



A CATALYST FOR COMMUNITY HEALTH

Appendix to
Promising Housing
Practices in Arizona

Innovative and Promising Housing Practices – Land Use and Zoning Challenges.

Arizona is the 6th largest state geographically and is the nation's 14th largest in terms of population with an estimated 7.4 million in July, 2022 (U.S. Census Bureau) with Maricopa County the most populous county in Arizona with population of approximately 4.5 million (July 2021). It is important to note that Maricopa County makes up more than half of Arizona's population. Between July 2021 and July 2022, the population grew by 1.3% or 94,320 persons or almost 260 a day.

The U.S Census puts Arizona Median Household Income of \$65,913 in 2021 dollars. About 12% of households received Food Stamps/SNAP benefits during the past 12 months (2021). 12.8% of all families and people were within poverty level. Family poverty level with children under 18 years of age is higher at 17.3%. 12% of all people between 18 and 64 years of age were considered at poverty level.

The state has 3,138,871 housing units (2021 census) of which 65.8% are owner-occupied (2021 ACS – Census). The median value of owner-occupied units in Maricopa County the state's largest is \$412,000 (AZ Regional MLS, December 2022). Median gross rent as of August 2022 was \$2,020 (AZ Regional MLS, December 2022)¹. During 2022, 60,469 building permits were issued (Arizona Economy.org Economic and Business Research Center). The US Bureau of Labor Statistics reports the unemployment rate in December of 2022 of 4.0%, a dramatic (and steady) decrease after a spike during COVID with an April 2020 peak hitting 13.9%.

Fast population growth has created more stress on the housing market. The demand for owner-occupied housing has continued and although following a peak of \$475,000 for a median priced home in the Phoenix Metropolitan Area, which did fall to \$411,995 in December of 2022 (ARMLS, Tom Ruff)¹.

The FY2022 Income Limits published by Housing and Urban Development (HUD) places Phx-Mesa-Scottsdale, Az MSA at \$88,800 for Median Family Income. A primary target group for many affordable housing programs are people earning at or below 80% AMI: ranging from \$49,500 for a single person to \$70,650 for a 4-person household. But for the FHA secondary financing Affordable Housing Programs, the limits to borrowers can be to households with incomes at or below 115% of Area Median Income and some workforce housing programs may target up to 120% AMI which would be \$106,550. When looking at a commonly accepted housing expense of 30% of your income an 80% AMI Household could afford a mortgage of approximately \$270,000 which is 34% less than the median priced home of \$412,000 and would require over \$140,000 in grants, silent second mortgages or other tools available to assist in the purchase of the property.

The housing market has clearly exacerbated in recent years and extreme lack of housing driving up prices. The housing shortages have been quantified by many including this in an Op/Ed AZ Republic January 23, 2023. Jenn Daniels and Sean Bowie cited a "Shortage of about 100,000" units². The report also lists several "barriers to development at the local level, bureaucracy within state agencies and preemptive state laws have limited the building of more housing units at a pace that keeps up with our growing population. Often unnecessary, burdensome rules and regulations have delayed project start times and increased costs for developers and homebuilders."³ Some of those include zoning and other land use approvals, design review challenges and plan and design review inspections and reinspection's.

The City of Phoenix in its Housing Phoenix Plan has a goal of creating or preserving 50,000 homes by 2030 and citing of shortage of 163,067 units (64,486 market rate and 99,581 affordable and subsidized

housing units)⁴. This shortage identified by the City of Phoenix was due to rapid population growth coupled with housing underproduction, and a grown mismatch between housing costs, wages and income. (Housing Phoenix Plan)⁴.

As identified in the ULI – Advancing Health & Equity Through Workforce Housing “Municipal planning policies and zoning regulations set the stage for the development of housing affordable to all income levels. Examples throughout the US demonstrate ways to overhaul outdated, convoluted, and strict requirements limiting innovation. Some are more radical like the elimination of single-family zoning districts in Minneapolis; others are more focused on incentives and moving projects faster like streamlining infill development projects in San Diego. Each jurisdiction structures regulations in different ways, depending on local context, conditions, and political will. Making planning and zoning processes shorter, simpler, more transparent, and less uncertain alleviates numerous factors restricting affordability.”⁵ The report also offers the solution to “Review and simplify zoning codes and development guidelines. Many regulatory processes are long with requirements that leave little room for creativity and innovation. Finding opportunities to improve and streamline will reduce development costs.”⁵

According to the Arizona Housing Coalition, Best Practice Toolkit for Municipalities, overregulation of land use can create barriers to affordable housing supply. Zoning regulations, parking requirements, height restrictions, lengthy permitting processes, City codes, and community opposition can contribute to increased development costs. Overregulation can restrict the ability of the developer to offer affordable rents and mortgages. Addressing overregulation and reform of land use policy is, therefore, a vital strategy for addressing housing affordability.⁶

A prominent barrier to affordable housing development is the State law prohibition on mandatory inclusionary zoning policy. Inclusionary zoning policies are imposed at the local municipal level to require private developers to set aside a certain percentage of their units within new construction projects at an affordable rent. State law determines whether municipal inclusionary housing measures are mandatory or voluntary. In Arizona, as well as Colorado, Idaho, Indiana, Kansas, Texas, Tennessee, and Wisconsin, local governments are prohibited from adopting at least some form of mandatory inclusionary housing (for ownership housing, rental housing, or both). In some cases, courts have determined that statutes limiting rent control also preempt mandatory inclusionary measures for rental housing. Inclusionary housing is a complicated national issue that varies greatly by state, with litigation and new legislation continually shaping the issue. The City of Flagstaff has worked within the confines of state statutes to develop a voluntary program to incentivize the creation of both rental and ownership housing, yet, until such time as our state law is changed, mandatory inclusionary zoning is not a tool available to Arizona's local municipalities for increasing the supply of affordable rental housing.⁶

Many innovative and promising strategies have been identified throughout the state with multiple solutions that can help solve the housing crises. These have ranged from alternative building methods, off-site construction, infill housing, accessory dwelling units and tiny homes. The various groups selected shared their vision and plans for each of these and how they contribute to helping meet the needs for a range of housing for Arizona with additional analysis/thoughts on how land use/planning impact each of these. These innovative and promising projects are discussed below.

