

Ann Arbor's Capacity for Increased Housing through Zoning Reform

WORKING PAPER #2

April 5, 2023

This paper serves to quantify the capacity of Ann Arbor for significant increases to housing through zoning reform. This is in response to the A2Zero Plan and community interest in increased housing density to address climate and affordability. The analysis considers the minimal densities needed for transit corridor development, with mixed used zoning, as well as the potential for increased density across existing single-family zoned districts. The market barriers to increase densities, at scale, in single-family districts implies that a greater focus on density along transit corridors may be more productive to these City goals.

Exercises like this paper are not a substitute for governed, public planning analyses, and meaningful, equitable stakeholder and regional engagement

I greatly appreciate the encouragement on this initiative and feedback on earlier drafts

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LAND ACKNOWLEDGEMENTS

For the topic of land use planning, it is important that Land Acknowledgements be shared.

Office of Sustainability and Innovation, City of Ann Arbor ⁱ

We acknowledge that the land the City of Ann Arbor occupies is the ancestral, traditional, and contemporary lands of the Anishinaabe and Wyandot peoples. We further acknowledge that our city stands, like almost all property in the United States, on lands obtained, generally in unconscionable ways, from indigenous peoples. The taking of this land was formalized by the Treaty of Detroit in 1807. Knowing where we live, work, study, and recreate does not change the past, but a thorough understanding of the ongoing consequences of this past can empower us in our work to create a future that supports human flourishing and justice for all individuals. .

Taubman College of Architecture and Urban Planning, The University of Michigan ^{ii iii}

Anishinaabeg gaa bi dinokiiwaad temigad manda Michigan Kichi Kinoomaagegamig. Mdaaswi nshwaaswaak shi mdaaswi shi niizhawaaswi gii-sababoonagak, Ojibweg, Odawaag, minwaa Bodwe’aadamiig wiiba gii-miigwena’aa maamoonjiniibina Kichi Kinoomaagegamigoong wi pii-gaa aanjibiigaadeg Kichi-Naakonigewinning, debendang manda aki, mampii Niisaajiwana, gewiinwaa niijaansiwaan ji kinoomaagaazinid. Daapanaming ninda kidwinan, megwaa minwaa gaa bi aankoosejig zhinda akiing minwaa gii-miigwewaad Kichi-Kinoomaagegamigoong aanji-daapinanigaade minwaa mshkowenjigaade.

The University of Michigan is located on the territory of the Anishinaabe people. The Ann Arbor campus currently resides on land ceded through the Treaty of Detroit in 1807. Additionally, in 1817, the Ojibwe, Odawa, and Bodewadami Nations made the largest single land transfer to the University of Michigan, ceded through the Treaty of Fort Meigs, with the hope that their children could be educated.

We acknowledge the sovereignty of tribal lands and the painful history of genocide, forced assimilation, and displacement of Native communities that facilitated the establishment of the University. We affirm contemporary and ancestral Anishinaabek ties to this land, the profound contributions of Native Americans to this institution, and the University’s commitment to educate the children of Native ancestors.

Preface

The US population is estimated by the US Census to grow to just under 405 million by 2060, a 22% increase over the 2020 US population.^{iv} For Ann Arbor, that 22% increase over our 2020 population of 122,830,^v would be an addition of 26,500 people for a total population forecast for 2060 of just under 150,000. . Planning for population growth is a key objective for the upcoming Comprehensive Land Use Plan project.

Ann Arbor’s RFP for the project outlined a number of core planning objectives for Ann Arbor to become more affordable, equitable and sustainable.^{vi} Sustainability was defined by the City’s A2Zero climate action plan.^{vii} The City stipulated that the Comprehensive Land Use Plan integrate these community goals.

The A2Zero Plan recommends investing in land use strategies that allow for denser and mixed-use neighborhoods. In particular, A2Zero targets a strategy to reduce miles driven in vehicles by 50%, with actions to implement non-motorized transportation, expand and improve local and regional transit, increase the diversity of housing, and establish mixed-use neighborhoods. . These considerations were also recommended:

1. Change zoning laws to allow for more density
2. “Upzone” to encourage density and affordability
3. Make zoning allowances for mixed-use neighborhoods and walkable grocery stores
4. Encourage tiny houses & accessory dwelling units
5. Transit-oriented urban planning along transit corridors
6. Design for increased urban density and walkability / bike-ability

Therefore, for the Comprehensive Land-Use Plan project, a forecasted and targeted population over a 40 year, and even 80 year, planning horizon needs to be considered, along with the zoning changes necessary to accommodate that growth, as recommended by the A2Zero Plan.

Community concerns on increased density include issues of affordability and quality of life for its current and future residents. According to the U.S. Census Bureau, the city covers 29 square miles, for a population density of 4,388 people per square mile. Table 1 presents the population densities of cities identified as the most “livable” globally, and provides an estimate of the cost of living differences with Ann Arbor’s.^{viii ix}

Table 1. Ann Arbor Cost of Living Compared to Top-10 2022 Livable Cities

City & Location	Livable City Rank	Density population /square mile	Cost of Living vs Ann Arbor
Vienna Austria	1	11,205	72%
Copenhagen Denmark	2	1,879	103%
Zurich Switzerland	3	12,000	150%
Calgary Canada	3	3,442	84%
Vancouver Canada	5	2,378	97%
Geneva Switzerland	6	33,000	139%
Frankfurt Germany	7	7,600	82%
Toronto Canada	8	10,750	96%
Amsterdam Netherlands	9	12,710	92%
Osaka Japan	10	31,630	66%
Melbourne Australia	10	1,274	96%

These highly livable cities average 165% greater density, but an average cost of living only 98% that of Ann Arbor’s. Density reduces the cost of living by making it so that car ownership costs are reduced, overall.^{x xi} On this basis, density increases using urban and regional design best practices have the ability to meet Ann Arbor’s livability, affordability, and sustainability objectives.

This paper addresses the single objective function of Ann Arbor’s potential population growth, the housing capacity for it, and the zoning reforms needed to accommodate it.

Executive Summary

This paper is an exercise on the forecasted and / or preferred population targets for Ann Arbor to 2060 and 2100, for consideration in advance of Ann Arbor’s pending Comprehensive Land Use Plan project. Ann Arbor has agreed to not annex land outside of the freeway ring, so population growth is constrained on that basis.^{xii}

Three population growth scenarios are considered, covering low, moderate, and high growth projections.

