

Base Buildings: A New Infrastructure

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Healthcare Facilities



Shopping Centers



Office Buildings



Multifamily Housing

INTRODUCTION

A significant literature exists addressing infrastructure in the built environment. Road networks on different scales, railway lines and canals come to mind, as do water and sewer systems and communication networks. They all serve multiple users and frame physical conditions for inhabitation. In large capital assets such as these, whose design and use stretch over large territories and over long periods of time, control is often hierarchically distributed and guided by both convention and explicit regulations. Governmental entities as well as private parties are involved in complex and changing patterns of initiative, financing and management.

Increasingly, large buildings serving multiple and changing users show similar characteristics by offering space for customized user settlement. This paper discusses how and why this is the case. Shopping centers and office buildings, for instance, have behaved this way for some time. Now we see residential buildings and hospitals shifting toward this mode. The implications for regulation and for innovation in the building industry are important.

BASE BUILDINGS: A NEW INFRASTRUCTURE

In large buildings, we see a tendency to separate a ‘base building’ from ‘fit-out’. This separation is also called “core and shell” and “tenant work”, or “support and infill”. Whatever the words used, the distinction is increasingly conventional – internationally - and is mirrored in the real property and building industries’ practices, methods and incentive systems.

For example, commercial office buildings have used this distinction for at least fifty years. Tenants lease space in buildings in which the layout for each is custom designed and individually adaptable over time. Private and governmental institutions owning large administrative buildings likewise make that separation to accommodate ongoing relocation and reconfiguration of functional units. Large building companies have distinct, dedicated divisions to service both the construction of base buildings and the installation of tenant improvements or fit-out. Tenants own their fit-out partitioning and equipment (usually called FF&E or Furniture, Fixtures and Equipment in the United States) and can sell it to the next users, or may clear out the space when they leave (increasingly using parts prepared for disassembly or recycling), to be fitted out anew by the next occupant.

Another example is shopping malls. Developers build large structures giving much attention to public space but leaving retail space empty. Overall architectural, technical, space and signage standards are established and documented in detailed tenant handbooks. This enables retail chains to lease space and bring in their own designers and fit-out services in a process that enables rapid turn-around of space for new occupancies, without disturbing the shared infrastructure or neighboring tenants.

This way of using built space already constitutes a substantial and conventional market, which, in turn, has given rise to an increasingly profitable and well-organized supply chain serving the demands for tenant “fit-out.” Both sectors – base buildings and fit-out - include finance companies, product manufacturers, design and engineering firms, construction companies and a host of others.

WHY HAS THIS TREND EMERGED?

The emergence of this phenomenon lies in a convergence of three dominant characteristics of the contemporary built environment. First is the increasing size of buildings, sometimes serving thousands.

Second is the dynamics of the workplace and the marketplace where use is increasingly varied and changing. Third is the availability of, and demand for, an increasing array of equipment and facilities serving the inhabitant user. In that convergence, large-scale real estate interventions make simultaneous or integrated design of the base building and the user level impractical – user-level decisions are effectively deferred and inevitably change over time in any case. Social trends towards individualization of use make functional specification increasingly personalized. Greater complexity and variety of the workplace demand adaptation by way of architectural components with shorter use-life, such as partitioning, ceilings, bathroom and kitchen facilities, etc.

This separation of base building from fit-out – observable everywhere in the world - includes utility systems as well. Adaptable piping and wiring systems on the fit-out level, for example, connect to their counterpart and more fixed main lines in the base building, which themselves connect to the higher level infrastructure serving the entire city.

In this process we see a significant contrast between what is to be done on the user level on the one hand and what is understood to be part of the traditional long-term investment and functionality of the building on the other.

This is the reason for the emergence of the base building as a new kind of infrastructure.

The distinction here is not strictly technical, but is better understood as happening between “levels of intervention” as is always the case when we compare infrastructure with what it is serving. In the case of buildings, the comparison has multiple dimensions, including the following:

BASE BUILDING

Longer-term use
Shared-service related design
Heavy construction
Long-term investment
Equivalent to real estate
Long term mortgage financing

INFILL or FIT-OUT

Shorter-term use
User-related design
Lightweight components
Short-term investment
Equivalent to durable consumer goods
Short term financing

HOSPITALS ARE EVOLVING IN SIMILAR WAYS

Application of this distinction is now evident in hospital construction. More than any other building type, hospitals are functionally diverse and technically complex. Changes in demographics, diseases, treatment procedures, equipment, doctor’s preferences, and regulations – with their demands for new spatial adjacencies and configurations - are forcing the emergence of a shorter use-life fit-out level.

When this distinction is recognized, construction of hospital base buildings starts before detailed fit-out design has been finalized, allowing a substantial shortening of the project critical path. Currently, it is not exceptional that a seven-year period elapses between planning a large medical facility and start of operations. Much of that time is spent determining the specifics of what we now can label fit-out, during which time overall design is on hold in conventional practice. Nevertheless, chances are that these specifics are partly obsolete when the building is first occupied. If a base building is conceived of as a project by itself, design on the fit-out level can proceed while it is being built. Staff can change – and defer decisions about - functional layouts and installation of equipment without disturbing the construction schedule of the base building.