Hercutech/Hercuwall – Interview - Greg Garrison, VP of Construction

Resources: <https://hercutech.com/>
<https://hercutech.egnyte.com/dl/pRV9YMy1rB>
<https://ics-tax.com/news/the-inflation-reduction-act-impact-on-45l-tax-credit/>
<https://www.housinginnovationalliance.com/?s=hercutech>

Hercutech manufactures the Hercuwall which is a panelized shell and demising wall system. As identified by several of the innovative projects within this report there is an emphasis on focusing on the need to build faster and more affordably. Hercuwall is one such business that offers an innovative solution to housing production, offering a product that is 3 times stronger than wood, manufactured of foam, film and steel and then site integrated concrete. In addition to being manufactured in a controlled environment, Hercutech through an “Aligned Assembly” process can streamline and integrate the design and drafting to deliver and install its product in a simplified process. Hercutech can control costs through speed, ability to purchase and store materials on site in the warehouse, no delays due to weather or other environmental concerns, and deliver the product in prenumbered panels to be assembled on site. Thus far in AZ 1,000 homes have been built and with an equal amount under contract in various stages of design. Hercutech can easily expand into other markets to provide ease of transportation to developers with estimated costs to build 60,000 sq. ft facility for \$750K.

Labor costs are also controlled as fewer trade workers are needed with a 4 person crew able to assemble what a comparable 12 person crew could complete in a conventional new home construction. A corresponding reduction in framing is also realized during the inspection process and are, on average reduced by 3-5 inspections for each home. Given that Hercuwall is different than a conventionally built home, Hercuwall has addressed this need with education/training to become a certified installer. HercuWall has been hosting HercuFit installer training sessions in a training facility in Tempe, AZ and several installation companies have completed HercuFit Installer Training. Among these groups include Habitat for Humanity, Sargon, and Trillium. These training sessions include both training in a classroom presentation setting as well as a hands-on HercuWall installation demo, which gives these installers the opportunity to build a HercuWall structure. Cost control is enhanced as Hercutech can lock the price for the entire term of a project. This Price lock is for the term of project ensuring consistency in pricing for the developer/General Contractor from the start of construction.

In addition to reduced costs and the speed of construction, several environmental impacts are noted including replacing up to 60% of wood used in typical wood frame construction as the materials are primarily foam and steel. The reduction of up to 90% of scrap material has been recognized on the job site (reducing the impacts on landfills) and given the type of construction (foam and steel) is fire resistant. The homes have also passed South Florida building codes and are hurricane rated, and given that the construction material is foam and steel are termite, mold and mildew resistant. Hercuwall offers lower insurance costs for builders with Builders Risk reduced up to 40% during construction, and up to a 30% reduction of general liability insurance long term.

Finally, the product is extremely energy efficient and residents of a home built with Hercuwall have experienced significantly lower energy bills and noise reduction. The building structure, insulation and weather resistant barrier(WRB) are all in one. On its own, the Hercuwall offers R-31 insulation and can reduce tenant electric costs up to 50%. Given these very tangible benefits, studies of rental communities

developed with Hercuwall report a 50-60% decrease in turnover in residents (due to the positive impacts of noise reduction and energy costs). In addition to utilities and sound reductions, owners of properties have the benefit of federal income tax credits and incentives for energy efficiency. As part of Section 45L of the Inflation Reduction Act, this tax credit for homes and units include \$2,500 for Energy Star Homes, as well as \$500 for multi-family homes. Additional credits available if the homes are solar ready thereby saving even more for the ultimate owner.

Other than training for the trades which is addressed through HercuFit training, the planning/land use issues have changed dramatically over the last 5 years. The zoning and land use issues are not as present as it is a building material/type. Although minor issues are still being addressed that include details to be approved through the building code addressing demising walls, there can still be challenges encountered when City Building Departments don't understand the assemble of the product and the fear of change from common construction types.

Habitat for Humanity of Northern Arizona – Interview - Eric Wolverton, Executive Director

Resources: <https://www.azcentral.com/story/news/local/arizona/2022/10/19/habitat-for-humanity-shifts-model-in-flagstaff-to-fight-housing-crisis/8237523001/>
<https://www.habitatflagstaff.org/>

Habitat for Humanity of Northern Arizona is looking to address the housing crises with a shift from what Habitat typically built and considered a “Forever Home” to a unique take on a first-time homebuyer program with their “Starter Home”. The starter home concept as being developed by Habitat (with the first closing having occurred in February, 2023), has many differences, not only in the look of the home but also, financing, how it is subdivided, the formula for resale, the subsidy provided and size of the home. The concept for the original homes and for the next step is the ability to scale the production of the home. The discussion around scalability has included discussions of the starter home on school owned property as well as working with existing market rate developers, all in a way to address the scarcity (and therefore cost) of land.

