Prefabricated Housing Systems

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Architects have long envisioned housing prefabrication as a means to improve design and reduce costs. Frank Lloyd Wright designed his American System Built homes between 1912 and 1916, Usonian houses in the 1930s and his mobile home in 1955.

Stimulated by Bauhaus thinking, prefabs were the ideal way to rationalize the building process, achieve economies of scale and bring good design to the masses. But the manufactured housing to win widest acceptance was the trailer. Architect-designed prototypes seldom were realized.

From Moshe Safdie’s Habitat 1967 to the surge of new interest via Dwell Magazine’s fostering of the modern prefab movement today, architects have advanced the cause with relatively minor progress towards its goals. Neither were developers’ efforts long lasting. The RFC-backed Lustron Corp. steel houses in the late 1940s ended in bankruptcy caused by production delays, escalating prices, zoning codes and distribution difficulties. HUD Secretary George Romney’s Operation Breakthrough for prefabricated building in 1968-1972 died at the hands of the Nixon Administration, labor and building code challenges.

Most prefabrication efforts in the United States recently have focused on single-family detached dwellings that are fully finished in factories and transported to the site. They have made minimal inroads into housing production for a variety of reasons:

1. Essentially, each as been produced against single-orders and therefore have never achieved mass production efficiencies. Some manufacturers have started to shift to construction of accessory dwelling units, [ADUs] but most jurisdictions do not easily permit them and fewer still foster their approval. Hence orders are still on a single-order basis.

2. Existing models bear the added costs of transport of units on oversized vehicles at great expense as wide-load cargoes with lead and trailer cars needing expensive cranes at the site. Hence the costs are rarely lower, and often higher, than stick-built housing. Furthermore, factories must be located relatively short distances from destinations and there is insufficient demand to satisfy such fixed costs of plant and equipment.
3. Manufacturers have designed and marketed the prefabs with a choice of fixed models marketed with builder names at prices equal to or greater than stick-built houses. But the prefab manufacturers do not control the land on which they will be built nor the local approval and construction process, nor have they negotiated adequate partnerships.

At this juncture, prefabs have not been developed as smaller components of an integrated system of building that runs from site selection, design configuration, cost estimation, approvals, financing, construction through to completion. But for the additional development of ADUs, prefabs have not been configured as part of a lower-density, multiple occupancy system.

One can easily project such situations for multigenerational occupancy of extended families, aging parents, boomerang adult children, college student rentals, or single adult friends living separately. For these kinds of occupancy, a system of individual small living units might permit users to select smaller unit pieces for initial configuration, flexible for later addition within the system. Such a system might be planned to incorporate site-built courtyards, arcades, arbors, trellises and other elements that could provide privacy for separate occupancy. Infill areas would be particularly appropriate sites.

**Age Segregation.** America is more segregated by age than at any time in its history. This is a consequence of planning and development policies pursued and intensified since the end of the Second World War. Yet the largest generation in American history, the baby-boom generation born immediately after that war [1946 – 1964], is aging into the portion of the housing market most segregated by age. In fact, more than 10,000 baby-boomers turn 65 every day of the year and will continue to do so until the year 2029.

At the same time, their echo-boomer children are more dispersed around the country than at any time in American history. That dispersion has reduced the bonds between generations leading to nuclear families, typically smaller in size, which in turn tend to live in places also segregated by age and income. Echo boomers increasingly opt for more diverse living environments as they meet their obligations as the sandwich generation between aging parents and younger children, all while holding two jobs.

Grandchildren grow up with greatly reduced contacts, supervision and assistance from grandparents. Aging and sickness tend to be abnormal to their experiences. Both baby-boomers
and echo-boomers increasingly rely upon institutions that are specifically segregated by age, income and condition. Daycare, eldercare, seniors housing, congregate care, assisted living, memory care, skilled nursing and what is marketed as continuing care, are not only new terms codified into land use planning, legislation, finance and regulation, but also are new institutions that have been developed, segregated and isolated from other housing stocks.

The results have not only splintered families, they have divided our cities. The essence of cities is urbanity, by which we mean age diversity, multi-generational vivacity, personal mobility, enhanced capacity, intensified perspicacity and enrichment, personal, professional, economic, educational and cultural.

