Appendix A

Recommended Projects

Recommended Projects

*Project List Descriptions

*Map of Projects by Horizon Year

*Table of Projects by Horizon Year

*Environmental & Cultural Screening

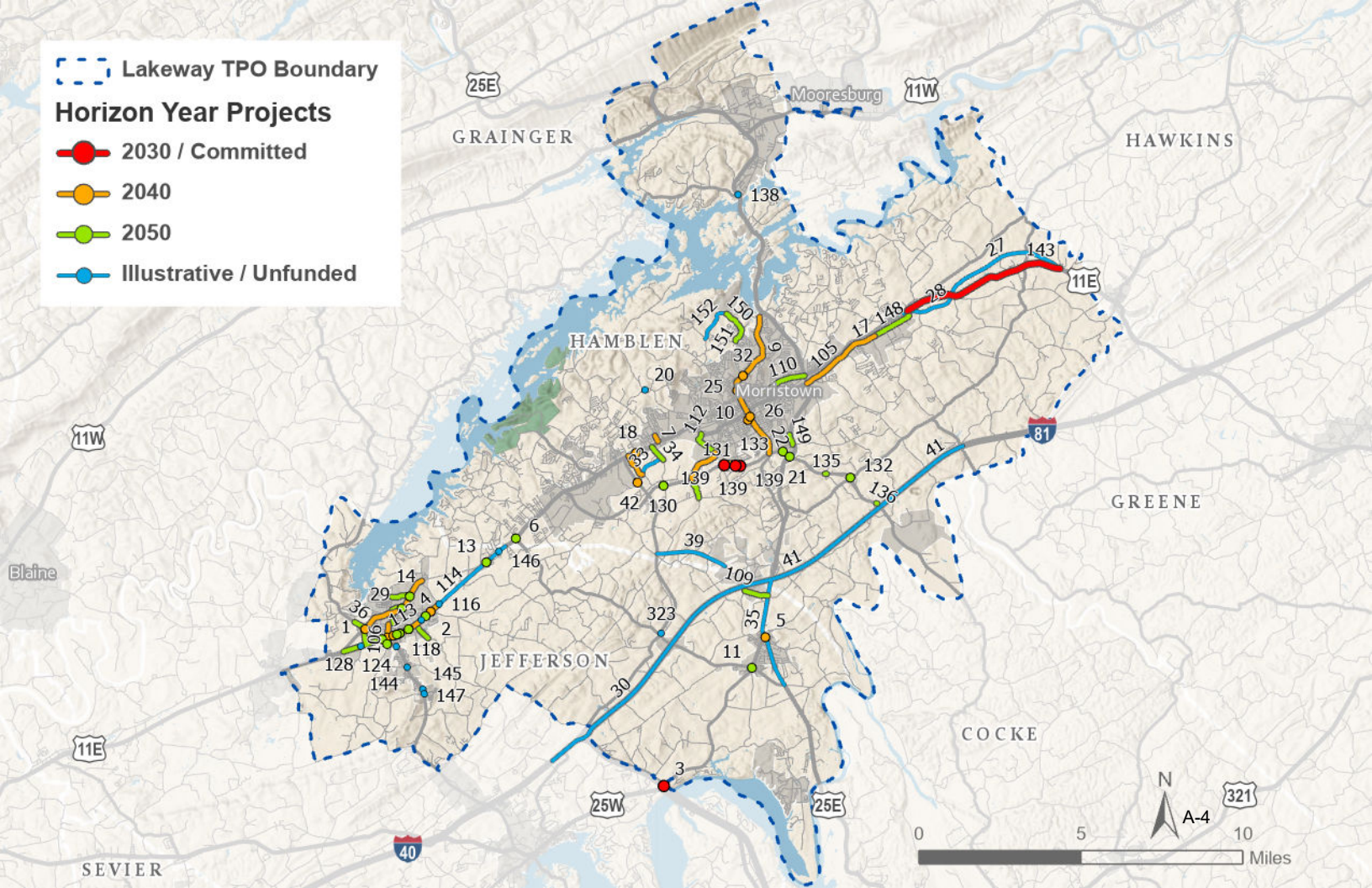
Project Lists

The following pages organize the fiscally constrained projects for the Lakeway Area Metropolitan TPO. Year 2030 projects are displayed in red. Horizon Year 2040 projects are displayed in orange. Horizon Year 2050 projects are displayed in green. The illustrative projects for the region are displayed in blue, representing unconstrained (vision) projects. The Horizon Year color also corresponds with the 'Horizon Year' column on the project table. The remaining table headings includes the following project details:

- **Map ID** – a unique identification to help track projects visually and allow for a spatial join of attributes within GIS software.
- **Project Type** – describes whether the project is an intersection (point), or corridor (line)
- **Project Description** – contains the name of the project facility (road names), the nature of the improvement, and the relative begin/end locations. This is the most descriptive project attribute.
- **Project Type** – describes general category of project improvement, and includes:
    - **Bridge** – replacement of a bridge facility that has been determined to be structurally deficient. The new bridge may include safety enhancements but will not have more through lanes than the previous structure had unless otherwise noted.
    - **Interchange** – construction or modification of existing exit ramp interchange.
    - **Intersection** – modification of a single intersection to improve safety and operations including the possible addition of separate turn lanes, realignment of approaches or traffic signal.
    - **ITS / Signal** – includes technology or equipment upgrades to a single or series of traffic signal(s) along a corridor to more efficiently move vehicles, including buses.
    - **Modify Roadway** – includes the addition or reduction of travel lanes to promote the movement of people or goods (freight). This may include the addition of a center turn lane, median, or similar modifications. The final design will determine the appropriate multimodal facilities.
    - **Multimodal** – the improvement of pedestrian or bicycle facilities along a roadway.
    - **New Roadway** – constructing a roadway on a new location. The final design will determine the median configuration in terms of either a continuous center turn lane or non-traversable raised median and the accommodation of bicyclists and pedestrians.
    - **Resurfacing** –pavement rehabilitation or maintenance of the travel lane, and markings.

- **Roadway Widening** – addition of vehicle capacity through construction of additional through travel lanes on an existing roadway. The final design will determine the median configuration and accommodation of bicyclists and pedestrians through sidewalks and/or bike lanes.

- **Length** – represents the project length in miles for corridors, and "-" for intersection projects.
- **County** – identifies the county location for the project.
- **Horizon Year** – identifies the funding horizon year that is proposed (2030 / 2040 / 2050 / Illustrative).
- **MPO Cost (YOE)** – represents the planning-level project cost in year-of-expenditure dollars. Some projects are represented with "-" indicating that the entire project would be grant-funded or would not be constructed using other funding means.
- **Cumulative Cost** – estimates the running total of project dollars spent, and is used to identify where the 2030 / 2040 / 2050 funding limits are exceeded.
- **Anticipated Funding Source** – represents the likely funding program(s) to be used for a project, and are subject to change.
- **Status** – represents additional project details that may include agency coordination, phase of the project development process (TIP, design, ROW acquisition), or alternative to a related project.
- **Priority Score** – represents a quantitative evaluation process of relative benefit to the community. Scores are intended to be used a "tie-breakers" among projects of similar importance, and are subject to re-scoring using a modified evaluation process at a later date.
- **Rank** – represents the order of highest priority score to lowest priority score.
- **Map ID** – a repeat of the first column to help with legibility of the table


Lakeway TPO Boundary
Horizon Year Projects
2030 / Committed
2040
2050
Illustrative / Unfunded
GRAINGER
HAWKINS
HAMBLEN
JEFFERSON
GREENE
COCKE
SEVIER
Blaine
Mooresburg
Morristown
25E
11W
11E
81
40
25W
321
N
A-4
0
5
10
Miles

LAKEWAY TPO - Mobility Plan 2050 Projects List

Feb-24

Map ID	Type	Project Description	Project Type	Length (miles)	County	Horizon Year	MPO Cost (YOE)	Cumulative Cost	Anticipated Funding Source	Status	PRIORITY SCORE	RANK	Map ID
142-143	line	Hamblen - SR34 Widening (Andrew Johnson Highway) - TDOT 10-Year Plan project 5 - PIN101419.03 - widen to 4-lanes	Roadway Widening	5.38	Hamblen	2030	$ 67,000,000	**$ 67,000,000**	TDOT 10-Year Plan	State-TDOT	120.00	1	142-143
3	point	Region 1 - TMA Brige Program - TDOT - 10-Year Plan project R1-B1	Bridge	-	Hamblen / Jefferson	2030	$ 66,500,000	**$ 133,500,000**	TDOT 10-Year Plan	State-TDOT	119.00	2	3
139	point	SR160 @ MLK Jr Pkwy J Turns	Intersection	-	Hamblen	2030	$ 2,500,000	**$ 136,000,000**	NHPP		81.10	15	139
322	line	SR343 ITS Traffic Signal Improvements	ITS / Signal	2.80	Hamblen	2040	$ -	**$ 136,000,000**	**RAISE**	**RAISE Grant project**	114.48	3	322
24	line	ITS and traffic signal coordination along SR343 (Cumberland St) (or RAISE grant funded)	ITS / Signal	1.00	Hamblen	2040	$ 4,800,000	**$ 140,800,000**	STBG-S	Committed - design / construction	112.29	4	24
321	line	SR343 S Cumberland St Complete Street - road diet	Modify Roadway	1.35	Hamblen	2040	$ -	**$ 140,800,000**	**RAISE**	**RAISE Grant project**	103.27	6	321
26	point	Intersection improvements at SR343 (S Cumberland St) and Inman St; signalize the intersection and add turn lanes (or RAISE grant funded)	Intersection	-	Hamblen	2040	$ 10,000,000	**$ 150,800,000**	HSIP	Committed - design / construction	89.85	9	26
153	line	Valley Home Road improvements	Modify Roadway	1.21	Hamblen	2040	$ 3,400,000	**$ 154,200,000**	STBG-S		83.90	10	153
9	line	Add sidewalks along SR343 (Buffalo Trail/Cumberland Ave) from Cherokee Park Rd to Davis St (or RAISE grant funded)	Multimodal	2.13	Hamblen	2040	$ 420,000	**$ 154,620,000**	OTHER	Committed - design / construction	83.88	11	9
105	line	E Morris Blvd resurfacing	Resurfacing	5.15	Hamblen	2040	$ 3,000,000	**$ 157,620,000**	NHPP	TIP project	78.44	20	105
2	point	Reconstruct Chucky Pike with signal modifications at US11E intersection	Intersection	-	Jefferson	2040	$ 200,000	**$ 157,820,000**	CMAQ		68.54	35	2
32	point	Intersection improvements at SR343 (Buffalo Trail) at Rader St: signalize the intersection and add NB left turn lane (or RAISE grant funded)	Intersection	-	Hamblen	2040	$ 700,000	**$ 158,520,000**	**RAISE**	**RAISE Grant**	67.54	36	32
25	point	Intersection improvements at SR343 (Buffalo Trail) at Cherokee Park Rd: signalize the intersection (or RAISE grant funded)	Intersection	-	Hamblen	2040	$ 120,000	**$ 158,640,000**	STBG-S	Committed - design / construction	61.54	43	25
5	point	Intersection improvements at SR32 / US25E (State St) and SR113 (Main St): add left turn lanes on SR32 (State St) and a left turn lane on eastbound SR113	Intersection	-	Jefferson	2040	$ 400,000	**$ 159,040,000**	STBG-S		46.69	64	5
4	line	Intersection and access management improvements along SR34/US11E from Russell Ave to Odyssey Rd	Intersection	1.93	Jefferson	2040	$ 1,400,000	**$ 160,440,000**	CMAQ		80.81	16	4
8	point	Intersection improvements at SR34/US11E and George Ave: add NB right turn lane extending to Elmwood St	Intersection	-	Jefferson	2040	$ 1,200,000	**$ 161,640,000**	STBG-L		77.69	21	8
22	line	Add sidewalks and streetscaping along SR343 (Cumberland St) from SR34/US11E to SR160 (or RAISE grant funded)	Multimodal	1.52	Hamblen	2040	$ 18,000,000	**$ 179,640,000**	HSIP	Committed - design / construction	104.19	5	22
43	line	Widen and realign S. Bellwood Road from 2 to 3 lanes from SR34/US11E to Veterans Parkway	New Location	0.77	Hamblen	2040	$ 14,300,000	**$ 193,940,000**	NHPP		100.04	7	43
131	line	MLK Jr Connector Rd	New Location	0.48	Hamblen	2040	$ 9,200,000	**$ 203,140,000**	STBG-S		83.50	12	131
106	line	Russell Ave resurfacing - segment 1	Resurfacing	0.40	Jefferson	2040	$ 300,000	**$ 203,440,000**	NHPP	TIP project	83.35	13	106
10	point	Rehabilitation of culvert / bridges over Turkey Creek at Rosedale Ave and Downtown	Bridge	-	Hamblen	2040	$ 200,000	**$ 203,640,000**	STBG-S		79.88	18	10
7	line	Central Church Road widening from 2 to 3 lanes from SR34/US11E to Connie St	Roadway Widening	0.20	Hamblen	2040	$ 3,800,000	**$ 207,440,000**	STBG-L	TIP project - Env Design	76.25	23	7
15	point	Intersection improvements at SR34/US11E and Russell Ave: add right turn lanes on SR34/US11E, pedestrian signals and sidewalks on all approaches	Intersection	-	Jefferson	2040	$ 600,000	**$ 208,040,000**	STBG-L		74.40	26	15
107	line	Russell Ave resurfacing - segment 2	Resurfacing	0.20	Jefferson	2040	$ 200,000	**$ 208,240,000**	NHPP	TIP project	74.40	26	107
18	point	Intersection improvements at SR34/US11E and Kidwell Ridge Rd: add turn lane on Kidwell Ridge Rd	Intersection	-	Hamblen	2040	$ 1,400,000	**$ 209,640,000**	HSIP		73.79	29	18

