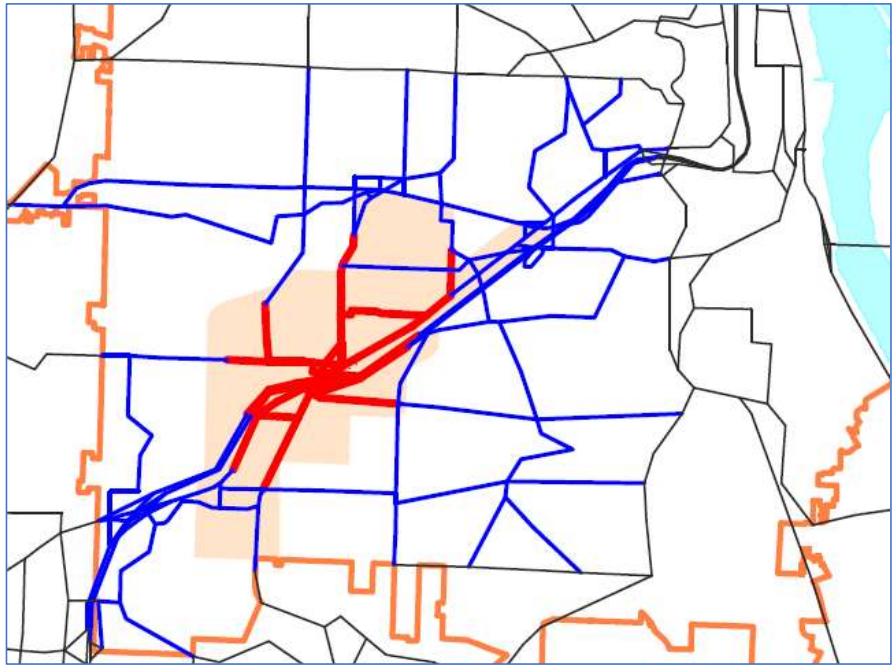
WPTC 2040 Demand Model Outputs

(draft, 07/27/22, Ning Zhou)

Item covers:

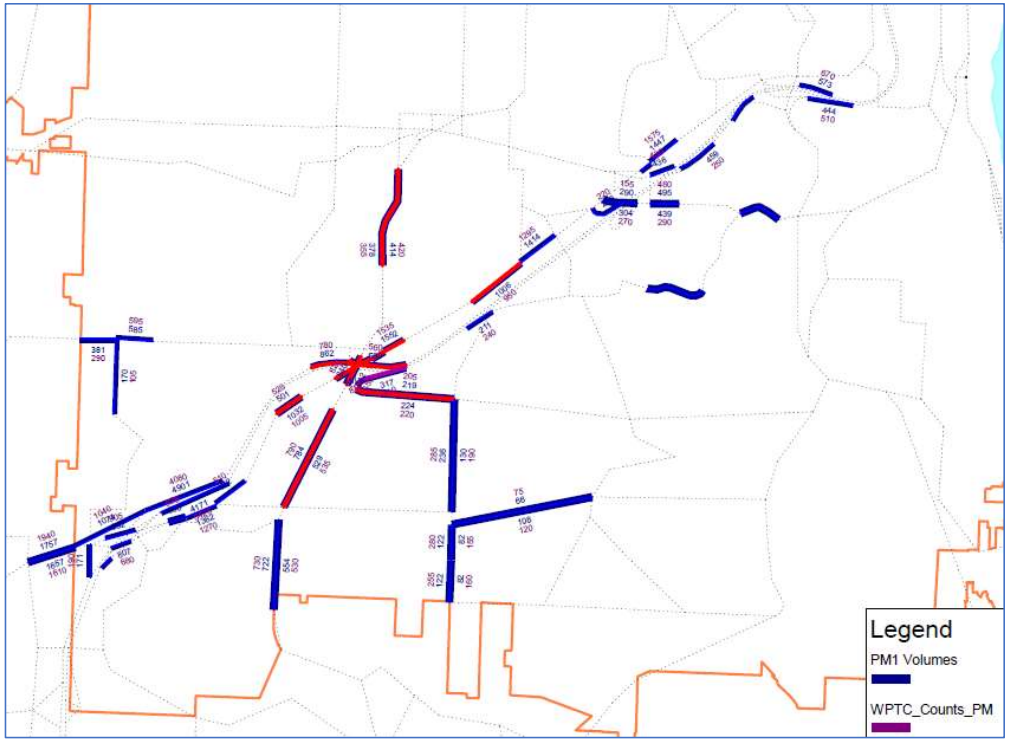
- Base Model
- WPTC Re-Zoning Plan
- WPTC Traffic Demand model outputs
  - Peak hour traffic demand changes
  - Volume changes on WPTC streets
  - VC ratio changes on WPTC streets
  - I-5 & Barbur user changes
  - FWY off-ramp queue length estimation for safety
  - Potential regional FWY tolling (RMPP) impact on Bardur

