Introduction

cityLAB, a think tank in UCLA's Department of Architecture and Urban Design, has spent three years investigating Backyard Homes as a simple, well-designed, sustainable proposition for the low density landscape of single-family, detached dwellings for which Southern California is so well known. In the City of Los Angeles alone, a half million lots are zoned single-family, and recent legislation makes it easier to construct a second dwelling unit on each property. This radical step has the potential to restructure sprawl in an intrinsically responsive manner: rather than large scale unwanted development, homeowners and neighborhoods can incrementally make their own homes more flexible and more affordable. In addition if we add a sizable number of Backyard Homes, we could significantly reduce the single-family zone's waste of non-renewable resources, particularly land and energy. Our studies find that resistance to such infill housing is ill-founded: neighborhood character remains the same, strain on infrastructure is not significant, and building one infill home at a time allows communities to control development.

To encourage Backyard Homes, cityLAB draws three fundamental conclusions from its research. First, building a Backyard Home should resemble a retail transaction rather than a standard construction process. Second, the Backyard Home prototype must be customizable, given the infinite range of backyard site conditions and the diverse functional needs of households. Daly Genik Architects have designed such a prototype, described in these pages. Third, while a Backyard Home will not be appropriate for every lot, a few pilot demonstrations must be built to get things rolling.

This pamphlet describes the logistics, design, and implementation of Backyard Homes as a response to current conditions in Los Angeles. But like other cityLAB projects, this one is also an open-source model that can be tweaked to fit other communities with different conditions. We invite anyone who seeks to improve a neighborhood in terms of stability, ecology, or affordability to exploit the Backyard Homes concept.

Dana Cuff
Director of cityLAB
After Sprawl

THE BEAUTY OF BACKYARD HOMES

Backyard Homes proposes an innovative, flexible, environmentally sensitive, and affordable set of architectural models for infilling the single-family residential zone in Los Angeles in order to increase the supply of housing near jobs. The tactics employed reflect both the city's suburban residential tradition and the opportunities provided within individual neighborhoods, on specific sites, and for particular households. The approach straddles architectural and planning practices and the scales at which each discipline operates. By so doing, we can envision how a largely suburban city can evolve into a more sustainable, posturban metropolis. Whether called granny flats, accessory dwelling units, or mother-in-law apartments, Backyard Homes can be built incrementally, on lots where they make sense. Building into cities rather than beyond them preserves farmland and sensitive, natural ecologies. Marginally more dwelling units per acre provides a means for preserving the benefits associated with suburban living while reducing carbon footprints and providing municipal services more efficiently.

CONSEQUENCES OF SUBURBIA

Today, zoning—as ideology and practice, stands in the way of sustainable urban development. At its inception in the early 20th century, zoning was viewed as a panacea to rampant development and speculation as well as to public health crises. But almost immediately it became a tool for exclusion, for social segregation, and for enforcing homogeneity, especially in the residential zones, turning a heterogeneous urban pattern into one composed of rigid enclaves.

By limiting the intensity of residential development in the city, single-family residential zoning constrains the supply of housing in Los Angeles and elsewhere. Despite overbuilding at the edge of the metropolitan area, a housing shortage has persisted in Los Angeles since the 1970s. The shortage has taken its toll on residents as rents have escalated, housing prices have risen, and commutes have lengthened. Inside the dwelling, overcrowding has increased in Southern California even as it has declined in the rest of the nation. In Los Angeles, one out of four households is overcrowded, and almost half of all renter households pay more than 30% of their income as rent. Yet, the City of Los Angeles has adopted a largely "hands off" policy in regard to intensifying single-family areas even though these account for 85% of the city's residential land. Los Angeles is not unique; most cities in California and throughout the western United States have similar patterns of development.

NEW RULES OF THE GAME

Since 1982 the State of California has proactively passed laws to encourage second units, or accessory dwelling units (ADUs), in single-family neighborhoods. Legally permitted second units, nonetheless, are rare in the state and in the Los Angeles region in particular. Most recently, in 2003, state legislative action—Assembly Bill 1866—reinforced "granny flats" construction.

