



Tampa Bay Regional Planning Model (TBRPM)

Visum

Executive Level Overview



TBRPM Executive Level Overview Agenda

Travel Demand Models 101

Data Needs

TBRPM Outputs

Case Study Examples

Other Local Government Uses





01

Travel Demand Models 101

What is a Model?



What is a Model?

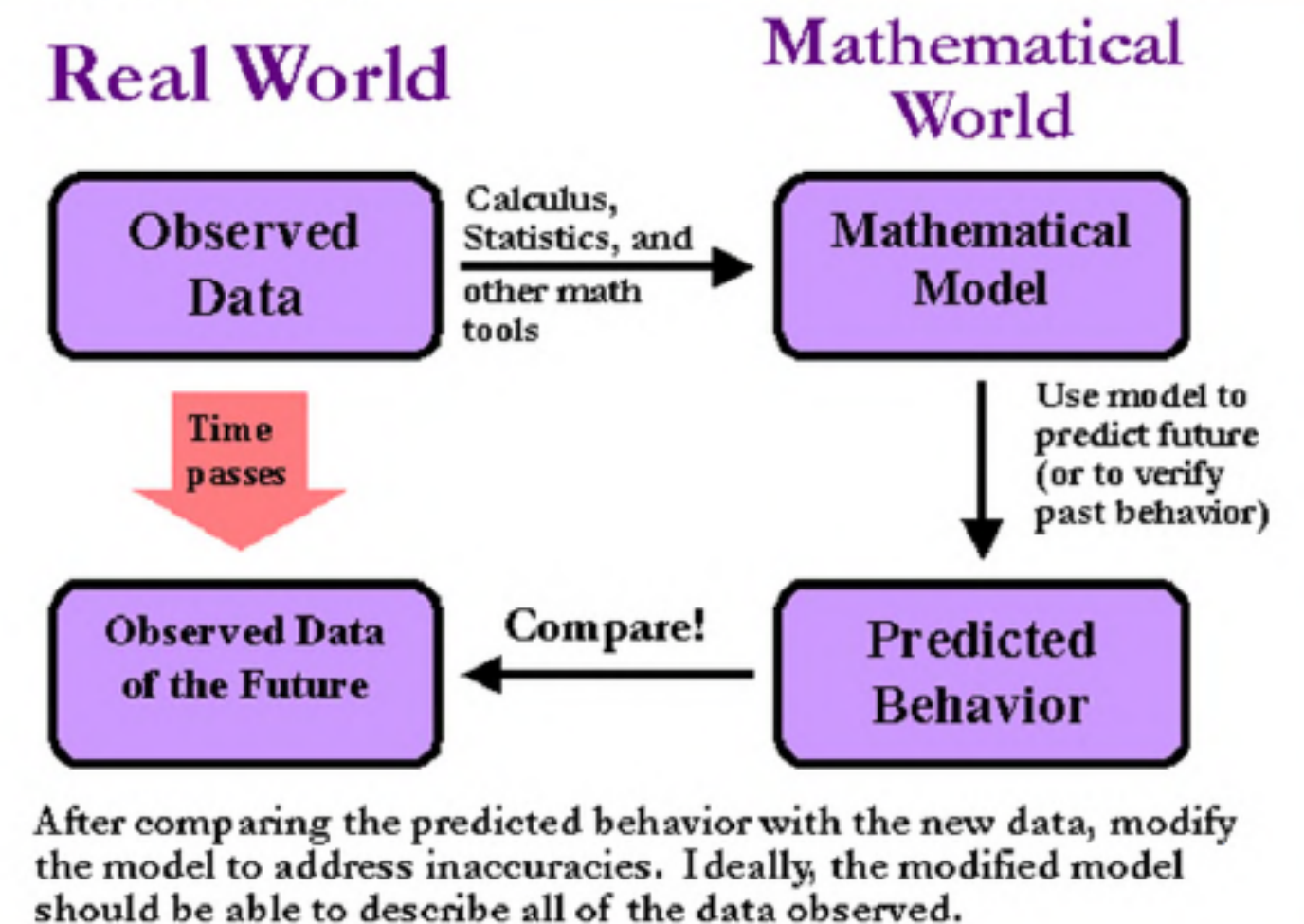
A model is

- An informative representation of an object, person or system.
- A pattern of something.
- A simplified description, especially a mathematical one, of a system or process to assist calculations and predictions.



What is a Travel Demand Model?

A schematic description of how a transportation system's characteristics – including land use, the transportation network, and the number and type of travelers – affect the use of the system.



What a Travel Demand Model Is and Is Not?

A Model Is...

- An analytical tool to provide important information to decision makers.
- A means to quantitatively estimate the effects of transportation planning, policy, or investment decisions on transportation demand.

A Model Is NOT...

- A crystal ball – it predicts a possible version of the future (even though I have a pair of flat screen crystal balls on my desk).
- An exact set of answers – it provides insights to inform a planning decision.

Traditional Four-Step Travel Demand Model Components



Trip
Generation



Trip
Distribution



Mode
Choice



Trip
Assignment



What Information Can Travel Demand Models Provide?



Future Movement:

estimates where and how people will travel in the future.



Modes of Travel:

estimates whether people will use cars, buses, bikes, or walk.



Infrastructure Guidance:

helps decide where to build roads, transit, and paths.



Traffic Prediction:

identifies busy times and areas to address congestion.



Public Transit Improvement:

assists in improving bus, train, and transit services.



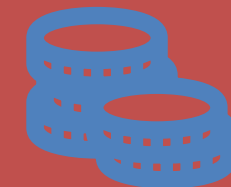
Environmental Check:

evaluates how travel choices impact the environment.



City Design Input:

influences where to place homes, businesses, etc.



Financial Insight:

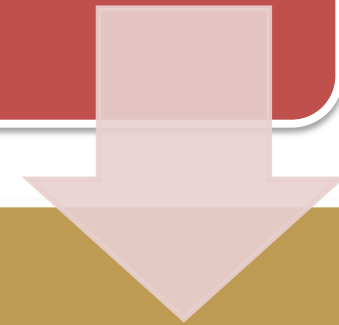
assesses the cost and benefit of transportation decisions.

Basic Elements to a Travel Demand Model

The Model

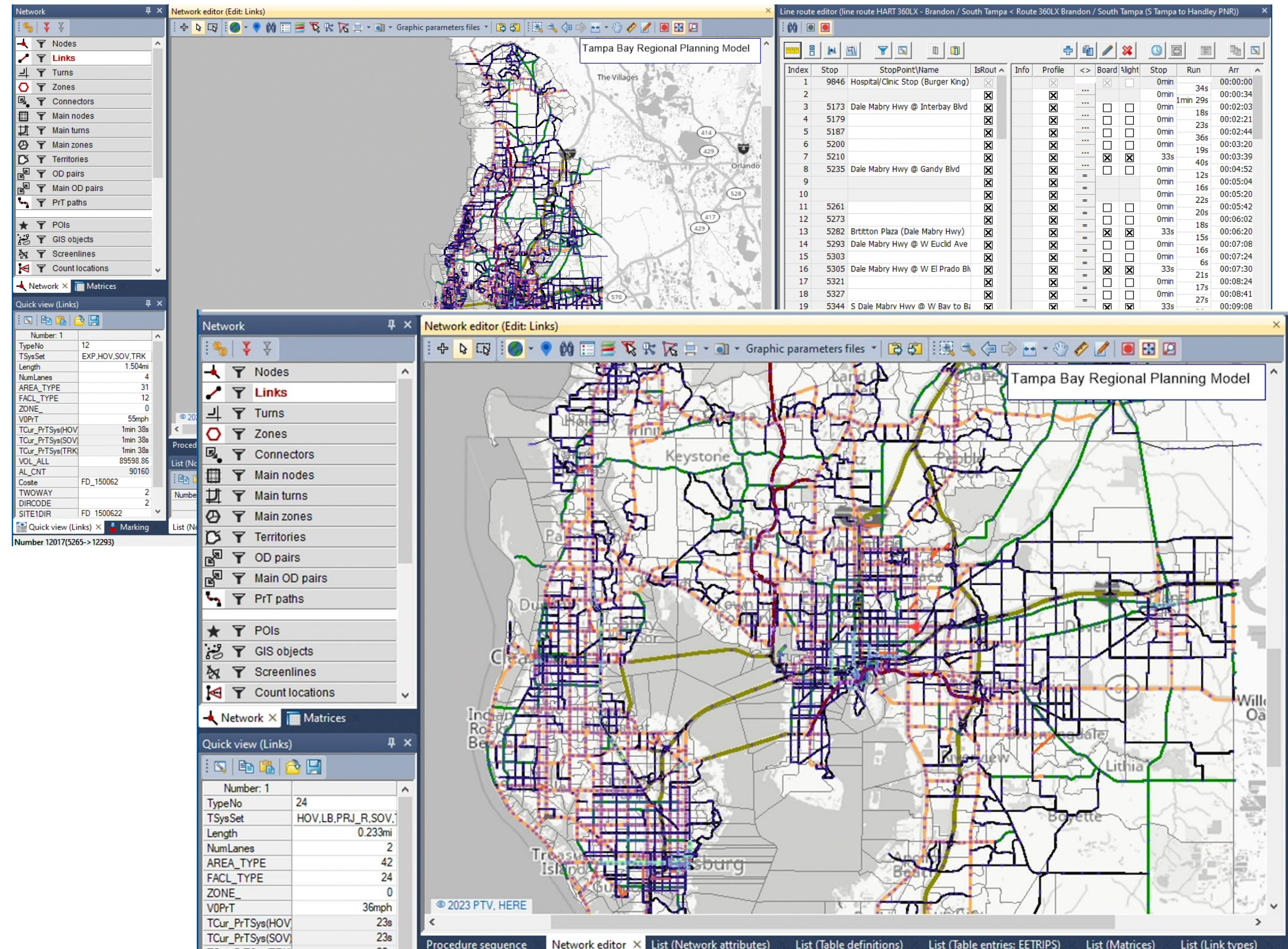
The Software

Various Data



The Software – VISUM Overview

- Transportation Planning Platform
- Integrated Multimodal Network Model
- Extensive GIS Functionalities
- Advanced Environment for Assignment / Demand Forecasting
- Analysis / Optimization of Networks
- Links to Microsimulation



The Various Data – Input and Output Data

Input Data

Highway
Network

- Number of Lanes
- Facility Type
- Capacity
- Toll
- Etc.

Transit
Network

- Transit Route Alignment
- Stops and Transfers
- Headway
- Fare
- Etc.

Land Use /
Socio-
Economic

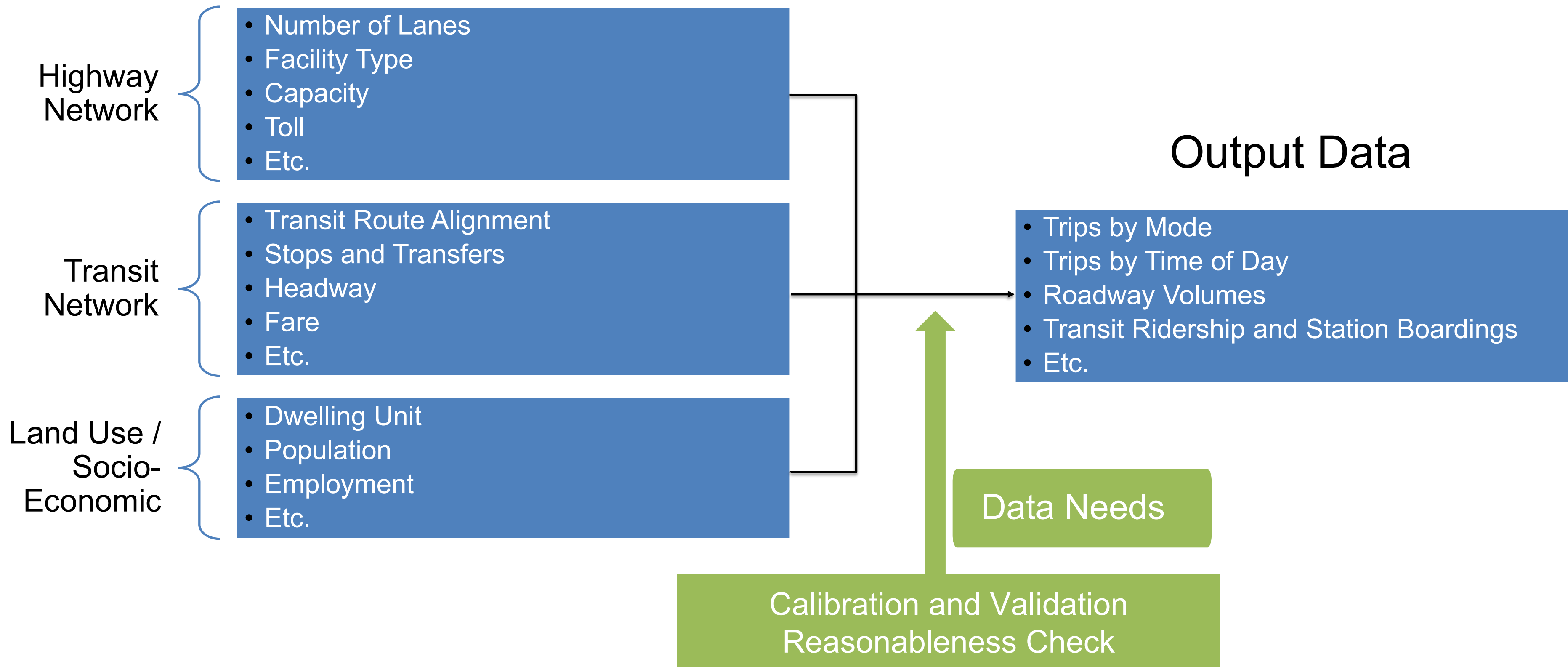
- Dwelling Unit
- Population
- Employment
- Etc.

Output Data

- Trips by Mode
- Trips by Time of Day
- Roadway Volumes
- Transit Ridership and Station Boardings
- Etc.

Data Needs

Calibration and Validation
Reasonableness Check



The Various Data – Facility Type and Area Type

Facility Type

Facility Type	Description
11 – 19	Freeways and Expressways
21 – 29	Divided Arterials
31 – 39	Undivided Arterials
41 – 48	Collectors
51 – 58	Centroid Connectors
61 – 68	One-Way Facilities
71 – 79	Ramps
81 – 89	HOV Facilities
91 – 99	Toll Facilities
49, 59, 69	Transit Use Links

Area Type

Area Type	Description
11 – 19	Central Business Districts (CBD)
21 – 29	Central Business Districts (CBD) Fringe Areas
31 – 39	Other Urbanized Areas
41 – 49	Outlying Business Districts (OBD)
51 – 59	Rural Areas

