
Attachment D Additional Content Needed To Fill In Gaps In the Proposed TMP Document

Additional content provided in this attachment includes:

- I. Pedestrian network completion performance measure. See tracked changes for new content.
- II. Vehicular congestion measure
- III. Design guidance for multi-modal corridors
- IV. Concurrency Appendix updates (mobility units and traffic impacts to state facilities). New content is highlighted yellow.

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I. Pedestrian Network Completion

The TMP identifies five modal corridor networks: automobile, bicycle, pedestrian, transit, and truck. The corridors are intended to highlight modally-specific routes that connect major local and regional connections. The corridors also help the City allocate limited street space, and in some cases they establish design standards and service levels to ensure adequate mobility for all modes. For more information about modal corridors, including maps, see Chapter 4 – The Multimodal Transportation System.

Progress toward the completion of these networks is an indication that the City is successfully delivering the TFP and implementing the policies contained in the TMP. The network completion measures support the *Strong Support for Urban Centers, Travel Choices and Mobility, and Neighborhood Access* strategies.

Methodology

Network completion is expressed as the percent of each modal corridor that is considered complete, by length. The definitions of completion vary by modal network.

Automobile

Segments of the automobile network are considered “complete” if they are in their final configuration, and do not have a reconfiguration project identified for them in the TFP or the buildout plan, which is the City’s long-term list of planned transportation improvements. For example, if a roadway project is planned for a segment of Avondale Road in either the TFP or the buildout plan but not yet built, then that segment is not complete. Conversely, a nearby segment of Avondale Road that is not scheduled for improvement is in its final configuration and would be considered complete. Intersection improvements are assumed to influence the portions of connecting streets within 300 feet of the center of the intersection.

Bicycle

Segments of the bicycle network are considered “complete” if they are served by a physically-separated bikeway or shared-use trail. This reflects the standard set forth in bicycle section of Chapter 4 - The Multimodal Transportation System.

Pedestrian

~~[Methodology to be added]~~ [To be provided at the 4/24/13 Commission Meeting](#)

Transit

Segments of the transit network are considered complete if they carry transit service that meets the City’s standards for that corridor. On “high frequency” corridors, that standard is 15-minute headways (the time between vehicles) between 7 AM and 6 PM. On “regular” corridors, that standard is 30-minute headways during the same period.

Truck

The method for calculating truck network completion is the same as the automobile network.

The Network Completion measure is produced by the City of Redmond Department of Planning and Community Development. It will be calculated and reported annually.

Targets

Baseline (2013)

Automobile: 60% complete

Bicycle: 37%

Pedestrian: ~~[Target to be added]~~ [will be provided at the 4/24/13 Commission Meeting](#)

Transit: 81%

Truck: 65%

2030 Target

Automobile: 68%

Bicycle: 51%

Pedestrian: ~~[Target to be added]~~ [will be provided at the 4/24/13 Commission Meeting](#)

Transit: 100%

Truck: 76%

Aspirational Target

Automobile: 100%

Bicycle: 100%

Pedestrian: 100%

Transit: 100%

Truck: 100%

II. Vehicular Congestion Performance Measure

Congestion is a familiar frustration for almost everyone who drives or takes transit, and is the result of a mismatch between demand for space on a street and the street's capacity. Unfortunately there is no easy fix for congestion. Large-scale road widening projects are expensive, only temporarily effective, and out-of-sync with Redmond's land use vision. An expanded system of variable tolling could result in long-term congestion reductions, but would require coordinated effort at the regional level or beyond. For the foreseeable future congestion will remain a fact of life in growing communities like the City of Redmond. Nevertheless, growth of congestion beyond expected levels suggests a need for additional investments in non-single occupancy vehicle travel choices, expanded efforts to reduce demand, and potentially, projects to increase roadway capacity.

Congestion is a key measure for the *Freight Mobility* and *Strong Support for Urban Centers* strategies.

Methodology

Vehicular congestion is expressed as the average delay (in minutes) incurred during a one-mile trip on principal, minor, and collector arterials in Redmond during the PM peak (5 PM – 6 PM). "Delay" is defined as the midblock travel time for the average trip taken at a typical urban travel speed (see below) minus the midblock travel time of the average trip as estimated by the City's travel demand forecast model. This includes trips on uncongested streets and in non-peak directions, so the citywide average is lower than the delays that travelers would experience along the city's most congested segments of roadway. Because of technical limitations the model does not include delay from traffic signals or delays related to collisions, construction, weather, and other periodic phenomena.