A3 1866 requires cities and counties to allow the development of second housing units in single-family and multifamily residential zones. To implement this provision, local governments may adopt an ordinance that designates allowable areas and imposes development standards related to things such as parking, building height, setback, lot coverage, architectural review, and maximum size of a unit. A community may opt out of local ordinances or, if the existing laws are conflict with state statute as amended when the municipality must immediately approve requests for second units that meet the following criteria:

- The unit is not attached to the existing dwelling and located within the legal area of the existing dwelling
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- The unit meets the requirements relating to height, setback, lot coverage, architectural review, site plan review, fees, code, and other zoning requirements generally applicable to residential construction in the zone in which the property is located.
- The unit meets the building code requirements that apply to detached dwellings as appropriate.
- The unit, along with any other buildings on the property, does not exceed 500 square feet.
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The state initiatives, however, remain largely ineffective in spurring the supply of legally permitted second units in the state and in Los Angeles. For example, since 2003, only eleven units have received permits in the City of Los Angeles. Since the City Council tabled further consideration of the issue in 2009, state law rather than local regulations is assumed to apply, making Backyard Homes possible across the City of Los Angeles.
SINGLE FAMILY RESIDENTIAL ZONING

The City of Los Angeles uses twelve categories of land use to guide development. Of the twelve categories, the single-family residential zones called “Low Density Housing” on the map are the most restrictive: only one dwelling per lot. Emerging in 1904 as a means to control the lay of the land, the single-family residential zones in the City of Los Angeles have gradually increased in area. By June 2010, the single-family residential zones consisted of 457,610 lots scattered across the city leaving major areas of land unbuilt. Incorporated in LA’s metropolitan grid, this stock of underutilized land provides a viable asset to support ongoing urban development.

Independent of zoning designations, gridded land platting served real estate purposes, giving form to an immense field, characterized in the 1950s by Reyner Banham as the Plains of Id. Over the past one hundred years the grid has been filled with a sprawling body of low-rise buildings. Across the city, topographic variations have morphed the Cartesian grid, dissolving its rigidity. The flexibility of the grid stands in stark contrast to the uniformity of the zone, where local significance and site-specific characteristics are suppressed by a set of deterministic codes. Backyard Homes is one way to increase zoning’s responsiveness to local conditions.


Grid versions of street layouts, shown here, demonstrate a flexibility of urban form not matched by right residential land use regulation.

Gridiron, Sherman Oaks, 91403
Pond Hills, Los Feliz, 90027
Gridiron with Alleys, Venice, 90291
Cul de Sac, Palms, 90066
ASSESSING ADUs

Some homeowners have developed their own solutions to the housing shortage by converting garages to second units or by subdividing or adding apartments to detached, single-family dwelling units. There is no reliable count of illegal second units, but the Los Angeles Times reported that, in 1987 about 42,000 garages were sheltering about 200,000 people in Los Angeles County. It is likely that the number of second units has ballooned in the last quarter century given that housing production has failed to respond to population growth in the region.

A 2009 cityLAB field survey of three areas with high home mortgage foreclosures in Los Angeles (Cypress Park, Hyde Park, and Pacoima) reveal a large number of ADUs. From 34% (Hyde Park) to as much as 80% (Cypress Park) of the housing units in those neighborhoods are likely to have ADUs on single-family zoned lots. These adaptations, while almost always illegal and constructed through informal means, have provided strapped homeowners with additional income that has allowed them to remain in their homes while providing a kind of affordable — if not always safe — housing. Life safety issues, including fatal fires, in some of these units have led to sporadic crackdowns on the practice and existing non-permitted units face an uphill battle to legalization.
Neighborhood Analysis

Map shows the distribution of single family lots in the City of Los Angeles.
The history, and future, of Pacoima describe the shift in urban growth management, from expansion to implosion.

