

# Chapter 4

## Future Conditions

This chapter of the Regional Transportation Plan (RTP) takes a broad look at the impacts the region's anticipated population and employment growth will have on our transportation facilities, and possible implications for future travel patterns and environmental considerations. The RTP uses a transportation demand model (also referred to as the regional transportation model) to quantify both current and future travel conditions. Thurston Regional Planning Council (TRPC) and local jurisdictions use an analysis to identify potential problem areas for further study. Further analysis reports on key measures of system performance.

Find additional information on the transportation demand model in Appendix I.

### Overview

TRPC used the regional transportation model to conduct the analysis in this chapter at a scale useful for identifying broad issues relating to transportation. The model allows analysis of factors such as:

- How system efficiency changes over time, or the comparison of network usage versus investments in capacity projects.
- How much we travel, generally expressed as travel volumes, or number of trips that the model predicts will utilize each part of the model network, including vehicle lanes, trails, and transit routes.
- How we travel, or mode, such as walking, bicycling, single occupancy vehicle, shared rides, school bus, or transit.
- How far we travel, generally expressed as vehicle miles traveled.
- How long it takes to travel, measured as average speed.

TRPC conducted the analysis for two time horizons, 2015 (current conditions) and 2040 (future conditions). TRPC calibrated the current conditions model to a household travel survey and actual traffic counts. The future conditions model provides planning level estimates of travel demand using a set of assumptions outlined below.

## Expected Future Versus Sustainable Thurston Vision

TRPC adopted the *Sustainable Thurston Plan* in December 2013. The plan includes a preferred land use scenario that supports vibrant urban cities and neighborhoods, and retains the rural character of rural Thurston County.

Local jurisdictions are integrating Sustainable Thurston concepts into local comprehensive plans. TRPC's next population and employment forecast will reflect adopted updated land use plans, including changes to growth boundaries, zoning, and development regulations.

As part of a future work program, TRPC will analyze the effect that implementing Sustainable Thurston's preferred land use may have on planning for transportation facilities and services (see Chapter 2: Work Program Priorities, Transportation and Land Use Category – Update the "Vision Reality" report.)

## Land Use

The transportation model reflects land use data as number of households, population, school and college enrollment, and jobs. Land use data used in the analysis is consistent with TRPC adopted population and employment forecast for Thurston County, and Puget Sound Regional Council's land use forecast for Pierce

County. TRPC developed land use forecasts for Mason, Lewis, and Grays Harbor Counties using population forecasts from the State Office of Financial Management. Staff at Joint Base Lewis-McChord provided land use estimates for the base. These forecasts are meant to reflect expected future conditions based on past trends, adopted land use plans, and best available data. (See Table 4-1.)

## Demographics and Household Characteristics

Demographics such as household size, number of children, and income vary by location. With the exception of household size, we held these characteristics constant between the base year (2015) and future year (2040). Household size decreases slightly between 2015 and 2040.

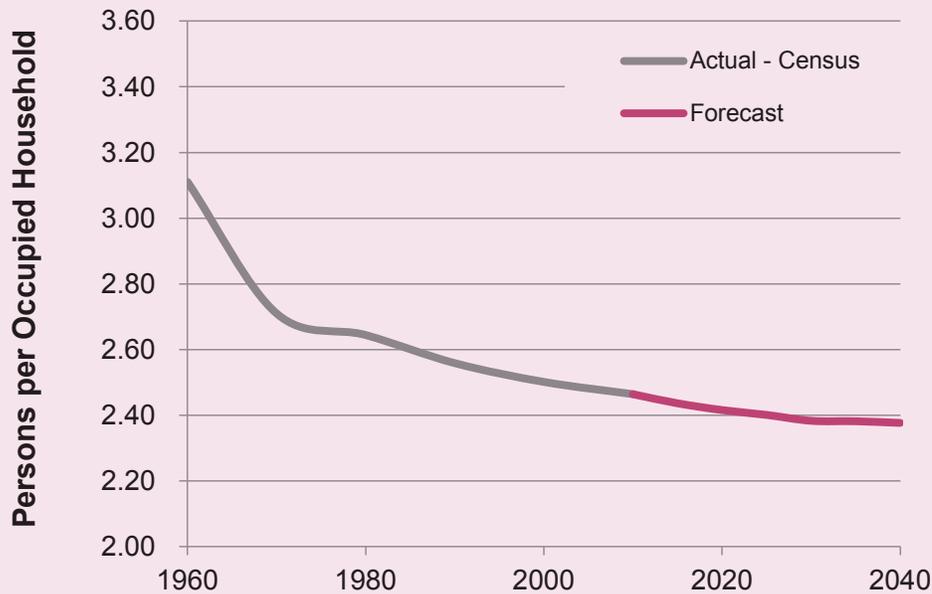
Thurston County's household size decreased dramatically in the 1960s, and has continued to decrease steadily since then. A variety of factors have contributed to this trend, including: less children per household, a greater number of one-parent households, and longer life expectancy resulting in a greater number of households without children. Household size contributes to the number of trips generated by household. (See Figure 4-1.)

**Table 4-1: Select Land Use Characteristics Used in the Transportation Model**

	Thurston County	Grays Harbor County	Lewis County	Mason County	Pierce County
2015 Households	106,059	28,723	30,148	24,237	311,313
2040 Households	162,209	31,056	36,009	34,222	425,424
<i>Increase in Households</i>	52.90%	8.10%	19.40%	41.20%	36.70%
2015 Population	267,410	73,110	76,660	62,200	830,120
2040 Population	394,000	77,070	88,967	84,919	1,098,157
<i>Increase in Population</i>	47.30%	5.40%	16.10%	36.50%	32.30%
2015 Jobs	145,971	28,602	32,297	18,969	348,957
2040 Jobs	199,715	30,915	37,670	25,509	467,763
<i>Increase in Jobs</i>	36.80%	8.10%	16.60%	34.50%	34.00%
2015 K-12 Enrollment	40,250	10,259	11,781	5,716	127,142
2040 K-12 Enrollment	57,587	10,739	13,802	7,824	148,679
<i>Increase in K-12 Enrollment</i>	43.10%	4.70%	17.20%	36.90%	16.90%
2015 College FTE Enrollment	9,833	0	2,289	300	32,228
2040 College FTE Enrollment	10,700	0	2,290	300	36,158
<i>Increase in College Enrollment</i>	8.80%	n/a	0.00%	0.00%	12.20%

Sources: Thurston Regional Planning Council, Puget Sound Regional Planning Council, and Washington State Office of Financial Management.

### Figure 4-1: Change in Household Size, Thurston County



Sources: 1960-2010 Census; 2015-2040 TRPC Population and Employment Forecast.

## Transportation Demand Management

Transportation demand management (TDM, also referred to as Travel Demand Management) is the application of strategies and policies to reduce travel demand (specifically that of single-occupancy private vehicles), or to redistribute this demand in space or in time. The region is employing – to varying degrees – a broad range of TDM measures including:

- Promoting the use of ride sharing.
- Building pedestrian-oriented design elements in street design, such as short pedestrian crossings, wide sidewalks, and street trees.
- Requiring parking users to pay the costs directly (as opposed to sharing the costs indirectly with others through increased rents).
- Increasing the cost of parking.
- Building public transportation infrastructure, such as bus shelters.
- Subsidizing transit costs for employees or residents.
- Building bicycle-friendly facilities and environments, including secure bike storage areas and showers.
- Allowing for and encouraging telework and flexible work schedules.

Nearby jurisdictions apply other TDM strategies, such as implementing road pricing tolls during peak hours, or providing for high-occupancy vehicle (HOV) lanes on the interstate highway. TRPC can model some TDM strategies such as the price of parking, tolling, and HOV lanes directly. The model can consider others, such as telework and compressed work week policies, by adjusting trip generation rates. Other strategies are captured in overall mode split characteristics, but cannot be evaluated without supplemental information. The analysis of future conditions assumes no changes in the magnitude or effect of TDM strategies and policies.

As part of the future work program, TRPC will investigate what effect enhancing TDM strategies will have on factors such as vehicle miles traveled (VMT), to assess what actions and investments the region must make to reach our VMT and greenhouse gas emission goals.

## Technology

The model reflects travel behavior based on technology that exists in 2015. Emerging technologies such as automated vehicles will have an effect on travel behavior, but it is too soon to tell what the effect may be. Future enhancements in technology may also increase our ability to collect and model travel behavior data.

## Transportation Facilities

Transportation facilities included in the model are major roads (collectors, arterials, freeways, and freeway ramps, with some local roads to the extent they support the modeling network), multi-use trails, and transit routes (Maps 4-1, 4-2, and 4-3).

The RTP analyzes future travel conditions for two alternatives:

- **Funded Projects:** Current conditions plus only currently fully funded transportation projects.
- **2040 Regional Project List:** Current conditions, plus regional improvements to transportation facilities, recommended through local jurisdiction analysis (Regional Project List).

## Regional Projects

Regional Projects include projects on the vehicle and multiuse trail network, and transit service. (See Regional Project List in Chapter 2: Recommendations.)

Local partners identify Regional Projects through their planning processes, and include those in local planning documents. The list of Regional Projects and Studies in the RTP must be financially constrained, which means the expenditures associated with these projects and studies must be equal to or below the forecast of revenue (see Chapter 5: Finance).

The Regional Projects include capacity and efficiency changes to the transportation network. The region is also undertaking a broad range of transportation demand management actions to make more efficient use of the existing network. Perhaps the most notable result of this commitment is the identification of strategy corridors in the region's busiest areas.

Strategy corridors are places where road widening is not a preferred option to address congestion problems. This may be because the street or road is already at the maximum number of lanes, or that adjacent land uses are either fully built out or are environmentally sensitive.

In strategy corridors, level of service (LOS) may exceed adopted standards, suggesting instead that we need a different approach for maintaining access in these areas. These approaches might include increased transit service, more sidewalks or bicycle facilities, a complete and connected street grid, transportation technology measures that improve system operating efficiency, access management, parking management, or incentives for employees to telework or carpool.

In addition to identifying strategy corridors, the region has adopted a policy to avoid widening any local arterial or collector to more than two through lanes in each direction and auxiliary turn lanes where warranted (five lanes maximum mid-block width) to preserve an acceptable community scale and minimize transportation impacts on adjacent land uses.

The Regional Projects List represents 20+ years of investments. As growth occurs and we update land use forecasts, the region will reevaluate the need for projects. The Regional Projects will:

- Help fulfill the visions outlined in local comprehensive plans.
- Enhance transportation facilities as needed to accommodate the effects of future population and employment growth.

- Improve safety performance for all users.
- Increase the range of healthy transportation options for active travel.

They will add:

- Over 20 miles of new multiuse trails.
- 6 new or realigned highway interchanges.
- Around 14 miles of new road connections.
- Over 85 lane miles of new general purpose lanes or center turn lanes, including new connections.
- Over 75 miles of new or rebuilt bicycle and pedestrian facilities.
- Improved transit facilities and service.

Street and road projects include intersection improvements, as well as bike lanes, sidewalks, planter strips, and other multimodal features. These facilities are typically 30 percent to 60 percent of total costs for street and road projects.

## Funded Projects

Funded Projects are a subset of the Regional Project List, and include those projects that have committed funding, and a high likelihood of being built. They include parts or all of projects:

- A7 Tye Drive Extension in Tumwater from near Kingswood Drive to Tumwater Boulevard.
- A12 Hogum Bay Truck Route in Lacey.
- C19 Old Highway 99 Improvements in Tumwater, from 73rd Avenue to 88th Avenue.

Other model network improvements are included in both the Funded Projects and Regional Project List model networks, but are not included in the Regional Project List as they are local rather than regional in nature. They include:

- Widening of SR 510 from 2 to 4 lanes within the Nisqually Indian Tribal Reservation.
- A new street connection in Lacey from Hogum Bay Road to Carpenter Road.

## How System Efficiency Changes Over Time

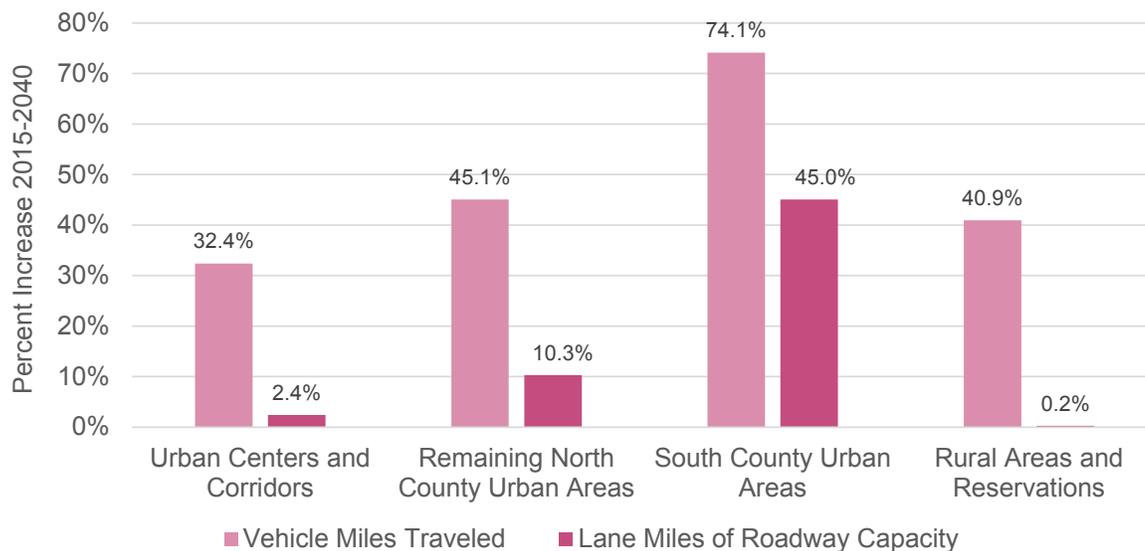
The transportation model allows for a comparison of system usage by vehicles versus investments in vehicle system capacity. The investments in vehicle system capacity are outlined in the Regional Project List (see Chapter 2: Recommendations), and include adding general purpose travel lanes, two way center turn lanes, or access management (usually some combination of center medians and roundabouts).

