

New Starter Home

highly affordable, ownable, 'starter,' smart, tiny houses in Portland - for backyard cottages, villages, or cottage clusters.

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by [Tim McCormick](#), with [Housing Alternatives Network](#),

Portland, Oregon.

tim@tmccormick.org, +1.503.334.1894

including contributions from:

- Andrew Heben - Program Director, [SquareOne Villages](#), Eugene, OR
- Mark Lakeman - Founder, [Communitecture](#), [City Repair Project](#); [Village Coalition](#), Portland
- John McCormick, AIA, AICP (Emeritus) - retired architect & planner, Portland



A proposal and development project [originally created](#) with Village Coalition in August, 2018 for submission to the [Meyer Memorial Trust](#), Portland, "One Million Month Challenge" grant challenge. This invited proposals for how to create one million months of low-income housing affordability, with lowest possible total subsidy.

Short link: tmccormick.org/projects/new-starter-home.

[Latest PDF version](#) (April 5, 2024).

Alternative/former titles used:

- **PAD Initiative:** Portland [or Portable] Autonomous Dwellings. [alluding to 2016 POD (Partners on Dwelling) Initiative, in Portland.]
- **LevitateTown:** building a network village of movable, smart, affordable starter homes.

Images above: Emerald Village, in Eugene, Oregon, under construction ca.2018; San Francisco "Earthquake Cottage" being relocated to a permanent site, ca 1906.

Table of contents



[click on section title, then on link that appears, to go to that section]:

Overview	3
Background: From Levittown to LevitateTown	5
Whom do we aim to help?	7
Fitting a range of site/zoning contexts:	7
Mobile housing	7
Detached Accessory Dwelling Units	7
Cottage Clusters, village models	8
Emergency, farmworker housing	8
Program strategies toolkit:	8
Strategy 1: Ensure affordability by covenant	8
Strategy 2: Use small, and self-buildable and prefabbable units	9
Strategy 3: Use movable and anchorable units	11
Strategy 4: Make homes usable across a variety of site, zoning, & tenure situations	13
Strategy 5: Allow options to site-build, trailer in, or crane in	13
Strategy 6: Use standardized, post foundations, independent of unit design	13
Strategy 7: Offer rentable, lowable, or rent-to-own homes	15
Strategy 8: create a network of sites and participants	15
Strategy 9: facilitate incremental building and expansion, by modular design	15
"PAD Initiative" design challenge	16
Sustainability, resiliency, off disaster, climate-change, off-grid adaptation	17
Making urban infrastructure more adaptable (incl points from Prof. Matthew E. Kahn via Twitter)	19
Financial analysis, timeline, funders (from 2018 grant)	21
Financial analysis	21
Timeline for a research & prototyping project	23
Potential funders/investors	24
Potential obstacles	24
Appendix 1: other Accessory Dwelling programs for low-income, houseless, or movable homes	25
References / Bibliography	26
Document history	30

Overview

New Starter Home is a proposed program to provide new, flexible, low-cost housing options for low-income households to rent, own, and/or rent out.

It has this defined goal and certain basic patterns such as a network of small units. Then it has 1) a set of component strategies which might be all or partially used, in different combinations, and 2) a range of possible land-use contexts such as different types of site. Because the approach might be pursued only with certain strategies, or for certain land-use contexts, at a given time, we separate each of these here to consider individually.



2. Project Summary

Our novel approach uses low-cost, expandable homes (or modules making up homes) that a) can be efficiently prefabricated or built on site; b) lived in or transported to site on standard road trailers; c) anchored for long-term use using a standardized foundation and connector design; d) in various site contexts, including on residential property as Accessory Dwelling Units, or in Cottage Clusters.

Oregon's 2018 Tiny House Code¹ created a pathway for this type of low-cost, space-efficient dwelling (400 square feet or less) to be widely developed, both as movable / trailer-mounted units regulated as vehicles and/or as foundation-anchored homes regulated by standard building code.

We build on this Code to develop a model for modular detachable homes, foundations, connectors, financing, permitting, and management of low-cost detachable homes, which could be *used in and potentially moved between multiple site or zoning contexts*.

The rationales are similar to what current Portland Planning and Sustainability Commission vice-chair Eli Spivak wrote in "A Legal Path for Tiny Houses on Wheels" (discussion document 2015)²:

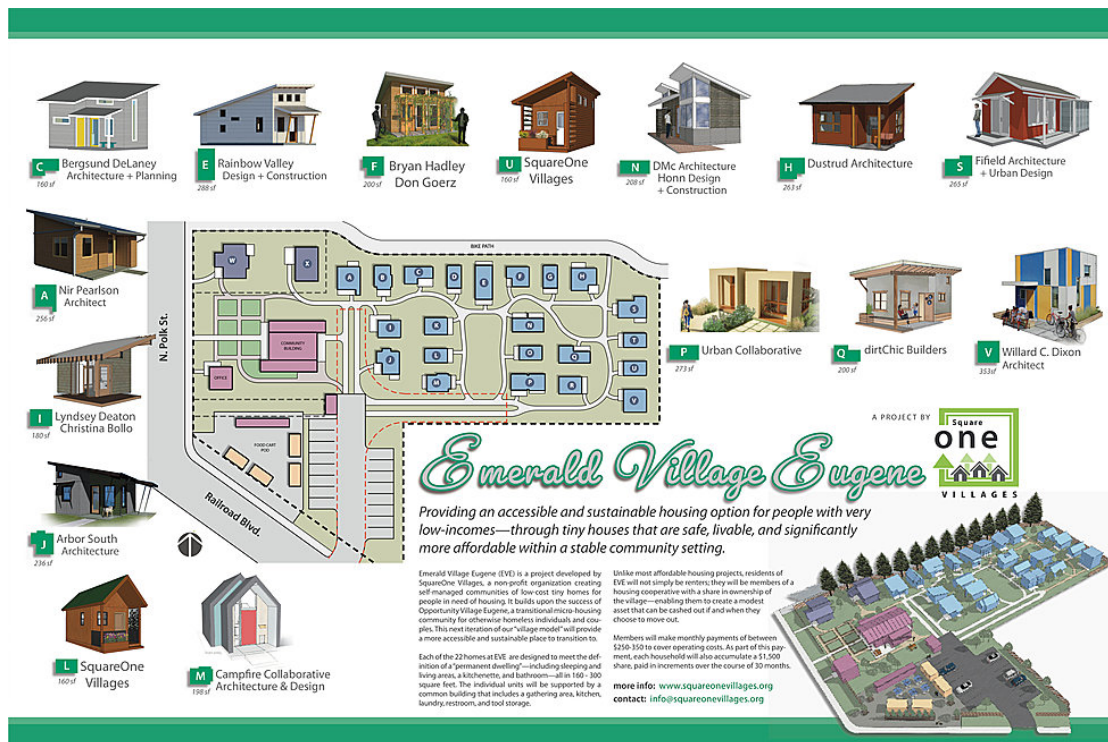
This proposal would legalize a new form of small, safe, low-cost, environmentally-friendly, and discreet housing that furthers important city goals, including:

- Providing affordable rental opportunities for homeless and/or low-income residents requiring little or no public subsidy;*
- Supporting extended family and other community living situations that don't always fit well within traditional single family homes; and*
- Creating opportunities for people to live in the City of Portland with much smaller environmental footprints*

[below: SquareOne Villages' Emerald Village, Eugene OR].

¹ Oregon Building Codes Division [Aug 1, 2018]

² Spivak, "A Legal Path for Tiny Houses on Wheels" (2015).



