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(+) City – Built Space Infrastructure

The skyscraper has long stood as the embodiment of human excellence, power, and achievement. The structural feats of such a built form is only made possible with human endeavors in technological advancement. Engineering developments since the 1880s have allowed skyscrapers to soar ever taller. Crucial developments in steel, glass, reinforced concrete and servicing technology such as pumps and elevators contribute to the possibility of modern skyscrapers. Technological accomplishments can allow buildings to be higher, allow for adventurous forms (fig. 3-6), and accommodate natural disasters such as earthquakes. Factors that led to the skyscraper and its changing forms are varied and complex,

> Skyscrapers are no more the sole product of architects' or engineers' imaginations than are any other familiar building type, such as dwellings, schools, factories, railway stations and airports. Rather they are the outcome of a combination of historical, social, economic and technological factors – over most of which professional designers have no direct control – which taken together amount to a modern vernacular. ([1])

Although the engineering feats of the past have shown how materials and technology can be pushed to limits of greatness and height – load-bearing brick in the Monadnock Building, wrought iron in the Eiffel Tower, steel in the Sears Tower (fig.2), and a composite of concrete and steel in the Petronas Tower (fig.1) – the start of the twenty-first century demonstrates "far more urgent reasons for building tall: cultural, demographic, environmental and economic." ([2]) Population growth and rapid rate of urbanization are factors that come into play in growing cities. Predictions show that by 2030, two thirds of the world's population will be urbanized and currently established metropolises will grow into unprecedented mega-cities. Many cities in Asia will see their skylines grow into maturity in ten years where in other cities such as New York and Hong Kong, similar skylines developed over decades (fig. 7, 8). The challenge of the modern skyscraper is no longer just height and strength but accommodation for growth and density while retaining a high quality of life.

Economically, skyscrapers are becoming more and more common in cities with scarce land. The higher ratio of rentable space per land area can accommodate the rising population density of developing cities. Convenience, comfort, and power are commonly associated with high rise living and working in city centers. Although tall buildings accentuate the skylines and act as identifying iconic symbols for cities, they are also often sources of isolation and can only be experienced from afar where access is limited. A common feature for iconic skyscrapers is its observation deck, the general public go from ground level to the top, usually skipping all the parts in between. Thus the lasting impression of most tall buildings is their exterior image, the kind seen on postcards and memorabilia. With rapid growth in countries such as Asia and the United Arab Emirates, the plethora of buildings undergoing construction all at once in a veritable "tabula rasa" where context is at irrelevant heights compared to what is being built, the danger of producing an isolated and vertically oriented city lingers.

The approach of our skyscraper project involves the examination of a new typology borne out of the currently "unused" spaces surrounding the typical high rise building. These unused spaces consist of voids above the current street level programming and infrastructure that fails to rise or repeat along with the upwards climbing metropolises. Using one of the densest locations in North America, Manhattan, as an example, the rising built forms of the cityscape extrude upwards from the ground following the city grids (fig. 13). As the grid becomes denser, the built forms rise higher, thus forming vertical extrusions. The areas where the streets and street level infrastructures are located and remain at grade level are not extruded; therefore these bands of spaces in the city become empty spaces in the matrices of extruded grid-forms (fig. 12). Rem Koolhaas writes, "Manhattan has no choice but the skyward extrusions of the Grid itself; only the Skyscraper offers business the wide-open spaces of a man-made Wild West, a frontier in the sky." ([3]) (fig.13). These skyward extrusions produce and retain infrastructural shortcomings inherent in the condition of current skyscraper programming: a dependency as well as a limitation to a single interface with the rest of the city, grade level (fig.14). The condition at grade level in a high rise building can take various forms including but not limited to lobbies, gardens, atria, retail, public and private facilities. The existing skyscraper typology with this kind of grade condition is not dissimilar from a suburban city plan with homogenous outer areas dependent upon a central core (fig. 14). The city, with a finer grain, is much more heterogeneous. In order to carry through the same kind of heterogeneity to the existing skyscraper condition, improved and increased infrastructure is required. Similar to some of Archigram's proposals, particularly Plug-In City and City Interchange Project (fig.9), where components and parts "plug into" the city and its infrastructure or joint towers grouped around a central transport hub, the new skyscraper-bridge typology creates easily repeatable and customizable parts that attach and feed in and out of existing structures to create new sources and channels of infrastructure and building.

