Architecture

What's Higher Than Highest? Wait and See

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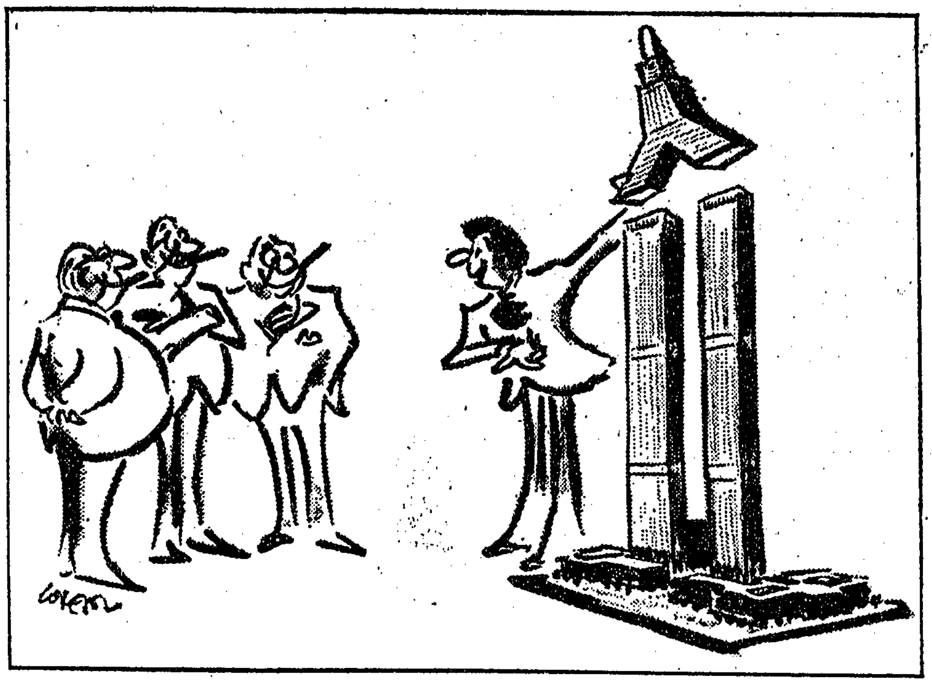

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"However, if the Empire State persists in this foolhardy challenge, we are prepared to move at once to Phase Two"

THE race is on again. Here we go for the world's tallest building. For love, and height, man leaves his senses. His love affair with the big building is one of the most enduring of all romances. The clouds must be scaled, like Mount Everest; the crown of highest must be worn, if briefly, before another takes the prize.

For a long time, for most of history, in fact, the super-building was only a dream. The skyscraper, the reality, is very young. It took 50 years, from the 1880's to the 1930's, to reach 100 stories. The miracle is a product of modern times and technology, of the metal frame and elevator, in the 19th century. It is a dream that rests solidly on science.

The peculiar drive for the title of tallest is a curious mix of emotion, structural engineering and economics. But it is a drive that will push the most pragmatic developer as close to irrational behavior as the cost-controlled real estate heart or computerized corporate soul can ever go. Call it status or immortality. Call it ego gratification. It seems to be programed into the psyche of man.

In the 1970's, the trend has exploded. The new contenders have eclipsed the records of the last race, in the 1930's, when the Manhattan skyline took, and held, the prize. The Empire State Building, the Chrysler Building, the clustered Wall Street towers, became New York's style and pride. Passions rode high. Construction men sneaked out to raise unannounced antennae to jockey the title from one building to another. Only the Depression, and the declining ratio of rising structure to rentable space, and therefore to any profitable equation, stopped the race.

It began again in the 1960's with Chicago's 100-story-high John Hancock building, a city within a city that houses 12,000 people in offices and apartments, with parking, shops and services. Today, the 110-story towers of the World Trade Center announce New York's new scale. Triumph is always temporary; a taller 110-story structure—1,450 feet to the Trade Center's 1,350 feet—is in construction for the new Sears Tower in Chicago. The Sears Tower has the advantage of a romantic silhouette, which the public has grown to expect and admire in its legendary skyscrapers; the flat-topped Trade Center universally displeases.