Excluding the freeways, vehicle miles traveled (VMT) is projected to increase in Thurston County by just over 42 percent, while roadway capacity would increase by 6 percent, if all of

the Regional Projects are completed by 2040. This illustrates that the region is not attempting to build its way out of congestion – rather, these strategic investments – along with a suite of other multimodal investments – will lead the region to a more efficient use of transportation infrastructure.

The south county urban areas – which include the cities, towns, and urban growth areas, are likely to see the greatest increase in vehicle miles traveled on their roadway networks, but are also making the greatest investments in increasing roadway capacity. Most of these investments are within the City of Yelm. In comparison, the rural county and tribal reservations identified very few capacity projects, but we expect VMT to increase by over 40 percent, which will lead to a lowering of level of service for travelers. (See Figures 4-2 and 4-3.)

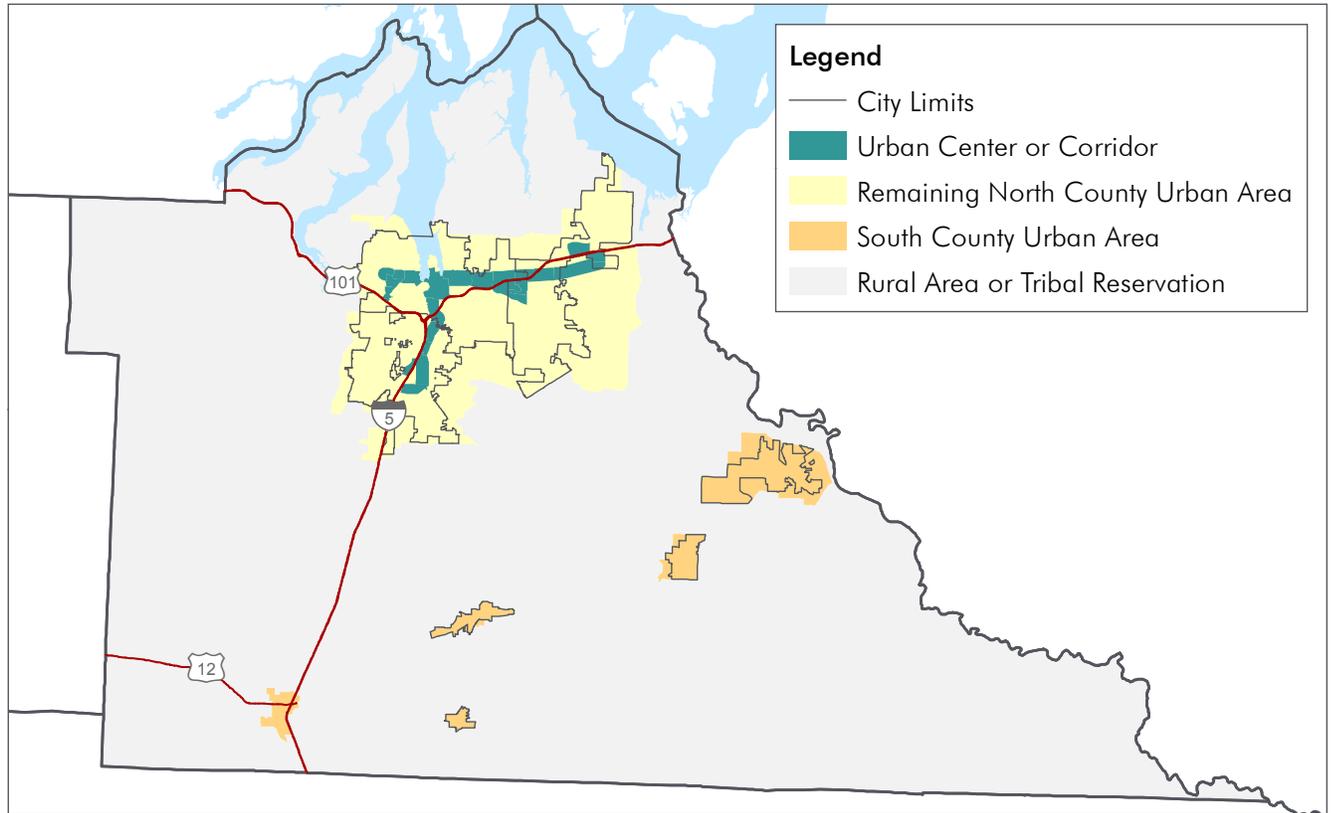
**Figure 4-2: Comparison of Increase in VMT Versus Increase in Roadway Capacity with Regional Projects**



Source: TRPC Transportation Model.

Note: Includes arterials and collectors. Excludes freeways and local roads.

Figure 4-3: Geographic Areas Used in the Analysis in this Chapter



## How Much We Travel

The transportation model predicts traffic demand volume, measured in number of trips, for all modes of travel. For vehicles, the model can compare the demand volume to estimates of capacity along major roads. This comparison is referred to as the volume to capacity (V/C) ratio.

### Vehicle Demand Volume Estimates

For the base year of the model (2015), the model calibrates vehicle demand volume estimates to achieve a “best fit” with actual traffic counts collected during the afternoon peak travel period (p.m. peak).

### Transportation Model Capacity Estimates

TRPC’s model uses generalized roadway capacities based on the type of roadway facility. The Technical Advisory Committee (TAC) of TRPC provided extensive input on how to classify the individual roadways captured within the transportation demand model’s network. This collaborative process ensured consistency of the roadway classification across jurisdictional boundaries.

Roadway capacities are assigned for each link of the regional transportation model network. Capacity is the maximum number of vehicles a network segment can accommodate without excessive delays. Lane Miles of Roadway Capacity (see Figure 4-2) are calculated by multiplying the number of lanes in each

### How Can Demand Exceed Capacity?

The transportation model estimates demand. The model assigns traffic trips to the fastest route. If the model has to choose between two arterials with the same speed limit, it will choose the shortest route. If one of the arterials becomes congested and travel slows, the model reassigns traffic to the other (now faster) route. The model will also shift trips to other modes of travel if they become the fastest way to travel. Because the number of trips traveling between the two destinations is fixed, it is possible that the model is unable to assign the excess trips when the route becomes “full.” In that situation, the model demand will exceed capacity. In the real world, travelers would adjust their departure (spreading the peak period), or where they travel (change jobs or move), in addition to changing routes or modes of travel.

direction by the length of the roadway, and the assigned capacity.

### Two-Hour Period

TRPC conducts the V/C ratio analysis for a two-hour period during the p.m. peak for average weekday conditions. These typically reflect the busiest hours of the day on any particular roadway during average conditions. This means roads are assessed for average conditions rather than worst-case conditions, such as during the holiday shopping season.

## Analysis

Using the V/C ratio as a screening tool, roadway segments are displayed in varying colors matching LOS levels for:

- Current Conditions (Maps 4-3; 4-3A)
- Future Conditions Funded Projects (Maps 4-4; 4-4A)
- Future Conditions Regional Projects (Maps 4-5; 4-5A)

The RTP compares these to adopted LOS standards that vary by area characteristics (see Chapter 3: Goals and Policies, Goal 9).

The Funded Projects maps (Maps 4-4; 4-4A) provide information on how the transportation system will perform in 2040 if we make no additional transportation improvements on the

## Multimodal Level of Service

Multimodal level of service (LOS) considers the volume of people and goods, not just vehicles, moving through a corridor. Lacey, Olympia, and Tumwater are all exploring ways of measuring multimodal level of service. As part of the future work program, TRPC will work with the cities on this measurement, collaborate on data needs, and explore regional multimodal level of service measures for the RTP.

regional transportation network (aside from those already funded and underway).

The Regional Projects maps (Maps 4-5; 4-5A) analyze system performance in 2040 with the anticipated projects on the network.

## The Volume to Capacity (V/C) Ratio and Level of Service

LOS is a qualitative mechanism used to determine how well a transportation facility is operating from a traveler’s perspective. The V/C ratio is a planning level method to determine the LOS, separated into six levels for analysis, and assigned a letter from A to F representing level of service. Planners use V/C ratio to identify possible LOS deficiencies in the transportation system. In this analysis, we use the V/C ratio to identify possible areas for future study.

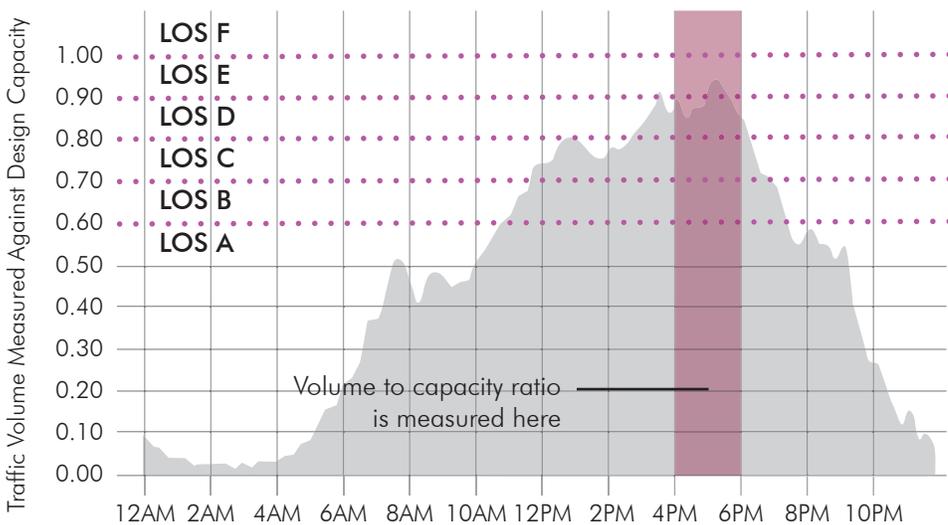
Level of Service	Description	Volume-to-Capacity Ratio
A	Highest driver comfort; free flowing	< .60
B	High degree of driver comfort; little delay	0.60 – 0.70
C	Acceptable level of driver comfort; some delay	0.70 – 0.80
D	Some driver frustration; moderate delay	0.80 – 0.90
E	High level of driver frustration; high levels of delay	0.90-1.00
F	Highest level of driver frustration; excessive delays	>1.00

Roadway level of service measures how “full” the roads are.

Using the maps, members of TRPC’s TAC identified potential problem areas for future study. The studies will involve more detailed modeling, and planners will consider factors such as intersection spacing and hierarchy,

road connections, access management, and environmental, social, and physical constraints prior to considering road widening. (See Chapter 2: Recommendations for a full list of studies.)

**Figure 4-4: Generalized Illustration of Two-Hour P.M. Peak LOS Time Period Measurement**



Source: TRPC.

## What do the Maps Show?

Maps 4-3 through 4-5 show the level of service (LOS) from the regional transportation model. In the regional model, LOS is defined as the volume to capacity (V/C) ratio during the two-hour p.m. peak period. Each segment of the roadway network containing freeways, freeway ramps, arterials, and collectors is shown on the map in varying shades of color representing the modeled LOS. In 2015 there are only a few segments along the transportation network that are highlighted as areas of concern – or showing a LOS that is below the regional LOS standard. In the rural areas, areas of concern are identified as any segments not meeting LOS C – or having LOS D, E or F (orange, red or purple) – such as State Route 510. In the urban areas outside of core areas, LOS D is an acceptable standard, so orange segments are not considered areas of concern. In urban centers and corridors, LOS E is an acceptable standard.

The 2040 Land Use with Funded Projects maps (Map 4-4 and 4-4A) show more areas of concern than the 2015 Land Use and Network maps (Maps 4-3 and 4-3A). Growth in jobs and housing increases traffic volumes on the network, and causes the LOS to degrade on some network segments. An example of this is State Route 510, which degrades from LOS E (red) to LOS F (purple).

Differences between the 2040 Land Use with Funded Projects maps (Map 4-4 and 4-4A) and the 2040 Land Use with Regional Projects maps (Maps 4-5 and 4-5A) are most easily seen in areas where Regional Projects are proposed. An example is Fones Road in Olympia. Fones Road is shown as reaching LOS F on Map 4-4A. With the Regional Project C17 – Fones Road widening (see Chapter 2: Recommendations) – Fones road would remain at an acceptable LOS.

A network segment highlighted on the map as an area of concern may lead to a study or assessment – or may be identified by planning staff as “model noise,” or an area where the model does not accurately reflect local conditions.

## Why are some streets shown as having an acceptable LOS when I know there are traffic issues?

The reasons include:

- The regional transportation model does not model intersection-level conditions. If congestion is occurring at a traffic signal – it will not be highlighted on the maps – or in the RTP analysis, because it is not an output of the regional transportation model. The regional model serves as a guide to local jurisdiction for long range planning but is not intended to be a real-time operations tool. Local jurisdictions have additional tools to model intersection-level conditions using regional model outputs.
- The maps show LOS over a two-hour window. Typically, the average V/C ratio over the two-hour peak travel period is about 85 percent of the one-hour period (see Figure 4-4 for an example of how travel changes over the two-hour peak period). Many of the congestion issues our region currently faces do not last the entire two-hour peak period, but are concentrated at times when large employment sites finish their work day.
- The maps are based on a regional model. The model is calibrated to actual traffic counts for the year 2015, and while the model is generally accurate across the region, it may be less reliable in some areas. That is why it is used for generalized planning purposes only.

## How We Travel

How we travel refers to the mode of travel we choose. A number of factors influence travel mode, including household characteristics, such as income and vehicle ownership; the accessibility and cost of travel between points; and land use characteristics, including employment density.

