



CENTER FOR STUDIES IN DEMOGRAPHY & ECOLOGY

UNIVERSITY *of* WASHINGTON



Demographic
Analytics Advisors

Preparing for the 2030 Census: Improving the Enumeration of Seattle's Housing Units

Prepared by

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Table of Contents

0. Executive Summary	4
1. Background.....	6
1.1 Scope of Work (SOW).....	6
1.2 The 2020 Census Count	6
1.3 Postcensal Population Estimates.....	8
1.4 Estimated Fiscal Impact.....	10
1.5 2020 Census & PEP Challenge Options	12
1.5 Outline of Remainder of this Report.....	13
2. Options for Improving Quality of Seattle’s Housing Data with the Census Bureau	14
2.1 Updating the Census Bureau’s Master Address File (MAF)	14
2.2 Population Estimates data provision with WA OFM.....	16
3. Preparing for 2030 Census	17
3.1 Expected 2030 LUCA Timeline	18
3.2 2030 LUCA Resources.....	19
3.3 A Case Study	19
3.4 Group Quarters	26
3.5 Looking Forward	29
References	30
Appendix A: Linking Permit & Parcel Data	31
Appendix B: King County Jurisdiction-Level Population Estimates	34
Appendix C: Group Quarters Classification	37
Appendix D: Non-Census Address Data Sources	38
Appendix E: List of Data Sources Shared with Seattle	39

0. Executive Summary

Background

The 2020 Census population count for Seattle of 737,018 was 3.8% lower than the Census Bureau's Vintage 2020 Population Estimate for April 1, 2020, of 766,214. Seattle's 2020 Census count of 368,308 housing units was 2.0% lower than Washington Office of Financial Management's (now superseded) 2020 post-censal estimates of housing units. The development of a complete address list to support the decennial census is critical to the accurate measurement of an area's population. Addresses define the census universe for points of contact, enumeration and tabulation. Decennial census counts of population and housing and their derivatives are factors that drive federal funding allocations of many types including education, housing, community development, federal transit, and many other grants. The first step the city of Seattle should take to ensure the most complete 2030 Census enumeration would be participation in the Census Bureau's Local Update of Census Addresses (LUCA) program.

The 2020 Census also impacts the Census Bureau's post-censal population and housing units estimates produced by the Population Estimates Program (PEP). PEP estimates serve as annual eligibility and allocation factors for many federal formula grants throughout the decade. In Vintages 2021-2023, published since the 2020 Decennial Census, Seattle's population estimates are recovering some of the gap between estimates of Seattle's population and the 2020 Census count. However, the Vintage 2023, July 1, 2023, Population Estimate was still 11,136 below the previously mentioned Vintage 2020 estimate. Focusing on HUD formula grants alone, we estimate that, if that difference of 11,136 represents real individuals, Seattle may have experienced a \$42,650.88 reduction in HUD formula grants per year, or \$426,508.80 over the decade.

Recommendation: The City of Seattle should invest in preparing for, and participating in, the Census Bureau's 2030 Local Update of Census Addresses (LUCA). Further, we recommend Seattle hire more personnel (even if only temporarily) if necessary to prepare for 2030 LUCA. In decades past, Seattle has not participated due to addressing data limitations. The new limited scope of 2030 LUCA — only addresses or Census blocks where issues with the Census Bureau's MAF are suspected—makes participation more feasible. Seattle should also participate in the Census Bureau's New Construction Program as they have in the past. Both programs will help to improve accuracy of housing unit, group quarters, and ultimately the population counts in the 2030 Decennial Census and subsequent Census Bureau data products.

Recommendation: To prepare for 2030 LUCA, we recommend Seattle:

- 1) **Identify** Census blocks where local data conflicts with Census Bureau Current Address Count Listing block-level data (updated biennially);
- 2) **Collect and compare** all available local data on housing unit counts and locations within those Census blocks;
- 3) **Corroborate** with Seattle's MAF unit listing for those blocks or identify areas for improvements in addressing data (particularly for multi-family housing units);
- 4) **Perform** on-the-ground validation including calling building managers or visiting the property to photograph meters or address information for the limited cases when the above activities do not yield definitive unit counts and/or addresses; and,
- 5) **Purchase** localized address lists from a recommended provider for the even rarer cases when all other activities do not yield definitive unit counts and/or addresses.

Note: depending on the volume and location of Census blocks for which the first three steps do not provide definitive unit counts and addresses, Steps 4 and 5 may be interchangeable or preferable in the opposite order. The data prepared by this process will be compared to the contents of the Census Bureau's MAF as part of the 2030 LUCA Program.

Recommendation: To prepare for 2030 LUCA, we recommend Seattle City Light begin to include residential and commercial indicators for each address when sharing address information for Seattle's MAF.

Recommendation: When participating in 2030 LUCA, we recommend Seattle prioritize the following information in the Census Bureau's MAF:

1. Unit-level addresses in blocks with recently completed permits for multi-family buildings, and other blocks with significant single family housing growth or turnover;
2. Geographic locations of housing units in or adjacent to Census water blocks; and,
3. Geographic locations and definitions of group quarters according to the Census Bureau.

1. Background

1.1 Scope of Work (SOW)

The Center for Studies in Demography & Ecology (CSDE) at the University of Washington (UW) was contracted to help improve the quality of housing unit data the Census Bureau has for the city of Seattle and understand and decrease the discrepancy between Census data and local data sources. *This report specifically addresses Task 9 of the SOW by identifying additional actions available to Seattle for improving the enumeration of the housing unit base in preparation for the 2030 decennial Census.*

In the remainder of Section 1 we describe the unexpectedly low 2020 Census counts for Seattle's population and housing units and its potential impact on the amount of federal funding the city will receive throughout the 2020 decade. We summarize previous research on the ways in which the Census Bureau allows cities to challenge official 2020 decennial counts or post-2020 annual estimates, and the limitations of these processes in Seattle's case. Section 1 concludes with an outline the rest of the report which focuses on looking to the future 2030 Census and the official processes provided by the Census Bureau for cities to update and improve existing housing data before the next decennial census begins.

1.2 The 2020 Census Count

The 2020 Census count of the population of the city of Seattle was 737,015. This is 3.2% lower than [estimated](#) by the Washington Office of Financial Management (WA OFM) had generated for the city's April 1, 2020, population before the Census Bureau released results of the 2020 Census. Moreover, this is 3.8% lower than Seattle's Census Bureau April 1, 2020, [population estimate](#) of 766,214 published before the 2020 Census. This has implications for the allocation of many different types of federal funding.

At the Census tract and block level, the 2020 Census counts include [differential privacy](#) for the first time. However, housing unit counts are not subject to differential privacy. The April 1, 2020, Census housing unit count for Seattle was 368,308. [King County Assessor's \(KCA\) tax parcel dataset](#) (Downloaded October 2023) reports 378,333 units with a year built of 2020 or earlier, just over 10,000 units more than the 2020 Census. Figure 1 shows the tract-level difference between the 2020 Census count of housing units and the number of housing units built in 2020 or earlier according to the KCA tax parcel data. Most of the Census tracts where the 2020 Census count of housing units are much lower than the City's count are in areas such as Capitol Hill, Downtown, the CID, and South Lake Union, where new construction of large multi-family homes is ongoing.

Seattle Housing Units by Tract
Census - KCA (2020)

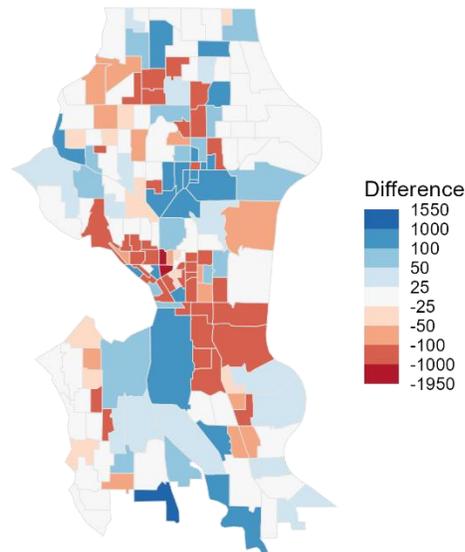


Figure 1: Tract-level differences in Census housing unit counts and local data (2020).

The housing unit difference is calculated as the decennial Census housing unit count (April 1, 2020) and the sum of all single- and multi-family units in the King County Assessor’s tax parcel data within a tract with a recorded build year of 2020 or earlier.