The dethroned Empire State Building has announced a desperate ploy to extend itself by adding 11 stories, a feat of extreme structural and logistical bravado and negligible credibility. Why? Because, like Mount Everest, the challenge is there? The reasons are both elemental and complex. As a start, according to Lynn S. Beedle, head of the Joint Committee on Planning and Design of Tall Buildings and director of the Fritz Engineering Laboratory at Lehigh University, the act of building is synonymous with civilization, and big buildings are equated with growth and the much debated condition called progress.

Mr. Beedle cites their obvious role as a mark of prestige; the big building is an irresistible overreacher. Then there are the developments in materials and techniques that permit more economical construction, the factors of increased population density, the desire for centralization of business activity that taller building complexes make possible, the decreasing availability of prime land, and the depletion of resources, requiring more people to be housed in multi-story structures.

The Joint Committee on Planning and Design of Tall Buildings has been formed by the American Society of Civil Engineers and the International Association for Bridge and Structural Engineering to deal with the high-rise syndrome. It has more than 800 members from over 45 countries, with 27 technical committees and 14 advisory committees. Its studies range from basic structure to environmental impact. (That downdraft around skyscrapers that lifts skirts is called the Monroe factor.)

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Its recent State of the Art report called Current Questions, Problems and Research Needs lists—just lists—almost 300 questions and problems raised by the tall building. They range from philosophical and environmental considerations of suitability, function, esthetics and community viability to subjects to strike terror into the layman's heart — gravity and wind loads, fire, blast and earthquake resistance, stability, stiffness and crack control, creep, shrinkage and the effects of temperature and elements.

In addition to dealing with an incredibly complex and changing technology, the Joint Committee states that its primary concern is with the "quality of life in the cities," and how concentrations of tall buildings shape and define it.

The pressures of land cost and land use in cities inevitably push buildings up. Still, they persist in appearing even in small centers that hardly seem to need them.

The definitive reason for the renewed race for height is structural—if it can be done, it will be done—like climbing that mountain. The last decade has been a time of spectacular breakthrough in such esoteric matters as windbracing and loadbearing systems of dramatic strength, efficiency and economy. High-speed elevators ascending in tiers that decrease toward the top—one changes elevators to reach the higher floors—help adjust the economic ratio of space to service.

Structurally, the simple, rigid column and beam metal frame that started it all is efficient only up to 20 stories. When trusses are added, sway is decreased and the building goes higher. For a building above 40 stories, steel must become heavier and correspondingly more expensive to resist wind loads.

For still greater stiffness and stability, with more economy of means, the "framed tube" has been developed, with exterior columns closely spaced. For more rigidity as the building goes higher, as in the John Hancock tower, diagonals are added for further bracing. "Tube-in-tube" strengthens both outer framing and inner shear walls.

The latest concept is the "bundled tube," used in the Sears Tower, which clusters framed structure tubes for maximum efficiency. The engineer for the Sears Tower, Fazlur Kahn, is as prominently credited as the architect, Bruce Graham. They are both in the Chicago office of Skidmore, Owings and Merrill, which has pioneered much current tall building construction. For those interested in technology, the October issues of the Architectural Record and Progressive Architecture provide fascinating summaries.

Structure is aided by the systems approach and computerization, for analysis and programing. "Interdisciplinary" work is in operating practice for the skyscraper, while other professions just talk about it. Prefabrication is a giant contributor.

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This is the progress side of the picture. For those interested in the problems, there are plenty. There are questions as to whether people really like living in high-rise buildings. Suburbia and the single house still win with the public, hands down. People are not really interested in such matters as the formation of sheet ice on exposed high-rise steel and the danger as it drops to the ground when the building warms, or how much movement or sway there can be without unsettling physical or psychological effects—these are concerns of the master builders. People just seem to prefer to hug the ground.

There are major environmental problems—the use of energy, the relationship of support structures and planning, how to cope with great concentrations of people as building density increases. And there are all the accompanying questions of transportation, land use, services and amenities and their costs.

Nothing affects the urban environment more than the kind of planning and design that goes into its tall buildings. As long as there is anything called civilization, man will heed that inner urge to build them.