NEIGHBORHOOD BENEFITS

Safely constructed, legally permitted second units offer numerous neighborhood and household benefits in addition to increasing the housing supply citywide. The units can provide an important source of affordable rental housing. Neighborhoods with second units can be more walkable with more public transit opportunities and more local services because more people reside nearby. Backyard Homes help stabilize communities, by providing flexible housing alternatives.

HOUSEHOLD BENEFITS

Second units can provide families with the kind of flexibility that allows them to stay in their houses for decades. The potential rents from second units can make it easier for young or middle class households to own single-family homes in good locations. They can provide flexible space for growing families and nearby but independent housing for adult children. They also provide an unmatched opportunity for seniors to live independently with their caregivers in close proximity. Or they can provide a smaller unit for households that seek to age in place and do not need all the space afforded by the primary unit but may need the supplemental income that comes from renting the larger, front house.

This series of images shows the incremental addition of 38 Backyard Homes to the 92 existing houses over a ten-year period.
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Site Potential

Nearly 500,000 single family properties exist in the City of Los Angeles. For various reasons (e.g., topography or lot size) not all of these lots will be appropriate sites for a Backyard Home, nor will all property owners want a second unit. But through a construction process that allows for both flexibility and customization Backyard Homes can be located on many different kinds of sites and address many different kinds of family living.

Morphosis
2-4-6-8 House
Completed 1997 in Venice, CA

Daily Genik Architects
Parks Residence
Completed 2006 in Venice, CA

Los Angeles, CA
Venice, CA

Rusandain, The Netherlands
Kortenie Stuhlmacher Architects

Kim, Germany
Studio Klesinger

Kirkland, WA
Thielson Architects

Deadrings Island, WA
SustainableBuild

Venice, CA

Toronto, Canada
Peter Duckworth-Pikington and Suzanne Cheng

Toronto, Canada
Diamond + Schmidt Architects

Menlo Island, WA
Hutchison + Maul Architecture

Santa Cruz, CA
Michael Herron Design Build
**GREENER BACKYARDS**

The addition of second units can help make greener, more livable neighborhoods by creating new housing that is resource-efficient, reducing environmental impacts while at the same time reducing resource and energy demand. The way a Backyard Home is configured on the property can improve the micro-ecology as shown below.

**LARGE LOTS**

Large lots are particularly amenable to the addition of a Backyard Home. The standard lot in Los Angeles is 50’ x 150’, but many are substantially larger. Even standard lots can readily incorporate a second dwelling unit and provide the required parking along with private yards for each unit. The concept below shows an early cityLAB design that demonstrates that large lots could accommodate parking and private gardens for several new households in addition to the original dwelling.
CORNER LOTS

Corner lots are ideal for Backyard Homes since construction access is simple and there is adequate space for parking. This example shows that in special cases, a second unit on a corner lot could even add an amenity or service to the neighborhood, such as a community garden, childcare center, or playground.

Design Concept by Roger Sherman Architecture & Urban Design [2006]

ALLEY LOTS

In Los Angeles, there are approximately 900 miles of alleys. Many of these are in single family neighborhoods, where the addition of Backyard Homes could contribute to greening the alleyways and making them safer. The infill housing example shown here explores the flexibility of a modular system of prefabricated components for housing units, carports, and solar panels. These could be flexibly configured in order to accommodate existing site conditions and homeowners’ preferences.

Design Concept by Daly Genk Architects [2009]
HOME AS A BUILDING TYPE: DENSITY VS. INTENSITY

The label “Backyard Homes” is used specifically to invoke presumptions about the home as a
building type: privacy, greenery, family, and ownership are all part of the type. To intensify the
residential zone of single-family homes, these qualities can be preserved through design if the
relationship between house and garden is carefully maintained. Courtyards are a native means to
afford higher density and privacy in a residential setting, as is the private garden.

Restrictions in single-family zoning traditionally limit outbuildings, focusing development on
additional area added to existing structures. Increased site intensity yields additional building
mass: the DNA of the Mansion originates in the zoning code. The Backyard Homes project
seeks to maintain the scale of existing neighborhood fabric while encouraging increased intensity
of use while maintaining the apparent neighborhood density.