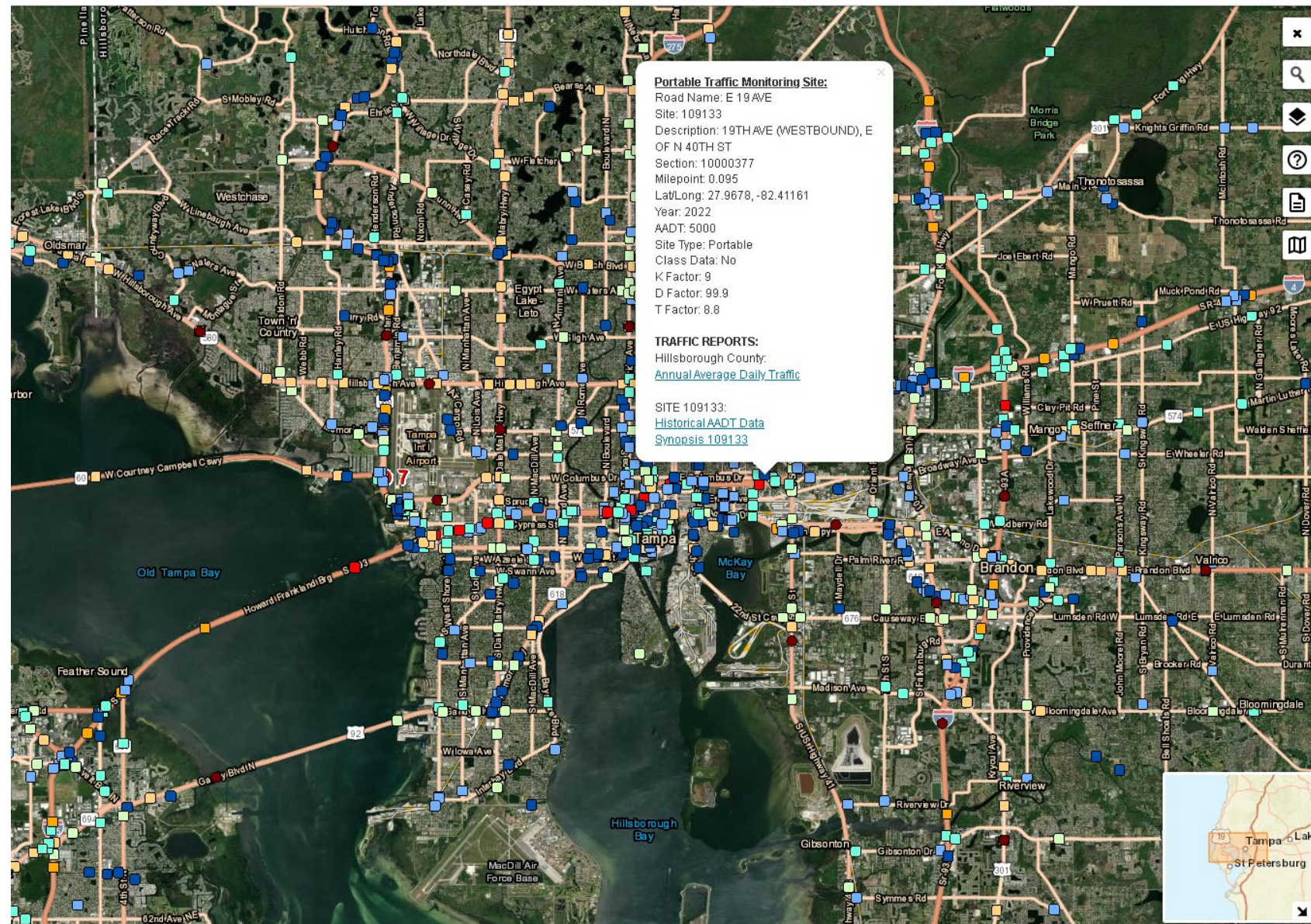


02

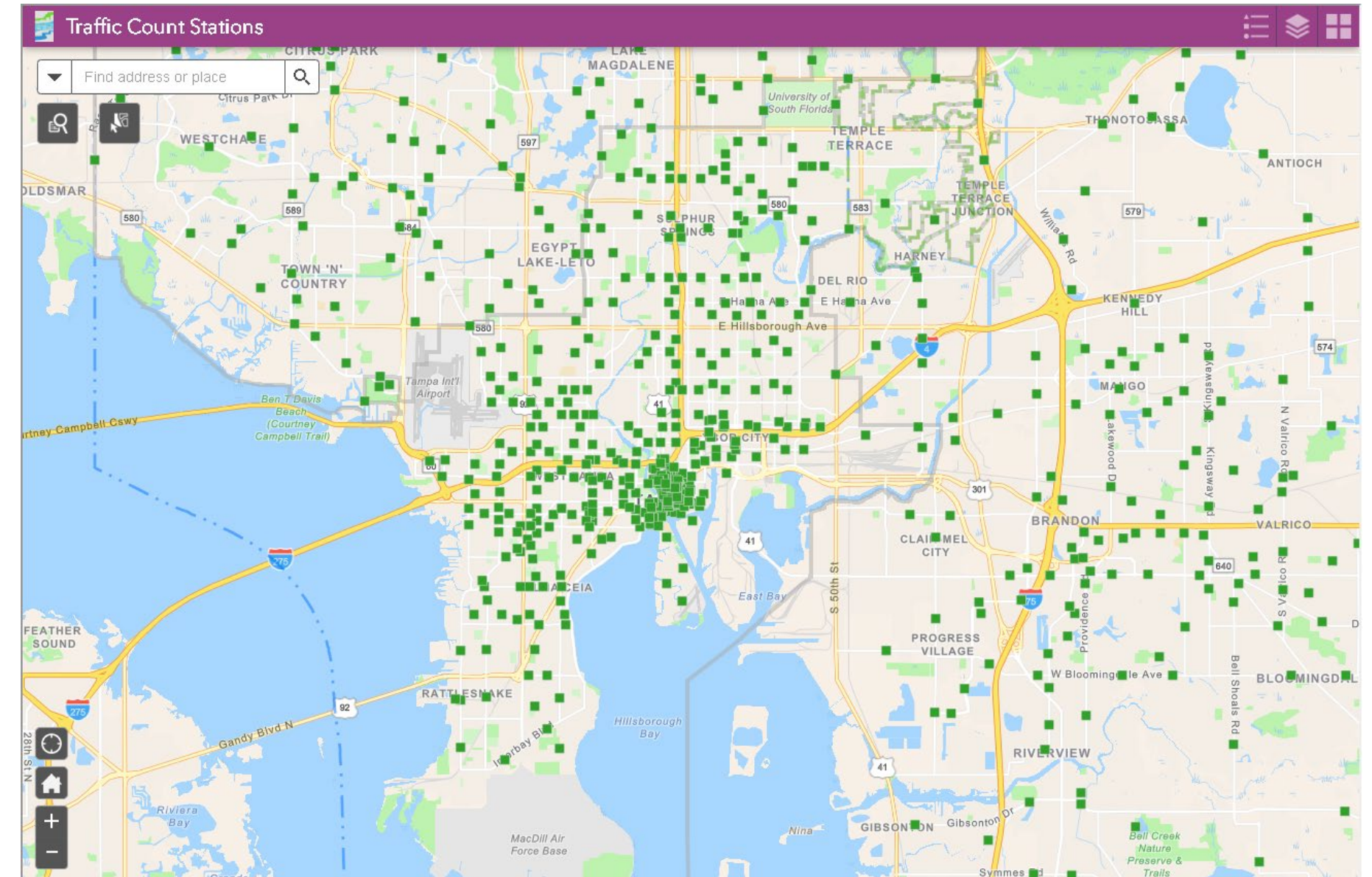
Data Needs

Count Data

Florida DOT Florida Traffic Online



Local Government Count Programs



More Counts → Better Validation

Survey Data

Available Survey Data

- U.S. Census
- American Community Survey (ACS)
- National Household Travel Survey (NHTS)
- Tampa Bay Regional Household Travel Surveys
- Long-Distance Travel Survey
- Origin / Destination Survey
- Local Transit Rider Survey
- Etc.

The image shows two website screenshots. The top screenshot is the U.S. Census Bureau homepage, featuring the title "Measuring America's People, Places, and Economy" and a search bar. The bottom screenshot is the National Household Travel Survey (NHTS) website, which includes a navigation bar, a "National Household Travel Survey" section with a description, and a "2017 Frequently Used National Statistics" section with icons for Vehicles, Vehicle Trips, Vehicle Miles, Persons, Person Trips, Person Miles, Households, Workers, and Drivers. It also features an "Announcements" section and a "2017 NHTS Summary Statistics" link.

More Surveys → Better Validation

Land Use / Socio-Economic Data

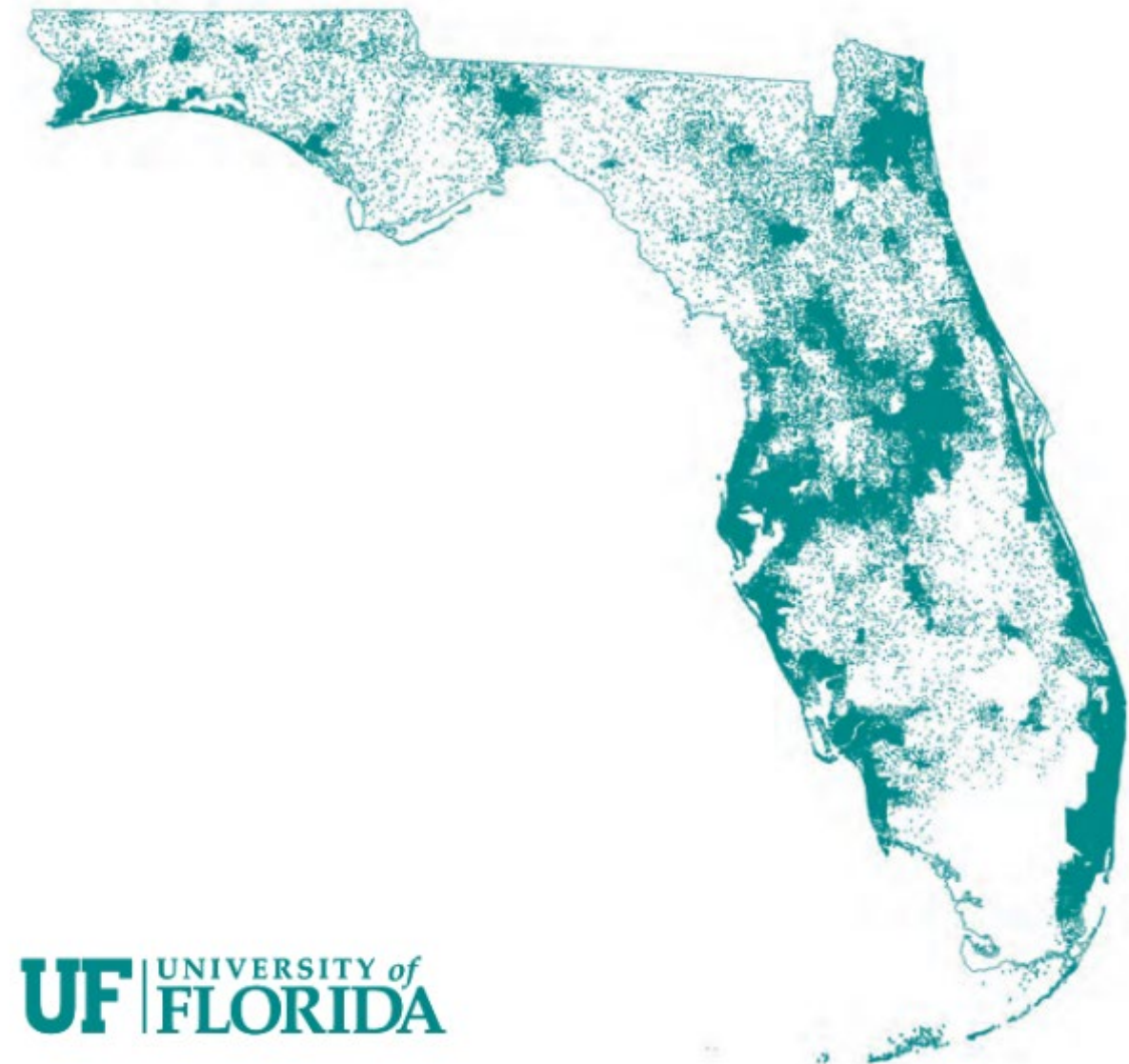
Land Use / Socio-Economic Data

- U.S. Census
- American Community Survey (ACS)
- Tampa Bay Regional Household Travel Survey
- Bureau of Economic & Business Research (BEBR)
- Dun & Bradstreet Data
- Local MPOs
- Etc.

College of Liberal Arts and Sciences
Bureau of Economic and Business Research

BEBR

**Florida Estimates of Population
2022**



UF UNIVERSITY of
FLORIDA

More Data → Better Validation

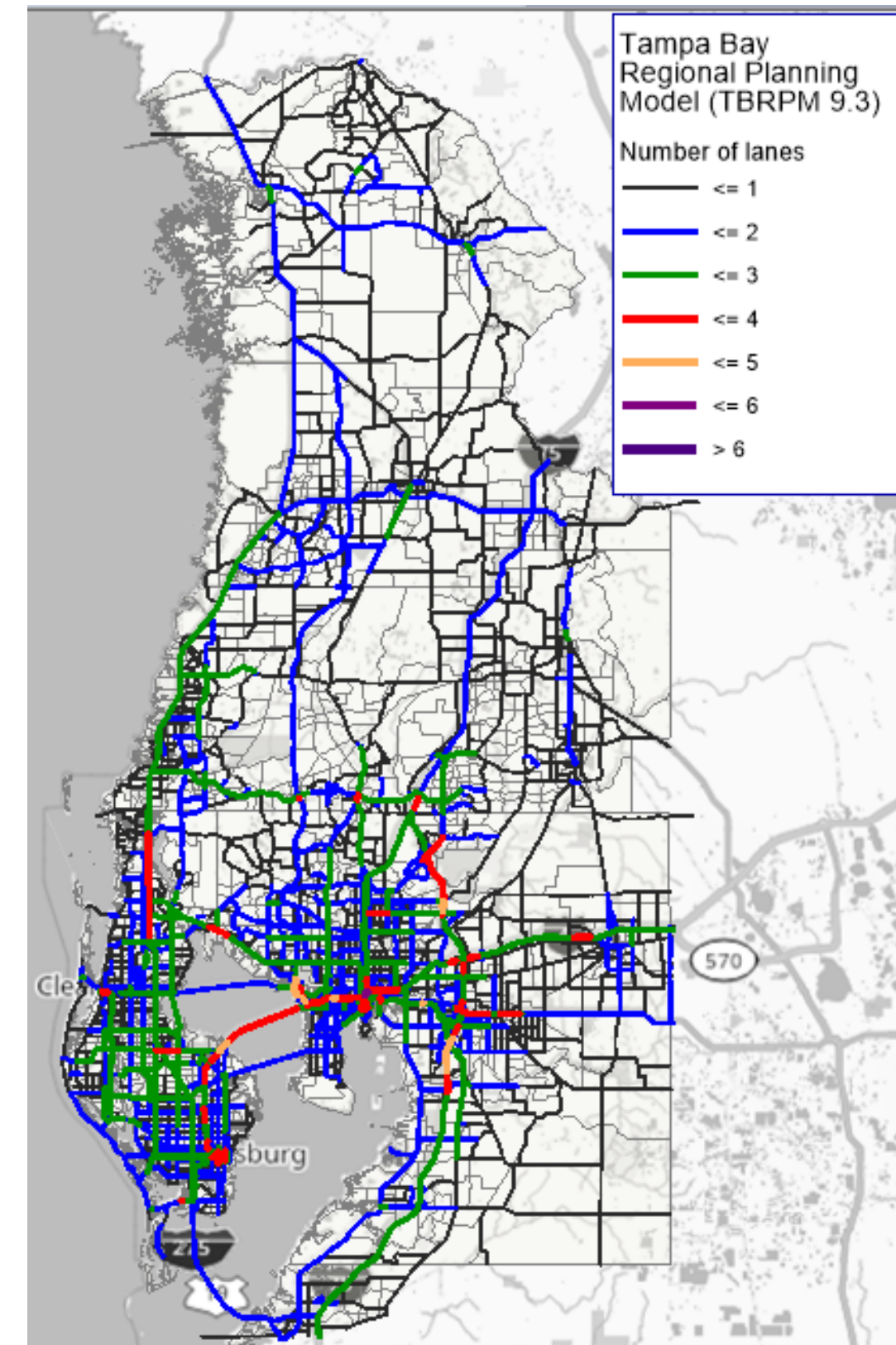
Highway and Transit Network

Highway Network

- Highway Projects
- Traffic Counts
- Toll Facilities and Toll Mechanism

Transit Network

- Route Alignments
- Service Span and Headways
- Ridership Observations
- APC Data
- GTFS



More Network Updates → Better Validation



03

TBRPM Outputs

What Can the TBRPM Provide

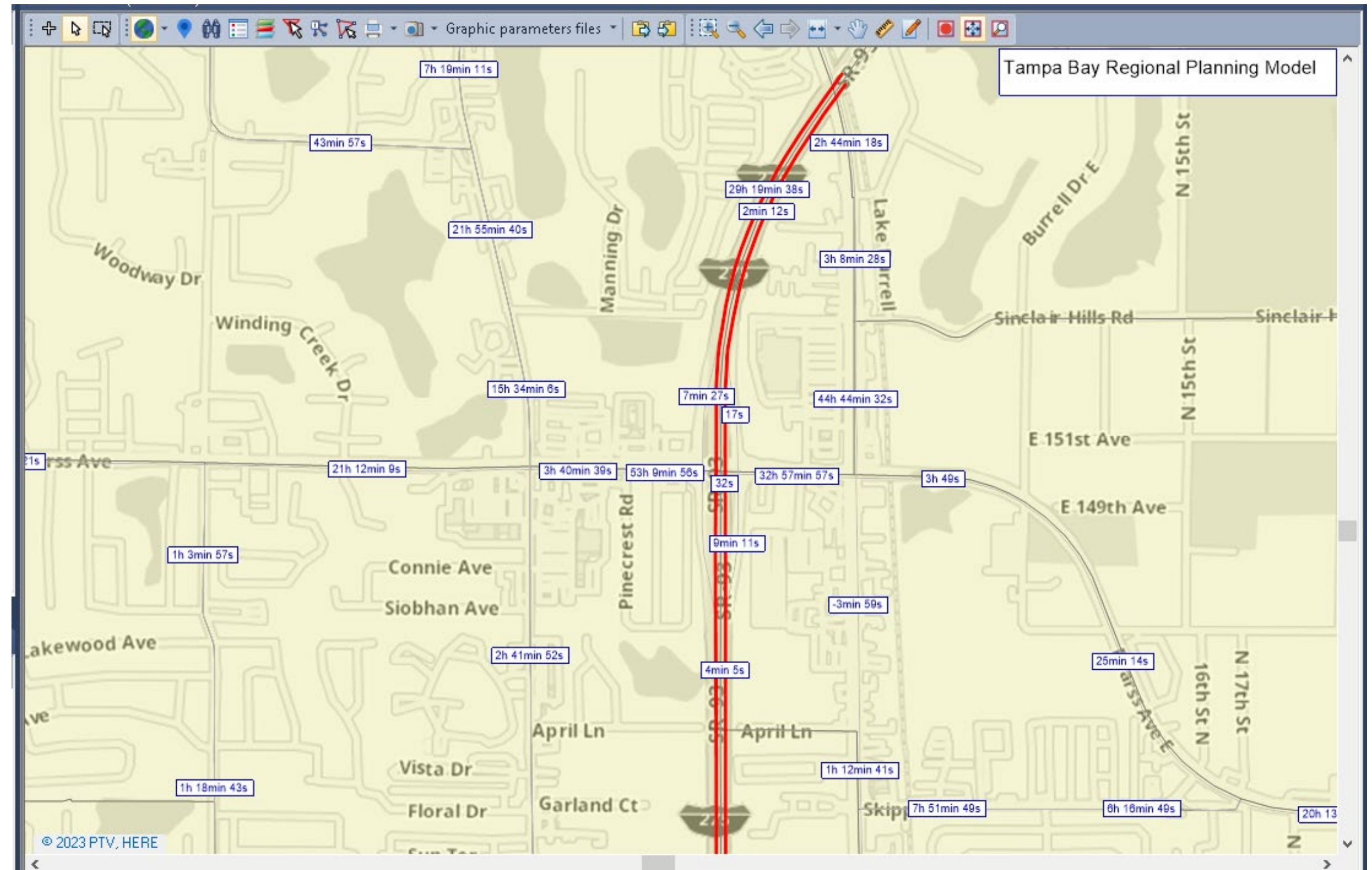
Tampa Bay Regional Planning Model Outputs

- Maps and Data Tables for Comparison between Alternatives
- Desire Lines Analysis
- Measures of Effectiveness (MOEs)
- Air Quality
- Etc.

