



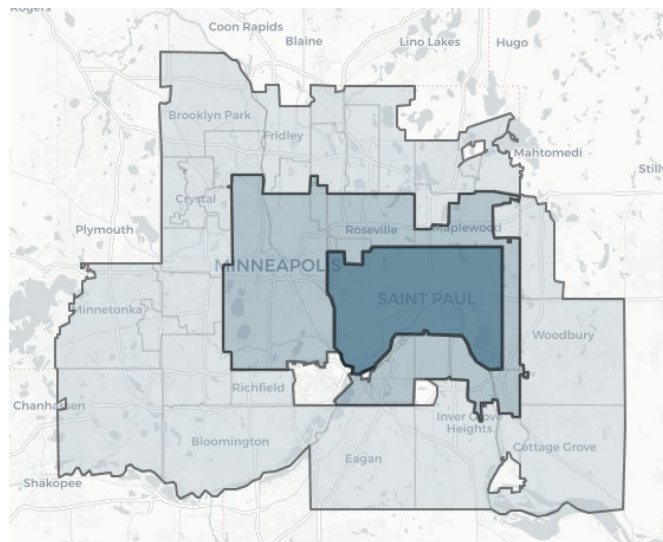
## Saint Paul Housing Dashboard: Technical Appendix

This technical appendix provides detailed information about the geographic scope, data sources, and variable definitions used in the [Saint Paul Housing Dashboard](#).

### Defining areas for spatial comparison

#### Regional comparison cities selection

To identify a set of regional comparison cities, we identified cities adjacent to Saint Paul, as well as a second tier of cities that border the initial adjacent cities. The following cities form a two-ring analysis of proximity:



#### National comparison cities selection

To identify a set of national comparison cities comparable to Saint Paul, we calculated Pearson correlation scores using the following series of socioeconomic and housing metrics:

1. Total population
2. Median household income
3. Mean household income

4. Total housing units
5. Occupied housing units
6. Percent of owner-occupied housing units
7. Median value of owner-occupied housing units
8. Percent occupied housing units built in 2020 or later
9. Percent occupied housing units built in 2010 to 2019
10. Percent occupied housing units built in 2000 to 2009
11. Percent occupied housing units built in 1980 to 1999
12. Percent occupied housing units built in 1960 to 1979
13. Percent occupied housing units built in 1940 to 1959
14. Percent occupied housing units built in 1939 or earlier
15. Total new privately owned housing units authorized
16. 1-unit permits
17. 2–4 units permits
18. 5 units or more permits

Data for each metric originates from the American Community Survey (ACS) 2023 1-year estimates (Tables DP05, S1901, S2503, S2504, S2506) and the U.S Census Bureau Building Permits Survey (BPS) data. The Pearson correlation score is a statistical measure that assesses the linear relationship between two sets of variables, producing a score between -1 and 1. A score of -1 indicates a strong inverse relationship, while a score of 1 indicates a strong positive relationship. Below is the formula used to calculate the Pearson correlation score.

$$r = \frac{\sum_{i=1}^n (X_i - \bar{X}) - (Y_i - \bar{Y})}{\sqrt{\sum_{i=1}^n (X_i - \bar{X})^2} * \sqrt{\sum_{i=1}^n (Y_i - \bar{Y})^2}}$$

Where:

$n$  is the number of paired observations (in our case  $n=18$  as there were 18 metrics of comparison)

$X_i$  represents the metric points for Saint Paul

$Y_i$  represents the metric points for a given comparison city

Cities with the highest Pearson correlation scores (closest to 1) were selected as Saint Paul’s peer cities, with a limit of one city per state. The following cities were selected:

1. Dayton, Ohio
2. Denver, Colorado
3. Des Moines, Iowa
4. Kansas City, Missouri
5. Lansing, Michigan<sup>1</sup>

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<sup>1</sup> While Grand Rapids had a higher Pearson correlation score, we chose Lansing as it is the capital city of Michigan. The difference in scores between Lansing and Grand Rapids was minimal (0.0033).

6. Lincoln, Nebraska
7. Madison, Wisconsin
8. Minneapolis, Minnesota
9. Pittsburgh, Pennsylvania
10. Raleigh, North Carolina
11. Salt Lake City, Utah
12. Sioux Falls, South Dakota
13. Wichita, Kansas

## Other spatial areas

For select metrics, users can view trends for Saint Paul’s 17 neighborhoods. We used the City of Saint Paul’s [District Council GIS layer](#) to map Saint Paul’s neighborhoods.