**Single-use Zoning.** Planning policies still overwhelmingly favor single-family detached houses with mandated front, rear and sideyard setbacks. A typical 2,000 square foot, single-family detached house occupies about 1,000 square feet of land on a parcel of at least 5,000 square feet. Therefore the footprint comprises 20 percent or less of the land area, leading to housing sprawl. Single-family detached housing is subdivided into different densities that further divide housing types by size, income and age. Not many young families can afford to live on larger lots, some of which even have minimum building sizes. Those who can afford to do so usually have children who are either older or have already left the nest.

Single-use zoning exacerbates such basic sprawl. Not only is multifamily housing not integrated with single-family housing, it too is subdivided into densities and housing types. Townhouses are not adjacent to garden apartments, mid-rise or high-rise apartments. Condominiums are segregated from apartments, usually for finance and market reasons.

And all of those new institutions specifically segregated by age, [daycare, eldercare, seniors housing, congregate care, assisted living, memory care, skilled nursing and continuing care] are segregated from all of the other kinds of housing.

This ingrained pattern of age segregation imposes both economic and social costs. More land, labor and capital are consumed. More roads are needed for transportation among age-segregated
facilities. More social services must be provided to disparate settings. More land, air and water are befouled with the byproducts of age-segregated development.

Can planners and architects propose an alternative model for intergenerational living? Whether it be for multigenerational living environments for related families or intergenerational models for different age groups, can we propose models that permit intergenerational contact, but do not force it? Can they retain privacy while building places that encourage mutual assistance?

Can these intergenerational models be affordable? Can the users have the ability to help design their own environments? Can we create a system that contains its own flexibility for change and growth?

Can we design and propose a system of smaller prefabricated components that can be linked at the site to create a multiplicity of configurations for intergenerational living? Can we design such configurations house unrelated singles, couples or families at the same time as they might be configured to house different generations of the same family? Can these models reinvigorate existing lower density areas within cities and suburbs even though they do not create the dense high-rise neighborhoods that have traditionally been the solution for urban redevelopment within cities?

This class will give students the opportunity to investigate in depth, and propose, a variety of affordable solutions for an architectural and planning problem that will be increasingly important both to the explosion of the aging baby boomer cohort as well as to their echo boomer progeny. By incorporating development considerations as well as architectural ones, the results of the class might actually be the source for production of housing alternatives.
**Student Projects:** Each student will wrestle with the nature and intricacies of prefabricated system design by adapting an existing system, or proposing an alternative system, for the design of 4 units of different size on a standard 50’ x 100’ city lot, which may be occupied by residents of different ages, who may or may not be related. The design and development criteria are as follows:

1. Buildable on 50’ x 100’ lot
2. Total of 4 units
   a. 500 SF
   b. 1,000 SF
   c. 1,500 SF
   d. 2,000 SF
3. 1 parking space per unit
4. 2 units handicapped accessible
5. Could be built in 4 phases
6. Expandable later
7. Private outdoor space for each unit
8. Potential for common space
9. One should use a pinwheel concept
10. One should use a private courtyard concept
11. Total development cost, including land and SDCs, not to exceed $200/sf
12. Should adapt existing prefab systems [below] or propose an alternative:
   1. Blu Homes
   2. Blue Sky Building Systems
   3. Connect:Homes
   4. FlatPak House
   5. Hive Modular
   6. HOMB System
   7. Ideabox
   8. IKEA BoKlok Homes
   9. Lindal Cedar/Collaborative
   10. LivingHomes
   11. LV Series Homes
   12. Ma Modular
   13. Marmol Radziner Prefab
   14. Method Homes
   15. Proto Homes
   16. Resolution 4 Modular
   17. SageModern
   18. Simpatico Homes
   19. Stillwater Dwellings
   20. ZETA Communities

The class will be interactive. Initially, each student will investigate and report on existing systems to the class. The class will discuss and refine the criteria listed above. Specialists will be brought into the class as needed by the students. The required reading is *Alison Arieff & Bryan Burkhart, Pre Fab, Globe Smith*, (800-748-5439)(2002), ISNB 1-58685-132-2.

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UO Architecture/Portland Center 407/507 • Spring Term • Tuesdays & Thursdays 2:00 – 3:20
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