The constrained, low growth projection, based on historical trends and existing land-use patterns, would find Ann Arbor’s population increase at most by 26,000 by 2100. This limited growth model would likely continue the previous 10-year, 90% increase to home prices.

	Growth Scenario		
	Low	Moderate	High
Population Projection to 2100	150,000	182,500	215,000
Additional Population over 2020	26,000	58,500	91,000
Additional Housing Units To Support	11,760	26,470	41,000

Most of all, housing is a regional issue, with Ann Arbor pricing affecting surrounding communities. Ann Arbor’s constrained low density has meant that not only is Ann Arbor unaffordable for many, but it has significantly increased housing costs in Pittsfield and Scio Townships, Ypsilanti, Dexter and Saline.

A middle-range growth scenario projects an estimated population increase of 58,500 people. . This moderate growth could be accommodated by implementing revisions to Ann Arbor’s zoning code just for the transit corridors (TC1), and transit oriented development of the downtown core districts.

Projected Capacity Increase by Zoning Reform Options		
Zoning Reform Option	Housing Units	Population
4 Transit Corridor (TC1) Districts	18,000	39,780
Downtown Core	10,500	23,205
Tailored, Form-based Zoning	26,100	57,681
Totals	54,600	120,666

For a high growth scenario, revising current single family zoning, to tailored, Form-based zoning, is evaluated. These Form-based zoning changes would allow for gentle density increases of multi-plex structures up to four units, within the same building envelop permitted for single-family structures. By-right development would be established. An additional housing capacity of 26,100 housing units, for a cumulative 2100 population increase over 120,000 is estimated, which would essentially double Ann Arbor’s current population and housing density.

Market barriers to gentle density increases to Ann Arbor’s R1 districts are described in the last section of this working paper, covering construction costs, general contracting, and financing constraints and market alternatives. Redevelopment of single-family districts currently is constrained from having an effective business case to scale for the density targeted for mixed-use walkable neighborhoods. By-right development may help.

Other options to increase housing in Ann Arbor could also occur along the length of the transit corridors, rather than just within the current TC1 Districts being established. This would require density to be permitted around existing businesses alongside those transit corridor routes. . Given that they would all abut residential districts, the building height would be capped at 55 feet within 80 feet of any residential district, or 4 - 5 floors.

Looking at the Ann Arbor Zoning map, it appears that many of these arteries have existing multi-unit residential (R2, R3, R4) and commercial designations (C1, C2). These could be converted to new integrated zoning that allows transit-based, mixed uses with those higher densities, for walkable commercial businesses and human services. Considering more TC1 applications along the various arteries into and out of Ann Arbor, in areas with existing R2-R4 and C1/C2 districts, would be a task for the Comprehensive Land Use Planning.

During the Comprehensive Land Use Plan project, Ann Arbor’s Economic Development Corporation and Planning Department may want to consider ways to address the market barriers to low-density housing. They may be able to determine effective policy initiatives that could be pursued to address these market barriers.

Ann Arbor’s Capacity for More Housing over the Next 40+ Years

Ann Arbor’s Comprehensive Land Use project offers an opportunity to consider the manner in which residents and City officials want development to proceed over the next 40 – 80 year period.

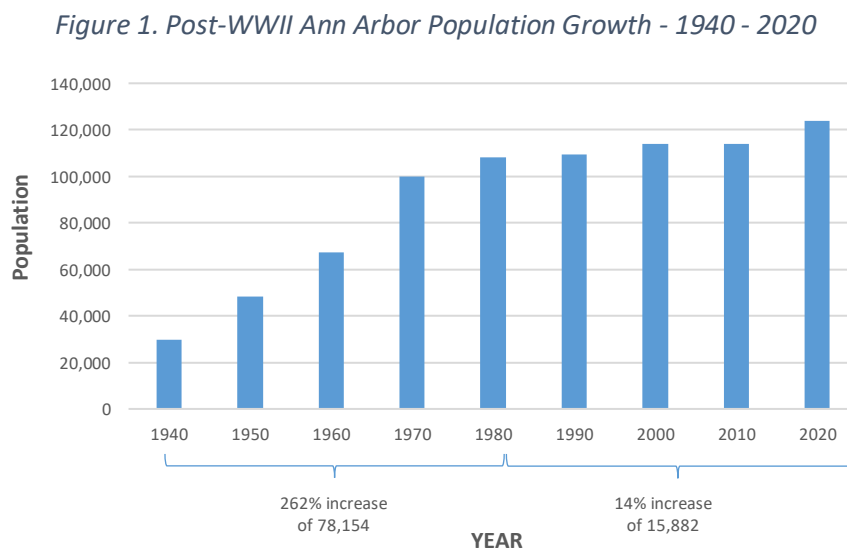
“Zoning is interconnected with and dependent upon community planning. Planning is the process of establishing and implementing a local community’s goals, objectives, and policies for growth, and development over the course of future decades.” ^{xiii}

Ann Arbor’s RFP on the upcoming Comprehensive Land Use Plan project stated that it should identify “land use strategies for affordability, sustainability, and a realistic vision for accommodating projected and / or desired population and job growth in the City through 2050 and beyond.”

This paper initially addresses the “projected and / or desired population growth” for Ann Arbor, followed by a discussion of the zoning changes that could be considered for additional housing capacity. An estimate of the scale of additional housing that could be supported from these changes is provided.

Ann Arbor Population Growth – The Post-WWII Years – 1940 – 2020

As shown in Figure 1, Ann Arbor grew over 315%, for an increase of more than 94,000 people, during the 80-year Post-World War II period, from 1940 – 2020.^{xiv} However, for the second 40 years of that period, from 1980 – 2020, the population of Ann Arbor increased by only 15,880 people, or 14%. The US Census estimated Ann Arbor’s population growth of 9,917 people, from 2010 to 2020, at only 8.7%.^{xv}



This constrained growth is largely due to the zoning restrictions on housing across Ann Arbor. About 70% of the parcels are designated as single-family residential (R1), with only 20% designated as multi-unit (R2, R3, R4, etc.).^{xvi}

Projecting Ann Arbor’s population growth over the next 40 years, given the housing constraints of the last 40, begs the question as to whether these constraints get resolved, and to what degree.