It is impossible for us to know whether the 2020 Census population count was truly a population undercount, and, if it was, by how much. However, the differentials in housing unit counts for Seattle as a whole and for tracts, suggest there may be a *housing unit* undercount. The Census Bureau defines a housing unit as

“an apartment, a group of rooms, or a single room occupied or intended for occupancy as separate living quarters. Separate living quarters are those in which the occupants do not live and eat with other persons in the structure and which have direct access from the outside of the building or through a common hall.” [1]

Decennial Census population counts and subsequent postcensal estimates (Section 1.3) are used as inputs to determine the amount of federal funding a state, county, or city may receive for certain funding programs, particularly Community Development Block Grants (CDBGs). [2-4] If many of these units were, in fact, occupied or occupiable on April 1, 2020, but not enumerated in the 2020 Census, this may be a major cause of the low population count, impacting federal funding. We discuss the financial impact on Seattle in more detail in [Section 1.4](#).

1.3 Postcensal Population Estimates

Throughout the postcensal period, the Census Bureau's Population Estimates Program (PEP) produces their annual estimates of Seattle's population and housing units using the 2020 Census population and housing units count as a base. Published annual estimates are referred to as vintages, with post-2020 Census vintages providing estimates of population and housing units for July 1, 2020, and each subsequent July 1 through the vintage's date. For example, Vintage 2022 would contain estimates for July 1, 2020, July 1, 2021, and July 1, 2022.

Annual Population Estimates are published first for each state and county, using the cohort-component method to project the populations forward from April 1, 2020. This method relies on vital registration to account for births and deaths and IRS tax returns along with information from Medicare and the Social Security Administration to account for migration. [5] Annual housing units estimates within states and counties are produced by adding new residential construction from the Building Permits Survey (BPS), new mobile homes from the Manufactured Homes Survey (MHS), and subtracting lost housing units due to demolition or natural disaster. [6]

Following the publication of state and county estimates, the PEP publishes estimates at the sub-county level for jurisdictions and unincorporated portions of counties. Using the same previously mentioned housing data sources as in state and county estimates, the PEP attributes a county's household population to each sub-county area by multiplying the number of housing units by the average number of persons-per-housing unit (PPHU) in the 2020 Census for each Census block. [7] Some iterative adjustments are then made at the jurisdiction-level so that the sum of all sub-county area household populations equals the county's household population total. Total population estimates at the state, county, or sub-county level include updated information on the group quarters' population from each state's [Federal-State Cooperative for Population Estimates \(FSCPE\)](#) agency.

PEP Vintages are used to allocate federal funding for CDBGs and other formula grants throughout the decade between decennial censuses. [3] An undercount of housing units in the 2020 Census will impact Seattle's PEP estimates starting housing units value, or housing units base, but only building permit data determine the post-censal estimate values in each year's PEP Vintage. Thus, a housing unit undercount in 2020 may also impact federal grant funding throughout the decade.

1.3.1 Seattle's Population Estimates: Vintages 2020-2023

The Census Bureau's Vintage 2020 Population Estimates were the last of the estimates produced that used the 2010 Census as their base, and provide a population estimate for April 1, 2020, of 766,214 for Seattle (See Figure 2.)

The Vintage 2021 & 2022 Population Estimates show a large population increase for the city of Seattle between July 1, 2021, and July 1, 2022. In contrast to Vintage 2020, these estimates use the 2020 decennial Census count of housing units and subsequent building permits as inputs. The estimated population increase includes an increase of 6,664 in group quarters population (Vintage 2022 Derivation Sheet). It is likely this increase reflects a combination of factors including the correction of data collection problems due to the COVID-19 pandemic as well as actual population change. Despite showing a large increase in Seattle's population, the Census Bureau's estimate of population change between the 2020 Census and July 1, 2022 (Vintage 2023), is 13,000 persons less than the change measured by OFM in their latest official estimates for April 1, 2022.

On May 16, 2024, the Census Bureau published the Vintage 2023 Sub-County Population Estimates. Seattle's population estimate grew by 5,944 (out of the 6,069 individuals added to King County from birth certificates, death certificates, and IRS tax filings) from 749,134 for July 1, 2022, to 755,078 for July 1, 2023. More than 99% of this change is due to estimated changes in the household population, with the estimated group quarters' population remaining nearly constant. *As Figure 2 shows, the April 1, 2020, Population Estimates base for Vintages 2022-2023 was 29,196 people lower than the Vintage 2020 April 1, 2020, Population Estimate. The Vintage 2023 Population Estimate for July 1, 2023, shrinks this gap by two-thirds, but is still 11,136 people lower than the Vintage 2020 April 1, 2020, estimate.*

For each Vintage published since the 2020 decennial Census (2021-2023), we requested Seattle's Derivation Sheet from the Population Estimates Challenge Program (PECP). *These can be requested as soon as sub-county estimates are published for each Vintage, and we encourage Seattle to continue requesting them throughout the decade.* Recall that to make sub-county estimates of the household population, the PEP first produces an "uncontrolled" household population estimate for each jurisdiction within a county and then applies a raking factor so that the sum over all jurisdictions' populations equals the county total. Seattle's raking factors in Vintages 2021-2023 were 0.9802, 0.9655, and 0.9523 respectively. *This implies that in each vintage, some of the household population allocated to Seattle based on its total number of issued building permits is being redistributed to smaller King County jurisdictions to ensure jurisdictions sum to county totals.*

1.4 Estimated Fiscal Impact

The annual Population Estimates produced by PEP provide inputs for many formulas used to calculate the amount of federal grant dollars allocated to a jurisdiction. Of course, not every federal allocation of funding is dependent directly on population size. So-called formula grants allocate federal money based on different formulas, many of which use information beyond just population size estimates. Measures such as population in poverty, per capita income, housing and household statistics are derivatives of current estimates from the PEP, because the PEP statistics are used to weight survey responses and ultimately drive the output of final products.

As one example of impact, we focus solely on money Seattle received from the Department of Housing and Urban Development (HUD), which allocates funds to jurisdictions directly, to provide a more detailed look at the potential impact of low decennial counts or population estimates. During 2020-2023, Seattle received four types of funding from HUD, each with different allocation formulas:

- 1) **CDBGs:** use Population Estimates (weight – 25%), population in poverty (50%), and population in rural areas (25%);
- 2) **Emergency Solutions Grants (ESGs):** use a fixed proportion of CDBGs jurisdictional allocations from the year prior;
- 3) **HOME Investment Partnerships Program (HOME):** use Population Estimates multiplied by net per capita income (10%), number of rental units where the head of household's income is at or below the poverty line (10%), number of families at or below the poverty line (20%), number of occupied rental units with at least one of four problems (overcrowding, incomplete kitchen facilities, incomplete plumbing, or high rent costs) (20%), number of rental units built before 1950 and occupied by poor households (20%), and the overall number of occupied rental units with at least one of the four previously mentioned issues (20%); and
- 4) **Housing Opportunities for Persons With AIDS (HOPWA):** uses Population Estimates for jurisdictional eligibility, but not allocation.

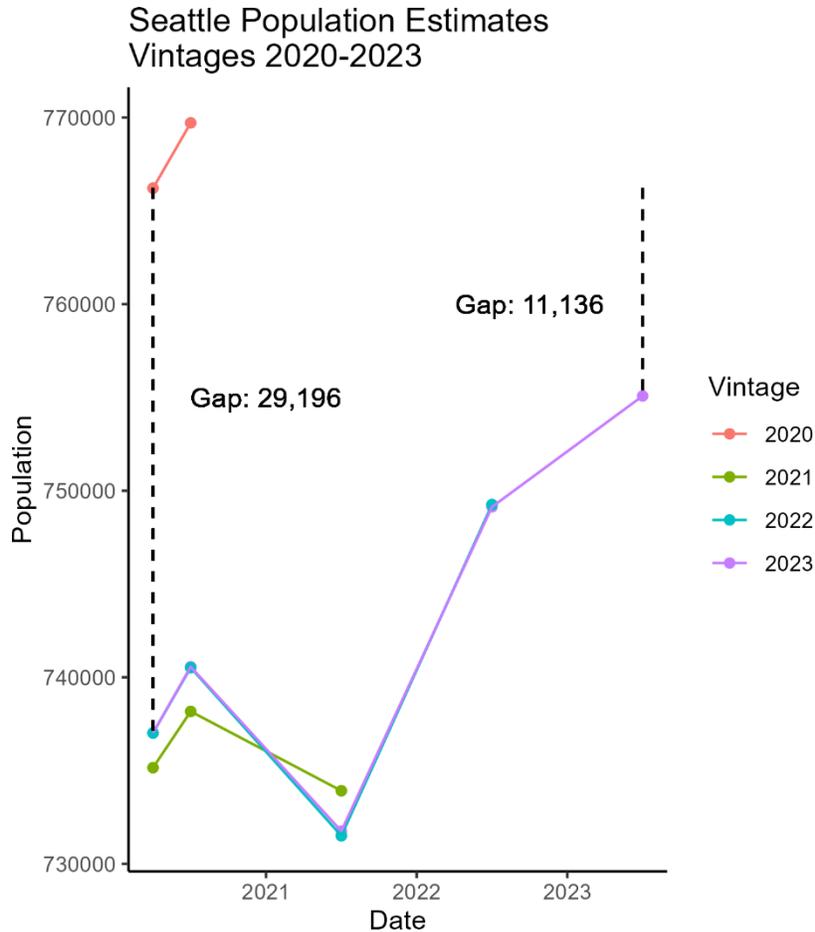


Figure 2. Seattle’s Population Estimates (Vintages 2020-2023). Vintage is indicated by color, with Vintage 2020 being the last set of Population Estimates to be produced using the 2010 Census as a base. Where you cannot distinguish Vintages 2022 & 2023, these estimates overlap exactly. Dashed lines indicate vertical distances between the Vintage 2020 April 1, 2020, estimate and the corresponding estimate.