Comparison between Alternatives

Network Comparison Maps

- New Roadways
- Removed Roadways
- Difference in Roadway Characteristics
- Volume Differences between Alternatives
- And all other variables, such as speed and travel times



Roadways with lane changes highlighted in red
Labels reflect changes in hours of delay

Measure of Effectiveness (MOEs)

Frequently Used Measure of Effectiveness (MOEs)

- System Miles and Lane Miles
- Vehicle Miles Traveled (VMT)
- Vehicle Hours Traveled (VHT)
- Volume over Capacity Ratio (V/C Ratio)
- Congested Speed
- Corridor Summary
- Etc.



TBRPM Can Estimate Air Quality in Terms of

- Total Fuel Use
- Total CO Emissions
- Total HC Emissions
- Total NO Emissions





04

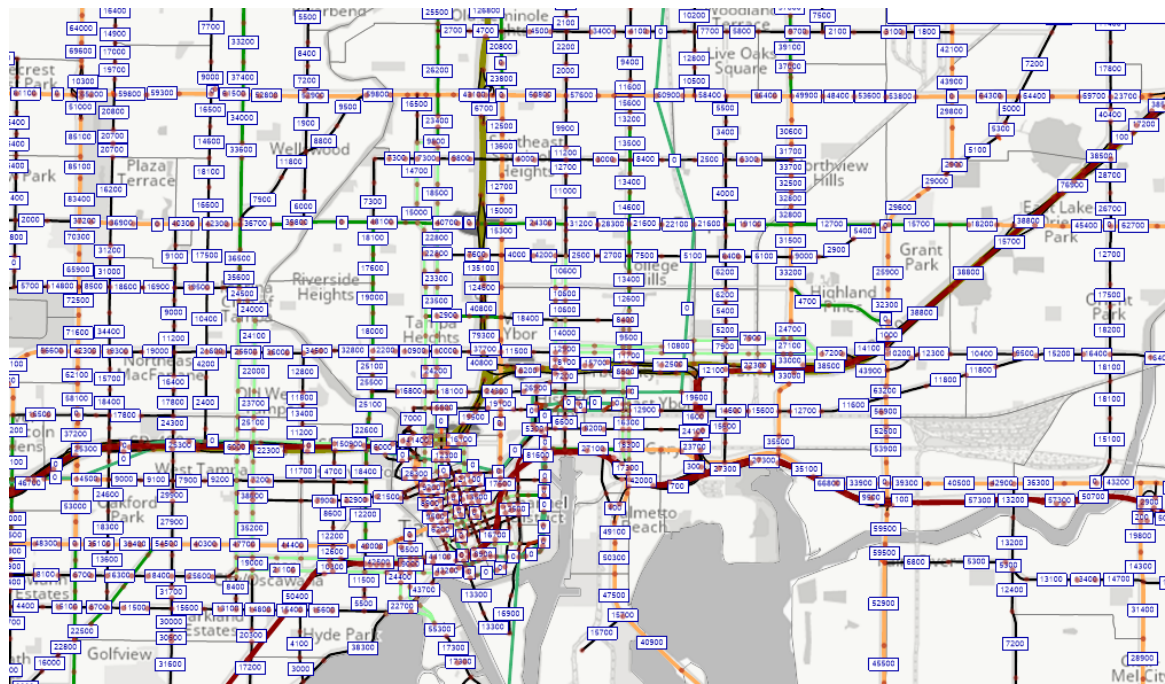
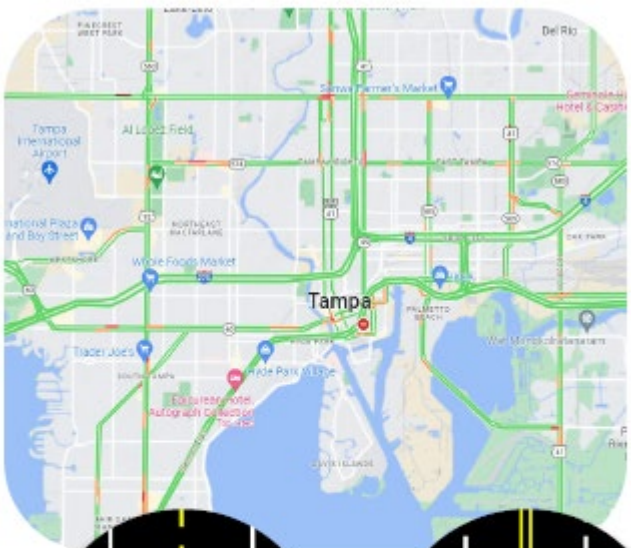
Case Study Examples

Lane Widening / Reduction Projects

Lane Widening Project
Lane Reduction Project

Volume Estimates and
Comparison

Performance Evaluation



Measure of Effectiveness (MOEs)

Frequently Used Measure of Effectiveness (MOEs)

- System Miles and Lane Miles
- Vehicle Miles Traveled (VMT)
- Vehicle Hours Traveled (VHT)
- Volume over Capacity Ratio (V/C Ratio)
- Congested Speed
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- Etc.

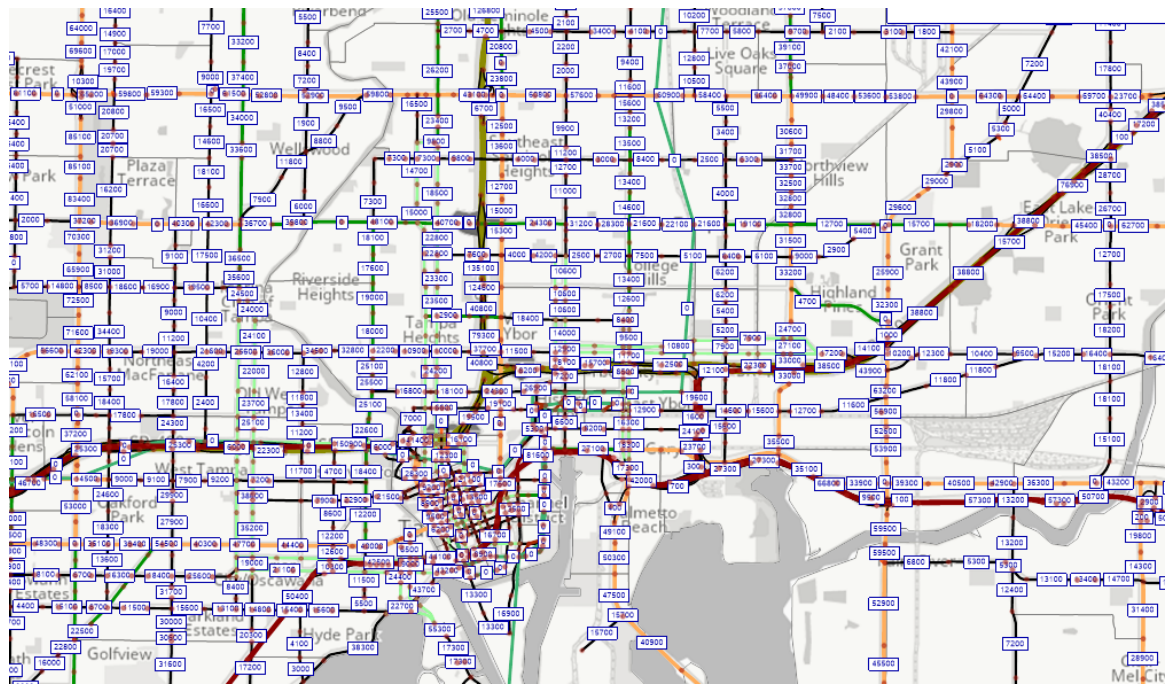
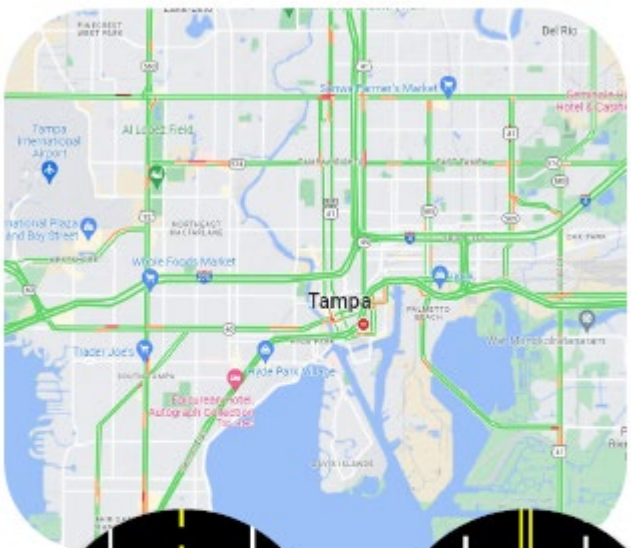