As eviction filings are handled at the county-level, we display the eviction filings for Ramsey County. Besides Saint Paul, which is the largest city in the county, there are 18 cities in Ramsey County.

The U.S. Department of Housing and Urban Development (HUD) tracks the unsheltered homeless population by the geographic service area, delineated by the Continuum of Care that serves it. For more information on how the Point-in-Time count is collected by the Saint Paul/Ramsey County Continuum of Care, known as Heading Home Ramsey, see [Heading Home Ramsey | Ramsey County](#).

## Data sources

Our primary sources of data are the American Community Survey 1-year and 5-year estimates. As Saint Paul’s population has historically exceeded the ACS 1-year estimate population threshold of 65,000, we are able to track metrics from the 1-year detailed and subject tables over time in the “View trends over time” tab. To include the cities outlying Saint Paul in the regional comparison, we use the 5-year estimates. Since ACS estimates are based on a sample rather than the entire population, there is sampling error. In general, estimates for jurisdictions with smaller sample sizes exhibit greater sampling error. This should be taken into consideration when comparing values across geographies. (Learn more about ACS data from [the U.S. Census Bureau](#).)

The dashboard incorporates other national data sources, such as CoStar, Zillow, and HUD, as well as local data from the City of Saint Paul, HousingLink, Minneapolis Area Realtors (MAR), and the Metropolitan Council.

## Calculating the metrics

### Defining affordability

The area median income (AMI) used across all other metrics in this dashboard is based on HUD’s [Area Median Family Income](#) (HAMFI). HAMFI is calculated to “determine Fair Market

Rents (FMRs) and income limits for HUD programs” and often differs from Census-reported AMI. (Learn more about income limits and rent limits from the [Metropolitan Council](#).)

To remain consistent with federal and state housing programs, our dashboard uses HUD’s definition of affordable housing, which is “housing on which the occupant is paying no more than 30 percent of gross income for housing costs, including utilities” ([HUD Glossary of Terms to Affordable Housing](#)).

## Household demographics

- **Median household income, by tenure:** Household income “includes the income of the householder and all other individuals 15 years old and over in the household, whether they are related to the householder or not” ([ACS 2024 Subject Definitions](#), page 96). We track the median household income for two types of tenure: owner-occupied and renter-occupied units. The former is defined as a housing unit where “the owner or co-owner lives in the unit, even if it is mortgaged or not fully paid for,” while the latter refers to units that are not classified as owner-occupied ([ACS 2024 Subject Definitions](#), page 44).
- **Count of households, by area median income:** For more information about AMI, see the “Defining affordability” section.
- **Homeownership rate, by race/ethnicity:** Race and ethnic categories are mutually exclusive: “White, non-Latino,” “Black, non-Latino,” “Asian, non-Latino,” and “Latino” and are based on race/ethnicity reported by household head. The “Households of color” category includes all households that are not identified as “White, non-Latino households.”
- **Labor force participation:** Labor force participation includes civilians 16 years and over. An individual is employed if they were “at work” or were “with a job but not at work” ([ACS 2024 Subject Definitions](#), page 74). Respondents are considered unemployed if “they (1) were neither ‘at work’ nor ‘with a job but not at work’ during the reference week, and (2) were actively looking for work during the last 4 weeks, and (3) were available to start a job” ([ACS 2024 Subject Definitions](#), page 74).
- **Employment of residents, by city of employment:** The dashboard displays employment statistics for residents of the selected geographic areas with private, primary, and private primary jobs. These employment statistics are based on the Longitudinal Employer-Household Dynamics Origin-Destination Employment Statistics data, which define employment as a worker being “employed with positive earnings during the reference quarter as well as in the quarter prior to the reference quarter” ([OnTheMap Data Overview](#), page 1).

## Housing characteristics

- **Occupied housing units, by type of structure:** If the unit is “the current place of residence of the person or group of people living in it at the time of interview, or if the occupants are only temporarily absent from the residence for two months,” the unit is

considered occupied ([ACS 2024 Subject Definitions](#), page 7). The count of occupied housing units is disaggregated into three categories: “1-unit detached,” “1–4 units attached,” and “Multifamily (5+ units).” According to the ACS, “1-unit detached” are “detached from any other house, that is, with open space on all four sides.” The category “1–4 units attached” includes “1-unit, attached” structures as well as structures with 2–4 apartments ([ACS 2024 Subject Definitions](#), page 46). “Multifamily (5+ units)” includes structures with 5 or more apartments.

