Multimodal Concurrency Implementation Guide

City of Bellevue, WA
Department of Transportation

September 2022

Multimodal Concurrency Implementation Guide

September 2022

City of Bellevue, WA
Department of Transportation

Approved:

Andrew Singelakis
Director of Transportation Department

Date:

Sept. 15, 2022

Table of Contents

List of Figures

List of Tables

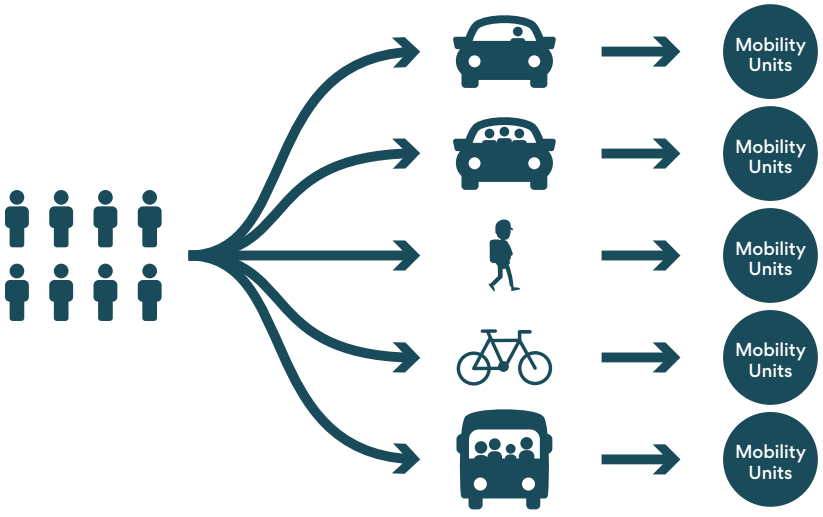
chapter
01

Introduction

Chapter 14.10 of the Bellevue City Code (BCC), the Multimodal Concurrency Code, establishes the requirements and framework needed to allow the City to meet the goal of the Growth Management Act to have the timely provision of transportation facilities needed to serve growth. The code requires all development proposals over a certain size to be tested for concurrency as a requirement of approval. This guide has been prepared to allow the Director of the Transportation Department to administer the concurrency program as authorized by BCC 14.10.020.C.

Multimodal concurrency relies on a plan-based "system completeness" strategy to develop a transportation system that is complete and connected for all travel modes. This system is based on ensuring that the supply of planned and funded transportation improvements is in place to meet the demand from planned growth and development. Supply and demand are measured using "Mobility Units" (MUs) that are based on person trips for vehicle, pedestrian, bicycle, and transit modes of travel.

Figure 1: Person trips to modes to MUs



Purpose of the Guide

This guide provides information necessary to administer the program requirements of the Multimodal Concurrency Code (Chapter14.10 BCC). It provides specific information to be used by developers in their concurrency applications, and by staff to review projects and maintain and manage the system.

The guide explains the application process for a concurrency determination for a development project and how the mobility unit demand is calculated for the project, and details how provisions of the code can be met in order to ensure that concurrency is achieved. It also explains how the supply of mobility units is calculated for the planning period, and how the available supply is determined through funded transportation system projects.

chapter

02

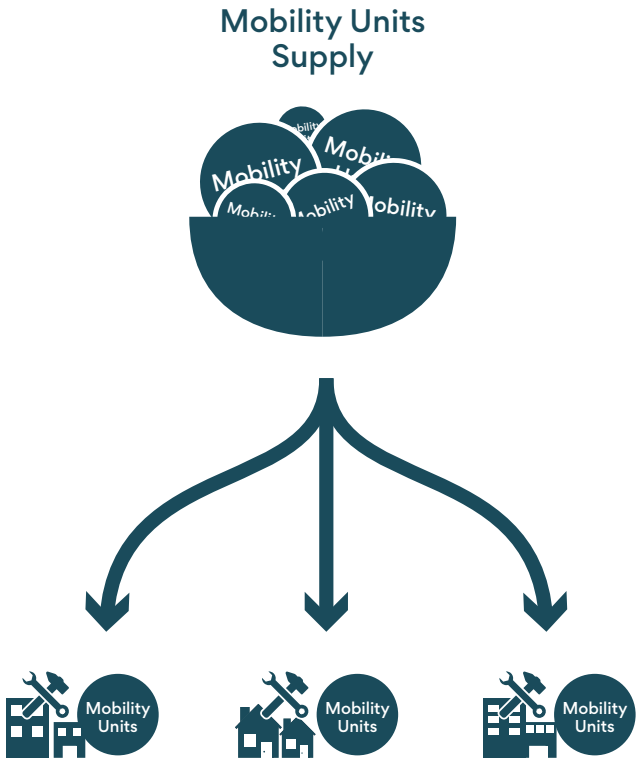
Program Description

The Multimodal Concurrency program allows the City to assess new development projects to determine if the supply of transportation system infrastructure is adequate to meet the demand from growth and development. The system has been designed to allow the readily available vehicle trip generation totals for a project to be converted into person trips by travel mode and mobility units of demand. The supply of available MUs must be sufficient to meet the demand of the project in order for the project to be approved.

Projects Requiring a Concurrency Determination

All development projects that could create additional demand and need for transportation system improvements will require a concurrency determination to calculate the number of MUs generated. This includes new construction, expansion, or a change in use for which a permit or approval is required. A concurrency reservation will be granted to all projects that generate more than 25 MUs, and a certificate of concurrency will be issued in conjunction with the project development permit approval. Projects that generate 25 or less 25 MUs will receive a determination stating that no reservation is required. However, such trips will be included in the calculation of MU supply. A concurrency determination or reservation is required to be included with a development application for a complete submittal.

Figure 2: Mobility Unit Supply Allocation



Information Needed for a Concurrency Determination

The demand for MUs for a project can be determined using the vehicle trip generation and location of the project. The City has developed a person trip generation model and MU calculation tool for this purpose. This is to simplify the project requirements as vehicle trip generation is a required element of the Transportation Impact Analysis that must be provided for review of development projects, and it is also used for the vehicle operational analysis and the impact fee assessment for the project.

For most projects, the City's PM Peak Hour trip rate schedule for common land uses should be used. Table 1 summarizes prescriptive PM peak hour vehicle trip rates and person trip rates for common land uses. The vehicle trip rates shown are based on data from ITE Trip Generation Manual, 11th Edition (2021). The vehicle trip rates are consistent with the prescriptive rates documented in the Transportation Impact Fee Program Report 2022 Update. The person trip rates were developed by applying Vehicle-to-person trip (P/V) ratios to the vehicle trip rates. More discussion regarding P/V ratios and the calculation of person trips is provided in Chapter 5. The following sections after Table 1 will document the concurrency application and determination process which includes usage of the vehicle trip rates. For uses that are not included in the prescriptive rate table, applicants should work with their project reviewer to calculate vehicle trips. Credit may be given for existing uses that have been in operation on the project site within the last two years consistent with the requirements for vehicle operational analysis and impact fee assessment.