We will proceed by looking at the three formula grant types that make direct use of Population Estimates in their formulas: CDBGs, ESGs, and HOME. Table 1 shows the amount received by Seattle for each grant type and year from 2020 to 2024. The last two columns show the weight given to Population Estimates in determining that amount and that same proportion of money for each grant type averaged over the 5-year period. We took a very conservative approach in measuring impact to only include direct uses of the population estimates and not their derivatives. On average, over the past 5 years, Seattle received \$2,898,143 from HUD that was directly dependent on Population Estimates. Dividing this amount by the Vintage 2023 July 1, 2023, Population Estimate of 755,078, yields \$3.83 per person per year. Returning to Figure 2, the gap between Vintage 2020 July

1, 2020, and Vintage 2023 July 1, 2023, estimate is 11,136 people. Applying the \$3.83 per capita in HUD dollars influenced by Population Estimates would indicate an approximate reduction in funding of negative \$42,650.88 per year, or \$426,508.80 over the decade. This is a rough estimate, relying on a difference in population we cannot definitively account for, and only addresses formula grants from one single agency. but provides an example of the level of financial impacts that can result from decennial undercounts and subsequently under-estimated Population Estimates.

Table 1. Formula grants made to the City of Seattle by the Department of Housing and Urban Development over the period 2020-2024 that depend directly on Population Estimates.

Year	CDBG	ESG	HOME	Total
2020	\$9,586,332	\$820,644	\$3,390,613	\$13,797,589
2021	\$9,533,942	\$817,674	\$3,371,865	\$13,723,481
2022	\$9,401,742	\$801,427	\$3,650,525	\$13,853,694
2023	\$9,486,805	\$826,314	\$3,717,743	\$14,030,862
2024	\$9,054,023	\$833,790	\$2,869,684	\$12,757,497
Pop Ests %	25%	25%	10%	–
Avg. Portion	\$2,353,142	\$204,993	\$340,009	\$2,898,143

1.5 2020 Census & PEP Challenge Options

In our previous contract PC022-18, we researched and reported on the mechanisms provided by the Census Bureau for jurisdictions to challenge either the 2020 Census counts or the Population Estimates. While more detail can be found in the Final Report for contract PC022-18, we briefly summarize the challenge mechanisms below.

There are 3 possible programs the Census provides to local jurisdictions for challenging their counts or estimates of the household population:

1. The [Census Count Question Resolution \(CQR\) Program](#), focused on challenging geographic information about population counts and housing units *enumerated* in 2020 Census;
2. The [Population Estimates Challenge Program \(PECP\)](#), focused on challenging housing data (permits, demolitions, and mobile homes) used in each annual PEP Vintage; and,
3. The [Special Census](#), a jurisdiction-funded full or partial re-enumeration.

The initial theory of new housing units not being enumerated in the 2020 Census rendered the CQR inappropriate as it focuses only on issues with housing enumerated in the decennial Census. The Special Census is costly and *always* results in an undercount--

permanent residents of Seattle who are away will not be enumerated elsewhere as they are in a nationwide Census. A PECP challenge must be submitted within 90 days of the publication of the Vintage a jurisdiction wishes to challenge.

While the 2020 Census provided a potentially low base for Seattle, Vintage 2022 showed a large jump in population (Figure 2). Due to the short turnaround time, it was decided in the last contract that Seattle would not challenge Vintage 2022. Instead, we would work with WA OFM to ensure accurate data was submitted as an input to Vintage 2023 and wait to see if the upward trend continued with Vintage 2023. (See [Section 2.2](#) for more detail.)

1.5 Outline of Remainder of this Report

In subsequent sections of this report, we summarize the options available to Seattle for improving the accuracy of the Census Bureau’s housing unit data throughout the remainder of this decade (Section 2) and in preparation for the 2030 Census ([Section 3](#)). Section 3 also contains detailed information on the timeline for the 2030 Local Update of Census Addresses (LUCA) ([Section 3.1](#)) and tools provided by the Census Bureau to aid jurisdictions in their participation ([Section 3.2](#)), a case study on a subset of 200 Census Blocks showing how to use those tools and identify discrepancies between Census Bureau and local data ([Section 3.3](#)), and a summary of the timeline and potential cost of Seattle’s preparation and participation in LUCA for the 2030 Census ([Section 3.4](#)).

2. Options for Improving Quality of Seattle’s Housing Data with the Census Bureau

2.1 Updating the Census Bureau’s Master Address File (MAF)

The Census Bureau relies on its Master Address File (MAF) to determine the frame of housing units to be surveyed in each decennial census or survey, such as the American Community Survey (ACS). If the hypothesis that newly constructed multifamily housing units in Seattle may not have been enumerated in the 2020 Census holds, the addresses of those units must have been missing from the MAF used in the 2020 Census. In this Section we outline a few options for improving the completion and accuracy of Seattle addresses contained in the Census Bureau’s MAF ahead of the 2030 Census.

2.1.1 Local Update of Census Addresses (LUCA)

The [Local Update of Census Addresses \(LUCA\)](#) program occurs prior to each decennial census and facilitates the review and transfer of housing unit and group quarter address data from jurisdictions to the Census Bureau. The Census Bureau then incorporates this data into their MAF in conjunction with integrating address information from the United States Postal Service. Satellite imagery data such as Google Maps, parcel and building footprint data, and address validation software are all used by the Census Bureau to validate this data. As part of the LUCA program, jurisdictions who elect to participate in LUCA may access their portion of the Census Bureau’s MAF.

To participate in LUCA, a jurisdiction must have unit-level addresses for multi-family units. Unfortunately, the addresses contained in KCA tax parcel and Seattle building permit data do not contain this information. Seattle has its own MAF based on data provided by Seattle City Light. Though Seattle’s MAF contains unit-level addresses, it does not contain a distinction between residential and commercial properties. In the majority of cases, with proper querying, the number of unique unit-level addresses in Seattle’s MAF assigned to a KCA parcel matches exactly and we can be confident these are correct city-level addresses for that multi-family building. Still, there are some blocks for which there are more unique addresses than reported housing units according to KCA parcel data and/or Seattle permitted data. Since units—as defined by Seattle City Light—correspond to meters and unique billing addresses, we expect Seattle’s MAF to be missing some additional dwelling units (ADUs) and detached additional dwelling units (DADUs) on the same meter as other housing units.

For the first time, the 2030 LUCA will require jurisdictions to submit data on only those addresses which are incorrect or have incorrect geographic attribution in the Census Bureau’s MAF or that are missing from the Census Bureau’s MAF. Despite the issues with

small portions of addressing data in Seattle's MAF, the more limited scope of the 2030 LUCA, and reduced level of effort as compared to previous years means Seattle's participation in the 2030 LUCA should be more feasible than it was for the 2020 Census.

In Sections 3.1 & 3.2 we describe the 2030 LUCA timeline and the new tools released by the Census Bureau to help jurisdictions identify locations in Seattle where the Census MAF may be of poor quality. In [Appendix A](#), we outline in detail the process we developed for linking KCA tax parcel data, Seattle permitting data, and the Seattle MAF in Census blocks with the greatest difference between local data and the Census Bureau's MAF. Performing this or a similar process, such as that undertaken by the NYC Department of City Planning [9], will enable the submission of unit-level addresses from Seattle's MAF. In Section 3.3 we present the results of a case study on 200 Census blocks in Seattle with the largest housing unit data discrepancies.

2.1.2 New Construction Program

In addition to LUCA, the Census Bureau's New Construction Program provides jurisdictions with the opportunity to submit unit-level addresses for new construction at the end of the decade. The Census Bureau has not made announcements for the 2030 program yet, but the 2020 Program ran from April 2019 – January 2020. As part of the 2020 Program, jurisdictions were able to submit unit-level addresses for any housing units under construction by March 1, 2018, that were expected to be complete by April 1, 2020.

Seattle participated in the 2020 New Construction Program, and we recommend continued participation in the program for the 2030 Census. In the absence of a formal announcement, we expect the 2030 New Construction Program to follow a relatively similar timeline as the 2020 New Construction Program.