Also reported for context is the average travel time (in minutes) for peak period, peak-direction travel on principal arterials in Redmond, which reflects the most severe congestion conditions in the city.

The data is generated by the City's travel demand forecast model, and will be reported once every three years.

Targets

Both the 2030 and long-term aspirational targets acknowledge that delay for roadways users will continue to grow as long as the number of jobs and housing units increases in Redmond. Individually, travelers can avoid peak period congestion-related delay by choosing travel modes that are not subject to congestion like biking, walking, or transit that operates in its own lane; shifting the timing of trips; and by reducing unnecessary trips during peak periods.

The 2030 target is the result of travel demand forecast model projections for 2030, which take into account land use changes, the transportation improvements included in the TFP, and changes in mode share and trip length.

[Aspirational target under development]

Baseline (2010)

Average travel time of [awaiting modeling results] minutes per mile

2030 Target

Average travel time of [awaiting modeling results] minutes per mile

Aspirational Target

[Aspirational target under development]

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III. Design Guidance for Combined Modal Corridors/Multi-modal Corridors

When modal corridors overlap modal priorities can become less clear. However, previous planning efforts such as corridor studies and citywide modal analyses offer guidance on how to support multiple modal corridors in the same street cross section. See Figure 1 for these corridors.

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Multimodal Corridors

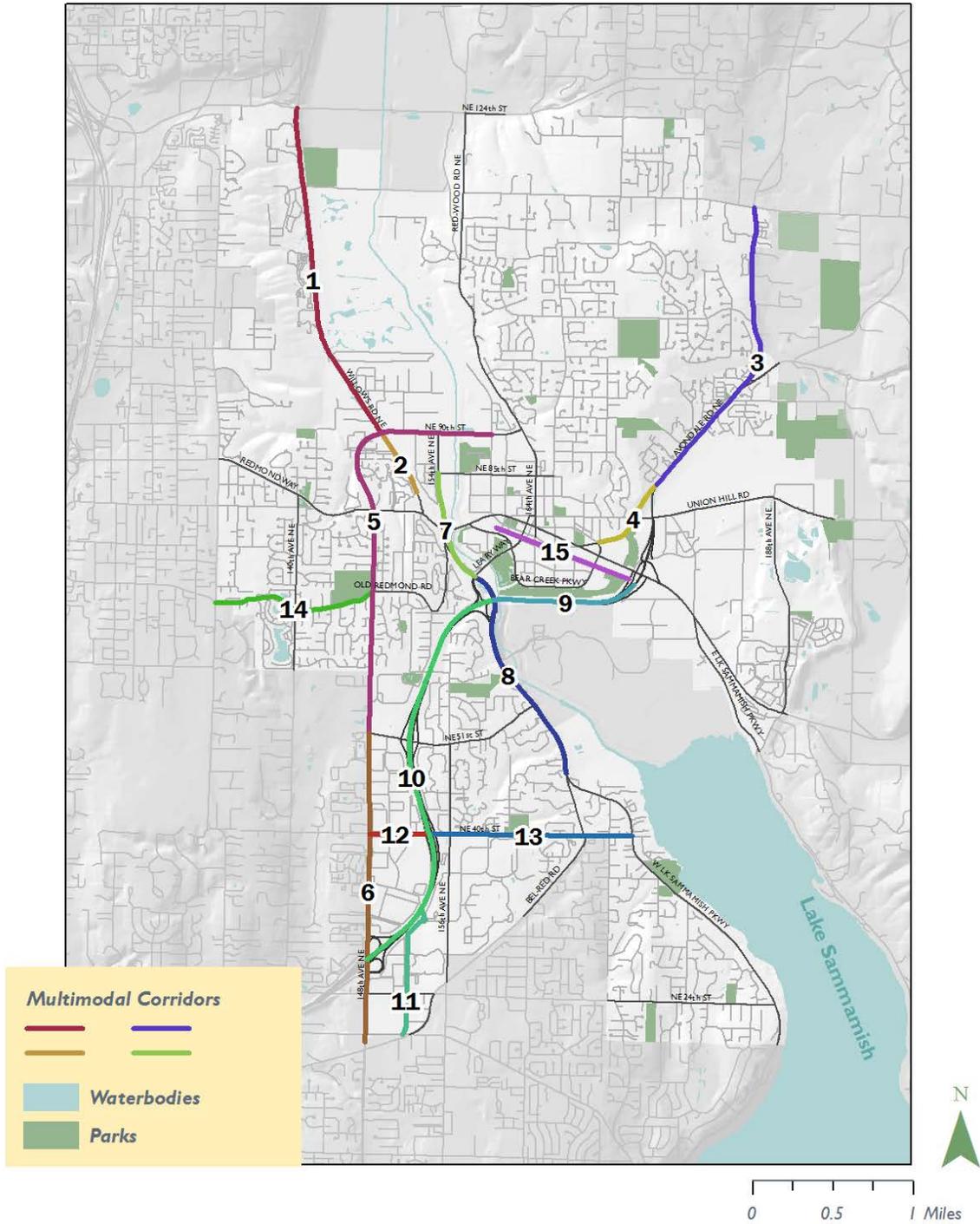


Figure 1

Each mode has basic priorities that apply on each modal corridor:

- Street – Provide for high vehicle volumes and reliable progression. Additional detail is provided about freight corridors.
- Transit – Provide high quality pedestrian access to and from transit stops, and support transit operating speed and on-time reliability. Additional detail on transit service is provided in the Transit Chapter.
- Bicycle – Provide high comfort bicycle facilities where currently deemed feasible and cost effective