Across the state, communities of all sizes are negatively impacted by increased land costs, rapidly appreciating homes and an overall lack of inventory. In fact the problem even prompted the City of Flagstaff City Council in December of 2020 to declare a formal “Housing Emergency”.⁷ Flagstaff (and Coconino County in general) is experiencing unique challenges based in part on its location/climate and the impacts presented with a large university in the City. As stated in a study by the ASU Morrison Institute from September, 2022 “The Gap is Widening”, Experiences of Housing Insecurity in Coconino County,” both Short-Term Rentals/Vacation Homes, (STR) and Student Housing lend themselves to exacerbate the housing market⁹. Also noted in the study as one of the most common reasons was the lack of available and affordable rental units and the conversion of units to short-term rentals (e.g., Airbnb’s). The number of short-term rentals (STRs) in Coconino County has risen sharply, with the average monthly listings increasing by nearly five times from 2016 – 2020. STRs, particularly ones that

convert an entire housing unit such as a single-family home or apartment, remove stock from the housing market that would otherwise be available to long-term renters. In the city of Flagstaff alone, more than 500 rentals have been removed from residential use through conversion to STRs as of 2021.⁹

An additional dynamic cited in the ASU Morrison Institute Study was the prevalence of housing marketed to undergraduate students. Coconino County is home to Northern Arizona University, a public research university serving 21,248 students at its Flagstaff and Phoenix Biomedical campuses in 2021. Of those students, many live off-campus in housing unaffiliated with the university but designed for student needs. In 2020, 11,480 students lived off-campus, and there were 3,531 beds available in rental complexes designated as student housing. Participants felt that Flagstaff's housing market disproportionately catered to the on-campus student population, with new rental development projects seen as almost exclusively student-focused.⁹

Following the declaration of the Affordable Housing Emergency, the City of Flagstaff Housing Section Created a "10-Year Housing Study, Create. Connect. Preserve. Protect." This 10-year Plan identified that Zoning within the community does in fact have "a profound impact on housing location and type, but it can also impact cost and affordability."⁸ In addition to regulating where housing can be built, the Flagstaff zoning codes regulate other elements such as lot sizes, number of bedrooms, lot coverage, parking, and setbacks, all of which can impact the cost of development and overall housing supply."⁸ Most studies and reports identified in this research uniformly addressed this concern. The plan also gives attention to Increasing density, building innovation, cost saving practices, preserving existing affordable housing and reviewing City Codes, processes and fees to facilitate costs saving.

The 10-year Plan also highlighted the limited land supply in Flagstaff for higher density housing, recognizing that 58% of land in Flagstaff is zoned for Single-family residential (and duplexes in one of the zoning categories) all of which are low-density zones. Additional available land in Flagstaff includes 5.6% of land zoned industrial, 12% is Public Open Space, and 10% is Public Facilities. Approximately 14% of the land within the city allows for medium or high-density housing to be constructed either through the commercial zoning categories as mixed-use or as apartments, condos, etc.⁸

To address the lack of access to housing, (coupled with the corresponding lack of ability to develop equity) Habitat for Humanity of Northern Arizona created an entirely innovative way to offer Starter Homes. These homes are simple, (approximately 500 sq. ft) efficient, stand-alone homes that are available for qualifying low-income (<80% AMI) families to purchase (Habitat anticipates a household of 3-4 can comfortably live in that size home). The homes are financed by Habitat for Humanity at 0% and a low (\$1,000 monthly payment) with a cap (both minimum and maximum) of the time a person can own the home of 3 to 10 years. Habitat also charges a \$1,000 down payment and has calculated the monthly payment currently at \$833/month (significantly less in move in and monthly costs even compared to rental and certainly other homeownership opportunities). Additional savings are realized through the Habitat design with the homes being Net Zero designed homes (energy costs are offset by 130%, the homes provide a solar package, and the homes typically receive a refund from the utility provider.). Within its model, Habitat then continues to offer the homes to low-income families through the program and during the ownership of the homes Habitat continues to maintain the appliances, roof, siding and outside paint.

The unique program redirects the passive income through a buyback savings account that is established for each homeowner. This savings account provides for a guaranteed payback to the homebuyer with a “savings through equity” program. The program offers \$10,000/year guaranteed during the time they live in the home (3-10 years). So if the homebuyer resides in the home the entire 10 years they are guaranteed \$100,000. Habitat International is the residential lender for the loans and the property is then resold by Habitat to another qualifying buyer.

The home model is designed by the City of Flagstaff architect and meets all of the city's current codes, thereby ensuring that the home will meet local standards. Habitat also works with the Northern Arizona State University School of Construction to build the structures on campus, transport the pieces to the site and work with the owner and other volunteers to erect and finish the home (utilizing the traditional Habitat approach).

The program has also identified unique/innovative ways to address some of the land use/zoning challenges encountered in a typical/conventional housing development. As was previously mentioned in the Morrison Institute study and the Arizona Republic (Lacey Latch & Juliette Rihl, January 19, 2022) lengthy zoning and approval processes, limited land and proliferation of short-term vacation rentals are issues addressing the availability of housing¹⁰. Habitat has addressed some of those issues by utilizing a condominium plat and not individually platted/subdivided homes and this change alone has saved a significant amount of time (and money). Additionally, parcels not typically suited for maximization due to configuration, size, access, now become easier to develop. They have found that they can also build at a higher density and provided an example of a 5,000 sq. ft. lot and the ability to build 2 homes vs. what typically would have been a one lot and one home.

Habitat is also looking at several opportunities for additional land including the local School Districts, churches, as well as private developers. One private developer in particular has donated 3 acres to the land trust (and the possibility for another 8 acres that is adjacent to the 3 acre parcel). The 3 acres of land should yield space for a minimum of 40-48 homes. The homes currently cost about \$125,000 unit (with no land costs) to build for the 500 sq. ft. homes and recently appraised for \$255,000. According to the Morrison Institute, the median value of homes Coconino County grew 36% from 2015-2020 and Flagstaff from 2020 of \$369K to \$490K in 2022.⁹

Discussions are also being held with the Unified School Districts and incorporating some of that land in the City Land Trust thereby increasing the availability and access to land for affordable housing development. As identified in a Vitalyst Spark Report “How School Districts Can Create Attainable Housing Opportunities” School districts are exempt from local zoning laws, creating broad opportunities. This strategy is helpful because education is a recognized governmental use, enabling a seamless pairing with housing efforts. In some communities, school districts are the largest public landholders, maximizing the potential impact.”¹¹