2.1.3 RDC or Internal Census Bureau Projects

Should Seattle want access to the Census Bureau's MAF earlier than the 2030 LUCA timeline allows, this could potentially be done in one of two ways: 1) submitting a research proposal via the Northwest Federal Statistical Research Data Center (NWFSRDC) on UW's campus or 2) working with the Census Bureau to develop an internal project. The process of project approval is lengthy (up to 1 year) and involves a member of the team getting [Special Sworn Status \(SSS\)](#) from the federal government which can take 3-4 months. Access to the [Northwest Federal Statistical Research Data Center \(NWFSRDC\)](#) can be facilitated by the [Center for Studies in Demography & Ecology](#) at the University of Washington.

Accessing the Census Bureau's MAF as part of LUCA will be much easier than attempting to engage in an RDC or internal research project with the Census. Both monetary and labor

resources could be reserved for doing data synthesis and on-the-ground research work on Seattle's housing units and Seattle's MAF, instead of preparing a research proposal.

2.2 Population Estimates data provision with WA OFM

Each annual PEP Vintage is produced using updated data on all permits from April 1, 2020, to July 1st of the Vintage year. *For Vintage 2023, CSDE and the City of Seattle worked with WA OFM, Washington's designated FSCPE to understand thoroughly the process of data submission.*

Annually PEP collects updated jurisdiction-level information on either issued building permits or completed permits for each July 1st-July 1st period. While Seattle has permit completion information, we learned that not all other jurisdictions within King County have this information in a readily available format. As Seattle, and King County, are growing rapidly, the number of issued permits in Seattle in each year of this decade is larger than the number of completed permits. Recall that PEP sub-county household population estimates are made by attributing the county's population to jurisdictions according to the proportion of the county's housing units each jurisdiction contains.

If Seattle were to switch to completed permits while other jurisdictions submit issued permits, the proportion of King County's population attributed to Seattle would inappropriately small. Subsequently, the PEP household population estimate would be inappropriately deflated. As such, the decision was made to follow other King County jurisdictions in submitting issued building permits.

Through meetings with King County Demographer Rebeccah Maskin and Bellevue City Demographer Bryce Williams-Tuggle, we learned that both unincorporated King County and Bellevue keep information on timing of completed permits. Combined, Seattle (39.2%), Bellevue (6.5%), and unincorporated King County (9.2%) comprise 54.9% of King County's housing units. *If (at minimum) each of these three jurisdictions began to submit completed permit information in the same year, Seattle's sub-county PEP estimates could be based on more accurate housing information for over half of the county's housing units without inappropriate decreases to any one jurisdiction's household population estimates.*

Following the PEP’s methodology, we created population estimates for each King County jurisdiction using the Census Bureau’s December 2024 Current Address Count Listing, i.e. housing unit counts, at the Census block level (See [Appendix B](#)). We compare the Current Address Counts to the data reported on issued permits during the BPS and find there are several fast-growing King County jurisdictions whose BPS permit reports are much larger than the housing unit counts from the Census Bureau’s MAF. In turn, the population estimates we produced using Current Address Counts are much larger than the PEP Vintage 2023 estimates in these areas. Relative to local population, Black Diamond is the most impacted King County jurisdiction, but North Bend, Duvall, Woodinville, Bothell, and Redmond also have large impacts. *These results further highlight the need for Seattle, King County, and other King County jurisdictions to work together to address potential issues with Population Estimates that may be resulting from rapid growth.*

3. Preparing for 2030 Census

We recommend the City of Seattle participate in the 2030 LUCA program. Seattle has not previously participated in LUCA, as it required the submission of unit-level addresses for all Seattle housing units. (See [Section 2.1.1](#) for more detail.) In the 2030 LUCA, jurisdictions will submit only the following data:

- 1) residential addresses missing from the Census Bureau’s MAF,
- 2) an indication to delete residential addresses from the Census Bureau’s MAF that do not exist, and
- 3) corrections to geographic locations of residential addresses.

While ensuring the entirety of Seattle’s MAF has accurate unit-level addressing information, especially for large multi-family homes, would be an enormous task, we believe the 2030 LUCA model of submitting only data where Seattle finds discrepancies with the Census Bureau’s MAF to be achievable.

To participate in 2030 LUCA, Seattle will need to:

- 1) identify Census blocks where local data conflicts with Census Bureau Current Address Count Listing block-level data;
- 2) collect and compare all available local data on housing unit counts, locations, and addresses within those Census blocks; and
- 3) corroborate the Seattle MAF’s unit listing for those blocks or identify improvements in addressing data for certain multi-family housing units

The resulting data products of this work will be brought into the secure computing environment provided for Seattle to review the Census Bureau's existing MAF and identify addresses that need to be added, deleted, or updated.

In the remainder of this section, we describe the Census Bureau's proposed 2030 LUCA timeline ([Section 3.1](#)) and newly announced resources from the Bureau that jurisdictions can use to prepare ([Section 3.2](#)).

In a small case study ([Section 3.1.3](#)), we share the results of applying our suggested workflow ([Appendix A](#)) to identify 200 Seattle Census blocks with large discrepancies between Census and local data sources, and link local housing unit information using GIS methods where possible and by-hand decision making when needed. This case study demonstrates the use of several of the new tools the Census Bureau rolled out to aid jurisdictions in their preparation for the 2030 LUCA. We also met with the former and current New York City demographers at the New York City Department of Planning as part of this contract to discuss the workflow we developed which is similar to their preparation for 2020 LUCA. [8]

3.1 Expected 2030 LUCA Timeline

Below we provide the Census Bureau's proposed [2030 LUCA timeline](#).

Early 2027 - Mid 2027: Prepare to Participate in LUCA

- Governments learn details about LUCA, set up accounts, and get registered.
- Gather materials to support the process of reviewing the address list once the review period opens.
- Practice conducting an address-level review. Submissions will not be accepted at this time, but there will be opportunities for training and hands-on practice.

Late 2027 - Early 2028: Review Address List and Submit Changes

- Continued opportunity to learn about LUCA, set up accounts, and get registered.
- Governments review the Census Bureau's address list and submit suggestions to add residential addresses, delete residential addresses that do not exist or update the geographic location of residential addresses.
- There will be a firm deadline for LUCA submissions so that the Census Bureau has time to process submissions and ensure all eligible addresses are included in the 2030 Census.

Early 2029: Receive Feedback on LUCA Submissions and Option to Submit Appeals

- Governments receive address-level feedback on how their submissions are incorporated into the Census Bureau’s address list.
- Governments must submit any appeals within 45 days of receiving feedback to the Office of Management and Budget (OMB).

Late 2029: Closeout

The closeout phase marks the end of governments’ access to confidential LUCA materials.

3.2 2030 LUCA Resources

In Table 2, we summarize the list of [2030 LUCA resources](#) advertised by the Census Bureau. These resources are integral to identifying Census blocks, block groups, or tracts with large discrepancies between Census Bureau data and local housing data.

The serial nature of the new Current Address Counts—released for each January 1st and July 1st—allow one to compare local block-level housing unit data to continuously updated Census Bureau MAF address counts throughout the decade. This provides timely insight into whether new housing units are being added to the Census Bureau’s MAF as they are completed, and, thus, identification of Census blocks for which Seattle will need to provide address information during 2030 LUCA.

The Address Geocoder can be particularly helpful in identifying mismatches between the geographic information (e.g. Census block) the Census Bureau associates with an address and the geographic information contained in local data. The Response Outreach Area Mapper (ROAM) can help identify areas where investments in other types of initiatives designed to increase Census response rates may be particularly helpful.

3.3 A Case Study

Following the workflow outlined in [Appendix A](#), we linked KCA tax parcel and Seattle permitting data for 200 Census blocks. These blocks were chosen based on discrepancies between Census Bureau data and KCA and permitting data (Appendix A: Step 2). (Note: the population estimates methodology applied to Current Address Counts in [Section 2.2](#) provide a Census block-level flag for differences in the Current Address Count and the 2020 Census count. This workbook provided with our final report has flagged potential Seattle Census blocks of interest based on this metric alone.) According to KCA data, these blocks contain 48,973 multi-family housing units and 1,057 single family units. Permitting data contains construction permits for 42,313 units. This triaging step makes use of the Current Address Counts and the 2020 Census housing unit counts described in Table 2.

The resulting data product has 2,704 rows where each row represents either a:

- 1) permit-parcel combination (56%),
- 2) parcel not matched to a building permit (43%), or
- 3) building permit not matched to a parcel (1%).

By linking KCA parcels with Seattle's permitting data, we are able to compare two sources of data for that property's number of housing units and get finer grain information on the date of completion from permitting data.