Some hospital clients build “shell” space which they later fit-out or leave empty as “swing” space for use when the building must be changed and units of function redistributed or resized. In such cases, it is not uncommon that different firms are hired to design the “core and shell” and the “fit-out” of the building.

Examples of the implementation of this strategy include most hospitals in the U.S. Department of Veterans Administration (known for using an “interstitial floor” concept), the Gonda building at the Mayo Clinic in Minneapolis, and the Banner Estrella Hospital in Phoenix in the US, among others. A good example in Europe is the large hospital in Kortrijk, Belgium, designed by the firm Baumschlager Eberle.

Another example in Europe is the INO Hospital project at the Inselspital Hospital in Bern, Switzerland. This is the clearest example of the new thinking about the construction of large projects that are expected to have a long asset life while accommodating change. In that project, the distinction between what they call “primary system” (100 year life), “secondary system” (10-20 year life), and “tertiary system” (5 year life) is made, representing a process now adopted as a matter of public policy for all public projects built by the Canton Bern Office of Properties and Buildings, the public sector entity responsible for the INO project. More than twenty projects have been realized using this approach, not limited to healthcare facilities.

RESIDENTIAL CONSTRUCTION IS MOVING IN THE SAME DIRECTION

Need for a base building type of infrastructure is also evident in residential construction around the world. While many housing projects have become bigger, residential life tends to become more individualized and changing. For generations, large-scale multi-family residential projects have created tension between the demands of efficient building logistics and economy, and user’s individual (and changing) preferences. We now understand how such projects can be well served by the introduction of a fit-out level available to each household. This enables the inhabitant to decide on his own part of the whole, while the base building serves all the occupants and can be applied on an urban scale as an architectural intervention.

An international “ Open Building” network has been active over the past decade documenting and supporting these developments. Achievements over the last three or four decades are now substantial and increasingly well documented. (www.open-building.org)

While the base building approach in residential construction has often been considered desirable but not economical, it is important to note that recent projects are commercially driven. Investment for the base building can be amortized over a longer term compared to traditional buildings. In addition, higher user satisfaction translates into higher rental rates or sales prices. Examples include the Plus Home projects in Helsinki, as well as the TILA projects, both built by the Sato Development Company; the two SOLIDS and the Multifunk projects in Amsterdam; a large number of projects in Moscow (Free Plan Apartments), and many in Japan. A key government agency in China is taking this approach seriously and has constructed several projects based on Japanese experience, and private developers in Taiwan have built several such projects. There is some evidence of this in the United States, in the detached home market (Bensonwood Homes), in cases where “production builders” think in terms of producing “volume” (largely empty shells) and in many high-end developments in which largely empty units are offered for sale.

In addition, the adaptive reuse of old warehouses and office buildings for residential occupancy often approaches the distinction discussed here. Many of these projects, around the world, have won awards.

THE FINE GRAINED LARGE PROJECT

Release of the tension between conflicting demands on the small and the large-scale is the most important aspect of the trend towards the emergence of base building infrastructure in contemporary building and real property development. As is usually the case, release of tension will make for new energies and innovation. The trend heralds the advent of the 'fine grained large project'.

To put it another way, with projects of greater magnitude and volume, pedestrian scale environment has become increasingly three-dimensional. The large commercial office building is a vertical extension of traditional urban fabric. The high-rise apartment building is topologically no different from a gated community. Understanding the base building as a new kind of infrastructure opens the way to truly three-dimensional urban design. Buildings and urban compounds have always tended to have their own gates. We are not surprised that behind these gates we find another urban environment with deeper levels of public and private space. This urban territorial stratification has been characteristic of cities in history for millennia. It is already there, in practice if not in the theories of the contemporary city, and will find expression in a truly contemporary way when base building infrastructure finds its way into general architectural practice.

The longer life span for the base building infrastructure, made possible by its adaptability to short-term inhabitation, allows increased investment in public space offered by it. This shift towards a new way of understanding and investing in large projects challenges traditional professional practice in terms of design and construction management, financing and legal and regulatory systems.

The architectural and management potential of this new trend invites serious exploration. But it is important to say that observation of the implementation of such projects around the world tells us that it is not a technical problem to begin with. The needed sub-systems and hardware are already largely available. But their handling and their allocation in a new timeframe need to be considered seriously. In other words, the true challenge posed by this new trend is towards professional habits and conventions that must adjust to new ways of designing, management, and cooperation.

While a new economic and regulatory framework needs to be worked out first of all, it is already possible to state in broad outlines how the fine-grained large project may enable, if not stimulate, a number of new developments. Two are immediately evident, but there may be more, and all need further study to unlock their potential benefits and to avoid the risks inherent in new ways of working.

