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Popular Science

THE *What's New* MAGAZINE

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No-Cost Vacation Shelters

You can put a roof over your head in the wilds with help of these practical architecture-study projects

By AL LEES

PS PHOTOS BY ED WESCH

What better recycling project than one that adds to your vacation fun? If you're planning to set up camp for several days—or weeks—why pack along a conventional tent when you can prefab a truly imaginative shelter from scrap cardboard? When you're ready to leave, you simply tear it down and toss it on your final bonfire.

Could you survive in one? Better believe it! An entire city of the structures shown on these four pages went up in the snowy woods of the Catskill mountains this spring as a field project for architectural students from various universities in the northeast. The four-day event—christened Whiz Bang Quick City (WBQC)—was the brainstorm of two young instructors at the architecture school of New York's City College. Lester Walker and Robert Mangurian. (You've seen projects designed by these two in previous issues, and you'll find a Walker desk further along in this issue.) The builders of that cardboard dome at right decided to stay an extra night after the city disbanded; they awoke next morning to find the dome had weathered blizzard winds and was sitting in six inches of snow. *All* the structures sheltered students through 15-degree nights.

What's Quick City up to? Walker and Mangurian sought ways to provide practical building experience for their students—something beyond drawing-board theory. They wanted to put structural design to a practical test not possible in cramped classrooms. Even further, they wanted their students to share community experience—to relate their individual structures to group needs in the creation of a self-sufficent city. Class assignments were given, and other architectural schools were invited to join the endeavor. Arrangements were made for donated acreage on which participants could converge at a given

Continued

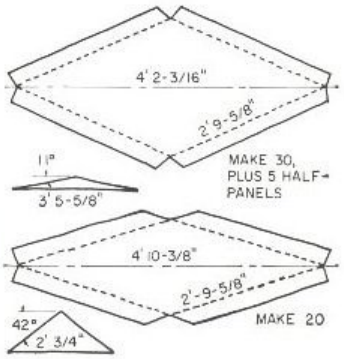
Report from the Midwest: Recycled boxes make a good-looking rugged geo-dome

Flanged panels fasten together with stove bolts through drilled hardboard strips, as shown by Charles Krueger.

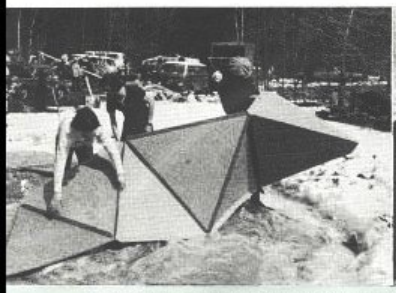
Special jig speeded panel production. Here, Krueger and co-instructor Nystuen weight glue-spread cardboard layers.

Dome is strong enough to support two adults, yet light enough for two to carry. Door gap doesn't seriously weaken structure. Interior headroom is cramped in this 3/8 dome; planned 5/8 version will be 10 feet high for full livability.

IN ANOTHER project, altogether independent of Quick City (proving that student builders share a national concern for recycling waste materials), a group at Stout State, Menomonie, Wis., launched its own shelters-from-scrap program. Rounding up used corrugated boxes, they calculated dimensions and angles for a pair of folded tetrahedron panels (below) that would assemble into a "two-frequency" dome. These panels were then mass-produced in laminations of three cardboard plies—both to stiffen previous folds in the boxboard and, by alternating corrugations, to strengthen the board itself. The center layer can be pieced together from scraps. Jigs are simple V troughs built of plywood. After drying under weights, laminated panels retained their shape. If five-inch flaps are liberally smeared with roofing cement before assembly, and the dome is painted, a weatherproof shelter results—for a cost of around $10 for the materials.—E. F. Lindsley