LAKEWAY TPO - Mobility Plan 2050 Projects List

Feb-24

Map ID	Type	Project Description	Project Type	Length (miles)	County	Horizon Year	MPO Cost (YOE)	Cumulative Cost	Anticipated Funding Source	Status	PRIORITY SCORE	RANK	Map ID
101	line	Old Andrew Johnson Highway resurfacing	Resurfacing	2.44	Jefferson	2040	$ 1,400,000	**$ 211,040,000**	NHPP	TIP project	72.65	30	101
42	point	Intersection improvements at Veterans Parkway and Merchants Greene Blvd/S Bellwood Rd: signalize the intersection	Intersection	-	Hamblen	2040	$ 2,900,000	**$ 213,940,000**	NHPP		69.04	34	42
1	point	Realign the intersection of US11E and SR92/Old Andrew Johnson Hwy; extend Overlook Rd	Intersection	-	Jefferson	2040	$ 2,100,000	**$ 216,040,000**	STBG-L		59.67	48	1
112	line	S Economy Rd Extension and improvements	New Location	0.81	Hamblen	2050	$ 16,000,000	**$ 232,040,000**	HSIP		97.98	8	112
34	line	Widen S. Sugar Hollow Rd from 2 to 3 lanes from SR160 to SR34/US11E	Roadway	0.54	Hamblen	2050	$ 7,300,000	**$ 239,340,000**	STBG-L		81.92	14	34
110	line	E Andrew Johnson Hwy / SR66 resurfacing	Resurfacing	1.33	Hamblen	2050	$ 900,000	**$ 240,240,000**	NHPP	TIP project	80.46	17	110
113	line	US11E Sidewalks new and repair	Multimodal	1.75	Jefferson	2050	$ 6,200,000	**$ 246,440,000**	OTHER		79.63	19	113
127	point	US11E @ Pearl Ave Intersection improvements	Intersection	-	Jefferson	2050	$ 3,200,000	**$ 249,640,000**	NHPP		77.52	22	127
140	point	SR160 @ Sulphur Springs Rd J Turns	Intersection	-	Hamblen	2050	$ 3,200,000	**$ 252,840,000**	NHPP		76.15	24	140
129	line	US11E Multiuse Path in Jefferson City	Multimodal	1.27	Jefferson	2050	$ 4,500,000	**$ 257,340,000**	TA		74.23	28	129
122	point	US11E @ SR92 / Maple St Intersection Improvements	Intersection	-	Jefferson	2050	$ 3,200,000	**$ 260,540,000**	NHPP		71.83	31	122
118	point	US11E @ Odell Rd Intersection Improvements	Intersection	-	Jefferson	2050	$ 3,200,000	**$ 263,740,000**	NHPP		71.06	32	118
108	line	Branner Ave resurfacing	Resurfacing	0.33	Jefferson	2050	$ 300,000	**$ 264,040,000**	NHPP	TIP project	70.15	33	108
119	point	US11E @ Hicks Rd Intersection improvements	Intersection	-	Jefferson	2050	$ 3,200,000	**$ 267,240,000**	NHPP		62.65	38	119
123	point	SR92 Russell Ave @ Flat Gap Rd improvements	Intersection	-	Jefferson	2050	$ 3,200,000	**$ 270,440,000**	NHPP		62.08	39	123
14	point	Intersection improvements at E. Old Andrew Johnson Hwy and Municipal Dr; Add turn lanes	Intersection	-	Jefferson	2050	$ 1,000,000	**$ 271,440,000**	STBG-L		60.96	44	14
103	line	Municipal Dr resurfacing	Resurfacing	0.59	Jefferson	2050	$ 400,000	**$ 271,840,000**	NHPP	TIP project	60.96	44	103
149	line	Joe Hall Road reconstruction for safety improvements from Hillvale Drive to Fish Hatchery Road	Modify Roadway	0.34	Hamblen	2050	$ 1,200,000	**$ 273,040,000**	STBG-L	New project	60.58	46	149
6	point	Intersection improvements at SR341 (Talbott-Kansas Rd) and Greenbriar Rd at SR34/US11E: realign intersection approaches and add turn lanes	Intersection / New Location	-	Hamblen	2050	$ 3,300,000	**$ 276,340,000**	STBG-S	Committed	42.42	70	6
17	line	Intersection improvements along E. Morris Blvd from Larry Baker Rd to Jones-Franklin Rd including realignment of Barton Springs Rd intersection	Modify Roadway	0.28	Hamblen	2050	$ 1,300,000	**$ 277,640,000**	STBG-L	Committed - ROW started	41.69	72	17
11	point	Signalize the intersection of SR341 (Roy Messer Hwy / Old Airport Rd) and SR113 (Main St)	Intersection	-	Jefferson	2050	$ 800,000	**$ 278,440,000**	CMAQ		30.48	86	11
36	line	Widen SR92 from 2 to 3 lanes from Old Andrew Johnson Hwy to Easley Rd	Roadway	0.40	Jefferson	2050	$ 6,300,000	**$ 284,740,000**	NHPP		64.46	37	36
104	line	SR92 realignment at Overlook Rd	New Location	0.47	Jefferson	2050	$ 11,100,000	**$ 295,840,000**	NHPP	TIP project	62.06	40	104
125	point	US11E @ Clinch View Circle improvements	Intersection	-	Jefferson	2050	$ 3,600,000	**$ 299,440,000**	NHPP		61.92	41	125
37	line	Widen Old Andrew Johnson Hwy from 2 to 3 lanes from Branner Ave to N. Chucky Pk	Roadway Widening	0.31	Jefferson	2050	$ 5,000,000	**$ 304,440,000**	STBG-S		61.92	42	37
130	point	SR160 @ Sugar Hollow Rd improvements	Intersection	-	Hamblen	2050	$ 3,600,000	**$ 308,040,000**	NHPP		60.29	47	130
102	line	Fate Rankin Rd resurfacing	Resurfacing	0.58	Jefferson	2050	$ 500,000	**$ 308,540,000**	NHPP	TIP project	58.17	50	102
29	point	Intersection improvements at Old Andrew Johnson Hwy and E. Main St/N Chucky Pike: realign offset intersection	Intersection	-	Jefferson	2050	$ 2,400,000	**$ 310,940,000**	NHPP		57.63	51	29
133	point	SR160 @ Fish Hatchery Rd improvements	Intersection	-	Hamblen	2050	$ 3,600,000	**$ 314,540,000**	NHPP		57.27	53	133

LAKEWAY TPO - Mobility Plan 2050 Projects List

Feb-24

Map ID	Type	Project Description	Project Type	Length (miles)	County	Horizon Year	MPO Cost (YOE)	Cumulative Cost	Anticipated Funding Source	Status	PRIORITY SCORE	RANK	Map ID
21	point	Modify US25E / SR32 interchange at SR160 to diamond interchange	Interchange	-	Hamblen	2050	$ 8,100,000	**$ 322,640,000**	NHPP	SR160 corridor study	57.27	53	21
148	line	E Morris Boulevard resurfacing from Jones-Franklin Road to US11E	Resurfacing	1.48	Hamblen	2050	$ 1,100,000	**$ 323,740,000**	NHPP	New project	49.77	60	148
151	line	Spout Springs Road improvements - phase 2	Modify Roadway	0.38	Hamblen	2050	$ 1,500,000	**$ 325,240,000**	STBG-L	New project	47.31	62	151
150	line	Spout Springs Road improvements - phase 1	Modify Roadway	0.76	Hamblen	2050	$ 3,000,000	**$ 328,240,000**	STBG-L	New project	46.13	65	150
109	line	Agricultural Park Blvd resurfacing	Resurfacing	0.75	Jefferson	2050	$ 600,000	**$ 328,840,000**	NHPP	TIP project	40.96	74	109
132	point	SR160 @ Springvale Rd Intersection improvement	Intersection	-	Hamblen	2050	$ 3,600,000	**$ 332,440,000**	NHPP		40.44	76	132
13	point	US11E / E Old AJ Hwy intersection; add new traffic signal	ITS / Signal	-	Jefferson	2050	$ 1,400,000	**$ 333,840,000**	NHPP		40.23	78	13
135	line	SR160 @ Bethel Rd / Lowland Pike Intersection improvement - add turn lanes	Intersection	0.09	Hamblen	2050	$ 3,600,000	**$ 337,440,000**	NHPP		38.04	83	135
136	line	SR160 @ Cobble Ln Intersection improvement - add turn lanes	Intersection	0.04	Hamblen	2050	$ 3,600,000	**$ 341,040,000**	NHPP		38.04	83	136
38	line	Widen Valley Home Rd from 2 to 3 lanes from SR160 to Roe Junction Rd	Roadway	0.65	Hamblen	2050	$ 10,300,000	**$ 351,340,000**	STBG-L		57.52	52	38
33	line	Extend Veterans Parkway as new 4-lane road from SR66 (Merchants Greene Rd) to S. Sugar Hollow Rd	New Location	0.83	Hamblen	Illustrative	$ 21,900,000		unfunded		75.31	25	33
114	line	US11E Multiuse Path in Jefferson County	Multimodal	2.72	Jefferson	Illustrative	$ 12,000,000		unfunded		58.42	49	114
124	point	SR92 George Ave Intersection improvements	Intersection	-	Jefferson	Illustrative	$ 4,000,000		unfunded		57.13	55	124
116	point	US11E @ Odyssey Rd Intersection improvements	Intersection	-	Jefferson	Illustrative	$ 4,000,000		unfunded		56.23	56	116
128	point	US11E @ Universal Rd Intersection improvements	Intersection	-	Jefferson	Illustrative	$ 4,000,000		unfunded		52.94	57	128
126	point	US11E @ Meadow Spring Drive improvements	Intersection	-	Jefferson	Illustrative	$ 4,000,000		unfunded		51.23	58	126
39	line	Extend Progress Parkway as new 4-lane road from existing termini westward to SR66	New Location	2.21	Hamblen	Illustrative	$ 58,300,000		unfunded		50.56	59	39
35	line	Widen SR32/US25E (State St) from 2 to 4 lanes from I-81 to SR341 (Roy Messer Hwy)	Roadway Widening	3.44	Hamblen / Jefferson	Illustrative	$ 60,400,000		unfunded		47.13	63	35
41	line	Widen I-81 from 4 to 6 lanes from SR341 (Exit 4) to SR340 (Exit 15)	Roadway	11.04	Hamblen /	Illustrative	$ 193,900,000		unfunded		45.92	66	41
144	point	SR92 at Crooke Road / Mt. Horeb Road ITS signalization	ITS / Signal	-	Jefferson	Illustrative	$ 3,300,000		unfunded		43.35	67	144
28	line	Relocate SR34/US11E from near E. Morris Blvd to west of Stagecoach Rd	New Location	1.71	Hamblen	Illustrative	$ 47,800,000		unfunded	Alternate Phase 2 of 3	49.04	61	28
27	line	Relocate SR34/US11E from west of Stagecoach Rd to Steadman Rd	New Location	3.94	Hamblen	Illustrative	$ 99,400,000		unfunded	Alternate Phase 3 of 3	43.10	68	27
138	point	US25E @ Lakeshore Dr / SR 375 Intersection improvement	Intersection	-	Grainger	Illustrative	$ 4,000,000		unfunded		41.33	73	138
146	point	Andrew Johnson Hwy / SR34 / US11E @ Lucille Lane ITS signalization and realignment of median	ITS / Signal	-	Jefferson	Illustrative	$ 3,300,000		unfunded		40.96	74	146
152	line	Spout Springs Road improvements - phase 3	Modify Roadway	1.20	Hamblen	Illustrative	$ 5,300,000		unfunded		40.44	76	152
30	line	Widen I-81 from 4 to 6 lanes from approximately 1 mile west of I-40 Interchange to near SR-341 (Roy Messer Highway), including an acceleration lane on I-40 WB	Roadway Widening	5.22	Jefferson	Illustrative	$ 328,400,000		unfunded	TIP project	39.50	79	30
323	point	Signalize the intersection of SR341 / SR66 (Roy Messer Hwy) and SR341 (S White Pine Road)	Intersection	-	Jefferson	Illustrative	$ 4,000,000		unfunded		39.50	79	323
145	point	SR92 at Oak Hills Circle / Bradford Square Drive ITS signalization	ITS / Signal	-	Jefferson	Illustrative	$ 3,300,000		unfunded		39.50	79	145
147	point	SR92 at Hinchey Hollow Road / Colony Drive new intersection signal and safety improvements	Intersection	-	Jefferson	Illustrative	$ 4,000,000		unfunded		38.77	82	147
20	point	Reconstruct intersection of McBride Rd at Clearview Rd to improve sight distance	Intersection	-	Hamblen	Illustrative	$ 2,700,000		unfunded		38.04	83	20

ENVIRONMENTAL & CULTURAL SCREENING

Introduction

As a recipient of federal funds, LAMTPO is tasked with evaluating the *potential* impacts of planned transportation projects on the environment as well as cultural resources within the region. The results of this desktop screening summary is an increase awareness of *potential* impacts and issues that should be considered as projects move through the development process.