The output of this linkage process allows one to perform the following tasks:

- Compare the number of completed housing units in a Census block by quarter and year (i.e. April 1st, July 1st, October 1st, and December 31st) to releases of the Current Address Counts to assess if new construction is being accurately observed by the Census Bureau.
- Run the parcel and permitting addresses through the Census Bureau's batch Address Geocoder to return the Census block to which the Census's geocoder assigns each address. Then, compare this information at the Census block level to the Census's Current Address Counts and link local data to illuminate the nature of discrepancies between the data sources.
- Further link the local housing data to Seattle's MAF. The Census block-level unit counts can help one understand the expected number of unique unit-level addresses and help determine which addresses are residential and which, if any, addresses in the MAF are duplicates.

Where the automated processes of this workflow or the by-hand linkage or on-the-ground research are not sufficient to identify the correct unit-level addresses for a Census block, Seattle may find purchasing a localized address list for the zip code containing that block. (See [Appendix D](#) for details.)

Table 2. Census Bureau resources to help jurisdictions prepare for the 2030 Census and participation in the 2030 Local Update of Census Addresses (LUCA). Where available, we provide links to downloadable datasets (usually in the form of .csvs) and interactive web browsers that allow for the visualization of data on a map. The Census Bureau Address Geocoder allows for the manual entrance of single addresses or the uploading of many addresses at once via spreadsheets in batches of 10,000 or less.

Resource	Description	Data	Map Viewer
2020 Census Address Counts	Census block-level 2020 housing unit and group quarters counts; useful for identifying blocks where Census and data differ Dated: April 1, 2020	Link	Link
Current Address Counts	Census block-level housing unit and group quarter counts; useful for identifying blocks where Census and local data differ Dated: January 1 and July 1 beginning 2022	Link	Link
Response Outreach Area Mapper (ROAM)	Census tract-level information on Census survey response rates; useful for understanding areas of Seattle that may have low response rates even if surveyed, could help triage other forms of 2030 Census preparation		Link
Address Geocoder	Submit addresses and receive the Census geographies	<div style="background-color: black; color: white; padding: 2px; text-align: center;">Batch File Processor</div> Link	

	to which that address is assigned
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3.3.1 Overall unit counts

For the 200 Census blocks in our case study, Table 3 shows the aggregate counts of housing units and group quarters by completion date along with available Census data counts or estimates at the block level. The synthesized KCA parcel and Seattle permitting data show over 5,000 more housing units as of April 1, 2020, than the 2020 decennial Census count. The local data shows annual housing growth that is increasing yearly, with a July 1, 2023, housing unit count of 49,941 for these blocks. The gap between this count and the Census Bureau data has grown to over 12,000 units as of the Current Address Count for July 1, 2023. Spatially joining on Seattle’s MAF to the linked parcel and permit data, and filtering down to active addresses, we find 38,751 unique addresses in this area within Seattle’s MAF, still over 1,000 more than the July 1, 2020 ,Current Address Count. It’s likely some of these housing units are assigned by the Census Bureau to other blocks beyond the 200 studied, but our analysis cannot determine how many. Further, some may be group quarters, but this is discussed in more detail in [Section 3.4](#).

Table 3. Total number of housing units and group quarters in case study area by date in KCA parcels combined with Seattle permitting data and Census Bureau data sources.

Date	Housing Units		Group Quarters	
	Local Data	Census Bureau	Local Data	Census Bureau
April 1, 2020	26,595	21,097	36	-
July 1, 2021	31,573	-	38	-
July 1, 2022	38,719	-	38	-
July 1, 2023	49,941	37,696	38	76

As of July 1, 2023, the Census Bureau counts double the population of group quarters as local sources. It is also plausible that some of the units counted by local data sources as housing units are being considered by the Census Bureau as group quarters.

3.3.2 Completion time of new construction

Of the 2,704 rows of the linked data product, 2,680 (99%) contain parcel information, and 1,140 (43%) do not have permitting data. Of those without permitting data, 65% of them are recorded in the KCA parcel data as having been built before 1990 when our permitting dataset begins.

Focusing on new construction (KCA parcel year built 2018-2022), Figure 3 shows that most housing units' building permits were finalized *after* the reported calendar year in the KCA parcel data. Several thousand units were *not* completed by April 1, 2020 (represented by the solid grey line in each panel).

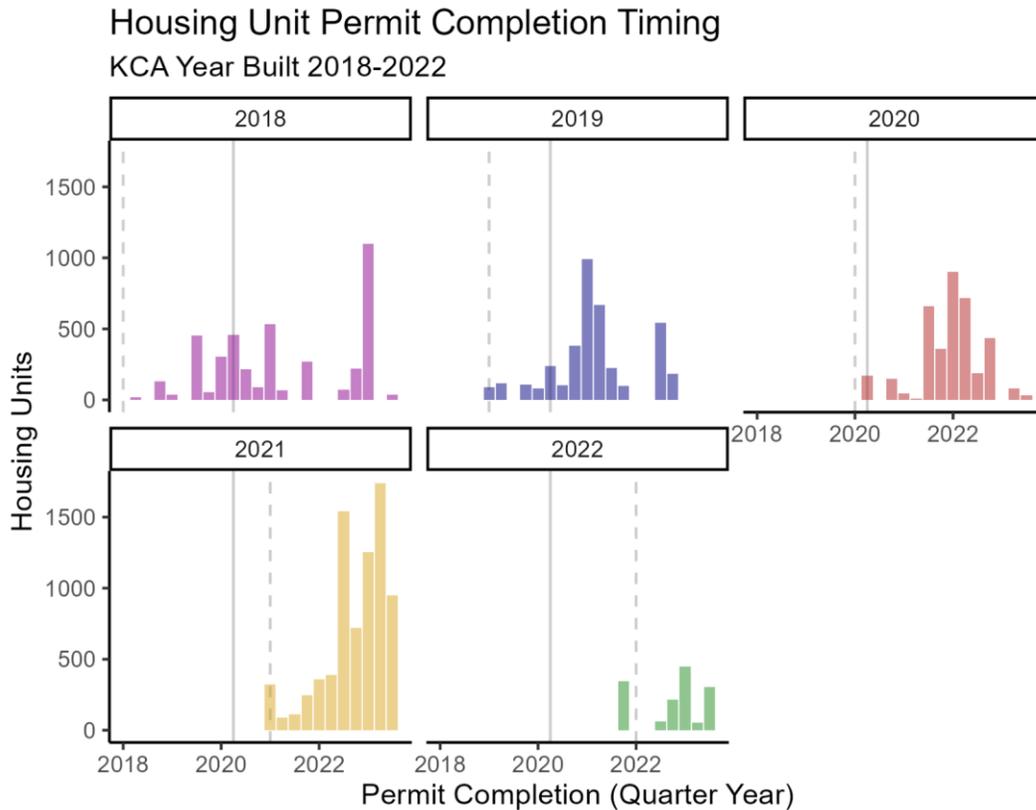


Figure 3. Housing units by permit completion date (x-axis) and KCA parcel year built (panel) for 2019-2021. Each panel shows the number of housing units (y-axis) in the case study by permit completion dates in quarter-years (x-axis). Dashed grey lines indicate the beginning of the calendar year for the KCA parcel year built of the housing units considered in each panel, and solid grey lines indicate April 1, 2020—Census Day.

In many of the 200 Census blocks in our case study where the 2020 Census housing unit count was below the KCA parcel unit count, the gap in housing units closes with the release of updated Current Address Counts. Further, Table 4 reports the number of housing units with building permits assigned to KCA parcels with reported year built

between 2018-2023 whose completed building permit had not been issued as of October 2023. Some of these projects may be ongoing or indefinitely suspended, particularly those with older parcel year-built fields, e.g. 2018-2020. It is likely, the larger volume of permits and units in 2021-2023 include many units that will be completed soon. *Combined, these points explain part, but not all, of the discrepancy in the initial housing unit comparison in Figure 1 and highlight the importance of this data linking procedure.*

Table 4. Number of housing units with reported parcel year built between 2018 and 2023 with no permit completion date.

Parcel Year Built	Parcel-Permit Combinations	Parcel Housing Units
2018	2	1,019
2019	1	36
2020	2	91
2021	15	1,235
2022	27	2,302
2023	6	1,296
Total	53	5,979

Recall from Section 2.2 that the PEP produces sub-county estimates based on the proportion of a county’s housing units contained within each jurisdiction, and, that housing units are counted by PEP as issued permits. The large volume of permits issued before 2020 shown in Figure 3 and permitted units in Table 4 for which the PEP assumption of 6-month completion is far too short or for which the housing units may never come to fruition may partially explain why the Vintage 2020 PEP estimate in Figure 2 is so much higher than the Census count. *However, the Census Bureau’s Current Address Counts and the increase in PEP Vintage Population Estimates as the decade continues, suggest that the Census Bureau is accurately updating their MAF for many newly constructed units.*

Takeaway: Seattle permitting information on completion of housing unit construction is more accurate and often a year or more later than KCA year-built information. Additionally, there are many housing units KCA parcel data records as being completed that do not yet have a completed Seattle building permit. Indeed, some projects may never be completed. While KCA data is important for getting Census block-level housing unit counts, linking with permitting data where possible or needed will ensure more accurate counts over time.