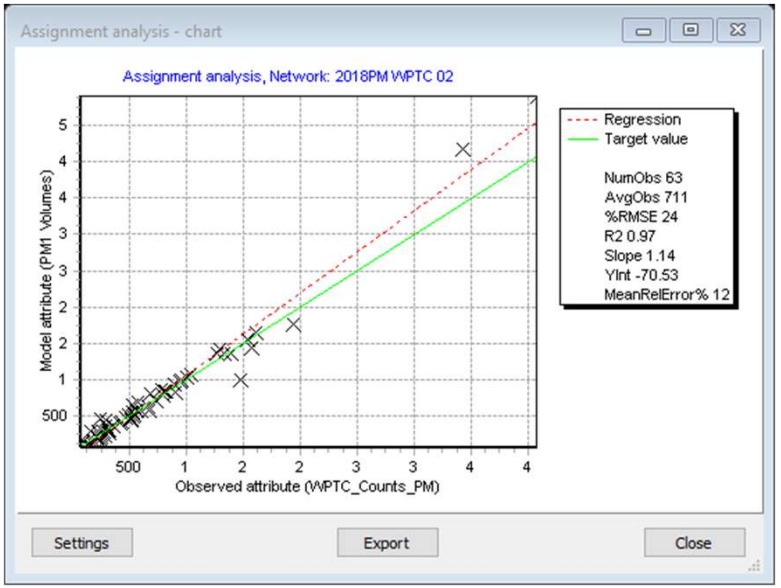
Base Model



- Based on City 2020/2040 RTP-Comp model, which is from Metro 2015/2040 RTP model
- A few local streets are added to reflect detail local traffic circulation
- The ODOT's safety project, Jughandle design at the interchange of I-5/ Capitol/Barbur has be coded into the 2040 base network
- 12 TAZs form the WPTC Plan area (brown area)
- The red and blue links form the WPTC Streets used in traffic analysis
- Existing model is calibrated to 2018 counts.

Calibration in Base Model (PM)