Ann Arbor’s current capacity for increased housing under existing zoning is severely constrained, and this housing inelasticity leads to the escalating price of housing, both rental and owner-occupied.^{xvii xviii}

Ann Arbor's Capacity for Increased Housing through Zoning Reform

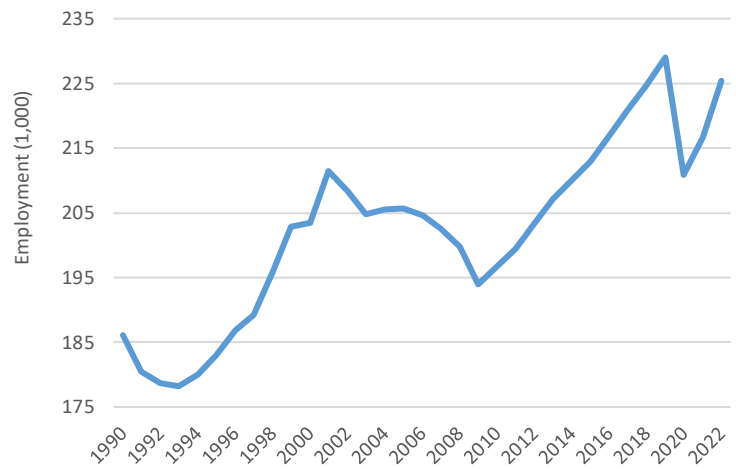
Ann Arbor Area Employment and Housing Price Growth

The high commuter and employment growth, many believe, explains in part the escalating housing prices. There is an estimated 83,000+ people commuting to Ann Arbor daily.^{xi} ^{xx} Coming out of the Great Recession in 2009, Ann Arbor area employment grew from 194,000 employed persons to a 229,000 peak, pre-COVID in 2019, an increase of 31,000 employed people.^{xi} That was an 18% growth in employment, over a recent 10-year period.

Figure 2. Ann Arbor City - Employment-based Commuting



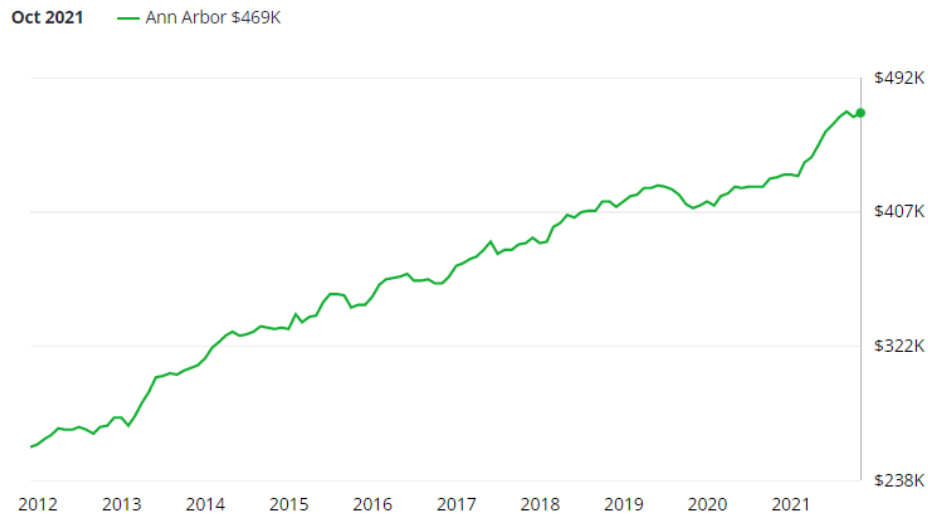
Figure 3. Ann Arbor Area Total Employment by Year



Ann Arbor Area Home Pricing Trend

The Zillow Home Value Index for Ann Arbor from 2012 through 2021 grew from about \$245,000 to \$469,000, an increase of over 90%. This was the housing price growth over the recent 10-year period.

Figure 4. Zillow Home Value Index^{xxii} Ann Arbor 2012 through 2021 (October)



From Figures 2 - 4, we can understand that employment and its growth, at 18%, is not enough to explain the 90% growth in prices that housing demand fostered.

Demand for housing in Ann Arbor is also from its attractiveness.

Ann Arbor's Capacity for Increased Housing through Zoning Reform

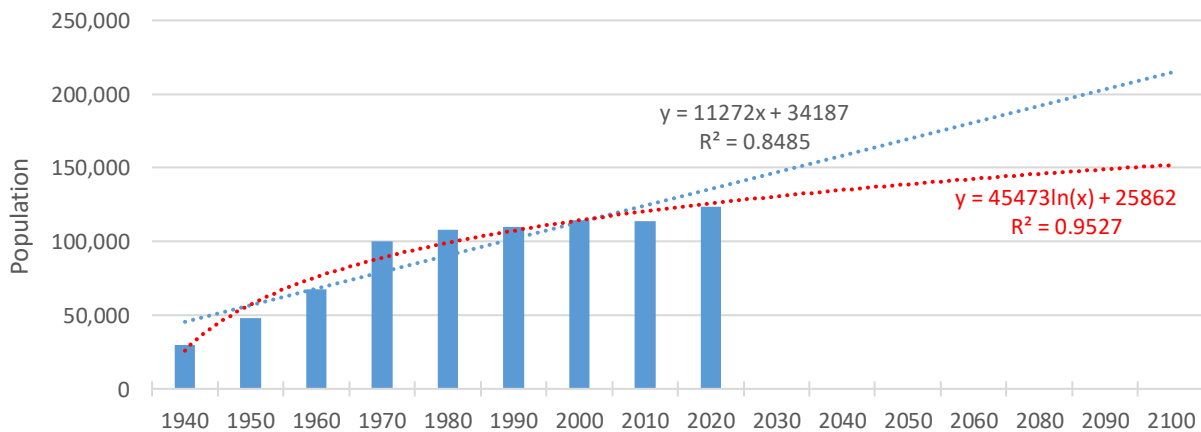
Ann Arbor continues to receive recognition as being one of the “best” places to live in the US, across numerous categories.^{xxiii} The University of Michigan’s student population has grown by over 7,500 undergraduate and graduate students over the recent 10-year time period.^{xxiv xxv} In addition, the University of Michigan and the University Hospital System are the largest employers in the County. Numerous tech start-ups and spinoffs from the University also attract higher income individuals. Many in these professions and student populations find Ann Arbor very affordable.