Table 1: PM Peak Hour Trip Rate Schedule

Land Use	ITE Land Use Code	Unit of Measure	Vehicle Trip Rate	Person Trip Rate		
				PMA 1	PMA 2	PMA 3
Residential						
Single Family	210	dwelling	1.00	2.03	1.67	1.67
Single Family Attached Housing	215	dwelling	0.57	1.25	1.00	0.95
Multi-Family Low Rise (1-2 stories)	220	dwelling	0.56	1.57	1.03	0.93
Multi-Family Mid Rise (3-10 stories)	221	dwelling	0.44	1.24	0.81	0.73
Multi-Family Mid Rise - Downtown/TOD	222	dwelling	0.19	0.53	0.35	0.32
Multi-Family High Rise (10+ stories)	222	dwelling	0.19	0.53	0.35	0.32
Senior Adult Housing - Multifamily	252	dwelling	0.26	0.53	0.43	0.43
Commercial - Services						
Walk-in Bank	911	sf/GFA	7.88	15.82	11.39	10.37
Hotel	310	room	0.59	1.27	1.06	0.94
Day Care Center	565	sf/GFA	8.34	14.87	14.23	13.58
Health/Fitness Club	492	sf/GFA	3.45	7.79	6.46	5.37
Commercial - Institutional						
Religious Institution	560	sf/GFA	0.49	1.18	1.14	1.09
Assisted Living	254	bed	0.24	0.49	0.40	0.40
Medical Clinic	630	sf/GFA	2.77	6.33	4.97	4.76
Hospital	610	sf/GFA	0.69	1.58	1.24	1.19

Table 1: Trip Rate Schedule (cont'd)

Land Use	ITE Land Use Code	Unit of Measure	Vehicle Trip Rate	Person Trip Rate		
				PMA 1	PMA 2	PMA 3
Commercial - Restaurant						
Fine Dining Restaurant	931	sf/GFA	4.37	12.92	10.66	9.26
Fast Casual Restaurant	930	sf/GFA	6.28	18.57	15.32	13.31
Fast Food Restaurant without Window	933	sf/GFA	16.61	49.11	40.51	35.19
Fast Food Restaurant with Window	934	sf/GFA	14.86	43.94	36.24	31.48
Commercial - Retail Shopping						
Shopping Center (over 150k sf)	820	sf/GLA	2.41	5.12	4.37	3.75
Shopping Center (40k to 150k sf)	821	sf/GLA	3.11	6.60	5.64	4.84
Strip Retail Plaza (under 40k)	822	sf/GLA	3.95	8.39	7.17	6.15
Supermarket	850	sf/GFA	6.27	13.31	11.38	9.77
Pharmacy	880	sf/GFA	4.26	9.04	7.73	6.64
Automobile Sales	840	sf/GFA	1.94	3.14	3.14	3.14
Commercial - Office						
Office	710	sf/GFA	1.04	2.26	1.60	1.34
Downtown Office	710	sf/GFA	0.78	1.70	1.20	1.01
TOD Office	710	sf/GFA	0.78	1.70	1.20	1.01
Medical/ Dental Office	720	sf/GFA	2.95	6.74	5.30	5.07
Industrial						
Manufacturing	110	sf/GFA	0.74	0.87	0.87	0.87
Mini-Warehouse	151	sf/GFA	0.15	0.18	0.18	0.18

sf/GFA

square feet Gross Floor Area

sf/GLA

square feet Gross Leasable Area

TOD

Transit Oriented Development

For uses with Unit of Measure given in sf, trip rate is given as trips per 1,000 sf.

Once the vehicle trip generation has been accepted by the project reviewer, an application for concurrency determination can be made. In some cases, an applicant may wish to also supply custom person trip generation and mode shares based on the specific trip generating characteristics of the proposed development in addition to vehicle trip generation. This information will require additional review before proceeding to the concurrency determination.

Application

Applicants will need to fill out the concurrency determination application form and provide project information including the applicant's name, project location, land use sizes, and a summary of the project vehicle trip generation and credit for existing uses This process needs to be completed prior to submitting the development permit. The concurrency application can be found at: *https://bellevuewa.gov/city-government/departments/transportation/permits-and-standards/transportation-codes*

Concurrency Determination

Once the concurrency determination application form has been submitted, the City will convert the provided vehicle trip generation into person trips and mobility units. The amount of mobility units being generated from project demand will be compared to the City's mobility unit supply to ensure that there is enough supply to meet the demand of the project.

The City will provide to the applicant a concurrency determination form stating the number of MUs generated by the project and whether or not a concurrency reservation is required for the project. A mobility unit output report will also be provided. Expect an approximate 2-week turnaround from application submittal to receiving the concurrency determination. The concurrency determination must be attached to the land use permit submittal to be deemed complete, regardless of whether a concurrency reservation is required or not. An example concurrency determination form is provided in Appendix B.

Concurrency Reservation

Any project generating more than 25 new mobility units will be required to obtain a concurrency reservation. The reservation will expire one year from the date on the determination form. If a complete development application is received prior to expiration, a one-year extension will be granted. If the reservation expires prior to approval of the development application, a new reservation must be obtained. If changes to a project result in a higher demand for MUs than the reservation allows, another application and determination is required to supplement the reservation.

Concurrency reservations may not be transferred to another development.

Certificate of Concurrency

A Certificate of Concurrency will be issued for a development project in conjunction with the development approval if the reserved MUs are adequate to meet the demand of the proposed project. A certificate will not be issued if the MU demand for the proposed project exceeds the number of MUs allowed in the concurrency reservation. The certificate is valid for one year and will become invalid if a complete building permit application is not received before it expires. If the certificate expires, a new concurrency application is required and a new certificate will be issued if the MU supply is adequate to meet the MU demand for the project at the time of the new determination. The new certificate must be issued before any building permits can be issued for the project.

Phased Projects

Phased projects must receive a concurrency reservation for the MU demand of the entire project at the time of application. Phased projects are typically approved with a Master Development Permit, and the concurrency certificate for the entire project will be issued with the MDP approval. The certificate for the project will be valid if a complete building permit application for any phase of the project is received within one year of issuance and will remain valid for six years if continuous permitting activity is maintained. Continuous activity would include construction under an issued building permit or review of a complete building permit application for any phase of the project. Each approved permit issued under the certificate will reduce the amount of MUs available for the entire project. If all phases of the project are not completed within six years, the concurrency certificate will expire and any remaining MUs will return to the supply. A new determination will be required, and a new certificate must be issued before any additional building permits will be issued for the project.

Available Mitigation Options if MUs are not Available

If the MU supply is insufficient to meet the demand of a proposed project, BCC 14.10.050 provides options available to meet concurrency.

The applicant can revise the development proposal to:

- Reduce the size of the project to reduce the number of MUs required.
- Delay the project until more MUs are available to be allocated.

Upon approval from the Director of Transportation the applicant may:

- Purchase MUs at a price determined by the Director.
- Construct a project that would add MUs to the available supply.
- Implement additional Transportation Demand Management strategies to reduce the MU demand of the project.

Implementation of these options must be approved by the Director of Transportation prior to the development application for the project to ensure that the project will have sufficient MUs reserved to allow approval. More specific requirements of these options are detailed in the Code.