Potential Impacts to Environmental Resources

Transportation projects have the potential to negatively impact some natural resources, namely rivers and streams, floodplains, wetlands, and other conservation lands. In addition, topographical features such as hillsides, ridgelines, and mountains, which may define an area's character, can also be considered natural resources that should be preserved. Examples of key natural resources found in the Lakeway region include:

- Cherokee and Douglas Lakes,
- Nolichucky River, and Turkey Creek.

The fiscally-constrained MTP projects shown in **Figure 1** are located in close proximity to some of these resources. Though still in the planning-design stages the scope of these projects should be continually refined throughout the project development process to a) avoid these features; b) minimize unavoidable impacts to the natural environment; or c) mitigate any remaining potential impacts.

Potential Impacts to Cultural Resources

The term 'cultural resources' typically refers to physical structures or areas that have historical significance to a geography, its residents, an event, and/or a specific culture. Some of the most common examples of cultural resources are those buildings, structures, or properties that have been officially designated as historically significant. In the Lakeway region, sites such as Barton Springs, Crockett Tavern Museum, Glenmore Mansion, and Fulton-Hill Park are examples of cultural resources. **Figure 2** depict the fiscally-constrained MTP projects that have the *potential* to impact cultural resources in the region.

Environmental Mitigation Strategies

The transportation projects included in the MTP vary in size and scope and their potential impacts will also vary. As projects progress from planning, through engineering and design, and ultimately to construction, impacts to both natural and cultural resources should be avoided wherever possible, minimized where unavoidable, and mitigated to ensure compensation for any lost resources. To accompany these three steps, **Table 3** provides various strategies that should be considered to ensure the negative impacts of transportation projects are addressed across the region.

Figure 1 – Environmental Resources

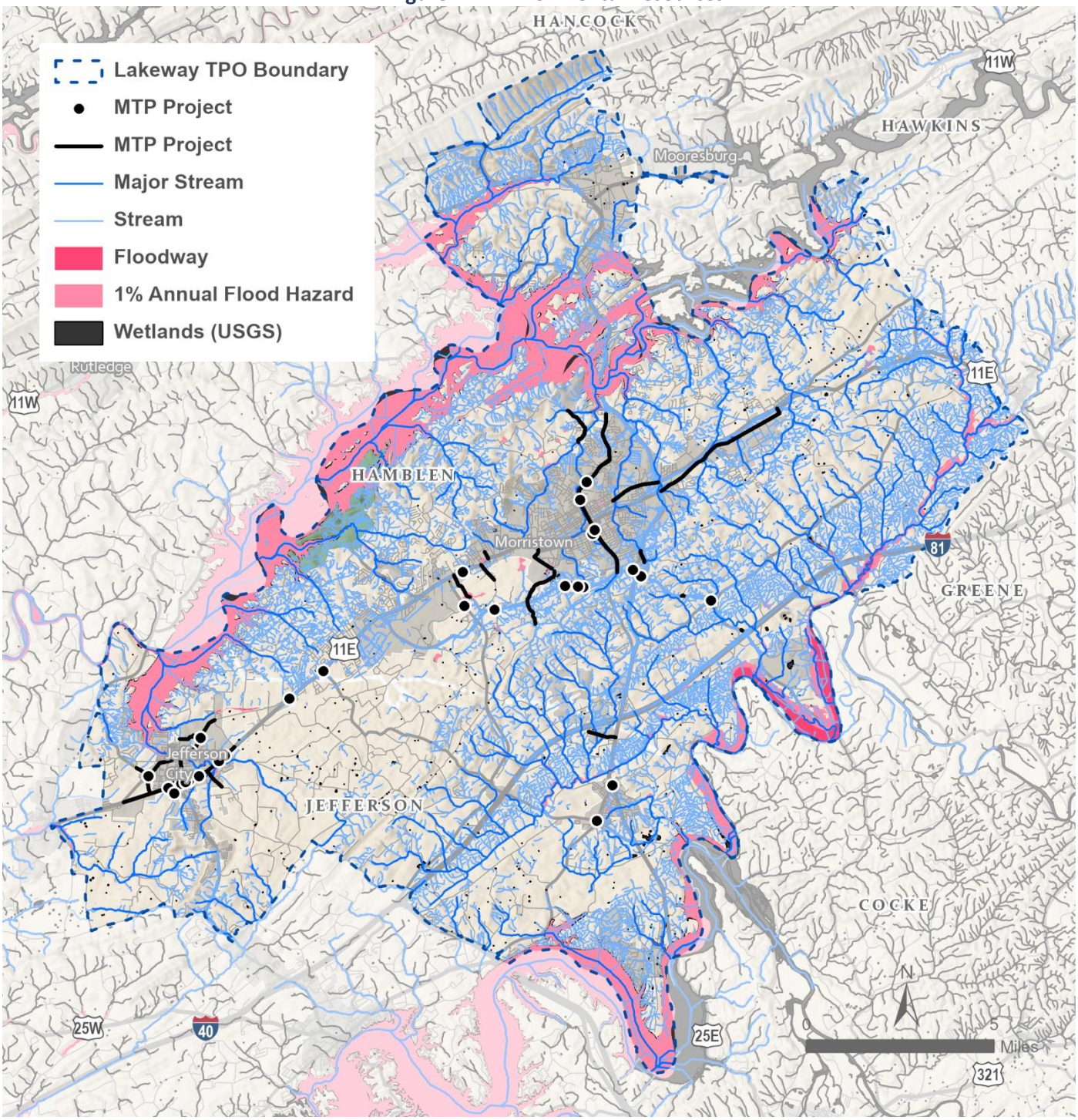


Figure 2 – Cultural Resources

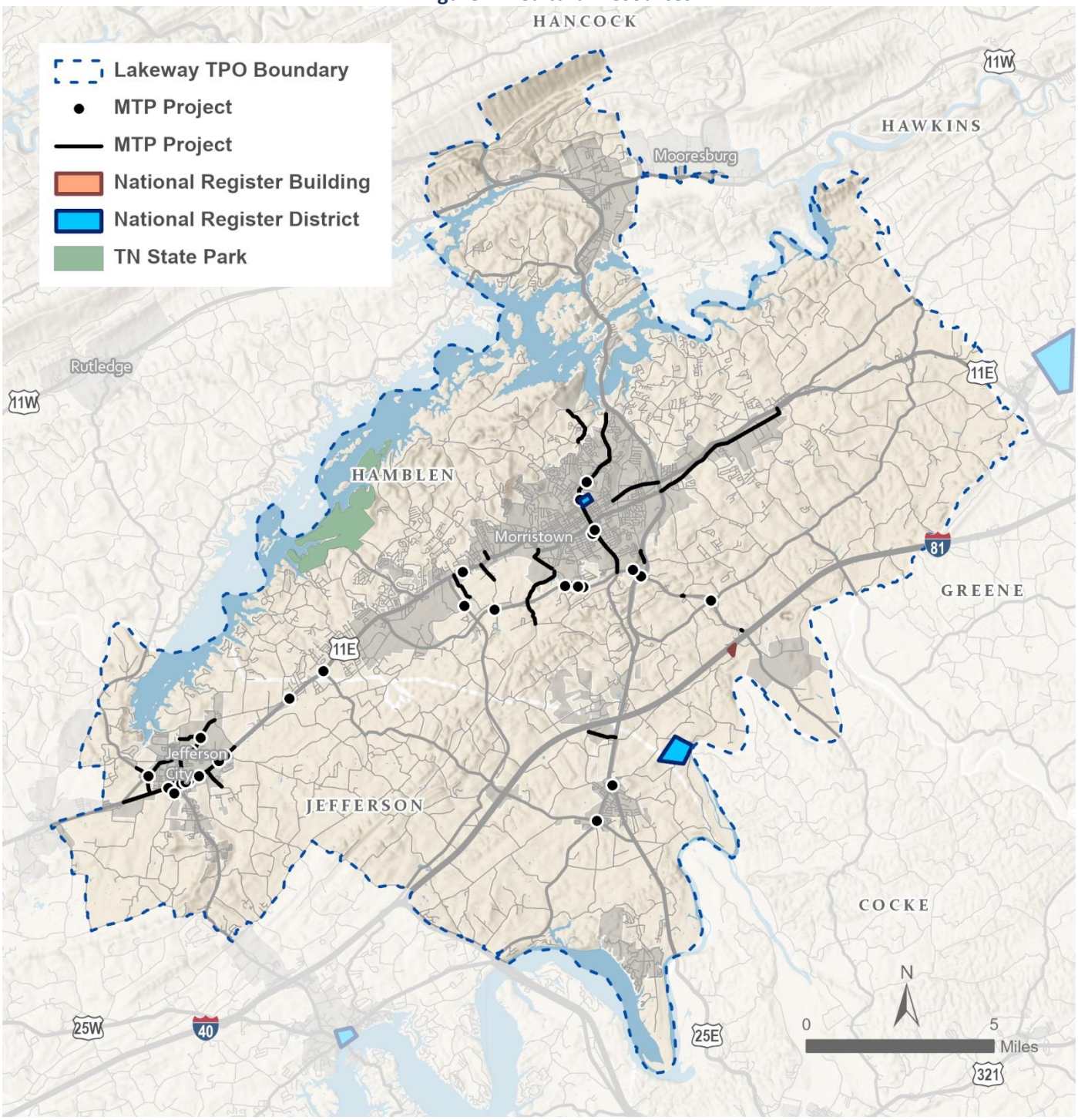


Table 3 – Potential Environmental Mitigation Strategies

Resource	*Potential Mitigation Strategy*
Water Resources	Promote redevelopment over new development to preserve existing permeable lands
	Require low-impact development and strongly encourage zero-impact development
	Avoid impacts to a wetland or other aquatic resource, but, if that's not possible, minimize impacts and compensate for them.
	Compensate for the lost functions of the impacted aquatic resources and set measurable and enforceable ecological performance standards to ensure successful compensation.
Cultural & Historic Resources	Consult early with the state historic preservation officer and other interested persons and parties to determine what resources may exist in a specific area.
	Engage in community discussion.
	Employ relocation, marking, and other measures as appropriate.
Open Space, Parks, & Recreation	Replace lands used with lands of reasonably equivalent usefulness and location, and of at least comparable value.
	Restore and landscape disturbed areas.
	Replace facilities impacted by the project, including sidewalks, paths, benches, lights, trees, and other facilities.
Agricultural & Farmlands	Avoid and minimize the amount of agricultural lands being used for projects.
	Monitor the agricultural land area development for future environmental damage.
Air Quality	Apply an environmentally safe soil stabilizer on dirt roads.
	Sweep roadways.
	Evaluate the use of available alternative engines and diesel fuels.
Habitat & Wildlife Areas	Avoid impacts by relocating the entire project or most impactful portions of the project to a less sensitive area.
	Minimize impacts by modifying the project proposal to not cause as great an impact.
	Repair and restore an affected area to pre-disturbance conditions or mitigate adverse impacts by restoring or even improving conditions.

Environmental Consultation Process

To ensure all potential impacts of the MTP are captured in this analysis, LAMTPO engaged various state and federal agencies in the review of the 2045 MTP. Specifically, the draft plan was sent to each of the following agencies to ensure consistency with any existing or upcoming plans, the correct use of relevant data and inventories, and any unforeseen impacts of the transportation projects.