Lane Widening / Reduction Projects

Lane Widening Project
Lane Reduction Project

Volume Estimates and
Comparison

Performance Evaluation

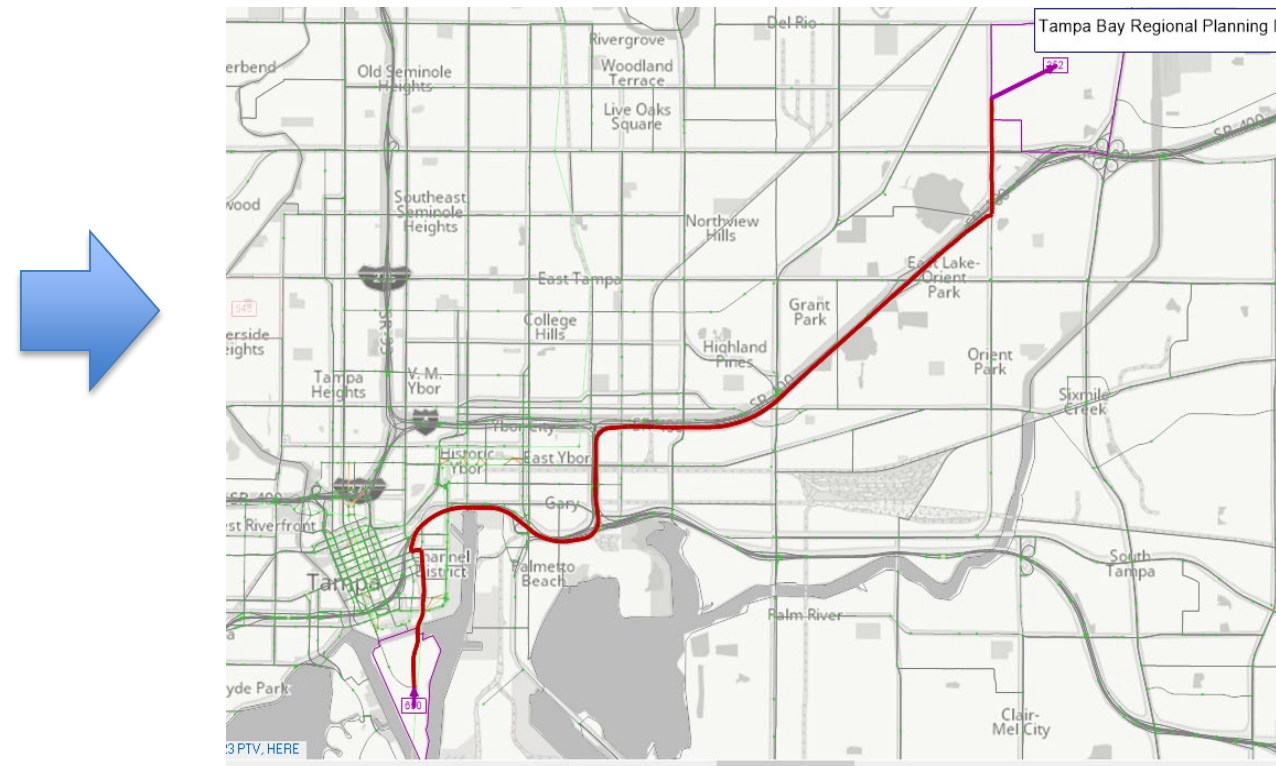


Origin-Destination Analysis for Work Zone

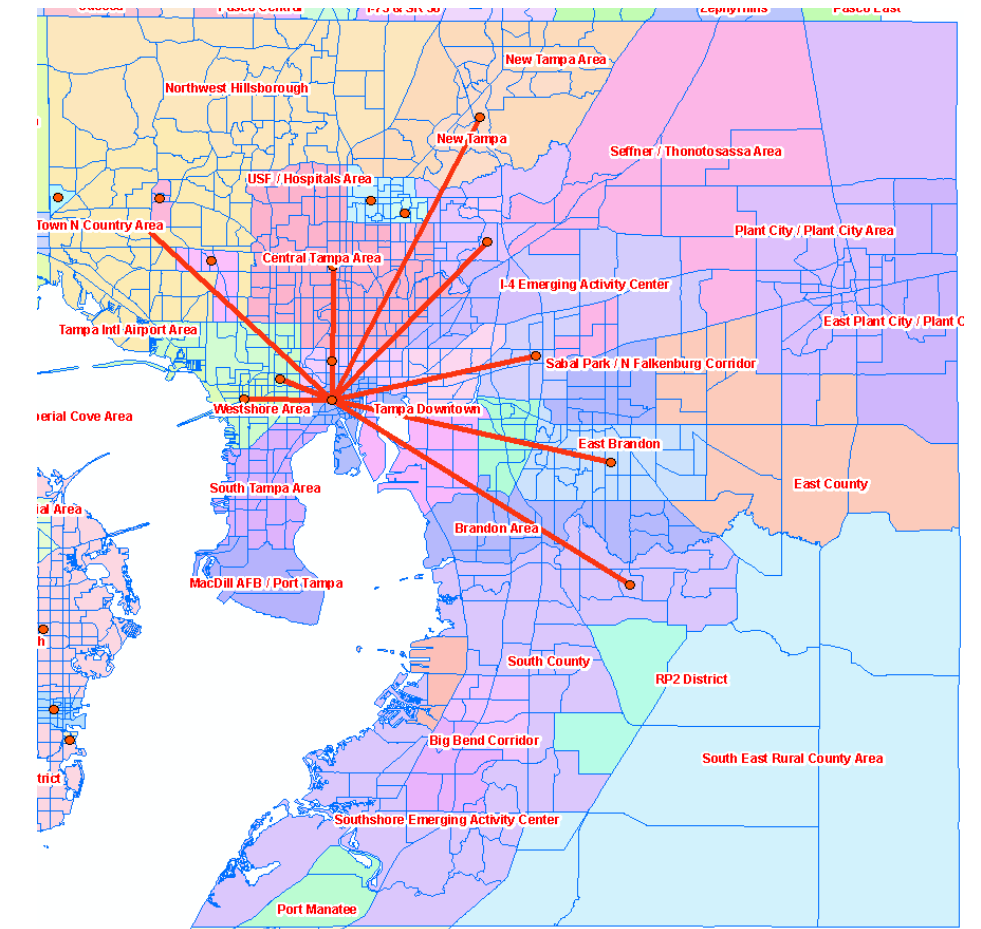
Work Zone Identification



Path Selection and Travel Time Estimates



O-D Pair Analysis

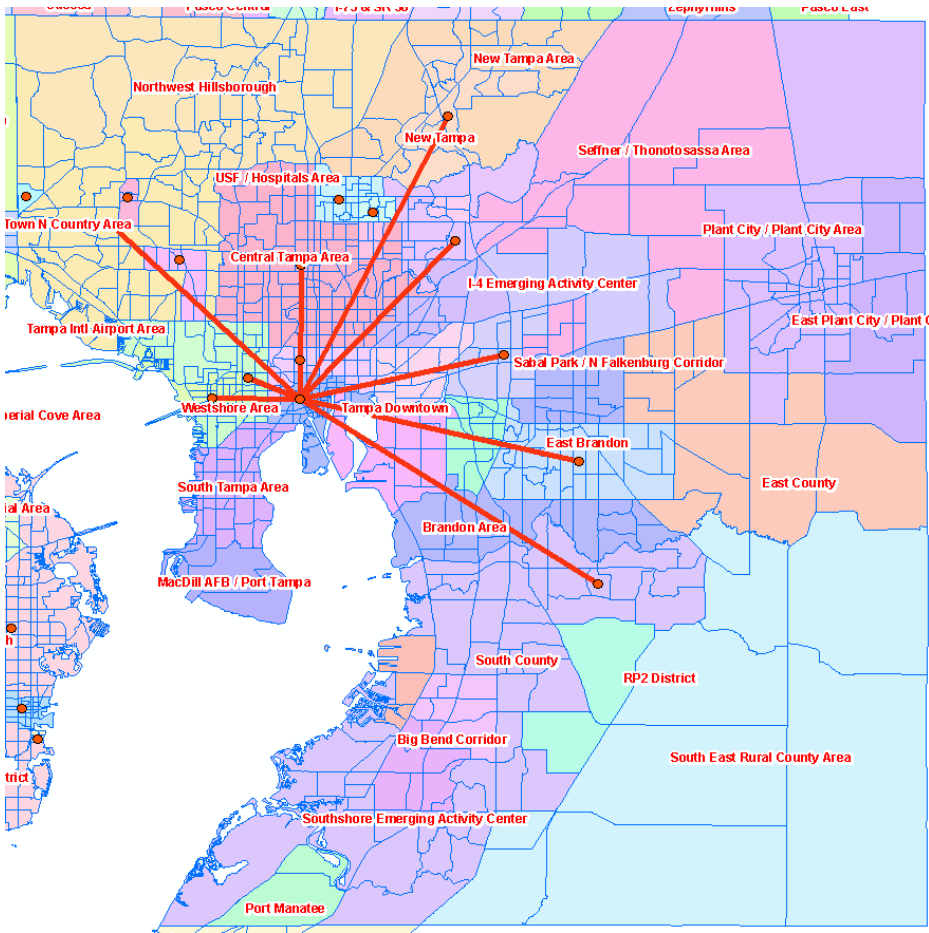
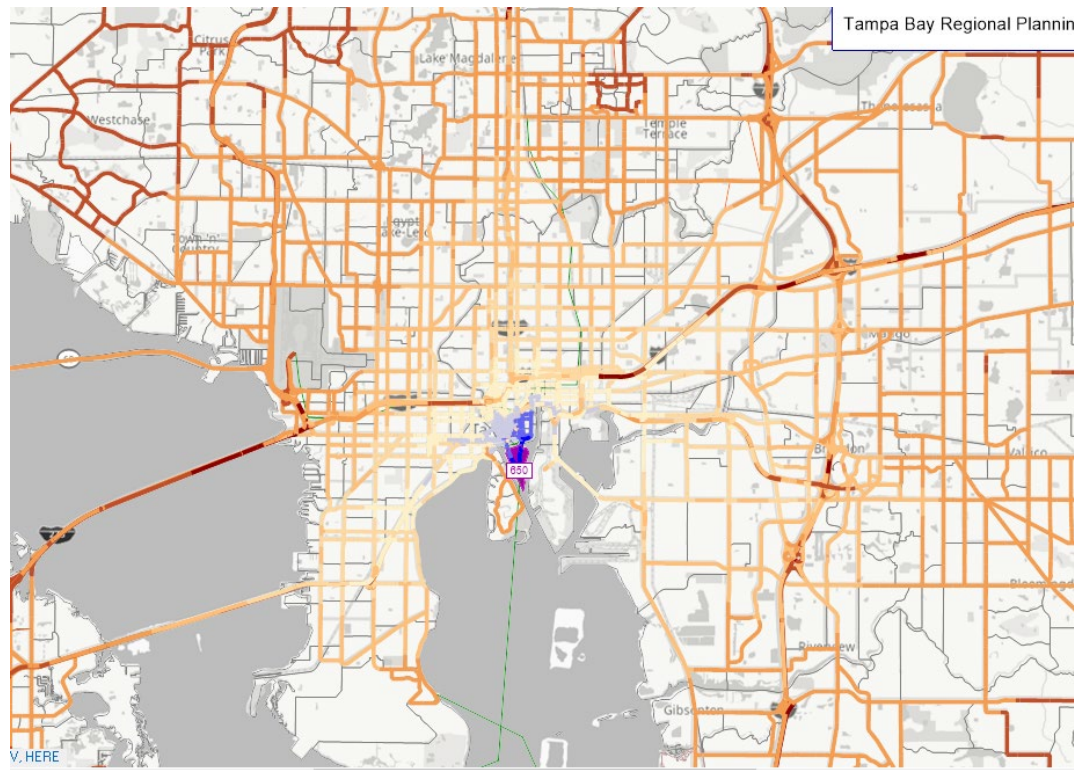


Road Closure

Road Closure Identification

Path Selection and
Travel Time Estimates

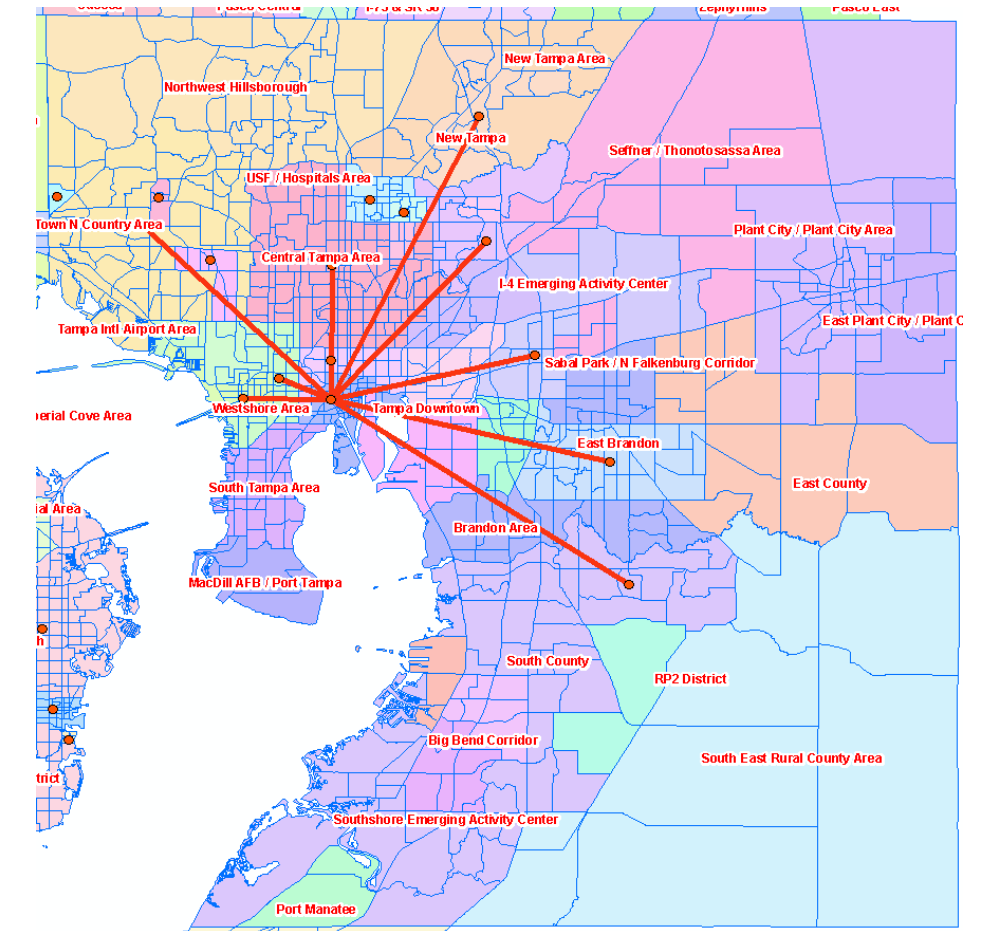
O-D Pair Analysis



Trip Origins and Destinations using Select Link Analysis

Select Link

O-D Pair Analysis



ESAL Calculation

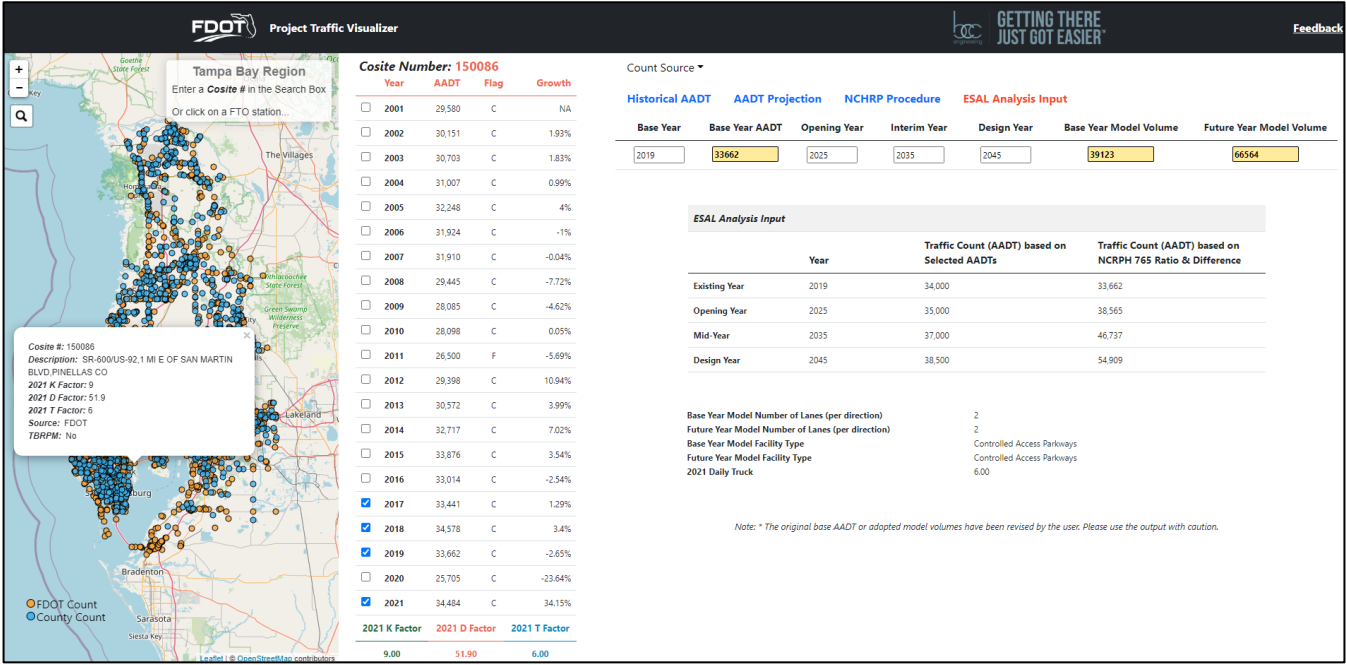
FDOT Historical Counts

FLORIDA DEPARTMENT OF TRANSPORTATION TRANSPORTATION STATISTICS OFFICE 2020 HISTORICAL AADT REPORT							
COUNTY: 15 - PINELLAS							
SITE: 0086 - SR-600/US-92, 1 MI E OF SAN MARTIN BLVD, PINELLAS CO							
YEAR	AADT	DIRECTION 1	DIRECTION 2	*K FACTOR	D FACTOR	T FACTOR	
2020	25705	C	E 12871	9.00	53.30	4.90	
2019	33662	C	E 17171	9.00	53.00	4.90	
2018	34578	C	E 17739	9.00	53.30	5.10	
2017	33441	C	E 17173	9.00	54.50	4.90	
2016	33014	C	E 17011	9.00	55.50	4.90	
2015	33876	C	E 17033	9.00	54.50	4.90	
2014	32717	C	E 16091	9.00	53.80	4.70	
2013	30572	C	E 15040	9.00	52.50	4.40	
2012	29398	C	E 14686	9.00	52.50	4.00	
2011	26500	F	E 0	9.00	53.20	2.30	
2010	28098	C	E 13923	9.00	53.21	5.30	
2009	28085	C	E 14094	9.00	54.92	5.30	
2008	29445	C	E 14899	9.00	54.56	5.30	
2007	31910	C	E 15931	9.00	53.63	5.20	
2006	31924	C	E 15909	9.00	51.67	4.80	
2005	32248	C	E 16087	9.00	51.30	5.20	

AADT FLAGS: C = COMPUTED; E = MANUAL ESTIMATE; F = FIRST YEAR ESTIMATE
S = SECOND YEAR ESTIMATE; T = THIRD YEAR ESTIMATE; R = FOURTH YEAR ESTIMATE
V = FIFTH YEAR ESTIMATE; 6 = SIXTH YEAR ESTIMATE; X = UNKNOWN
*K FACTOR: STARTING WITH YEAR 2011 IS STANDARD, PRIOR YEARS ARE K30 VALUES



Future AADT Estimates

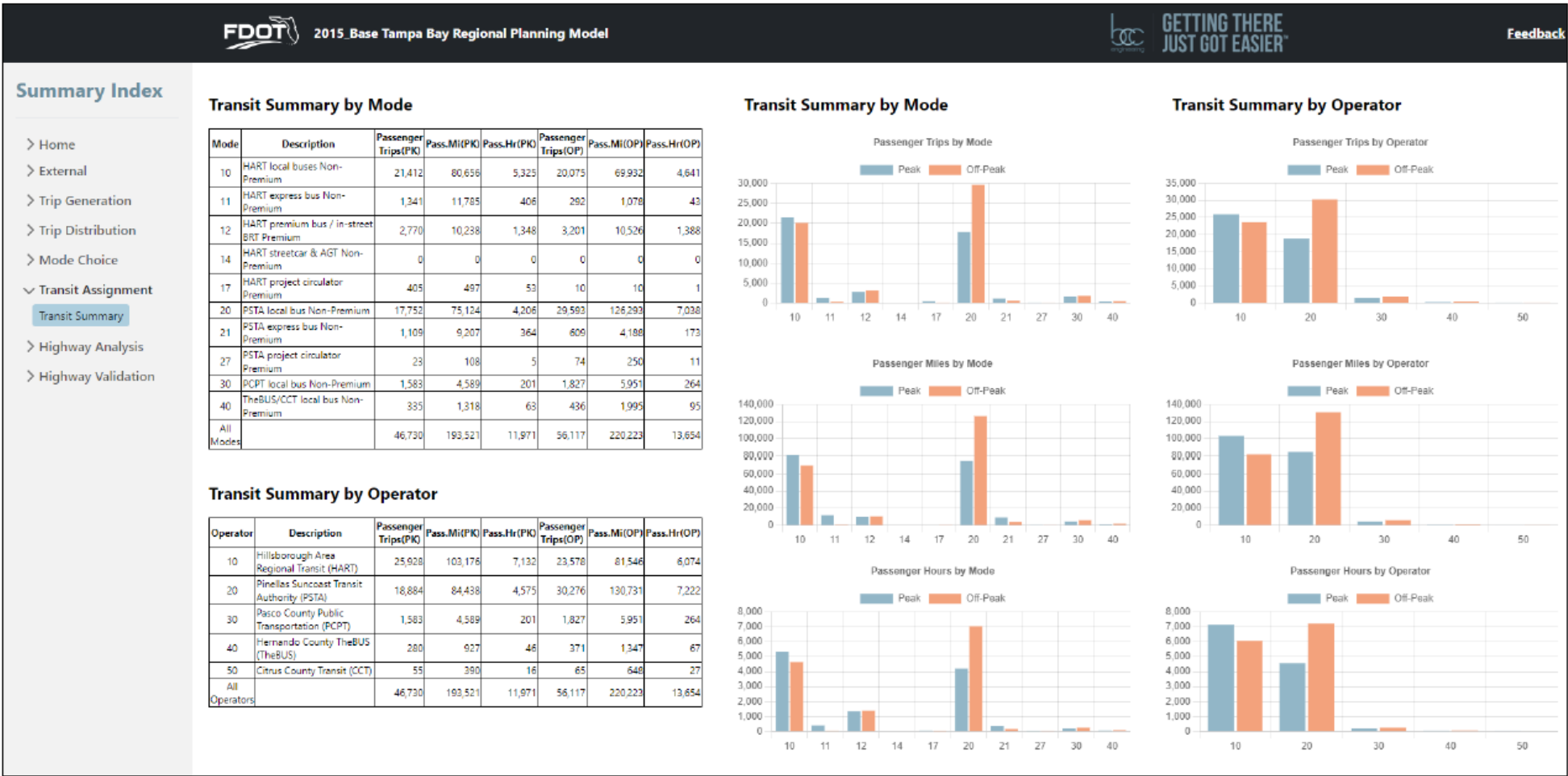
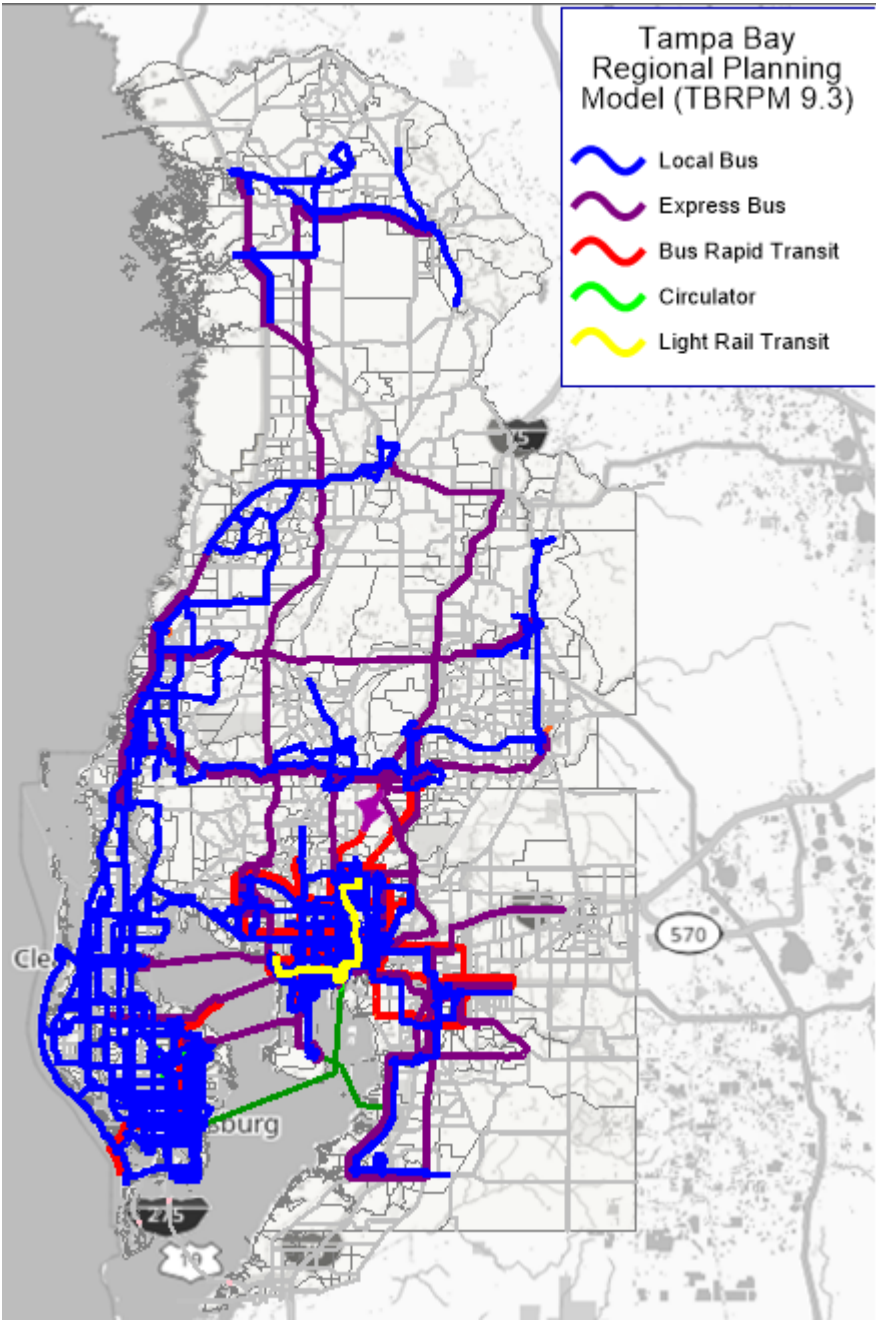