Background: From Levittown to LevitateTown

New Shelter Homes builds on a unique set of political and legal circumstances in contemporary Portland, and also much older ideas about mass- and adaptable housing.

In 2015, Portland Mayor Charlie Hales declared a Housing State of Emergency, in the face of widespread, visible homelessness. Similar declarations have been made in Seattle, San Francisco, Los Angeles, San Jose, Salem, etc as homelessness has risen on the West Coast in particular, compounded by additional crises of unprecedented wildfire impacts and the Covid-19 pandemic.

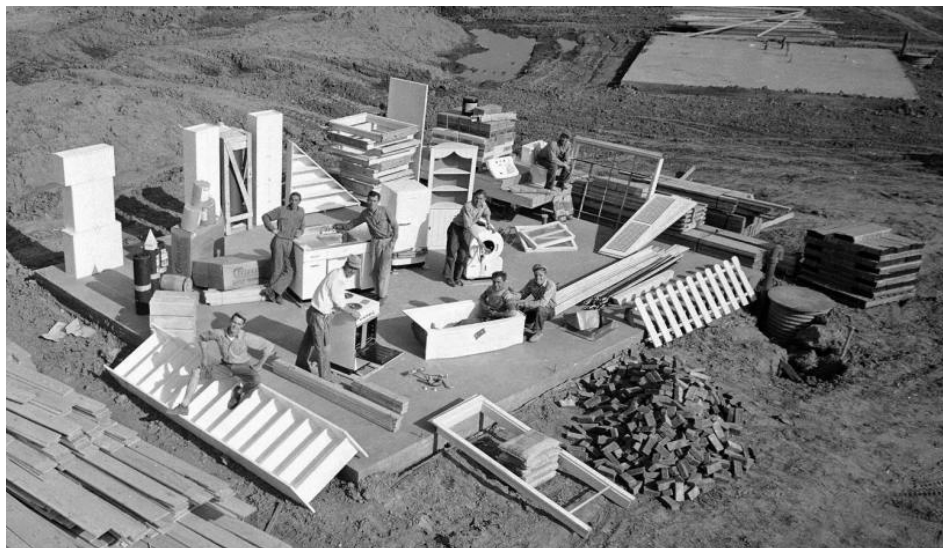
In 2017, Portland Councilmember Chloe Eudaly announced a policy of de facto legalization of vehicle dwelling on private residential property, in her capacity as Commissioner of the enforcing department. In February 2019, Portland City Council, passed [Ordinance 189387](#), extending the state of Emergency and also directing that:

"BPS (Bureau of Planning and Sustainability) in coordination with the Joint Office of Homelessness Services (JOHS) is directed to develop a legislative proposal to amend City Code to allow for temporary housing, shelters, and alternative shelter siting"

This proposal became the **Shelter to Housing Continuum project (S2HC)**, which has consciously drawn upon longstanding precedents for homeless 'village' projects in Portland -- such as Dignity Village, 2001 to present, the POD Initiative community design program, 2016-2018, and Kenton Women's Village, 2017-present -- which have achieved high levels of official and community acceptance, and useful models such as the "sleeping pod" special building code. Two years of development work on S2HC has helped establish ideas of a new "low end" or starting point for housing, as a matter of public need and interest. The now-pervasive idea of "missing middle" housing, as promulgated by Berkeley-based Opticos Design, is being expanded to **"missing small"** housing, in the coinage of Berkeley architect and advocate Alfred Twu.

In a way, this new focus on a low end to a housing spectrum, or continuum, began 70 years earlier. In 1947, development began on what became the most iconic ever "starter home" program: **Levittown**, built by William J. Levitt and his company Levitt & Sons. These units were substantially standardized, originally 750 square feet, and designed to be expandable by the owner. They were developed to be affordable on a manageable percentage of average households' income.

Historian Kenneth T. Jackson described the Levitts as, "the family that had the greatest impact on postwar housing in the United States...who ultimately built more than 180,000 houses and turned a cottage industry into a major manufacturing process."³



above: construction materials delivered to a Levittown site after foundation poured⁴



aerial view of Levittown, Pennsylvania, circa 1959. from Wikimedia Commons.

³ Jackson, Kenneth T. *Crabgrass Frontier: The Suburbanization of the United States*, 1984.

⁴ Chantry, 2012.

Our proposal is motivated by the urgent need for such starter housing today, and how little of it is being produced or is available in high-cost cities like Portland. Also, by the possibilities to meet that need creatively today: by using Tiny House Code, efficient mass-production building like the Levitts did, and land that is relatively inexpensive/available because it is already owned by a homeowner willing to add an ADU, or is small, interim-use, or high-density such as in a pocket-neighborhood/village model.

Because our proposal employs movable units, and a flexible and expandable network rather than a single site, we alternately call it “**LevitateTown**” in homage to the Levittowns.

The New Starter Home proposal is significantly informed by my experiences 2012-18 in the Bay Area and Mendocino Co., California, living in a variety of cottage, informal, movable, and self-built homes -- including, during the last two years, in my own modular kit-built structure inside an Oakland "housing hacker" warehouse within which other residents had also built their own small homes.

Also, by my experiences visiting a wide variety of alternative, mobile, manufactured, and village housing sites in Oregon, Washington, California, & Colorado, particularly de-facto permanent sites like Dignity Village and fully permanent sites like Emerald Village, Eugene.

Whom do we aim to help?

This program is focused on helping extremely low-income (< 30% AMI) and hard-to-house households (disabled, formerly houseless, etc).

The proposal is designed to address a wide variety of situations across Oregon, and to potentially and hopefully support homes / households moving between those situations, to meet needs and opportunities. For example, a New Starter Home in this program might be initially deployed as farmworker housing, or at an interim housing urban village, but be relocated with its occupants to a backyard ADU or permanent village location. Or, being movable and sellable, a resident with equity interest in the unit might sell it in order to help move to a different situation.

Fitting a range of site/zoning contexts

Mobile housing

eg, under Portland's Shelter to Housing Continuum code, Outdoor Shelters or vehicle dwellings & Tiny Houses on Wheels on private property;

Detached Accessory Dwelling Units

, i.e. backyard cottages. These could be on foundation, or movable (in jurisdictions allowing mobile ADUs, such as LA, San Jose, & San Diego).

Cottage Clusters, village models

Permanent multi-unit sites, such as e.g. [SquareOne's Emerald Village](#), Eugene, poster for shown above; pocket neighborhoods, bungalow courts, or mobile-home park, using various zonings like multi-residential, PUD, or manufactured housing park.

See "Open new paths from the streets to permanent housing", ab In Our Opinion" (op-ed) article from *The Oregonian*, March 24. It was co-authored by Tim McCormick representing PDX Shelter Forum and Village Collaborative; Laquida Landford, leader of **AfroVillage PDX**; and Les Wardenaar, Chair of the **Interfaith Alliance**. (it is also available online at: <https://www.oregonlive.com/opinion/2021/03/opinion-open-new-paths-from-streets-to-housing.html>).

This article particularly emphasizes the opportunity for Shelter to Housing Program, and/or further phases of work, to *facilitate wide, low-cost, *permanent* housing for current or near houseless people, by allowing houses to move from Outdoor Shelters to backyard cottages, as accessory dwellings, or to cottage clusters*, which will become allowed *by right* in Portland under the **Residential Infill Project, Part 2**, now beginning and to be completed in 2022.

Emergency, farmworker housing

Program strategies toolkit

Strategy 1: Ensure affordability by covenant

We propose to structure this program to specifically prefer Extremely Low Income households (0-30% AMI) -- where possible, both for ADU host-site owners, and for the Starter Homes residents themselves.