Culdesac – Interview - Erin Boyd

Resources: <https://culdesac.com/>
<https://opticosdesign.com/work/culdesac-tempe/>
<https://www.governing.com/archive/gov-tempe-arizona-efficient-sustainable-transportation-20-minute-city.html>

Culdesac is the first of its kind residential development that does not focus on the automobile and builds neighborhoods with limited to no parking allowing the maximization of land for residential (rental) units and the ability to embrace community, open space, and alternative modes of transportation while maximizing density. As an example, one acre of land could provide for 120 parking spots vs 40 housing units, 10,000 sq. ft of retail and 55% open space. As identified in “More for Less?” An Inquiry into Design and Construction Strategies for Addressing Multifamily Housing Costs” Joint Center for Housing studies of Harvard University and NeighborWorks America. Structured Parking “particularly below-grade or multi-level structured parking adds significant costs. A single unit of structured parking can add more than \$50,000 to per-unit costs. Costs increase significantly when parking is underground or multilevel because of the costs of digging deeper and the demands that parking places on building structure. While not within an individual project team’s control, policies to reduce required parking are critical to reducing the impact of parking costs on affordable housing. Shifting from minimum parking requirements to maximum parking requirements, eliminating or reducing parking requirements on TOD sites, or centralizing off-site parking can help to reduce the amount of parking that must be built on site.”¹²

They offer residential units at a variety of price points integrated with local retail, commercial uses, and open space for nature and public plazas. The communities prioritize biking, walking, and transit over cars and parking. They partner with leading mobility companies to deliver convenient and affordable transportation services and offer \$3,000 in mobility benefits with various alternative transportation providers. This creates a vibrant urban lifestyle without the need for a private vehicle.

Habitat for Humanity Southern Arizona – Interview with Charlie Buchanan

Resources: <https://www.habitattucson.org/2021/03/02/the-chuck-center-workforce-development/>
<https://experience.arcgis.com/experience/db482b2fdb34ebeb174438a091097d8>
<https://raleighnc.gov/permits/building-accessory-dwelling-unit-adu>
<https://aduniverse-seattlecitygis.hub.arcgis.com/pages/gallery>

The Habitat for Humanity in Southern Arizona has found its own unique way to address the affordable housing crises. With a partnership with the Pima Community College for labor development and training the two organizations are working on a formula to accelerate the building of homes at an affordable price. This formula includes an offsite modular design and manufacturing of homes as well as for thinking of the same model to be utilized for Accessory Dwelling Unit kits.

The Connie Hillman Urban Construction Knowledge Center (CHUCK) will serve as a 1) construction hub, 2) warehouse, and 3) training center. It will provide job training and intern opportunities with real-world experience building affordable modular housing. The facility will feature over 15,000 square feet of storage, classroom, and office space. Working with the Community college this state of the art facility will help to provide a trained workforce, warehousing and supply chain solution, (the facility will produce their panelized system that is designed in 4' or 8' increments. The panels are easily "flat stacked" and can be rapidly deployed to the job site with a total of 2 homes that are able to fit on a single trailer.) These efficiencies will result in reducing what was typically a 12–18 month process that now becomes 6-9 month process cutting construction time down by 50%. The unique partnership with the Community College also helps to address the decline in skilled labor and employees. The streamlined process will easily allow them to do 100 homes a year all with their existing staff and volunteer base.

An opportunity to expand the production of homes through the CHUCK Center is with the construction of Accessory Dwelling Units (ADU's). Habitat for Humanity of Southern AZ has plans to become licensed to sell manufactured homes through the State Department of Housing and could offer their manufactured homes as an alternative to site built homes.

Discussion also centered around the housing needs in Tucson and Pima County, and as in other communities, Tucson and Pima County both recognize the need for policies to address the housing crises. Pima County identified through it's "Implementation Action for Affordable Housing Outcomes" Two overarching strategies and several "Short, Mid-Term, and long-term goals" to reach them. The strategies included "Build More Across the Housing Continuum" and "More Access to Affordable Housing". Specific recommendations include recommendations that address land use and zoning hurdles and include:

- Identify opportunities for multi-jurisdictional collaboration on zoning, progress that needs to be made, and the timeframe to accomplish zoning alignment

- Incentivize affordable housing and balance with county goals for water and open space management

- Streamline development (Fast track and incentivize (including through subsidy financing) innovation in design, height and density for housing development projects).

- Develop strategic updates to county zoning code to enable "missing middle" housing (duplexes, triplexes, townhomes, condos) and align with municipal jurisdictions

- Amend zoning code text in Pima County development code to reduce lot size, while increasing density and height requirements

- Infill incentive districts for affordable housing,

- An expedited entitlement process to help reduce bottlenecks.

- Create inventory of county properties suitable for sale to nonprofit developers that are below fair market value rents (as allowed in state statutes); align opportunities with municipal jurisdictions

Identify county parcels suitable for land swaps with other municipal jurisdictions. If infrastructure is not currently available, identify financing sources needed for predevelopment costs associated with available infrastructure (as identified/allowed in Pima County Capital Improvement Plan)

Issue and fund an RFP for developing affordable housing of developable vacant properties; identify partnerships with municipal jurisdictions, private sector and nonprofit developers 4. Inventory potential of redevelopment of underutilized hotels, commercial props, schools, and existing parking lots; market assets; identify partnerships with municipal jurisdictions, private sector and nonprofit developers.¹³

The City of Tucson also has addressed the needs for affordable housing and through the creation of the Commission on Equitable Housing and Development has identified numerous policy initiatives. These include many that specifically addressing land use and zoning issues including:

Update Zoning Regulations to Encourage Affordable Housing

- a) Incorporate incentives into planning and overlay zoning on transit corridors.
- b) Promote high-quality, climate-adapted, and attractive design of new housing.
- c) Update development standards and create tools to incentivize affordable housing.