COSTS AND BENEFITS OF MANUFACTURED HOUSING

For the past hundred years, architects have consistently sought housing solutions that effective-
ly deploy pre-fabrication strategies, with little success. Manufactured housing (generally in the
form of mobile homes) comprises almost a third of all new single family units built since 1980. Its
popularity is primarily due to its affordability (ranging from a
fifth to a half of the cost of conventional site-built homes).
But manufactured housing has certain disadvantages: it is subject
to depreciation and thus consumption-based rather than
investment-based; it is logically difficult to use in tight infill
conditions; neighborhoods resist it; it is programmatically rigid.

Modular construction, on the other hand, has none of these dis-
advantages and can be more affordable and ecological than con-
ventional construction: rationalization of building systems can
speed and simplify construction while minimizing waste. Yet
the success of modular solutions has proven elusive. Modular
solutions have tended toward extremes of “completeness”. At
one end of the spectrum, they are envisioned as fixed spaces – complete buildings or building
elements that can be prefabricated in transportable sizes, and joined to adjacent modules on site.

This industrial design strategy is similar to the way automo-
biles are marketed: colors and finishes can be selected by the
consumer, but the models, from Tempo to Taurus are fixed,
limiting the adjustability of each model to the specifics of the
site. This is an approach that limits both choice and the pos-
sibility of unanticipated, unoriginal solutions.

At the other extreme, measurement-based systems use wall or
building panels of specific sizes to configure the perimeter of
structures. This design strategy is more like a Lego set, made
of elements that can be aggregated according to specific rules.
This offers greater adjust-
ability and scaling, though a
successful outcome relies entirely on the skill and experience
of the individual manipulating the system. This approach in-
creases choice and allows that bad iterations are inevitable and
tolerable.

These two approaches illustrate what could be characterized as
the Optimization Paradox. In the first example, the top-down
design of a finished product allows for the rationalization in
production. Increased efficiency lowers the cost of each unit;
the more similar each module is to its predecessor, the more
 economical it is to produce. It is also invariably less adaptable
to varying unique conditions. The Lego model operates in the opposite direction: by increasing
flexibility and allowing greater adjustability, costs increase through redundant structure and
allowing for more open-ended solutions in production.

THE BACKYARD SQUEEZE: AT HOME IN A "SOFT" MODULE

The Squeeze is a modular home that seeks to address the apparent paradox of optimization. It is
a prototype characterized by three basic components: floor, frame, and fabric. Taking advantage
of industry norms in digital fabrication, the system anticipates that each iteration of each com-
ponent can be unique and stay within the parameters of the system. This will allow the Squeeze
to be shaped by site and circumstance, and allow owners to configure only as much Backyard Home as they desire. The prototype is founded on the premise that emphasizing surface area over square footage yields distinct benefits: it will be light and fast to construct, and inherently environmentally sound due to its low material intensity.

**Floor**
The floor is an expanded aluminum honeycomb panel, in common use as building panels in technology and transit manufacturing. Pre-wired and set on a screwjack foundation system, the perimeter is CNC-milled to the shape of the house, and reinforced at connection points to support the formed aluminum frame.

**Frame**
The primary frame is made of stretch-formed aluminum extrusions that is heat strengthened following the forming process.

The frame is nested into a collapsed configuration for shipment, allowing for the assembly to fit through tight side-yard spaces, expanding once it reaches the backyard around mature landscape and site conditions.

**Fabric**
Once assembled and stiffened by the floor, the frame is enclosed by a multilayer performative fabric that is cinched to the frame and the perimeter of the floor. A partial vacuum is continuously applied to the space between the interior and exterior fabric, providing rigidity to the assembly. The enclosing material can vary according to homeowner preference and regulation: it can be printed with solar collectors for energy efficiency, fitted with trellises and covered in vines, or vary in translucency to admit light as desired.