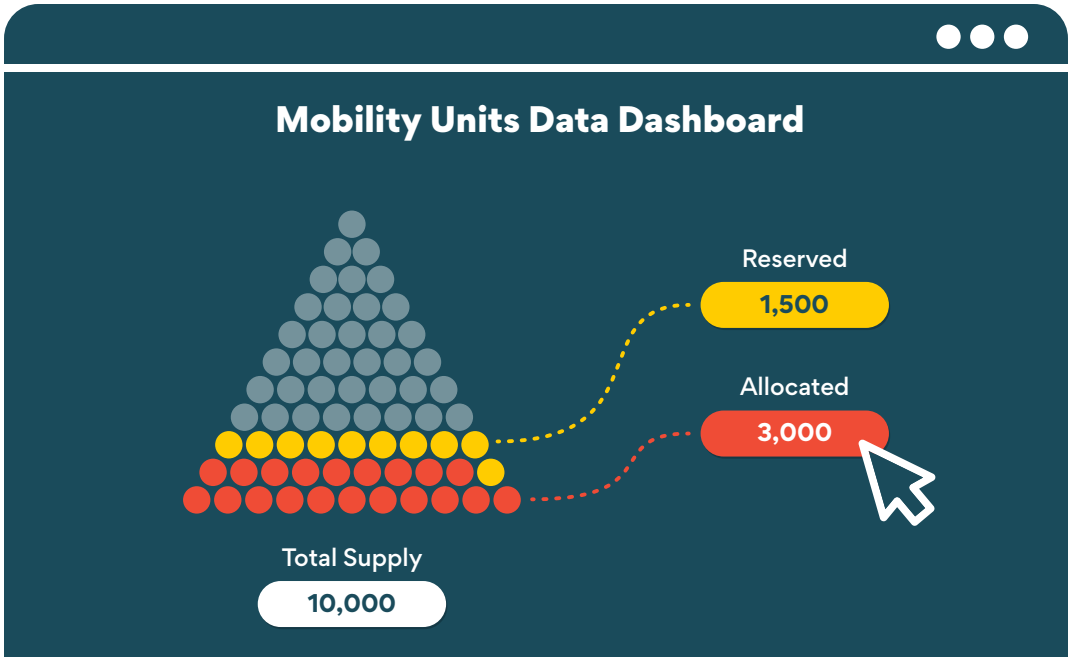
chapter

03

Concurrency System Management

The City will maintain and manage the Multimodal Concurrency system to ensure that the supply of transportation projects is available to support growth and development. Continuous reporting will be provided to monitor the MUs allocated to projects, MUs reserved for projects, and MUs remaining in the available supply. A dashboard on the City website will display this information.

Figure 3: Mobility Unit Dashboard



Reporting

In addition to the dashboard reporting of the current status of the concurrency system, reports will be prepared annually and periodically to document program activity on both the supply side and the demand side.

Annual Update

A summary report will be prepared annually. This report will document the standing of the available MU supply. It will include the dispersion of MUs through allocation to approved projects and reservation for projects under review. It will also include the addition of MUs to the available supply from newly funded projects and unused reserved units.

Periodic Update

A periodic update will be prepared for the program every five years or sooner as needed. This update will review land use and financial projections and recalculate the MU supply and value based on the updated information to be compatible with the growth forecast from the Comprehensive Plan and funding trends and forecasts. It will also review person trip data and mode share data sources including the BKR forecasting model and adjust the concurrency model as needed. When completed, the Director will approve the periodic update as the basis for concurrency program going forward.

Implementation Guide

Per BCC 14.10.020.C, the Implementation Guide is approved by the Director for use by the City to administer the Concurrency Program. This Guide was approved following a public hearing before the Transportation Commission. Any substantive changes to the Implementation Guide will also require a public hearing. Minor changes, such as updating or correcting information, may be approved administratively by the Director.

chapter

04

Mobility Unit Supply

The Multimodal Concurrency (MMC) system relies on a measure known as the "Mobility Unit" (MU). Both the "supply" of MUs, provided by transportation system projects, and the "demand" upon that system created by land use development are expressed in terms of MUs. This chapter will focus on the supply side of the MMC equation.

Mobility units of supply are created when the City funds and constructs projects that improve system mobility by adding capacity to the transportation system. The amount of funding authorized for these projects divided by the value of an MU to determine how many MUs are available in the MMC supply.

Methodology

The methodology to determine MMC Supply involves several components and process steps. In the subsections below, these are described and defined. The components include Project Eligibility and Cost Considerations; MMC Timeframes; the planning period Growth Forecast; and the planning period Financial Forecast. The process steps to determine the MU value and the available MMC supply in MUs are also described. There is also certain methodology and process that will be used to set the program up at its inception in 2022 which is described as the "Running Start". This part of the methodology accounts for available capacity from recently completed projects that have been constructed to provide for planned growth.

Project Eligibility and Cost Considerations

Transportation capital projects provide the supply of mobility units that form the basis of concurrency. Projects that complete, improve or otherwise implement part of a planned modal system are eligible to be included in the supply side of the MMC equation. Projects that maintain the system but provide no additional supply are not included in the equation.

The cumulative total cost of the supply projects, actual cost and/or estimated future cost, is the specific variable that is used in the calculation of the value and quantity of MUs. Total project cost includes preliminary engineering/design, property acquisition, and construction phase costs. The cost of projects, or portions of projects, that complete or enhance any part of the following modal systems as described in the Mobility

Implementation Plan, may be included in the determination of MMC supply:

- Citywide Arterial Roadway Network – Projects in this category must add or enhance vehicular capacity along Primary Vehicle Corridors and/or at designated System Intersections.
- Citywide Bicycle Network, including Priority Bicycle Corridors.
- Citywide Pedestrian Network - This network primarily consists of the Arterial Sidewalk System but may include off-street trails that provide meaningful connections to local or regional destinations.
- Citywide Frequent Transit Network – The city does not provide nor fund transit service in Bellevue, but city projects may specifically support efficient transit operations or improve passenger amenities at transit stops.

Both discrete transportation capital projects and ongoing capital programs (or portions thereof) may complete, improve or otherwise implement part of one or more of these modal systems.

Most transportation capital projects have a primary purpose or intended benefit to the city's transportation system. For MMC eligibility, the primary project purpose must be to advance the completion or efficiency of one or more of the modal networks described above. For these projects, the full cost of project development and implementation are eligible to include in the MU cost/value calculations.

Other projects have a different primary purpose such as system maintenance/ rehabilitation, safety, or improvements "off-network" (i.e., sidewalks on non-arterial streets). These project costs are ineligible to include in the MU calculations.

Occasionally, a project clearly has two (or more) primary purposes (i.e., a project that rehabilitates an existing arterial roadway surface while also constructing new pedestrian and/or bicycle facilities). In these cases, a determination of proportional project cost eligibility (e.g., 50-50) is made.

Ongoing capital programs typically fund a variety of smaller scale projects in a variety of locations, some on the designated modal networks, some off network. For determining eligible costs of these investments, an evaluation of historical expenditures has been conducted to quantify what proportion of the program allocations (e.g., 10, 33, or 50 percent) should be considered eligible for MMC MU calculations.

Project Costs and Multimodal Concurrency Windows

There are three (3) distinct time windows for project cost/future revenue quantification and MU value/supply calculations (described in later subsections) consideration:

1. **Planning Window**– Includes all costs of projects included within the CIP Plan Window, 2021 through 2027, plus the proportion of forecast future transportation capital revenue projected to be allocated to MMC eligible projects and programs (or portions thereof) from 2028 through 2044, the initial planning horizon year.
2. **Capital Investment Program (CIP) Plan Window –** Includes full cost incurred to date and programmed future funds for eligible projects and capital programs (or portions thereof) planned to be completed within the CIP Plan timeframe, currently 2021 through 2027. This seven (7) year window is updated with the adoption of each new CIP Plan as part of the city's biennial budgeting process. This CIP Plan Window will include a "sliding" six (6) year window that will constitute the required 6-year "concurrency period".
3. **Running Start Window –** Includes cost of eligible projects fully completed and opened for use within a defined five-year period, 2016 through 2020, immediately preceding program inception. Project costs within this timeframe, and the resulting conversion into MUs, will be used as a one-time allocation, or an initial balance for the MMC supply. Running start project costs may include expenditures made before the five-year period as long as the project was completed within the five-year period. Costs incurred during this period for projects that are not fully completed are included in the CIP Plan window.