State Agencies	Federal Agencies
• Tennessee Dept. of Environment and Conservation (TDEC) • Tennessee State Historic Preservation Office (SHPO) • Tennessee Wildlife Resource Agency (TWRA)	• U.S. Environmental Protection Agency (EPA) • U.S. Army Corps of Engineers • U.S. Fish and Wildlife Service • U.S. Forest Service • U.S. Department of Agriculture • National Park Service (NPS) • Tennessee Valley Authority (TVA)

Appendix B

Roadway Financial Analysis and Assumptions

Roadway Financial Revenues

*Federal Funding
*State Funding
*Local Funding
*Revenue Projections by Horizon Year
*Comparison of Projections 1-3

Introduction

With input from the public and stakeholders the transportation needs within the Lakeway region were assessed and prioritized for implementation. The 2050 MTP must be fiscally constrained, meaning that projects in these documents can be implemented using committed, available, or *reasonably available* revenue sources, with reasonable assurance that the federally supported transportation system. To that end, this appendix details the various sources of transportation funding and projections of available revenues over the next 25 years. The intent of these provisions is that Mobility Plan 2050 be fiscally constrained, only programming dollars it expects to receive.

Roadway Financial Analysis

Operating, maintaining, and improving the highway/roadway system relies on federal, state, and local funding. While the funding amounts vary among the different sources, each plays a critical role in supporting the region's multimodal transportation system.

FEDERAL FUNDING

Federal funding represents the largest transportation funding source for the TPO. The current federal surface transportation authorization bill is known as the Infrastructure Investment & Jobs Act (IIJA), which is set to expire in September 2026. As such, the availability of funds in the following programs is largely contingent on the passage or extension of a new reauthorization bill. Four primary funding programs constitute the majority of federal funding for roadway improvements in the Lakeway region:

- **National Highway Performance Program (NHPP)** is a significant funding source and provides funding for capacity, operational, or maintenance improvements to highways and bridges on the National Highway System (NHS). Within the Lakeway region, some of the major NHS roadways include I-81, U.S. Routes 11E and 25E, and State Routes 160 and 92. Approximately 90% of funding for improvements to the interstate system can be sourced using NHPP funds, with the remaining 10% coming from state or local sources. For non-interstate projects, NHPP dollars can be used to fund only 80% of project costs, requiring approximately 20% of project costs be matched with non-federal dollars.
- **Surface Transportation Block Grant (STBG)** Program provides funding to both states and local municipalities to fund improvements to roadways based on their functional classification as well as bridges, bicycle and pedestrian infrastructure, and capital transit projects. Each state is provided an annual apportionment of STBG funds, of which a percentage is also sub allocated to local municipalities based on population. State STBG funds (STBG-S) are typically used to fund projects prioritized and selected by TDOT. Local STBG funds (STBG-L) can be used on any eligible facility and improvement type based on priority established in the MTPO's processes. For both

STBG-S and STBG-L, federal funding can be used to fund up to 80% of project costs with the remaining 20% funded through state or local matches.

- As a set-aside from the **STBG** program, the **Transportation Alternatives (TA)** program is used to fund on and off-road bicycle and pedestrian projects, safe routes to schools, recreational trails programs, and others. The TA program requires a 20% non-federal match to accompany the maximum 80% federal funding share.
- **Highway Safety Improvement Program (HSIP)** is another significant source of federal funding with the primary purpose of reducing traffic-related fatalities and serious injuries on public roads. Safety projects using HSIP funds must be consistent with TDOT's Strategic Highway Safety Plan, discussed earlier, and be selected based on crash history. HSIP projects allow for up to 90% of project costs to be funded using federal funds with the remaining 10% funded through a non-federal match.

There are other, less frequent, federal funding sources available to the MTPO, described below.

Congestion Mitigation and Air Quality Improvement Program (CMAQ)

The CMAQ program was designed to assist nonattainment and maintenance areas in meeting the National Ambient Air Quality Standards (NAAQS) for ozone, carbon monoxide (CO), and particulate matter by funding transportation projects and programs that will improve air quality by reducing transportation-related emissions. This program is managed and projects are selected by TDOT with input from the TPO.

Carbon Reduction Program (CRP)

The IIJA established this program, which provides funds for projects designed to reduce transportation emissions, defined as carbon dioxide (CO2) emissions from on-road highway sources. Both TDOT and the TPO receive an annual allocation of CRP funds.

Federal Lands Access Program (FLAP)

The Federal Lands Access Program (Access Program) is continued from MAP-21 to improve transportation facilities that provide access to, are adjacent to, or are located within Federal lands. The Access Program supplements State and local resources for public roads, transit systems, and other transportation facilities, with an emphasis on high-use recreation sites and economic generators.

Better Utilizing Investments to Leverage Development (BUILD)

Previously known as the Rebuilding American Infrastructure with Sustainability and Equity (RAISE) and Transportation Investment Generating Economic Recovery (TIGER) discretionary grants, this program was established under the American Recovery and Reinvestment Act of 2009. The program provides grants for surface transportation infrastructure projects with significant local or regional impact. The eligibility requirements of BUILD allow project sponsors, including state and local governments, counties, Tribal governments, transit agencies, and port authorities, to pursue multi-modal and multi-jurisdictional projects that are more difficult to fund through other grant programs.

Safe Streets and Roads for All (SS4A)

The IIJA established the Safe Streets and Roads for All (SS4A) competitive grant program to fund regional, local, and Tribal initiatives through grants to prevent roadway fatalities and serious injuries.

Reconnecting Communities Pilot (RCP)

The IIJA established the Reconnecting Communities Pilot (RCP) competitive grant program to advance community-centered transportation connection projects, with a priority for projects that benefit low-capacity communities.

Highway Infrastructure Program (HIP)

The Consolidated Appropriations Act, 2023 (Public Law 117-328) appropriated funds through the Highway Infrastructure Programs (HIP) as a set aside for "Community Project Funding / Congressionally Directed Spending". These funds remain available for obligation to the specifically listed projects through September 30, 2026.

STATE FUNDING

Like the federal government, the State of Tennessee funds surface transportation projects primarily with motor fuel taxes. Tennessee is a "pay as you go" state and does not incur debt to finance the construction or maintenance of the state's surface transportation system. TDOT uses fuel taxes to support transportation improvements throughout the state. In 2017, Tennessee passed the IMPROVE Act, which increased gasoline and diesel taxes to provide funds for transportation projects across the state.

The TPO area has received funds from three other discretionary funding programs administered by TDOT. The **State Industrial Access (SIA) Program** provides needed connections to developing industrial sites. The **Local Interstate Connector (LIC) Program** provides funding for new roadways that connect critical local facilities and the interstate system. Finally, the **Multimodal Access Grant (MMAG) Program** provides funding for pedestrian and bicycle facilities along state routes.

The State of Tennessee also distributes **State Street Aid** funding to cities and counties for use in eligible activities. Directly generated by gas tax revenues, the State Street Aid funding can be used for a variety of street improvements, including roadway construction or reconstruction, maintenance, right-of-way acquisition, roadway widening, purchasing of related construction or maintenance equipment, street lighting, signage, traffic control equipment, and other administrative costs of making such improvements.

LOCAL FUNDING

Towns, cities, and counties use their own general funds for transportation improvements, operations, and maintenance. Some counties have instituted a local wheel tax in addition to the State motor vehicle registration fee to support their general funds. Local jurisdictions also provide funding to match federal or state funds for local transportation projects. Money for capital investments in streets and highways

may also come from the sale of bonds. Locally, jurisdictions in the TPO area have additional funding sources available to them through state enabling legislation to finance transportation projects. These sources of funding can include rail authorities, local gasoline tax, local motor vehicle taxes, and road improvement districts. These sources can help generate a steady flow of funding for transportation improvements. The following describes these options as well as other local funding tools available.

Property Taxes

Property taxes are the chief source of local revenue and are dependent on local economic conditions. Typically, though, they remain a steady and reliable source of revenue. The funds are distributed to a general fund and then appropriated for transportation purposes.

Sales Taxes

This is one of the most commonly used and a major source of general revenue for state and local jurisdictions. This tax is placed on the sale of consumer goods and services, and purchases by business firms of items for business use. The tax is a function of the tax rate, use of funds and of redistribution formulas. A sales tax is generally more acceptable to citizens than other taxes since the tax is collected in small amounts that are not highly visible to consumers.

REVENUE PROJECTIONS

In developing the roadway element of the **Mobility Plan 2050** financial plan, the TPO Transportation Improvement Program (TIP) and the IIJA were reviewed. Summary financial data was used to determine historic funding levels for various federal, state, and local funding sources and programs as shown in **Table B-1**. Funds sub-allocated to the TPO (L-STBG, L-STBG-TA and CRP) reflect annual allocations, while TDOT managed federal funds reflect actual annual obligations in the TPO planning area.

Table B-1. Historic Roadway Capital Revenues

FUND SOURCE	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	AVERAGE
CMAQ	--	--	--	--	--	**--**
HSIP	$123,408	$5,631,375	$2,227,438	$1,335,563	$890,000	***$2,041,557***
NHPP	$1,628,460	$2,700,000	$150,000	$100,000	$75,000	***$930,692***
STBG	--	--	--	--	--	**--**
STBG-TA	$382,291	$785,000	$465,000	$310,000	$232,500	***$434,958***
STATE-TDOT	--	--	--	--	--	**--**
OTHER STATE	$891,955	$900,000	$900,000	$900,000	$900,000	***$898,391***
SUBTOTAL	**$3,026,114**	**$10,016,375**	**$3,742,438**	**$2,645,563**	**$2,097,500**	***$4,305,598***

Using these data and in consultation with TDOT and the Federal Highway Administration (FHWA), an average annual growth rate was developed. This rate was used to project highway revenue sources over the life of the **Mobility Plan 2050**. Projected highway revenues increase at a **rate of 2.2% annually**, matching the annual growth rate of IIJA apportionments to Tennessee. In consultation with TDOT,

revenues legislated for specific projects in the TPO area through the Transportation Modernization Act (TMA) are included in the applicable horizon year. This results in the new revenues shown in **Table B-2** program for each plan horizon.

Table B-2. Projected Roadway Capital Revenues

FUNDING SOURCE	2025-2028 (TIP)	2028-2030	2031-2040	2041-2050	TOTAL
CMAQ	$321,787	$171,707	$980,134	$1,218,413	**$2,692,041**
HSIP	--	--	$16,468,357	$28,334,896	**$44,803,253**
NHPP	--	--	$36,118,029	$62,143,456	**$98,261,485**
STBG-S	--	--	$13,733,810	$23,629,928	**$37,363,738**
STBG-TA	$552,580	$294,859	$1,683,111	$2,092,289	**$4,622,840**
SRTS	$107,946	$57,601	$328,794	$408,727	**$903,069**
STATE-TDOT	$134,363,568	$406,804	$2,630354	$3,269,815	**$140,724,542**
OTHERS	--	--	$8,506,181	$14,634,447	**$23,141,628**
SUBTOTAL	**$135,345,881**	**$984,971**	**$80,448,771**	**$135,732,971**	**$352,512,594**

To develop the capital costs for projects in the **Mobility Plan 2050**, an **annual inflation rate of 3.8%** was used. The inflation rate was based on the number developed by TDOT for their first 10-Year Project Plan that was released in December 2023. TDOT decided to take a *fairly conservative approach* which is based on the relatively high inflation rate that has been recently observed since roughly the start of the Covid pandemic.

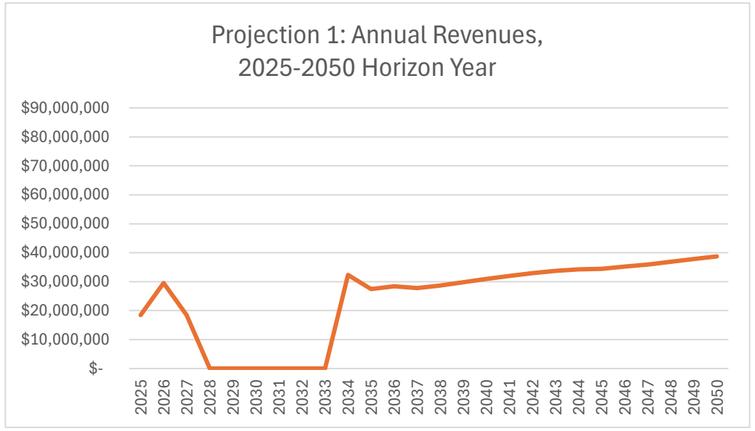
Summary

This document outlines the assumptions underlying the financial plan for the **Lakeway Mobility Plan 2050**. Specifically, revenues for roadways and transit are summarized with historical data and associated growth rates for future projections. In addition, anticipated growth rates for estimating YOE highway and transit needs are presented and are based on historic data as well as consultation with FHWA and TDOT. The financial plan for **Mobility Plan 2050** applies these assumptions to future project needs and demonstrates fiscal constraint of the planned spending.