It is the low and middle-income households that find it difficult to afford Ann Arbor housing.^{xxvi}

Ann Arbor Population Growth Projections

Land use planning projects may analyze a number of growth and development scenarios, with low, moderate and high ranges, for example. A simple linear and logarithmic trend analysis on Ann Arbor’s population over time provides some possible projected ranges. If one applies a ‘best-fit’ estimation of the population trend data, 40 to 80 years into the future, it might look like one of the graphs below.^{xxvii} 95% of the variance is explained by the logarithmic growth curve, and 85% of the variance is explained by the linear growth curve, so each model is a good fit. There may also be the unlimited, exponential growth option, but that would obviously not be appropriate for this zoning-based land-use exercise.

Figure 5. City of Ann Arbor Population by Year Forecast to 2100



The continuation of constrained growth, estimated by the logarithmic curve, over 80 years could find Ann Arbor reaching 150,000 in population, for a net addition of 26,000 people. This would be approximately 20% growth from 2020 to 2100. Given Ann Arbor’s prior 80 year history (see above), 20% growth could be considered low-growth for that length of time.

The US Census estimates the average number of people per household in Ann Arbor at 2.21.^{xxviii} So 26,000 additional people to the City of Ann Arbor can be expected to need an additional 11,760 units of housing (= 26,000 / 2.21).

The linear, higher growth estimate projects a population of around 215,000 people in Ann Arbor over 80 years, for an additional 91,000 people, or a 73% increase over 2020. At 2.21 people per household, the additional 91,000 people can be expected to need 41,000 additional units of housing.

Halfway between these two growth projections would be a population of 58,500 more people, for 26,470 additional housing units. This could be a potential middle-range, moderate growth scenario.

Here are the three scenarios in table form:

Table 2. Ann Arbor Population and Housing Projections over Low, Moderate and High Growth Scenarios

	Growth Scenario		
	Low	Moderate	High
Population Projection to 2100	150,000	182,500	215,000
Additional Population over 2020	26,000	58,500	91,000
Additional Housing Units To Support	11,760	26,470	41,000

The next section analyzes land use changes Ann Arbor already has made, like Transit-Corridor Districts (i.e., TC1), and Accessory Dwelling Units (ADUs), and new options like tailored, Form-based Zoning for what are currently single family districts. A capacity analysis on the potential for this housing is provided.

Transit Corridor (TC1) District Zoning

Ann Arbor’s Planning Department proposed at City Council’s request a Transit Corridor (TC1) overlay,^{xxx} and provided applications of it to two areas of Ann Arbor, one in the South State / Eisenhower Pkwy area, and a second one in the North Maple / West Stadium area.^{xxxi xxxii} Two additional areas are anticipated for TC1 District designations, including Washtenaw Avenue between US-23 and Platt Road, and Plymouth Road between Traverwood Drive and US-23.^{xxxiii}

Transit corridors establish a pattern of walkable districts or neighborhoods connected to commercial, employment, institutional and recreation areas. A transit corridor is defined as the walkable areas around all of the stations along a transit line.

The South State / Eisenhower Pkwy TC1 District of 238 acres and the North Maple – West Stadium TC1 District of 210 acres both are approximately 1/3 of a square mile in area, each. Best practices for transit-oriented development for a 'village' scale bus transit system would have a housing density of 15 to 25 housing units per acre for a 1/4 mile radius around the bus-transfer stops.^{xxxiv xxxv} These densities are known to reduce vehicle miles traveled with Transit Oriented Development (TOD).^{xxxvi xxxvii xxxviii xxxix}

TOD’s are a mix of housing, retail and/or commercial areas and amenities within walking distance of public transportation. They are established within ¼ – ½-mile walking distance of public transit, with areas near transit increasing in density. TOD’s are categorized according to the following types:

Table 3. Transit Oriented Development Types and Minimum Average Residential Density ^{xl}

TOD Type	Description	Recommended Residential Density
Core	Dense downtown cores of regional importance with two or more modes of high-capacity transit	50 units per acre
Center	Mixed-use residential and employment districts containing at least two modes of transit	25 units per acre
Village	Smaller centers of local economic and community activity with transit service	15 units per acre
Destination	Institutional and university centers, stadiums, and regional parks	

On this basis, these TC1 Districts can be an 'idealized' form of TOD-based development. ^{xli}

To appreciate the minimal requisite housing scale, below in Figures 6 and 7 are visual views of 18 and 27 housing units per acre (net).^{xlii} Locally, the Veridian development on Platt is 12.5 units per acre.^{xliii}

Figure 6. 18 Housing Units Per Acre (net)



Figure 7. 27 Housing Units Per Acre (net)



Using the recommended densities of 15 and 25 units per acre, Table 4 provides the following breakdown of the base level of housing units that should be targeted for each of the current TC1 Districts.

Table 4. Housing Units by Density for TC1 Districts

	Baseline Number of Housing Units	
	Stadium / Maple (210 acres)	State / Eisenhower (238 acres)
15 units / acre	3,150	3,570
25 units / acre	5,250	5,950
Average	4,200	4,760

A mid-point between these ranges of 4,500 units of housing for each TC1 District is a minimum baseline for each TC1 District to meet its objective for enough density to reduce vehicle miles traveled and shift people to walkable neighborhoods supported by bus transit. Multiplying these across the four planned TC1 Districts means a projected minimal capacity increase of 18,000 housing units.

The Downtown Core

The Ann Arbor Area Transportation Authority (AAATA) recently released its long-range plan and received another 5-year millage, over 40% of which is to build out its bus-line service capacity.^{xliv xlv xlvi} Figure 8, below, shows AAATA’s Long Range Plan for 2045, including Rapid Bus Transit with a transit-hub in the downtown core area, and additional transit-hubs identified in each TC1 District.