For 19 count links within WPTC area:
No links is under or over assigned

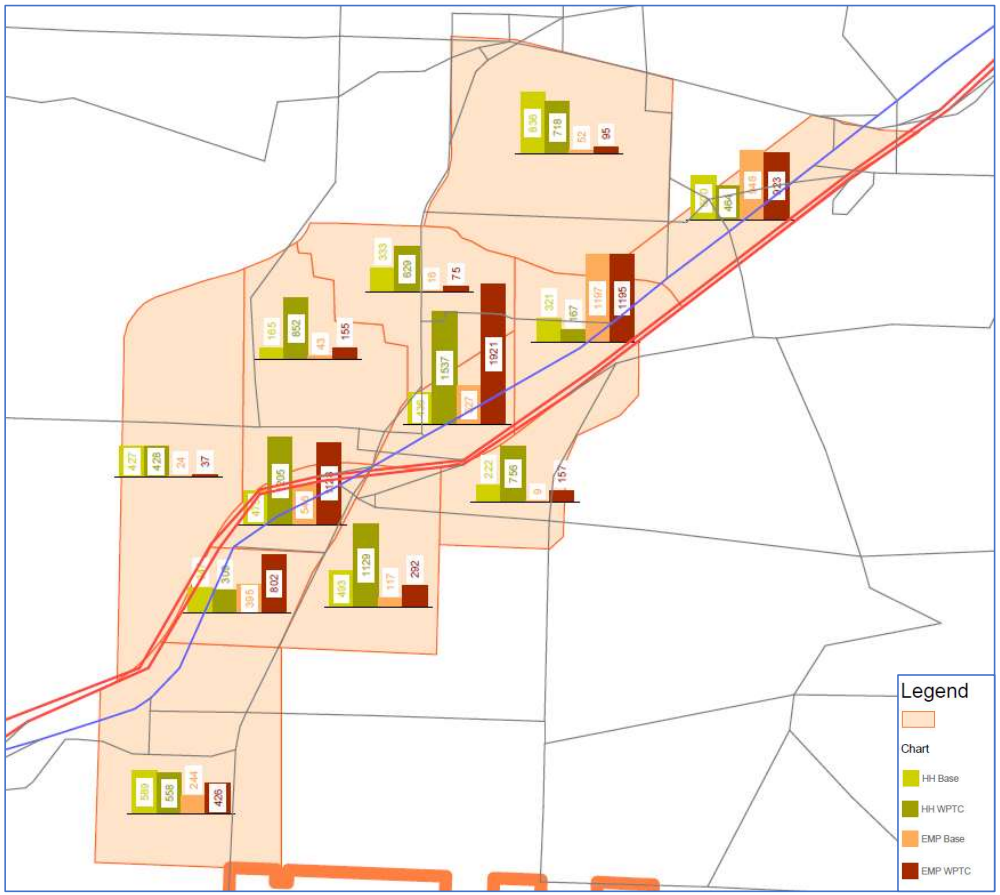
For 63 count links within WPTC analysis area:
9 links are under assigned
11 links are over assigned

(calibration standard: +-15% deviation from counts)

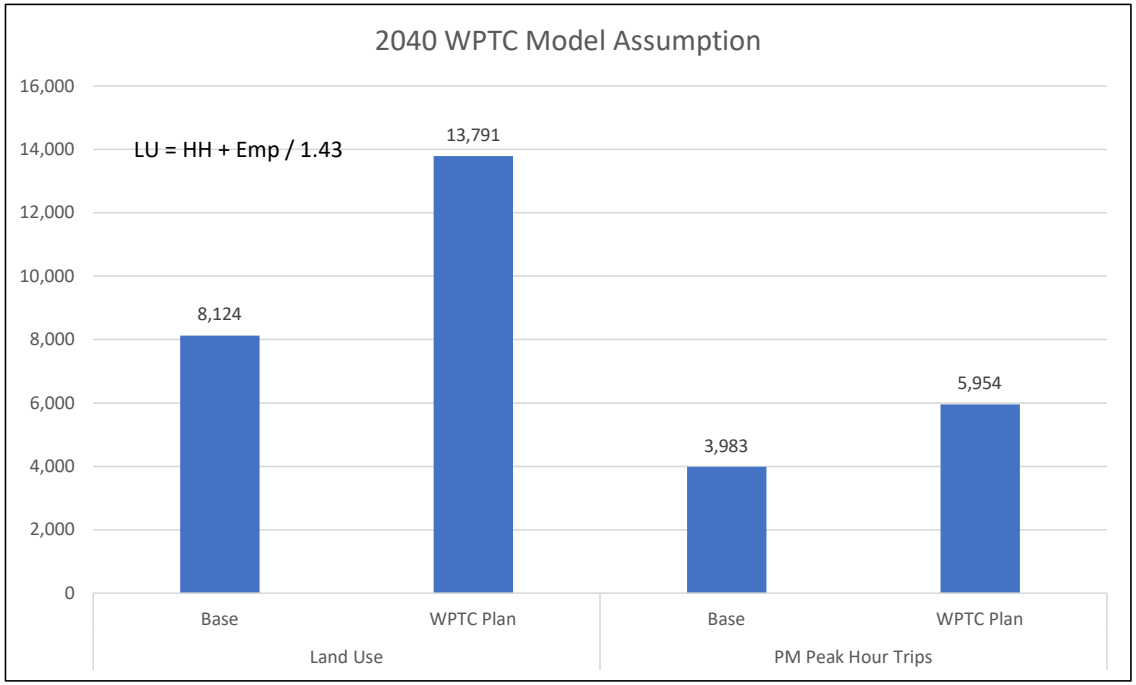
WPTC Re-Zoning plan

12 TAZ total:

	2040 RTP-Comp Base	WPTC Plan	Δ
HH	5,244	8,752	+67%
EMP	4,118	7,206	+75%



Traffic Demand Changes from the WPTC Re-Zoning Plan



- WPTC plan raises 70% more growth than the 2040 RTP/Comp
- Accordingly, the 2040 PM peak hour auto demand is projected to increase 57.3%.
- The demand projection is based on the base model data at TAZ level.
- With -5% mode shift discount, additional 49.5% auto demands is modelled