Projection 1: Cumulative Revenues, 2025-2050 Horizon Year

10-Year rolling average with 10-Year Plan Commitments as normative; Inflation factor 2.2%

	Cumulative Revenues	
2024-2027	$	133,500,000.00
2024-2030	$	133,500,000.00
2031-2040	$	205,450,921.48
2041-2050	$	351,942,172.74

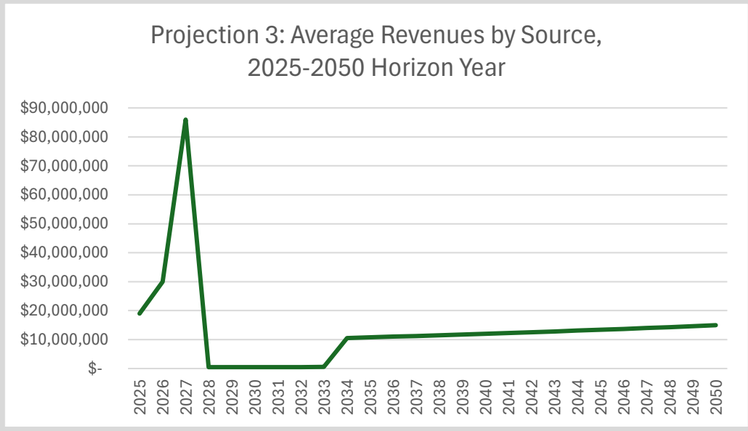


Projection 3: Annual Average Revenues, 2025-2050 Horizon Year

Projection of sources by annual average; Inflation factor 2.2%

	Cumulative Revenues	
2024-2027	$	135,345,880.97
2024-2030	$	136,330,852.23
2031-2040	$	80,448,770.92
2041-2050	$	135,732,970.65

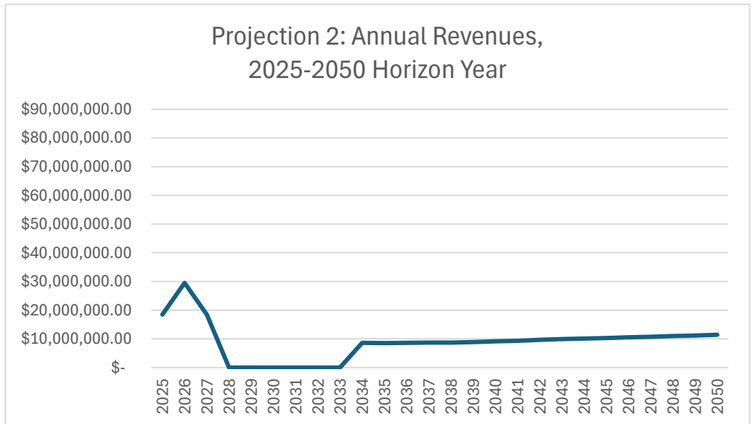
Selected Projection (3)

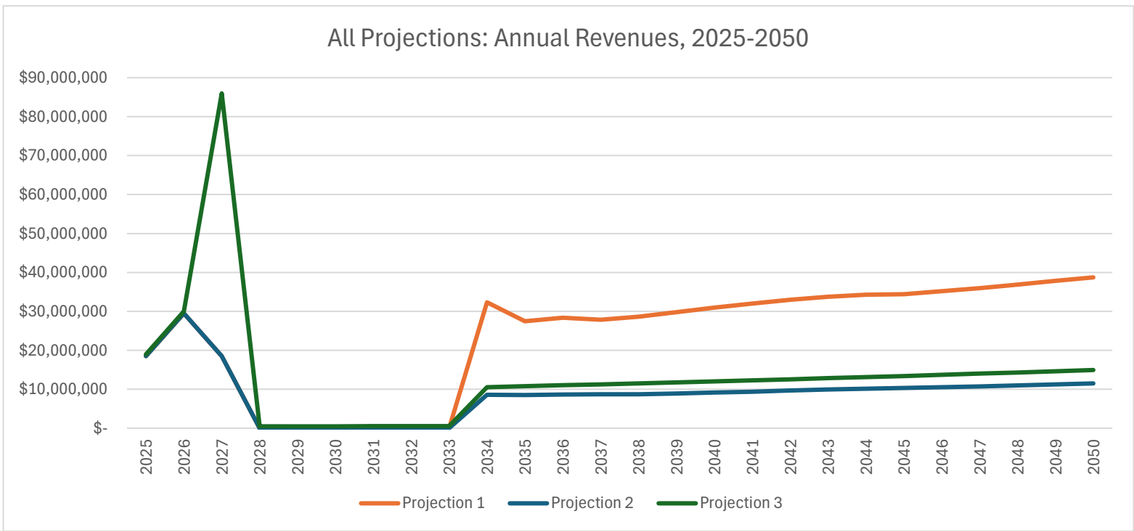


Projection 2: Cumulative Revenues, 2025-2050 Horizon Year

10-Year rolling average with 10-Year Plan Commitments as aberration; Inflation factor 2.2%

	Cumulative Revenues	
2024-2027	$	66,500,000.00
2024-2030	$	66,500,000.00
2031-2040	$	61,210,000.00
2041-2050	$	104,280,000.00





Appendix C

Technical Advisory Committee (TAC)

Meeting Dates

*TAC#1 - 15Nov2023

*TAC#2 - 15Feb2024

*TAC#3 - 2May2024

*TAC#4 - 10Jul2024

*TAC#5 - 3Oct2024

*TAC#6 - 8Jan2025

Agenda

Lakeway MPO
2050 MTP Update

Technical Advisory Committee (TAC)
TAC#1 Meeting

November 15, 2023 @ 10 AM (in-person)

Meeting Agenda

1. **Welcome / Introductions – *Why are we here?*** (TPO) - 5 min
2. **Advisory Committee – Roles & Responsibility** (Stantec) - 10 min
3. **Schedule, Data Needs** (Stantec) - 5 min
4. **Outreach Strategy** (Stantec + TPO) - 10 min
5. **Interactive Mapping Exercise** (All) – 30+ min
6. **Action Items / Next Steps** (Stantec) - 10 min

Meeting Attendees & Notes:

Attendees: (6) Michelle Christian (TDOT), Troy Ebert (TDOT), Rich DesGroseilliers (LAMTPO), Shannon Collins (Lakeway Transit), Steven Neilson (Morristown), James Gallup (Jefferson City)

This plan will be successful because…

- **Michelle:** (TDOT) – Meet Federal and State requirements. Liaison with TDOT/FHWA.
- **Rich:** Coordination. TPO serving as "go to" point of contact with local governments.
    - **Recently completed studies:**
        - US 11E corridor study
        - TN 160 corridor study
        - TN 343 corridor study – now RAISE grant $23M for Complete Street
        - Bike Plan 2019
- **Steve Neilson:** Population and development growth: over 2,000 lots/dwelling units approved for development over the past 2 years. Including industrial developments, and hospital expansion.
- **James Gallop:** Maintaining partnerships for coordinated planning. Focus on Safety, congestion, and speed control / traffic calming. Infill projects and retail development (near Walmart).
    - This region attracts special events for fishing tournaments, camping/RVs
- **Shannon:** Local transit fixed routes are well utilized, with requires for expanded routes/stops. Facing driver and vehicle shortage. Supplemented with deviated fixed route service within 0.75 mile of existing stops ("cloud" service area). Capital replacement and maintenance are critical issue.
    - East TN Human Resources Agency (ETHRA) supports rural transport P2P service.
    - Site selection process for LT Transit Hub (WSP) – two sites identified
- **Troy:** TAC staff coordination will help guide this process. Leveraging digital outreach is important.

Topics discussed

- US Census data suggests 9% Hispanic/Latino, and is likely *under-reported*
- US Census data suggests 'gap' of 10-40 year olds as compared with State of TN, though this is *rapidly changing* with more families moving to this region; many requests for Parks & Recreation facilities
- Development is placing pressure on transportation infrastructure (roads, intersections)

- Morristown is described as a "linear city" with growth along US 11E
- Local colleges are growing:
  - **Walters State** Community College https://ws.edu/campuses/morristown/index.aspx
  - **Tennessee College of Applied Technology** TCAT https://tcatmorristown.edu/
  - **Carson-Newman University** – Jefferson City, rapidly expanding campus https://www.cn.edu/
- Several industrial lots identified (x3 locations in particular) – related to '*Made in America*' initiative https://www.madeinamerica.gov/
  - Van Hool industrial (500 employees). High growth area. Bus manufacturer https://www.vanhool.com/en/vehicles
  - Oshkosh Corp (industrial) defense contractor https://www.oshkoshcorp.com/
    - Also doing business as: JLG https://www.jlg.com/en
  - East TN Valley Industrial District (east of Morristown) https://www.etdd.org/
    - Greenworks Tools Manufacturing
- Roadway Projects / Planned Improvements
  - TDOT Interstate Corridor Study: (2020) <link>
  - I-81 exit 8 improvements (US 25E) – larger ramps
  - TN 66 – has a corridor overlay district w/access management. Major TDOT project.
  - US 11E – recently completed study: signal timing and access management
  - Interstate 81 widening to 6 lane (exit 4): *now, near, or future?*
- Perception of significant 'red tape' to plan, design, construct projects in this region – perhaps more of a backlog of needs than delay
  - Strategy for smaller projects that can be implemented more quickly
- Autonomous vehicle platooning (freight) would be significant for I-81/40 corridors
- US 25 is a cut thru for I-81 traffic to *avoid* Knoxville, TDOT Weigh Station, and head NW to Kentucky
- Lakeway Transit: hoping to add microtransit and larger buses to industrial sites (larger service area)
  - Need more bus shelters
  - Discussed sign post + two seats as an *alternative* or complement to shelters
  - Some daily riders for employment, medical, and/or grocery trips
  - Recently completed Transit Hub Study (2-sites)
- Goals: 2040 and 2045 Goals were presented
  - *Are we seeking to consolidate or add/delete any of these 10 goals?*
  - *Safety and Security – can we combine?*
  - *Environmental Sustainability and Natural Environment – can we combine?*

Action items:

TAC members

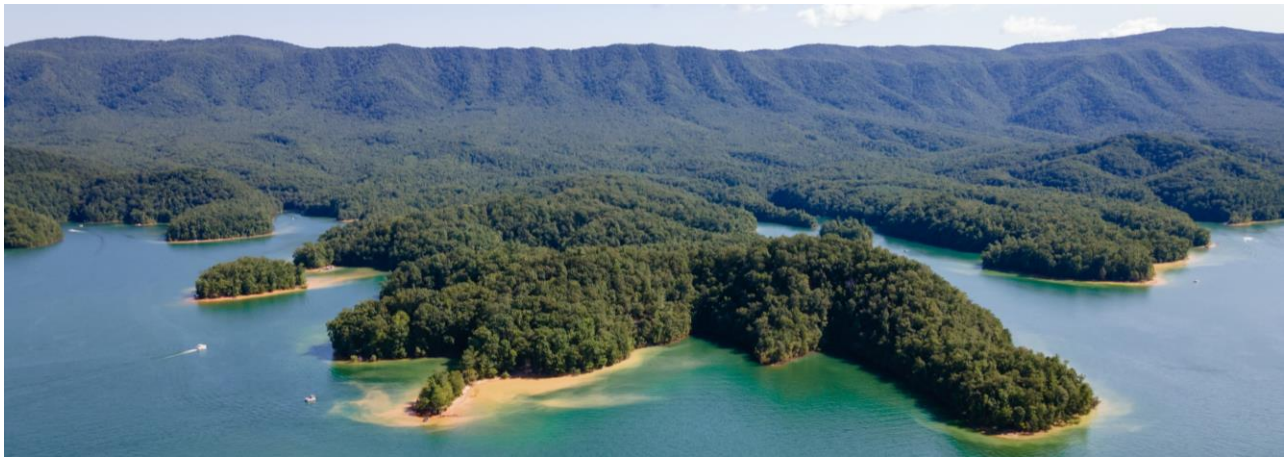
- Correct anything that we have mislabeled, or described above
- **Share the project website www.LAMTPOforward.com** and help promote the Survey + Interactive Map
  - Reshare Rich's posts on LinkedIn and NextDoor
- Generate a list of 'who' else needs to be made aware of this MTP process – need your help!
- Share photos of Morristown/Lakeway region for MTP document/slides.
- Share project plans/details or cut sheets describing:
  - TDOT Interstate Corridor Study (2020) <link>
  - TDOT Congestion Action Plans – Knoxville Region <link>
  - TDOT Planning Studies <link>
  - US 11E corridor study – signal timing and access management
  - TN 160 corridor study (loop road; access controlled)

- TN 343 corridor study – now RAISE grant $23M for Complete Street
- Morristown Bike Plan 2019
- TN 66 corridor overlay district
- Lakeway Transit Hub Study

Stantec team

- Generate half-page flyer to help promote website/survey via email
- Identify data/resource gaps, and request info
- Coordinate Community Engagement Round #1 logistics (Dec / Jan)
- Review financial trend spreadsheet

Attachments: Presentation slides



Lakeway Forward: LAMTPO 2050 MTP Update

Technical Advisory Committee (TAC) – Meeting #1
November 15, 2023

TDOT Department of Transportation
Stantec

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Agenda

1. Welcome / Introductions
2. Advisory Committee – Roles
3. Schedule
4. Outreach Strategy
5. Interactive Mapping Exercise
6. Action Items