The proposed project will consist of forms that bridge across existing vertical conditions, not unlike bridge forms in projects such as ARC Studio's Duxton Plain Public Housing (fig. 10) and Massimiliano Fuksas' Twin Towers in Vienna (fig. 11). These bridges produce new infrastructures and programming aimed to service above-ground levels. The improved infrastructures must repeat and extrude along with the upward forms of the city. The bridges create lofted planes that act as fields where multidirectional activity can occur at a higher level above ground (fig. 15-17). Vertical and lateral movement is therefore expanded in the sky. The programming for the bridges will consist of retail, services, entertainment, circulation structures, open space, and other small commercial usage, much like current street level conditions. By essentially creating additional "streets", connectors, and planes in the sky, the connection points of the bridges become vital areas of interest. The connection points at above ground levels can be expressed architecturally as a link between two distinct existing conditions in a city; it could represent a social condenser or interchange between a new infrastructure and an existing building; and it could carry with the structure new services to feed in and out of buildings. Structure, programming and economics are critical in this proposal. Eric Howeler talks about the complexity of modern skyscrapers,

> The skyscraper is representative of urbanity, of density, of modernity-in short, of the driving forces of the twentieth century. It occupies the intersection of real estate, finance, technology, social aspirations, and cultural sensibilities, and as a cultural artifact, serves as an architecturally condensed index of the present moment-vertical now. ([4])

The current conditions of the skyscraper do indeed act at various cross sections of the market and economy, however, the proposed project illustrates the limitations that exist in the decidedly directional operation of the skyscraper. The proposed multidirectional bridges and planes allow for many more possibilities of interaction and organization of spaces. The bridge as retail and commercial space can propel the reorganization of building cost hierarchy, where convenience determines price points. No longer would costs be in a one-way up-down direction but multiple ways and in multiple directions. Additional services and infrastructures can be run along the new bridges to better service and accommodate existing and new structures. Services at higher levels can be made convenient and more accessible to include energy as well as safety such as police and firefighting. Open and green space can be introduced at more frequent intervals and various levels. Green roofs and other green initiative will be given more weight and consideration due to better accessibility and usage. Residential high rise can utilize the bridges and planes as gardens, front and backyards, and other recreational spaces. Similar to existing underground path systems (such as ones in Toronto and New York), the bridges between the high rises become paths in the sky. Restaurants and bars located at high levels will be more accessible through the web of connectors. The negative spaces between the skyscrapers and bridge forms become more dynamic "rooms" where open spaces are defined at various height levels. Economically, the multilayered programming will result in a more complex system of real estate organization and speculation thus stimulating the economy further, particularly for growing metropolises. The resulting variegated fine grain of the new skyscraper-bridge typology produces a metropolis denser and more accommodating than the current conditions of high rises. Its product is a web city that is infinitely more complex that the one-directional organization of current grid-extrusion skyscrapers and creates a fluid condition for a city in growth to better accommodate the driving forces of the twentieth and twenty-first centuries.

The project speculates on the way skyscrapers might be able to break out of its current rigid homogenous existence with a new typology that promotes interconnectivity between these homogenous structures to form a web of finer grain heterogeneous spaces that are more responsive to the modern metropolis (fig. 18-19). Such a speculation is particularly important in the face of current building booms as seen in such prominent cities as Shanghai and Dubai.

Citation + Sources:

1 – Abel, Chris. “Origins and Diversification” Sky High: Vertical Architecture. p. 16-35, Royal Academy of Arts, London. (2003)

2 – Foster, Norman. “Forward” Sky high: Vertical Architecture. p. 8-9, Royal Academy of Arts, London. (2003)

3 – Koolhaas, Rem. “The Double Life of Utopia: The Skyscraper.” Delirious New York. p. 72, Oxford University Press, London. (1978)

4 – Howeler, Eric. “vertical now: the skyscraper at the beginning of the 21st century.” Skyscraper: Vertical Now. p. 8-14, Rizzoli, New York (2003)

Images Used:

1 – Skyscraper: Vertical Now, Eric Howeler.