The future conditions evaluation includes examining:

- How our mode of travel will change between today and the future.
- The impact building new transportation facilities or providing additional transit service will have on how we travel in the future.
- How where you live makes a difference in what mode of travel you choose.

## How Our Mode of Travel Will Change Between Today and the Future

The transportation model forecasts that by 2040 walk, bicycle, and transit trips will increase slightly within Thurston County. Our drive-alone share will remain the same, and shared rides will decrease slightly, based on changes in land use and transportation facilities alone. The forecast does not consider other factors that affect mode of travel, such as emerging technologies or implementing the *Sustainable Thurston Plan* land use vision for more compact

growth around areas with frequent transit service. The forecast does not include changes in the cost of fuel or parking, or potential increases in other transportation demand management strategies. These could all lead to further changes in travel mode.

## The Impact Building New Transportation Facilities or Providing Additional Transit Service Will Have on How We Travel in the Future

While there is a slight difference in mode of travel between 2015 and 2040, there is virtually no difference with or without the Regional Projects. (See Table 4-2.) This indicates that investments in multimodal facilities keep pace with investments in vehicle capacity in the

**Table 4-2: Mode of Travel**

Mode of Travel	2015	2040 Funded Projects	2040 Regional Projects
Walk	8.0%	8.3%	8.3%
Bicycle	1.4%	1.4%	1.4%
Transit	2.2%	2.8%	2.8%
Drive alone	50.6%	50.7%	50.8%
Other shared rides	37.9%	36.8%	36.7%

Source: TRPC Transportation Model.

Regional Project List. Therefore, we can attribute the difference between 2015 and 2040 to land use changes. (See Figure 4-2.) The 2040 land use forecast assumes a greater concentration of households and employment in the urban areas compared to today.

### How Where You Live Makes a Difference in What Mode of Travel You Choose

Urban corridors and centers reflect the current and future city centers of Lacey, Olympia, and Tumwater, and the connecting corridors. These are the areas with the greatest concentration of jobs and housing within the county. Residents living in these areas tend to walk, bicycle, and use transit more than those in other regions of the county. In large part, the results reflect

walkable neighborhoods, and frequent – generally 15 minute – transit service in urban corridors and centers.

The remaining north county urban areas are the neighborhoods that surround the city centers and corridors. People in these neighborhoods tend to walk, bicycle, and use transit less than center and corridor residents, but more than rural residents. Often, some bicycle and pedestrian infrastructure links neighborhoods to commercial areas. However, many neighborhood residents do not live within walking distance of jobs, goods, and services. Transit is available in many of the neighborhoods, but is generally half-hour to hourly service. The percent of people carpooling is higher in the neighborhoods than in city centers and corridors. (See Table 4-3.)

### Importance Of Investing in Transit, Bicycle, and Pedestrian Modes

Investing in transit, and pedestrian and bicycle facilities is an important element of implementing local comprehensive plans. These investments help to:

- Complete our transportation network and provide safe modes of travel for all users.
- Promote active transportation, implementing many of the shared community goals outlined through the Thurston Thrives process and the *Sustainable Thurston Plan*.

As the region completes the multimodal network, and expands transit service and facilities, the number of travelers utilizing the multimodal network will increase. The modes are all interconnected. For instance, building sidewalks near transit stops will increase safety for both pedestrians and transit users.

**Table 4-3: Mode Share by Area, Thurston County**

	Urban Centers and Corridors		Remaining North County Urban Areas	
	2015	2040	2015	2040
Travel				
Walk	12.7%	13.0%	8.7%	8.8%
Bicycle	1.1%	1.1%	1.7%	1.8%
Transit	6.8%	8.9%	1.6%	2.0%
Drive alone	49.2%	49.6%	50.5%	51.2%
Other shared rides	30.2%	27.3%	37.5%	36.3%
	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>

	South County Urban Areas		Rural Areas	
	2015	2040	2015	2040
Travel				
Walk	10.1%	11.1%	2.7%	2.5%
Bicycle	0.8%	1.0%	0.9%	0.9%
Transit	1.4%	2.2%	0.3%	0.5%
Drive alone	45.2%	44.9%	53.3%	53.3%
Other shared rides	42.4%	40.8%	42.9%	42.8%
	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>

Source: TRPC Transportation Model.

South county urban areas are Bucoda, Rainier, Tenino, Yelm, and their growth areas, and the Grand Mound urban growth area. Residents here tend to walk and use transit slightly more than those that live in neighborhoods in the north county. Intercity Transit provides service to Yelm and Rural & Tribal Transportation (RT) serves the other communities.

Rural areas are those outside of any of the urban growth areas. People that live in rural areas tend to drive alone, vanpool, and take the school bus more than residents of other parts of the county. Transit, pedestrian amenities, and bicycle lanes are not available for large parts of the rural county.

## Basic Needs Survey Highlights — Importance of Multimodal Choices for People with Low Income

It is important to increase transportation options for those within our community that cannot afford to own and maintain a vehicle. In 2013, TRPC and community partners developed a basic needs survey. The Thurston County Housing Authority, Community Action Council, Family Support Center, and Thurston County Food Bank distributed the surveys to a group that traditionally does not participate in planning processes.

The survey results highlight the necessity of providing transportation options, especially transit, for people with low income to meet their daily needs. For some, it's about necessity, not choice.

The survey reached the intended demographic of low-income residents in Thurston County. We received over 1,000 surveys, with 72% of the people that responded reporting an annual household income of under \$15,000.

### **Some highlights of the survey:**

*Asked what ways they travel to work, grocery shopping, etc.  
(choosing all that apply).*

- 11% used a bicycle
- 21% traveled with a friend or relative
- 33% walked
- 40% rode a bus
- 53% used a car

*Asked how many cars they owned*

- 47% didn't own a car,  
but of those, 5.5% had access to a car

*Asked how often they rode the bus*

- 36% said often or always

For this and many other reasons, the region is committed to providing a full range of transportation options. These may take different forms depending on the urban or rural context.

## How Far We Travel

How far we travel refers to the distance vehicles travel along our transportation network.

Commonly referred to as vehicle miles traveled (VMT), we measure this important aspect of travel because of vehicle wear on roads, and contributions to greenhouse gas emissions and climate change impacts. We estimate that on-road vehicles account for 43 percent of Thurston County's greenhouse gas emissions. (See Figure 4-5.) The RTP sets goals to reduce vehicle miles traveled in the Thurston region to help meet regional greenhouse gas reduction goals (see Chapter 3: Goals and Policies, Section 18. Environmental and Human Health). Understanding some of the factors that contribute to how far we travel will help our region's policy makers better understand how their actions can influence this important measure.

The future conditions evaluation includes examining:

- How our investments in infrastructure and services affect vehicle miles traveled.
- How close we will be to meeting our vehicle miles traveled goals by looking at changes in land use, and facilities and service investments.
- How where we live influences vehicle miles traveled.

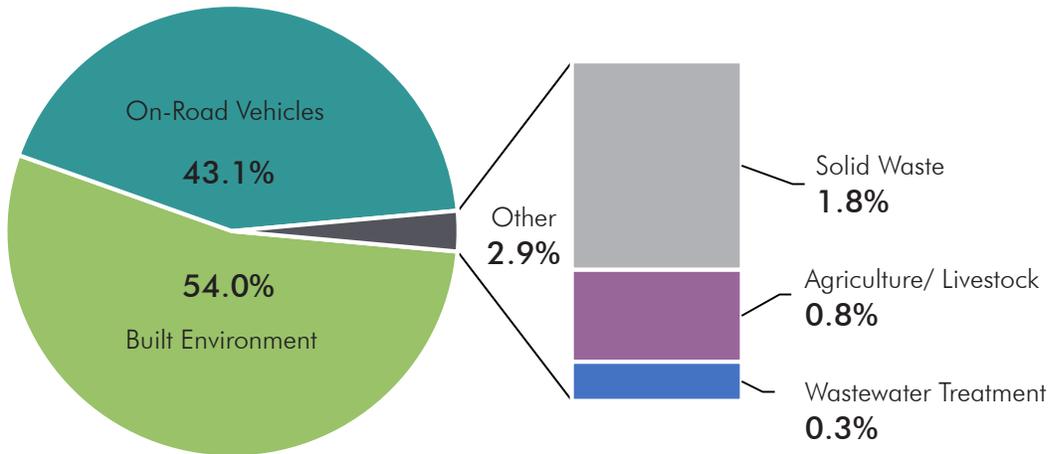
### Importance of Street Connections

Some of the Regional Projects identified in the RTP add street connections to complete the grid of arterials and collectors that provide the backbone of our transportation system.

Adding multimodal street connections serves several purposes:

- Increasing connectivity provides a more direct route for travelers, and can reduce vehicle miles traveled.
- Increasing connectivity also improves access and safety for pedestrians, bicyclists, and transit users.
- Increasing street connections gives travelers options for alternative routes to travel.
- In congested areas, adding new street connections reduces the need to widen parallel routes.

**Figure 4-5: 2012 Sources of Greenhouse Gas Emissions, Thurston County**



Source: Thurston Climate Action Team.

### How Our Infrastructure and Service Investments Affect Vehicle Miles Traveled

TRPC estimates average daily VMT on Thurston County’s roadway network to be around 6,500,000 in 2015<sup>1</sup>. This estimate is for all public roads within Thurston County, including local roads, collectors, arterials, and highways. With changes in population and employment, we expect to see daily VMT rise to over 8,880,000 by 2040. The difference in 2040 estimated VMT with or without the Regional Projects is estimated at less than 1 percent. Therefore, adding capacity to our

roadway network will not substantially increase VMT in our region.

### How Close We Will Be to Meeting Our Vehicle Miles Traveled Goals by Looking at Changes in Land Use, and Facilities and Service Investments

Chapter 3 Goals and Policies, Section 18, Environmental and Human Health, contains the following policy:

Decrease annual per capita vehicle miles traveled in the Thurston Region to:

- 1990 levels by 2020
- 30 percent below 1990 by 2035
- 50 percent below 1990 by 2050

<sup>1</sup>TRPC receives annual VMT estimates from the Washington State Department of Transportation Highway Performance Monitoring System (1990-2014). The transportation model generates VMT estimates for major roadways within Thurston County to estimate growth.

**Table 4-4: Difference in 2040 Daily Vehicle Miles Traveled with Funded Projects and Regional Projects, Thurston County**

	2015	2040 Funded Projects	2040 Regional Projects
Daily VMT	6,482,100	8,861,000	8,882,000
2015-2040 Daily Growth in Vehicle Miles Traveled		36.7%	37.0%

Source: TRPC Transportation Model.

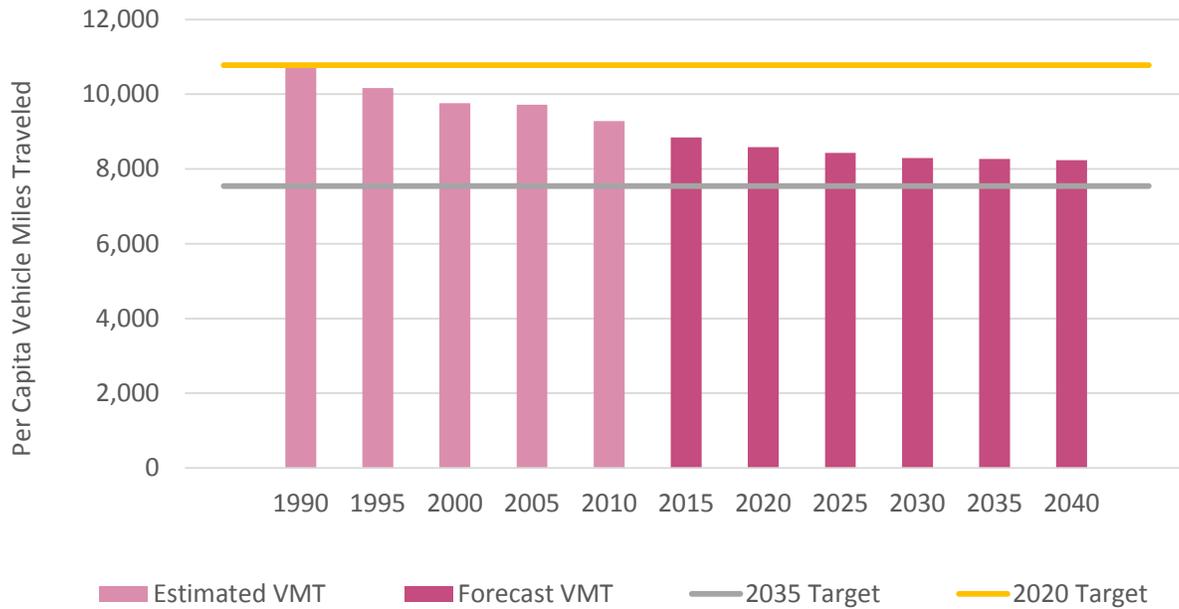
The transportation model forecasts that we already meet our 2020 goal, but will fall short of the 2035 goal if we solely rely on planned land use and infrastructure investments (including multimodal investments). To reach our goals, we will have to increase efforts in other areas such as transportation demand management, alternative land uses such as those described in the *Sustainable Thurston Plan*, and increased investments in multimodal facilities. Other factors influence travel behavior, but are outside of the realm of local government influence, such as the cost of fuel, or overall change in travel behavior based on socio-demographic factors.

TRPC used actual traffic counts at select locations, and estimates for the entire roadway network. The transportation demand model forecasts rate of growth.

### How Where We Live Influences Vehicle Miles Traveled

Where people live makes a large difference in how far we travel. The average resident in city centers and corridors travels one-third less distance a day than the average rural resident. Their vehicle miles traveled – a calculation that takes into account both how far they travel and by what mode – is around half that of a rural resident. People in neighborhoods or south county urban areas travel 9-16 percent less distance a day, with 22-24 percent less vehicle miles traveled, than their rural counterparts. (Table 4-6.)