- Pedestrian – the pedestrian zones are located in the urban centers and near light rail stations. Provide high quality sidewalks and frequent crosswalks, including midblock crossings where pedestrian volumes are anticipated such as connecting the interior pathway system in Downtown across arterial streets like 85th Street.

The table below provides additional detail, such as facility type per mode and any known gaps (brought from the system plans and the buildout project list).

ID	Combined Modal Description
1	<p>Street – Minor arterial. Provide for freight movements and vehicle volumes. Ultimate cross section includes two general purpose lanes in each direction and turn lanes where warranted.</p> <p>Transit – Medium demand corridor. Improve transit stop facilities and access by installing additional crossings and sidewalks. Support transit speed and reliability through signal priority and measures that assist transit vehicles merging back into traffic.</p> <p>Bicycle – Paved, Shared-Use Path. Complete the Redmond Central Connector as a separate but adjacent bicycle and pedestrian corridor. Provide access to and from the Central Connector to land uses across Willows Road by installing additional crossings.</p>
2	<p>Street – Minor arterial. Provide for freight movements and vehicle volumes.</p> <p>Bicycle – Paved, Shared-Use Path. Complete the Redmond Central Connector as a separate but adjacent bicycle and pedestrian corridor. Provide access to and from the Central Connector to land uses across Willows Road by installing additional crossings.</p>
3	<p>Street – Principle arterial. Provide for freight movements and vehicle volumes. Improve access management.</p> <p>Transit – Medium demand corridor. Improve transit access through additional crossings.</p> <p>Improve transit speed and reliability through signal priority and measures that decrease delay for transit vehicles. Stop treatments and location should avoid conflicts with cyclists.</p> <p>Bicycle – Cycle Track. Provide one way raised cycle track where existing bicycle lanes are located. Provide high quality access across corridor to encourage use and discourage wrong-way riding.</p>
4	<p>Street – Minor arterial. Provide for vehicle volumes.</p> <p>Bicycle – Bicycle Lane. As a modal corridor bicycle lane, provide bicycle lanes up to stop bar at</p>