ESAL Calculation

Transit Analysis

Transit Routes

Ridership Forecasts

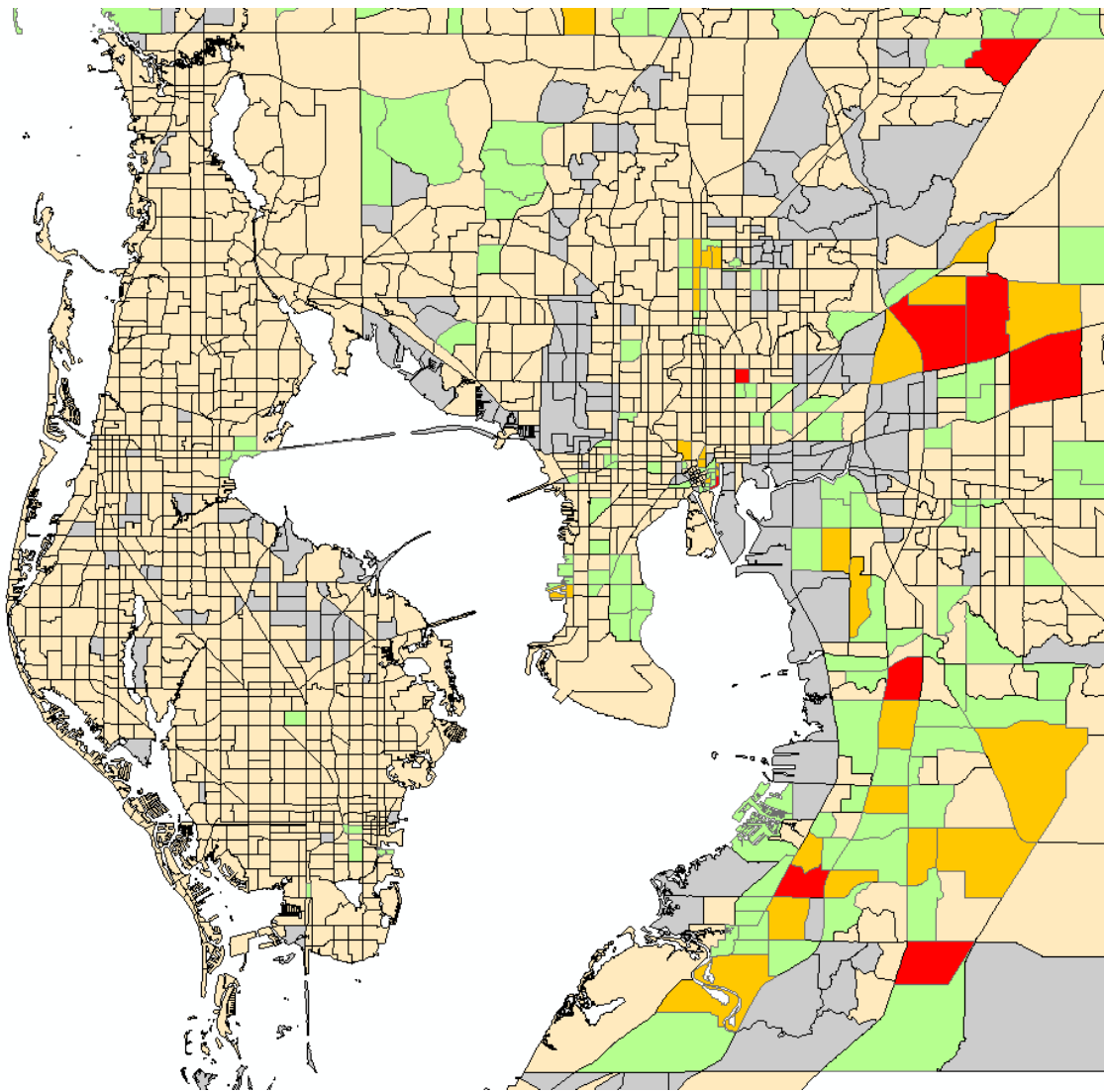
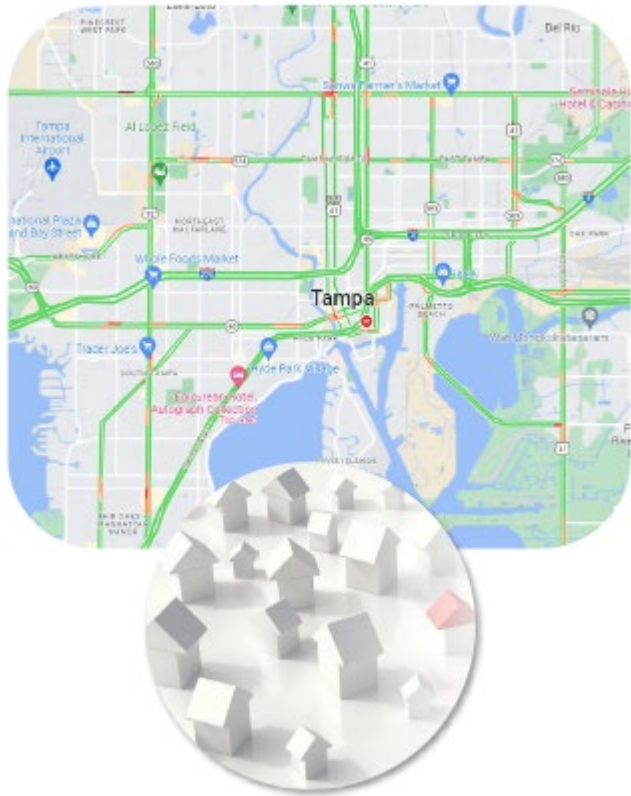


Socio-Economic Data Changes

New Developments

SE Data Updates

Trip Estimates from New Developments



From Development Area		Number of Trips
1	Town-N-Country	70,000
2	Westshore	125,000
3	USF	230,000
4	Downtown	175,000
5	I-75 / I-4	90,000
6	Brandon	178,000
7	East I-4	49,000
8	MacDill / South Tampa	40,000
9	Gibsonton	120,000
10	Sun City Center	95,000
11	SR 589 / SR 54	46,000
12	I-75 / SR 54	40,000

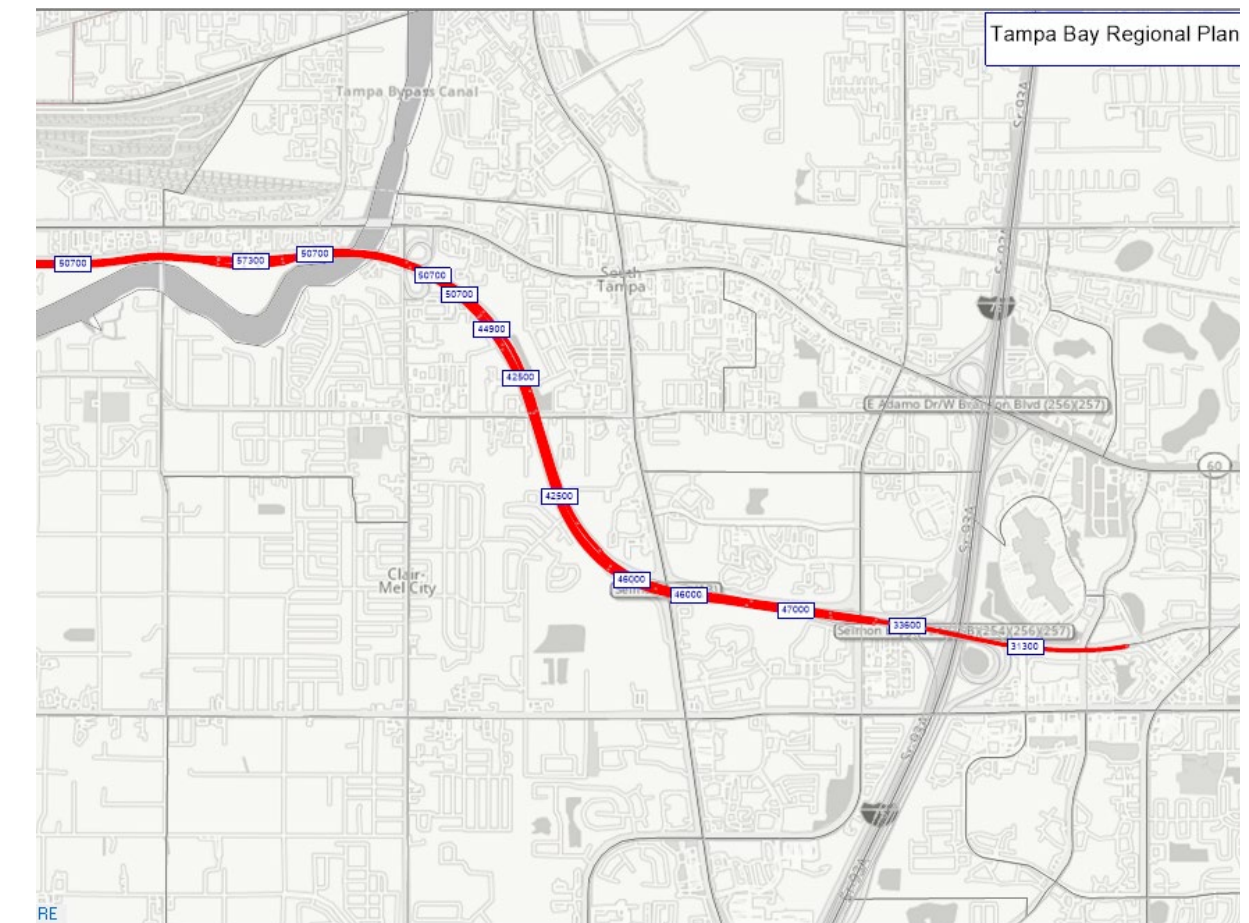
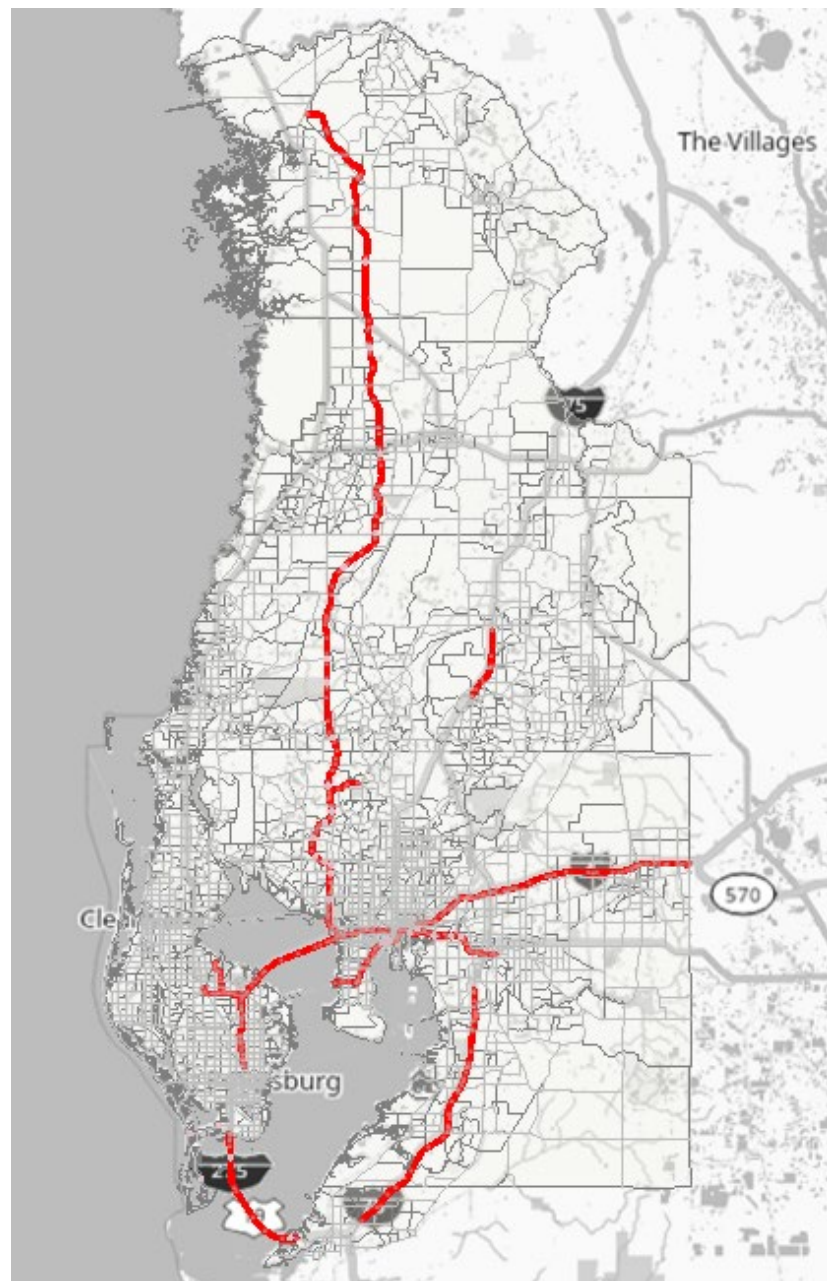
Numbers shown are for illustrational purpose only

Manage Lane / Toll Lane Study

Toll Lanes Identification

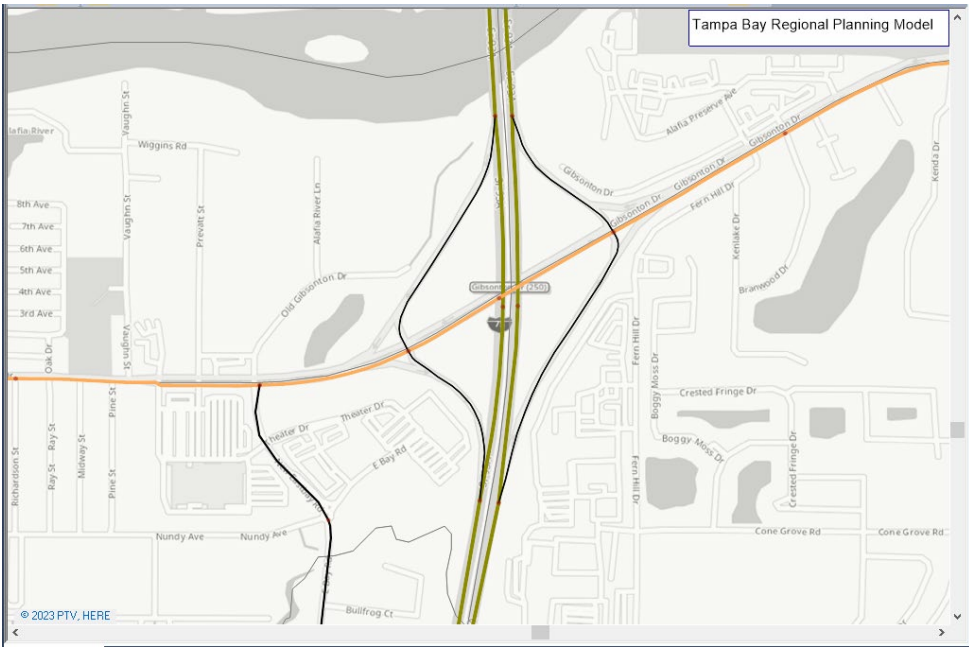
Toll Price Updates Toll Mechanism Updates