**Figure 4-6: Annual Per Capita Vehicle Miles Traveled, Thurston County**



Sources: Washington State Department of Transportation Highway Performance Monitoring System (1990-2014). TRPC Transportation Model (growth forecast 2015-2040).

**Table 4-5: Estimated and Forecast Vehicle Miles Traveled and Per Capita Vehicle Miles Traveled, Thurston County**

	Estimate	Forecast			
	1990	2015	2020	2035	2040
Daily VMT	4,760,000	6,482,000	6,962,000	8,400,000	8,882,000
Annual VMT	1,737,400,000	2,365,930,000	2,541,130,000	3,066,000,000	3,241,930,000
Change from 1990		36%	46%	76%	87%
Population	161,238	267,400	295,900	370,600	393,700
Change from 1990		66%	84%	130%	144%
Annual Per Capita VMT	10,775	8,848	8,588	8,273	8,235
Change from 1990		-18%	-20%	-23%	-24%

Sources: Washington State Department of Transportation Highway Performance Monitoring System (1990-2014). TRPC transportation model (growth forecast 2015-2040).

**Figure 4-7: Vehicle Miles Traveled by Area**



Source: 2013 Household Travel Survey, TRPC.

**Table 4-6: 2013 Average Distance and Vehicle Miles Traveled by Area, Thurston County**

	Urban Centers & Corridors	Remaining North County Urban Areas	South County Urban Areas	Rural Areas
Average Distance (miles)	24.7	35.1	32.4	38.6
Average Vehicle Miles Traveled	15.4	22.5	22.2	29.1

Source: 2013 Household Travel Survey, TRPC.

## How Long It Takes to Travel

The time it will take to travel is a measure of congestion on our transportation network. We can use the transportation model to estimate the average speed in Thurston County. Average speed does not reflect posted speed limit, but rather is a measure of vehicle delay – or vehicle miles traveled divided by vehicle hours traveled.

TRPC expects that overall speeds will decrease as population and employment increases. The difference in change in speed by 2040 with or without the Regional Projects is less than one mile per hour (Table 4-7), however there is a fairly large difference in the south county urban areas at peak periods. (Figure 4-8 and Table 4-8.)

With the Regional Projects, we forecast average speeds to decrease in all areas of Thurston County. Average speeds will decrease the most in the rural county.

An average 10-mile commute in Thurston County takes around 28 minutes today. By 2040, it will take 31 minutes without the Regional Projects, and 30 minutes if we complete the Regional Projects.

## Interstate 5 and US Highway 101

I-5 and US101, limited access freeways, serve as part of the Thurston region's local transportation network, as connections to surrounding counties, and as the backbone of state and interstate travel.

Moving people and goods through these major transportation corridors is a key goal of the state and region's transportation strategy – and presents many challenges. At the I-5 Nisqually Bridge– the link between Pierce and Thurston Counties – we project average daily speeds over the bridge will decline from around 58 miles per hour to around 47 miles per hour, and even lower in peak periods.

On the freeway system as a whole, we expect speeds within the contiguous urban areas of Lacey, Olympia, and Tumwater to decline by around 12 miles an hour at peak periods. In the remainder of the county, which is predominately rural, we project speeds to decline by around 7 miles per hour during peak periods.

Today, a typical trip from one end to the other on the 14.6-mile stretch of I-5 through Lacey, Olympia, and Tumwater's urban areas takes around 27 minutes during the peak period. In 2040 the same trip could take 35 minutes.

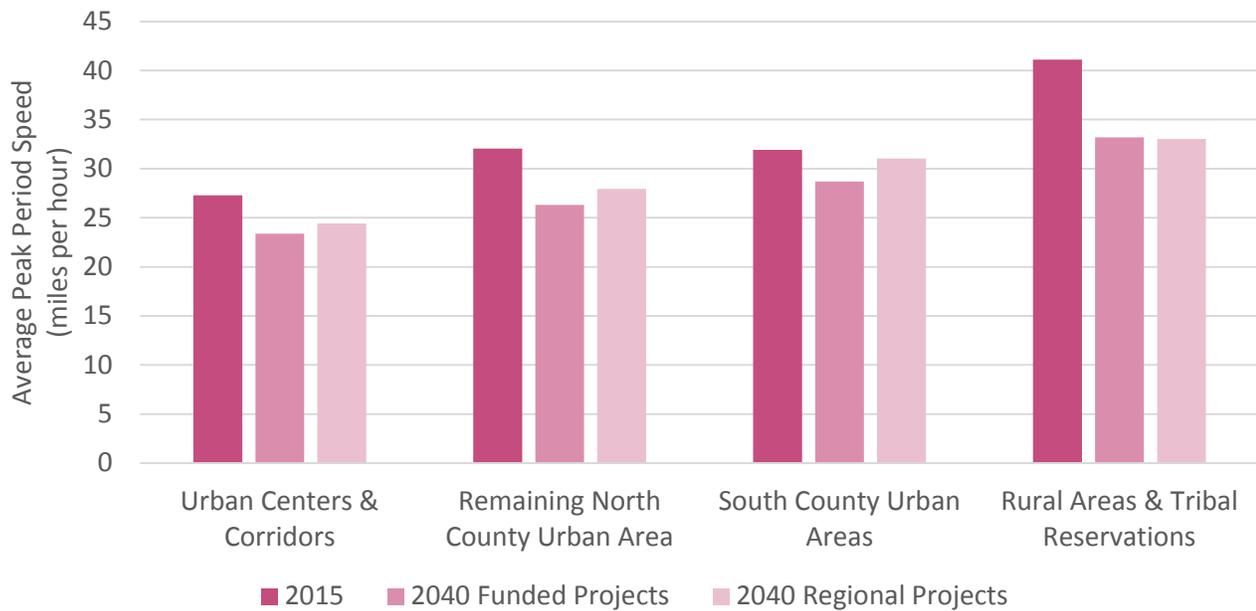
**Table 4-7: Difference in 2040 Average Speed with Funded Projects and Regional Projects, Thurston County**

	2015	2040 Funded Projects	2040 Regional Projects
Average Daily Speed (miles per hour)	35.3	31.9	32.6
Change 2015-2040		minus 3.4	minus 2.7

Source: TRPC Transportation Model.

Note: Arterials and collectors only; excludes freeways and local roads.

**Figure 4-8: Peak Period Speeds by Area**



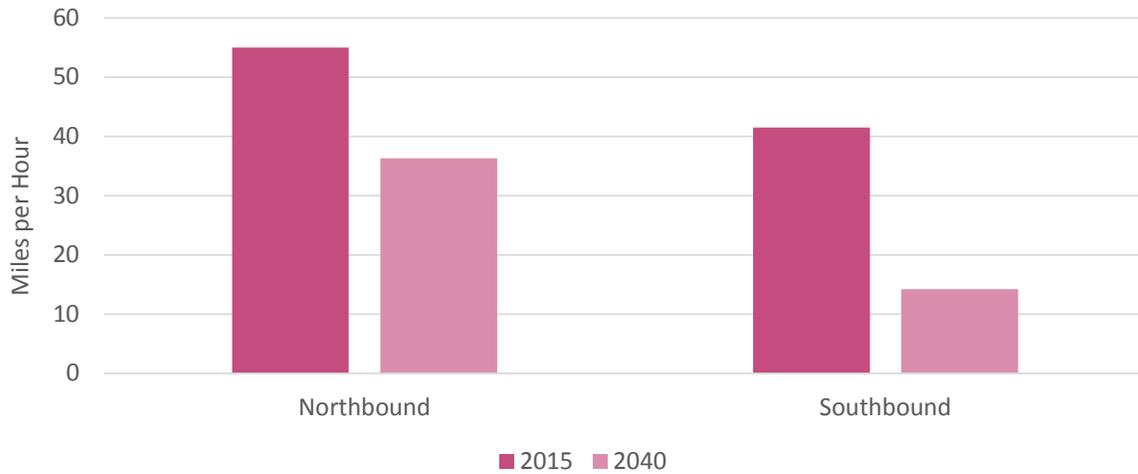
Source: TRPC Transportation Model.  
 Note: Arterials and collectors only; excludes freeways and local roads.

**Table 4-8: Difference in 2015 and 2040 Average Peak Period Speed, by Type of Area, Thurston County**

	Average Peak Period Speed (miles per hour)			
	Urban Centers & Corridors	Remaining North County Urban Areas	South County Urban Areas	Rural Areas & Tribal Reservations
2015	27.3	32.1	31.9	41.1
2040 Funded Projects	23.4	26.3	28.7	33.2
2040 Regional Projects	24.4	27.9	31.1	33.0

Source: TRPC Transportation Model.  
 Note: Arterials and collectors only; excludes freeways and local roads.

**Figure 4-9: Peak Period Travel on Interstate 5 at Nisqually Bridge**



Source: TRPC Transportation Model.

Note: Arterials and collectors only; excludes freeways and local roads.

**Table 4-9: Interstate 5 at the Nisqually Bridge, Projected Speeds**

	Average Daily Speed (miles per hour) at Nisqually Bridge on I-5		Average Peak Period Speed (miles per hour)	
	North Bound Lanes	South Bound Lanes	North Bound Lanes	South Bound Lanes
2015	57.9	57.8	55.0	41.5
2040	47.1	47.1	36.3	14.2

Source: TRPC Transportation Model.

Note: Project speeds in the transportation model assume travelers will not exceed the posted speed limit of 60 m.p.h.

**Table 4-10: Difference in 2040 Average Peak Period Speeds for Interstate 5 and US Highway 101, Thurston County**

	Average Peak Period Speed (miles per hour)	
	2015	2040 Regional Projects
Lacey, Olympia, Tumwater urban areas	54.2	41.9
Change 2015-2040		minus 12.3
Remainder of Thurston County	63.3	55.8
Change 2015-2040		minus 7.5
Overall Freeway Speed in Thurston County	58.2	47.7
Change 2015-2040		minus 10.5

Source: TRPC Transportation Model.

## Summary

The 2040 conditions described in this chapter give us a glimpse into the future of travel within Thurston County. The analysis indicates that:

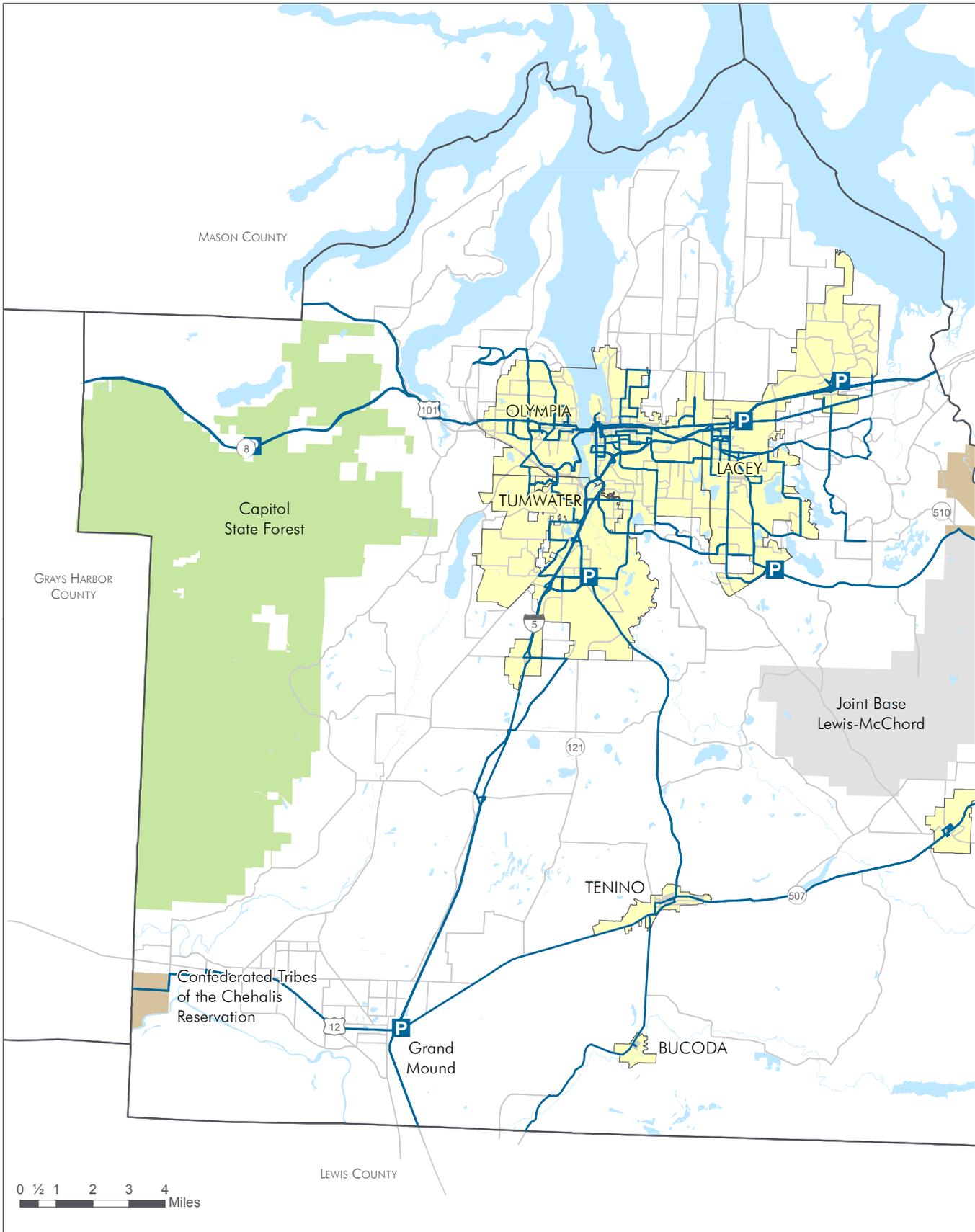
- Roadway efficiency will increase in the future. We'll experience a 42 percent increase in VMT and a 6 percent increase in roadway capacity by 2040.
- Walking, bicycling, and transit will increase in the future, but shared rides will decrease, because of changing land use.
- Travel mode is strongly influenced by land use characteristics, and access to transportation facilities and services strongly influences travel mode.
- Adding capacity to our roadway network will not substantially increase VMT in our region.
- VMT will increase in the future. Our planned land use and capacity improvements alone will not be sufficient for the region to meet our 2040 targets.
- VMT for the average resident in city centers and corridors is half that of a rural resident, indicating that concentrated development in our city centers and corridors that already have frequent transit service will lead to a reduction in per capita VMT.