- **Occupied housing units, by household income and value level:** For more information about area median income and affordability limits, see the “Defining affordability” section.
- **Age of housing:** The year the structure was built refers to the year when the building was first constructed, not when it was remodeled, added to, or converted ([ACS 2024 Subject Definitions](#), page 53).
- **Vacancy rate:** We show two vacancy rate metrics in our dashboard. The first is the gross vacancy rate, which is the number of vacant units divided by the total number of housing units. The ACS considers a unit vacant “if no one is living in it at the time of interview” or if the units are “occupied at the time of interview entirely by persons who are staying two months or less and who have a more permanent residence elsewhere” ([ACS 2024 Subject Definitions](#), page 8). The second vacancy rate measure is the vacancy rate of apartments, which is defined as “the amount of New/Relet/Sublet space vacant divided by the existing RBA (rentable building area)” ([CoStar Glossary](#)). Residential condos and co-ops are excluded from the pool of apartment buildings used to calculate this vacancy rate.
- **Affordable rental units, by household income:** For more information about AMI, see the “Defining affordability” section.
- **Publicly subsidized housing units:** The Streams data include properties that are affordable to households earning 80 percent of AMI or less. These properties include those that are federally funded, such as through the HOME Investment Partnerships Program, the Low-Income Housing Tax Credit (LIHTC), Project-Based Section 8 Vouchers, Public Housing, USDA Section 515 Rural Rental Housing, and HUD’s Section 202 Supportive Housing for the Elderly, as well as state and locally funded programs, such as the 4D Low Income Rental Classification. Emergency shelters and transitional housing are not included in the Streams data. Our dashboard displays units with end dates later than January 1, 2025. Units without documented end dates are assumed to be active ([About Streams](#)).

## Production

- **Residential housing units permitted, by structure type:** Our dashboard disaggregates the count of residential housing units permitted into three structure types: “Single family,” “Duplex, triplex, and quadplex,” and “Multifamily (5+ units).” The Census

Building Permits Survey categorizes permits into the following types: “1-unit,” “2-units,” “3–4 units,” and “5+ units.” “Single family” is the count of “1-unit” permits of fully detached homes, semi-detached/side-by-side homes, row houses, and townhouses if they are separated by a ground-to-roof wall and do not share utilities. “Duplex, triplex, and quadplex” is the combined number of “2-units” and “3–4 units” permits, and “Multifamily (5+ units)” is the count of “5+ units.”

- **New affordable rental housing units, by household affordability:** The count of new rental housing units is based on building permits collected by the Metropolitan Council through an annual survey of local governments, as well as non-permitted newly affordable units. For more information about AMI and affordability limits, see the “Defining affordability” section.
- **New housing units in H1 and H2 zones, by structure types:** In November 2023, zoning amendments created the H1 and H2 zoning districts, which replaced the single-family R1-R4 districts. The H1 and H2 zones allowed the following permitted dwelling types: one-family, two-family, and multiple-family. According to Sec.66.212. in Saint Paul’s Code of Ordinances, the H1 and H2 residential districts allow for “reuse and/or conversion of existing homes and infill development in existing neighborhoods, lots, and backyards, without having to demolish existing viable housing.” The H2 zoning districts are located “in Neighborhood Nodes and near transit routes along fixed rail and bus rapid transit corridors and high-frequency bus routes” ([Code of Ordinances Sec.66.212](#)).
- **New housing units from commercial conversions, by structure type:** The new housing units displayed in our dashboard “were produced by converting formerly commercial space (including retail, commercial, institutional and industrial type uses) into residential space (including single family, duplex, 3–4 unit, multifamily and congregated-type residential uses)” ([City of Saint Paul Open Information](#)). Only units originating from buildings where no housing units previously existed and at least 10 new housing units were built are shown in the dashboard.

## Price of housing

- **Home prices:** Our dashboard shows two measures of home prices: the 12-month rolling median sales price from MAR and the Zillow Home Value Index (ZHVI). Prices from MAR do not account for seller concessions. The ZHVI measures the typical value for homes in the 35th through 65th percentile range. (Learn more about the ZHVI Methodology [here](#).)
- **Rental prices:** The Zillow Observed Rent Index (ZORI) is the mean of rents in the 35th through 65th percentile range for all rental homes and apartments. (Learn more about the ZORI Methodology [here](#).) CoStar’s market effective rent is the mean effective rent of multifamily apartment buildings (excluding co-ops and residential condos). CoStar defines effective rent as “the average rent paid over the term by a tenant adjusted downward for concessions paid for by the landlord (such as free rent, moving expenses,

or other allowances), and upward for costs that are the responsibility of the tenant (such as operating expense pass throughs)” ([CoStar Glossary](#)).