3.3.3 Housing on or adjacent to water

One issue this data linkage case study brought to light concerns housing units on waterfront property and some houseboats. We focus on two 2020 Seattle Census blocks:

530330063003005 (hereafter referred to as Block 6300.3005) and 530330063003006 (Block 6300.3006).

Block 6300.3006 was part of the 200 blocks identified by our triaging process as having large discrepancies between the Census Bureau and local datasets. Figure 4 highlights the difference in the Census Bureau's July 1, 2023, Current Address Count and KCA tax parcel housing unit counts. Block 6300.3006 has 0 housing unit addresses in the July 1, 2023, Current Address Count and 105 housing units in the KCA tax parcel data dated October 1, 2023. Conversely, Block 6300.3005 has 105 addresses reported in the July 1, 2003, Current Address Count and 0 housing units according KCA on October 1, 2023. Note, all housing units within this block were constructed by 1990 and do not have a record in the Seattle permitting data.

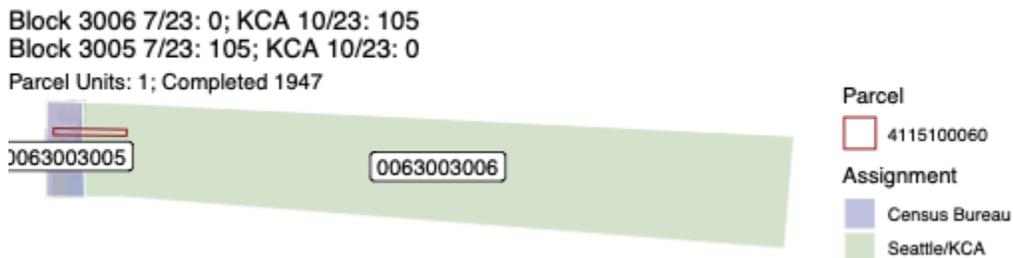


Figure 4. Discovering housing units assigned to the wrong parcels using the Census Address Geocoder. Parcel 4114100050, built in 1947 and containing 1 housing unit, is outlined in red. Using the parcel centroid, KCA data assign this housing unit to Block 530330063003006 (green). The Census Bureau geocoder assigns the address for this housing unit to Block 530330063003005 (blue). The total block level unit counts by both data sources appear at the top, indicating total opposite assignment of the same 105 units across sources.

Parcel 4115100060, outlined in red in Figure 4, is 1 of 6 parcels spanning the border between the two blocks. Seattle's MAF contains 107 unique addresses in these 6 parcels, and 2 unique addresses for this parcel. The GPS location from the KCA parcel data puts the housing unit in Block 6300.3006 (the green block in Figure 4), while the Census Bureau Address Geocoder assigns the two addresses to Block 6300.3005. Both of the MAF addresses are assigned to Block 6300.3005.

In fact, in Table 5, we see the total housing unit counts in each of Block 6300.3005 and Block 6300.3006 by data source--KCA unit counts, unique addresses in Seattle's MAF, and results of geocoding those addresses--and the proportion of total housing units each data

source assigned to those blocks. Taking the two blocks together, as we saw in the heading of Figure 4, both KCA parcel data and Census Bureau data agree on the total housing units contained between them. KCA data would put all 105 unit addresses in Block 6300.3006 like Parcel 4115100060. While Seattle’s MAF apportion units across the two blocks more accurately, it contains 107 unique addresses a slight difference from KCA and Census Bureau sources.

Table 5. Example geographic discrepancies for waterfront housing units.

Census block assignments for housing units assigned to Blocks 6300.3005 or 6300.3006 from KCA tax parcels (October 1, 2023), the Seattle MAF, and Census Bureau Current Address Counts (July 1, 2023).

Census block	KCA parcels	Seattle MAF	Census Bureau
6300.3005	0 (0.0 %)	25 (23.4 %)	105 (100 %)
6300.3006	105 (100 %)	82 (76.6 %)	0 (0.0 %)
Total	105 (100 %)	107 (100 %)	105 (100 %)

Takeaway: Block 6300.3006 was flagged as a block with a large positive difference between local housing unit counts and Census data sources. This analysis showed that:

- 1) housing unit data discrepancies exist even for long-built units,
- 2) the housing units in question were not *missed* by the Census Bureau but assigned to a different Census block.

This is an example of a Census block whose addresses Seattle would submit to the Census Bureau as part of 2030 LUCA for geographic discrepancies. It remains to be seen how the Census Bureau would resolve this discrepancy in their data, i.e. whether Seattle would have the choice to dictate the block assignment for each address based on the MAF assignments or the parcel assignments. In this example, the Seattle MAF distribution appears more realistic; however, it splits up units in the same parcel into different Census blocks.

We recommend the City of Seattle explore and synthesize all local waterfront housing unit information in preparation for 2030 LUCA, in order to compare address and geographic information to the Census Bureau’s MAF.

3.4 Group Quarters

Beyond the 200 Census blocks in the case study, we also compared Census Bureau and KCA information on group quarters throughout Seattle. Figure 5 Shows the spatial distribution of group quarters across Census tracts according to: 1) the July 1, 2023, Census Bureau Current Address Listing Count data (left panel) and 2) the October 2023

KCA parcel data. It's clear that there are many group quarters counted by the Census Bureau that are not so categorized in KCA parcels. Of note are the large number of group quarters in SODO, Georgetown, and surrounding areas that do not show up in the KCA data.

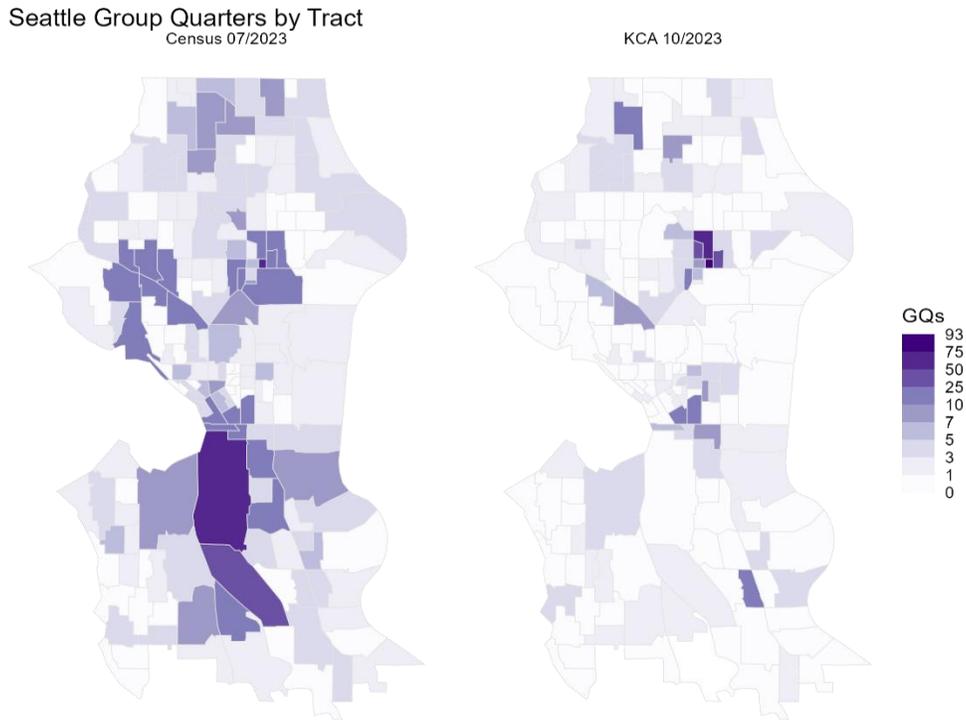


Figure 5. Seattle's Group Quarters (King County Assessor & Census Bureau, 2023). The left panel shows the count of group quarter facilities (not units or occupants) according to the Census Bureau's Current Address Count dated July 2023. The right panel shows the count tax parcels containing group quarters in the King County Assessor's data whose year built is 2023 or earlier.

To better understand the process by which information on group quarters is submitted to the Census Bureau, we acquired the WA FSCPE's submitted list of Seattle's group quarters from Erica Gardner at WA OFM. The list contained 33 entries of group quarters that are reported annually in WA OFM's Housing and Population Survey. This dataset is a subset of the full collection of group quarters OFM reports on to the Census Bureau, and bundles all of a university's group quarters into a single entry for each of three categories: dorms, fraternity or sorority houses, and student apartments.