Table 1. The 2040 daily mode shares for the WPTC project area (2040 RTP/Comp Model data)

		Auto Person	Transit	Bike	Walk
All Trips	WPTC Area	84.2%	9.9%	2.5%	3.4%
	City Average	78.4%	6.1%	6.0%	9.5%
HBW Trips	WPTC Area	71.5%	22.2%	4.6%	1.7%
	City Average	69.0%	15.0%	11.4%	4.5%

HBW = Home Base Work trips, substituting for commuting trips

It is noticeable that the daily mode share for active transportation is low in the WPTC area, lower than City average, even with area's Town Center designation in the model. Possible reason is the existence of travel barrier of two ODOT's streets of I-5 and Barbur in the area which made travel length of active transportation trips much longer.

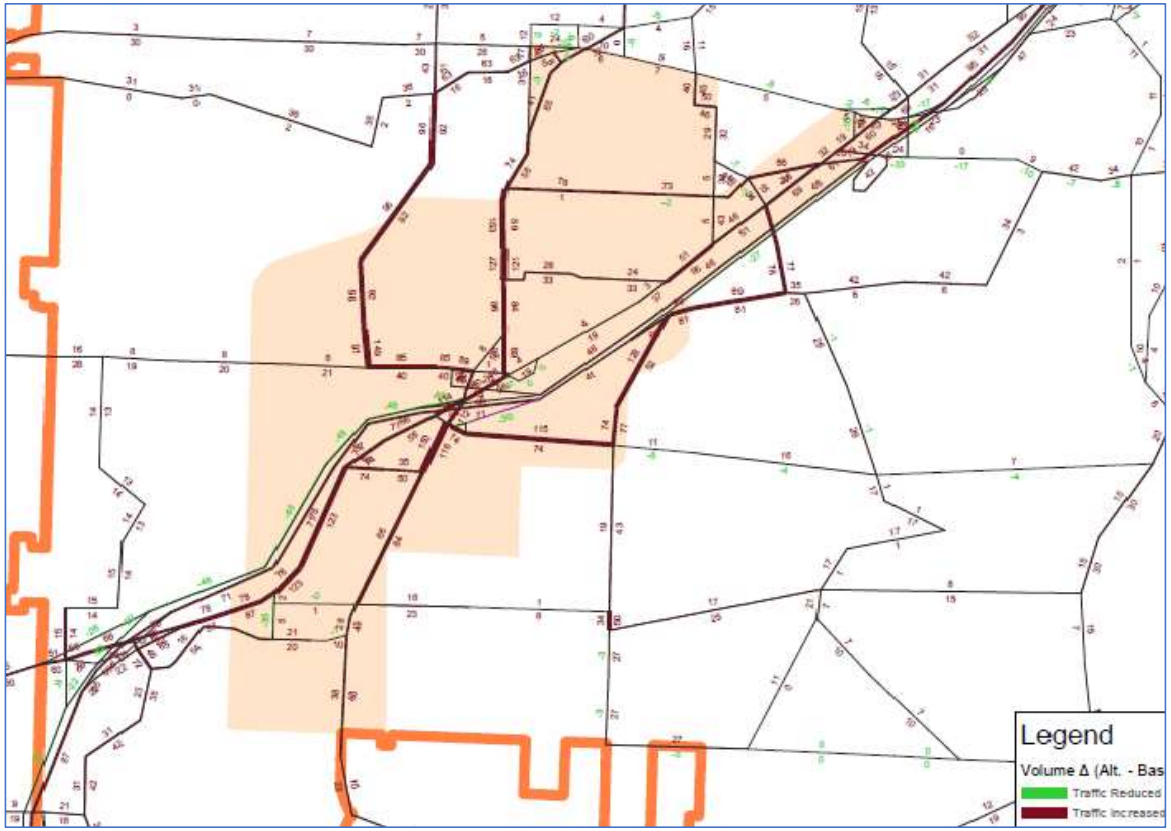
Table 2. 2040 Volume Changes (WPTC Plan – Base)