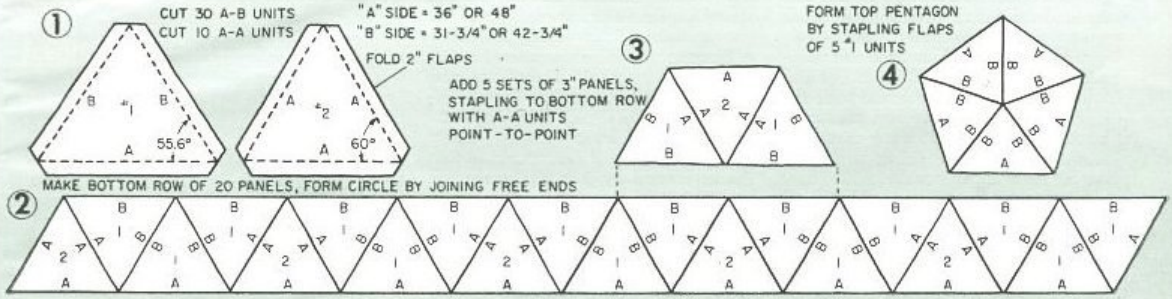
Let You Recycle Trash



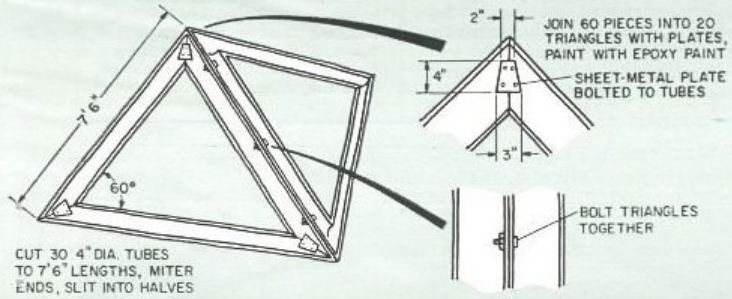
Bottom row of prefabbed triangles were stapled together at Quick City site and formed into circle. Note ground cloth.

Three-panel sets are added, as shown in sketch below. Several of these panels have cutouts for tape-hinged windows.

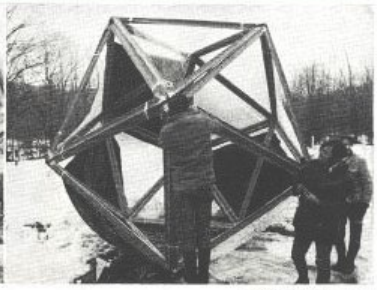
Seams were sealed with 2" waterproof fabric tape after top pentagon was put on. Dome was finished with epoxy paint.



Discarded carpet tubes frame a sturdy icosahedron



Ten feet tall with twenty faces framed with split and mitered cardboard tubes, this plastic-sheathed icosahedron was one of Quick City's imposing structures. As sketches and photos show, equilateral triangles were prefabbed with bolted-on joiner plates. Then triangles were bolted together (with wrappings of package tape for temporary connection). For larger floor space, you can stop with a ⅝ icosahedron; full shape requires final five-triangle peak similar to starting assembly in first photo. Structure was designed and built by Louis Aiese and Anthony Villano. Tubes are yours for the asking at carpet stores.



Conduit version of PS Sun Dome was so strong you could climb it, despite front access gap. Weatherproof skin (and ground cover) was 6-mil polyethylene film—black for privacy. Clear film makes a fine greenhouse.

date. Various sponsors were contacted for materials: Monsanto provided polyethylene film, Alton Box Board Co. donated cardboard, and Sears Roebuck gave tools and assembly materials.

Still, the materials budget was minimal and, walking the "streets" of this instant city, we were struck with the ingenuity the students had shown in making use of no-cost waste materials. Ducking inside the various structures, we realized many would make cozy temporary shelters—for the backyard or the wilderness.

All of the students we interviewed recommended starting with an accurate scale model; this is especially valuable for checking the geometry involved in dome building. True, some of the structures that worked out in model form collapsed when erected full-scale —that's "learning through failure."