	intersections and provide bicycle positioning markings through intersections. Support high quality transition to Bear Creek Trail.
5	<p>Street – Principle arterial. Provide for freight movements and vehicle volumes.</p> <p>Transit – High Demand Corridor with Bus Rapid Transit service. Improve transit speed and reliability through signal priority and measures that decrease delay for transit vehicles, in particular at BRT stops and for turns from NE 51st street to 148th AVE NE.</p>
6	<p>Street – Principle arterial. Provide for freight movements and vehicle volumes. Add northbound lane from south City limit with Bellevue to the eastbound SR 520 onramp.</p> <p>Transit – High Demand Corridor with Bus Rapid Transit service. Improve transit speed and reliability through signal priority and measures that decrease delay for transit vehicles, in particular at BRT stops and for turns from NE 40th ST to 148th AVE NE. Transit stops locations should be coordinated with existing and new signalized crossings.</p> <p>Pedestrian – Provide signalized crossings to support significant pedestrian volumes. Provide trail to support bicycle and pedestrian travel on east side of roadway.</p>
7	<p>Street – Principle arterial. Provide for freight movements and vehicle volumes.</p> <p>Transit – High Demand Corridor, critical to regional routes on SR520. Support access through improved crossings, improved sidewalks (none exist along most of the corridor), and connections to the new Redmond Central Connector. Evaluate potential for relocating stops closer to Leary Way intersection.</p>
8	<p>Street – Principle arterial. Provide for freight movements and vehicle volumes.</p> <p>Bicycle – Paved, Shared-Use Path. Complete the Sammamish River Trail along the east side of West Lake Sammamish Parkway as a separate but adjacent bicycle and pedestrian corridor. Provide access to and from the land uses across West Lake Sammamish Parkway.</p>
9	<p>Street – Limited Access Freeway. Provide for high vehicle and freight speeds and volumes.</p> <p>Transit – East Link Light Rail. Support highest operating speed possible for rail alignment adjacent to Marymoor Park. Light rail continues into Downtown, crossing under SR 520 and providing a SR 520 undercrossing for the East Lake Sammamish Trail.</p>
10	<p>Street – Limited Access Freeway. Provide for high vehicle and freight speeds and volumes.</p> <p>Transit – East Link Light Rail. Support highest operating speed possible for rail alignment. Support station access and provide for very high volumes of pedestrians, including new bridges over SR 520 for bicycles and pedestrians.</p> <p>Bicycle – Paved, Shared-Use Path. Complete the 520 Trail projects identified in the 520 Corridor Planning Study, including undercrossings at 51st St, 40th St, and 148th Ave, as well as bicycle/pedestrian bridges over SR 520.</p>
11	<p>Transit – High Demand Corridor with Bus Rapid Transit service. Improve transit speed and reliability through signal priority and measures that decrease delay for transit vehicles, in particular turns to and from NE 24th. Support fast, convenient transfers to light rail station.</p>

	<p>Pedestrian – Main Street. Provide an experience that draws regional and national visitors to stroll along the 152nd Ave main street. High quality furnishings, pedestrian crossings, programmed and unprogrammed spaces, sidewalk cafes.</p> <p>Bicycle – Cycle Track. Provide one way raised cycle track at road grade buffered from on-street parking by raised planter strip. Provide Bike Boxes at intersections.</p>
12	<p>Street – Minor arterial. Provide for high vehicle volumes.</p> <p>Transit – High Demand Corridor with Bus Rapid Transit service. Improve transit speed and reliability through signal priority and measures that avoid delay for transit vehicles, in particular turns to and from 156th AVE NE and 148th AVE NE. Support fast, convenient transfers to light rail station.</p> <p>Pedestrian – Provide for comfortable walking space for high pedestrian volumes.</p>
13	<p>Street – Minor arterial. Provide for vehicle volumes.</p> <p>Pedestrian – Provide for comfortable walking space for high pedestrian volumes.</p> <p>Bicycle – Bicycle Lane. As a modal corridor bicycle lane, provide bicycle lanes up to stop bar at intersections and provide bicycle positioning markings through intersections.</p>
14	<p>Transit – High demand corridor. Support and maintain speed and reliability through signal priority and measures that avoid delay for transit vehicles and avoid conflicts with cyclists</p> <p>Bicycle – Bicycle Lane. As a modal corridor bicycle lane, provide bicycle lanes up to stop bar at intersections and provide bicycle positioning markings through intersections.</p>
15	<p>Transit – East Link Light Rail. Complete light rail into Downtown following Infrastructure Alignment Plan. Ensure high quality light rail travel time reliability and moderate speed. Support transfers to and from arterial bus service.</p> <p>Bicycle – Complete Redmond Central Connector Master Plan quality of materials, spaces, and connections, following the Infrastructure Alignment Plan.</p>

IV. Appendix C: Concurrency Management and Level of Service

Introduction

The TMP represents a multimodal approach to addressing transportation and includes programs, projects and services that are intended to serve the communities transportation and land use vision as articulated in the Redmond Comprehensive Plan. The City of Redmond's plan-based transportation concurrency system is a tool to ensure the pace of development does not exceed the pace at which the multimodal, growth related program, projects and services included in the TMP are implemented.

The 2004 Comprehensive Plan and 2005 TMP established the framework for a new plan-based concurrency management system that would ensure the City meet its level of service (LOS) standard of growth occurring proportionately and in parallel with development of the City's transportation system. This was a significant change from the prior LOS and concurrency management system which was based solely on measuring vehicle LOS at system intersections in seven Transportation Management Districts. This system was determined to be inconsistent with other Comprehensive Plan policy.