Residents would be asked to contribute a percentage of their reported income - perhaps 30%, which is a common threshold defining housing affordability. Initial acceptance and ongoing participation in the program might require periodic reporting of assets and income. After initial placement, if the resident/household increased its income beyond the ELI range, they could stay in the program and unit, but their rent contribution would go up proportionately to their income. ("social housing" model).

Homeowner participation in the program, including receiving subsidized foundation/utility hook-up pads, and issuance of units, might be limited to or focused on low/fixed-income homeowners.

By contrast, Accessory Dwelling Units currently in Oregon are usually created by and help build wealth for high-income, high-education households; and the units average \$1250-1500/month [**ref. needed**], so are not usually providing deeply affordable housing].

Restrictions on who could host or inhabit New Starter Home would, ironically, echo but invert -- for inclusionary and social justice purposes -- the Levittown's worst aspect, their racially restrictive covenants:

"As well as a symbol of the American Dream, Levittown would also become a symbol of racial segregation, due to Clause 25 of the standard lease agreement signed by the first residents of Levittown, who had an option to buy their homes. This "restrictive covenant" stated in capital letters and bold type that the house could not "be used or occupied by any person other than members of the Caucasian race."⁵

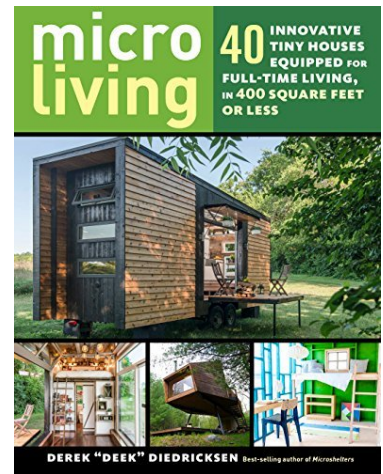
⁵ Wikipedia, "Levittown."

Strategy 2: Use small, self-buildable, and prefabbable units

i) Small:

Inherently affordable housing: being limited to 400 square feet, which is smaller than most dwellings in Oregon and the U.S., these units would tend to be inherently affordable, in that a) less materials (even if high-end) and labor would be required in their construction, b) utility and maintenance costs are lower, c) higher-income households tend to seek larger dwellings so there is less market competition for smaller units.

At up to 400 square feet, we could argue that units like these are fairly comparable to the original 750sf Levittown homes. Given that these tiny houses are primarily aimed at singles and couples, vs 3-5 person families at Levittown. Also, given many ways which new technologies and practices make households require less home space: for example, wide variety of goods and services available on-demand, pervasive off-site storage facilities, shorter average tenure in housing (< 2 years for rentals); space-efficient digital media and newer appliances (eg wall-mounted flatscreen, vs cabinet tv and music center).



[above: the two models offered at the first Levittown, in NY: Colonial, and Ranch].

ii) Prefabbable:

Potentially, many *existing* unit designs could be employed in or adapted to this system - if the unit is Tiny House Code compatible, and there is a possible way to make the unit trailerable and/or anchorable. For example: units from SquareOne Villages permanent sites e.g. Emerald Village; or Panoramic Interests' 'MicroPAD' unit; or units from Blokable, Kasita, Dweller, Stuart Emmons, or the manufactured-housing makers' tiny-house lines. Or, as generated by an open community design process as successfully used by Village Coalition for the POD Initiative.

There are also many tiny-house plans available free or low-cost. See for example Derek "Deek" Diedricksen. *Micro Living: 40 Innovative Tiny Houses Equipped for Full-Time Living, in 400 Square Feet or Less* (forthcoming October 2018, pictured above).

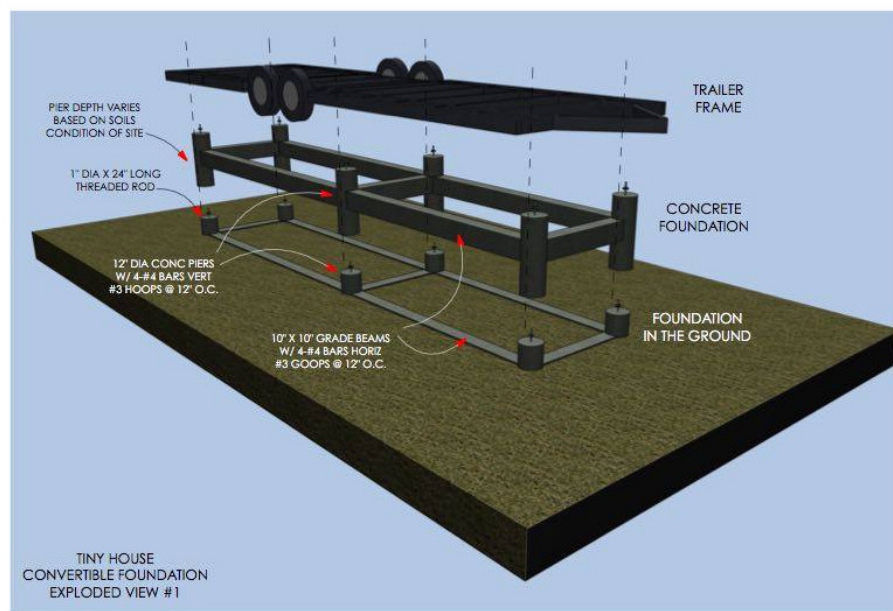
Strategy 3: Use movable and anchorable units

We propose an approach where homes (or component modules for them) may be used and transported on standard road trailers, but may also be moved onto and anchored to a permanent foundation, for long-term, building-code-compliant use; and may be later unanchored and moved. See "Tiny house convertible foundation" diagram below, and section g), for more on this point.

The detachability and mobility has a number of possible benefits, independent of each other:

1. Off-site prefabrication for efficiency.
2. House may be separately owned, rather than e.g. being owned by the ADU site homeowner.
3. Residents may move a unit from or to another site, e.g. from an interim village or another city.
4. Site owner does not have to permanently commit to the house being there. This allows use of interim sites, and much lowers the commitment/risk for ADU site homeowners.

[below: tiny-house convertible foundation design, by David Ludwig]



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LUDWIG DESIGN - DAVID LUDWIG - ARCHITECT **TINY HOUSE CONVERTIBLE FOUNDATION** 480 GATE FIVE RD. #122, SAUSALITO, CA 94965
415-722-8488 david@ludwigdesign.com

This approach is unusual in offering a "movable, but permanent" option: secure housing that can be permanently owned by the resident, or build equity towards owning a different home; but which yet can move between locations, or expand, as the household's needs evolve.

Conventional mobile, i.e. manufactured housing is usually owned by the resident, and in theory is relocatable, but in practice these homes are rarely moved, for several reasons:

1. It typically costs many \$1000s to move a unit, which most mobile-home park (or "manufactured-housing park") residents cannot afford.

2. In recent decades, creation of new mobile home parks has been largely restricted in urban areas across the US, and they are increasingly redeveloped for other uses, so available places for mobile-home residents to move to are very scarce in most areas.
3. Mobile home parks today typically only accept mobile homes compliant with the 1978 HUD unit standards, and many especially poorer residents have units which don't comply.

Nonetheless, manufacturing housing is **the most common form, de facto, of affordable housing in the US**, and some urbanists today such as Nolan Gray (see References) observe that it offers many useful patterns for relatively dense urban housing. The historical advantages and perils of its use in the US are important topics to understand, in proposing any type of relocatable and/or prefabricated housing today. See Wallis [1991], *Wheel Estate*, and Sullivan [2018]. *Manufactured Insecurity*.