Using the TOD recommended housing complement for a downtown core of 50 units / acre within ¼ to ½ mile area (~210 acres), provides a forecasted need of 10,500 additional housing units. It is yet to be determined if additional zoning changes would be required from the current downtown districts (D1 & D2).^{xlvii xlviii} Table 5 summarizes the potential additional housing and population capacity increases for Ann Arbor through these transit-based zoning changes.

Figure 8. Ann Arbor Area Transportation Agency (AAATA) Proposed 2045 Service Network

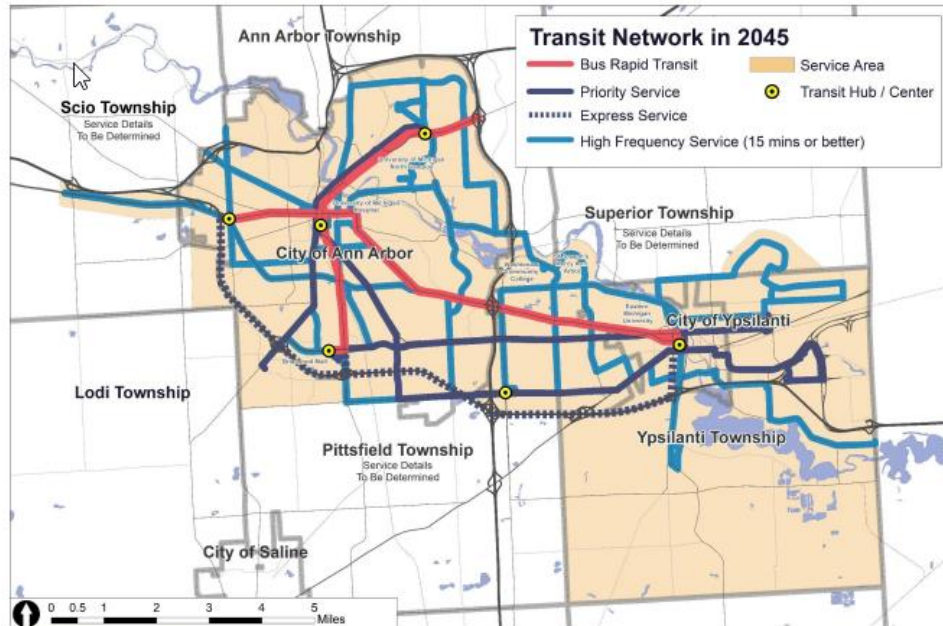


Figure 6 – Proposed Service Network in 2045

Table 5. Summary of Transit-based Zoning for Additional Housing and Population Capacity

	Projected Housing Units	Projected Population (2.21 / Unit)
4 Transit Corridor Districts	18,000	39,780
Downtown Core	10,500	23,205
Totals	28,500	62,985

Zoning changes to foster housing development are not deterministic. Just because these areas have been re-zoned as TC1 Districts does not assure the targeted development will occur, as permitted.

The City of Ann Arbor provided generous height allowances for the TC1 Districts.^{xlix} By contrast, the 15 – 25 housing units per acre of density implies an even, low-height (5 – 6 story) development across the entire District, as shown in Figures 6 and 7. There are properties that may not be developed at all beyond their current state, or are developed for purposes other than housing, so the additional capacity by allowing taller buildings is an appropriate assurance on meeting the targeted housing densities.

The totals summarized in Table 5 are above the 11,760 housing units for the low growth scenario in Table 1, and are just over the moderate growth target of 26,470 housing units.

To be in range to the high growth target of 41,000 additional housing units of capacity, further zoning changes will need to be considered to support Ann Arbor’s population growth projected in Figure 5.

Form-based Zoning of Residential Districts

This section of the paper provides an exercise to estimate the capacity of additional housing for Ann Arbor if single-family districts were converted to a tailored, Form-based Zoning approach that allows up to 4-plex units.

Under a tailored, Form-based Zoning approach, the same building envelopes could be maintained as currently exist in R1 districts, but there would be an allowance for 2-plex, 3-plex, 4-plex and greater units.

ⁱ That is, one can build up to four units, but height and setback limits are the same that applies to single-family homes. Multiplex housing types were common in residential areas before Single Family Districts.ⁱⁱ Alternatively, modifying height, related-occupancy, and set back limits provides even greater flexibility, as only up-zoning, while retaining other housing ordinance terms, may still restrict density.ⁱⁱⁱ

Ann Arbor already allows for 2-plex units across R1 Districts with the Accessory Dwelling Unit updates to the Unified Development Code. ADUs are permissible in any R1, R2, R3 or R4 zoning district.ⁱⁱⁱⁱ If single-family zoning restrictions are removed, there may be even more flexibility for 2-plex units.

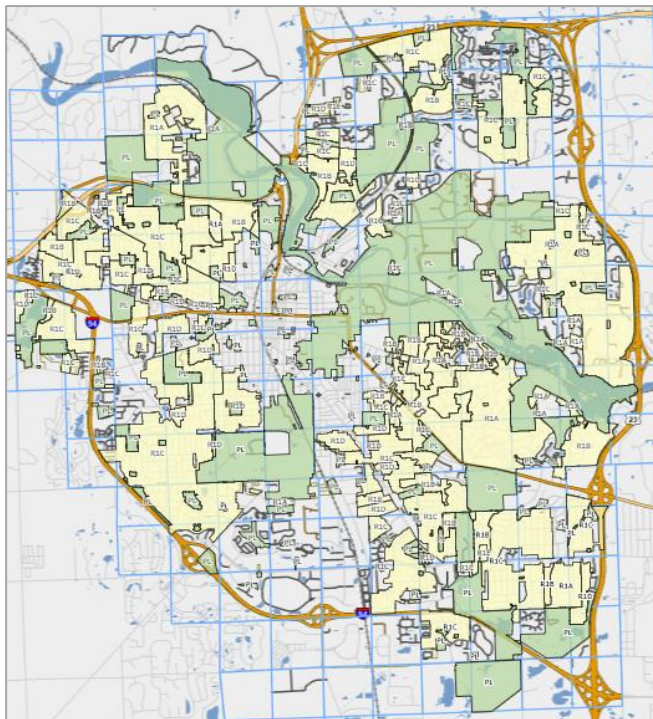
This section approximates the total additional housing capacity available to Ann Arbor if there were an even distribution of single, 2-plex, 3-plex and 4-plexes, built in areas currently zoned for single-family residences. This analysis will be done based on the current number of land parcels in those R1 districts. Presumably, these would be built-out over the 40-year planning horizon typically used in the Comprehensive Land-Use Plan projects.