After the adoption of the 2005 TMP the City embarked on a study to implement plan-based concurrency and the City's new LOS standard. The study resulted in establishing an LOS based on City-wide person miles of traveled, also referred to as Mobility Units. The study also resulted in updates to the City's Zoning Code consistent with Comprehensive Plan policy TR-27. Another part of the study was determining how the new system would be administered to ensure implementation of growth related multimodal transportation programs, projects and services consistent with the Comprehensive Plan and TMP (TR-29). The resulting plan-based concurrency system now in place ensures the City is meeting the requirements of the Washington State Growth Management Act (GMA), while also simplifying the development review process.

The foundation of the plan-based concurrency system is an up-to-date plan of programs, projects and services that supports the community land use vision. The TMP includes the Transportation Facilities Plan (TFP), which is multimodal in scope, financially constrained and based on Redmond's 2030 vision of a balanced land use and transportation system. The TFP represents a plan that responds to existing growth trends and prepares for future growth in the City's two urban centers while continuing to improve transportation within established neighborhoods.

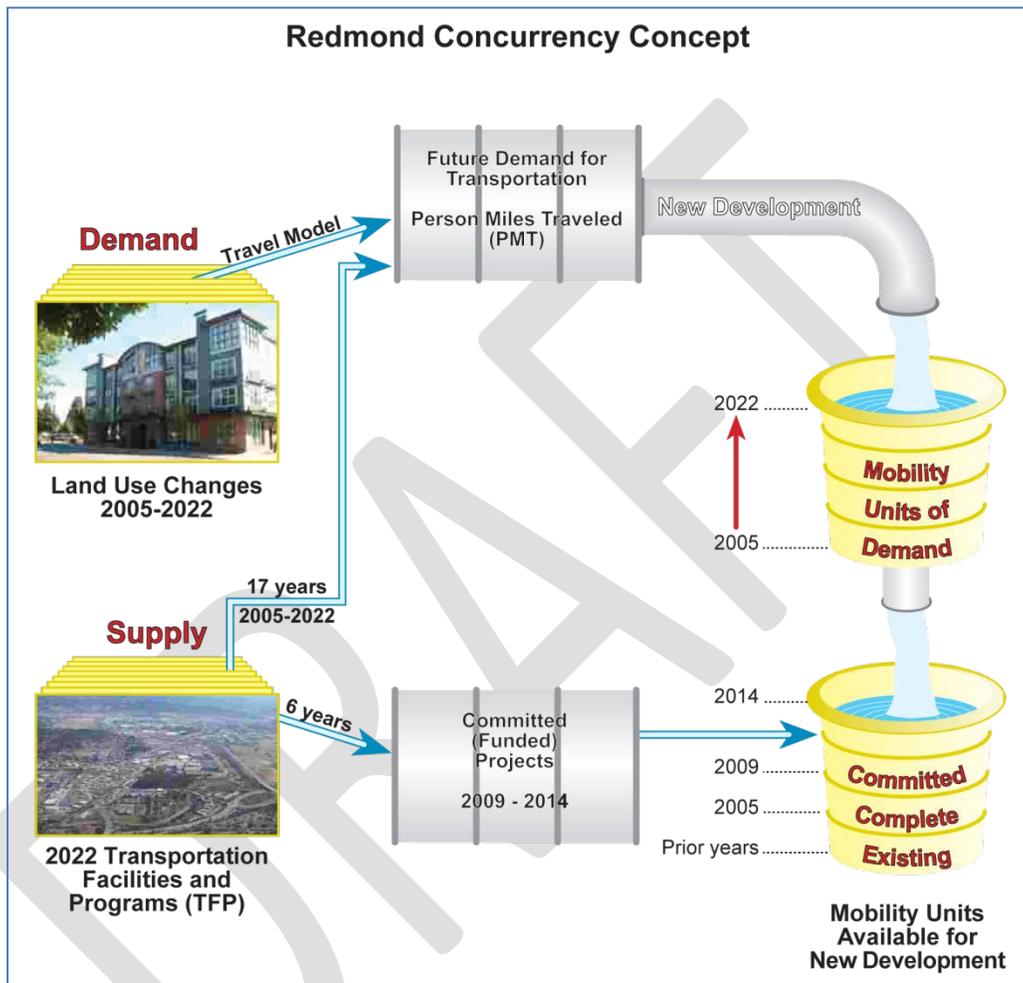
The TMP also includes a Performance Monitoring chapter which provides transportation system monitoring beyond what is required in this chapter to meet GMA level of service and concurrency requirements. The Performance Monitoring chapter provides specific performance measures reported out annually for various transportation modes allowing the City to better manage the transportation system. This also allows the concurrency management system to focus on ensuring that implementation of growth related programs, projects and services included in the TFP keeps pace with growth.