Making the house movable allows efficient off-site production, and opens up a wide variety of of normally unutilized sites for hosting a unit: such as sites planned for eventual development, as with the Kenton Women's Village in Portland; or ADU sites of homeowners not able or willing to commit to a permanent unit there.

One model/inspiration for this movable/anchorable approach is the San Francisco "**Earthquake cottages**" (or shacks), around 5000 of which were built for displaced residents just after the 1906 earthquake.

They were erected and lived in on public land, offered to residents on rent-to-own terms, and many were over time, as intended, moved to other sites for permanent housing or commercial use, often built up and around. Some are still in use 110 years later.

[below: San Francisco "earthquake cottage" being moved from public to private site by owner, ca 1906].



New Starter Home, like the earthquake cottages, are particularly aimed at the most dispossessed and needy. They could support, say, residents in villages developed by the Village Coalition or Square One Villages, becoming long-term anchored housing, there or elsewhere or as ADUs. They could also be individually owned by residents, or could be partially owned by being in a village that is set up as Limited Equity Cooperative; etc.

Strategy 4: Make homes usable across a variety of site, zoning, & tenure situations

By employing OR Tiny House Code that both supports mobile housing and allows incorporation in Building Code, our "starter homes" could work in a wide variety of site and zoning situations, and a wide variety of households and life phases.

- Accessory Dwelling codes.
- Campground zoning - sometimes used by interim villages.
- Multifamily (*cough* multi-unit) - used e.g. for Emerald Village, Eugene.
- Portland RIP (Residential Infill Program) for redeveloping residential sites with potentially more units.
- Mobile home sites.
(note, Portland has just created a new Manufactured Housing zoning type, aiming to protect the city's 56 mobile-home parks and 3000 residents from displacement pressure. One of our research strands should be to explore how this, and other cities' mobile-home situations, may work together with the New Starter Home model).

Strategy 5: Allow options to site-build, trailer in, or crane in

A crane would generally work in all cases to deploy a prefabbed unit, but they are expensive to hire, require expert operators, may require street closure that annoys neighbors, and they are relatively scarce -- i.e. it could be hard to scale up to the desired deployment rate with them.

For various reasons it may in cases be advantageous to build on site, or be possible to deliver a unit (or perhaps modules constituting or extending a unit) by ordinary road trailer. We propose to use a "tiny house convertible foundation" -- see section g) below for explanation -- which enables a trailer-mounted unit to be rolled directly over the foundation, and lowered onto a connector structure.

Strategy 6: Use standardized, post foundations, independent of unit design

A key factor in Levitt Brother's success, as with other mass post-war builders like Joseph Eichler and Henry Doelger in the Bay Area, was a highly efficient, "mass production" system using economy of scale in supplies and methods. For example, Levitt houses used mobile, specialized teams that did one part of the process and quickly moved from site to site.

We are proposing a similar strategy for foundations: to design a low-cost, standardized foundation system which could be put in on many sites by specialized teams/contractors, in advance or and independent of the units put onto them. We hypothesize (pending further study and development of OR Tiny House Code) that this could be done with foundation posts, rather than a full foundation slab, which is both cost-effective and flexible in terms of handling different site conditions/slopes.

For example, the full standard 'PAD' foundation might cover an area of 20x20', i.e. the 400sf maximum allowed by Tiny House Code. Rather than a continuous concrete slab, however, it might comprise 12 concrete posts at approximately 10' spacing (2 groupings of posts, each 3 x 2 = 6 posts), which could be submerged below ground level until used. Initially, perhaps an 8x20 trailerable unit is deployed, and only 1/2 of the foundation posts are uncovered and connected to. Some or all of the remaining posts might be later uncovered and used for, say a deck structure, or to deploy and join a

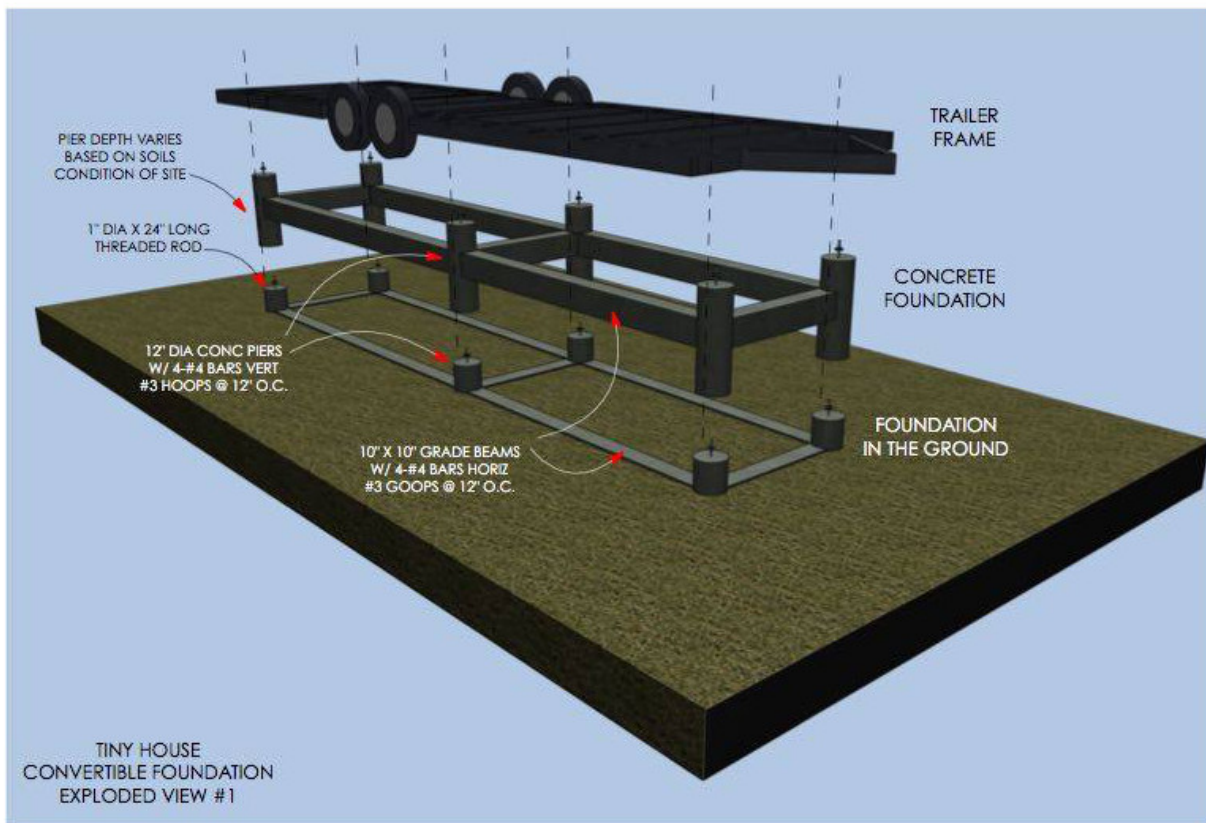
new home module for expanding the home.

Also, part of all of the unit might later be removed, and the foundation posts under it re-covered, so the space could be reused e.g. for a lawn or garden.

Structures of various designs and sizes may be connected to the same standard foundation. They just need to either:

- A. be designed to fit the standard post connector locations (and their structural capacity); or
- B. utilize a *connector* structure designed to securely interface between the unit's connection points and the foundation posts. So, for example, the New Starter Home program might source tiny-home units or plans from other vendors, which weren't themselves designed for it; but we could design and fabricate a connector to use those units on our foundations.

[below: example design for a "tiny house convertible foundation", enabling a trailer-mounted home to roll onto and then be anchored to a permanent foundation. From David Ludwig, Architect, Sausalito].