		Base (2040)			WPTC		
		I-5	Barbur	Others	I-5	Barbur	Others
AM	Volumes						
	Changes						
PM	Volumes	4,865	1,125	325	4,895	1,180	355
	Changes				+30 (0.6%)	+55 (4.6%)	+30 (8.6%)

- On average the PM peak hour traffic will increase about 4% on WPTC links
- The heavy burdens of the added traffic will be on City streets

See plot in next slide for detail distribution of the WPTC added traffic

2040 PM Peak Hour Volume Changes (WPTC Plan – 2040 Base)



Attached volume plots:

2040 PM WPTC Volume

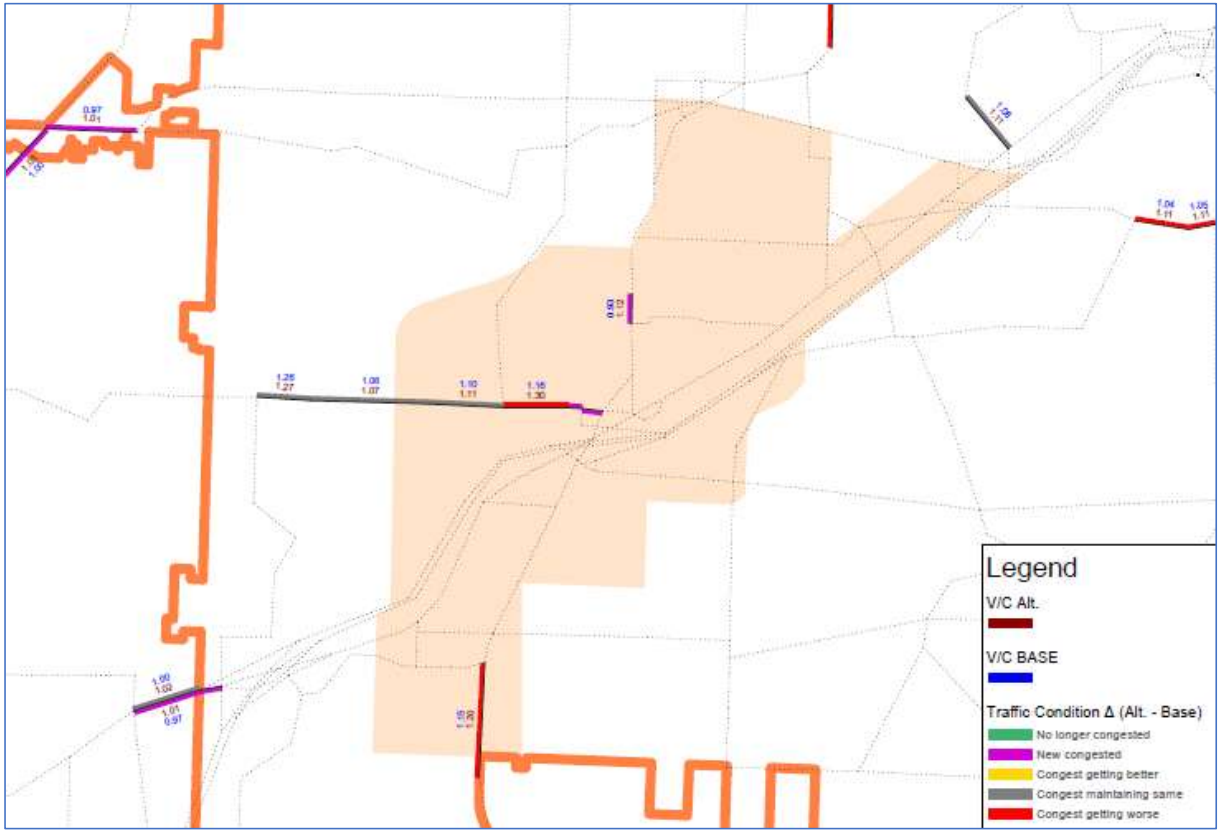
Table 3. 2040 Traffic Condition Changes (WPTC Plan – Base)

