Vision hardware.

**NEW PRODUCTS continued**

**DOOR HARDWARE combines viewer, pull and lock**

Thanks to a team of dissatisfied and creative architects, a handsome, cost-saving piece of hardware is now on the market. In planning the Darien Junior High—their first school design commission—Ketchum, Gia & Sharp carried a fresh approach through to the smallest details—in this case, the conglomerate items found on a conventional classroom door. Instead of accepting the standard individual parts, K, G & S summed up vision panel, door pull and lock in one specially made item. It proved to be far less costly than separate stock items; in fact, $10 is the minimum estimated saving on each door. Now Hardware Sales Co., Inc., the unit's custom-crafters, are putting it up for sale as Com-Vision # HSC-3.

The hardware comprises a Y-shaped pull, cast of brass and chrome plated, machinescrewed into the exterior half of an aluminum frame. A $2" thick glass push plate doubles as the viewer. The glass sets into the inside half of the frame and is held snug by brass clips. A mortised cylinder lockset with 4$2" backset is mounted below the pull and is keyed from the outside, worked by thumb turn from inside.

Com-Vision measures 6$4" wide x 18$%" high and is mounted in a rough opening 5$%" x 15$%". The unit, with dead lock, costs about $57 not installed as compared to more than $70 for separate items.

**Manufacturer:** Hardware Sales Co., Inc., 383 Post Road, Darien, Conn.

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**project-O-lites:** These instruments make use of objective lenses to produce a well defined beam, plus built-in framing shutters or diaphragms to limit the area and shape of the coverage. They are especially useful where selective coverage is needed from an extremely inconspicuous source, as in churches, art galleries, dining rooms, displays, etc. Sizes range from small "pinhole" units up to 2000-watt units for projecting a powerful beam from a very high place.

Size shown: #1854: 400 watts; 3$%" aperture; Price, $66.25

**CENTURY LIGHTING, INC., 521 WEST 43RD STREET, NEW YORK 36**

626 NORTH ROBERTSON BOULEVARD, LOS ANGELES 46

---

**HONEYCOMB CORE DOOR with plastic face resists warpage & wear**

The Chemclad door for interior or exterior use is constructed to resist dimensional change even in warm, damp climates. Between its moistureproof plastic laminate faces is a honeycomb core of resin-impregnated kraft paper. Only the frame for this rigid, stressed-skin unit is made of wood. The door's smooth, tough surfaces will show little effect from any scratching or scuffing it might receive in school and institutional applications. Prices: $30 to $60, depending on style and size.

**Manufacturer:** Bourne Manufacturing Co., Detroit, Mich.

---

*Technical Publications p. 260*
High Velocity air conditioning is constantly posing new problems. Here is one of many for which Anemostat has a practical solution.

In High Velocity installations, too, "When Anemostat Air Diffusers are in sight the system is right."

**PROBLEM:**
How can you handle unlimited volumes of air from a single air diffuser on a High Velocity single or dual duct system?

**SOLUTION:**
Use 3 series HP-4 High Velocity Units in tandem connected to an Anemostat Air Diffuser.

"No Air Conditioning System Is Better Than Its Air Distribution"
To comply with requests of our customers, dealers and distributors, we have completed years of research and tests on three new products to add water-repellent materials and coatings to The THORO System, for protection to any type surface.

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Clear, water-repellent material for porous brick, stone, concrete, stucco, asbestos siding and shingles, interior plaster and masonry surfaces, where texture and color are to be retained.

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THE MODERN AUTOMATIC DOOR CONTROL

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DOR-O-MATIC
Division of Republic Industries, Inc.
4440 N. Knox Ave., Chicago 30, Illinois

Write for complete information

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WITH
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considerable variance of opinion—largely the result of different statements by manufacturers —on how to take care of it once put down. To help clear up the confusion voiced by dealers, installers and maintenance people, the Chemical Specialties Manufacturers Assn. tested representative brands of vinyl flooring. Slip, scratch and soil resistance and gloss were compared on waxed and unwaxed specimens. According to the tabulated results in this report it looks as if waxing is still desirable for good maintenance. (Alternate upkeep suggestion from makers of all-vinyl tile is that the flooring be machine-rubbed occasionally with fine steel wool for a rich satin finish.)