This forecast is only as accurate as the assumptions that underlie it. It gives us important information about our general direction, given what we know today. We recognize many other factors, beyond those of the forecast, may impact exactly where we end up.

- Speeds will decrease in the future, with the exception of the Yelm area.

The analysis in this chapter also raises questions that TRPC will study.

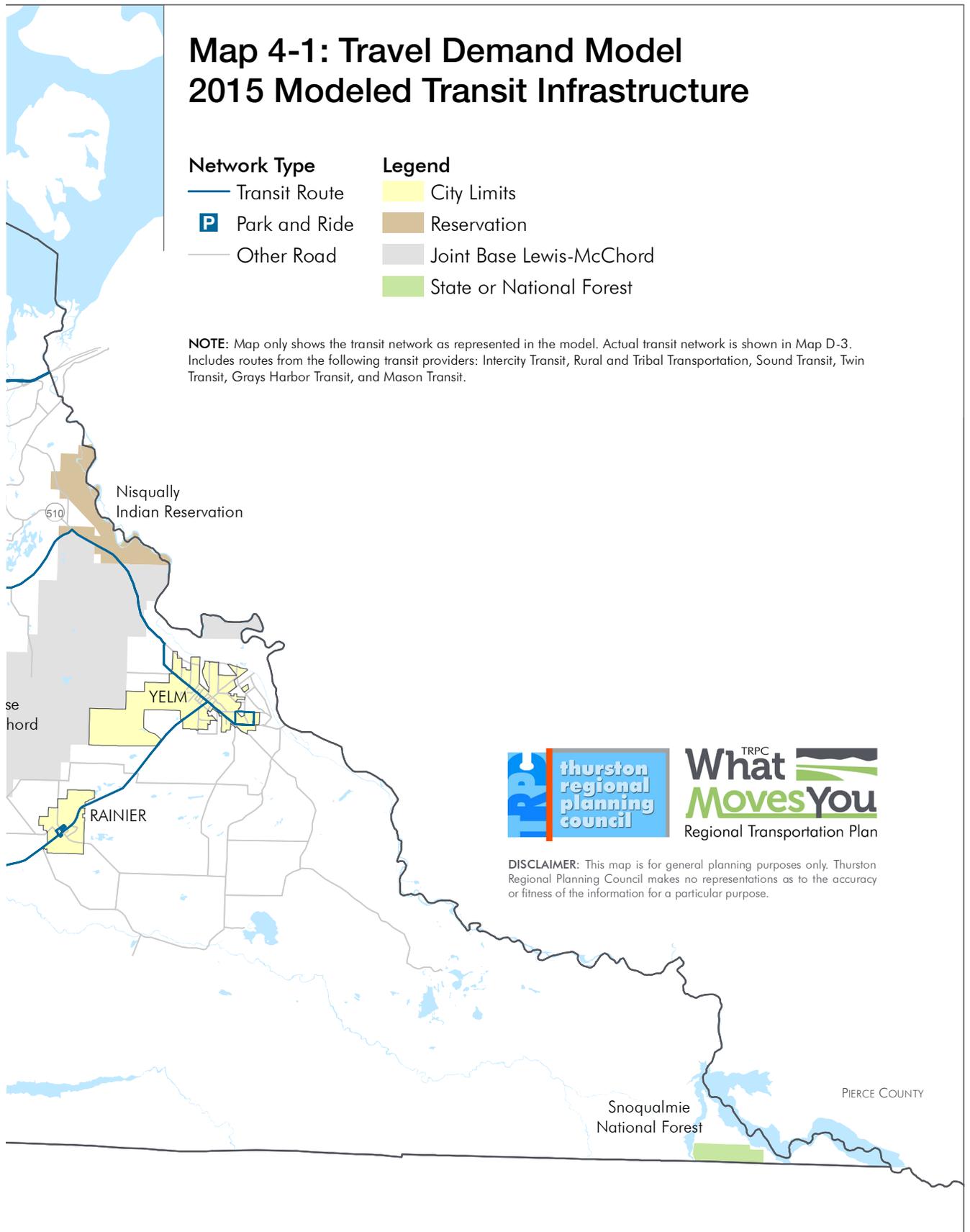
- What steps do we need to take to meet our VMT goals? Will meeting those goals sufficiently reduce greenhouse gas emissions as called for in the *Sustainable Thurston Plan*?
- What strategies can we identify to meet adopted level of service standards, especially on rural roads that are not meeting today's standards and are unlikely to be widened in the future? Strategies could include revising level of service standards, or identifying rural strategy corridors – areas where we could apply other means of managing congestion rather than road widening.
- What strategies can we identify to increase efficiency in the urban strategy corridors?



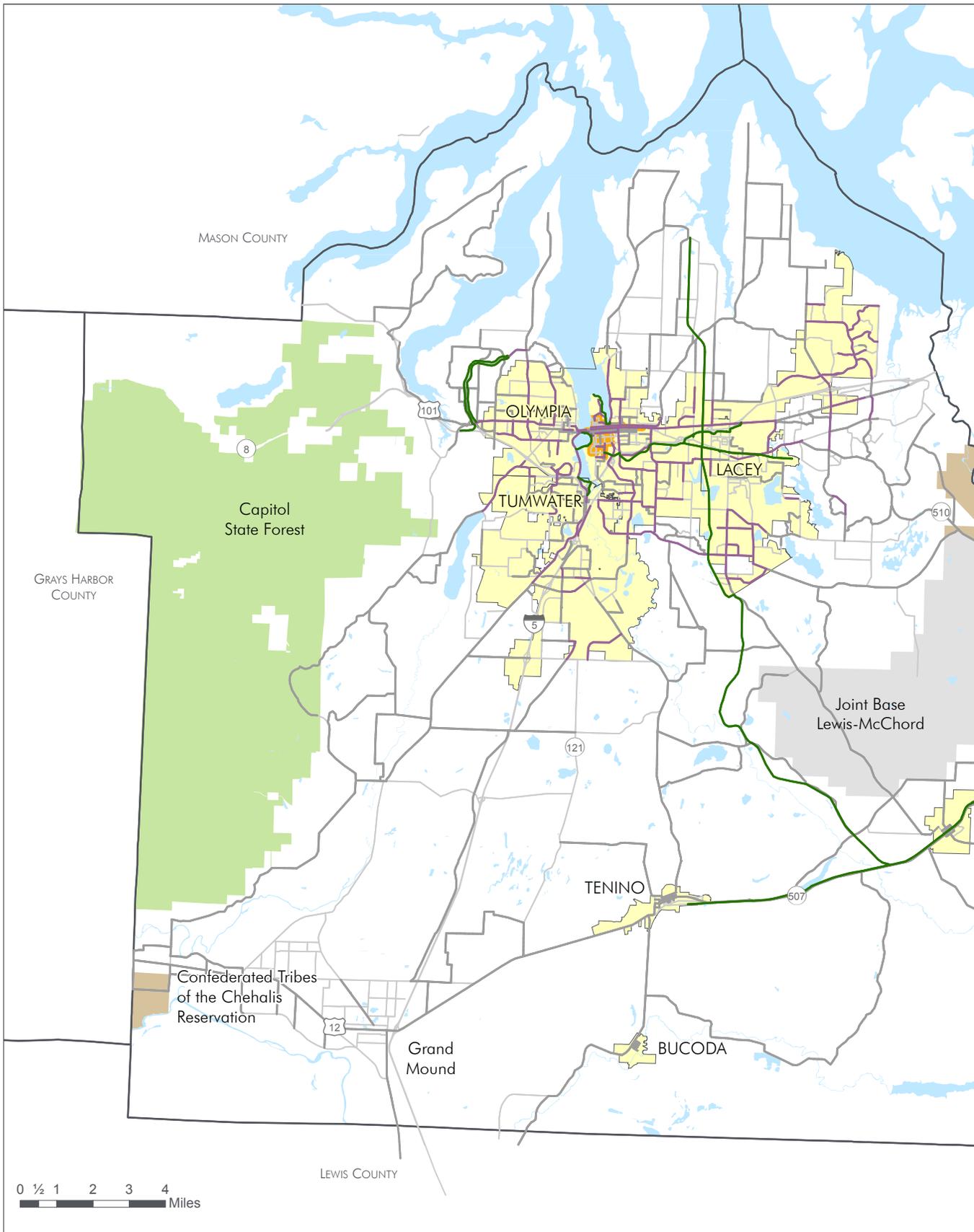
# Map 4-1: Travel Demand Model 2015 Modeled Transit Infrastructure

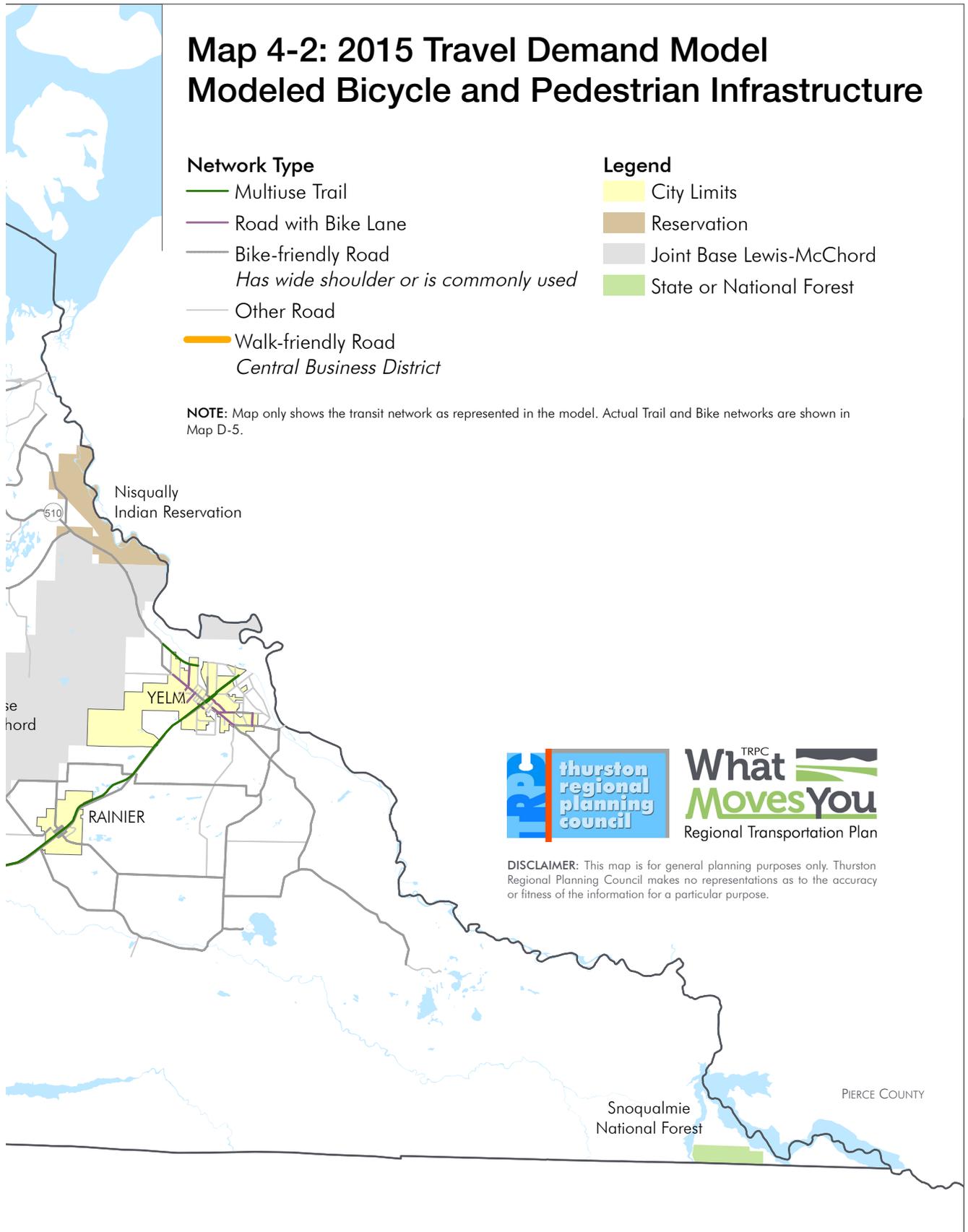
Network Type	Legend
 Transit Route	 City Limits
 Park and Ride	 Reservation
 Other Road	 Joint Base Lewis-McChord
	 State or National Forest

**NOTE:** Map only shows the transit network as represented in the model. Actual transit network is shown in Map D-3. Includes routes from the following transit providers: Intercity Transit, Rural and Tribal Transportation, Sound Transit, Twin Transit, Grays Harbor Transit, and Mason Transit.