Framework

The plan-based concurrency system is based on analysis of 2030 land uses (as contained in the Comprehensive Plan) and the 2030 TFP, which is designed to provide sufficient capacity for that land use. To

maintain concurrency, then, it will be necessary to appropriately pace land development with multimodal transportation system programs, projects and services.

The overall concept for maintaining this critical balance of transportation concurrency in Redmond is shown in the figure below. The committed, complete and existing “bucket” in the bottom right illustrates the short-term capacity that will be available to new development based on progress made by the City in implementing transportation programs, projects and services.



Level of Service

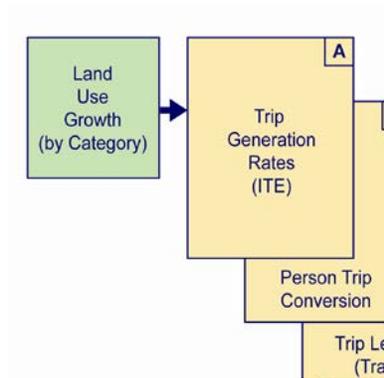
The level of service measure for concurrency is to demonstrate completion of the multimodal transportation system is occurring at the same rate or a faster rate than the growth in travel demand.

Demand

Measuring concurrency requires the creation of an apples-to-apples comparison between demand for and supply of multimodal transportation infrastructure. The starting point for this comparison is the development of

a land use summary table. This table summarizes the total amount of new development, measured in the number of residential dwelling units and square feet of non-residential space in 2010 and the 2030 land uses forecasted by district. The growth in development is calculated as the difference in the 2030 and 2010 land uses.

Person Mile Calculator



Conventional planning practice determines transportation impacts by calculating the number of automobile trips that will be generated by the forecast land uses. Using a multimodal approach, the new plan-based concurrency system relies on a mode-neutral measure known as the “mobility unit” (measured in terms of person miles traveled rather than vehicle miles traveled or automobile delay).

Supply

Based on adopted plans and policies, the list of transportation programs, projects and services to be implemented by 2030 is expected to be sufficient to meet the travel demand generated by new development. A key element of the plan-based concurrency system is communicating how much of the 2030 TFP is implemented within the six-year concurrency window.

In order to measure the amount of capacity available for each travel mode (e.g., bicyclists, motorists, pedestrians, and transit users), the City developed a measure called “system completion.”

The analysis uses the capacity-enhancing list of transportation programs, projects and services from the 2030 TFP with cost estimates for each. Next, the analysis evaluates their status by determining how many projects are complete, fully funded or partially funded in the City’s 6-Year Program. Based on this analysis the percent of committed capacity-enhancing TFP programs, projects and services is determined as well as the number of mobility units of supply available.

Concurrency Management

Using the calculations described for supply and demand above, concurrency is determined by comparing the available transportation mobility units against the demand for mobility units generated by new development. To manage the pace of development in the short-term, the concurrency test focuses on “how much room is left in the 6-Year Bucket?” This test entails a comparison of the available mobility units based on projects funded or constructed in the time horizon of the 6-Year Program, as required under the GMA. One important step in this process is to account for the mobility units that have been allocated for “pipeline” development projects that have been approved by the City but not yet occupied.

Available Mobility Units - Comparing Supply to Demand

The available mobility units are calculated by comparing the available supply to the demand. As shown below, the supply of mobility units represents the proportion of the TFP that is committed to be built during the next six years. As previously described, approximately 60 percent of the mobility units are currently available for development. The current demand for mobility units is represented by the amount of pipeline development approved within the City.

Management System and Development Review

Under the proposed plan-based concurrency system, concurrency approval of a proposed development is based on the availability of mobility units within the mandated 6-year time frame. To manage the pace of development in the short-term, the concurrency test will focus on “how much room is left in the 6-year bucket?” This test will entail a comparison of the available mobility units based on projects funded or completed in the 6-year program time horizon, as required under the GMA.