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Project Team

Rich DesGroseilliers
MTPO Coordinator
richd@mymorristown.com

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Troy Ebbert
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Timothy Tresohlavy
Project Manager
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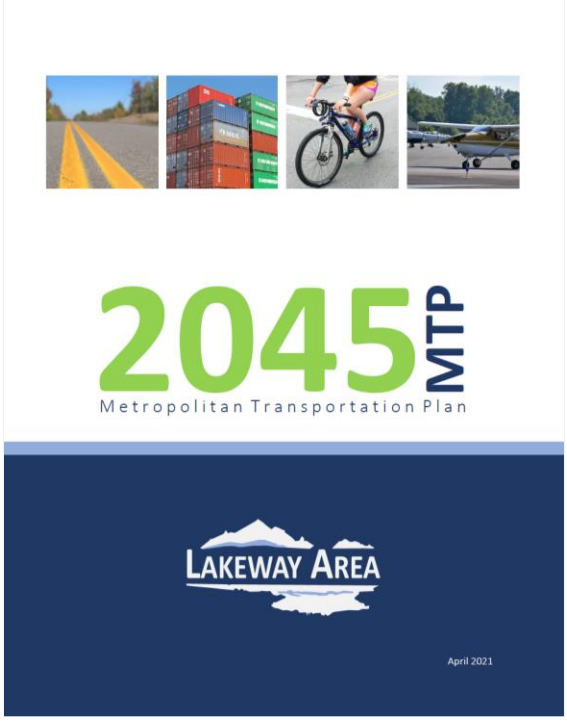
Metropolitan Transportation Plan is…

Federal requirement – FHWA
Long-range 20+ years
Multimodal
Fiscally-constrained
Representation of YOUR local goals / needs



*This **plan** will be successful because…*

5

Agenda

1. Welcome / Introductions
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6. Action Items

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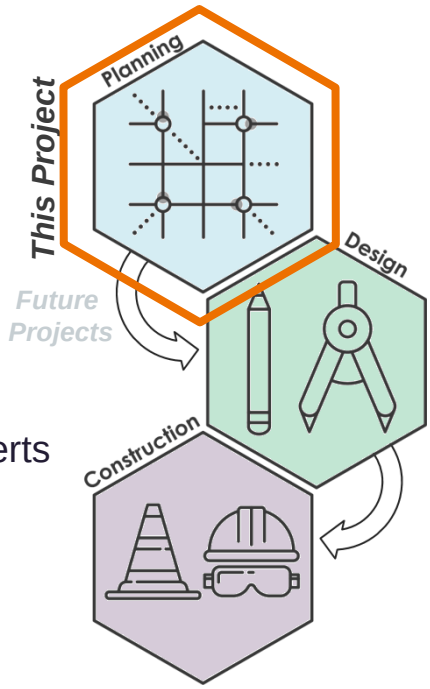
Roles

Stantec—the 'process'

- Synthesizing information
- Facilitation
- Technical assistance and best practices

Advisory Committee—the local experts

- Meeting logistics, scheduling
- Local area knowledge & community vision
- Identifying the "***who***" needs to be involved?
  - *YOU know YOU better than us!*



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Agenda

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Schedule

20-month time frame
Sept 2023 – May 2025

WE ARE HERE!

Fall / Winter 2023	Spring / Summer 2024	Winter / Spring 2025
Winter 2023 - 24	*Summer / Fall 2024*	

• Digital Public Outreach
  • Project website
  • Online survey
  • Interactive map
• Existing Conditions review
  • Data assembly
  • Prior plans / documents
• Focus Group "listening sessions"
	• Synthesis of regional vision/goals
	• Mobility gap analysis
	• Planning factors / Performance Measures
	• Financial projections to 2050
	• Scenario planning & project review
		• Synthesis of public feedback
		• Prioritization
		• Draft Plan
		  • Public Comment Period
		• Final Plan / Adoption

Outreach Strategy

General

What to expect…

Website + Online Survey + Interactive Map
- Digital outreach 24-hours / 7-days

Technical Advisory Committee (TAC)
- Total of eight (8) – half virtual

Community Events: two (2) rounds
- *Issues & Vision:* citizens provide direction
- *Priorities:* citizens provide feedback

Focus Groups: up to four (4), virtual "listening"
- Topics identified – need help *identifying the 'who'*

Specific

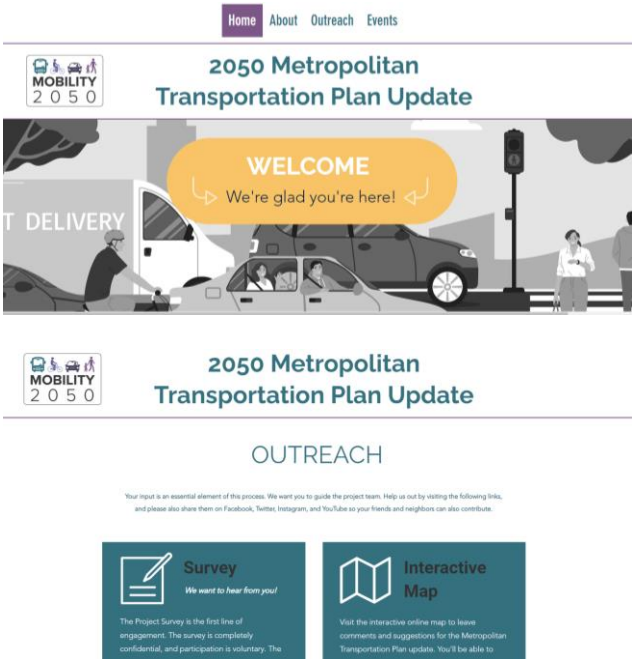
Website

What we need from you…

www.LAMTPOforward.com :

- Bookmark it!
- Share it!

Our *launching point* for Public Outreach



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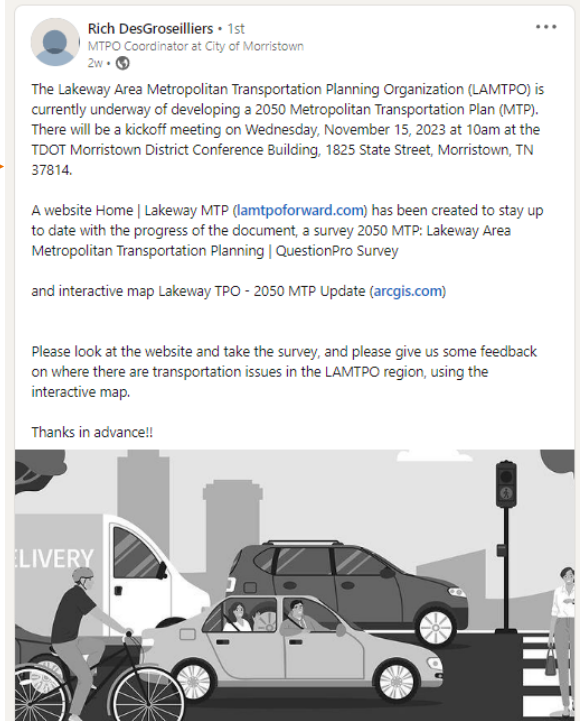
Share / Reshare

Rich posted – Oct 26

Your turn to repost!



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Interactive Map

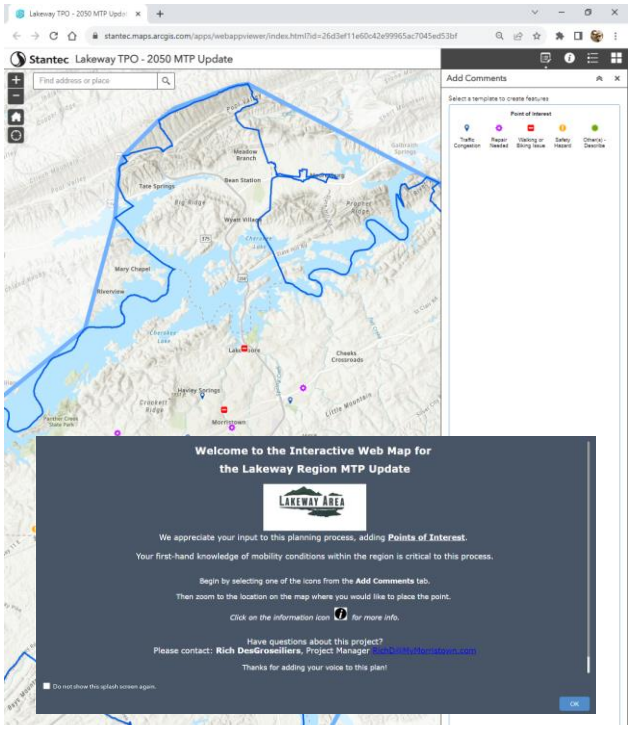
Tell us about …

Point of Interest

- Traffic Congestion
- Repair Needed
- Walking or Biking Issue
- Safety Hazard
- Other(s) - Describe

24-hours per day – thru Spring 2024

Used as Evaluation Criteria later in this MTP process

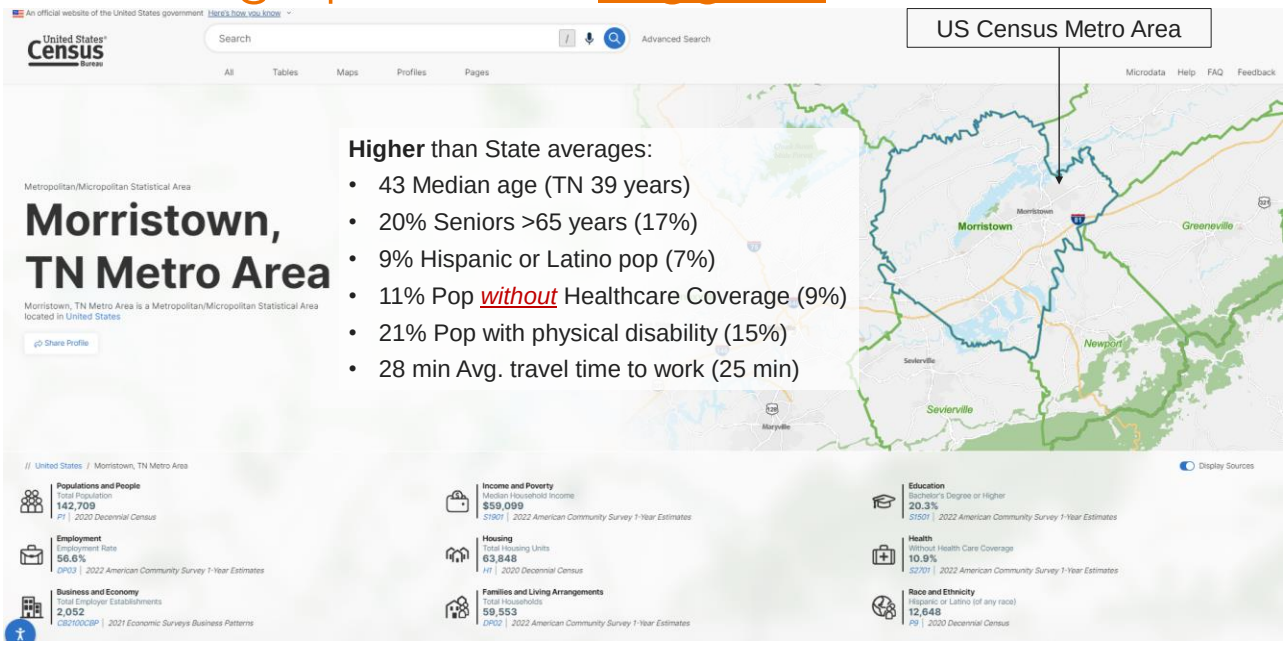


What we (think we) know about you...

Agenda

1. Welcome / Introductions
2. Advisory Committee – Roles
3. Schedule
4. Outreach Strategy
5. Interactive Mapping Exercise
6. Action Items

Demographic Data ***Suggests***…



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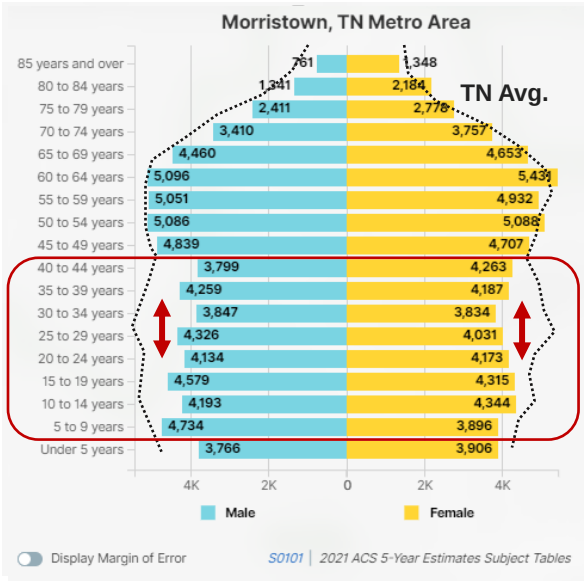
Demographic Data ***suggests***…

- "Silver years" community, tailored towards 45+ years
  - Affordable cost of living
  - Larger lot sizes
- Outdoor recreation / leisure

Fewer youth / young professionals (10-40 years) than TN average



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Employment data suggests…

Major industries (LEHD):

- Manufacturing 25%
- Healthcare 12%
- Retail / Trade 12%
- Food Service 8%

HALF of residents are employed *outside* the county!