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**MAINTENANCE LIGHTING.** Group Lamp Replacement Pays Off, 1B-3239. Inquiry Bureau, General Electric Lamp Div., Nela Park, Cleveland 12, Ohio. 10 pp. 81/2" x 11"**


continued on p. 264
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MINNESOTA, famed land of wildlife and changing seasons, is headquarters for some of the country's finest White-Tail deer hunting...

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Heating dollars go further when McQuay Down Flow Unit Heaters are installed. They are especially recommended for saving heat ordinarily wasted in buildings with high ceilings. These vertical unit heaters have the famous Ripple Fin Coils. Providing peak heating efficiency, they lower heating costs by circulating evenly and gently this normally stratified air.

In the McQuay line are 22 down flow units to meet your exact requirements. Capacities range from 25,400 to 500,000 Btu per hour. Four styles of directional air diffusers are available to provide any desired air distribution. Consult the McQuay representative in your city or write McQuay Inc., 1609 Broadway N.E., Minneapolis 13, Minn.

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TECHNICAL PUBLICATIONS

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WIRING. Type C. Silic-O-Netic Overload Relay, Bulletin 5101A. Heinemann Electric Co., 388 Plum St., Trenton 2, N.J. 4 pp. 8½ x 11"


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AIR EXHAUST. Jenn-Air Power Exhausters, Bulletin 53-B. Jenn-Air Products Co., Inc., Architects & Builders Bldg., Indianapolis 4, Ind. 6 pp. 8½ x 11"

PLASTER. Metal Lath and Plaster Solid Partitions with Channels, Technical Bulletin No. 5. Metal Lath Manufacturers Assn., Engineers Bldg., Cleveland 14, Ohio. 8 pp. 8½ x 11"

GLASS FIBER PRODUCTS. How Fiberglas Products Make Schools More Efficient, Comfortable, Economical. Owens-Corning Fiberglas Corp., Nicholas Bldg., Toledo 5, Ohio. 11 pp. 9 x 12"


WIRING. Wire and Cable for the Chemical Industries, Booklet No. 19-312. Construction Materials Div., General Electric, Bridgeport 2, Conn. 19 pp. 8½ x 11"

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Strength plus lightness permit use of fewer columns, shallow footings, eliminate need for sub-purlins.

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Advertisers index:

268

Page: 83
268 Advertisers index:

243 Advance Transformer Co.

245 Alberene Stone Corporation

245 Alberene Manufacturing Co., W. D.

76 Allied Chemical & Dye Corporation (The Barrett Division)

13 Allied Structural Steel Companies

216 Alkynite Company of America

243 Alumilite Corporation, The

104, 105 American Brass Company, The

190, 191 Aluminum Window Corp. The (Subsidiary of General Bronze Corp.)

26, 27 American Air Filter Company, Inc. (Herman Nelson Division)

68, 69, 251 American Brass Company, The

21 American Hardware Corp., The (P. and F. Corbin Division)

74 American Playground Device Co.

87 American Radiator & Standard Sanitary Corporation

84 American Seating Company

226, 227 Anheuser-Busch Company

241 American Steel & Wire Division (United States Steel Corp.)

228 Annesotia Corporation of America

237, 262 Architectural Forum

32 Armstrong Cork Company

12 Art Metal Company, The

195 Auth Electric Company, Inc.

97 Auto-Lok Aluminum Awnings Windows (Ludman Corp.)

78 Automatic Sprinkler Corp. of America

48 Babcock & Wilcox Company

76 Barrett Division, The (Allied Chemical & Dye Corporation)

24 Bayley, William Co., The

23 Beauty-Safe Scaffolding, Inc.

Cover III Blue Ridge Sales Division (Libbey-Owens-Ford Glass Co.)