2 – Sky High, Chris Abel.

3 – Skyscrapers: Structures and Design. Matthew Wells.

4 – Competition Images, Michael CC Lin & John Lee

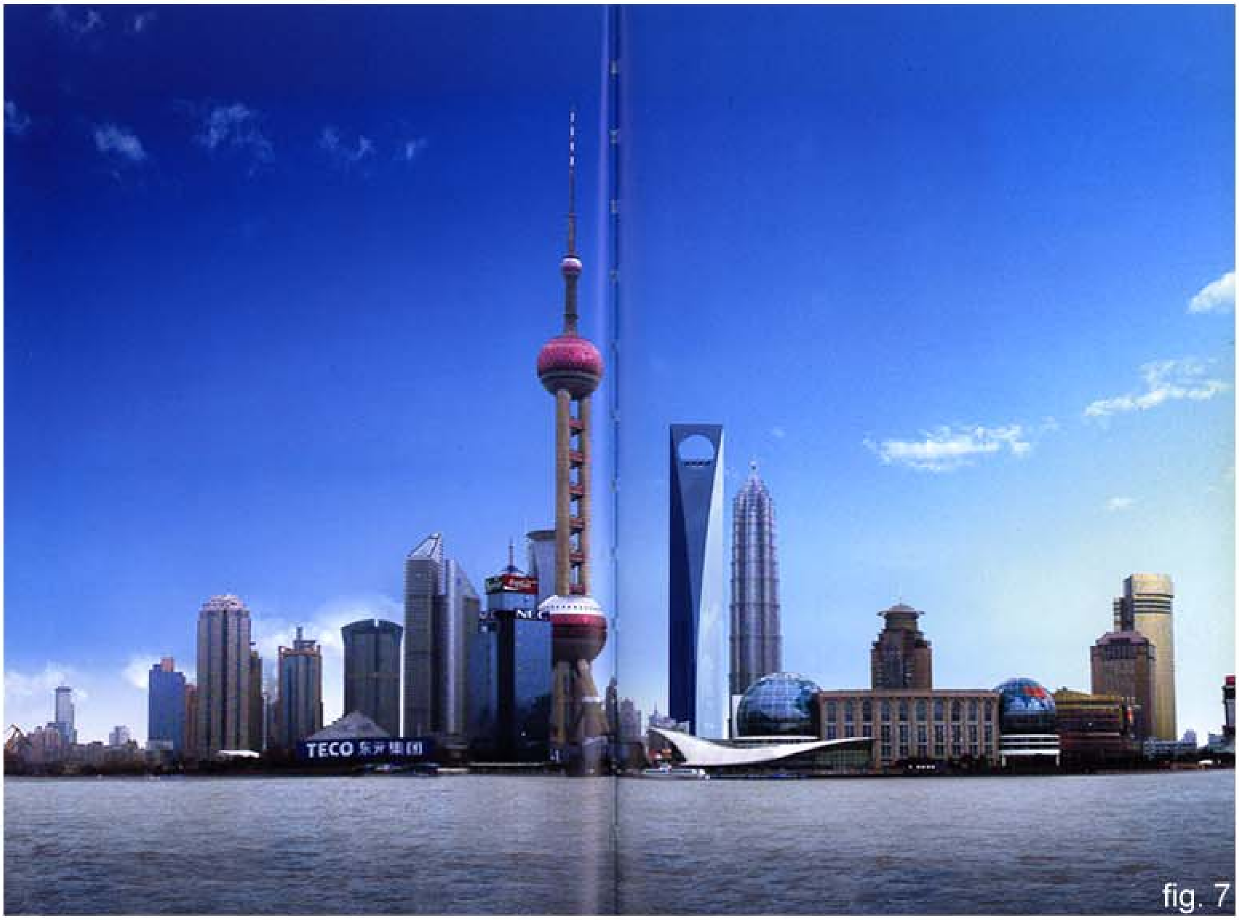

fig. 7

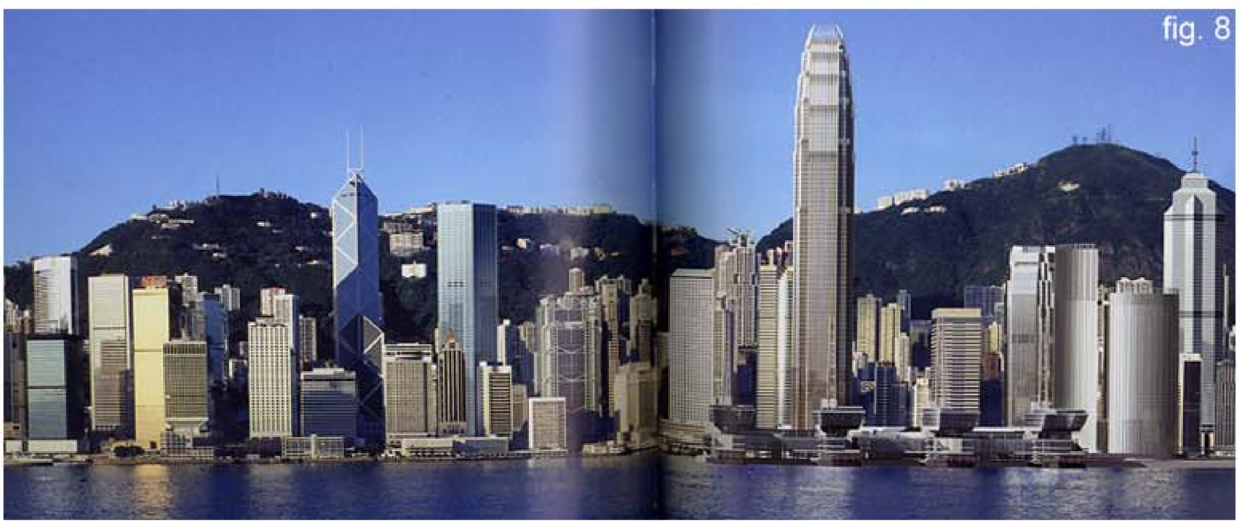

fig. 8

fig. 7,8:
Skyscrapers play an important role in the shaping of a city's skyline and its identity. The Shanghai Skyline(7) and the Hong Kong Skyline(8).

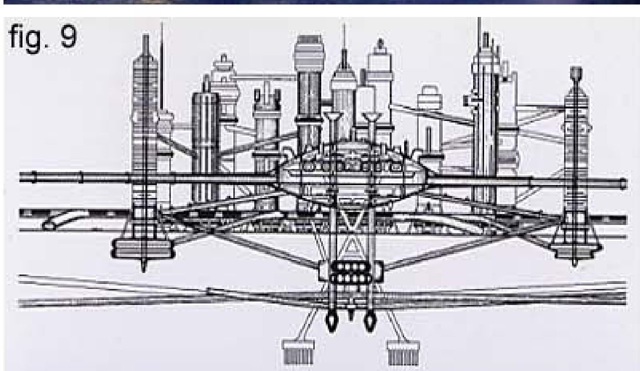

fig. 9

fig. 10

fig. 11

fig 9,10,11:
Bridge-like forms that connect vertical towers at a higher level. City Interchange Project by Archigram(9); Duxton Plain Public Housing by ARC studio(10); and Twin Towers by Massimiliano Fuksas(11).


fig. 1


fig. 2

fig. 1,2:
Pushing the limits of materials and technology; composite of steel and concrete in the Petronas Towers(1); and steel in the Sears Tower(2).


fig. 3

fig. 3-6:
Advancements in technology allow for adventurous forms; Torqued Tower by Calatrava(3); GPA Gasometer Project by Coop Himmelb(l)au(4); Shanghai Information Town by Arquitectonica (5); and CCTV Head-quarters by OMA(6).