		Base (2040)			WPTC		
		Under Cap.	At Cap.	Over Cap.	Under Cap.	At Cap.	Over Cap.
AM	Miles (%)						
PM	Miles (%)	69.2 (92%)	3.9 (5%)	2.1 (3%)	67.5 (90%)	5.1 (7%)	2.6 (4%)
	Changes				-1.7	+1.2	+0.5

- The traffic increase from WPTC will not result in link V/C > 1 on ODOT facility
- Noticeable worsen traffic condition from WPTC plan is projected on Taylor Ferry Rd and on Capitol Hwy as per PM assignment

See plot in next slide for detail distribution of the V/C changes

2040 PM Peak Hour Traffic Condition Changes with WPTC Plan



Attached volume plots:

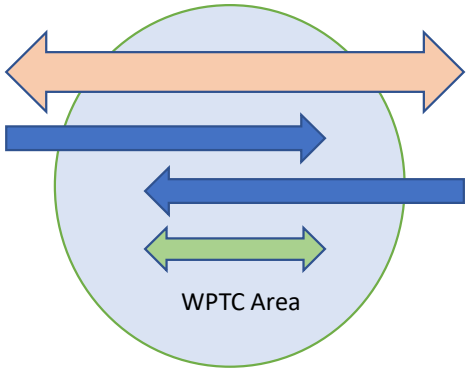
2040 PM WPTC VC

Table 4. WPTC Area I-5 and Barbur User Changes

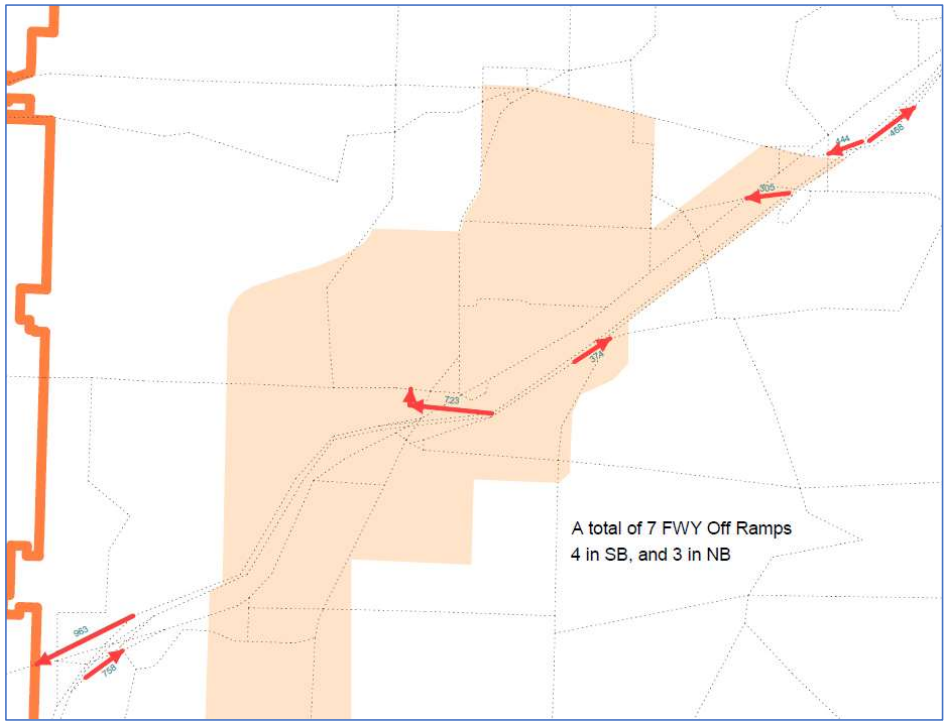
From PM peak hour assignment	Base	WPTC
Total Trips	17,410	18,075
Local Users	2,595 (15%)	3,565 (20%)
Internal Users	70 (0%)	115 (1%)
Through traffic	14,815 (85%)	14,525 (80%)
Area Trips use I-5/Barbur as Access	65%	60%