The Planning window together with a growth forecast are used to determine the value of a mobility unit. This window uses 2044 as the forecast year to be consistent with the requirement to use the Comprehensive Plan growth target for the Planning Window (BCC 14.10.030.C). This window will be updated each time a new growth target is provided for the Comprehensive Plan, generally every five years.

The CIP Plan window uses the most recent adopted CIP, 2021 through 2028 at program inception. This window is reviewed and updated continuously as projects are funded to support the program, generally every two years when a new CIP plan is adopted.

The Running Start window will determine the initial balance of MU supply at program inception. This window is based on the five years prior to the inception of the MMC program, 2016 through 2021. This window is only used at the beginning of the program and is not updated during future program updates.

CIP Plan Window Allocation and Planning Window Financial Forecast

The amount of transportation funding projected to be available in the planning window is used to determine the mobility unit value. This window uses the amount of funding allocated to multimodal projects and programs in the adopted seven-year Capital Investment Program (CIP) that build new transportation facilities that support growth; as well as a revenue forecast for the remaining years of the planned forecast timeframe (~20 years to 2044). The Planning window uses the same allocation assumptions embodied within the CIP.

Typical funding sources for multimodal projects include:

- **General CIP revenue,** comprised of the portion of the City's sales tax, business & occupation tax and long-term debt dedicated to capital improvements
- **Transportation dedicated revenue,** various taxes and fees, such as fuel taxes and real estate excise taxes. This category may include other revenue streams dedicated to Transportation projects and programs. Some examples include: the Neighborhood Safety, Connectivity and Congestion Levy approved by the voters in 2016 and expiring in 2036, or, the Transportation Infrastructure and Finance Innovation Act (TIFIA) loan with the U.S. Department of Transportation executed in 2017 with projects planned to be completed by 2024.
- **Impact fees** and other developer contributions required from new development
- **Grants and contributions** from other agencies that are generally restricted to specific projects or programs. For multimodal concurrency forecasting purposes, a historical average and assessment of future grant program opportunities are used in forecasting future revenues.
- **Funding for Debt Financing Costs** associated with debt previously issued to support eligible multimodal concurrency projects and programs.

Future revenue projections can be volatile and depend on many factors, such as the local, regional and national economies, legislation at all levels that may affect taxes or fees, and the relative investment priorities of both public agencies and private entities. Actual revenue collected and allocated from any source may vary significantly. This forecast is revised approximately every five years to allow these projections to be modified as needed based on updated information and to be consistent with the updated Comprehensive plan growth forecast.

Running Start Window Allocation

The Running Start window is based on the value of improvements completed between 2016 through 2020 that provide system capacity. These projects were constructed to accommodate growth that is projected to occur during the planning window even though they were completed prior to the implementation of the MMC system in 2022. These projects were reviewed to allocate the amount of eligible funding similar to the projects in the CIP Plan window with one difference. Projects that are complete and currently open for use will not have 100 percent of their provided network capacity (primarily vehicular capacity) available as "supply" to new development. For this reason, an evaluation of the used/unused capacity is applied to each specific project's cost, and only the proportional cost of unused capacity is included in window calculations.

Planning Window Growth Forecast

As described in the introduction of this guide and illustrated in Figure 1, mobility units are based on person trips split up into different modes of travel before conversion into MUs. In order to forecast the number of MUs needed as part of the City's projected growth, the growth in person trips first needs to be forecasted.

To forecast person trip growth throughout Bellevue, the Bellevue-Kirkland-Redmond (BKR) traffic model was referenced. Using the 2044 land use growth forecast model and the baseline (existing conditions) model, the number of net new person trips for each of the five travel modes was determined from the model data. Table 2 below summarizes the person trip growth projections by mode between 2020 and 2044. The person trips by mode were then converted to mobility units by multiplying each type of person trip by the respective mode factor. Mode factors are weighted factors that are assessed on each mode based on their respective impact to the transportation/street system. More discussion regarding person trips, mode shares, mode factors and mobility units are provided in Chapter 5.

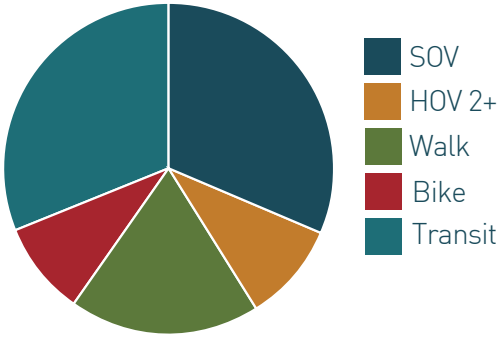
Table 2: 2020-2044 Person Trip Growth

Mode	New Person Trips	Mode Factors	Mobility Units
SOV	27,427	1.0	27,427
HOV2+	8,290	0.4	3,316
Walk	16,337	0.1	1,634
Bike	7,870	0.2	1,574
Transit	26,876	0.1	2,688
Total	**86, 800**		**36,639**

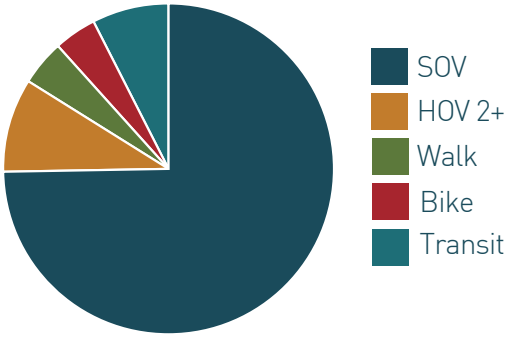
As also shown in Table 2, approximately 86,800 new person trips would be generated between 2020 and 2044 which will result in approximately 36,639 mobility units needed to accommodate planned growth.

Figure 4: 2020-2044 Person Trip Growth

New Person Trips



Mobility Units



Mobility Unit Value

The value of a mobility unit during a specific planning period is the determined using the Planning Window financial forecast and the Planning Window growth forecast. For the planning period used at program inception, 2021-2044, the financial forecast totals $447.7M and the MU forecast is 36,639. This will result in a MU value for this planning period of $12,219.

Figure 5: Mobility Unit Value Formula

Planning Window Financial Forecast

÷

Number of Forecast Mobility Units

=

Mobility Unit Value ($)

$447,699,000 ÷ 36,639 = $12,219

Available Mobility Units

The forecast for the supply of available mobility units reflects the amount of funding in the CIP Plan Window that is allocated to multimodal project and programs in the adopted CIP that build new facilities that support growth. At program inception, the available MUs also include the "bank" of existing capacity represented by the Running Start window.

To determine the available MUs for the Running Start window, the MMC funding amount of $138.5M is divided by the MU value of $12,219 resulting in 11,335 MUs. To determine the available MUs for the CIP Plan window, the MMC funding amount of $286.6M is divided by the MU value of $12,219 resulting in 23,455 MUs. At program inception, the MMC program will have 34,790 MUs total to support growth and development.

Running Start Window	11, 335 MUs
CIP Plan Window	23, 455 MUs
Total MU Supply	34,790 Mus

This page is intentionally blank.

chapter

05

Mobility Unit Demand

The Multimodal Concurrency system measures travel demand using Mobility Units (MUs). The MUs are calculated by multiplying the number of person trips generated for each mode of travel by the mode factor for each mode. Each of these elements can be determined for proposed development projects using the City's concurrency model and calculation tool.