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TINY HOUSE CONVERTIBLE FOUNDATION

480 GATE FIVE RD. #122, SAUSALITO, CA 94965
415-722-8488 david@ludwigdesign.com

Strategy 7: Offer rentable, ownable, or rent-to-own homes

Strategy 8: Create a network of sites and participants

This approach is different in aiming to build a 'network' both for residents and units. We envision over time developing a growing number of sites that are built and permitted to allow these starter homes to be sited, and offering program participants opportunities to move their home to a new location if it better suited their needs and wishes. Also, we conceptualize the homes as a managed 'fleet' of units, which might not only be moved but be bought back from residents, sold to homeowners, replaced/upgraded, or individually funded by donors, investors, or crowdfunders. This allows flexibility, and lowered risk for program participants.

We propose to offer resident participants an assurance that:

1. A site will be available for them for the life of the program, i.e. even if their original site is interim or may be withdrawn by an ADU homeowner;
2. They may sell any acquired equity, up to the total value of the unit, upon leaving the program.

Residents may stay in a unit even if their income increases above 30% AMI, but their rent is set as a percentage of income (say, 30%) and would increase.

Strategy 9: Facilitate incremental building and expansion, by modular design

We propose to use modular, extensible home designs, which could allow residents to incrementally build their homes, for example from a 160sf tiny-house-on-wheels type design (8x20') to a 320sf (16 x 20') double-module unit.

This echoes another practice of Levitt Homes: the "expansion attic":

*"Returning to the Levitt Homes firm after war's end, Bill Levitt persuaded his father and brother to embrace the utilitarian system of construction he had learned in the Navy. With his architect-brother, Alfred, he designed a small one-floor house with an unfinished 'expansion attic' that could be rapidly constructed and as rapidly rented to returning GIs and their young families."*⁶

With the buried-post foundation approach (see section g) above), a full set of posts might be installed on site (for a full 320-400sf house), but only a portion uncovered and used, if a smaller unit is placed there.

The small scale, ownability, and dweller-empowering ethos of New Starter Home is intended to encourage diversity and creativity in how they are built and adapted. Even with a standardized foundation, low size limit, and possibly prefabricated designs, there can still be a wide range for dweller control. In this regard as well, the example of Levittown's 'homogeneous' housing is instructive:

"As the first and one of the largest mass-produced suburbs, Levittown quickly became a symbol of postwar suburbia. Although Levittown provided affordable houses in what many residents felt to be a congenial community, critics decried its homogeneity, blandness, and

⁶ Wikipedia, "Levittown, New York."

*racial exclusivity...Today, "Levittown" is used as a term to describe overly sanitized suburbs consisting largely of identical housing....Oddly enough, although Levittown is remembered largely for its homogeneity, the majority of houses in Levittown have by now been so thoroughly expanded and modified by their owners that their original architectural form can be somewhat difficult to see; however, with diligent observation, several original examples can still be seen today."*⁷

"PAD Initiative" design challenge

Create a community open design process for many teams to design units to these specifications — as done successfully with the POD Initiative, units designed to Portland's special "sleeping pod" building code.

Building on POD Initiative, but instead of PDX "sleeping pod" code, using proposed OR Tiny House Code plus Portland ADU code and village / pocket-neighborhood zoning possibilities. Also exploring how to potentially use, for such housing, funding sources such as Portland or Metro housing bonds, homelessness funding, and Section 8 vouchers.

The initiative could pick a site or several to make a specific program, like POD Initiative did with Hazelnut Grove.

'PAD' might be for Portland Autonomous Dwelling? alluding to:

- earlier "autonomous house" ideas: (i.e. off-grid eco-housing, Brenda and Robert Vale's 1975 book *The Autonomous House*);
- see Appendix 2: sustainability, resiliency, emergency needs: extending to off-grid homes;
- detachability,
- empowerment of residents;
- structural foundation 'pads' as in the proposal.

⁷ Ibid.

Sustainability, resiliency, off disaster, climate-change, off-grid adaptation

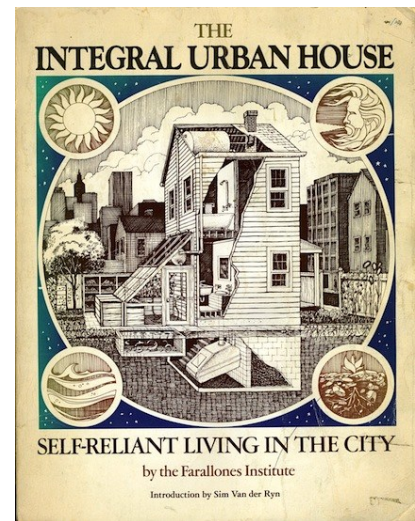
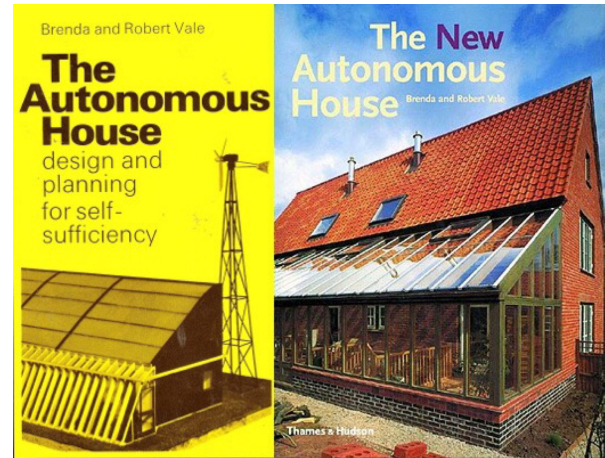
from: McCormick. "The New Urban Autonomous House."
Nov 2017 / Sept 2018⁸:

"Could urban off-grid houses make sense, even be helpful for addressing cities' housing shortages? In a sense, there are already many of them: like the RVs that many people live in for low cost or convenience...."

"Why not see the value in people being able to more autonomously and at low cost live next to services/work as they wish? perhaps part of the time or short-term. Or, in using part of the US' pervasively and freely available parking area for an urgently needed alternate purpose? In letting more housing be 'agile', deployable rapidly and perhaps impermanently, to help deal with the fact that our conventional planning and housing systems are evidently not handling well the change rate here, which has enormous cost economically & socially & environmentally?"

"Of course, freely parked RVs have issues of social (non)acceptability, possibly incurring costs to local governments and neighbors without producing tax revenues, etc. And most people probably have no conception that an urban dwelling unit is possible or practical without permanent, conventional grid connections for power, water, waste, etc. While I and others, on the other hand, think it's increasingly not only possible, but often may be better for reasons of ecology, environment, & autonomy. Many people have worked on developing this for decades [see Brenda & Robert Vale, 1975/2000; and Integral Urban House, Berkeley 1982, both at right], with the tiny-house movement picking up the torch.

How might we explore models that address these concerns and possibilities?"