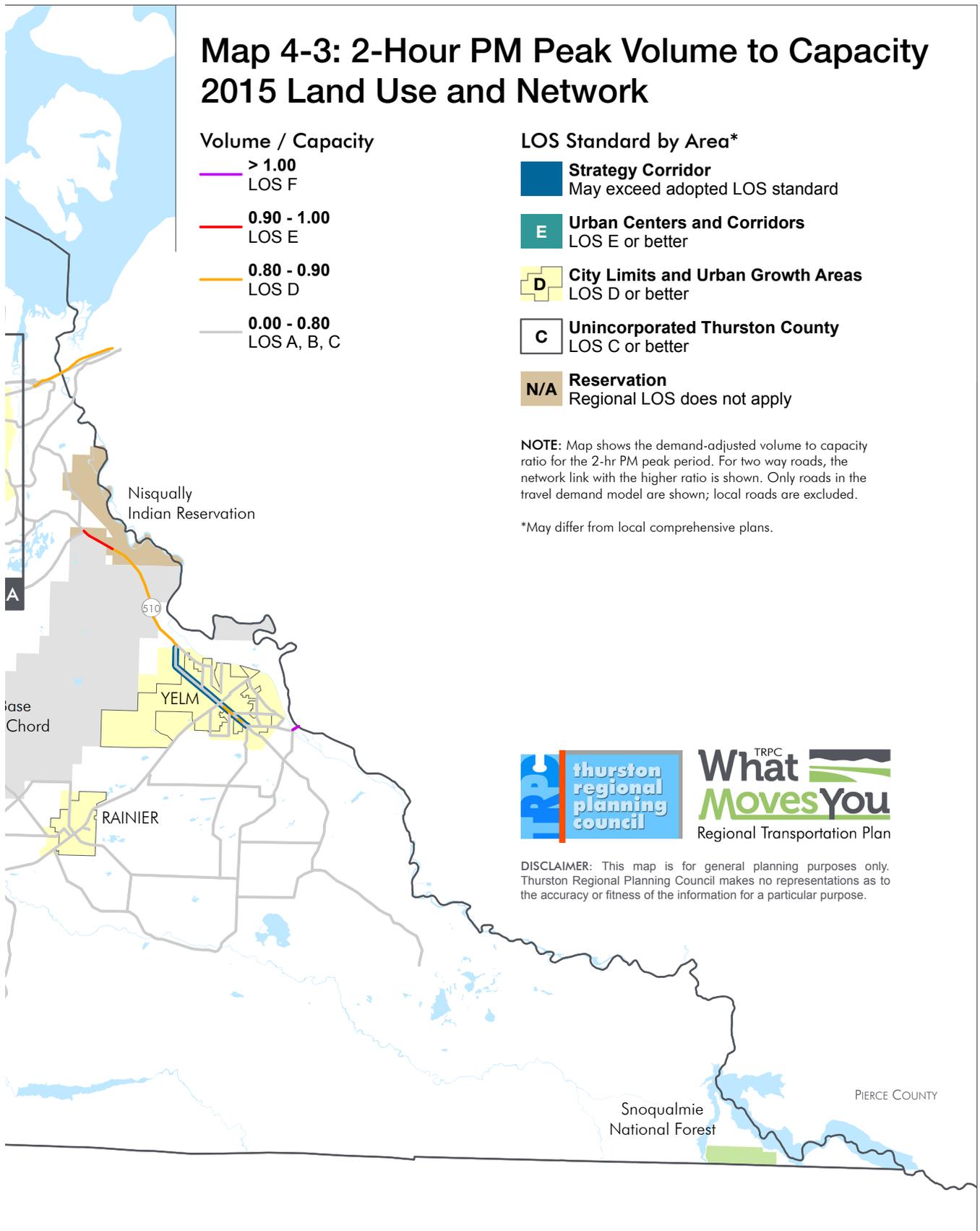
**DISCLAIMER:** This map is for general planning purposes only. Thurston Regional Planning Council makes no representations as to the accuracy or fitness of the information for a particular purpose.