- Total trips are the trips driven on at least one segment of I-5 or Barbur Blvd of WPTC streets
- Local users are the trips have at least one trip end within the project area
- Internal users are the trips have O and D both within the project area, a subgroup of the local users
- Area trips use I-5/Barbur as access = local users / area's total demands

- Logically, the expanded WPTC development will increase the shares of local users on I-5/Barbur, up 5%
- But through traffic will still be the mainstream on the two ODOT streets
- WPTC plan doesn't change the character that the two ODOT streets are the area's gateway



Planning Level Safety Analysis on FWY Off Ramps

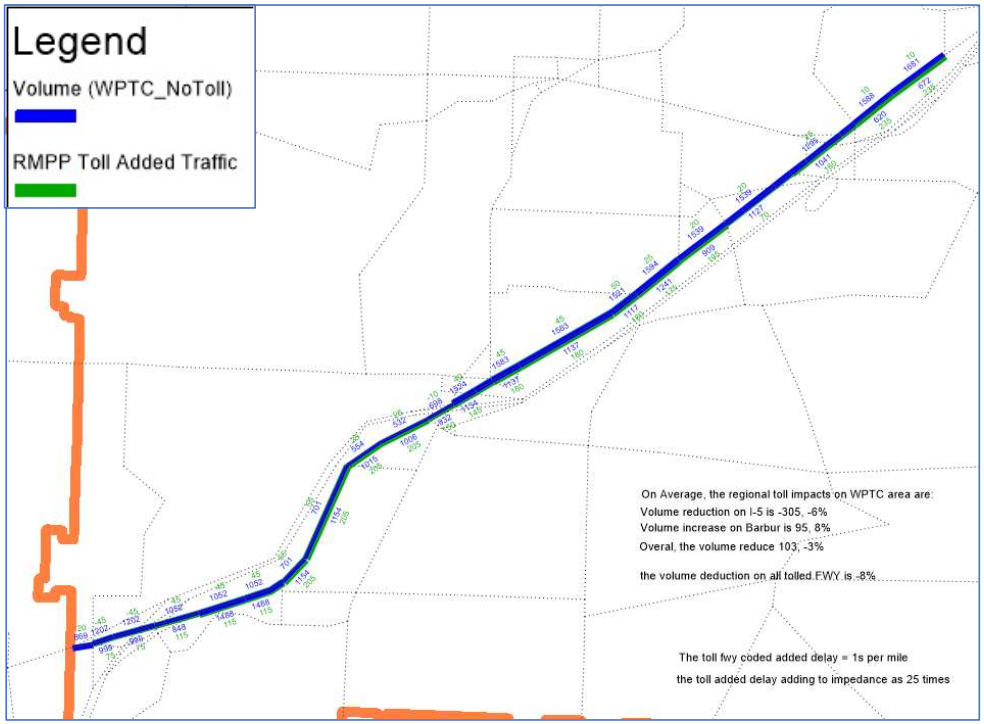


- Safety analysis is to estimate the potential max queue length at the ramp based on:
  - 2040 PM peak hour volumes (WPTC model)
  - Ramp characters: # of lanes, length (measured from Google Maps)
- Planning level analysis methods:
  - Assumed 90s signal cycle length, 50% green time split
  - Max arrival per cycle estimated by Poisson distribution with 95th confidence
  - Max queue is ½ of max arrival (50% green time)

- The estimated max queue lengths at all 7 ramps are shorter than their ramp lengths during PM peak hour in 2040.

- I-5 SB off-ramp at Capitol HWY: projected 723 v/h results in the max queue of 14 cars, which is about 1/3 of the ramp length of 1025 ft.

Estimation of RMPP Tolling Impact on Barbur Blvd



- No tolling rate is assumed, a rough -8% RMPP overall diversion on FWY is used instead
- The estimation assumes the WPTC plan in place
- Other WPTC streets will be impacted by RMPP toll too

- On average, Barbur Blvd will add about 190 cars (PM peak hour, 2-way) from RMPP toll,
- With the toll, the V/Cs on Barbur will increase, but not one segment will over 1

- Off peak diversion might be slightly higher than peak hours