As part of the concurrency review process, each development proposal would be analyzed to determine the number of mobility units expected to be generated by the development. This demand for mobility units would then be compared to the available mobility units within the City’s 6-year program. If sufficient mobility units are available, then the development is considered to be concurrent.

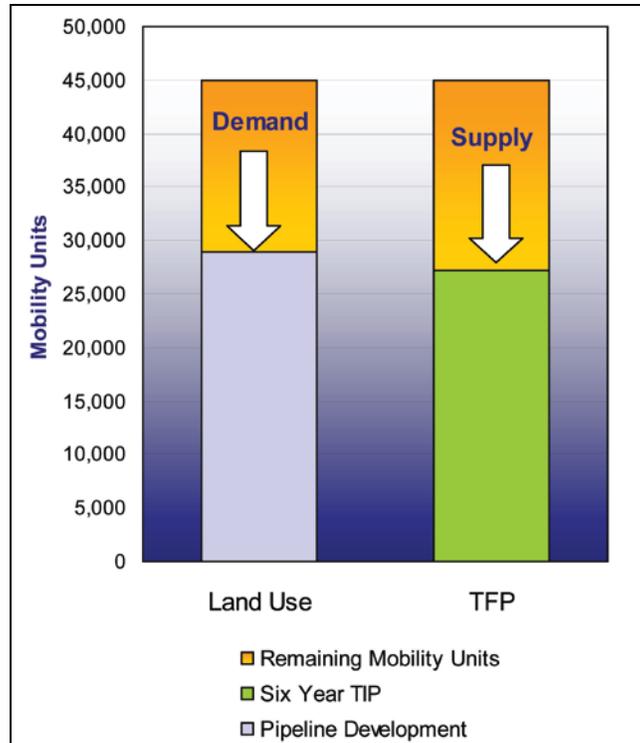
If the development is deemed to be not concurrent, then the applicant would need to wait until additional mobility units become available or pay for additional mobility units to offset the impacts of the development. Mobility units become available as additional projects are funded and committed by the City within its 6-Year Programs, the Transportation Improvement Program and Capital Investment Program. Alternatively, an applicant could agree to accelerate the implementation of key infrastructure projects in order to provide sufficient transportation system capacity. This process would be similar to the supplemental mitigation procedures currently used under the City’s existing concurrency regulations.

Once concurrency is achieved, the proposed development would need to comply with SEPA requirements, applicable City zoning and building codes, and pay transportation impact fees.

TRENDS AND CONDITIONS

Comparing Supply and Demand

The current demand for mobility units (person miles of travel) is based on the total amount of development that is either in the development design and review “pipeline”, under construction or complete during the planning horizon. Based on current development 35,429 mobility units of demand planned for in the 2005 Transportation Master Plan have been allocated to these projects.



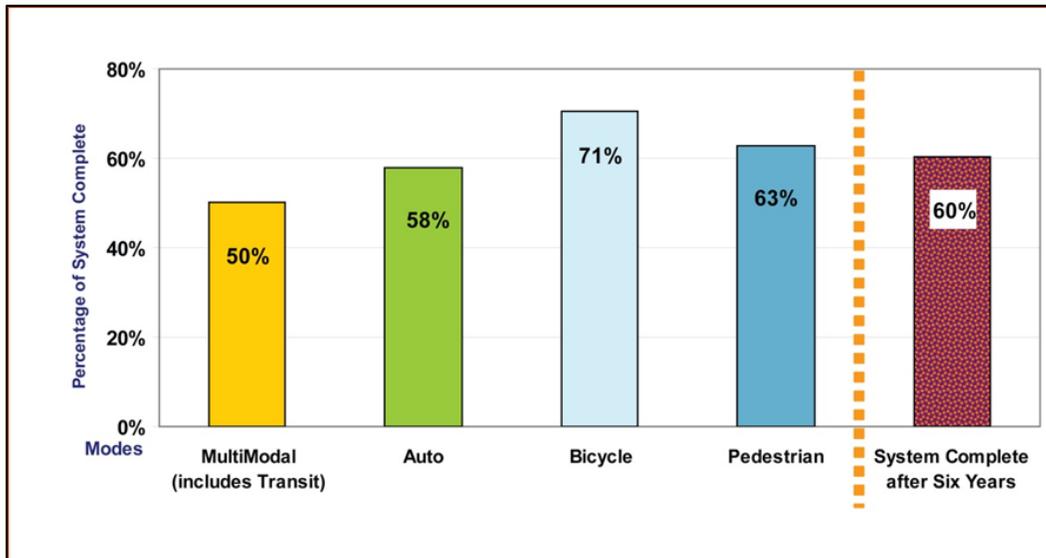
The current supply for mobility units is based on the total amount of capacity-enhancing programs, projects and services in the Transportation Facility Plan which are either complete or committed. This is also referred to as system completion. Based on analysis of completed projects and the current 6-year TIP there are **44,060** of mobility units of supply available.