Toll Lane Volume Estimates

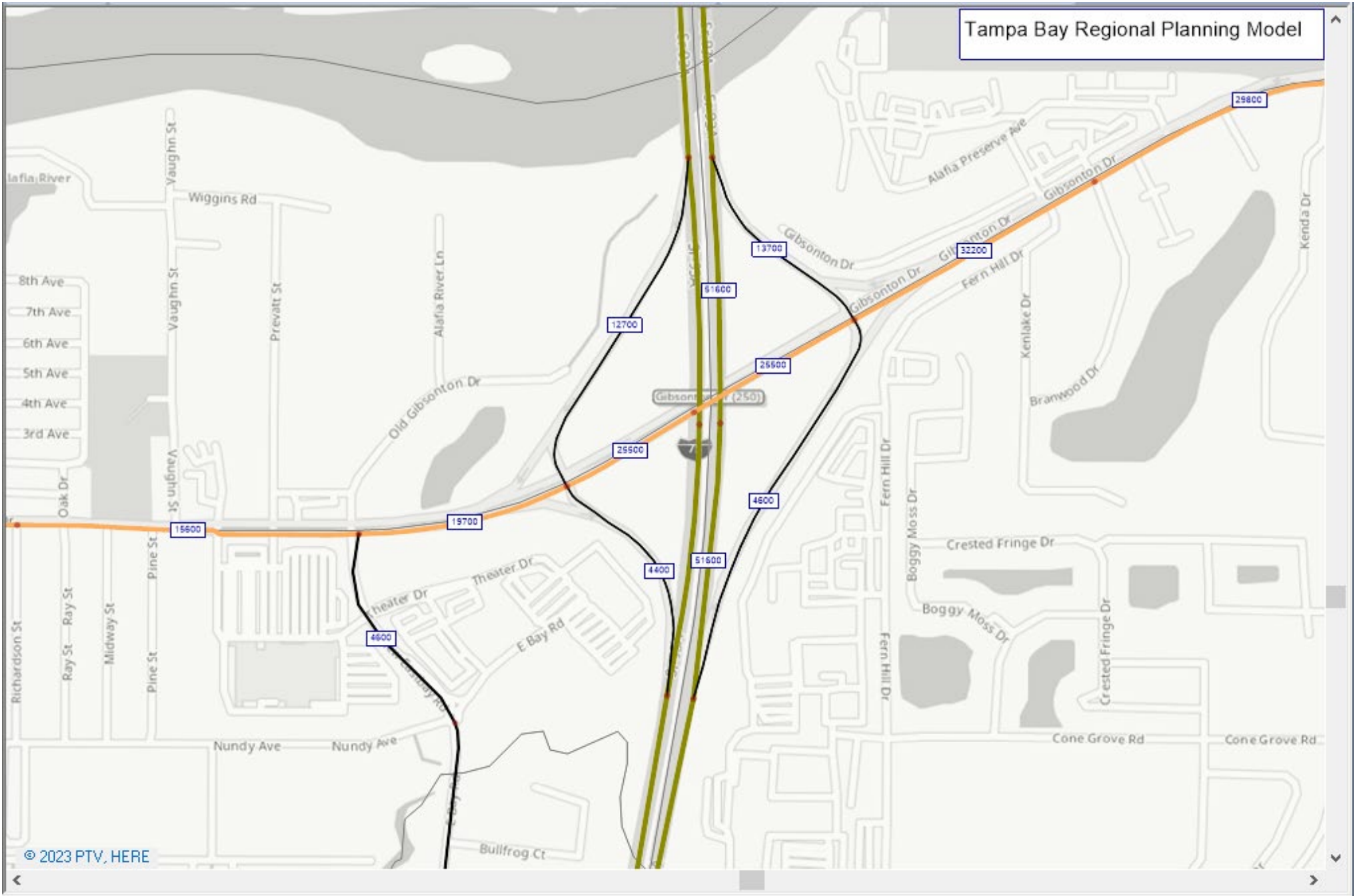


Interchange Justification Report / Interchange Modification Report

Interchange Modifications



Interchange Volume Estimates

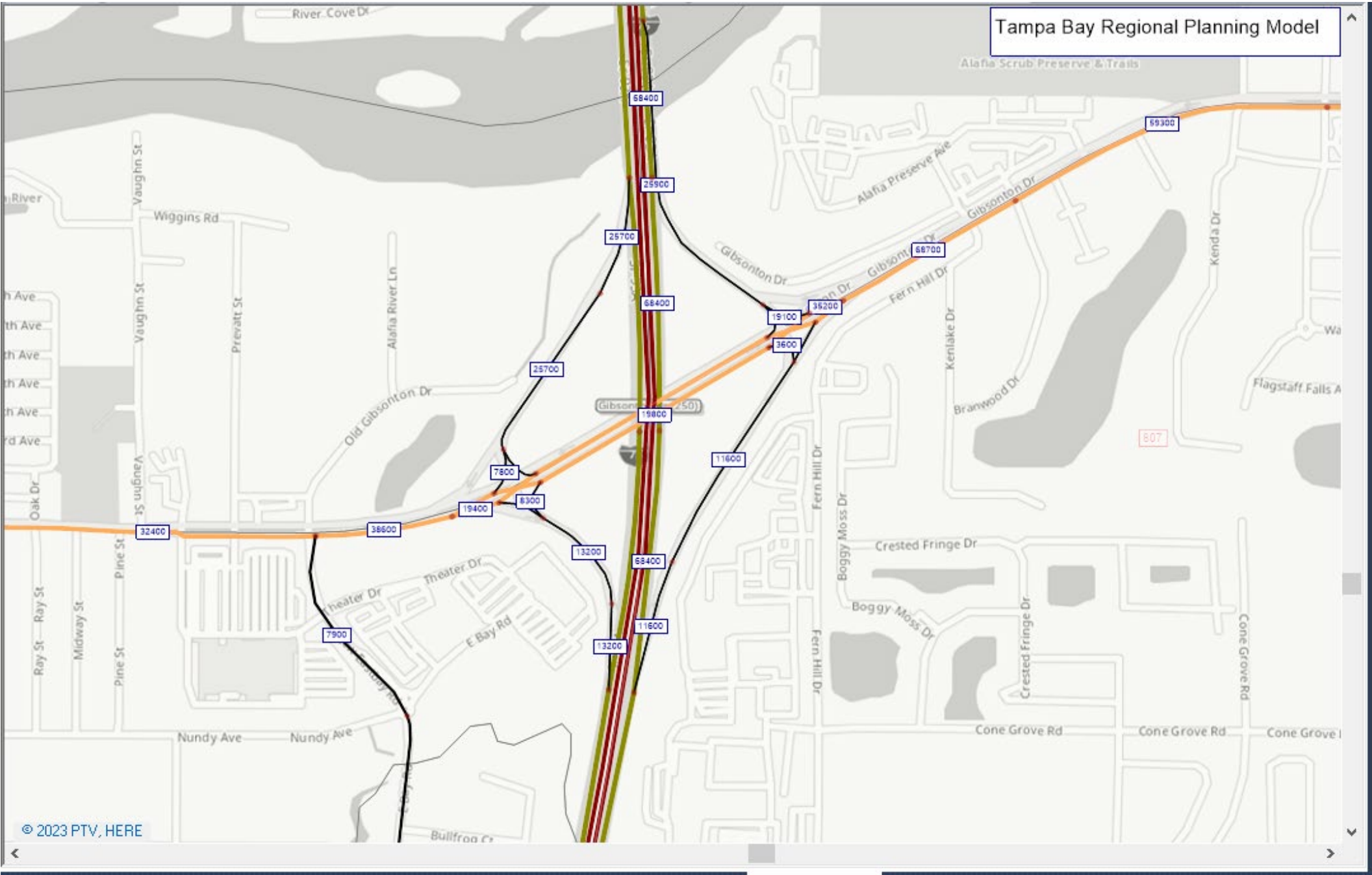


Interchange Justification Report / Interchange Modification Report

Interchange Modifications



Interchange Volume Estimates





05

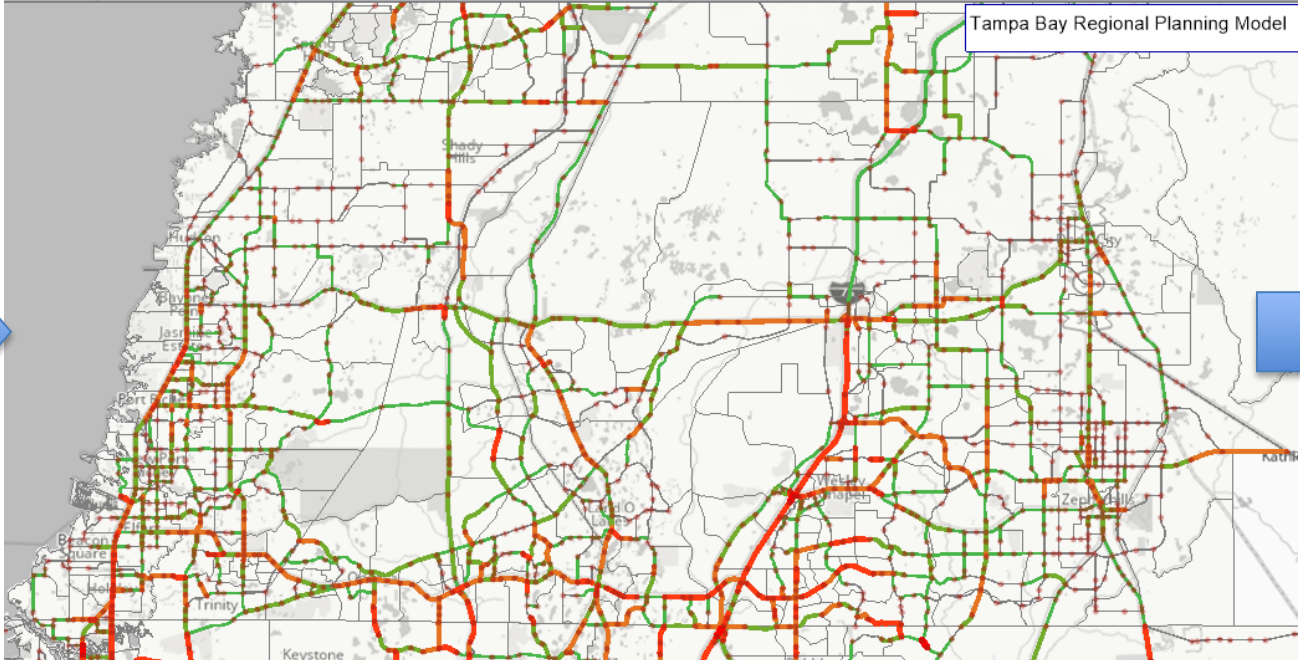
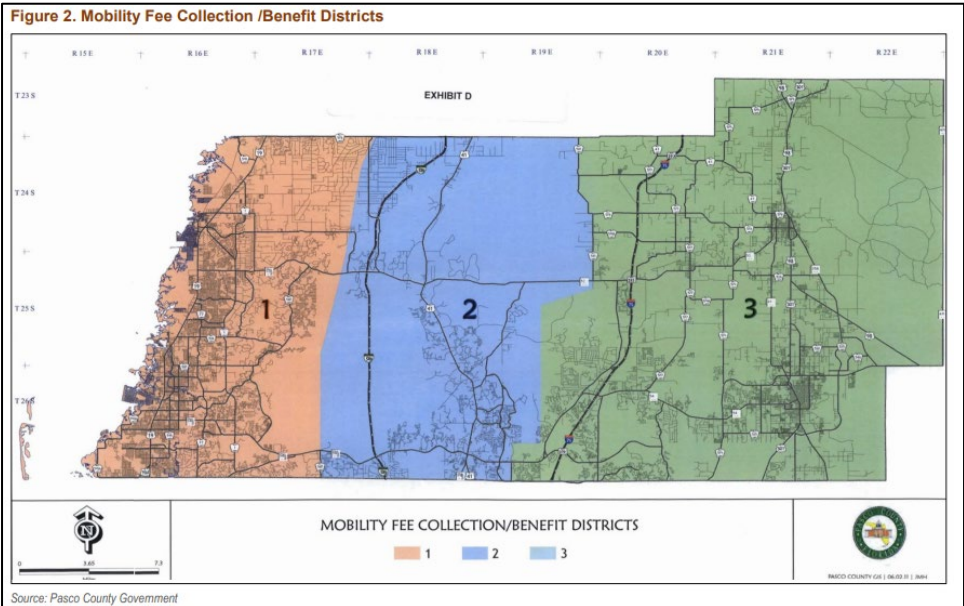
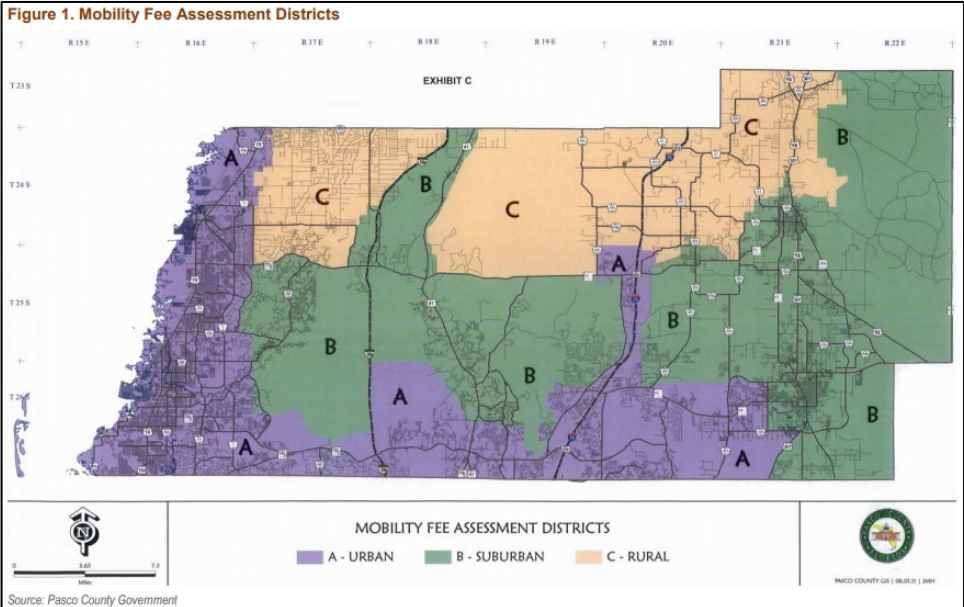
Other Local Government Uses of the Model

Mobility Fee Study

Mobility Zones and Roadway Projects

Volume/Capacity Ratio Estimates

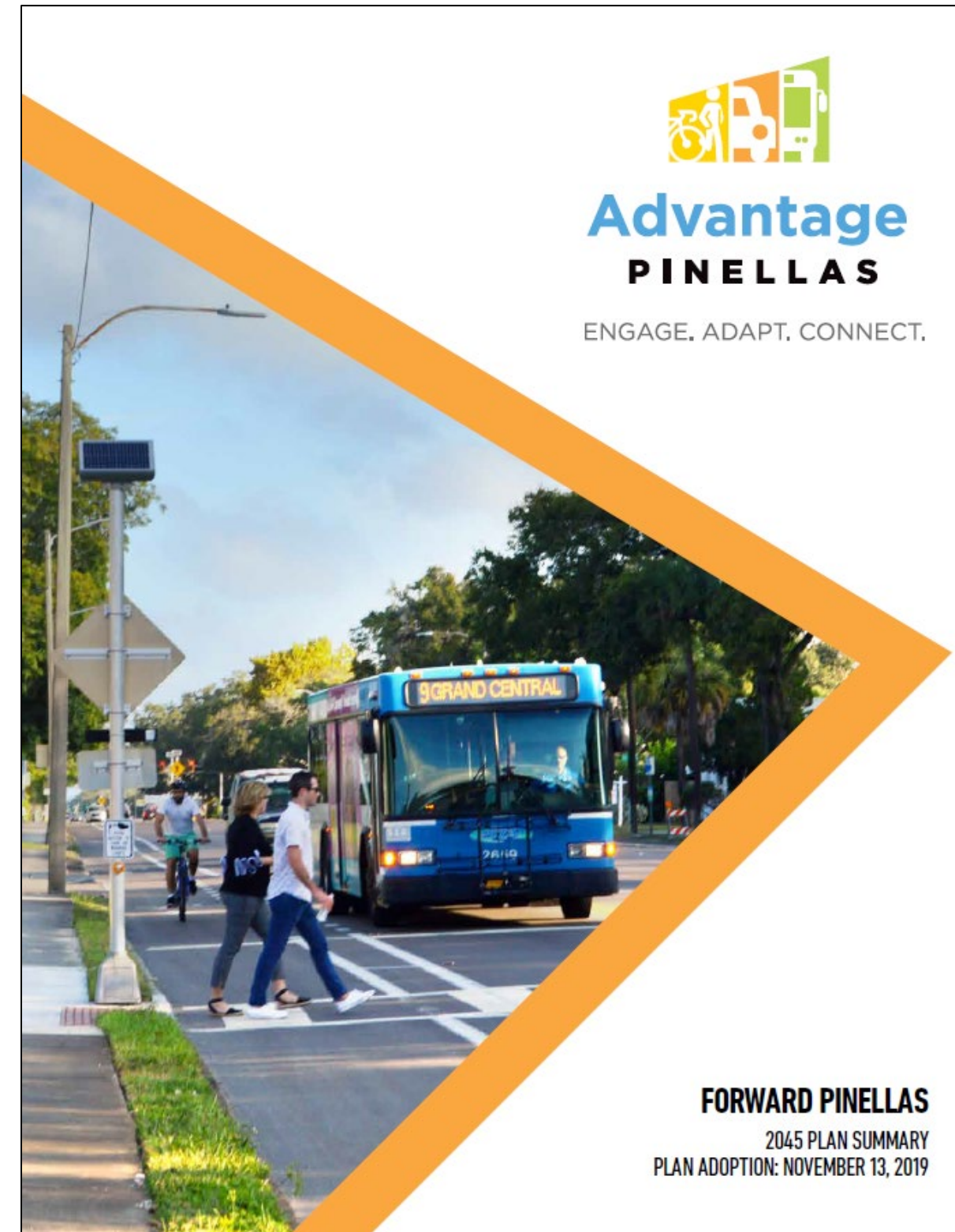
Mobility Fee Calculation



Urban (Fee District A) Standard Mobility Fee Schedules for Period 1/1/2022 to 12/31/2022