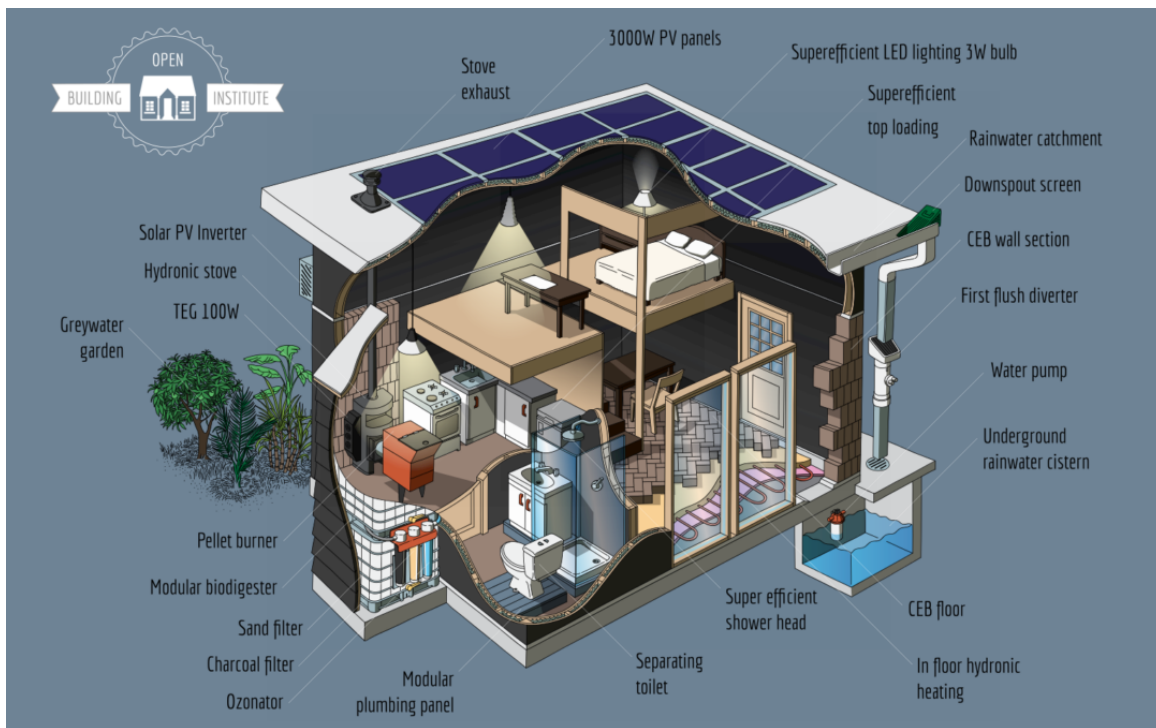
also related, from an [August 22 post in The Village Collaborative group](#):

"Lately I've become increasingly interested in housing that anticipates, and helps address, possible massive climate-change- and natural-disaster- driven disruptions. Particularly, what might be done in the Pacific NW, which a) is predicted to receive a large influx of population due to climate change making other areas of US and world less habitable; b) could be hit any time by a mass post-earthquake exodus from adjoining California (population 40M, vs Oregon's 4.2M), and c) could be hit anytime by an even larger

⁸ McCormick, November 2017.

earthquake from the nearby Cascadia Fault offshore (see "[The Really Big One](#)" by Kathryn Schulz, 2015).

"What would we do if, say, 100,000 Californians arrived in Portland over the next month after a massive quake? Or, if The Big One on the Cascadia Fault knocks out most bridges, larger older buildings, energy and water/sewer infrastructure in western Oregon, for several years? Or just, less abruptly, accelerating climate-change disruption causes Portland's already high in-migration rate to keep accelerating, year after year, when there is already a significant housing shortage and a fast-emptying construction pipeline (i.e. planned units)?



[above: Open Building Institute's "\$25,000 Open Source, Modular, Eco-Home"]

"Or to look at it more positively, how might we shape our housing, and city and state, to best welcome and afford opportunity to climate / disaster / disruption refugees? and align this with local goals and values and aspirations of inclusivity, justice, sustainability, civic health, leadership in green urbanism?

"How about, say, Portland groups leading development of sustainable, change-resilient, off-griddable housing prototypes -- PAD House? Portland Autonomous Dwelling -- which might be used here and elsewhere. A Portland product, like the Portland Loo now used across the US and Canada (<http://portlandloo.com/>) ?



See also:

Bruder, Jessica (2017). *Nomadland: Surviving America in the Twenty-First Century*.

Rosen, Nick (2010). *Off the Grid: Inside the Movement for More Space, Less Government, and True Independence in Modern America*.

Making urban infrastructure more adaptable

(points from Matthew E. Kahn via Twitter discussions)

Matthew E. Kahn [@mattkahn1966](#)

[Bloomberg Distinguished Professor of Economics and Business at Johns Hopkins University; Director of Johns Hopkins University's 21st Century Cities Initiative].

[Twitter thread Dec 28, 2020](#):

"Ed Glaeser has released an important new Urban Economics paper that suggests a "temporal mismatch" due to the combination of disruptive technological change, incumbent durable capital and the fixed cost of rebuilding. (1/N)

Glaeser, Edward L.(2020). "Infrastructure and Urban Form." NBER Working Paper No. 28287, December 2020. https://drive.google.com/file/d/1c1SqUmJnSEaQv_Hf_s84pG9n2nLiGmzO/.

"Future transportation innovations, including autonomous vehicles and telecommuting, are likely to also change urban form, although cities often take decades to adapt to new forms of mobility."

"The decision to invest in fixed local infrastructure can be understood as a game between the public sector and private investors, where all actors want someone else to bear the risk. The permanence of rail loads the risk onto the public sector and makes the private sector less vulnerable. But in many cases, the public sector will benefit from keeping its options open."

"Cities feature durable structures that are arrayed across space with a given transport technology in mind. Due to the durability of capital, an inefficient "lock in" occurs as the transport technology is disrupted.

Glaeser is a great historian and he will tell a story about how subways, then cars and soon automated vehicles continually disrupts the urban form. At any point in time, the land assembly problem and the existence of durable capital of different vintages slows down ...

the urban economy's transition to matching the right private sector buildings that firms and people want to locate in with the city's current transport infrastructure. How does capitalism solve this dynamic challenge?

Devin and I study what is the optimal durability of urban real estate capital. In the economy we study, climate change raises local sea level rise risk and forward looking developers build less durable structures. Option value!

Bunten, Devin & Kahn, Matthew E., 2017. "Optimal real estate capital durability and localized climate change disaster risk," *Journal of Housing Economics*, Elsevier, vol. 36(C), pages 1-7.
DOI link: <https://doi.org/10.1016/j.jhe.2017.01.004>.
PDF (Accepted Manuscript):

Abstract:

"The durability of the real estate capital stock could hinder climate change adaptation because past construction anchors the population in beautiful and productive but increasingly-risky coastal areas. However, coastal developers anticipate that their assets face increasing risk and this creates an incentive to seek adaptation strategies. This paper models climate change as a joint process of (1) increasingly destructive storms and (2) a risk of sea-level rise that submerges coastal property. We study how forward-looking developers and real estate investors respond to the new risks along a number of dimensions including their choices of location, capital durability, capital mobility (modular real estate), and maintenance of existing properties. The net effect of such investments is a more resilient urban population."

Excerpts:

"Consider a new type of real estate capital stock that features an explicit option to disassemble it and move it to – higher ground. By paying a cost of \$d dollars, a real estate owner retains the option to disassemble an existing property and to transfer it to another location.

"To appreciate the possible adaptation benefits of such a capital stock imagine an extreme case in which \$d equals zero so that homeowners can costlessly carry their home to another location when a short term threat (such as a flood) emerges. In such a –turtle economy, neither life nor capital (i.e the turtle and its shell) would be destroyed by natural disasters. The capital would move to higher ground for a short time (and rents for this land would be paid) and then the capital would move back to its original location.

"In this section, we analyze how this option affects a real estate investor's optimal durability investment and maintenance investment relative to the case presented in the previous section in which the capital was –stuck in the coastal city. To fix ideas, we refer to this section's capital as Lego – resembling the children's building blocks that can be assembled and disassembled. Engineering work on modular building highlights that this is a feasible possibility."