Unlike manufactured housing, the Squeeze responds to changing household dynamics: it can be a guestroom, a mother-in-law unit, an office, or an empty-nester’s more compact home.
Implementation

An intrinsic part of Backyard Homes is their incremental implementation. cityLAB envisions this happening one willing household at a time. But prior to any grass roots effort, the value of Backyard Homes—to the city, to neighborhoods, and to households—must be demonstrated through a handful of actual projects. Such demonstrations are important, in part, because second dwelling units on single-family lots remain controversial in Los Angeles. Demonstrations will illustrate how parking is best handled, how increased demands on public services are met, and how neighborhood character is preserved.

In the beginning we assume that Backyard Homes will be undertaken by volunteer households accessing architectural and construction services through traditional means. In other words, families will engage architects to design the units in a manner that negotiates the specific conditions present on their lot and the program requirements they set. They will then engage building contractors to execute custom-designed second homes.

But the true potential of Backyard Homes, we believe, lies not in custom-built, one-off solutions—as important as those pioneering efforts will be—but in the potential to make the experience of providing a Backyard Home a retail-like experience. To the vast majority of Angelenos, the idea of engaging an architect remains a foreign one. Even hiring a licensed general contractor to undertake the construction of the second unit would be considered a rare notion.

The negotiations necessary to build an architect-designed home remain legally and financially complex. Nevertheless, we believe that the continuing industrialization of home construction, and the benefits that may accrue to that process through the adoption of practices like mass customization, may be leveraged to vastly simplify the process of delivering ADUs to homeowners. Eventually it could be as easy to purchase a Backyard Home as a new car: go to the source, select among models, option packages, colors, and payment. With the Backyard Home, the “dealer” would also arrange for site work, foundations, permits, and inspections.

Once it becomes possible to deliver flexibly-designed, site-adaptable second dwelling units in even small quantities, other possibilities arise. For instance, a private home builder could decide to go into the Backyard Homes business. Or a non-profit housing developer could decide to either include second units as part of making newly-constructed homes more affordable or, if they are interested in providing rental housing, in working with existing homeowners to build Backyard Homes on scattered sites.

At cityLAB, we are forwarding Backyard Homes on two fronts: we are actively seeking to assist individual property owners who wish to build a prototype; and we are in discussions with groups like Habitat for Humanity and housing agencies within the City of Los Angeles. These groups are purchasing foreclosed single-family dwellings that are perfect candidates for an additional rental unit, making the entire property more affordable.

There are many routes to implement Backyard Homes, in Los Angeles and beyond. We encourage all these routes toward greener, better designed, and more affordable neighborhoods.
Looking Ahead

cityLAB, working with an impressive group of collaborators, has developed a strong argument in favor of adding second units to single family properties. Backyard Homes are smart—environmentally, economically, urbanistically, and in terms of design. They will be built one-at-a-time, which means that homeowners and neighborhoods have greater control over the development of their communities. Now we need to build a few demonstration projects -legal Backyard Homes that meet California State requirements for granny flats. These demonstrations, if done well, will reassure the surrounding residents, policymakers, and other property owners considering a second unit.

The American Dream of owning a free-standing home remains a strong ideal, even though it has moved further out of reach for most citizens. We are not proposing that Backyard Homes can solve the housing problem, but they could improve conditions for many of us in a way that complements our ideals. Of the half million residential properties in Los Angeles, if just ten percent built a Backyard Home we would have 50,000 new rental units. And if these are thoughtfully designed like the models illustrated in these pages, the new homes would extend rather than erode the American Dream.

We have the opportunity to simultaneously improve our cities, our neighborhoods, and our homes. In Los Angeles and beyond, we should not let this opportunity pass.

Further Reading


Southern California Studies Center. 2001. Sprawl Hits the Wall: Confronting the Realities of Metropolitan Los Angeles. Edited by M. Dear. Los Angeles: The Southern California Studies Center University of Southern California and The Brookings Institution Center on Urban and Metropolitan Policy.


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