The comparison of current mobility unit demand and mobility unit supply available determines the amount of mobility units available for new development. The City currently has **8,631** mobility units of supply available ($44,060 - 35,420 = 8,631$).

System Completion

The portion of the TFP that is complete or committed. The result of this analysis showed that the total system completion equals the sum of the 6-Year TIP/CIP (60%), as shown in the diagram below. This figure also shows the approximate percent committed of the specific modal projects.

System Completion Status



State Highway Levels of Service

The Washington State Growth Management act requires that cities' comprehensive plans include "[e]stimated traffic impacts to state-owned transportation facilities resulting from land use assumptions to assist the department of transportation in monitoring the performance of state facilities, to plan improvements for the facilities, and to assess the impact of land-use decisions on state-owned transportation facilities."¹ Redmond has two state routes within its borders: SR 520 and SR 202 (Red-Wood Rd NE/Redmond Way). Table 1 includes volume-to-capacity (V/C) ratios for the Redmond extents of these facilities for the 2010 baseline and in 2030 with projected land-use changes and completion of the Transportation Facilities Plan (see Chapter 7 – Transportation Facilities Plan).

Table 1. V/C Ratios for Highways of State Significance in Redmond

Corridor	Volume to Capacity (V/C Ratio)			
	2010		2030 TFP	
	MD	PM	MD	PM
SR 520 WB from Redmond Way to West Lake Sammamish Pkwy NE	0.79	0.82	0.89	0.89
SR 520 EB from Redmond Way to West Lake Sammamish Pkwy NE	0.75	1.16	0.84	1.17
SR 520 WB from West Lake Sammamish Pkwy NE to NE 51 st St	0.61	0.55	0.67	0.57
SR 520 EB from West Lake Sammamish Pkwy NE to NE 51st St	0.62	0.85	0.62	0.89
SR 520 WB from NE 51st St to NE 40th St	0.61	0.57	0.71	0.67
SR 520 EB from NE 51st St to NE 40th St	0.42	0.62	0.54	0.72
SR 520 WB from NE 40th St to 148th Ave NE	0.58	0.54	0.72	0.71
SR 520 EB from NE 40th St to 148th Ave NE	0.49	0.58	0.6	0.68

¹ RCW 36.70A.070(6)(a)(ii)

Redmond Woodinville Rd NE (SR 202) from NE 90th St to NE 124th St	0.92	1.34	1.06	1.66
Red-Wood Rd (SR 202) from NE 85th St to NE 90th St	0.73	0.81	0.79	0.97
164 th Ave NE (SR 202) from NE 85th St to Redmond Way	0.74	0.83	0.92	1.07
Redmond Way (SR 202) from 164th Ave NE to 170th Ave NE	0.52	0.5	0.84	1.08
Redmond Way (SR 202) from 170th Ave NE to SR 520	0.89	0.98	1.07	1.12
Redmond Way (SR 202) from SR 520 to East Lake Sammamish Pkwy NE	0.85	1.17	1.09	1.36
Redmond Way (SR 202) from East Lake Sammamish Pkwy NE to 185th Ave NE	0.72	1.04	0.87	1.21
Redmond Way (SR 202) from 185th Ave to E city limits	0.66	1.03	0.83	1.26

Implementation and Action Steps

Once the TMP update is adopted the concurrency management system will be recalculated using the adopted 2013-2030 Transportation Facility Plan from the TMP and the 2010-2030 growth targets from the Comprehensive Plan. The amount of “pipeline” development will also be updated to reflect the new 2013-2030 planning horizon. The result of this update will be an updated number of Mobility Units of supply available for new development.

Once the status of the concurrency management system has been updated implementation of the growth related portion of the TFP annually and new development proposals will be tracked as developers apply for concurrency. Based on this information the Mobility Units of supply available for new development will remain up-to-date.