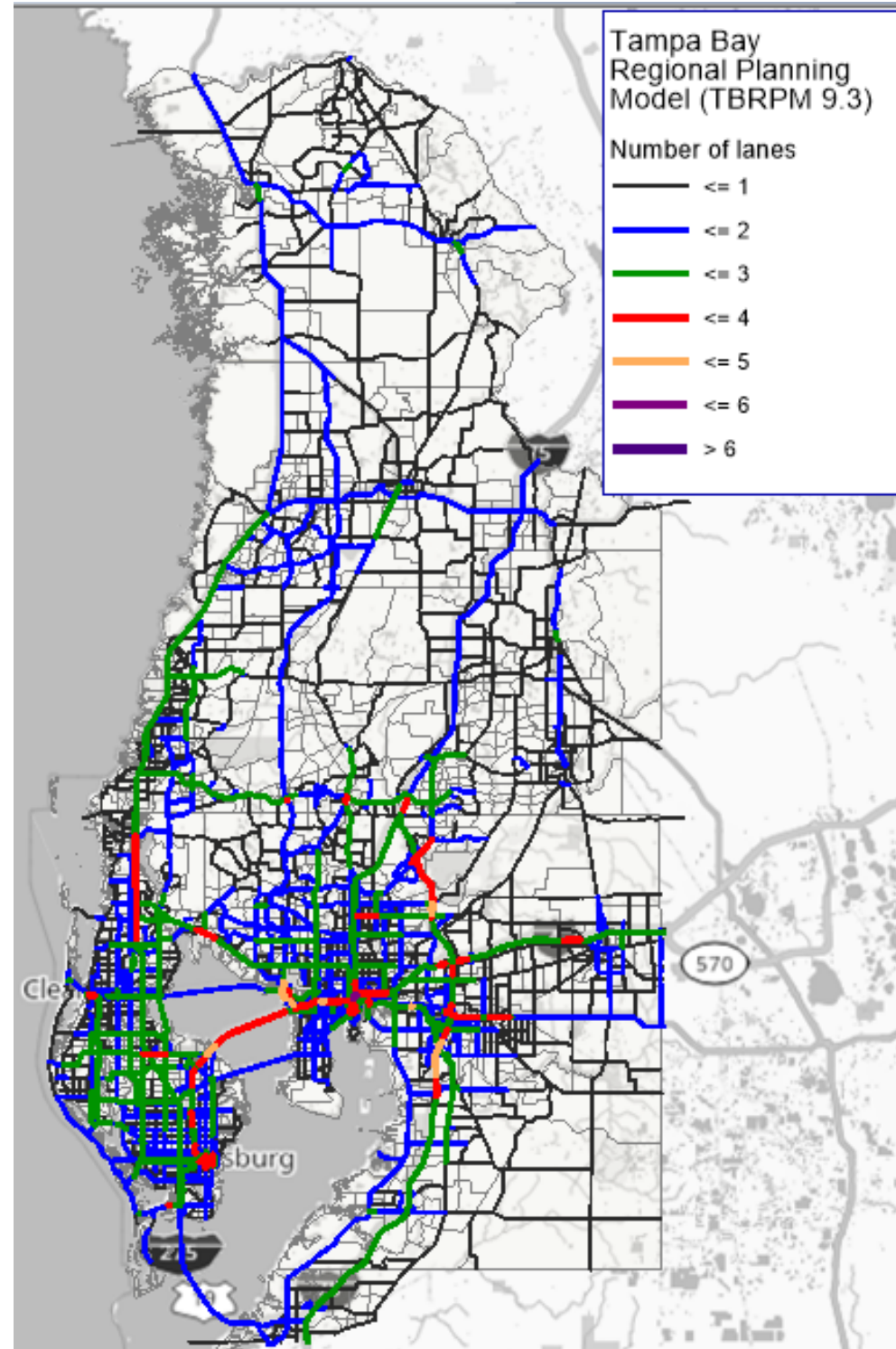
Pasco LUC	Land Use	Units	2021 Fee	Full Fee	Fee Before Incentive	2022 Net Fee	Percent Change (from 2021 Fee)	Required Subsidy	ROW Share	SIS Share	Road Share	Transit Share	Bike/ Ped Share
RESIDENTIAL:													
Single Family (Detached)													
210.0P	Accessory Dwelling Unit	du	new	\$2,926	\$2,725	\$2,102	n/a	\$623	\$480	\$264	\$1,266	\$48	\$44
210.1P	< 1,500 s.f. & Hh Inc < 80% SHIP	du	\$0	\$4,457	\$4,134	\$0	0%	\$4,134	\$0	\$0	\$0	\$0	\$0
210.2P	0 to 1,500 s.f.	du	\$4,173	\$7,187	\$6,694	\$4,304	3%	\$2,391	\$1,008	\$449	\$2,656	\$100	\$91
210.3P	1,501 to 2,499 s.f.	du	\$5,335	\$8,591	\$7,976	\$6,018	3%	\$1,953	\$1,379	\$138	\$3,635	\$140	\$127
210.4P	2,500 s.f. and greater	du	\$6,329	\$9,330	\$8,606	\$6,528	3%	\$2,078	\$1,496	\$804	\$3,940	\$152	\$137
210.5P	Low Income* SHIP defined Multi-Family(2)	du	\$0	\$2,066	\$1,857	\$0	0%	\$1,857	\$0	\$0	\$0	\$0	\$0
220	Multi-Family Apartments	du	\$4,280	\$5,266	\$4,867	\$4,427	3%	\$440	\$983	\$655	\$2,593	\$102	\$94
231	Low-Rise Condominium/Townhouse (1 to 2 stories)	du	\$4,009	\$5,453	\$5,066	\$4,135	3%	\$931	\$937	\$545	\$2,471	\$95	\$87
232	High-Rise Condominium (3 or more stories)	du	\$2,358	\$3,191	\$2,938	\$2,432	3%	\$506	\$550	\$325	\$1,450	\$56	\$51
240	Mobile Home Park	du	\$2,207	\$3,158	\$2,932	\$2,276	3%	\$655	\$520	\$285	\$1,372	\$52	\$48
251	Age Restricted Single Family(3)	du	\$1,924	\$2,756	\$2,523	\$1,984	3%	\$539	\$452	\$252	\$1,192	\$46	\$42
252	Age Restricted Multi-Family(3)	du	\$709	\$727	\$595	\$680	-4%	-\$86	\$151	\$99	\$400	\$15	\$15
253	Congregate Care Facility (Attached)(3)	du	\$448	\$698	\$646	\$462	3%	\$184	\$107	\$53	\$283	\$10	\$10
LODGING:													
310	Hotel	room	\$0	\$6,774	\$6,341	\$0	0%	\$6,341	\$0	\$0	\$0	\$0	\$0
320	Motel	room	\$0	\$1,992	\$1,853	\$0	0%	\$1,853	\$0	\$0	\$0	\$0	\$0
330	Resort Hotel	room	\$0	\$5,705	\$5,334	\$0	0%	\$5,334	\$0	\$0	\$0	\$0	\$0
RECREATION:													
412	General Recreation	acre	\$646	\$1,686	\$1,767	\$666	3%	\$1,101	\$164	\$41	\$433	\$15	\$14
416	RV Park	RV space	\$730	\$769	\$685	\$719	-2%	-\$34	\$180	\$108	\$422	\$16	\$15
420	Marina	berth	\$1,251	\$2,629	\$2,465	\$1,290	3%	\$1,174	\$309	\$110	\$814	\$30	\$27
430	Golf Course	hole	\$15,451	\$34,549	\$32,476	\$15,936	3%	\$16,540	\$3,840	\$1,270	\$10,121	\$370	\$335
431	Miniature Golf Course	hole	\$1,120	\$3,704	\$3,478	\$1,155	3%	\$2,323	\$287	\$62	\$755	\$27	\$24
437	Bowling Alley	1,000 sf	\$10,147	\$28,977	\$27,219	\$10,465	3%	\$16,753	\$2,571	\$649	\$6,785	\$239	\$222
444	Movie Theater	screen	\$12,844	\$36,929	\$34,616	\$13,247	3%	\$21,369	\$3,255	\$791	\$9,629	\$283	\$269
491	Racquet Club/Health Club/Spa/Dance Studio	1,000 sf	\$4,423	\$12,397	\$11,624	\$4,562	3%	\$7,063	\$1,119	\$289	\$2,953	\$104	\$97
495	Community Center/Gymnasium	1,000 sf	\$9,145	\$33,284	\$31,286	\$9,432	3%	\$21,854	\$2,353	\$462	\$6,200	\$219	\$198
496P	Ice Hockey Arena	1,000 sf	\$796	\$14,824	\$13,920	\$821	3%	\$13,099	\$214	\$8	\$563	\$19	\$17
INSTITUTIONS:													
520	Elementary School	student	\$441	\$1,301	\$1,217	\$455	3%	\$762	\$112	\$27	\$295	\$10	\$10
522	Middle School	student	\$628	\$1,664	\$1,556	\$648	3%	\$910	\$158	\$43	\$418	\$15	\$14
530	High School	student	\$664	\$1,573	\$1,472	\$685	3%	\$787	\$166	\$51	\$438	\$16	\$15
540	University/Jr College (7,500 or fewer students) (Private)	student	\$1,283	\$2,149	\$2,014	\$1,323	3%	\$691	\$309	\$141	\$814	\$31	\$28
550	University/Jr College (more than 7,500 students) (Private)	student	\$959	\$1,451	\$1,357	\$969	3%	\$368	\$228	\$117	\$600	\$23	\$21
560	Church	1,000 sf	\$3,022	\$5,254	\$4,940	\$3,117	3%	\$1,823	\$732	\$318	\$1,932	\$70	\$66
565	Day Care	student	\$271	\$1,200	\$1,124	\$280	3%	\$844	\$70	\$11	\$186	\$6	\$6
566	Cemetery	acre	\$3,228	\$7,912	\$7,420	\$3,329	3%	\$4,091	\$809	\$243	\$2,130	\$78	\$70
610	Hospital	1,000 sf	\$8,384	\$10,967	\$10,256	\$8,647	3%	\$1,609	\$1,947	\$1,186	\$5,130	\$202	\$181
620	Nursing Home	bed	\$532	\$1,313	\$1,223	\$549	3%	\$674	\$133	\$39	\$352	\$12	\$12
OFFICE:													
710	General Office 50,000 sf or less(4)	1,000 sf	\$0	\$10,625	\$9,961	\$0	0%	\$9,961	\$0	\$0	\$0	\$0	\$0
710.1P	General Office 50,001-100,000 sf(4)	1,000 sf	\$0	\$9,940	\$9,290	\$0	0%	\$9,290	\$0	\$0	\$0	\$0	\$0
710.2P	General Office 100,001-200,000 sf(4)	1,000 sf	\$0	\$9,714	\$9,078	\$0	0%	\$9,078	\$0	\$0	\$0	\$0	\$0
710.3P	General Office 200,001-400,000 sf(4)	1,000 sf	\$0	\$9,493	\$8,869	\$0	0%	\$8,869	\$0	\$0	\$0	\$0	\$0
710.4P	General Office greater than 400,000 sf(5)	1,000 sf	\$0	\$9,276	\$8,666	\$0	0%	\$8,666	\$0	\$0	\$0	\$0	\$0
714	Corporate Headquarters Building	1,000 sf	\$0	\$7,187	\$6,700	\$0	0%	\$6,700	\$0	\$0	\$0	\$0	\$0
720	Medical Office	1,000 sf	\$0	\$36,677	\$34,449	\$0	0%	\$34,449	\$0	\$0	\$0	\$0	\$0
750	Office Park	1,000 sf	\$0	\$15,400	\$14,435	\$0	0%	\$14,435	\$0	\$0	\$0	\$0	\$0
760	Research and Development Center	1,000 sf	\$0	\$10,778	\$10,080	\$0	0%	\$10,080	\$0	\$0	\$0	\$0	\$0
770.P	Veterinarian Clinic	1,000 sf	\$0	\$21,692	\$20,373	\$0	0%	\$20,373	\$0	\$0	\$0	\$0	\$0