fig. 4

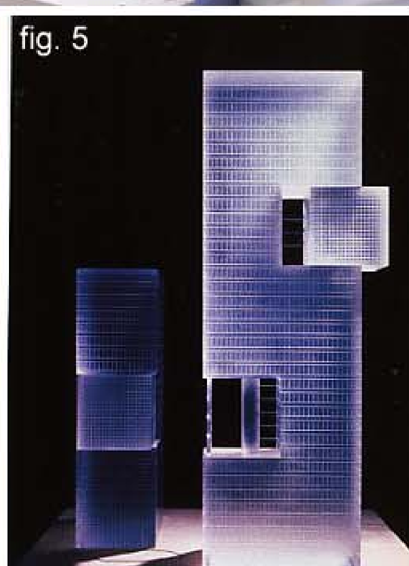
fig. 5


fig. 6

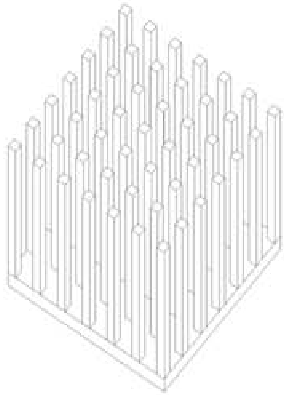

fig. 12

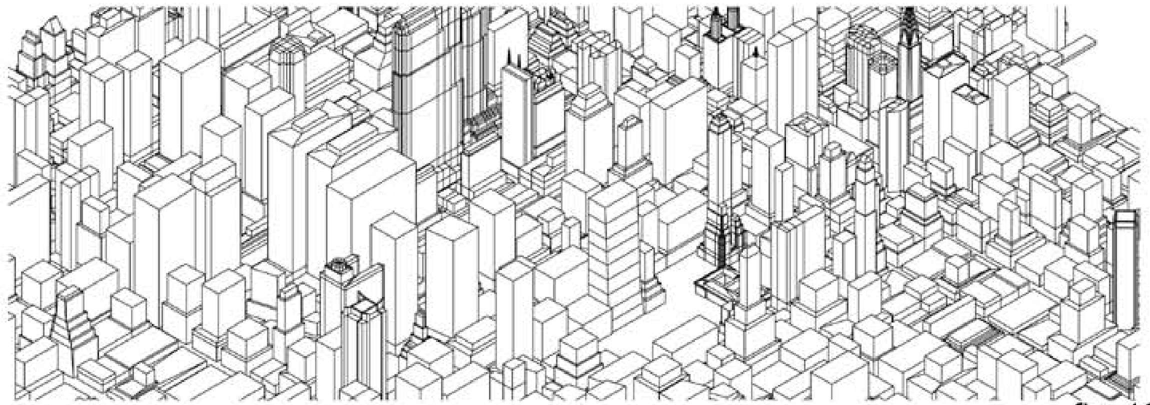

fig. 13

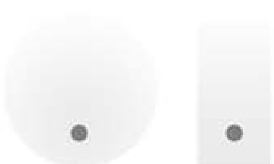