Methodology

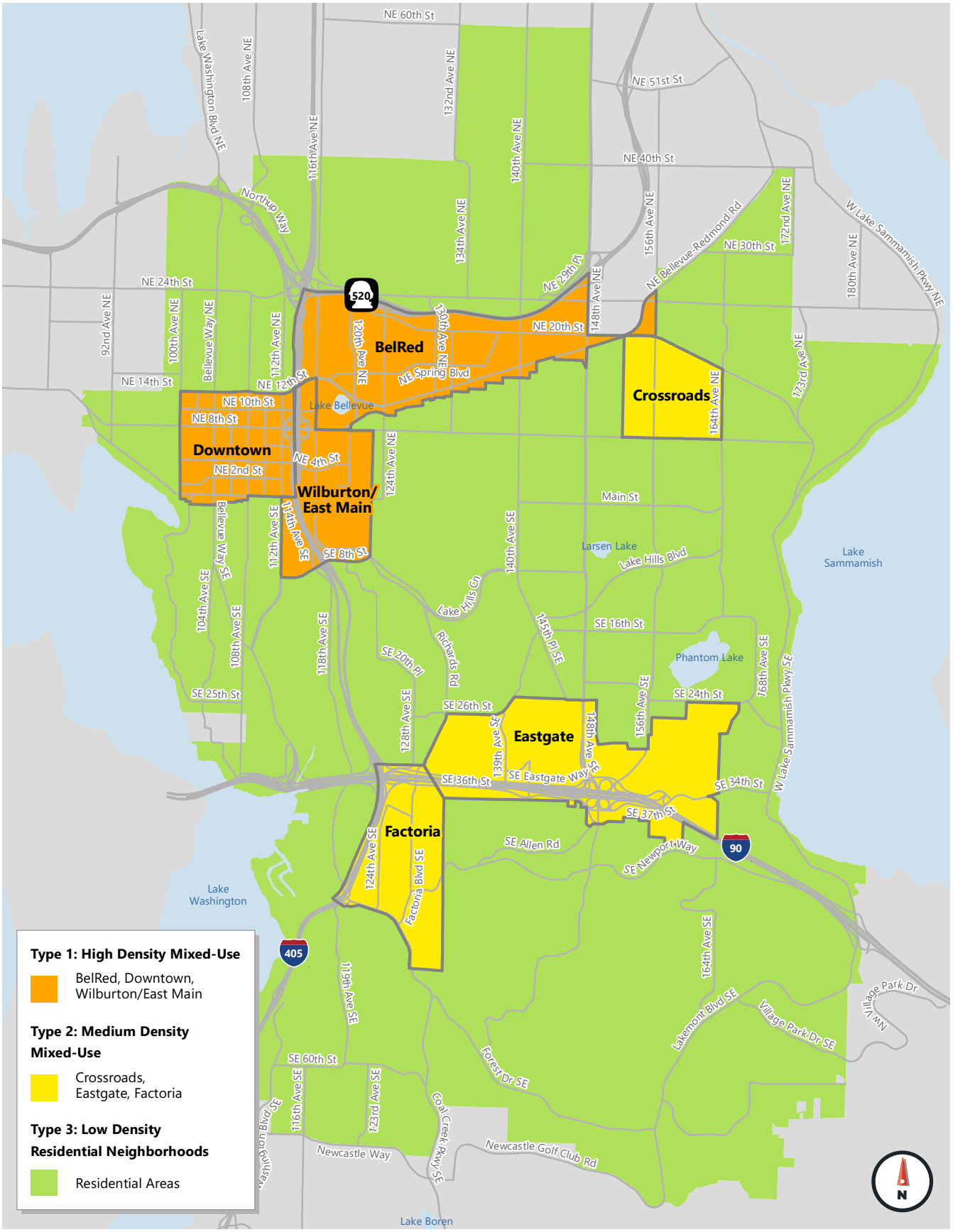
The methodology for estimating MUs builds upon the current City's process for estimating vehicular trip generation. Vehicle trip generation is typically provided in a Transportation Impact Analysis (TIA) report for each proposed project and is used for operational analysis requirements and impact fee determination. Basing the MU calculation on vehicle trips simplifies the project requirements and ensures consistency throughout the transportation review. Vehicle trips for most projects can be calculated using the City's prescriptive rate table that is available for many common land uses and shown in Table 1 in Chapter 2. The MU demand methodology uses vehicle-to-person (P/V) trip ratios, mode shares and mode factors to convert vehicle trips to person trips and mobility units.

Because not all areas of Bellevue share the same person trip characteristics, the City is divided into three Performance Management Areas (PMAs). (As shown in Figure 6 on the following page.)

These are defined in the Mobility Implementation Plan and represent the density and mobility options in the different areas of Bellevue. PMA 1, the orange area, has the highest density of development and many mobility options including light rail. PMA 2, the yellow area, has moderate to high density and good mobility options, mainly frequent transit service. PMA 3, the green area, has lower density development and fewer mobility options. The density and mobility options influence the mode shares and P/V ratios, which required the data to be PMA-specific.

Person trip data is provided for five different modes of travel: single occupancy vehicle (SOV – passenger car), high occupancy vehicle (HOV2+ - carpool), walk, bike, and transit. Mode factors were developed for each of these modes based on assessing the relative impacts of each respective mode on Bellevue's Street system. The City of Bellevue created a concurrency model and mobility unit calculation tool based on these components. More information regarding the process of calculating mobility units are outlined in the following sections.

Figure 6: Performance Management Areas



Mode Shares

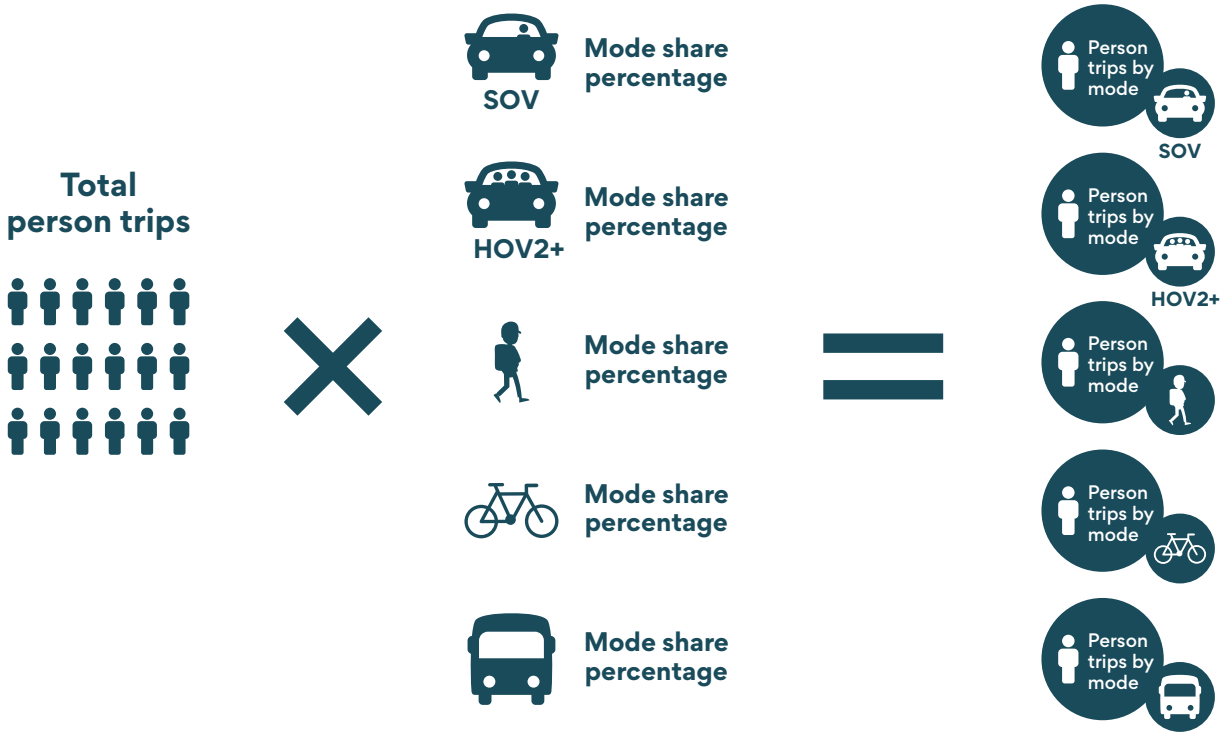
Mode shares (measured in percentages) are defined as the proportions of persons that are traveling by single occupant vehicle (SOV), High occupancy vehicle (HOV 2+), walking, bicycling, and transit. All five modes must add up to 100 percent. Mode shares were developed using the following resources:

