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# MODULAR URBANISM

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This essay will investigate three different scales of modular urbanism categorized by the *piece*, *unit(s)*, and *field* in relationship to speed and forms of American urbanism.

Modularized building materials and typologies have influenced construction techniques in the discipline of architecture for centuries. “A module is a standard unit of construction that is designed for ease of assembly, tends to be more finished than other methods of prefabrications, but it is not restricted in scale.”<sup>1</sup> These systems have been used to: remove waste; increase speed; improve precision; lower purchase cost; and favor repetition of labor tasks. The size, weight, and proportion of the module directly relate to the speed of construction, but only a few strategies actually accelerate the speed of development. Starting with the modular *piece* we can see how the three modular scales *piece*, *unit(s)*, and *field* are inter-related throughout history.

## MODULAR PIECE

Infrastructural and governmental acts throughout early American history have significantly influenced the use and dissemination of modular building components. For example the Erie Canal enabled ships and goods to move from the east coast to the heart of the country. Other examples include 1862 westward expansion of the railroads and the 1862 Homestead Act. These examples set into motion a need for modular construction pieces that could be transported throughout the North America.

An example of the modular *piece* is the balloon frame construction method. “The balloon frame is often considered one of the first thoroughly American forms of serial architecture production.”<sup>2</sup> This technique allowed the construction process to occur in days and not weeks. Balloon frame construction was initially developed by Augustine Taylor to mitigate Chicago’s housing shortage between 1830 and 1850 when the population grew from 200 to 29,963 people.<sup>3</sup> The balloon frame method was a direct response to the speed of development. This building method also had a direct influence on the American expansion westward paralleling the train. During this time, local sawmills began to produce pre-cut or milled lumber facilitating the speed of construction. In 1924 the American Lumber Standards was enacted and local pre-cut dimensional lumber became standardized across the United States. As pre-cut

dimensional lumber became standardized larger modular based methods of construction were developed.

## MODULAR UNIT(S)

Manufacturing techniques have influenced architecture since the early 1900’s. The assembly line, made famous by Henry Ford in the early 1900’s, established a new manufacturing and product delivery method. This construction method changed the way Americans purchase products for the next 100 years.

This resulted in a new form of constructing the single-family suburban house. Pre-assembled modular *units* including walls and roof trusses increased the speed of construction. Leading architects of the time including, Le Corbusier and Frank Lloyd Wright as well as leading retail department stores all applied the assembly line logic to the housing industry. The Sears and Roebuck mail-order kit houses (1908-1940) was a successful model and offered 447 different housing styles, selling more than 100,000 homes between 1908 and 1940. Through both mass production and modularized techniques the Sears and Roebuck mail-order kits cut costs and reduced construction time by 40%.<sup>4</sup> Sears and Roebuck kit houses fueled thriving industries across the Midwest, including Standard Oil of Indiana. “In 1918, Standard Oil of Indiana made mail-order history when they placed a one million dollar order with Sears Roebuck & Company for 192 Honor-Bilt homes”.<sup>5</sup> Another company taking advantage of this new technology was Gunnison Homes, labeled the Henry Ford of Housing. Gunnison Homes sold 4,500 homes in 38 state by 1941.

In the 1920’s the housing boom was an outcome of the immediate needs of young families moving out of multi-generational living conditions. During this time there was a projected need of one to two million homes. By 1935, the *Architecture Forum* had identified 33 different prefabricated housing manufacture in the United States poised to offer affordable mass-produced housing. Eventually the scale of the module *unit(s)* increased to include the entire home. The mass deployment of the single family home changed the way developers thought of neighborhood development. This transition started in the mid 1920’s but can clearly be seen in the development strategies after World War II.

## MODULAR FIELD

Aladdin Homes was a prominent home sales company selling 75,000 homes between 1906-1981. Aladdin Homes was first company to increase the scale of housing deployment by proposing 'Aladdin City' in 1925. The 'Aladdin City' ranged in size from 300 to 10,000 people. The scalar changes from *piece* to *unit* and then to *field* yet again changed the deployment strategy of the single family home.

After World War II a large majority of the U.S. market adopted on-site framing as the construction method for mass housing at the scale of large suburban developments.<sup>6</sup> This was an opportunity for the union labor forces to provide jobs to the troops. The suburban development of Levittown, New York, 1947-1951, is a prime example. The development utilized the assembly line concept allowing for the speedy construction of houses — 150 per week, or one every 16 minutes of an eight-hour day. William Levitt told the New York Times, "it amounted to a reversal of the Detroit assembly line. There, the car moved while the workers stayed at their stations. In the case of our houses, it was the workers who moved, doing the same jobs at different locations." The repetition of the housing units met the population demands but also suffered aesthetically. "The unfortunate reality of the automated production techniques in building is that it is only serving the most mediocre of projects."<sup>7</sup> This construction technique also produces a considerable amount of onsite waste of time and resources.