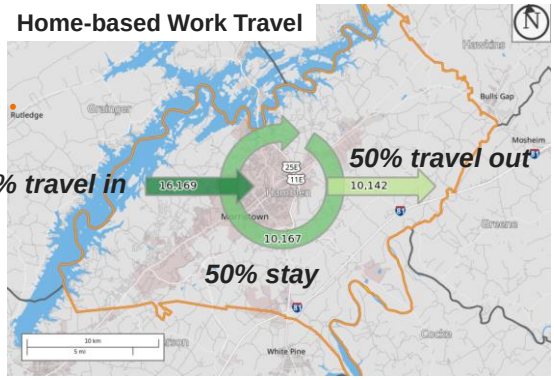
- Knoxville, Greeneville, Johnson City

https://onthemap.ces.census.gov/
https://lehd.ces.census.gov/data/

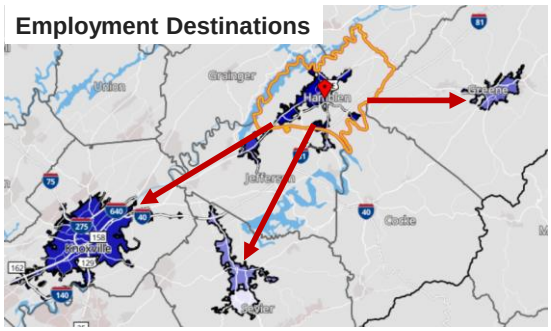
Major Employers

1. Hamblen County Dept. of Education
2. Koch Foods
3. MAHLE Engine Components
4. Howmet Aerospace

Home-based Work Travel



Employment Destinations



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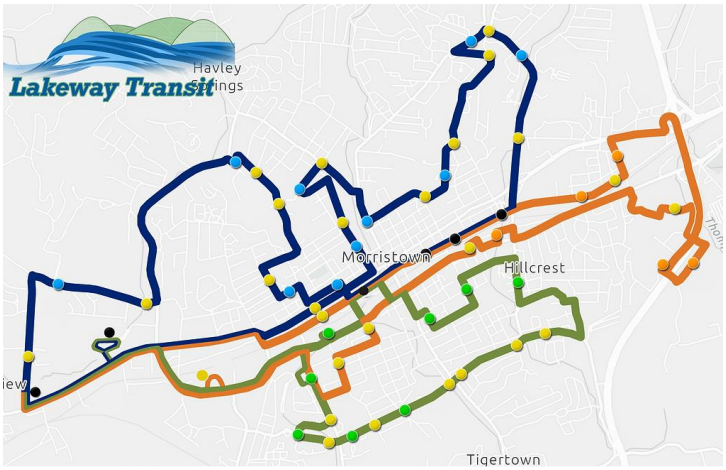
Transit Service

Lakeway Transit - fixed route

- 7am to 6 pm service (60 min)
  - Orange / Blue / Green →



ethra East Tennessee Human Resource Agency

Demand-response service

- Scheduled 3-bus days ahead
- $3 per trip, each way

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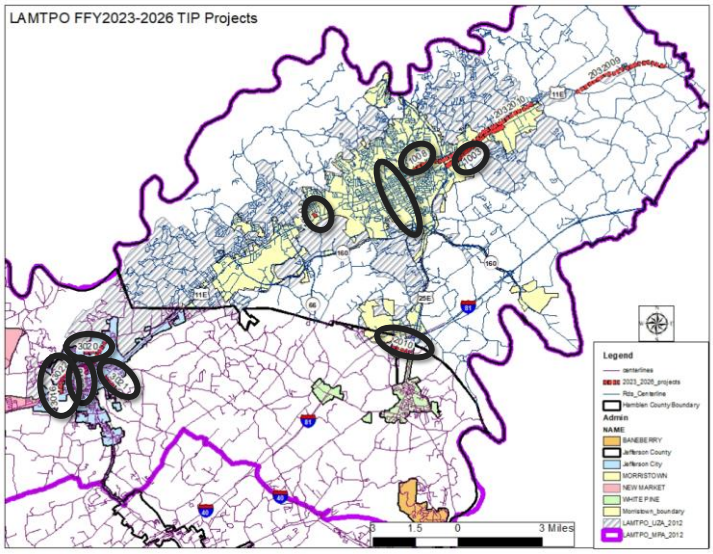
2023 – 2026 TIP:



10 Local Projects:

Morristown:
- ***1003:*** E Morris Blvd resurfacing ($2.8M)
- ***1008:*** E AJ Hwy resurfacing ($1.1M)
- ***1010:*** Central Church Rd Improvements ($1.9M)
- ***RAISE*** Complete Streets / ITS coordination

White Pine:
- ***2010:*** Agricultural Park Blvd resurfacing ($261K)

Jefferson City:
- ***3016:*** Old AJ Hwy realignment / Overlook Rd extension ($1.3M)
- ***3018:*** Branner Ave resurfacing ($218K)
- ***3020:*** Municipal Dr resurfacing ($240K)
- ***3021:*** Fate Rankin Rd resurfacing ($218K)
- ***3022:*** Old AJ Hwy Resurfacing from SR92N to city limits ($1.1M)

20

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Polling Time!

Visit www.menti.com

Use code 4109 8890

or take a photo of this QR code

21

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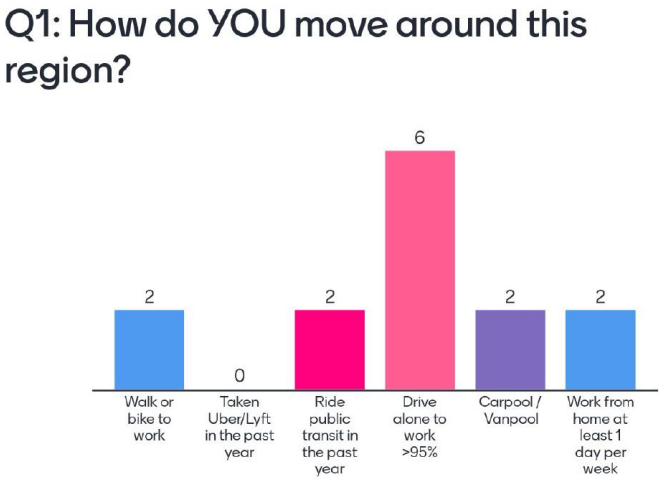
QUESTION 1: How do YOU move around this region? (check **ALL** that apply)

A. Walk or bike to work
B. Taken Uber/Lyft in the past year
C. Ridden public transit in the past year
D. Drive alone to work at least 95% of the time
E. Carpool or Vanpool
F. Work from home at least one day a week



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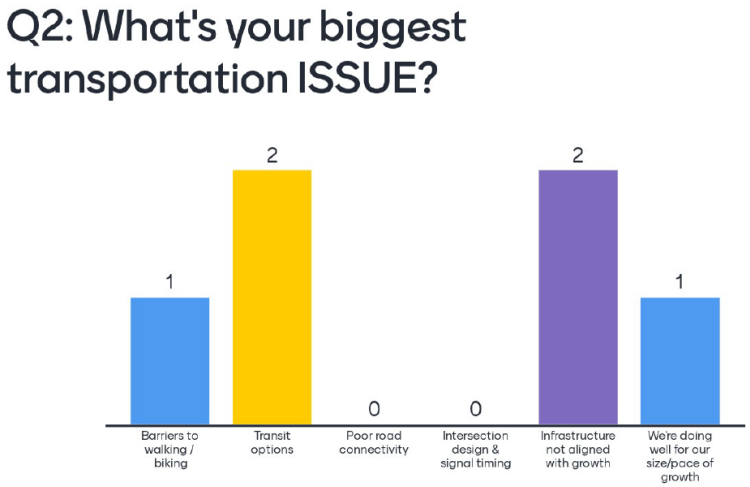
Question 2: What's your biggest transportation ISSUE? (**choose ONE**)

A. Barriers to walking / biking
B. Transit options
C. Poor road connectivity
D. Intersection design & signal timing
E. Infrastructure not aligned with growth
F. We're doing well for our size/pace of growth



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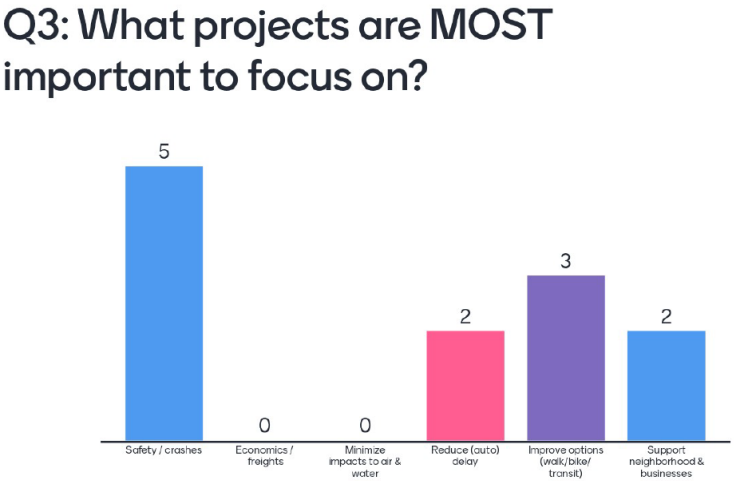
Question 3: What projects are MOST important to focus on? (choose TWO)

A. Safety/Crashes
B. Economics/ Freight
C. Minimize impacts to air & water
D. Reducing auto delay
E. Improving options (walking, biking, transit)
F. Supporting neighborhoods and business interests



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Trends we see

- Technology emerging
- Cultural / Lifestyle shifts
- Aging populations
- Changing economy
- Hybrid/ WFH Work Choices
- Shrinking revenues

26

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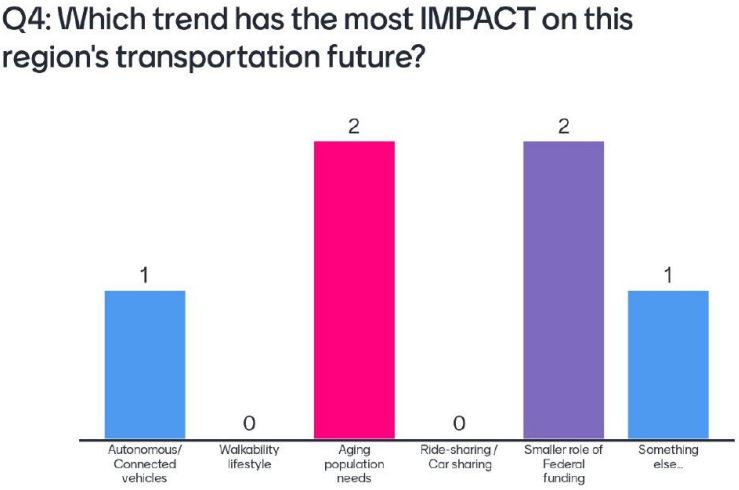
QUESTION 4: Which trend has the most IMPACT on this region's transportation future? (choose ONE)

A. Autonomous/Connected vehicles
B. Walkability lifestyle
C. Aging population needs
D. Ride-sharing / Car sharing
E. Smaller role of federal funding
F. Something else…



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Rethinking the Role of Streets

PHOTO CREDIT:
HTTP://CHARLESTONINSIDEOUT.NET/HISTORIC-KING-STREET-IN-1915/

28

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Rethinking the Role of Streets

PHOTO CREDIT: HTTP://COASTALCONSERVATIONLEAGUE.ORG/NEWS/BLOG/ERRORS-OMISSION/

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Streets are Inadequate

- No sidewalks
- Too dangerous to cross on foot
- Uninviting for bus riders
- Not safe for bicyclists
- No room for people!
- Inaccessible for wheelchairs

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Every mode needs…

- Convenience
- Safety
- Comfort
- Access
- Predictability
- Affordability
- Reasonable travel time

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Safety benefits

- U.S. Pedestrian deaths are at the highest level in 41 years –
  - 7,500 struck and killed while walking on US streets