Fourteen of the listed group quarters are tiny house villages or encampments reported to OFM by the state's Low Income Housing Institute (LIHI). The names of these villages can also be found on [LIHI's website](#), but information on the number of group quarters units is

not. One of LIHI's villages, True Hope Village, is contained in the KCA data, but under the name TINY HOUSE VILLAGE. It was possible to locate the parcel in which some of the villages were located, but the parcel information did not indicate the villages' presence. For example, Whittier Heights village is located in parcel 0458000040 but the parcel's property name is indicated as CITY LIGHT SUB STATION.

We also found several group quarters on OFM's list that were contained in the KCA data with out-of-date property names or present use fields. Three new shelters, converted from the Extended Stay America – North Seattle, the Holiday Inn Express & Suites – North Seattle, and the Inn at Queen Anne, are all in the KCA parcel data, but their property names remain unchanged, and their present use is still designated as Hotel/Motel. The Lakefront Community House, a new shelter, is listed as Perinatal Treatment Services in KCA data, and the Hotel Reynolds, a work release facility, has a present use of Apartment.

While the list prepared by OFM had many entries not identifiable from KCA data, it does not contain all the group quarters shown in the July 1, 2023, Census Bureau Current Address Count that are missing from the right panel of Figure 5. So, even adding the tiny house villages to other group quarters identified in the KCA data will not fully address this issue. The Census Bureau treats individuals living in cars, or tents as living in group quarters. Also service provision locations that address homeless or housing insecure individuals are counted as group quarters by the Census. It is possible that some of the "missing" group quarters could result from this assignment.

Finally, Figure 1 shows many Census tracts where KCA unit counts are much *higher* than the Census counts. While Section 3.3.2 indicates much of this may be due to KCA year-built information being much earlier than a unit is habitable, other cases may be units the Census Bureau designates as group quarters while KCA designates them as housing units.

It will be important to get the exact list of Census Bureau group quarters during 2030 LUCA and to ascertain how certain types of shelter are counted.

Takeaway: Local data on the number of group quarters locations are substantially lower than the Census Bureau's. It is likely many of these locations are designated in KCA data as housing units, not group quarters. Further, research shows a gap in KCA parcel data on shelters and other temporary housing modalities, particularly tiny house villages.

Confirming definitions, addresses, and locations of group quarters should be a high priority for research when Seattle receives access to the Census Bureau's MAF as part of 2030 LUCA.

3.5 Looking Forward

We recommend that Seattle participate in both the 2030 LUCA and New Construction programs. As mentioned in Section 3.1, jurisdictions participating in 2030 LUCA will get access to their portion of the Census Bureau's MAF in late 2027 or early 2028. We recommend Seattle begin preparing local data by late 2026 or early 2027 to identify more Census blocks and properties where there may be discrepancies with the Census Bureau's MAF.

While there may be concerns about the cost of the labor necessary to carry out this preparation, it is important to put that cost in context of: 1) Seattle's other expenditures toward preparing for the decennial Census, 2) the opportunity cost of incorrect housing data being used as inputs to the next decade's population estimates, and 3) the economic impact that incomplete counts and estimates have on state and federal funds distribution as well as business decisions made by private industry and the City in preparation for the 2020 Census, Seattle spent an estimated \$430,000 including initiatives to advertise the Census and improve turnout, the labor involved in these initiatives, as well as the labor time spent in meetings with the WA SDC to learn about 2020 Census programs and timelines. This expenditure was almost exactly the magnitude of the estimated decrease in HUD dollars over the 2020 decade estimated in Section 1.4. We recommend that Seattle hire a person who can help with data preparation for 2030 LUCA. The expenditure of a relatively small amount of money in addition to other investments that support the 2030 Census may have a bigger overall impact on Seattle's 2030 counts, subsequent Population Estimates, and related federal funding than certain advertising or awareness raising activities.

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Appendix A: Linking Permit & Parcel Data

As each Census Bureau data set containing information on Seattle’s housing can be tied to a calendar date—the 2020 Census corresponds to April 1 and PEP estimates correspond to July 1, comparisons to KCA tax parcel data alone which only contain the year in which the building was built, as in Figure 1, are not ideal. However, Seattle’s permitting data has permit completion data at the date and quarter level. Part of the work performed in association with this contract involved demonstrating how data from various sources could be combined to better understand where and the extent to which the Census Bureau’s information on housing units in Seattle may be incomplete or otherwise inaccurate.

One way we addressed this was to develop and apply a method for linking properties in the permitting dataset to tax parcels in the KCA data so that we could identify and use detailed information regarding the date of completion where possible. Details of this method are described in [Appendix A](#) and results contained in [Section 3.3](#) make use of the linked data.

- 1) Aggregate King County Assessments (KCA), City of Seattle Permitting, and Seattle City Light aggregate residential unit count data to Census block, block group, and tracts where possible. Combine this with aggregate housing units from the 2020 Census and the newly released July 1, 2023, housing unit estimates.
 - a. Remove group quarters from KCA by removing parcels whose PRES_USE is Congregate Housing, Retirement Facility, Retirement Facility, Rehabilitation Center, Residence Hall/Dormitory, Group Home, Nursing Home, Rooming House, Fraternity/Sorority House
- 2) Triage Census blocks, block groups, and tracts by:
 - a. The magnitude of the difference between the 2020 Census housing unit counts and the KCA data
 - i. When under 5%, treat these as a lower priority for by-hand work
 - b. The magnitude of the difference between the KCA post-2010 housing unit counts and the permitting data net units.
 - c. The magnitude of change in housing units in a 2020 Census block in the KCA data between 2010 and 2020.
 - d. The magnitude of cumulative net units in a 2020 Census block in the permitting data between 2010 and 2020.
 - e. The magnitude of change in housing units between the 2020 Census housing unit counts and the newly published July 1, 2023, Address Counting List.
 - f. The magnitude of net units from building permit data between Q1 2020 and Q2 2023.

permitting. Calculate differences between parcel unit counts and both Census counts.

- 4) Review flagged rows for discrepancies.
 - a. Check to see if any of the units are on the apodments/SEDU list. Though Seattle does not permit these anymore, it's possible they may be leading to unit count discrepancies across local and Census Bureau data sources.
 - b. If none of this works, resort to Google maps, apartment building websites, or phone calls to large apartment building offices to find candidate matches between KCA and permitting data.
 - c. Flag blocks and rows where there are real discrepancies between the Census and our synthesized data.
- 5) Return a table with a column identifying the relevant Census geography. Rows will contain relevant permitting info for properties that appear to be missed by the Census.

Appendix B: King County Jurisdiction-Level Population Estimates

Purpose: The King County Review File was developed to assist in both the review of the Census Bureau’s post-census estimates for municipalities and to provide an initial review process for Seattle and King County’s review of the Census Bureau’s MAF in support of the LUCA program. This file provides measures of block level change in housing units for the period 4/1/2020 – 12/2024 and was designed to highlight blocks that require review as if LUCA was currently in progress. The file also provides a separate set of municipal population estimates based on the Census Bureau’s MAF that could be used to review the Vintage 2023 estimates produced by the Census Bureau.

The unprecedented methodology used to create the MAF-based population estimates replicates the approach used by the Census Bureau to develop its municipal population estimates. The MAF represents the housing stock in place at a given time and is multiplied by persons per household to develop a household population estimate. Annual updates the Census Bureau employs for group quarters population are not available, therefore household population is added to the 2020 Census group quarters population to develop a total population estimate. Finally, the file is structured to be easily updated in the future with all formulas evident in the spreadsheet cells.

Seattle has been the focus of our work in this project; however, both its statistics and Federal funding revenues are impacted by the entirety of King County. From a population estimate perspective, that impact is based on both the rake factor applied by the Census Bureau to control the final municipal estimates to a county total, and the estimate of housing for each municipality in King County. Regarding federal funding, it is important for all of King County to be appropriately represented as Seattle and the county receive funding based on urbanized area statistics (for example formula grants from the U.S. Department of Transportation). Improving the MAF through the LUCA program for the entire county will ultimately provide the most representative measure of population in the 2030 Decennial Census.

File Description

The file is a Microsoft Excel workbook with multiple sheets (tabs) defined below.

- **CACL Tab:** Current Address Count Listing Tallies by Census Block. This sheet contains raw data downloaded from the Census Bureau’s Current Address Count Listing files (CACL). Note: The CACLs (after the 6/2022 processing cycle) contain block definitions (split blocks) that differ from the 2020 Decennial Census. When processing these data we separately added a block split flag and included both April 2020 and current block geocodes for each record.