8 Brunswick-Balke-Collender Company, The

62 Bryne Doors, Inc.

90 Buffalo Forge Company

60 Byers, A. M., Co.

59 Carey, Philip, Mfg. Company, The

218 Carrier Corporation

4 Celotex Corporation, The

256 Century Lighting, Inc.

253 Certain-Teed Products Corporation

223 Chase Brass & Capper Co.

40 Claridge Equipment Company

53 Cleaver-Brooks Company (Boiler Division)

197 CO-two Fire Equipment Company

238 Columbus Coated Fabrics Corporation

237 Combustioner Division (The Steel Products Engineering Company)

214 Concrete Reinforcing Steel Institute

21 Corbin Division, P. & F. (The American Hardware Corp.)

262 Corning Glass Works

54 Crossley Lumber Company

84 Cyclotherm Corporation

240 Davidson Enamel Products, Inc.

226, 227 Day-Brite Lighting, Inc.

26, 27, 221 Detroit Steel Products Company

222 Douglas Aircraft Company, Inc.

14, 15 Douglas Fir Plywood Association

249 Dur-O-Wal

Cover III EJECO.

49 Federal Seaboard Terra Cotta Corporation

20 Fenwal, Inc.

70 Fiat Metal Manufacturing Company

65 Flynn, Michael, Manufacturing Company

239 Follansbee Steel Corp.

245 Formica Company, The

259 Franklin Products Corp.

28 Frigidaire Division (General Motors Corporation)

73 Fuller Company, George A.

200 Garden City Plating and Mfg. Company

233 General Air Conditioning Corp.

Page: 86

86 General Aniline & Film Corporation (Ozalid Division)

190, 191 General Bronze Corp. (The Aluminum Window Corporation Subsidiary)

116 General Electric Company

28 General Motors Corporation (Frigidaire Division)

234 Glynn-Johnson Corporation

2 Goodyear Tire & Rubber Co.

239 Gotham Lighting Corporation

99 Green Steel Products Co. (Subsidiary of Granite City Steel Co.)

205 Grinnell Company, Inc.

236 Haertel, W. J. & Co.

82 Hardwood Products Corporation

1 Hausman, E. F., Company, The

212 Haven-Bush Company

264 Haws Drinking Fountain Co.

259 Hendwich Manufacturing Company

192 Higgins, Inc.

94 Holcomb & Hoke Mfg. Co., Inc.

224 International Steel Company

6, 85 Johns-Manville

71 Johnson Service Company

10 Kentile, Inc.

207 Kewanee-Ross Corporation

254 Kewanee Manufacturing Company

114, 115 Keystone Steel & Wire Company

236 Knapp Brothers Mfg. Co.

261 Knoll Associates, Inc.

244 Laclede Steel Company

280 Lees, James and Sons Company

196 Lewis Asphalt Engineering Co.

19 Libbey-Owens-Ford Glass Company

Cover II Libbey-Owens-Ford Glass Company (Blue Ridge Sales Div.)

88 Lightolier Company, Inc., The

29 Louisville Cement Company, Inc.

97 Ludman Corp. (Auto-Lok Aluminum Awnings Windows)

101 Ludowici-Gelafon Company

219 Macomb Incorporated

17, 61 Mahon, R. C., Company, The

248 Marlo Coil Co.

211 Master Tile Corporation of America

262 Matot, D. A., Inc.

245 McDonald Products Corp.

263 McQuay, Inc.

95 Medusa Portland Cement Company

255 Mengel Company, The

98 Miller Company, The

202, 208 Minneapolis-Honeywell Regulator Company

194 Mississippi Glass Company

250 Montgomery Elevator Company

22 Multi-Vent Division (The Pole-National Company)

209 National Gypsum Company

92, 93 Nelson, Herman (Division of American Air Filter Co., Inc.)

77 Nestlitt, John J., Inc.

217 New Castle Products

25 Norman Products, Inc.

232 North Carolina Granite Corporation

243 O'Keefe's, Inc.

5 Orr & Sembower, Inc.

55, 56, 57, 58 Otis Elevator Company

Cover IV Overhead Door Corporation

86 Ozalid Division (General Aniline & Film Corporation)

64 Peckel Company (The Richmond Fireproof Door Company)

38 Petro Division

9 Pittsburgh Corning Corporation

215 Pittsburgh Plate Glass Company

268 THE MAGAZINE OF BUILDING
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**Daylighting Efficiency**—White translucent PLEXIGLAS transmits 60%-75% of the daylight, provides complete diffusion, and reduces solar heat. Clear material gives 92% transmission. One-piece dome eliminates opaque cross members.

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