Facilitate Development by Reducing Costs and through Innovation

- a) Streamline development review process for affordable housing projects.
- b) Evaluate expansion of the affordable housing impact fee program
- c) Promote low-cost development methods such as modular homes, 3D-printed homes, etc.
- d) Incentivize ADU construction to add affordable rental units to the market.¹⁴

And as with Pima County many other jurisdictions have cited the availability to develop affordable and mixed income housing on City owned land. Although tiny homes are not necessarily allowed outright in the development code, the City of Tucson recently passed an ordinance to allow Accessory Dwelling Units (ADU's) fewer than 50 of these have been submitted to the City or permits processed and none built as of today. As is reported, the permitting process is still cumbersome, time consuming and limiting to individuals wanting to develop on their property with review of plans/permits taking up to 7 months to complete. As a best practice the City of Raleigh, North Carolina was cited (see attached under resources). The City of Raleigh developed an ADU Fast Track program that makes constructing an ADU more accessible for homeowners. They provide access to "Fast Track plans" which have be pre-reviewed for building code compliance and are offered through an online gallery where potential owners can view and purchase plans (from the designer) at a fee far below the typical design cost. (resources)

The ULI Advancing Health & Equity Through Workforce Housing also recommends developing "libraries of pre-approved, permit ready plan options" communities can provide prototype designs and pre-approved plans that have been reviewed for conformance with building codes and other standards in advance to encourage workforce housing options, like accessory dwelling units, infill missing middle, micro-units, etc. The City of Seattle developed a website called ADUniverse that offers 10 pre-approved accessory dwelling unit (ADU) designs. (resources)

Habitat Central Arizona – Interview with Jason Barlow and Tana Nichols

Resources: <https://habitatcaz.org/documents/newsletters/Spring-2022-Newsletter-Web.pdf>
<https://www.peri.com/en/business-segments/3d-construction-printing.html>
<https://cobod.com/about-us/>
<https://www.candelariadesign.com/3d-printed-home-for-habitat-for-humanity-az>

Habitat for Humanity Central Arizona has built its first 3D-printed home in Tempe. This is a single-family home built on a lot purchased from the City of Tempe. A majority of the home was 3D printed, with 80% completed by a printer and 20% was traditional construction. Habitat and the City of Tempe saw this as a possible solution to the lack of affordable housing. Habitat partnered with ASU, Peri Company, a German company that developed the Build to Design Cobod II printer and Candelaria Design. This home in Tempe was the first fully licensed 3D printed home in the United States.

As a pilot project there were many opportunities to learn from the process and identify areas that will need improvement. Given that this was an infill project and a single home, the 3D printing process may not be the best for a single lot infill development. However, a townhouse development and the economies of scale that can be realized by development of a single row of homes may lend itself to a better model. The code to allow 3D printing is also slowly evolving and The Peri Group is implementing changes to the International Building Code and continuing to improve the printer itself. Per The Peri Group's website they believe that 3D printing will revolutionize the construction industry and 3D printing will help to address labor and housing shortages by increasing productivity. Time and cost savings are realized as only 2 people are need to operate the printer, there is flexibility in design and longevity.

Zoning and land use issues were the same as a conventional wood frame home however the largest issue encountered were building code issues. The Peri Group is advocating for changes to the International Building Code but essentially this was an "Alternative method of design" as the code typically deals with wood or steel frame however the building codes do not address the 3D printed home. As the first in the country, inspections became difficult as none one of the city's inspectors were trained in requirements for the construction. Throughout the process 3rd party engineers were hired to prove the integrity of the design. Additional costs were encountered with the construction itself as the roof structure (Trusses were not allowed to set on the concrete directly) so a steel frame had to be built to support the trusses adding approximately \$30,000 in costs.

Other issues specific to this development included a willingness of a jurisdiction open to allowing this in the city, a lengthy approval process (mainly with this home due to the lack of building codes) however the Environmental Review process required due to the use of federal funds took two years to complete, with the entire time frame for this project taking approximately 3 years. The cost of 3D printing equipment is prohibitive, given the uniqueness of the building type and technology needed, the printer (which may be in excess of \$1M) was on loan from the manufacturer in Germany and had to be shipped to the US and delivered to Tempe via Houston, TX. Again given the construction type, almost daily

meetings with inspectors to address and/or modify the codes were needed. Heat in the Phoenix metropolitan area is another factor as temperatures above 100 degrees cause the printer to clog narrowing the window during the construction of this home (which happened to be in the summer) 6:30 a.m. - 9:30 a.m. A workout was identified with modifications to the concrete mix and water cooling of the concrete. Finally, Covid presented unique issues during this process most notably in the shipping of the equipment overseas.

General issues identified for infill development is that each city and towns land use and zoning process is different when it comes to requirements (and timeline) to obtain permits. For example, in Phoenix if you are building on an infill lot that is zoned multi-family you can use the single family zoning setbacks for the site plan. The City of Glendale requires variances from the multi-family zoning requirements thereby increasing time due to public hearing process, legal advertising etc. with the addition of this public hearing process it can take up to 6 months to complete. As identified in the ULI-AZ – Advancing Health & Equity Through Workforce Housing, one of the potential solutions is to “Promote consistency between jurisdictions with model building codes”⁵. The varying nature of building codes between jurisdictions add complexity and costs to development. Local jurisdictions can adopt model codes and ensure their codes align with those adopted by neighboring jurisdictions to save time and money.

As has been identified by several of the organizations the easiest way to develop is not on single infill lots but a subdivision maximizing the number of lots that you can build on or, in the example of Flagstaff, is by utilizing the condominium plat for the development of the homes.

Newtown CDC – Interview with Stephanie Brewer

Resources: <https://newtowncdc.org/who-we-are/https://newtowncdc.org/what-we-do/community-land-trust.html>

Newtown Community Land Trust is a non-profit organization that creates permanently affordable housing by purchasing or developing homes which are then sold to low- and moderate-income households. Newtown was founded in 1994 and is the largest land trust in Arizona, with more than 150 homes across Maricopa County and more added every year. Newtown is recognized throughout the Phoenix Metro Area as a leading provider of homebuyer education, homeownership counseling, credit counseling, financial coaching, financial literacy education, and down-payment assistance.