- **Market asking rent per unit, by neighborhood:** The market asking rent per unit represents the mean value of all 2-bedroom units in multifamily apartment buildings (excluding co-ops and residential condos). The market asking rent is defined by CoStar as the dollar amount the lessor is asking for to lease their building or space ([CoStar Glossary](#)). Additionally, the dashboard displays the 60 percent AMI rent affordability limit, which aligns with government affordable housing programs like the LIHTC and HOME Investment Partnerships Program. To calculate the 60 percent AMI rent-affordability limit, the AMI for a 2-bedroom or 3-person household in the Minneapolis-St. Paul-Bloomington area in 2024 is \$111,800, and the 60 percent AMI is \$67,080 (as per HUD data). If a household should spend no more than 30 percent of its income on housing costs, the 60 percent AMI rent-affordability limit in 2024 is \$20,124, or \$1,677 monthly.
- **Rent and income growth comparison:** When calculating the median gross rent, the ACS excludes units where no rent is paid. The ACS calculates the median household income using linear interpolation. Households without a reported income are included in the distribution. Both median gross rent and median household income are rounded to the nearest whole dollar ([ACS 2024 Subject Definitions](#) pages 19 and 96).
- **Supply of NOAH [naturally occurring affordable housing] rental listings:** HousingLink’s Rental Revue data “observes between 10,000 to 15,000 unique rental vacancy listings per month in the Twin Cities” ([Twin Cities Rental Revue Rental Market Data](#)). For more information about AMI and affordability limits, see the “Defining affordability” section.
- **Housing Choice Vouchers:** The dashboard displays the total number of Housing Choice Vouchers issued annually, as published by HUD. To calculate the “Total vouchers in use, “we multiply the percentage of occupied voucher units by the total number of vouchers issued.

## Housing cost burden

Households are considered “housing-cost-burdened” when they pay 30 percent or more of their household income in the past 12 months toward housing costs. For owner-occupied units, housing costs include “mortgages, deeds of trust, contracts to purchase, or similar debts on the property ... real estate taxes; fire, hazard, and flood insurance on the property; utilities ... and fuels” ([ACS 2024 Subject Definitions](#), pages 38–39). For renter-occupied units, housing costs encompasses gross rent, which is “the contract rent plus the estimated average monthly cost of utilities ... and fuels ... if these are paid by the renter (or paid for the renter by someone else)” ([ACS 2024 Subject Definitions](#), page 19). Household income thresholds are defined by the ACS and are not adjusted for inflation over time.

## Stability

- **Time since moving into unit, by tenure and Year householder moved in:** The year refers to the year of the latest move ([ACS 2024 Subject Definitions](#), page 52).
- **Foreclosure rate, by structure type:** The foreclosure rate is calculated by dividing the total number of foreclosed mortgages by the total number of current, delinquent, and foreclosed mortgages.
- **Eviction filings in Ramsey County:** Eviction filings data are publicly available through the Legal Services Corporation’s Civil Court Data Initiative. The LSC collects data through web scraping, which may not include eviction filings that are sealed, not digitized, or have changed case types. (See more about LSC’s data collection methodology [here](#)).
- **Unsheltered homeless population:** HUD defines the unsheltered homeless population as individuals “sleeping in a place not designed for or ordinarily used as a regular sleeping accommodation (e.g., abandoned buildings, train stations, or camping grounds)” or “outside of a housing structure, but on the property of a housing structure” (e.g., garage or shed) ([HUD Defining Homeless Final Rule](#)).

## Local tax base

- **Median apartment prices:** Our dashboard displays two types of prices: median market value per unit, which reflects the assessed value of the unit from the MetroGIS Parcel data, and the median sales price per unit from CoStar. The sales price data includes public record transactions on apartment units where the sale status is either “sold” or “under contract.”
- **Count of apartment units sold and number of buildings represented:** The count of units sold excludes “under contract” and “for sale” units.
- **Property taxes for apartments:** The calculations of median property taxes paid per unit and total property taxes paid include multifamily apartment buildings and complexes and exclude assisted living and mixed-use properties.
- **Property taxes for single-family homes:** The calculations of property taxes paid by the median-value home and total property taxes paid include owner-occupied single-family properties and exclude non-owner-occupied single-family properties, commercial and nonresidential properties, and vacant residential land.