"For an investor considering building a new structure in the coastal area, the optimal structure durability and size will be a function of whether the property can be moved in the future. This option is more valuable if the future fat tail coastal risk is known to be unknown or if the distribution is known then in the case where there is –fat tail risk. In terms of our parameters, the option is more valuable if or are likely to decline over time, or if they are drawn each period from a fat-tailed distribution. The standard logic from the Dixit and Pindyck (1994) option value model is that there is a value to delaying a decision until the uncertainty is resolved."

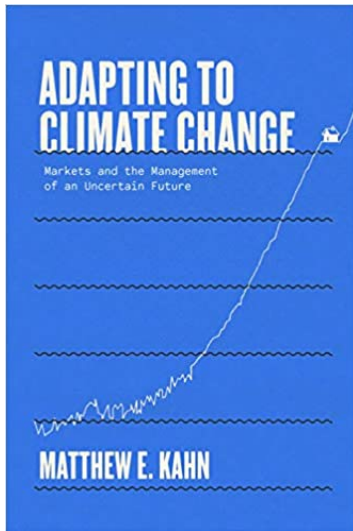
"If capital owners are aware that they cannot move their capital and that it is at risk, then they will build less durable capital and maintain it less. Such a depreciating capital stock will become a poverty magnet as predicted by the filtering hypothesis (Sweeney 1974, Glaeser and Gyourko 2005).

"Mobile –Lego capital offers housing developers a potential solution to the risks of climate change. It also offers homeowners protection against another catastrophic risk: declining demand for coastal real estate in the face of climate change."

Urban economists need to join children and play with Legos! In a "Lego Economy", we build structures and we hold an option to disassemble the structure. A "Lego City" represents a real option to reoptimize as transport technology changes.

Ed Glaeser writes "Future transportation innovations, including autonomous vehicles and telecommuting, are likely to also change urban form, although cities often take decades to adapt to new forms of mobility."

He is correct about the historical fact that "often takes decades to adapt" but this is a reduced form relationship. If we had a modular capital stock that embodied real options, this time gap would shrink. I discuss this adaptation issue here:



Adapting to Climate Change: Markets and the Management of an Uncertain Future.

by Matthew E. Kahn, forthcoming March 30, 2021 from Yale University Press. ISBN 978-0300246711.

<https://www.amazon.com/gp/product/0300246714/>.

Even the best economists often extrapolate based on past reduced form correlations. My 2021 Yale Press Book argues that adaptation progress with respect to climate change risk is accelerating due to markets, innovation, experimentation and rising human capital."

Tim McCormick @tmccormick 9:32 AM · Dec 28, 2020

great pts. Cities might also (relatedly) array structures across space less fixedly with other disaster resilience/adaptivity in mind e.g. earthquakes; for household mobility; or to use land more efficiently via interim use. All are motivators of #NewStarterHomes proj in Portland.

Financial analysis, timeline, funders (from 2018 grant)

Financial analysis

[from 2018 Meyer Trust application: "How would you describe the potential impact of this approach on housing affordability for the category you selected above? You are encouraged to include a "target" or goals statement breaking down your approach to 1 million months, such as "Create 4,200 new multifamily units that will be affordable to families at or below 60% AMI for 20 years, with a public subsidy of no more than \$30,000/unit."].

We could get to 1 million months of affordability with a target of deploying 1,700 units over ten years (ramping from 1 up to 340 units/year, for an average of 170/year), and those units remaining in use for, on average, 20 more years. So, 25 years total use on average. (units could and likely would remain in use much longer, this is just a conservative estimate for analysis).

Focusing just on the Accessory Dwelling use case for these New Starter Home (NSH): Portland has an estimated 116,000 single-family lots on which an ADU could be deployed. (per study of Commissioner Chloe Eudaly's office.⁹ The target of 1,700 units would therefore be met by deploying one unit on about 1.5% of eligible lots. Portland's official ADU count is about 2% of lots now, and for comparison, in Vancouver BC, over 40% of single-family lots have one or more ADUs.

⁹ [Monahan 2017]

1,700 units x 25 years avg deployment x 12 months/year x 2 households/unit = 1 million months.

There are two households per unit, because we aim for the ADU to both be affordable to its residents, and for the pad rent to provide housing affordability to a low-income homeowner on whose lot the home is placed.

We estimate an average monthly rent to homeowner of \$400, and roughly estimate that this could be paid with the fair market rent that 30% AMI households in Portland could afford at 30% of gross income:

[From Portland Housing Bureau <https://www.portlandoregon.gov/phb/article/684577>:

30% AMI for 2018 for Portland-Vancouver-Hillsboro MSA:

\$17,100 for 1 person

\$19,560 for 2 person

30% of this is \$427.50 for 1-person household, or \$489 for 2-person.]

If resident candidates were accepted who had a range of incomes, 0-30% AMI, then on average it would of course be lower than the 30% threshold. On the other hand, since we propose a "social housing" style rent contribution, a fixed percentage of household income, we might expect to get a > 30% AMI contribution from some portion of residents as their incomes rise and they stay in the units.

We estimate a \$40,000 cost per home for unit, standard foundation, and utility connections. We assume development fees will be waived, according to current Portland "SDC Waiver for ADUs, with Conditions" policy deed-restricting the unit against short-term rental (STR) use. [see City of Portland, June 27, 2018].

1,700 units * \$40,000 = total unit production costs \$68,000,000

Let's roughly guess 30% additional overhead not yet included would be needed to manage this program

=> **\$88,400,000 total**, or \$88.40 per month of affordability achieved.

However, note that in the expected outcome of the program, participants would acquire equity in their units over time, unlike in conventional rental affordable housing. They may choose to sell the partial or full equity back to the program upon exiting a unit, or may sell it to others. This accumulated liquid equity could be accounted for as an asset generated by the New Starter Home program, offset against the public subsidy put in. Due to the potential high degree of resident-owner "sweat equity" and self-investment into these homes, this asset value could be very high compared to the public investment made, and compared to the depreciated value of conventional housing that might alternatively have been funded with that investment.

Timeline for a research & prototyping project

1. Kickoff public event. Team meetings of team and advisors
Assess current or projected need for working space. If needed, begin seeking a workspace.
Begin research reports:
 - a. evaluating Oregon Tiny House Code, HB 2001 (middle housing), [HB 2006](#) (housing emergency); Portland Shelter to Housing Continuum code, Residential Infill Program Part 1 & 2, manufactured housing park ordinance
 - b. Analysis of the vendor and competitive marketplace: what existing housing products might be used with the proposed system; what competing development models are there (e.g. Dweller startup in Portland, Blokable, Kasita, various Portland ADU developers/designers).
 - c. Financial modelling for running a rent-to-own housing network, particularly as it intersects with Portland ADU market. Potentially contract out this report.
2. Set up design challenge for units and foundation/connector systems.
Organize and begin use of workspace, if applicable.
Launch design challenge.
3. Complete research reports a).
Identify demo site to implement test foundation/connector and unit design.
4. gather Design Challenge entrants for charette.
Complete research report b).
5. Public presentations of 1st charette outcomes.
Award funds for implementation of demo unit(s); Teams/vendors begin unit construction.
Finalize prototype standardized foundation/connector
Complete research report c).
6. Implement 1st prototype foundation and connector.
7. Deploy 1st prototype unit(s), both mobile and anchored, at the demo site.
Organize public unveiling events and public viewing of the site.
8. Gather program stakeholders to review models, learnings.
Publish and publicize study findings so far, in local / state / national media, and local outreach.
Invite round 2 proposals for units and foundation/connector designs.
9. Refine financial modeling for rent-to-own network, based on research and prototyping.
10. Gather, review, award, share Round 2 proposals for units and foundation / connector designs.
11. deliver Year 1 summary reports to funders and other stakeholders.