- Bellevue-Kirkland-Redmond (BKR) traffic forecasting model
- Other similar concurrency systems
- Census Tract Data regarding commute statistics
- Commute Trip Reduction (CTR) Survey Data
- ITE Trip Generation Manual

Each land use / land use type in the City of Bellevue trip rate table has a unique set of mode shares for each PMA. To calculate person trips by mode, total person trips are multiplied by each respective mode share percentage for the land use as shown in Figure 7. The set of mode shares for each land use and each PMA are provided in Appendix A.

As discussed in Chapter 2, an applicant may choose to provide custom mode share data in lieu of utilizing the city's prescriptive mode share dataset. The custom mode share data will be reviewed and accepted by the project reviewer prior to concurrency application.

Figure 7: Person Trips by Mode



Vehicle to Person Ratio

Vehicle-to-person trip (P/V) ratios allow the conversion from estimating vehicle trips to person trips for each land use in a simple calculation step. Similar to mode shares, the P/V ratios were developed through analysis of the following resources:

- Bellevue-Kirkland-Redmond (BKR) traffic forecasting model
- Other similar concurrency systems
- Census Tract Data regarding commute statistics
- Commute Trip Reduction (CTR) Survey Data
- ITE Trip Generation Manual

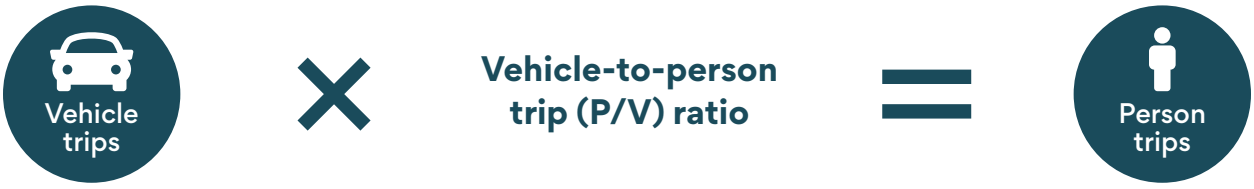
The ratios can be derived from the average vehicle occupancy (AVO) of HOV2+ vehicles and the mode share percentages. Each land use type/category has a specific set of vehicle-to-person trip ratio and mode shares unique to its nature, and each land use / land use type in the City of Bellevue trip rate table has a unique P/V ratio for each PMA. As mentioned, the person-to-vehicle ratios and mode share percentages vary for each PMA due to the variance in density and transit facilities.

To calculate the number of person trips, vehicle trips are multiplied by the P/V ratio as shown in Figure 8.

Typically, person trips are calculated from vehicle trips using P/V ratios set by the City as the default method of calculation. However, the applicant has the option to supply their own person trip calculations. The applicant must also provide vehicle trips and subsequent mode share data that includes SOV, HOV2+, walk, bike and transit. It is up to the discretion of the reviewer to determine if the provided trip generation data are justified using data, engineering judgement, and project specific information prior to approval.

As discussed in Chapter 2, an applicant may choose to provide custom person trip data for the concurrency determination in lieu of providing vehicle trip data for this purpose. In this scenario, P/V ratios would not be applicable.

Figure 8: Vehicle Trips Converted to Person Trips

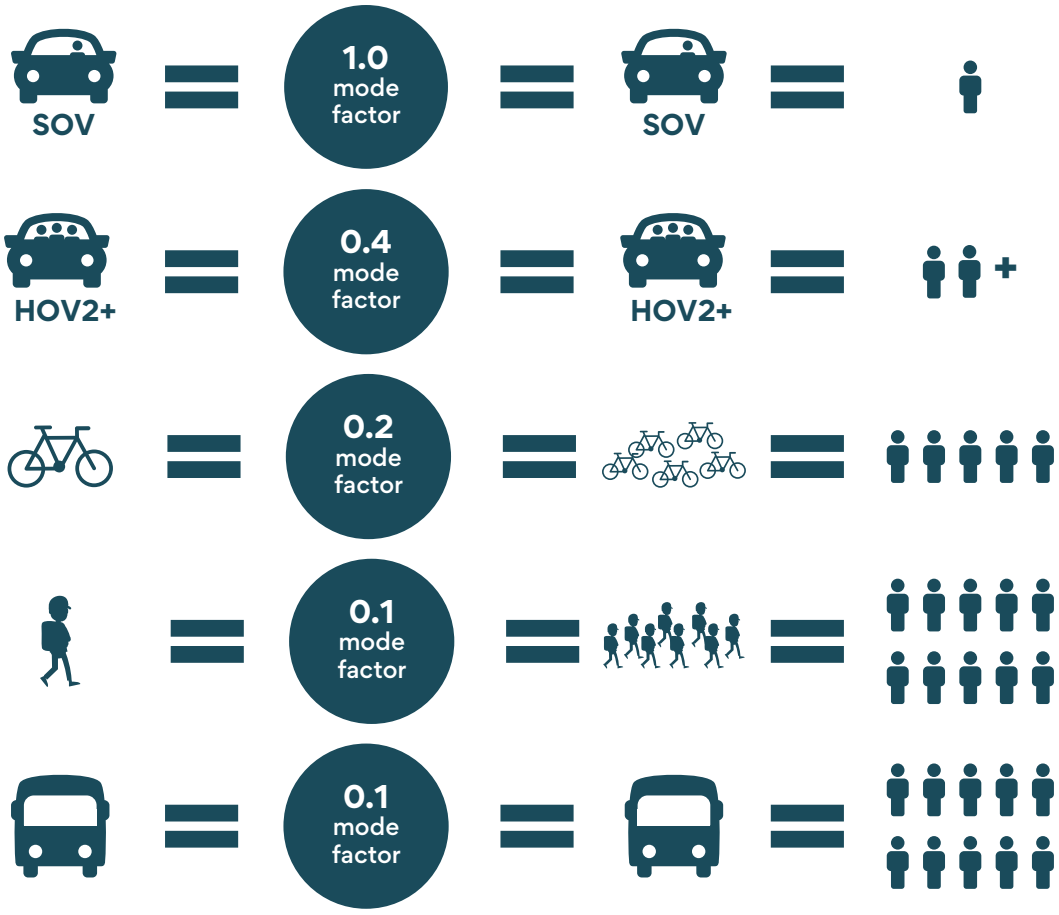


Mode Factors

Mode factors are weighted factors that the City has assessed on each mode based on their respective impact to the transportation/street system. The factors were developed to quantify a universal unit used for concurrency after being converted from person trips of different modes. Figure 9 provides a visualization of each mode's impact based on the amount of physical space occupied:

A SOV person trip was set to be a baseline factor of 1.0 and is the most impactful type of person trip. Based on the illustration, the SOV person trip occupies approximately 2.5 times more space than a HOV person trip (assuming an average of 2.5 people per HOV), 5 times more space than a bicycle person trip, and 10 times more space than walking and transit person trip. Based on the SOV mode factor of 1.0, the other mode factors equate to 0.4, 0.2, and 0.1 for HOV, bicycling and walk/transit respectively. Mode factors do not vary depending on the land use or PMA and are consistent throughout the City of Bellevue. Mode factors may not be modified.