Newtown builds or renovates houses and sells them at below-market rates to qualified buyers. The price is much lower than comparable houses because they only sell the house, while the land remains with the CLT, and the homeowner obtains a renewable 99-year lease for a small monthly fee. When CLT houses are resold, the resale price is restricted so that the sellers can make a profit, but the house remains affordable.

Utilizing Newtown’s model, If the current homeowner decides to sell their house, Newtown will purchase the home at the original purchase price plus 25% of the increased value of the house, which allows the first homebuyer to make a profit, while still ensuring that the house remains affordable. Newtown will then resell the home to another income-qualified buyer, keeping the house and land in the CLT for an indefinite period of time for future first-time homebuyers.

The model (although there are slight variations across the country) that Newtown follows is holding the land in a Community Land Trust (CLT) which is a form of shared equity homeownership. A land trust acquires land and maintains ownership of the land in perpetuity for the benefit of the community. Community land trusts can be used for many types of development, including commercial space, housing, urban farms, and community centers. Most often CLTs are used to ensure long-term home affordability and provide access to homeownership for hardworking individuals and families who are otherwise priced out of the housing market. (ULI-AZ-HHE Task Force Report)⁵.

Newtown recently completed the new construction of 13 Micro Estates (the homes were 600 sq. ft) that were environmentally sensitive homes. Tempe Micro Estates were designed as an 'intentional neighborhood,' where residents share the desire to interact with their neighbors. Each home is small and private, but the sense of community around it is big. These homes are part of a Community Land Trust, providing resident controlled homes on community-owned land. The site features a 900-square foot Common Room near the front of the property providing a place to gather, share meals, relax, and interact with neighbors and friends. Each home faces a central courtyard, featuring Sonoran Desert-friendly landscape design and common garden areas.

Through land purchased with HUD funds, the City of Tempe released an RFP that requested proposals to provide an affordable housing product on a small site (.65 acres). As a land-trust, the Newtown Model provides for a 99-year renewable lease and the homes are ensured to remain affordable with the formula to pass along "equity" to future homebuyers of the homes while at the same time allowing the owner to also develop equity and build wealth. This model is receiving a lot of attention locally as communities struggle to find a way to continue to meet the needs of a variety of housing and income levels.

The Tempe Micro-Estates feature:

- 600 square feet of living space
- One loft bedroom in two-story homes or first-floor bedroom in accessible home
- One full-size bathroom
- Open-concept kitchen, dining, and living area
- Full-size appliances
- Private patio and side yard
- High-quality, low-maintenance building materials
- Water and energy-efficient design
- Low heating and cooling needs
- Low-waste, low-energy construction
- ENERGY STAR® Home Performance certification

The Land Trust model itself does not present any "Land Use or Zoning challenges" however, due to the size of the homes, the Micro Estates Project in other communities could be problematic due to

restrictions on size of the homes. Newtown found that by submitting the project as a Planned Area Development (PAD) this process allowed flexibility in the site plan as opposed to subdividing into typical lots. Newtown realized they could maximize the site through the PAD zoning and through a collaborative process working closely with the City of Tempe. The PAD Zoning Newtown proposed incorporated unique solutions due to the size of the homes and size and configuration of the lot. Newtown also benefited from the City of Tempe with the waiver of fees and its general political and public support of this infill development.

The changes requested through the rezoning (PAD) including those addressing:

Building Setbacks. The Micro Estate's PAD set new building setbacks. Since the existing R-4 zoning did not anticipate the development of a small-lot, small-home subdivision.

Parking. The PAD established new parking standards based on its reconfiguration as a micro estate's subdivision. With its' close proximity to a light rail station (1,730 feet away) the property falls within the General Plan's 'Rail Corridor Growth Area' that "rail corridor growth area includes land within one-half mile of the existing light rail alignments" Additionally in support of the designation the City of Tempe in the RFP stated that the city "would encourage minimal parking at the site" and utilized Standards for Multifamily developments. The city of Tempe recognized that proximity to pedestrian and transit-oriented areas is a rationale for reducing parking, allowing a creative site plan, and thereby creating additional opportunities for affordable housing.

Building Height. The building height was reduced from what would have been allowed and the height cap represented a decrease of 16 feet in allowable building.

Minimum Net Site Area, Minimum Lot Width, Minimum Lot Length. The PAD set a standard of 400 square feet minimum per dwelling, and a minimum lot dimension of 26' x 36' to allow for the single family lots.

Some of the changes were also the result of innovative thinking in the RFQ process released by the City of Tempe. The City of Tempe should be commended for its forward thinking RFP and the requirements and scoring assigned through the RFP process. It was clear the City wanted this development to serve as an example for affordable housing in the City as is apparent in the introduction to the RFP that "The anticipated project will serve as a model for small-scale affordable and sustainable housing in the City."

The City also desired a tiny home concept and was open to the different types of ownership for the developer that included either a land purchase, land lease, or community land trust to encourage development of an affordable housing project based on a tiny house community model and requesting that the dwellings be no larger than 600 sq. ft. Additionally, at minimum, 51% of the developed units were required to be either for rental or purchase to families at 80% Annual Median Income (AMI) or below.

Even on a smaller site, the City encouraged through the RFP that community amenities would be included such as a 900 square foot community center, adequate space for a community garden and/or agriscaping, as well as the use of sustainable building practices (such as building with sustainable materials) including solar panels and a rainwater collection system. The City was also interested in a development that aspired to be as close to net zero as possible.

Reduced parking as identified several times during the preparation of this report was also encouraged by Tempe which “encouraged minimal parking at the site as well as bike parking and storage plans”. Finally, scoring criteria (and additional points) were included in the evaluation of the proposals including the following innovative scoring:

Additional points were provided in the scoring if the housing developer included additional workforce or affordable housing above the minimum of the 51% of the units that were required to be for rental or purchase to families at 80% Annual Median Income (AMI) or below.