Potential funders/investors

We imagine a primary funder/partner to help pilot and develop the New Starter Home model, platform, implementation. Along with and after that, we propose a "multidirectional platform" model of potentially allowing many parties to participate, especially as funders/investors.

This is an idea behind real-estate funding platforms like Crowdrise.

Also, was proposed in an early concept proposal [Housecloud](#) [McCormick 2014]: (aka AirbnbX, Affordbnb):

"AirbnbX / HouseCloud is a trusted marketplace for property owners, housing developers/investors & agencies, and residents, to find, site, design, build, invest in, and manage affordable/accessory dwellings.

To develop it along these lines as an open platform, we conceptualize New Starter Home as potentially an independent organization, which supports core services such as code/standards development, dwelling unit / foundation / connector design, mapping of potential sites, and establishing model contracts.

City of Portland housing bond, 2016 \$260M

\$258.4 Million approved November 2016

first solicitation for funding proposals was in April 30

Metro (Portland regional government) 2018 \$650M bond

In 2018, voters approved a \$652.8 million affordable housing bond measure to create permanently affordable homes.

The first project funding award was announced mid 2019.

Potential obstacles

1. We have not yet market-tested the proposition of putting small detachable ADUs and standardized foundations and connectors on home lots. While our intuition and experience with housing suggests this could be quite appealing to both property owners and home seekers, this is a hypothesis needing to be tested.
2. For this approach, we would need to either source compatible units, or perhaps design them and develop production capacity to produce them locally. Also, we would need to design very efficient, standardized approaches to laying foundation pads and utility connections (as was the approach of Levitts). These are significant design challenges, and possibly significant capital investment to set up production facilities. On the other hand, the production complexity of small, prefab units is relatively low and uses well-known technologies; and local production is an opportunity to create employment and involvement for low-income program participants.

Appendix 1: other Accessory Dwelling programs for low-income or houseless, or movable homes

see: HousingWiki > [Accessory Dwelling Units](#) > ["Affordable ADUs" section](#) AND ["Movable ADUs"](#)

Appendix 2 - Notes, etc

[below: Caravan Tiny House Hotel, Portland. An example of tiny houses now anchored to foundations with utility hookups; also, of putting many units on a small lot similar to a single-family lot].



Conceivably, a city might require/incent basic 'PAD' type foundation foundations on yards of all new detached houses;

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"There are an estimated 2,000 ADUs completed in Portland, sitting on less than 2% of home lots, the most in the country. But as many as 116,644 properties—nearly half of taxable lots—could be 'ADU friendly,' according to an analysis done by Portland State Univ. As companies like Dweller and others (including Cover in California, Blokable in WA state) try to bring down upfront building costs through prefabrication, Quinton believes a total of 10-20k ADUs could be a good goal for the city."

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Abstract:

"The durability of the real estate capital stock could hinder climate change adaptation because past construction anchors the population in beautiful and productive but increasingly-risky coastal areas. However, coastal developers anticipate that their assets face increasing risk and this creates an incentive to seek adaptation strategies. This paper models climate change as a joint process of (1) increasingly destructive storms and (2) a risk of sea-level rise that submerges coastal property. We study how forward-looking developers and real estate investors respond to the new risks along a number of dimensions including their choices of location, capital durability, capital mobility (modular real estate), and maintenance of existing properties. The net effect of such investments is a more resilient urban population."

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"The decision to invest in fixed local infrastructure can be understood as a game between the public sector and private investors, where all actors want someone else to bear the risk. The permanence of rail loads the risk onto the public sector and makes the private sector less vulnerable. But in many cases, the public sector will benefit from keeping its options open."

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- *Section R104.11 Alternative materials, design and methods of construction and equipment.* Allows for a chassis/trailer being incorporated into a suitable foundation to meet the intent of the code.
- *Appendix E: Manufactured Housing Used As Dwellings.* focuses on approved ways to mount a chassis/trailer to a code approved foundation for manufactured housing.
- *Appendix Q: Tiny Houses.*

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Acknowledgements

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- Vahid Brown - Village Coalition; Clackamas County Housing Policy Coordinator.
- Andrew Heben - Program Director, SquareOne Villages, Eugene.
- Nathan Ho - San Jose Mayor's Senior Advisor for Housing
- Matthew E. Kahn - Bloomberg Distinguished Professor of Economics and Business at Johns Hopkins University.
- Mark Lakeman - founder, [Communitecture](#), [City Repair Project](#); [Village Coalition](#), Portland.
- John McCormick, AIA, AICP (Emeritus) - retired architect & planner, Portland.
- Michael Parkhurst - Meyer Memorial Trust, Cost Efficiencies program director.
- Wayne Stewart - retired civil engineer; former chair, Portland Design Commission, Portland.

Document history

2 September, 2022

Incorporated some revisions, corrections, updated/fixed URLs.

7 April, 2021

Revised document for sharing to Mayor Wheeler & Portland City Council member, requested by Wheeler after my spoken Public Communications at start of [Council meeting Weds April 7](#), on Portland's Shelter to Housing Continuum program and related/successor initiatives such as Residential Infill Program, Part 2.

28 December 2020

rearranged document, bumped "Sustainability, Resiliency, off-grid" etc section from an Appendix up to its own section. Grouped financial analysis, timeline, funders/investors, potential obstacles as subsections of new section "Financial analysis, timeline, funders (from 2018 grant)", since these were all specific to that grant application.

Added a new subsection "Making urban infrastructure more adaptable" within "Sustainability, resiliency.." incorporating points from correspondence & discussion Matthew E. Kahn.

10 September 2019

"Appendix 1: other Accessory Dwelling programs for low-income or houseless, or movable homes" now points to YIMBYwiki > Accessory Dwelling Units page where these topics will be maintained.

Added to Acknowledgements: Nathan Ho, San Jose Mayor's Senior Advisor for Housing.

4 September 2019:

- reformatting/layout: increased Normal Text style to 11pt; redoing 1st page as more of a cover/title page, moved Table of Contents to 2nd page.
- added notes on ADU subsidy/financing programs in San Mateo County, Santa Clara County / City of San Jose.
- added info on possible revision of City of Los Angeles ADU ordinance to allow movable units / tiny homes on wheels.

19 August 2019

Added references Law [2017], and to Eli Spevak [2015] "A Legal Path for Tiny Houses on Wheels." other edits.

25 Feb 2019

moved "PAD Initiative" into the main title. Emphasized this section in TOC. Various other edits.

10 Oct 2018

shifted footer to header. Created footer section, began adding footnotes for references in text.

5 Sept 2018

added to references: McCormick, "How might we put affordable housing on disused & small sites in San Francisco?" (Nov 5, 2016).

27 August

- added footer and page numbering.
- added to Appendix 2: Off-grid.

25 August

- added "Appendix 2: extending to off-grid homes" and related references.
- added Version History section to help people see how doc has evolved, and see what's new since they previously saw it.

24 August 2018 (TM):

- Reformatted doc for better PDF output: customized Normal style with increased line spacing etc.
- edits throughout based on proofreading printed version.
- added placeholder Section 7: Extending to off-grid housing.
- in Financial Analysis, cut program cost in HALF, because I realized we might count each ADU unit as creating affordability both for its resident and for a low-income homeowner on whose lot the home is added.

14 August 2018: version submitted to Meyer Trust for the 1 Million Month Challenge.