This potential for additional residential housing will be included in the total housing capacity analyses, along with the housing densities targeted for Transit Corridor TC1 Districts, which seek increases of enough scale for people to switch from auto to bus-based modes of transit.

Ann Arbor's Current Single Family Districts Rezoned to Tailored, Form-based Zoning

As shown in Figure 9 and Table 6, over seventy percent of the parcels, and over fifty percent of the land area, in Ann Arbor are zoned single-family residential (R1), excluding the land designated as Public Land (PL) Districts (i.e., the University of Michigan, City and County Land, Public Schools, etc.).^{liv}

Figure 9. Yellow Shaded Single Family Districts (R1A, R1B, R1C, R1D, R1E) & Green Shaded Public Land



Presented in Table 6, 17,400 parcels exist across Ann Arbor's R1 Districts, which equals the total number of single-family housing units allowed, short of the recently permitted ADUs.

Shown in Table 7, these R1 parcels on average exceed Ann Arbor's UDC minimum lot area restrictions by over 200% (excluding the five R1E parcels). Therefore, applying tailored Form-based Zoning to current R1-zoned parcels has considerable leeway. R1E parcels represent special cases, and are not analyzed.

Table 8 applies an even distribution of 2-plex, 3-plex and 4-plex housing units across Ann Arbor's current Single Family Districts, showing an increase in the housing capacity in Ann Arbor of over 26,000 units. Consider this a high-end estimate of the housing potential for what is currently zoned R1. This residential housing projection may change if the upcoming Comprehensive Land-Use Plan project resulted in decreased setbacks, increased heights, changes to minimum lot and house sizes, etc.

Table 6. Ann Arbor R1 Zoning Districts Metrics, derived from Table 5 ^{lv}

Ann Arbor R1 Zoning Districts	Acres	Percent of Total City Land Area (excl. Public Land)	Number of Land Parcels	Percent of Total City Land Parcels (excl. Public Land)
R1A	946	7%	1,091	4%
R1B	1,703	13%	2,741	11%
R1C	3,271	25%	10,210	42%
R1D	734	6%	3,353	14%
R1E	14	0.1%	5	0.02%
	6,667	51%	17,400	71%

Table 7. Ann Arbor R1 Zoning Districts Average Area Metrics

Ann Arbor R1 Zoning Districts	Acres/parcel (Avg.)	Avg. SF / parcel (43,560 SF/acre)	Average Feet/Side (SQRT)	A2 UDC Minimum Lot Area: SF/Unit ^{lv}	Average Excess Area Capacity
R1A	0.867	37,756	194	20,000	189%
R1B	0.621	27,065	165	10,000	271%
R1C	0.320	13,954	118	7,200	194%
R1D	0.219	9,531	98	5,000	191%
R1E	2.828	123,188	351	4,000	3080%

Table 8. Potential Additional Capacity for Gentle Density Housing Increases to Ann Arbor R1 Districts*

Zoning District	25% to 2-Plex Units	25% to 3-Plex Units)	25% to 4-Plex Units	Total Additional Housing Units
R1A	273	546	818	1,637
R1B	685	1,371	2,056	4,112
R1C	2,553	5,105	7,658	15,315
R1D	838	1,677	2,515	5,030
R1E	1	3	4	8
	4,350	8,700	13,050	26,100

* These numbers are in addition to the 17,400 units already permitted across that number of R1 parcels.

As shown previously in Figure 1, growth, per se, has not been foreign to Ann Arbor. Ann Arbor increased in population by 94,000 people from 1940 – 2020, with 76,854 just during the 1940 to 1980 period. An increase in over 26,100 housing units over another 40-year period, with a potential population increase of 57,680 (at 2.21 people per household), would not necessarily be exceptional for Ann Arbor.

There is a difference, though: all of the 26,100 units would be infill. Much of the growth of previous decades was in previously undeveloped Ann Arbor land.

Adding the potential increased capacity of 26,100 units of housing through tailored Form-Based Zoning across Ann Arbor’s current single-family residential zone, to the four TC1 Districts baseline target of 18,000 housing units, and the additional 10,500 for the downtown core, provides a projection of 54,600 units total, across a 40 – 80 year planning horizon. See Table 9, below.

Table 9. Summary of Zoning Reforms for Additional Housing and Population Capacity

Projected Capacity Increase by Zoning Reform Options		
Zoning Reform Option	Housing Units	Population
4 Transit Corridor (TC1) Districts	18,000	39,780
Downtown Core	10,500	23,205
Tailored, Form-based Zoning	26,100	57,681
Totals	54,600	120,666

This is well above the high-end growth projection of 41,000 housing units needed to meet Ann Arbor’s growth potential of an additional 91,000 people by 2100. The reform of single family residential in addition to the transit-based zoning has the potential to increase Ann Arbor’s population by over 120,000, which would essentially double Ann Arbor’s current population and housing density.

Again, housing and population growth cannot be assured simply through zoning changes. In addition, there are the basic economics of redeveloping the existing single-family parcels. The next section covers the challenges for building out multiplex units across Ann Arbor’s single-family parcels.

Market Barriers to Housing Production via Re-Zoning Single-Family Districts for Gentle Density, By Sarah Lorenz

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The redevelopment of Ann Arbor single-family homes and vacant lots into 2 - 4 unit properties faces substantial market barriers and is unlikely to create a significant supply of new housing. Other cities experimenting with changes to single-family zoning are typically larger and have more underutilized property, vacant land, and / or low cost homes that make upzoning potentially productive. Ann Arbor, in contrast, is quite small, homogenous, and has always had significant demand, so there are few truly underutilized properties other than parking lots. The barriers to increasing housing via upzoning include construction costs, general contracting constraints, financing constraints, and alternatives for buyers in the market.