Figure 9: Mode Factors



Mobility Unit Calculation

To calculate the mobility units, the person trips by mode are multiplied by each respective mode factor. As shown in the Table 3, 100 person trips equates to 40.5 MU's after applying mode factors. Generally, the higher the non-motorized mode shares are for a development, the lower the mobility units generated relative to the total number of person trips due to the lower mode factors associated with the non-motorized modes.

Table 3: Mobility Unit Calculation

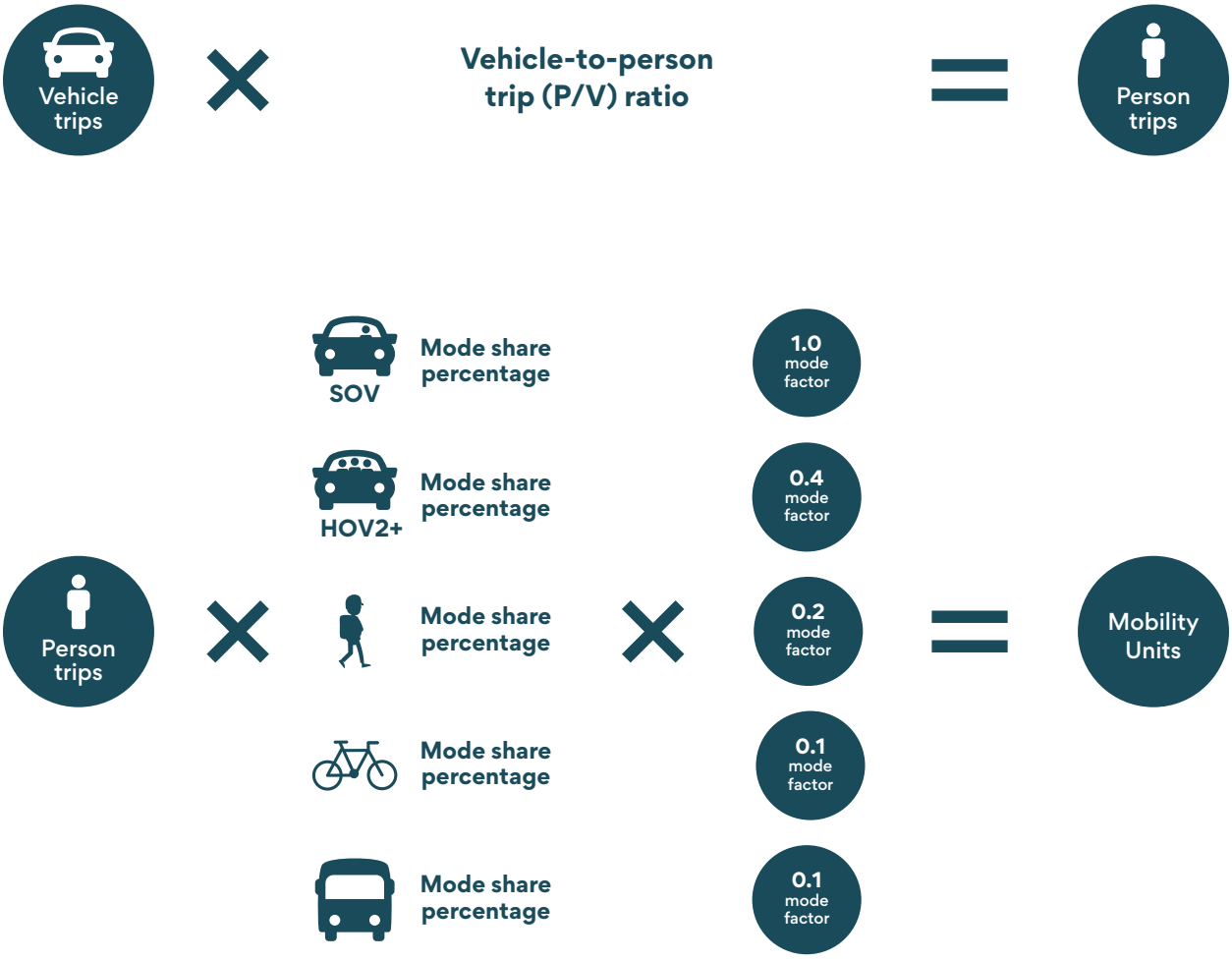
Person Trips	Mode	Mode Factor	Mobility Units
25	SOV	1.0	25
25	HOV2+	0.4	10
15	Walking	0.1	1.5
5	Bicycle	0.2	1
30	Transit	0.1	3
100	**All**		**40.5**

To summarize, the following elements are involved in the calculation of mobility units:

- Vehicle trips
- Person trips
- P/V ratios
- Mode Shares
- Mode Factors

The process starts with vehicle trips that are multiplied by the P/V ratio to calculate total person trips (when person trips are proposed, this step is not necessary). The total person trips are then split up into person trips by mode using the applicable mode shares. Lastly, the person trips by mode are multiplied by each respective mode factor to calculate mobility units by mode. The mobility units by mode are then summed up to calculate total mobility units.