The respondent’s inclusion of solar panels or a rainwater collection or grey water system, the use of sustainable building practices and the incorporation of a community garden/orchard and or agriscaping also provided additional points.

And finally, that the surrounding neighborhood is expected to partner with the developer on the final planning and design of the site.

The City of Phoenix has also looked at creative methods to deal with standard zoning challenges and the reduction of parking and other creative methods have been addressed as part of the Reinvent PHX¹⁶ project to create a vision for communities along the light rail. An urban and transit-oriented zoning code, the Walkable Urban (WU) Code, was adopted in 2015¹⁷. The code regulates development in proximity to light rail stations and is envisioned to replace existing zoning for properties within the six higher density Transit-Oriented Development (TOD) Districts. The City conducted extensive community and private sector engagement to create these plans, which focus on reduced parking requirements near light rail stations, reduced building setbacks, expanded opportunities for mixed-use development, and set a minimum requirement of 75 percent shade cover for sidewalks. (ULI-AZ HHE)

As identified in the ULI-AZ HHE Task Force Report, some of the many benefits of a Community Land Trust include:

- CLTs already exist in Arizona who are strong community partners with expansion potential.
- The CLT model pairs well with LEHCs, land banks, and community development corporations, so they could take on multiple roles in a community.
- CLTs revitalize blighted properties while maintaining affordability.

Some of the barriers however include:

- CLTs have limited funds with a major focus on grants.
- Underwriting a mortgage for a homeowner on a CLT property can be challenging for lenders.
- Scaling CLTs for greater impact - there is a lack of them now with only 7 CLTs in Arizona and 5 of those focus on affordable housing³

(Flagstaff Historic Southside; City of Flagstaff CLT; Patagonia Housing CLT; Pima County CLT, Newtown CLT)

Cuadro Design – Interview with Sharayah (Shay) Jimenez

Resources: <https://www.cuadro.design/work/project-two-998ef>
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<https://missingmiddlehousing.com/>
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<https://formbasedcodes.org/>

In 2021 the Pima County Community Land Trust as fiscal partner along with partner Cuadro, LLC were recipients of the Vitalyst Systems Change Grants to improve community health across the State. This programs intent was to increase access to affordable quality housing by establishing an Accessory Dwelling Unit (ADU) Incentive Program. This led to a unique partnership that includes the City of Tucson and multiple neighborhood associations, private sector, and non-profit organizations. The program is focused on countering displacement using tools like infill incentives and neighborhood leadership to support diverse, mixed-income neighborhoods.

Cities across the country have started to address ADU's by allowing them through ordinances and to be considered part of their affordable housing stock. Some states have even gone as far as to adopt legislation to allow ADU's statewide (these include California, Oregon, and New Hampshire) from *City of Tucson Planning Commission report dated 7/21/2021*.¹⁸ In Tucson, Accessory Dwelling Units were not allowed however they did allow "separate sleeping quarters" or ADU's were allowed on a limited basis on some large parcel properties. However, in January 2022 the City of Tucson adopted its first ADU ordinance. The benefits of ADU's (as cited by the City of Tucson, include):

- Increase affordable rental housing supply.
- Encourage more flexible housing options for seniors.
- Support multi-generational households and living arrangements.
- Provide supplemental income to landowners and promote neighborhood stability.
- Support climate-resilient infill development in context with existing neighborhoods

The code amendment adopted by City of Tucson allows:

- One ADU to be built on any residential lot in the city (any lot with one or two homes)
- The maximum size of the ADU is up to 10% of the lot size, up to a maximum of 1,000 square feet. All lots are allowed an ADU of at least 650 square feet.
- The maximum height for ADUs is 12' or the height of the primary structure on lots with two-story homes.
- All other dimensional standards regarding lot coverage and setbacks apply.

- One parking space is required per ADU, which can be waived for sites that are a quarter mile from transit or a bike boulevard; on-street parking can also be used
- Each newly constructed ADU is required to have a cool roof.

Additionally, the City directed staff to develop programs and provide resources to fund ADU repairs, improvements and learn about opportunities to develop an ADU on their property. One such program was the Mi Casita Program which is a project created in collaboration with Pima County Community Land Trust, CUADRO Design, City of Tucson, with funding from Vitalyst Health Foundation and the Community Food Bank of Southern AZ to empower and support independent ADU development in Tucson. It should be noted that the ordinance has a sunset clause with a 5-year review and the ordinance will expire and cease as of October 19, 2026, unless extended by City Council.

From its review by the City of Tucson, Planning and Development Department (for the period between January-December 2022), 35 ADU applications are under review, 24 have been approved (or permits issued) however so far 0 have been constructed. Common feedback or concerns cited with the new ADU permitting process was encountering challenges between permitting and inspections, lack of access to standard approved plans, a checklist of items needed for completion and during inspections and a waiver for low-income households (for impact fees).

Permitting for ADU's, even though allowed is still time consuming, with one example shared during an informational presentation on ADU's of the process taking 4-5 months to obtain permits. Several communities have addressed this problem through "Fast Track" or availability of pre-approved standard plans. One example cited by both Cuadro and Habitat was the best practice of the City of Raleigh and its' ADU Fast Track program. Per the Cities website "This Fast Track program can make constructing an Accessory Dwelling Unit (ADU) a more accessible process for Raleigh residents: Fast Track plans have been reviewed for Building Code compliance before becoming part of the online gallery". Residents can view the gallery and purchase plans (from the designer) at a fee far below the typical design cost. Interested parties can purchase plans from the ADU gallery and work directly with the designer.