THE EMERGENCE OF A FIT-OUT INDUSTRY

Residential application of the distinction between base building and fit-out, although based on the same principles observed in office buildings, shopping malls and hospitals, is particularly important because it affects a very large market whose potential is not yet understood or exploited.

It is well understood that industrial manufacturing is most effective and dynamic where individual users are directly served. Witness the automotive, electronics and telecommunications sectors, all of which have learned to be very sensitive to individual demand. The potential market for residential fit-out is at least as large as that of the automobile industry. Designing base buildings understood as 'infrastructures for living' will stimulate the evolution of a fit-out industry that will itself accelerate innovation and distribution of new domestic fit-out services and systems.

In Japan, the first formal fit-out system (ECOCUBE), targeting the activation of post war residential apartments as well as newly built base buildings, has been launched in the market. It is finding use in the re-activation of the existing stock of well-situated and technically sound apartment and office buildings needing to be upgraded and adapted to new living and working standards. Technical sub-systems and products that can be integrated in partial or full fit-out system “packages” are increasingly available in the international building supply market, and in the Netherlands, for instance, there is evidence of continued commercialization efforts to develop marketable fit-out systems.

In general, the creation of a genuine, certified fit-out industry is not a technical or industrial design problem. As noted above, necessary material subsystems and components like partitioning, bathroom and kitchen equipment, piping and wiring are available. What is needed is the introduction of new kinds of businesses to meet new demands. Some may employ installation teams modeled on the “work cell” familiar in automotive manufacturing. In the case of fitting out an empty space in a prepared base building, a trained team will bring in all the ready-to-assemble parts – organized off-site in boxes and bundles – and install everything before handing over a finished dwelling with a users manual. This will avoid the disruptive sequencing of subcontractors now producing so much inefficiency and disruption in conventional building practice. Backed up by sophisticated data and logistics, this will combine efficiency with customization at a range of price points.

It is important that the legal and economic frameworks needed for the emergence of such an industry are put in place by local and national government bodies, and by the financial companies that understand the market potential. For example, building regulations in some countries require that bathrooms and kitchens be placed exactly above each other in multi-story buildings. Such laws are a reaction to bad quality in conventional construction, and need to change to help stimulate the implementation of this strategy for sustainable, adaptable residential architecture.

The distinction between the long-term asset and the shorter-term equipment and fit-out in residential construction can also be harnessed for the detached or attached (row-house) market. Building an architectural shell distinct from dwelling units’ inside layout and equipment may follow the same separation as already noted. The same fit-out industry that can deliver “ready-to-assemble” product bundles to large buildings can serve these house types as well. Here too, large development projects encompassing many detached or attached units can benefit from the availability of fit-out businesses offering competitive fit-out systems and services.

Roughly speaking, the cost of a complete fit-out system for a dwelling unit is in the order of the cost of the cars its occupants use. This shows the magnitude of the shift we are identifying - an entirely new industry of impressive scope, based on industrial manufacturing of parts and delivering what is best called a durable consumer good. In this perspective the trend towards base building infrastructure also allows the building industry to effectively come to terms with industrial production in its most creative and responsive mode.

MEETING THE SUSTAINABILITY AGENDA

Base buildings that are well insulated and built for long-term and efficient performance are easier to build when freed from intricate and complex fit-out demands. Double-envelopes can be designed to meet the highest building performance standards, reducing heating and cooling loads while providing ample natural illumination. On the other hand, fit-out components and parts - those that consume energy and are particularly related to eco-effects in buildings – can be clearly aligned with legal

responsibilities. This clarity of who is responsible for what is even more important when facade elements become parts of fit-out packages. Because individual fit-out users are responsive to new products and services from the manufacturing sector, accelerated turn around cycles will boost the large-scale re-orientation of environmental construction to the demands of a carbon free ecology. In fact, the United States Green Building Council's LEED rating system already recognizes the distinction we discuss here in the commercial market, and the best construction companies already deliver high-performance buildings with well-insulated building skins. Similar developments are already well underway in Europe and Japan.

CONCLUSIONS

These notes point to a general trend apparent in various kinds of real estate – such as workplaces, residential, commercial/retail and health care - that can be understood as the emergence of a new kind of infrastructure. This trend is the result of forces in our society that are not new, but that are slowly but perceptibly altering the way we deal with buildings. It may be safe to assume that these forces – towards larger projects, greater individualization, and increasing availability of sophisticated equipment and utility services available to the inhabitant/consumer - will not go away. Therefore, we suggest that the emergence of the new base building infrastructure invites clear recognition and active development. The resulting impacts on real estate and architecture will, we believe, be significant.

The problems to be faced in pursuing this goal are not trivial. Necessary professional reorientation, and changes in accounting and management, may well determine the pace, direction and quality of change. But it is important to note that the examples that can be cited today have emerged from sound economic reasoning and a willingness to respond to market forces.

The time may have come to establish a more explicit platform for study and development of what seems to have come not as a new design idea, but as a new reality to be taken seriously.

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