fig. 14

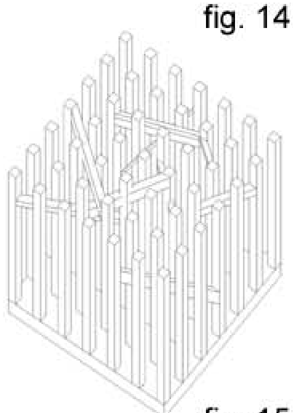

fig. 15

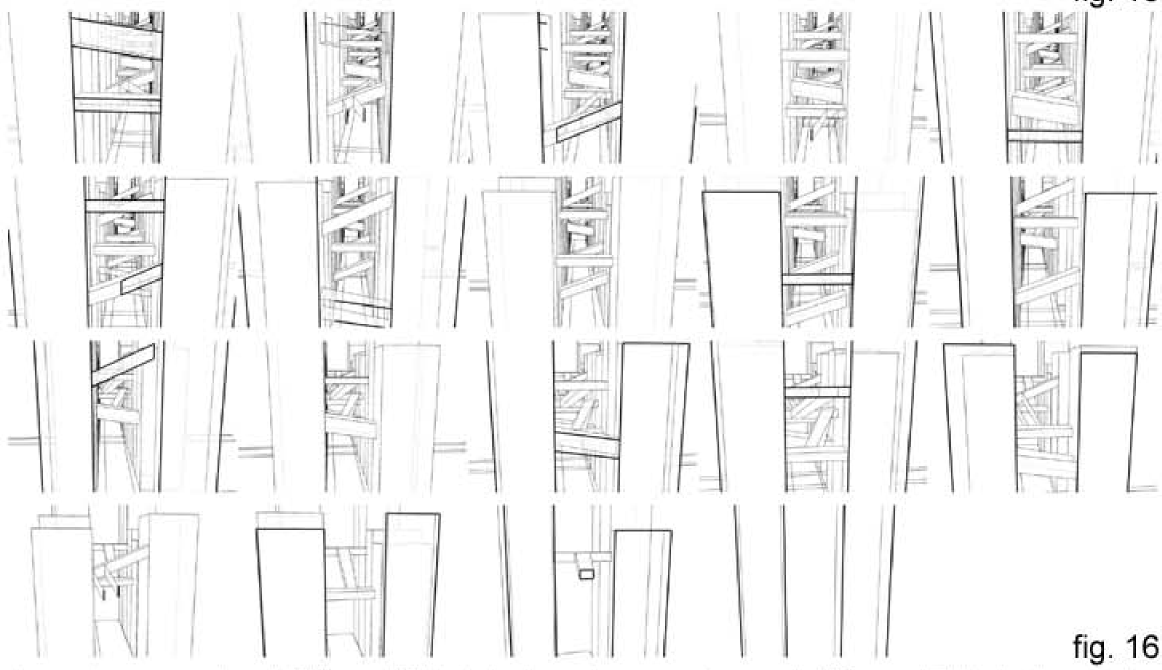

fig. 16

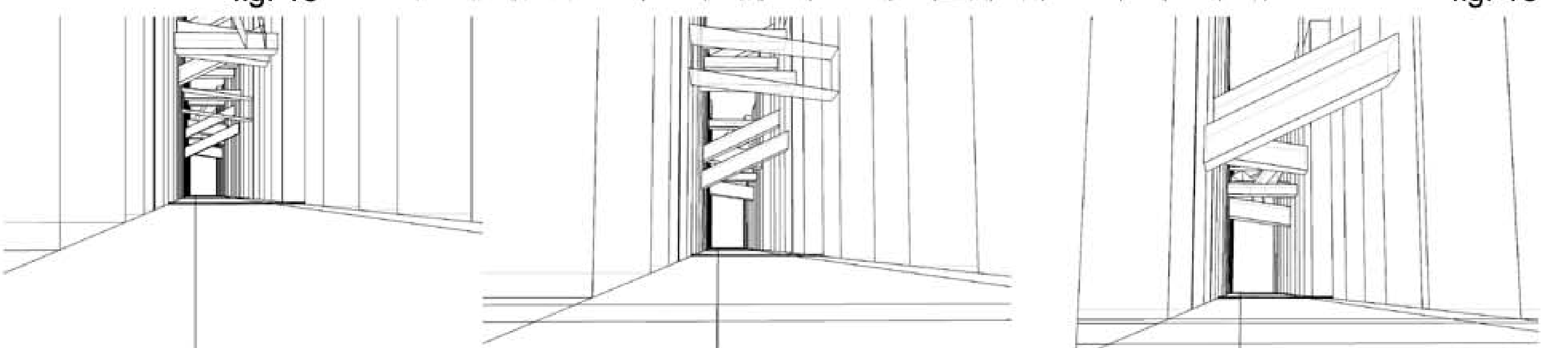

fig. 17

fig. 18

fig. 19