Figure 10: Mobility Unit Calculation Formula

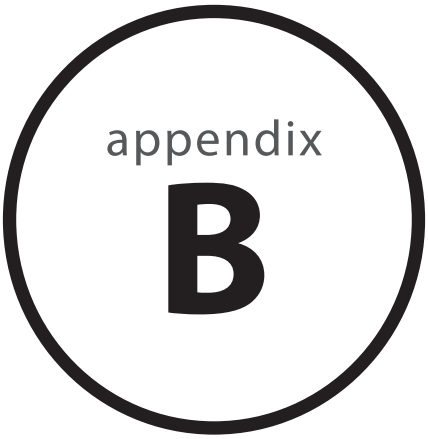


appendix

A

Mode Shares for Land Uses by Performance Management Area

LAND USE	Performance Management Area 1						Performance Management Area 2						Performance Management Area 3					
	Mode Shares (%s)					P/V	Mode Shares (%s)					P/V	Mode Shares (%s)					P/V
	SOV	HOV 2+	Walk	Bike	Transit	Ratio	SOV	HOV 2+	Walk	Bike	Transit	Ratio	SOV	HOV 2+	Walk	Bike	Transit	Ratio
Single Family	36%	33%	14%	4%	13%	2.03	44%	40%	5%	2%	9%	1.67	44%	40%	7%	2%	7%	1.67
Single Family Attached Housing	34%	31%	18%	4%	14%	2.19	42%	38%	7%	2%	11%	1.75	44%	40%	7%	2%	7%	1.67
Multi-Family Low Rise (1-2 stories)	26%	24%	20%	5%	25%	2.81	40%	36%	9%	2%	13%	1.84	44%	40%	7%	2%	7%	1.67
Multi-Family Mid Rise (3-10 stories)	26%	24%	20%	5%	25%	2.81	40%	36%	9%	2%	13%	1.84	44%	40%	7%	2%	7%	1.67
Multi-Family Mid Rise - Downtown/TOD	26%	24%	20%	5%	25%	2.81	40%	36%	9%	2%	13%	1.84	44%	40%	7%	2%	7%	1.67
Multi-Family High Rise (10+ stories)	26%	24%	20%	5%	25%	2.81	40%	36%	9%	2%	13%	1.84	44%	40%	7%	2%	7%	1.67
Senior Adult Housing - Multifamily	36%	33%	14%	4%	13%	2.03	44%	40%	5%	2%	9%	1.67	44%	40%	7%	2%	7%	1.67
Walk-in Bank	43%	17%	25%	5%	10%	2.01	60%	23%	10%	2%	5%	1.45	66%	25%	4%	3%	2%	1.32
Hotel	34%	31%	20%	2%	13%	2.16	41%	37%	12%	2%	8%	1.79	46%	42%	5%	2%	5%	1.59
Day Care Center	38%	47%	12%	1%	3%	1.78	39%	49%	8%	1%	3%	1.71	41%	51%	4%	1%	3%	1.63
Health/Fitness Club	33%	30%	25%	5%	8%	2.26	39%	36%	15%	5%	5%	1.87	47%	43%	5%	2%	3%	1.56
Religious Institution	14%	69%	10%	2%	5%	2.40	15%	72%	8%	2%	4%	2.32	15%	75%	5%	2%	3%	2.22
Assisted Living	36%	33%	14%	4%	13%	2.03	44%	40%	5%	2%	9%	1.67	44%	40%	7%	2%	7%	1.67
Clinic	26%	44%	15%	3%	12%	2.28	34%	56%	6%	2%	3%	1.80	35%	58%	1%	1%	5%	1.72
Hospital	26%	44%	15%	3%	12%	2.28	34%	56%	6%	2%	3%	1.80	35%	58%	1%	1%	5%	1.72
Fine Dining Restaurant	16%	45%	23%	4%	12%	2.96	19%	55%	15%	3%	8%	2.44	22%	63%	8%	2%	5%	2.12
Fast Casual Restaurant	16%	45%	23%	4%	12%	2.96	19%	55%	15%	3%	8%	2.44	22%	63%	8%	2%	5%	2.12
Fast Food Restaurant without Window	16%	45%	23%	4%	12%	2.96	19%	55%	15%	3%	8%	2.44	22%	63%	8%	2%	5%	2.12
Fast Food Restaurant with Window	16%	45%	23%	4%	12%	2.96	19%	55%	15%	3%	8%	2.44	22%	63%	8%	2%	5%	2.12
Shopping Center (over 150k sf)	35%	32%	18%	4%	12%	2.12	41%	37%	12%	3%	8%	1.81	47%	43%	5%	2%	3%	1.56
Shopping Plaza (40k to 150k sf)	35%	32%	18%	4%	12%	2.12	41%	37%	12%	3%	8%	1.81	47%	43%	5%	2%	3%	1.56
Strip Retail Plaza (under 40k)	35%	32%	18%	4%	12%	2.12	41%	37%	12%	3%	8%	1.81	47%	43%	5%	2%	3%	1.56
Supermarket	35%	32%	18%	4%	12%	2.12	41%	37%	12%	3%	8%	1.81	47%	43%	5%	2%	3%	1.56
Pharmacy	35%	32%	18%	4%	12%	2.12	41%	37%	12%	3%	8%	1.81	47%	43%	5%	2%	3%	1.56
Automobile Sales (New)	41%	52%	1%	1%	5%	1.62	41%	52%	1%	1%	5%	1.62	41%	52%	1%	1%	5%	1.62
Office	40%	15%	10%	5%	30%	2.17	56%	22%	5%	5%	12%	1.54	67%	26%	1%	1%	5%	1.29
Downtown Office	40%	15%	10%	5%	30%	2.17	56%	22%	5%	5%	12%	1.54	67%	26%	1%	1%	5%	1.29
TOD Office	40%	15%	10%	5%	30%	2.17	56%	22%	5%	5%	12%	1.54	67%	26%	1%	1%	5%	1.29
Medical/ Dental Office	26%	44%	15%	3%	12%	2.29	34%	56%	6%	2%	3%	1.80	35%	58%	1%	1%	5%	1.72
Manufacturing	79%	14%	1%	1%	5%	1.18	79%	14%	1%	1%	5%	1.18	79%	14%	1%	1%	5%	1.18
Mini-Warehouse	79%	14%	1%	1%	5%	1.18	79%	14%	1%	1%	5%	1.18	79%	14%	1%	1%	5%	1.18
Schools	23%	29%	11%	2%	35%	2.89	23%	29%	11%	2%	35%	2.89	23%	29%	11%	2%	35%	2.89
Custom	35%	35%	12%	3%	15%	2.04	42%	38%	8%	2%	10%	1.75	45%	43%	5%	1%	6%	1.61



Mobility Unit Determination Example

Transportation

Concurrency Determination

Submit this determination with the land use permit application for this project.

Date: 9/15/22

Project Name: Bellevue Office

Permit Number: 22-000000

Contact/Applicant Name: City of Bellevue

Email: COB@bellevuewa.gov

Project Address: 450 110th Avenue NE

Concurrency Reviewer: John Doe

Mobility Units required for proposal: 210

- ☑ This serves as a Concurrency reservation for 210 Mobility Units.
- ☐ This project generates 25 or fewer mobility units and does not require a concurrency reservation.

Notes:

1. This form must be submitted for all Land Use permit applications regardless of concurrency reservation status.
2. This reservation expires one year from the date above. A one-year extension may be requested if an accompanying Land Use permit is in review.
3. Mobility Units may not be transferred to another property or applicant.

Determination Output Report

Project Name: Bellevue Office
Permit # 22-000000
Project Address: 450 110th Avenue NE
Prepared by: John Doe
Date: 9/15/22

PMA 1

Proposed

Land Use	Size	Units	Vehicle Trips	Person Trips	Person Trip Types By Mode						Total Mobility Units Generated					
					SOV	HOV2+	Walk	Bike	Transit	Total	SOV	HOV2+	Walk	Bike	Transit	Total
Downtown Office	225	1,000 sf / GFA	176	383	154	57	38	19	115	383	154	22.8	3.8	3.8	11.5	196
Shopping Center (over 150k sf)	5	1,000 sf / GLA	20	42	14	13	8	2	5	42	14	5.2	0.8	0.4	0.5	21
Fast Casual Restaurant	5	1,000 sf / GFA	40	118	19	53	27	5	14	118	19	21.2	2.7	1	1.4	45
0	0		0							0						0
0	0		0							0						0
0	0		0							0						0
0	0		0							0						0
Subtotal			**236**	**543**	**187**	**123**	**73**	**26**	**134**	**543**	**187**	**49.2**	**7.3**	**5.2**	**13.4**	**262**

Existing

Land Use	Size	Units	Vehicle Trips	Person Trips	Person Trip Types Broken Down						Total Mobility Units Generated					
					SOV	HOV2+	Walk	Bike	Transit	Total	SOV	HOV2+	Walk	Bike	Transit	Total
Downtown Office	60	1,000 sf / GFA	47	102	41	15	10	5	31	102	41	6	1	1	3.1	52
0	0		0							0						0
0	0		0							0						0
0	0		0							0						0
0	0		0							0						0
0	0		0							0						0
0	0		0							0						0
Subtotal			**47**	**102**	**41**	**15**	**10**	**5**	**31**	**102**	**41**	**6**	**1**	**1**	**3.1**	**52**

Net New	**189**	**441**	**146**	**108**	**63**	**21**	**103**	**441**	**146**	**43.2**	**6.3**	**4.2**	**10.3**	**210**
									Concurrency Reservation is Required					

City of Bellevue
Department of Transportation
450 110th Ave NE
PO Box 90012
Bellevue, WA 98009
(425) 452-6856

September 2022