You choose the size. In such structures, it's what you make it. You'll note domes of two different diameters in our cover photograph. Both were constructed the same way, but of different-size triangles, indicated on the sketch panel on the previous page. (The smaller orange dome was erected by one of the few female students in the project, Marcy Kaplan.) For a stable foundation, you can stake a frame of 1-by-2s (cut to A dimension, with ends mitered at 18 degrees) flat against the ground and staple into their edges. For flange joining, use industrial plier-type staplers.

The conduit dome (above) was a clever adaptation of our wood-lath Sun Dome, erected by John O'Connor and Tom Cusanelli.

Though WBQC was held near Woodstock (see box, right) it had little in common with the famous '69 festival that took that town's name. As Walker points out: "The Woodstock Festival consisted of an elite few doing their thing before 350,000 spectators. WBQC involved everybody in creative activity. Once the structures were up, the city's 200 citizens worked out zoning, fire laws, and codes to suit immediate needs. WBQC was such a success that we plan to repeat it next year for two weeks." Moving near a student campfire, he added: "In May, though." PS

April Odyssey of WBQC

Covering Quick City for this story proved an adventure in itself. The poster-map that CCNY students distributed to various architectural schools directed us to a donated 50-acre site near the remote hamlet of Hartford, N.Y. But when we arrived, we were met by a rather sheepish sheriff's deputy waving an injunction. Some local citizens had seen a copy of the poster and spread the (false) alarm that thousands of hippies were to descend on their town for a weekend's rock orgy. When the CCNY trucks arrived, the students found themselves barred from their site. (Above, Mangurian tries to explain the misunderstanding to The Law.)

At the last minute, a site was found 140 miles to the south—at Woodstock, no less. After a weary trek, the "first annual" Quick City flowered (right). Those uptight citizens of Hartford will never know what they missed.—Al Lees

Where to get more data on domes

Want to duplicate the conduit dome above? You can work from the PS Sun Dome blueprint, just as the Quick City builders did. Send $5 to Popular Science Plans Division, 355 Lexington Ave., New York, N.Y. 10017, and ask for Plan No. 5519.

Information about domes of all kinds, including kits you can buy, is available in a new publication just off the press: Domebook II. It's available from Pacific Domes, Box 279, Bolinas, Calif. 94924, at $4 plus 20¢ mailing (California residents add another 20¢ tax). Compiled by dome expert Lloyd Kahn, it's an expanded sequel to his earlier sell-out Domebook I.

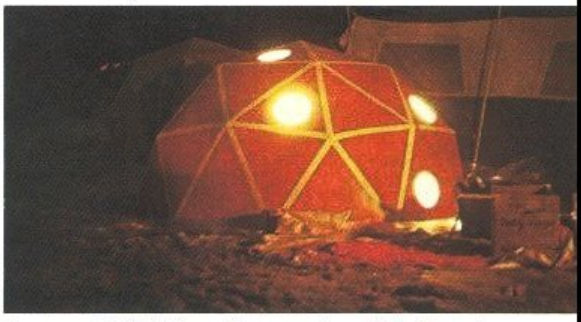
Polyethylene sheet makes an air house

Giant pillow by Cornell team is single 20-by-100-ft. sheet of 6-mil polyethylene folded double and heat-seamed. Interior (photo far right) is over 40-ft. long. Squirrel-cage fan keeps it inflated through air-feed tube.

Happy group of students (Zaskorski, Dolny, Foley, Loper, and Olivas) sit around fire discussing cardboard dome they built.

Icosahedron was so light in weight that the young builders could roll it around the Quick City site to find most favorable location for it. In photo at left you're looking down on top of the structure.

Many parts were prefabbed several weeks before structures were erected at Quick City. Below, cardboard tubes awaiting use. Photos below and left by R. Mangurian, who helped organize the event.



Domes were lighted with candles or gas lamps. Hibachis made heat; cardboard tubes, venting. Photo above by Carl Zaskorski.

Interior of Cornell inflatable was heated by small space heater with vacuum-cleaner fan. Photo below by David Sargarin.