- Source: <https://www.census.gov/geographies/reference-files/2025/geo/addcountlisting.html>
- **CACL TALLY Tab:** This sheet contains a pivot-table that presents a time series tally of the CACL by block. Note: These tallies are based on 2020 Decennial Census geographic definitions, however, because the CACL Tab also contains current definitions tallies could be run either way.
- **Block_Base2020 Tab:** This tabulation includes 3 data sources merged at the block level. It is the key component for supporting LUCA review.
- **Decennial PL94-171 data:** https://www2.census.gov/programs-surveys/decennial/2020/data/01-Redistricting_File--PL_94-171/Washington/
- **CACL Time Series from the CACL Tally Tab:**
 - **Housing Estimates from WA OFM:** <https://ofm.wa.gov/washington-data-research/population-demographics/population-estimates/small-area-estimates-program>
 - Note - This sheet contains a review flag for each block that highlights substantial changes (both gains and losses) present in the MAF. It also contains a review flag that highlights substantial differences between the block level MAF tallies and the WA OFM estimates.
- **C404 Permits: Tab:** U.S. Census Bureau annual building permit data for municipalities and the unincorporated area of King County. Source: <https://www.census.gov/construction/bps/visualizations/datatool/index.html>
 - The data are tallied to create a 4/1/2020 - 7/2023 change measured by permits.
- **Census2023 Tab:** Vintage 2023 Census Bureau Estimates for Municipalities Source: <https://www.census.gov/data/tables/time-series/demo/popest/2020s-total-cities-and-towns.html>
- **OFM_Int2023 Tab:** WA OFM's Vintage 2024 estimates with a 7/1/2023 Interpolation to be consistent with the Census Bureau's reference date. Source: <https://ofm.wa.gov/washington-data-research/population-demographics/population-estimates/small-area-estimates-program>
- **Estimates Universe Tally Tab:** This sheet contains multiple subsections for 7/1/2023. It is the key component for population estimate review and for engaging municipalities to review their MAF tallies in LUCA.
- **Tally of Census 2020 Tab:** a pivot table of census data and MAF changes by Municipality (Columns A through G)
- **Development of MAF-Based Population Estimates by Municipality (Columns I through N):** Note: uncontrolled and controlled population estimates are developed

to display the impact of rake factor to control estimates to the Census Bureau's county estimates.

- **Comparison of MAF-Based Population Estimates (raked) to Census Bureau Estimates (Columns P through S)**
- **Comparison of MAF-Based Population Estimates (unraked) to WA OFM Estimates (Columns U through X)**
- **Comparison of MAF Change to Building Permit Change (Columns Z through AC)**
- Note: There are 9 municipalities highlighted in red that appear to have sizeable MAF shortages.

Appendix C: Group Quarters Classification

To create Figure 5, we used the following data-based definitions to identify group quarters in King County Assessor tax parcel data:

- All parcels whose land use (PRES_USE) is defined as: Congregate Housing, Retirement Facility, Rehabilitation Center, Residence Hall/Dorm, Group Home, Nursing Home, Rooming House, or Fraternity/Sorority House
- All parcels whose PRES_USE is defined as Hotel/Motel and has greater than 0 single family units (SF_UNITS) or multi-family units (MF_UNITS)
- All parcels whose PRES_USE is defined as Church/Welfare/Relig Srvc and has greater than 0 SF_UNITS or MF_UNITS
- Some other specific properties found by searching parcel data who the following property names (PROP_NAME):
 - SCCA - Alliance House,
 - Group home BLDNG 331,
 - Group home BLDNG 332,
 - Group home BLDNG 333,
 - KING COUNTY TEMPORARY HOUSING UNITS,
 - SEATTLE HOUSING AUTHORITY,
 - HOLLY PARK,
 - Harborview Medical Center Core,
 - WEST SEATTLE PSYCHIATRIC HOSPITAL,
 - HOUSE OF GOOD SHEHERD (CITY OF SEATTLE PROPERTY),
 - King County Children and Family Justice Center

In the process of comparing King County and Seattle group quarters data with the group quarters list provided by WA OFM, we identified more group quarters not identified by the list above. These group quarters and their identifying information can be found in [Section 3.4](#).

Appendix D: Non-Census Address Data Sources

We researched many private or proprietary sources of address data. Below we provide details on the companies we explored and what we learned. *We recommend using Marketing Systems Group (MSG), recommended by NORC at The University of Chicago, to purchase address information if necessary; MSG is one of the only companies we found that will provide the list of addresses directly to the client.*

- **Marketing Systems Group (MSG):** MSG provide support to businesses and survey companies in the form of address lists and mailing services.
 - **Contact Info:** We were connected to Janet Malofiy (JMalofiy@m-s-g.com) by CSDE alumni and colleague Lee Fiorio at [NORC at The University of Chicago](#). NORC is a premiere, global survey company whose clients include the World Bank, the U.S. Government, the Bill and Melinda Gates Foundation, the Centers for Disease Control and Prevention, the American Medical Association, and the Washington State Office of Superintendent of Public Instruction among others. NORC uses MSG exclusively for the creation of sampling frames and pulled samples.
 - **Pricing Info:** \$425 set-up fee, plus \$0.045 per record; addresses transferred directly to client if desired
- **Lacy & Par:** Address vendor currently patronized by the City of Seattle for various projects.
 - **Contact Info:** Through email, phone, and in-person conversations, we deduced that Lacy & Par will not release the addresses purchased to the client. As such, their services are useful for mass-mailing but not improving local housing unit address data.
 - **Pricing:** \$128 for first 5,000 addresses, 0.026 cents per record for each additional. If it is purchased as a “Consumer list”: \$165 for first 3K address, 0.055 cents per record for each additional
- **Co-Star:** CoStar data provides address, number of units, occupancy rates, and other information about the building itself about all commercial buildings, including multi-family rentals by quarter.
 - We were able to test out Co-Star's services thanks to Dr. Steven Bourassa and his student Mason Virant from the UW Department of Real Estate. While the information is high quality, there is no option to batch query the software, making it less-than-ideal for large scale use. We provide the Co-Star results for two properties as part of our data transfer: Balfour Place (1820 Minor Ave) and The Waverly (210 8th Ave N).

Appendix E: List of Data Sources Shared with Seattle

As part of the final report, we have provided many data sources used in our analysis and a handful produced as research products. The full detail on these data sources can be found in DataSources.xlsx, but are listed with less detail below.

Census Bureau Sources

- **Population Estimates Vintage 2023:** County-level and sub-county population estimates, county-level housing units estimates, and county-level components of population change for July 1, 2020-July 1, 2023
 - Seattle city Derivation Sheet containing sub-county estimate inputs provided by the Population Estimates Challenge Program
- **Population Estimates Vintage 2022:** County-level and sub-county population estimates, county-level housing units estimates, and county-level components of population change for July 1, 2020-July 1, 2022
 - Seattle city Derivation Sheet containing sub-county estimate inputs provided by the Population Estimates Challenge Program
- **Population Estimates Vintage 2021:** County-level and sub-county population estimates, county-level housing units estimates, and county-level components of population change for July 1, 2020-July 1, 2021
 - Seattle city Derivation Sheet containing sub-county estimate inputs provided by the Population Estimates Challenge Program
- **Population Estimates Vintage 2020:** Sub-county population estimates and county-level housing units estimates for July 1, 2010-July 1, 2020
- **Population Estimates Vintage 2020:** Sub-county population estimates for July 1, 2010-July 1, 2019
- **Current Address Count Listing:** Census block-level counts of unique housing unit addresses and group quarters contained in the Census Bureau's MAF updated approximately every 6 months
 - June 2022, July 2023, July 2024, December 2024

Seattle City Light

- **Premises:** unique residential premises contained in Seattle City Light data aggregated to the Census block group level, with some attempt made to account for older multi-family homes that are “master-meter” buildings, i.e. multiple units are

on the same meter. Produced for this project after conversations with Mike Hamilton and Jessica Kenyon.

- April 1, 2020 and December 31, 2020

WA OFM

- **Group Quarters:** list of group quarters reported to the Census Bureau that are contained in King County, broken out by city, and each group quarter's capacity or number of beds of each reported annually since 2020
- **Superseded Population & Housing Estimates:** April 1st estimates of housing and population produced by WA OFM for the state's counties and large cities for 2010-2020

Report Products

- **Linked King County Parcel and Seattle Permitting Data:** datasets produced for and used in the [Section 3](#) case study; parcel-permit combinations, parcels without permits, or unmatched permits for 200 Census blocks. A further filtered dataset contains only the remaining rows from the original product that do not appear to properly be accounted for in Census Bureau data with the release of the Current Address Count Listings
- **Seattle HUD Allocations:** underlying data and citations for calculations in Table 1
- **Population Estimates for King County jurisdictions using Current Address Count Listing:** Ron Prevost implemented the Population Estimates Program sub-county algorithm using the Current Address Count Listing Census block-level data