Construction Costs and General Contracting Constraints

New construction or conversion of existing single-family homes into 2 - 4 units will require the services of an architect and an experienced general contractor. Single-family home redevelopment on small lots within existing neighborhoods is highly complex, custom work—and therefore expensive. There is a limited number of residential general contractors with the capacity to do whole-house remodeling and custom infill/new construction. Construction costs have risen sharply in recent years, and construction workers are being priced out of the Ann Arbor housing market. The aging Ann Arbor housing stock is requiring significant renovation and updating, creating high demand and long waiting lists for general contractors and tradespeople. .

In addition, rising expectations for “HGTV” homes creates additional demand for construction services. . There are probably only a dozen or so custom builders in Ann Arbor capable of taking on large infill projects, and they are already inundated with work. . It is difficult for new or smaller builders to move into

this project category, due to the risk, cash requirements, and long timelines. . This creates major barriers to the production of new housing units via single-family conversion.

Availability of property is also a constraint. . In 2022, there were about a dozen vacant lots sales in the City of Ann Arbor, which is typical, so this will not be a significant source of new housing. . Even if 12 vacant lots were purchased every year for a decade and each developed into a quadplex, this would only result in a total of 480 units, and that is a best-case scenario. . Vacant land with zoning for multifamily in the nearby townships is rare or nonexistent. .

That leaves conversion and expansion of existing single-family homes. . Most of the existing homes in the City of Ann Arbor were constructed in the mid-twentieth century or earlier and tend to be comparatively small, which means that any meaningful source of new units will require new construction in some form. New construction in conjunction with an existing home is even more complex and costly. Construction prices have continued to rise, and as of 2023, custom infill costs range from \$300 - \$650 per square foot. This is in addition to the purchase of the existing home.

The complexity and risk of these projects are demonstrated by a recent attempt to re-develop an existing 4-unit building to create more density to offset the costs of redeveloping a new 4-unit building, with twice the beds, that would be net-zero energy. The developer is the co-founder of a well-known and respected custom building company in Ann Arbor, with a newer start-up net-zero development business. The developer purchased this property over 20 years ago and thus had the advantage of a lower cost basis. The project will be a national model of energy efficiency. ^{lvii lviii}

The developer has extensive experience in the construction industry and the rental housing market in Ann Arbor. Yet, it will take nearly six years to obtain approvals for this project, with the projected costs nearly doubling, due to inflation and rising interest rates in that time period. This is just one example of the real world barriers facing small infill development. It is doubtful this type of development offers significant appeal for developers or current rental houses.

If the City re-defines residential zoning, like Form-based, for by-right development, these may be more attractive by reducing timelines and approval risks. But a simple analysis below shows the additional challenges of infill “upzoning” development as a major source of new housing.

Sample Project

The most plentiful housing type in Ann Arbor is the typical mid-century ranch with 1000 sf and an average purchase price of \$400,000. Low-cost, distressed properties are rare, so a reliable source for major new housing supply will have to include homes in good repair in this price range. Below is a brief financial analysis on the cost of adding a second story to create two stacked ranch units:

- \$400,000 purchase price for a 1000 square foot ranch
- \$600,000 - \$1,300,000 construction costs at \$300-\$650 per square foot x 2000 square feet^{lix}
- \$1,000,000 - \$1,700,000 total cost
- \$500,000 - \$850,000 per unit (without holding costs, loan costs, or developer fees)

This project is probably infeasible, since buyers can simply purchase another single-family house or condominium of the same size for less without the inconvenience of living in a stacked flat and sharing yard and parking space.

Alternatively, they can commute for 15 - 30 minutes and have a single-family home of double or triple the size, with private yard space, a two-car garage, in-suite bathrooms, ample storage, and lower taxes. In

larger, more expensive markets like Seattle or Boston, commuting for 30+ minutes may not access significantly lower cost housing, and options like this might be attractive. That is not the case in Ann Arbor for the foreseeable future.

In a second scenario, the financials might be improved by increasing the number of units from two to four, reducing the unit size to 800 square-feet, and value-engineering for a cost of \$300 square-feet:

- \$400,000 purchase price for a 1000 square foot ranch
- \$960,000 construction costs at \$300 per square foot x 3200 square-feet
- \$1,360,000 total cost
- \$340,000 per unit

This scenario is more promising, but the next hurdles must be considered: how will projects like this be financed and who will build them?

Financing Constraints

Who has the financial capacity and interest to engage in custom building projects of this nature?

- Purchase and holding costs of \$400,000 (on a vacant home in the case of a two-story addition)
- Architectural fees of \$10,000 - \$50,000 or more (paid up front, with no guarantee the construction costs will be feasible)
- Once architectural plans are finalized, bids from contractors must be gathered, which may take significant time and require additional payments
- Once a contractor and budget are determined, a construction loan must be obtained, which will require an appraisal that meets or exceeds the construction cost. Unusual projects with few or no comparable sales may fail to appraise for the required amount.
- Likely timeline of two years or more
- Total project cost of \$1,360,000 or more

There are six possible categories of developers of this type of project:

1. **Owner-Occupant:** This will require someone with the purchasing power to obtain a construction loan of \$1,360,000. Nevertheless, it is highly unlikely that individuals with this financial profile will choose to live in a quadplex, especially in an 800 sf unit. They are much more likely to purchase an \$800,000 home and a separate \$560,000 investment property, for example.
2. **Owner-Occupant Group:** This possible, but likely to be rare, as it will require one or more people with the time, interest, and capacity for recruiting three other owners with a similar vision, investing funds in purchasing property, commissioning architectural plans for that site, obtaining bids from contractors on those plans, and obtaining financing on an unusual construction project.

This will also require a condominium agreement or some other legal structure. Individuals with the financial capacity and timeline for this type of project will also have many other housing market options.

3. **General Contractor:** GCs in Ann Arbor are unlikely to use their own capital on risky, unusual spec projects of this type when they have enormous demand for their services from owner-occupants for high-end home remodels with low risk.

4. **Small Investor:** Banks rarely, if ever, lend on spec home construction, so that leaves hard money lenders, which brings extraordinary risk with rates of 10-25% interest on projects with a cost over \$1,000,000, as well as long timelines prone to delay. Small investors with hundreds of thousands of dollars have many other options in the Midwest, such as house flipping or buying small apartment buildings with guaranteed cash flow.