The accelerated speed of modular construction including the *piece*, *units*, and *field*, specifically within the suburban single-family house, is in response to two centuries of population booms. However, this method of construction generated generic suburban housing typologies and "in the early twentieth century, the appearance of the new architecture was an outcome of the reductive nature of its assembly methods."<sup>8</sup>

## MODULAR PROJECTIONS

Ryan Smith states in his book *Prefab Architecture, A Guide to Modular Design and Construction*, "The current system of housing delivery is broken, fraught with waste, litigation, and inequity, needing fixing in order to continue to provide housing in the future, and the technology exists for prefabrication to make inroads into providing affordable quality housing and that the benefits for financial institutions, design professions, owners, and the building industry would be incalculable."<sup>9</sup>

In recent years, the car, ship, and aircraft industries have shifted towards the use of modular-base production strategies instead of the piece-by-piece assembly line methods. Beyond reducing project duration, the module-based method increases quality and reduces waste. However, modular-based production has not been fully embraced by the fields of architecture or construction. This construction strategy has the ability to change the way we think about housing in America. Stephen Kieran and James Timberlake state in *Refabricating Architecture*, "The current building process is akin to the original Ford assemble line. Parts are gathered and delivered

to the site, where they are placed in turn in their proper location on the chassis. It is a fully linear and hierarchical process."<sup>10</sup> The modular-base system is only applied at a minimal scale in housing including doors, windows, and some finishes. If this system were scaled up to the size of a room or floor, the speed and quality of construction would increase.

Prefabricated modular building methods have also increased in popularity by contractor and customer. They can be organized into modular, mobile home, production builder, and panelized.<sup>11</sup> Examples include, Dwell Magazine's PreFAB focus, the *Make it Right* projects in New Orleans, and Kieran Timberlake Associate's Loblolly House.

The United States is in a critical junction in its history. If we are not careful, large tracks of housing could become unused and dilapidated. This is reinforced by the 2011 Museum of Modern Art (MOMA) in New York City exhibition on *Foreclosed: Rehousing the American Dream*, an exploration of new architectural possibilities for cities and suburbs in the aftermath of the recent foreclosure crisis. The exhibition supported claims by scholars like Charles Waldheim, Chair of Landscape Architecture Department at Harvard's Graduate School of Design, who claims "low scale and low density"<sup>12</sup> development will infill the outlying areas of North American cities, and Ellen Dunham-Jones of Georgia Tech states that as we continue to grow and shift, "the big design and development project for the next 50 years is retrofitting suburbia."<sup>13</sup> Studio Gang's *Foreclosed* proposal for Cicero, Illinois was innovative and utilized a modular building strategy allowing for the addition and subtraction of modular rooms based on the user's need.

In July 2012, New York City's Mayor Bloomberg announced a competition to develop an innovative apartment model for small households with a rental building composed primarily, or completely, of micro-units – apartments smaller than what is allowed under current regulations. This competition will help promote the use of modular building components and could be a catalyst towards a more efficient form of housing.

Looming at the accelerated speed of modular construction including the *piece*, *units*, and *field* we can begin to identify patterns are trends of development. With the recent financial crisis, housing foreclosures, and slow down in construction, this is an opportune time for the construction industry to reconsider single-family housing construction techniques in the United States.

## ENDNOTES

1. Ryan E. Smith. *Prefab Architecture, A Guide to Modular Design and Construction*. p 160
2. Barry Bergdoll and Peter Christensen. *Home Delivery, Fabricating the Modern Dwelling*. (Museum of Modern Art, New York) p 41
3. *Ibid*, p 41
4. What is a Sears Modern Home? <http://www.searsarchives.com/homes/>
5. Rosemary Thornton, Carlinville's Standard Addition: \$1 Million Worth of Sears Homes. [http://www.route66university.com/study/essay\\_thorn\\_std.php](http://www.route66university.com/study/essay_thorn_std.php)

6. Ryan E. Smith. Prefab Architecture, A Guide to Modular Design and Construction. P 255
7. Stephen Kieran and James Timberlake. Refabricating Architecture, (McGrawHill 2004), p 112
8. Ibid, p 109
9. Ibid. p 255
10. Ibid, p 42
11. Ryan E. Smith. Prefab Architecture, A Guide to Modular Design and Construction. P 253
12. Charles Waldheim, "Landscape Urbanism" Presented at UNCC College of Arts & Architecture, February 17<sup>th</sup>, 2010.
13. Ellen Dunham-Jones, "Retrofitting Suburbia" Presented at TED: Ideas worth Spreading, January 2010.