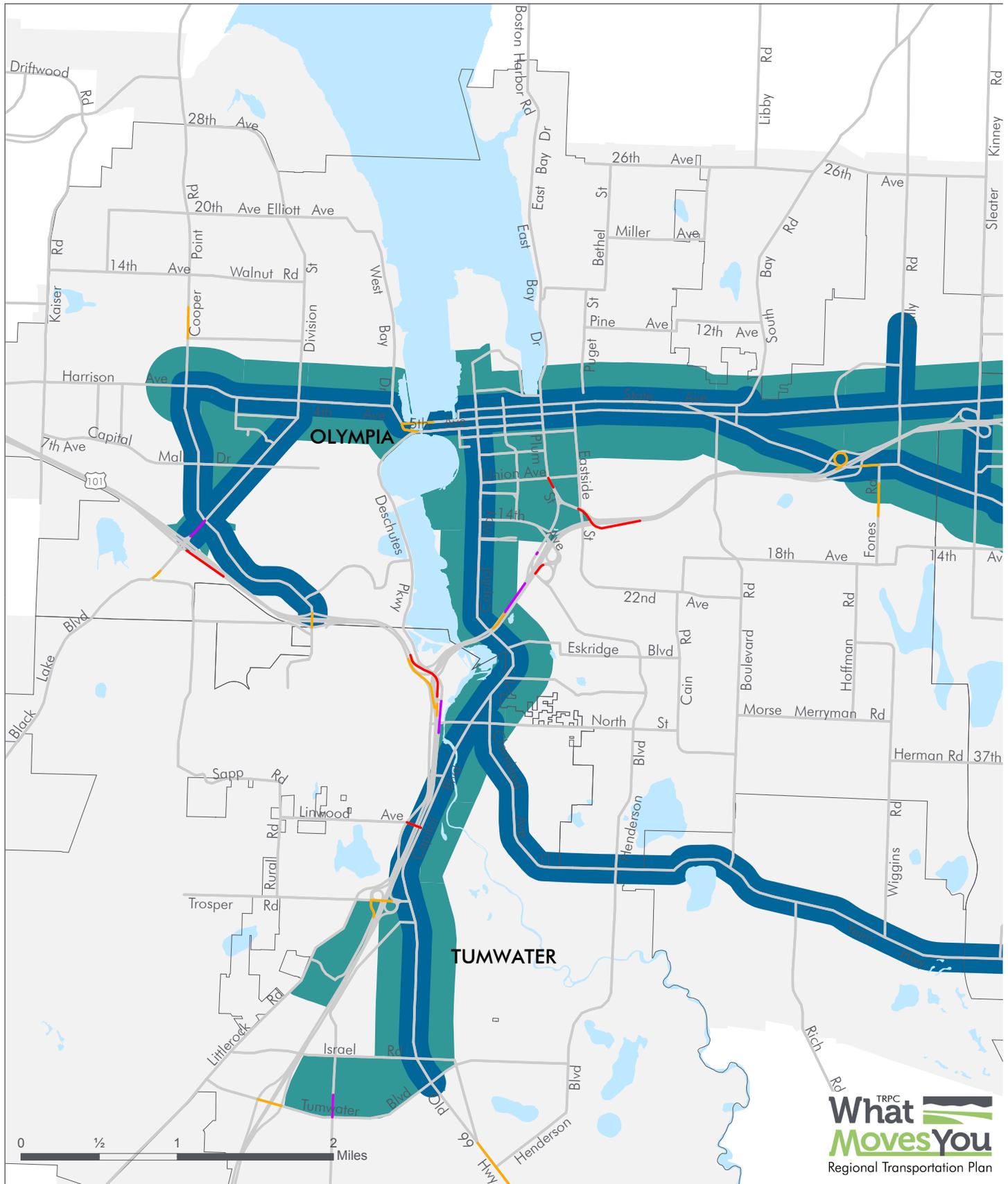


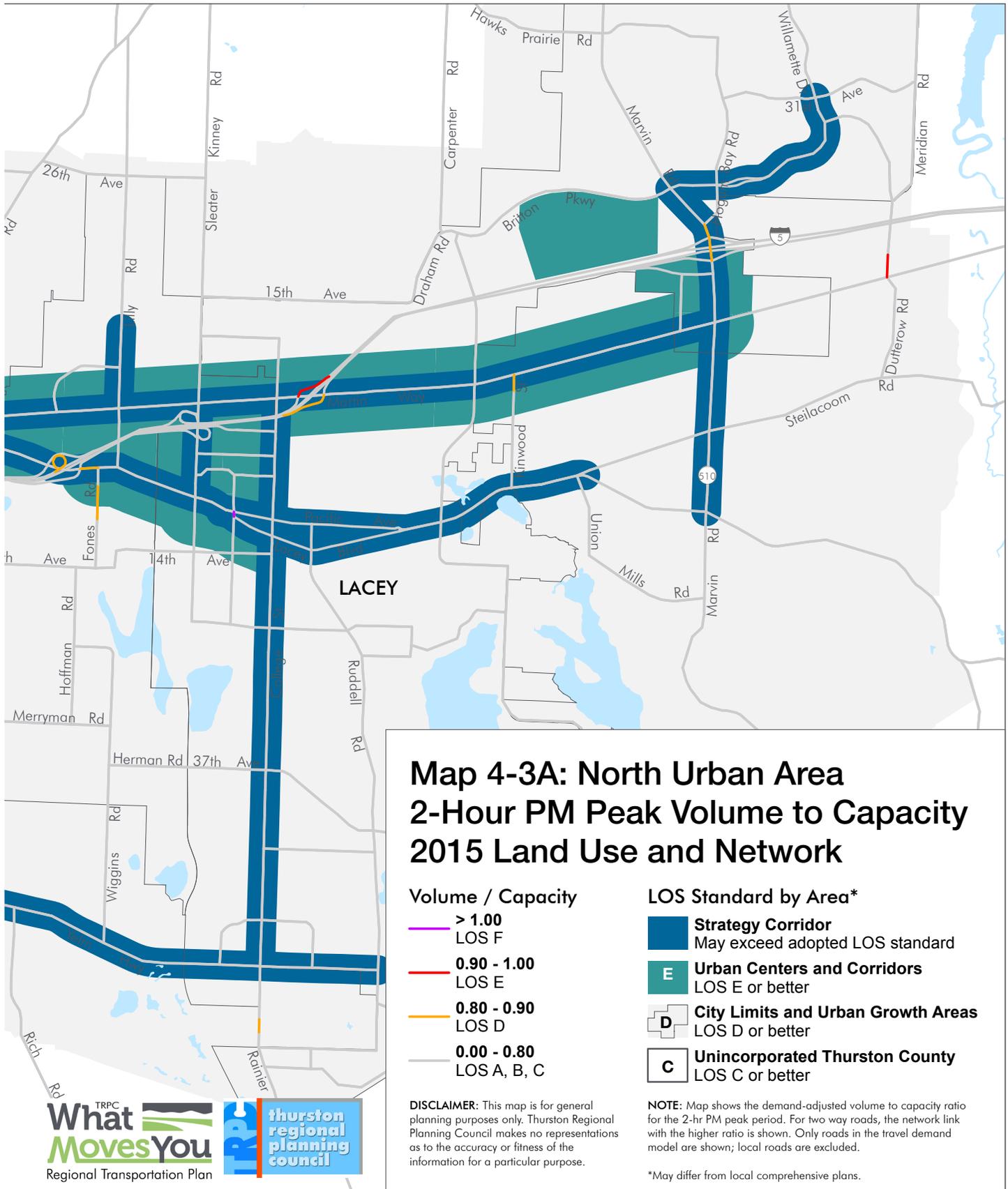


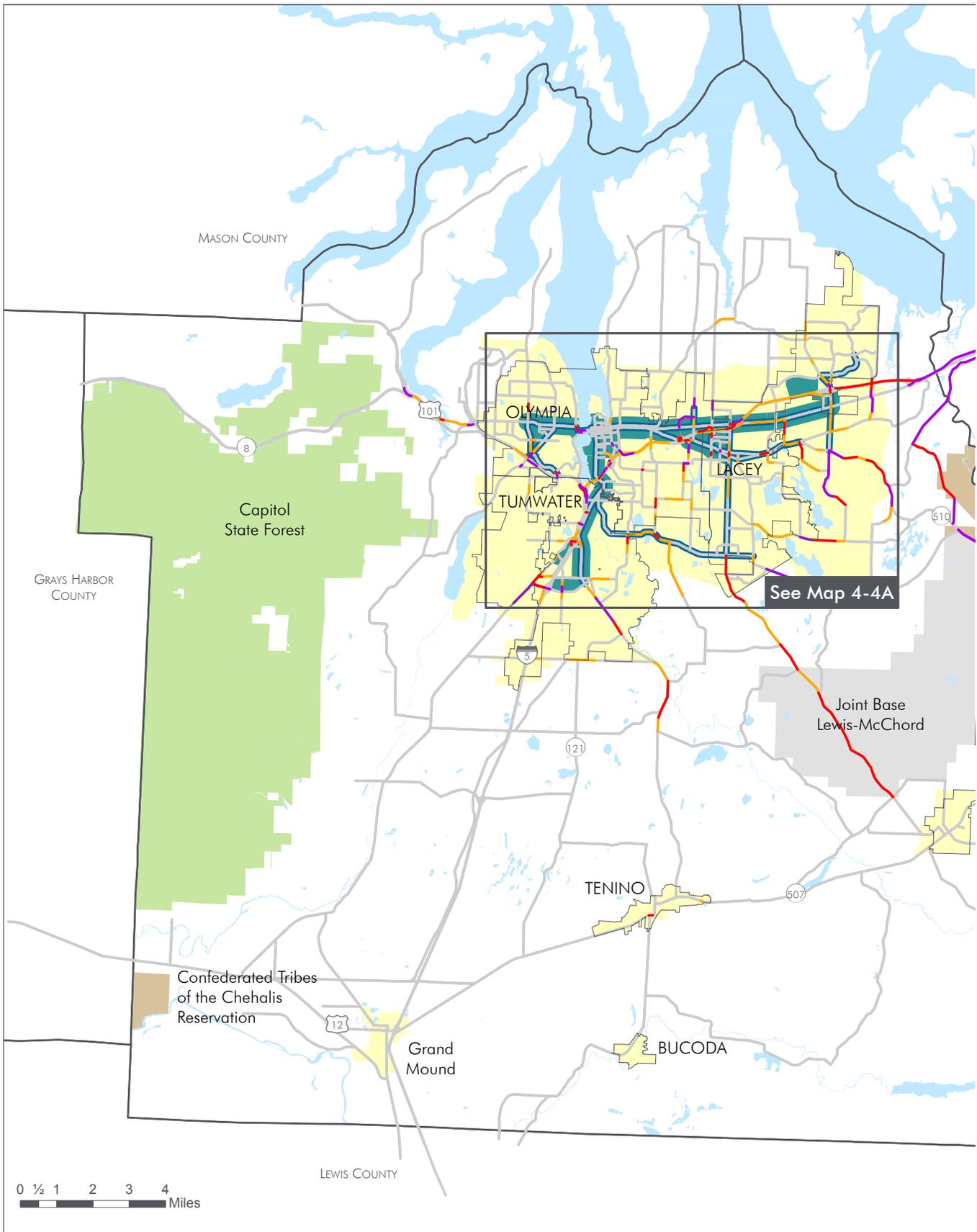


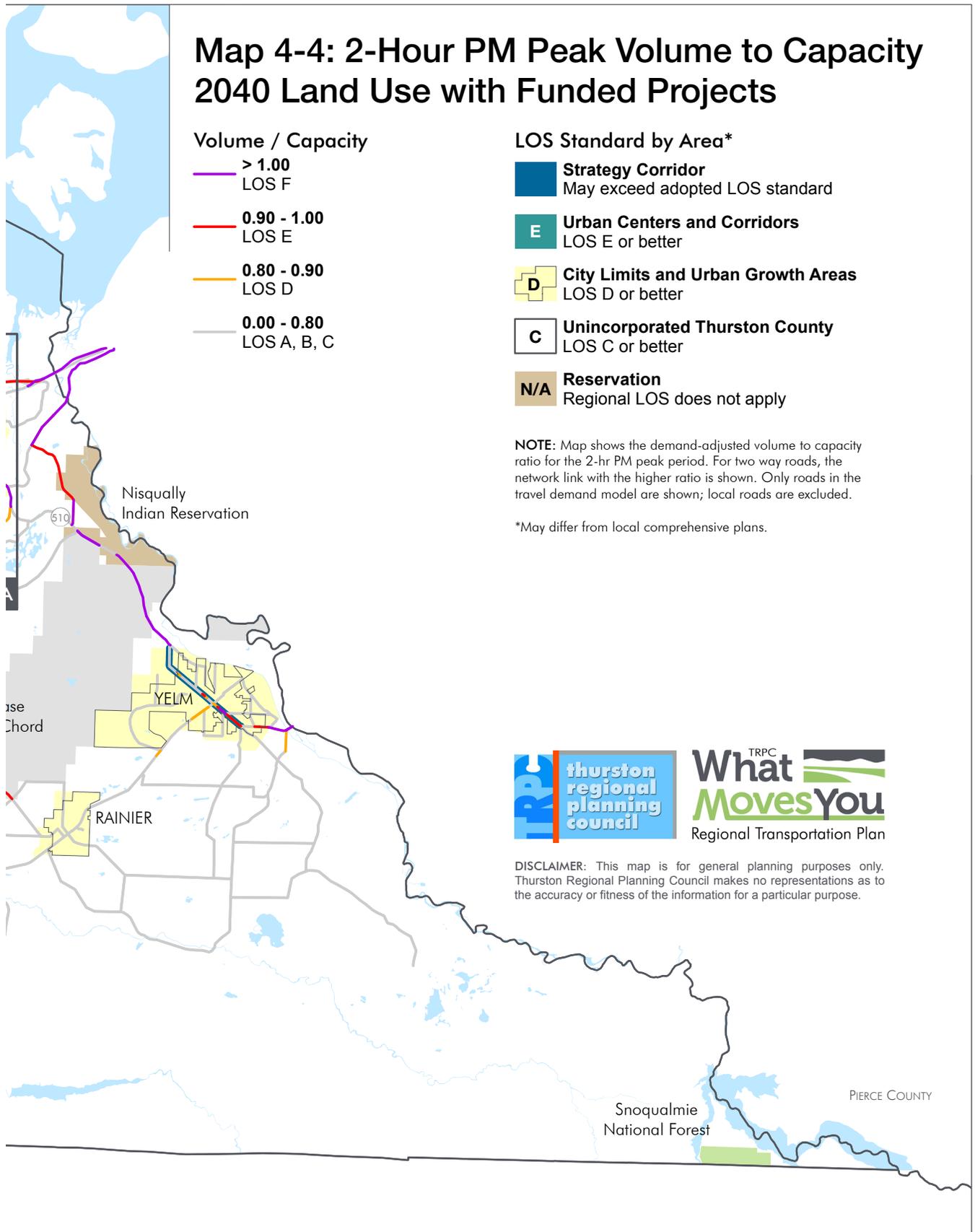
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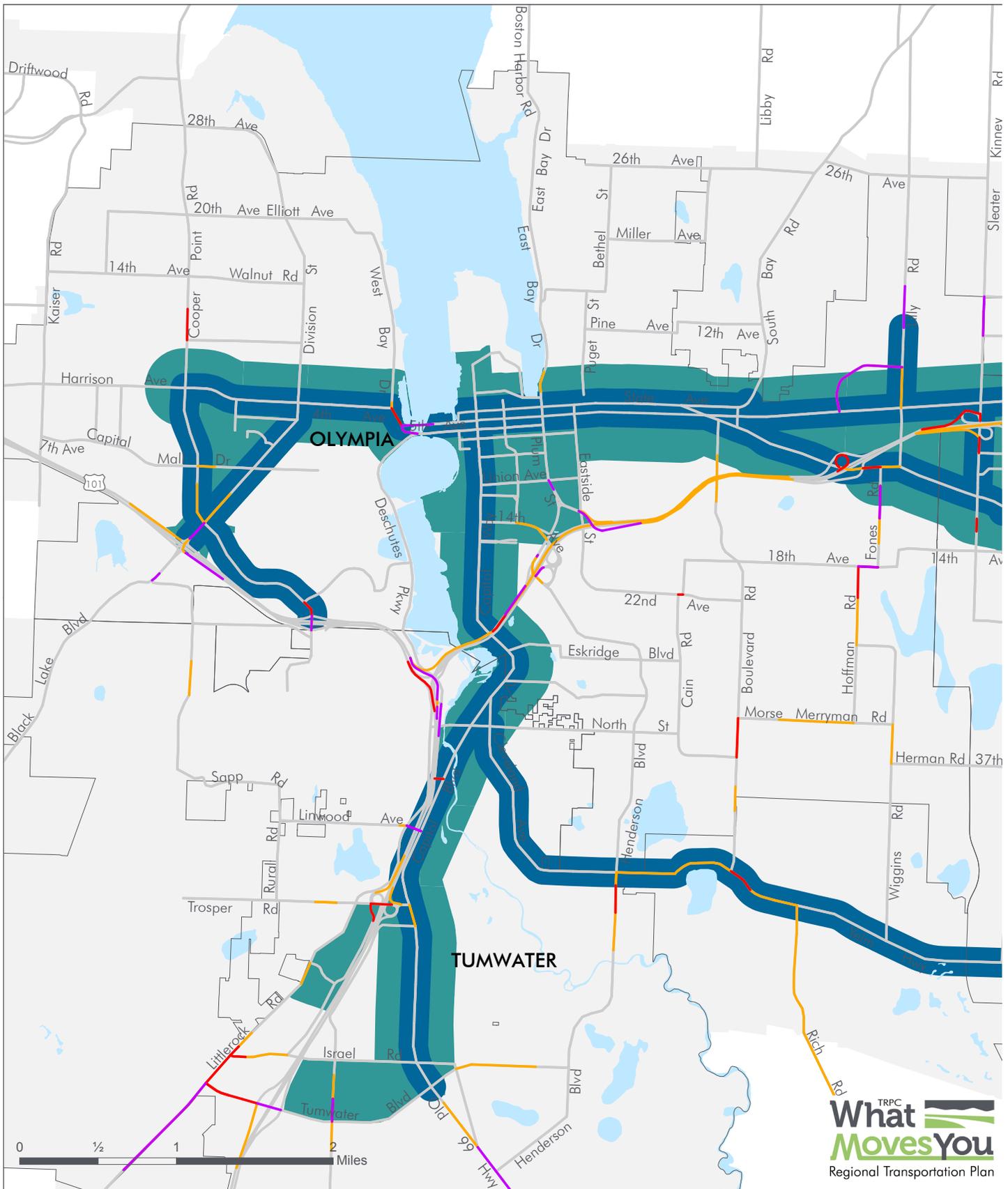