Other discussions with Cuadro centered on smaller scale residential work, how to effectively do infill and to better address the "Missing Middle" housing needs of the community. According to <https://missingmiddlehousing.com/>. Missing Middle refers to "These building types, such as duplexes, fourplexes, cottage courts, and courtyard buildings, provide diverse housing options and support locally-serving retail and public transportation options. We call them "Missing" because they have typically been illegal to build since the mid-1940s and "Middle" because they sit in the middle of a spectrum between detached single-family homes and mid-rise to high-rise apartment buildings, in terms of form and scale, as well as number of units and often, affordability."

According to Shay Jimenez, the current zoning code is structured to deal with more larger scale development but a "Main Street Model" is key to increased density and that is where communities really struggle based on the underlying zoning and structured to more of a suburban type of development. Another recommendation was moving from a Euclidean Zoning (Euclidean zoning divides towns into districts based on permitted uses, and in so doing creates specific zones where certain land uses are permitted or prohibited). This can be helpful, as it enforces the separation of industrial land uses from residential land uses and can protect against pollution risks. However, Euclidean zoning has also exacerbated segregation issues, limited housing supply, (The Atlantic, The Segregation That Zoning

Inflicts on Cities, Richard Florida and CityLab 1/5/2016)¹⁹ and encouraged urban sprawl. Restrictions on minimum lot sizes, strict building codes, and other elements of Euclidean zoning have increased housing costs, limited new housing construction, worsened affordability issues, and increased the inequality divide in urban areas. – (Boston University School of Law Analysis State Legislation, July 19th, 2018)²¹.

Shay's recommendation (and several communities, including the City of Phoenix) are looking to Form-Based Codes which according to <https://formbasedcodes.org/> is " a land development regulation that fosters predictable built results and a high-quality public realm by using physical form (rather than separation of uses) as the organizing principle for the code. A form-based code is a regulation, not a mere guideline, adopted into city, town, or county law. A form-based code offers a powerful alternative to conventional zoning regulation.

As cited in the ULI AZ Advancing Health & Equity through Workforce Housing, "Utilize flexible, form-based, and transit oriented zoning coordinating transportation, land use, and housing planning will help ensure that transit accessible neighborhoods are successful. Focusing on physical form rather than the separation of uses and the relationship to transit can encourage smart site and pedestrian scale design practices allowing higher quality, more aesthetic products, and neighborhoods. Well-designed form-based codes can positively impact affordability across the income spectrum when adequate densities and supply are encouraged."³

Finally, Shay is currently helping to build the ecosystem of small developers in Tucson, in partnership with the national non-profit, Incremental Development Alliance (<https://www.incrementaldevelopment.org/>). These efforts have helped create the Tucson Small Scale Development Coalition which is focused on educating small, local builders, designers, and neighborhood advocates on all aspects of planning, design, and financing for small-scale development projects. They can identify a vacant corner lot near your neighborhood, or an abandoned commercial strip, and let you know the status. Created as an alternative to large, corporate models of development and gentrification by learning how to do this work, at a local level. Nationally, Incremental Development has worked in several communities and for example in Kalamazoo, Michigan local residents were able to review the zoning ordinance and identify zoning barriers that were explicitly preventing walkable, financially sound small development two years after this process, city staff are building the political unity to repair a broken zoning code (<https://www.incrementaldevelopment.org/work>).

ZenniHome – Interview with Trevor Barger

Resources <https://zennihome.com/>

ZenniHome is a response to the growing supply chain issues and increasing demand for the production of additional housing units of all types. In addition to the numerous benefits of factory-built homes ZenniHomes (built to International Residential Building Code Standards) can reduce construction time, built in controlled environment not subject to environmental influences (delays, weather impacts, etc.), benefits from buying in quantities that can be stored on site at the facility/warehouse, less waste and efficient quality control of construction. They also are designed to be easily transported and have a minimum environmental footprint, stack in multi-family configurations, and include leading-edge technologies that are "smart" connected homes.

As a relatively newly incorporated company ZenniHome has limited supply of existing homes with just two completed, however this year promises to be an exciting time for the company with 66 current employees at its facility in Page, AZ they anticipate the hiring of an additional 84 employees in the coming year as production begins to ramp up. A range of housing types are provided including two stand-alone homes (one at 320 sq. foot and the second at 640 sq. feet). The homes can be an accessory dwelling unit/guest house, or primary residence. One of the most unique facts is that ZenniHome is the that the units can be stacked one on top of the other (up to 7 floors) to create multi-family dwellings (called ZenCity). The first ZenCity project will be at 29 West Main Street in Mesa, Arizona. This site is in downtown Mesa, along the light rail line and near Mesa Art Center, shopping public amenities etc. This is the reuse of building along Main Street and will provide for 90-apartment units. The Mesa development will be a 5 story development built over a grocery store and very dense at 180 units to the acre.

Depending on use (primary residence vs. ADU) a buyer would still need to work with the jurisdictions Planning and Zoning Department to ensure the home is allowed (i.e. any restrictions on an ADU as applicable). HOA requirements are also required to be verified as with all new homes including any restrictions in factory built vs. site built requirements. The properties are on a permanent foundation and meet IBC, however review by the jurisdiction for conformance with fire and zoning is still needed and as the homes are built to multi-family standards the fire code review has been very straightforward. Every jurisdiction however is unique in its typical zoning requirements (setbacks, access, parking, design, structure type, etc.) On its website ZenniHomes goes into detail on the process and requirements for the placement of a home. <https://zennihome.com/pages/our-process>.

Given the variability of each jurisdiction there is no “easy way” to see by city/town/county if the building would be allowed outright and each jurisdiction is going to have it’s own submittal process. Zennihomes offers optional solar packages however some CCR’s in communities can create some limits with regard to solar panel installations but they cannot prohibit solar. The National Multifamily Housing Council and the National Association of Home Builders published a study finding that regulations imposed by various levels of government account for 32.1% of total development costs on average and up to 42% of total development costs in some cases. These costs stem from requirements such as building setbacks, parking minimums, permitting processes, environmental reviews, and public hearings.

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