Long Range Transportation Plan

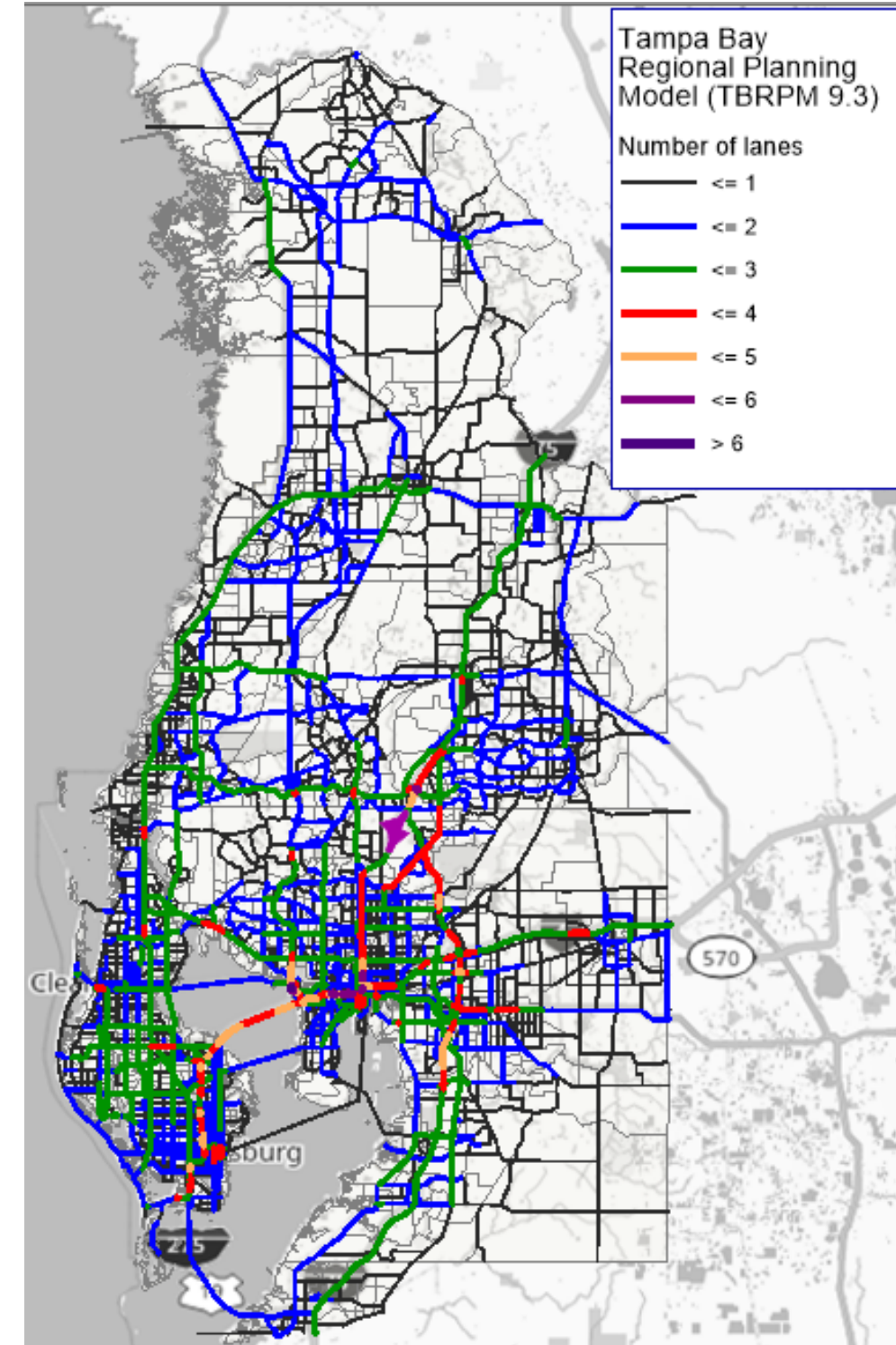


Long Range Transportation Plan

Exiting plus Committed
Network



Cost Feasible Network



Land Use Impact Study

Land use changes and
Roadway Projects

Turning Movement
Estimates

LOS Calculation

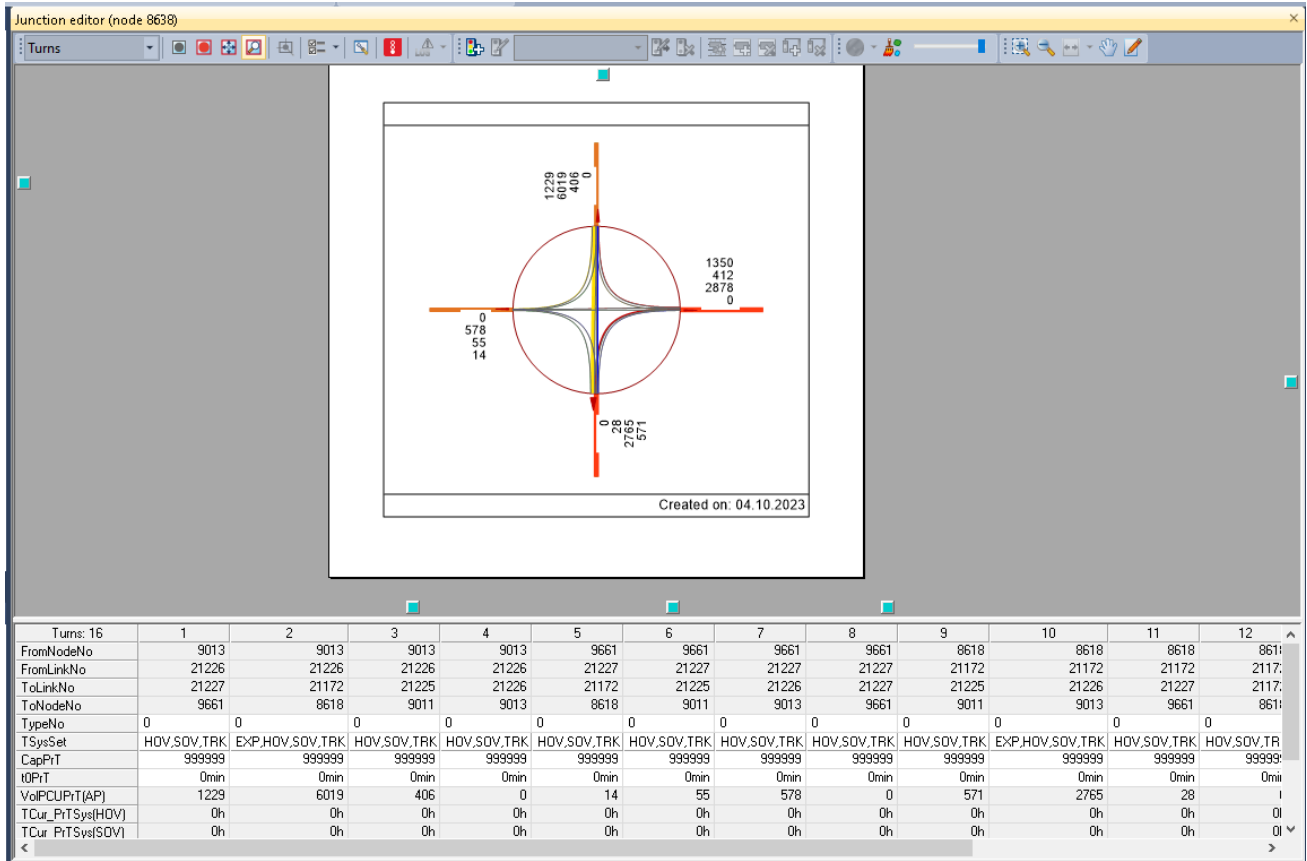
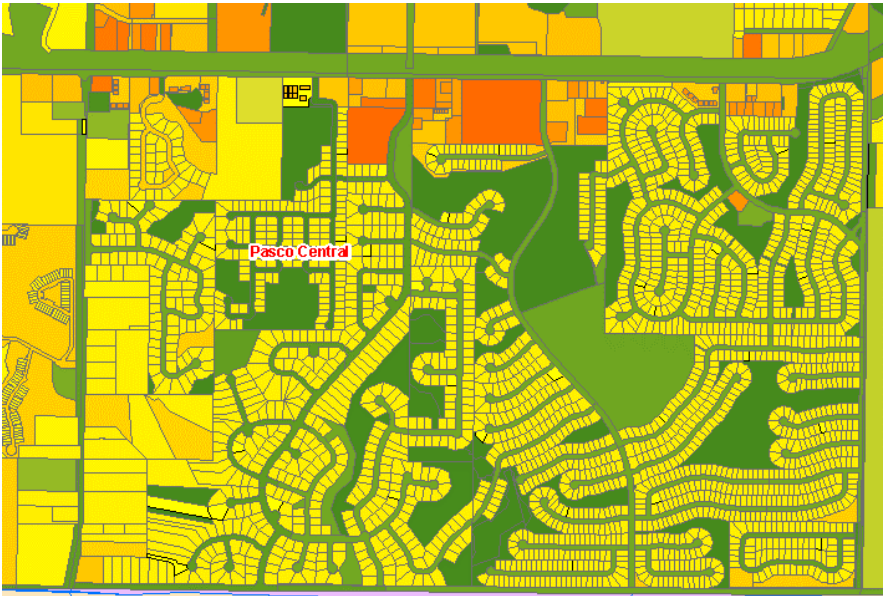
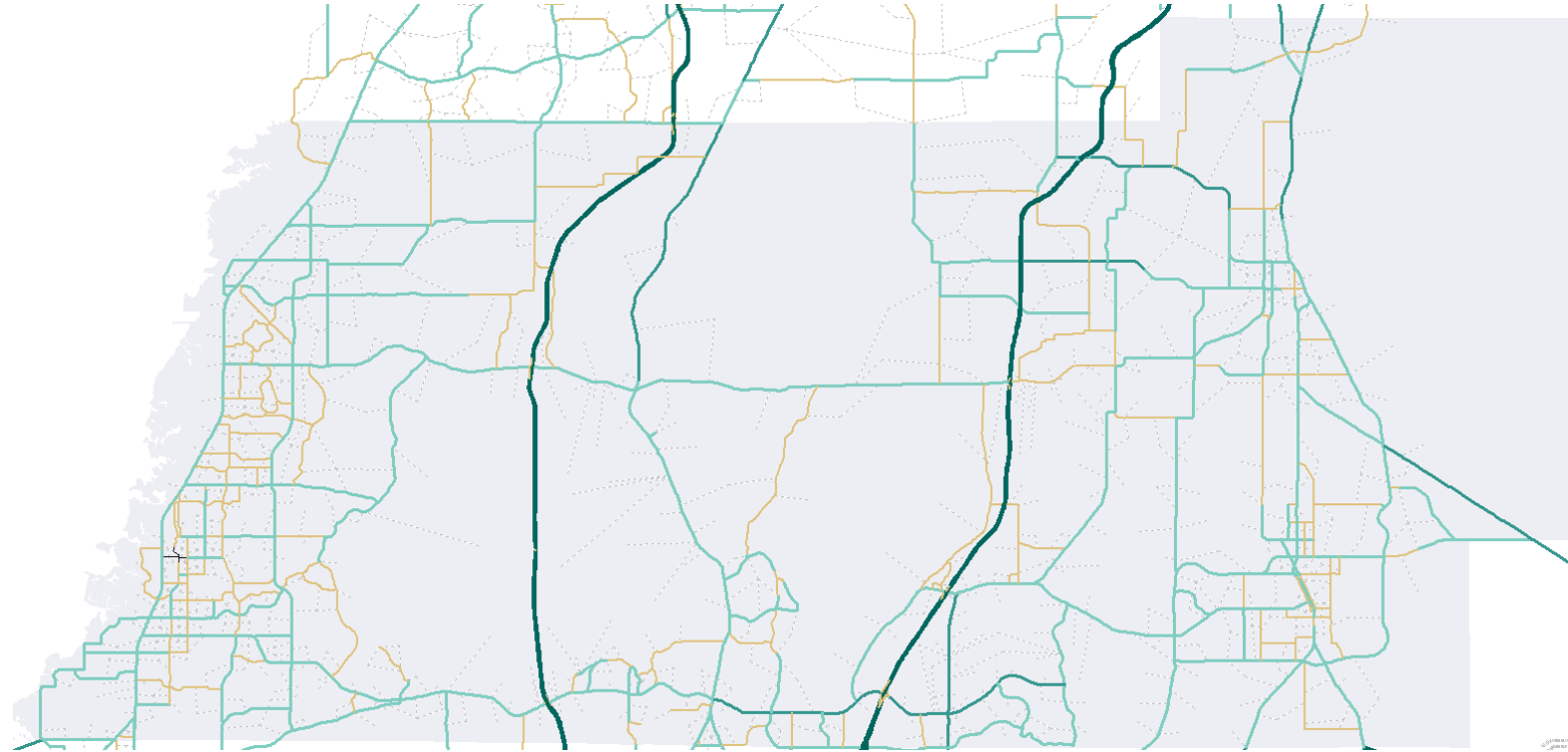


Table 13. Freeway generalized service volume table.						
Area Type	Number Lanes	Truck Percent	Level of Service—B Service Volume	Level of Service—C Service Volume	Level of Service—D Service Volume	Level of Service—E Service Volume
Rural	4	0	46,100	62,000	74,800	84,700
Rural	4	10	43,900	59,000	71,200	80,700
Rural	4	20	41,900	56,300	68,000	77,000
Rural	4	30	40,100	53,900	65,000	73,700
Rural	6	0	69,200	93,000	112,200	127,100
Rural	6	10	65,900	88,500	106,900	121,100
Rural	6	20	62,900	84,500	102,000	115,600
Rural	6	30	60,100	80,800	97,600	110,500
Rural	8	0	92,200	124,000	149,600	169,500
Rural	8	10	87,800	118,100	142,500	161,400
Rural	8	20	83,800	112,700	136,000	154,100
Rural	8	30	80,200	107,800	130,100	147,400
Rural	10	0	115,300	155,000	187,100	211,900
Rural	10	10	109,800	147,600	178,100	201,800
Rural	10	20	104,800	140,900	170,000	192,600
Rural	10	30	100,300	134,800	162,600	184,200
Rural	12	0	138,400	186,000	224,500	254,300
Rural	12	10	131,800	177,100	213,800	242,200
Rural	12	20	125,800	169,100	204,100	231,200
Rural	12	30	120,300	161,700	195,200	221,100
Urban	4	0	43,700	60,100	73,100	83,000
Urban	4	10	41,600	57,200	69,600	79,100
Urban	4	20	39,700	54,600	66,400	75,500
Urban	4	30	38,000	52,200	63,600	72,200
Urban	6	0	65,600	90,100	109,700	124,600
Urban	6	10	62,500	85,800	104,400	118,600
Urban	6	20	59,600	81,900	99,700	113,200
Urban	6	30	57,000	78,300	95,400	108,300
Urban	8	0	87,500	120,200	146,200	166,100
Urban	8	10	83,300	114,400	139,300	158,200
Urban	8	20	79,500	109,200	132,900	151,000
Urban	8	30	76,100	104,500	127,200	144,400
Urban	10	0	109,400	150,200	182,800	207,600
Urban	10	10	104,200	143,100	174,100	197,700
Urban	10	20	99,400	136,600	166,200	188,700
Urban	10	30	95,100	130,600	159,000	180,500
Urban	12	0	131,300	180,300	219,400	249,200
Urban	12	10	125,000	171,700	208,900	237,300
Urban	12	20	119,300	163,900	199,400	226,500
Urban	12	30	114,100	156,700	190,800	216,700

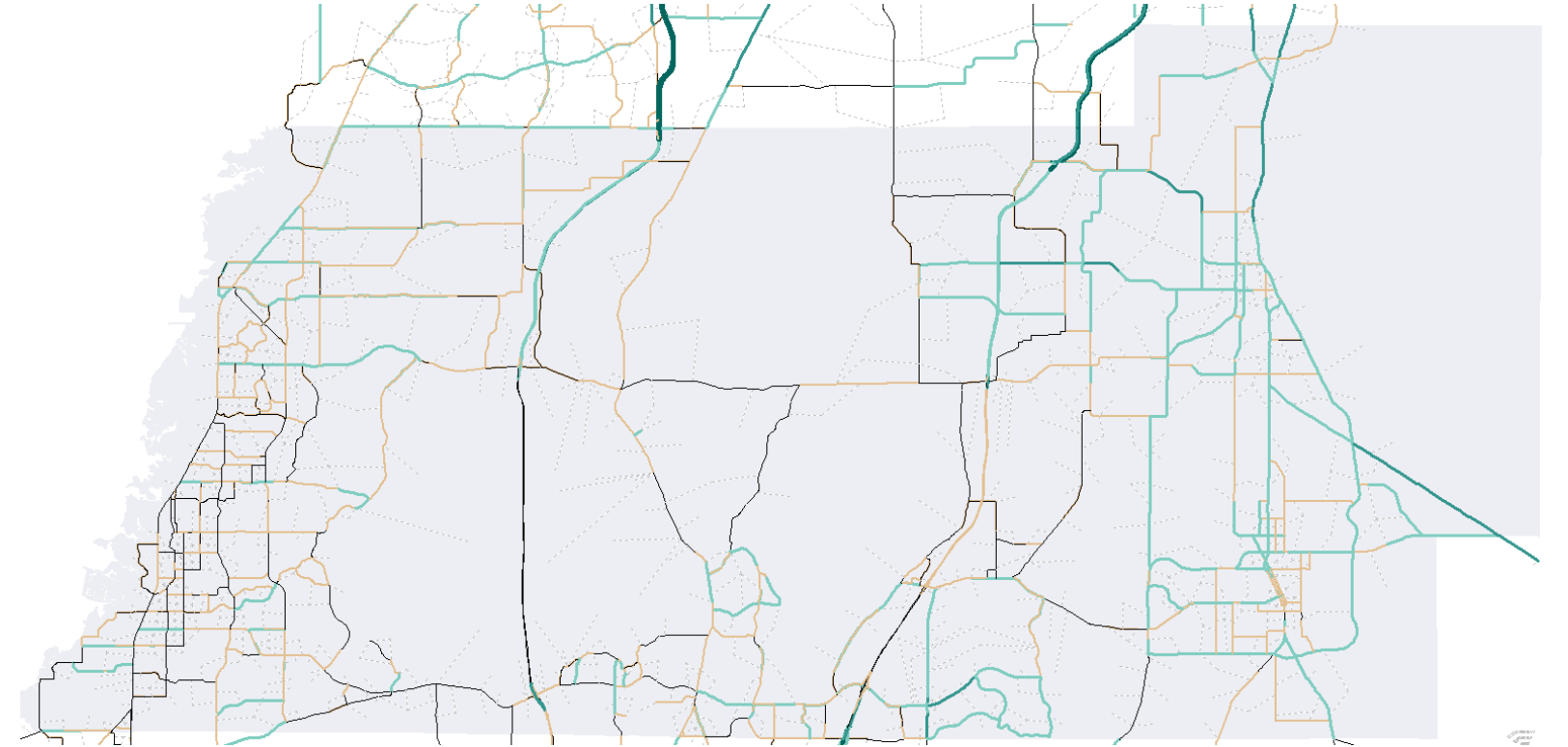
Numbers shown are for illustrational purpose only

Congestion Management Plan

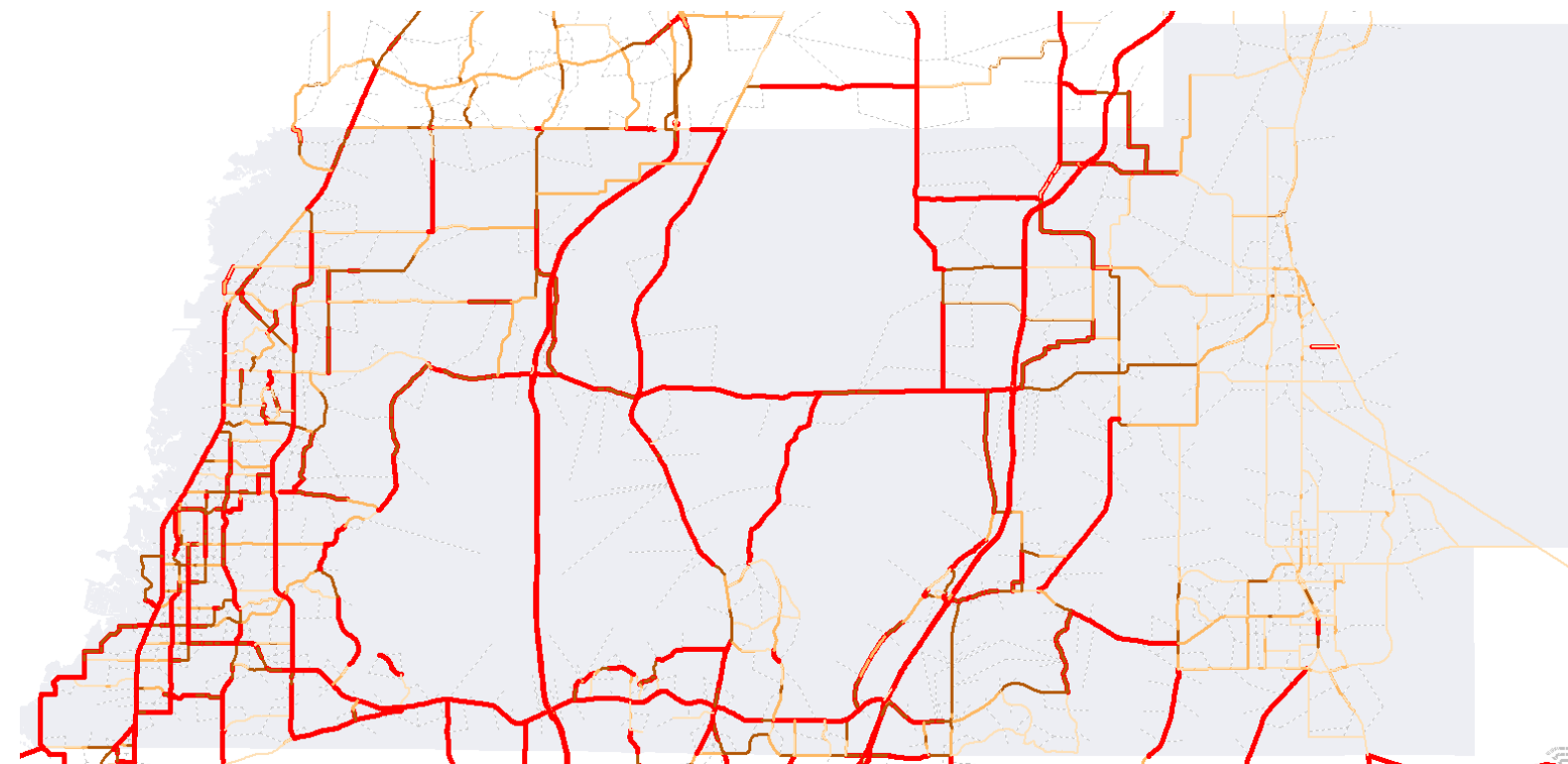
Free Flow Speeds



Congested Speeds



Congested Speed Changes



Additional Applications

- How many visitors come to a defined area, district, or Activity Center?
- What roads will have the most congestion in the future that are near transit facilities?
- How many Productions and Attractions are inside the Urban Service Area vs Outside?
- What are the Total Lane Miles being modeled by facility type?
- What is the estimated delay in travel times between Activity Centers in the Future?