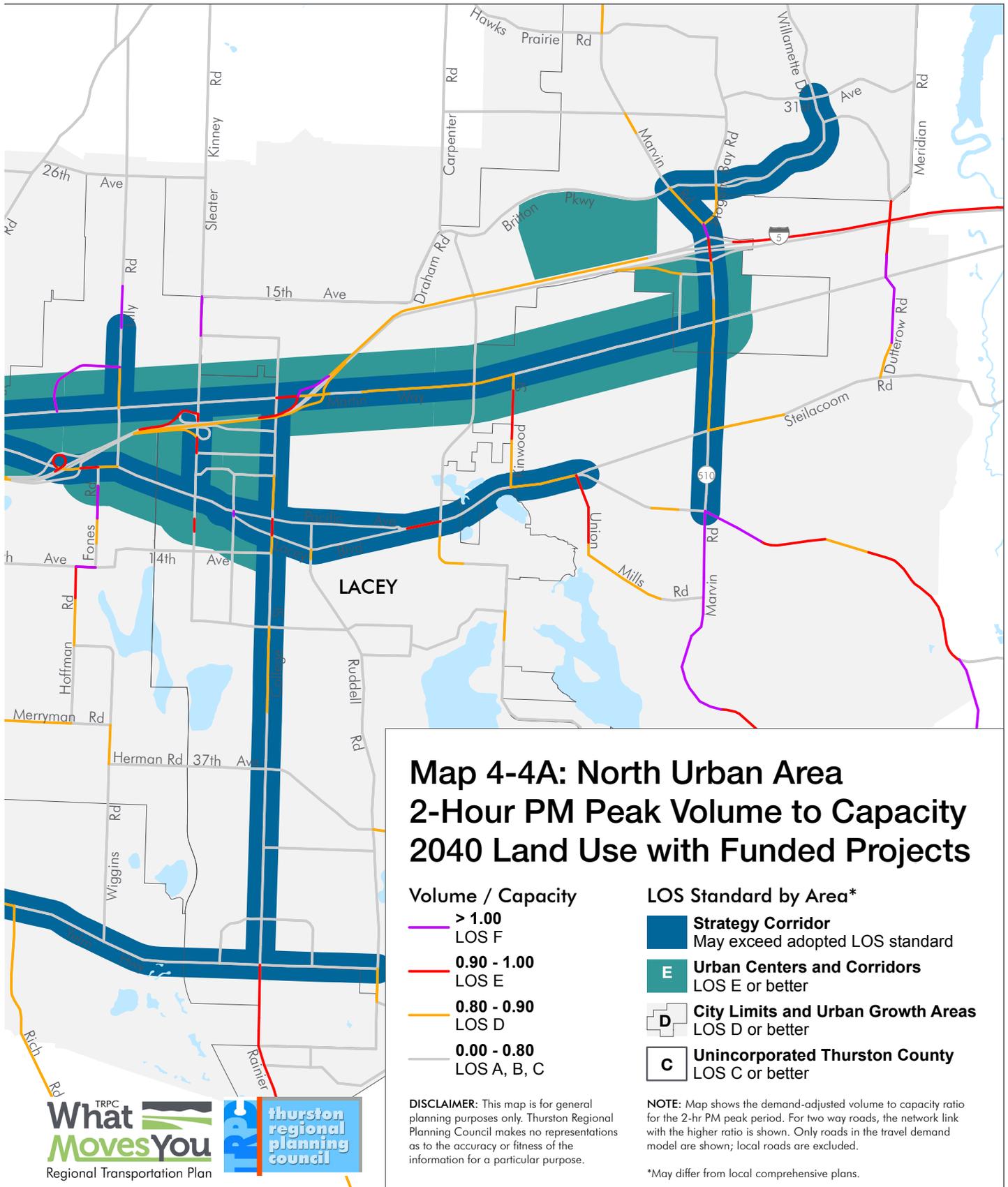


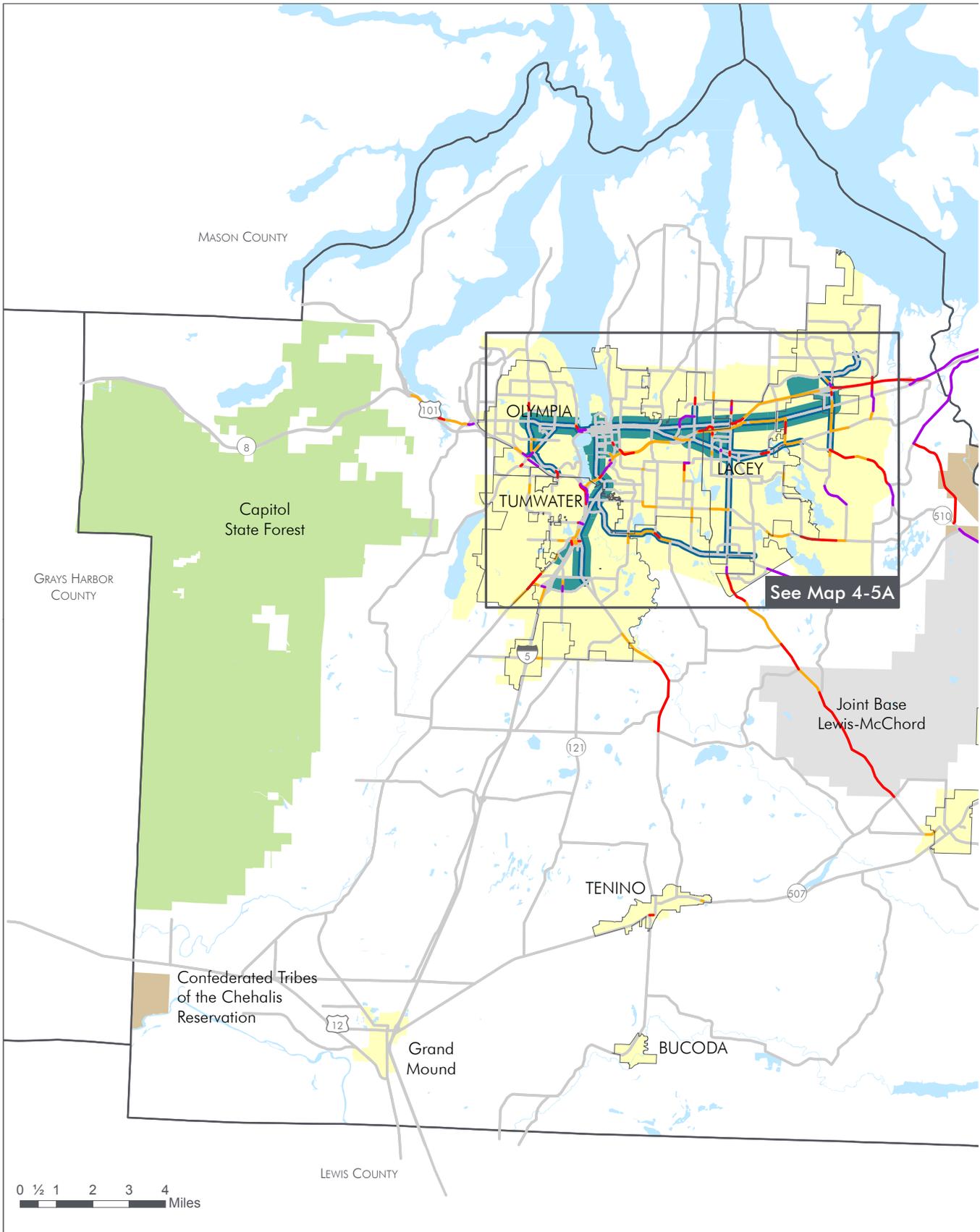


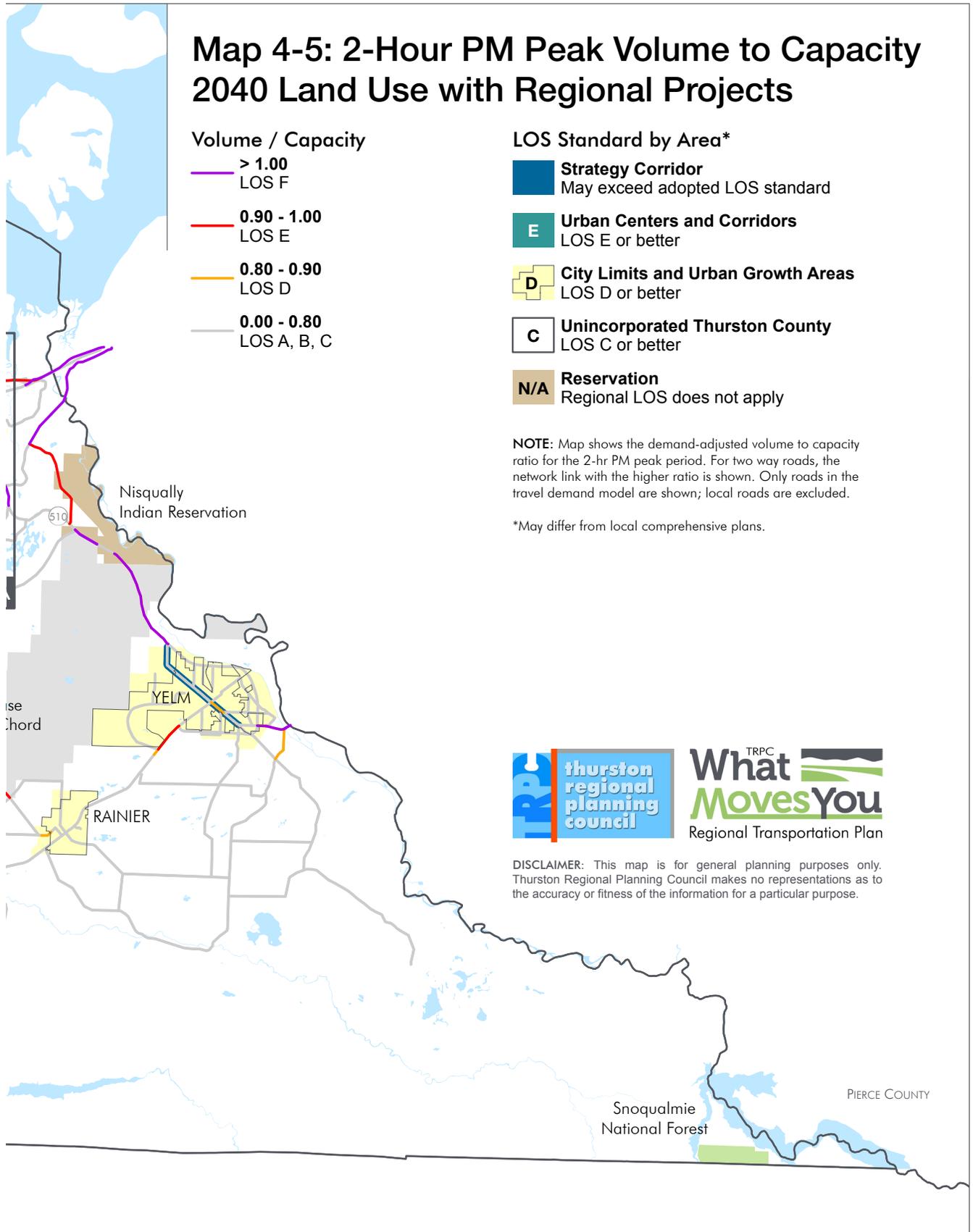


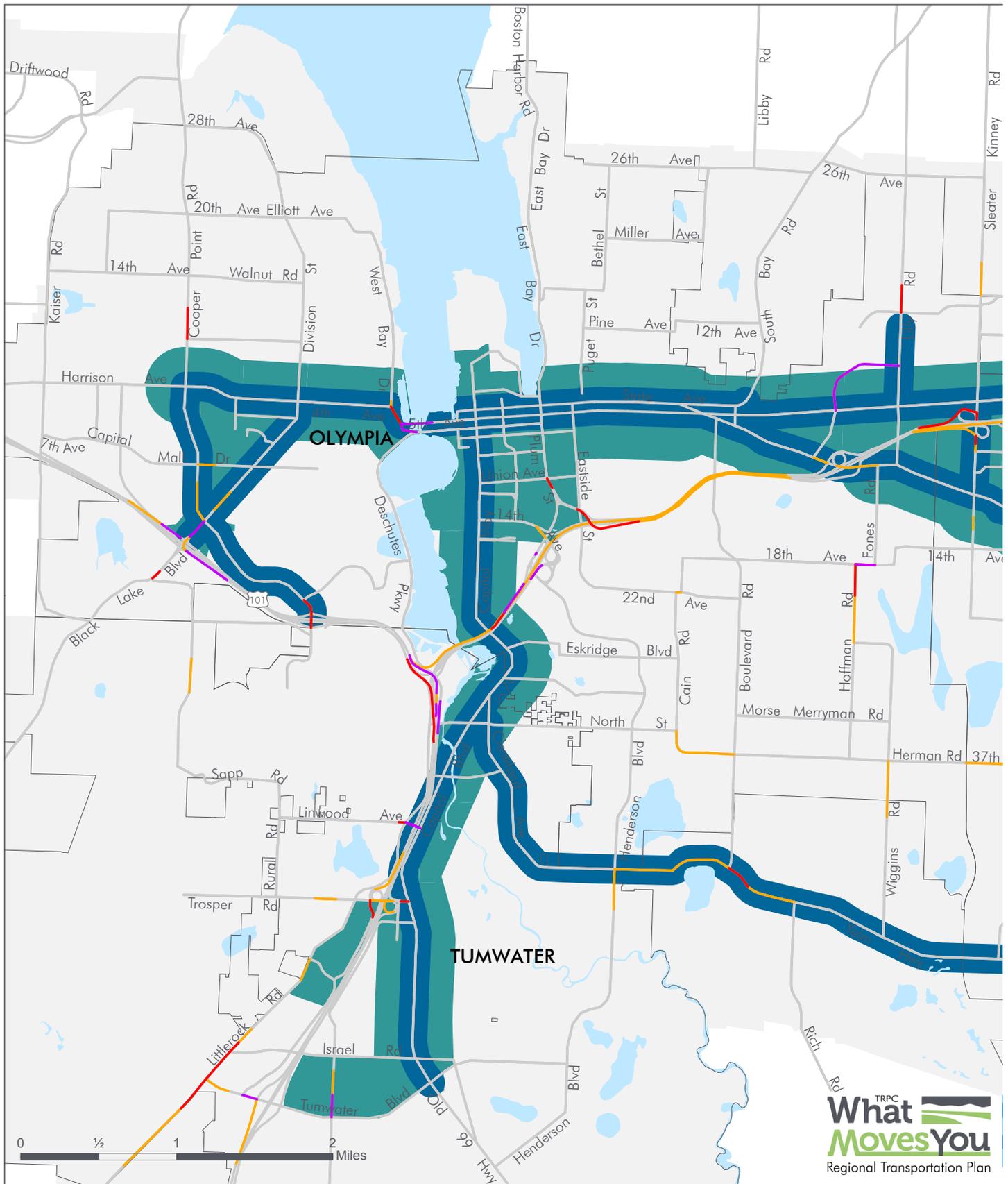


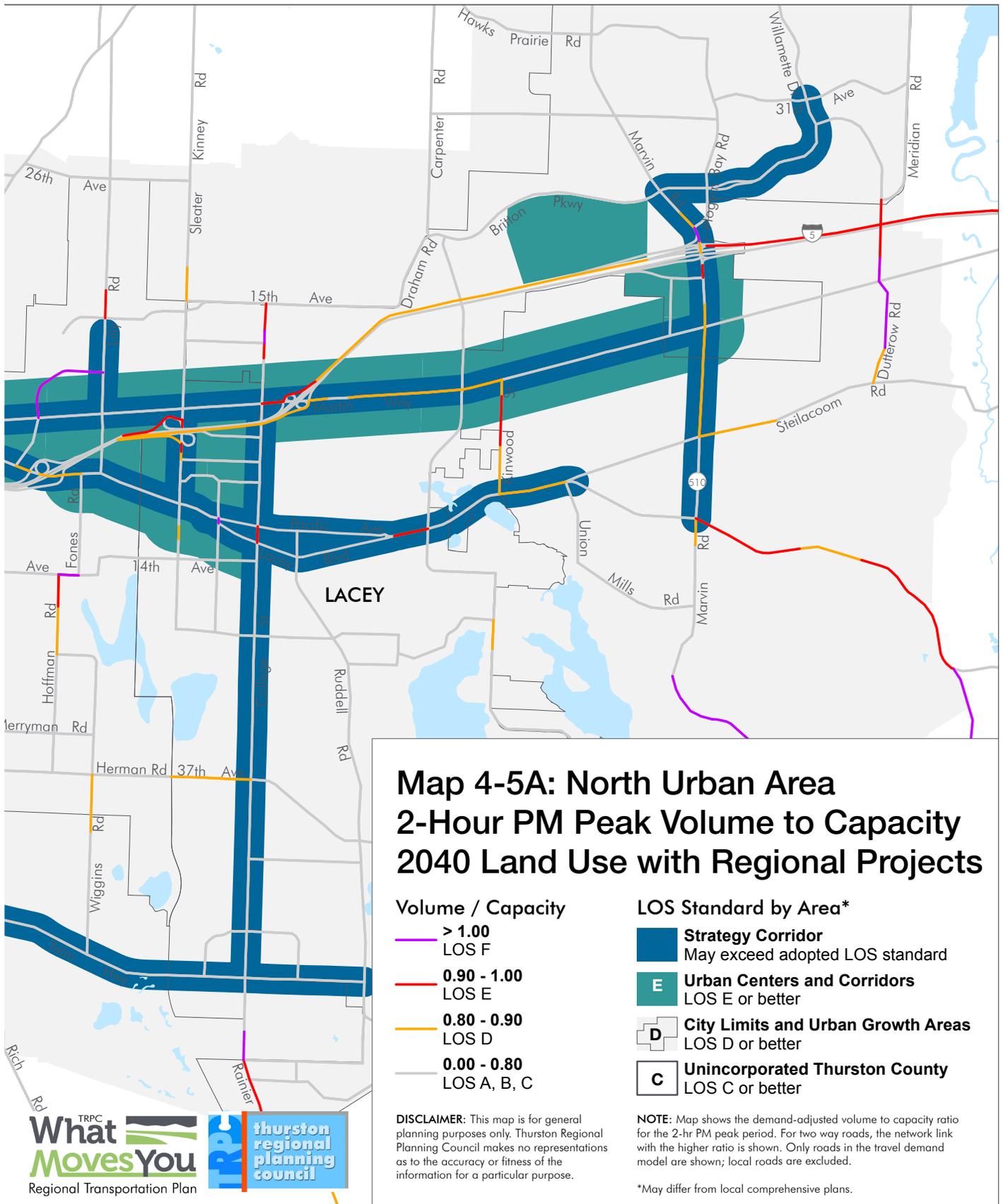












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