An investor will be functioning as a developer and will add a profit margin that covers the higher cost of capital, so the price of the units will likely rise to \$400,000 - \$500,000 or more, which will make an infeasible sales price on 800 square-foot units. Larger units might be feasible, but properties to accommodate a 4000 - 6000 square-foot structure will be limited, and the costs and risk will rise accordingly.

5. **Large investor:** These investors have even more options for their cash, and are unlikely to engage in attempts to scale up this type of work in the small Ann Arbor market, which will require intensive on-the-ground supervision of custom projects. These investors will be functioning as developers and will add a profit margin which may make an infeasible sales price.
6. **Nonprofit:** Most housing nonprofits focus on affordable housing at lower price points, and are unlikely to shift into this highly intensive category of infill for middle-income buyers.

In summary, Ann Arbor's market characteristics are somewhat unusual: a small, in-demand market, embedded in a fairly affordable Midwestern region, with housing prices expensive for the region but relatively affordable compared to other large, high-growth national markets. Ann Arbor is drawing high-income workers from those high-growth, expensive markets, with a concentrated locus of job generation at the parking-constrained University of Michigan. These factors will continue to drive up demand for housing and construction, but also make infill housing development via upzoning a low-yield proposition. Streamlining the process for would-be developers of all types should be a priority, and other supports might be considered as well, such as financing options, technical advice, house plans, etc. This strategy should be considered one of many that will be required to address our housing shortage.

Summary and Discussion

This working paper has been a thought exercise on the forecasted and / or preferred population targets to 2060 and 2100, for consideration by Ann Arbor's upcoming Comprehensive Land Use Plan project.

The constrained, low population growth projection, based on historical trends, would find Ann Arbor's population at nearly 150,000 out to 2100. Maintaining Ann Arbor's current zoning districts means that this limited growth model would only continue the previous rate of price escalations on housing.

If the middle-range growth scenario was adopted for the Comprehensive Land Use Plan, 26,000 additional units of housing would be needed, out through 2100, for an estimated population increase of 58,500 people. This would have Ann Arbor attain a population just over 181,000 by 2100.

This growth could be accommodated by adopting and implementing revisions to Ann Arbor's zoning code only for the transit corridor (TC1), and transit oriented development of the downtown core districts. There will be competition for other land uses in TC-1 corridors (primarily retail) and significant portions of these areas are already developed – this challenges what will incentivize redevelopment.

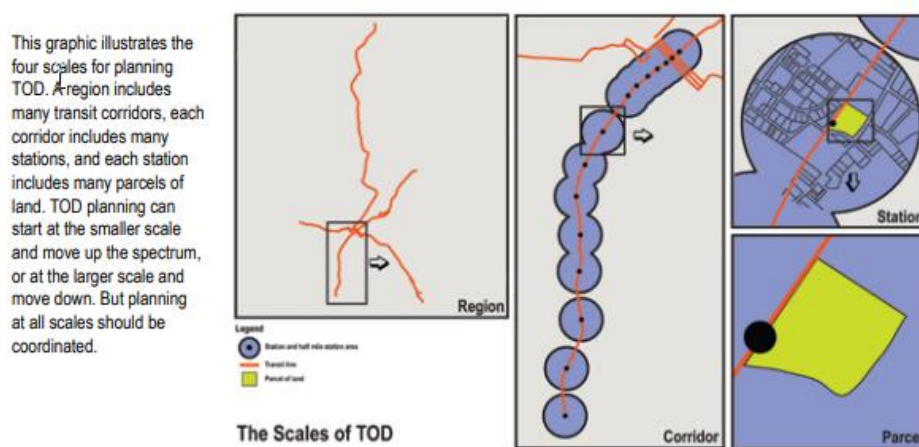
Given the market barriers to gentle density increases to Ann Arbor's R1 districts, described in the last section of this working paper, Form-based Zoning, while potentially providing a cumulative doubling of Ann Arbor's population and housing density across all zoning reform options, may not have an effective

business case to scale for the density needed for mixed-use walkable residential neighborhoods. Form-based zoning for by-right development may mitigate some of these risks and business case issues.

Ann Arbor's Economic Development Corporation and / or the City Planning Department, may want to consider ways to address these market barriers to housing density. A significant project cannot get through the planning process in under 6 months, and it often takes between 6 months and a year to get building permits.^{lx} They may be able to determine effective policy and other City initiatives that could be pursued to address these market barriers to housing development.^{lxi}

Other options to increase housing in Ann Arbor could also occur along the length of the transit corridors, rather than just within the current TC1 Districts being established. This would require density to be permitted along existing businesses alongside those transit corridor routes. . See Figure 10, below.

Figure 10. Transit Corridors and TOD^{lxii}



The TC1 designations can be applied on this basis. Given that they would all about residential districts, the building height would be capped at 55 feet within 80 feet of any residential district, or 4 - 5 floors.

Looking at the Ann Arbor Zoning map, it appears that many of

these arteries have multi-unit residential (R2, R3, R4) and commercial designations (C1, C2). These could be converted to new integrated zoning that allows mixed uses with those higher densities, for walkable commercial businesses and human services. Considering more TC1 applications along the various arteries into and out of Ann Arbor, in areas with existing R2-R4 and C1/C2 districts, would be a task for the Comprehensive Land Use Planning.

The current median sales price of an Ann Arbor home is just over \$430K.^{lxiii} Without substantially more housing built in Ann Arbor, over the next 10 years, we can expect the median sale price of an existing home (i.e., not new construction) at over \$800K, given the 90% price escalation of the last 10 years (Figure 4). This is essentially the current threshold that marketers of luxury homes use for the Ann Arbor area.^{lxiv} So, on this basis, *existing* home sales in 10 years will be at or above the current luxury market threshold.

If the city wants certain outcomes, like significantly increased residential housing supply, it should reduce barriers to those outcomes. These issues for Ann Arbor are currently big, almost insurmountable, barriers.

Given the A2Zero Plan and related community interest in increased housing density to address climate and affordability, this paper serves to quantify the capacity of Ann Arbor for significant increases to housing through zoning reform. The analysis considered the minimal densities needed for transit corridor development, with mixed used zoning, as well as the potential for increased density across existing single-family zoned districts. The market barriers to effectively increase densities in R1 districts, implies that a greater focus of density along transit corridors may be more productive to City goals.

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