- Complete Streets reduce crashes through comprehensive safety improvements

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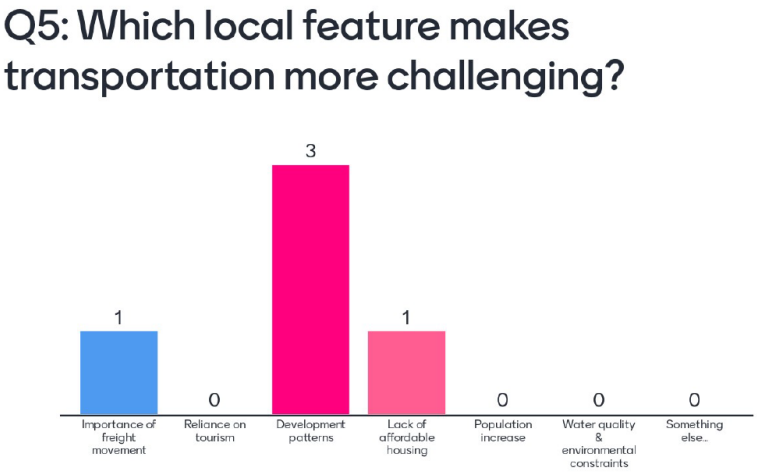
Question 5: Which local feature makes transportation more challenging? (choose ONE)

A. Importance of freight movement
B. Reliance on tourism
C. Development patterns
D. Lack of affordable housing (people making longer trips)
E. Population increase
F. Water & environmental constraints
G. Something else…



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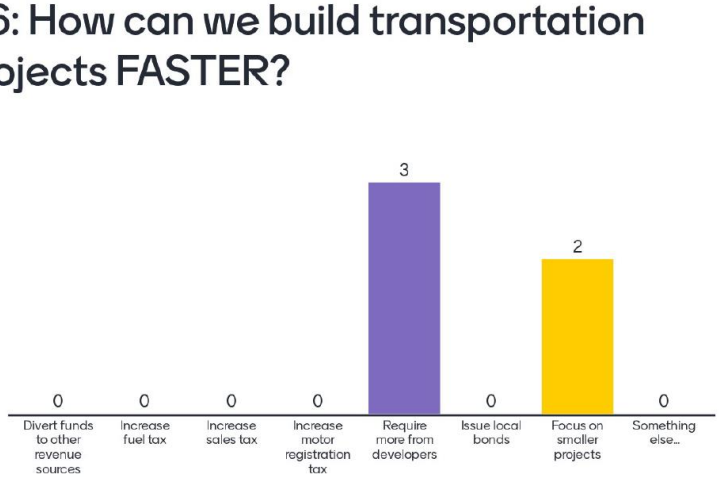
Question 6: How can we build transportation projects FASTER? (choose ONE)

A. Divert funds from other revenue sources
B. Increase fuel tax
C. Increase sales tax
D. Increase motor registration tax
E. Require more from developers (Impact Fees, etc.)
F. Issue local bonds
G. Focus on smaller, "bang-for-the-buck" projects
H. Something else…



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Let's talk MTP / Regional Goals!!!

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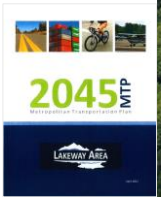
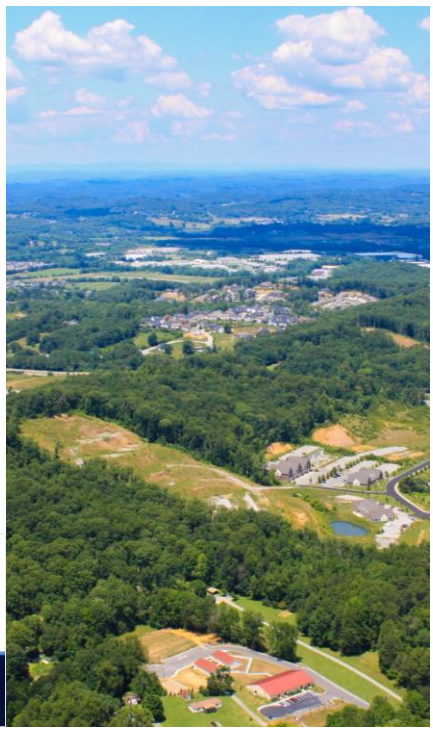
2045 MTP – 10 GOALS

1. An **Efficient** transportation system
2. Improve **Safety**
3. Promote **Security**
4. Maintain & improve the quality of the **Natural Environment**
5. Improve **Mobility** (personal & freight)
6. Effectively manage **Financial Resources**

Carried over from 2040 MTP

7. Environmental **Sustainability**
8. System **Reliability**
9. **Congestion** reduction
10. Infrastructure **Conditions**





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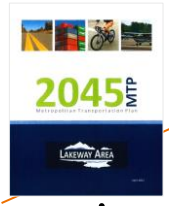
Consolidation Opportunities?



1. An **Efficient** transportation system
2. Improve **Safety**
3. Promote **Security**
4. Maintain & improve the quality of the **Natural Environment**
5. Improve **Mobility** (personal & freight)
6. Effectively manage **Financial Resources**
7. Environmental **Sustainability**
8. System **Reliability**
9. **Congestion** reduction
10. Infrastructure **Conditions**

- Maintenance & Efficiency
- Mode Choice
- Safety & Security
- Health & Environment
- Equitable Access
- Congestion Reduction
- Preservation of Places
- Economy & Freight

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What *don't* we know?

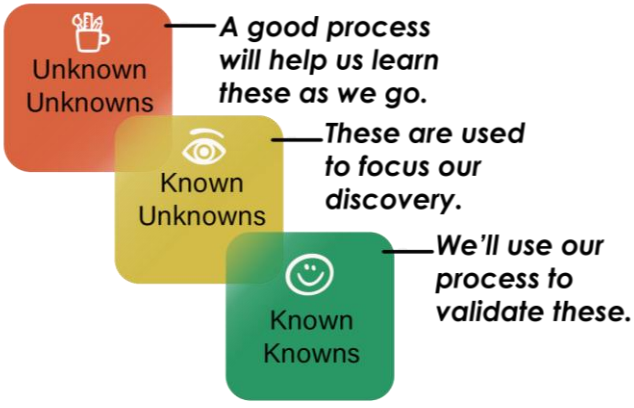
Let's Discuss

Previous planning efforts / studies?

Additional data resources?

Important destinations?

Problem topics?



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Agenda

1. Welcome / Introductions
2. Advisory Committee – Roles
3. Schedule
4. Outreach Strategy
5. Interactive Mapping Exercise
6. Action Items

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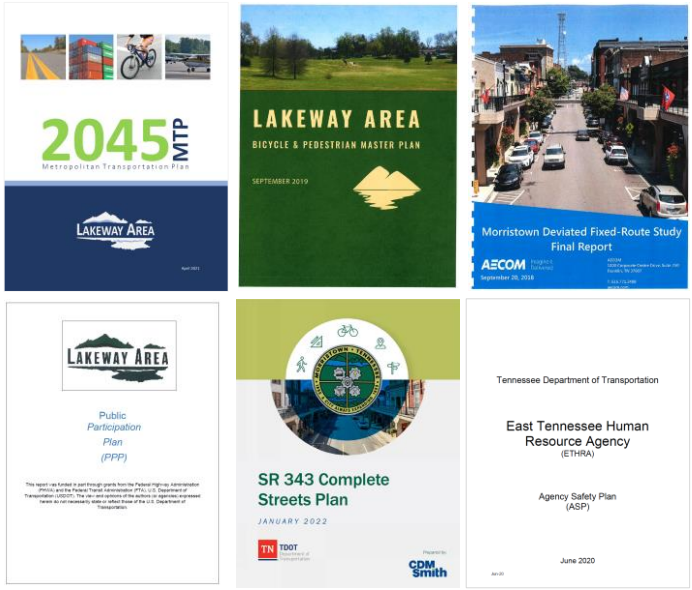
Coordination Items

Background Resources

- Previous studies / plans / reports?
- Additional data sources?
- What don't we know?



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Action Items

We need from YOU…

- **PROMOTE** the website + survey + interactive map
- Send us more data / resources to fill any knowledge gaps!

STANTEC is working towards…

- Existing conditions / synthesis
- TAC #2 – *tbd*
- Community Event – Round #1 – Dec-Jan 2025
  - Multiple events /dates

Agenda

Lakeway MPO
2050 MTP Update

Technical Advisory Committee (TAC)
TAC#2 Meeting

February 15, 2024 @ 10 AM (in-person)

Meeting Agenda

1. **Welcome / Introductions** – *Today's objectives* (LAMTPO) - 5 min
2. **Review of Schedule, Outreach, Resource Needs** (Stantec) - 5 min
3. **FHWA Requirements for MTP Update** (Stantec) - 15 min
4. **Vision & Goals Discussion** (Stantec) – 30 min
5. **Funding Trends** (Stantec) – 15 min
6. **Action Items / Next Steps** (Stantec) – 5 min

Meeting Attendees & Notes:

Attendees: (15); Steve Neilson (LAMTPO), Troy Ebert (TDOT), Mike Patterson (ETHRA), Mark Potts (Jefferson County), Laura Smith (ETDD), Ekem Eamonoo-Lartson (ETDD), Michael Dick (TDOT), Josh Cole (Morristown), Larry Clark (Morristown), Gary Chesney (Morristown), Jodi Barnard (Chamber of Commerce), Bill Brittain (Hamblen County), Porter Massengill (Jefferson City), Tony Cox (Morristown), Andrew Ellard (Morristown)

Discussed TDOT 10-Year Plan – Build with Us (Troy Ebbert, TDOT) https://www.tn.gov/tdot/build-with-us.html

- Each of TN's 4 regions will receive $750M for the first 3-year priority projects (total of $3B)
- Transportation Management Areas (TMAs) will receive additional funding (Lakeway is not a TMA)
- Assumes a 3.8% annual inflation rate (more conservative in the short term)
- Projects are prioritizing: Safety, Congestion, Economic Growth, Preservation, and Livability/Sustainability

Three (3) projects overlap with the LAMTPO Boundary

FY2024-2026 – 3-year Plan Project

- (5) Hamblen County – State Route 34 widening $67M
- (6) Hawkins County – State Route 31 reconstruction $11M – LAMTPO boundary *touches* this roadway

TMA Bridge Program

- (R1-B1) Jefferson County – Bridge Maintenance Program $216M

Review of Schedule & Outreach to Date

- This project is transitioning from Phase 1 (outreach and assembly) to Phase 2 (needs analysis), where a significant amount of data analysis and synthesis of information will occur.
- We reviewed the varying outreach strategies for different groups of people, from the very broad/general public to the specific/technical TAC members.
- Outreach to date has included:
  - 110+ unique visitors to the project website www.LAMTPOforward.com
  - 120+ survey participants – ***would benefit from more transit users***
  - 72 points of interest added to the ArcGIS Online interactive map
  - ~28 sign in participants to our Community Open House event (Thursday evening)

FHWA Requirements for MTP Update

- Reviewed the essential elements of an MTP update, including all modes, 20+ years into the future, and the movement of people and goods (freight).
- This is a good reminder of the flexibility that FHWA provides its MPOs to plan for *their* future accordingly.
- Reminder of Stantec's role in this process, receiving data/plans from LAMTPO's members and providing:
    - Validation // Synthesis // Integration of needs
- Review of the revised TPO boundary, which has been revised as of the Census 2020 definition for urbanized boundaries:
    - added land surrounding Bean Station, and lost area near New Market, for a net gain of +1.37 square miles (+0.44%)

Visioning Discussion

- Reminder of what TAC#1 meeting discussed
- Review of Population projections to 2045 from the prior plan, and discussion of whether this annual growth rate (+0.6%) still feels reasonable/appropriate for our 2050 projections
    - Discussed that residential permits would be an interesting trend of recent housing growth
    - Also discussed school enrollment trends
- Will likely utilized population growth projections that are *consistent* with Knoxville TPO projections
    - Woods & Poole projections (data purchase)

Funding Trends

- Reviewed assumptions from 2045 MTP, including: ($350M by 2050)
    - Project revenue growth of **~+2.5% per year**
    - **Inflation** cost increases of **~+3.6% per year** (aligns closely with TDOT 10-year plan assumption)
- Reviewed the previous mix of project funds by funding category:
    - NHPP 53%
    - State-STBG 16%
    - IMPROVE Act 11% (ending; will be different acronym moving forward)
    - Local-STBG 9%
    - HSIP 7%
    - Other – State 4%
    - Transportation Alternatives (TA) <1%

Action items:

TAC members

- Compile and share population trend data, which may be in the form of:
    - Housing unit trends over the past 5+ years, or similar
    - School enrollment trends over the past 5+ years, or similar
- Correct anything that we have mislabeled, or described above
- **Share the project website www.LAMTPOforward.com** and help promote the Survey + Interactive Map
    - Reshare Steve's posts on LinkedIn and NextDoor

Stantec team

- Facilitate and summarize Community Engagement Round #1 (tonight)
- Review financial trend spreadsheet and see input on funding trends (2019-23)

Attachments: Presentation slides

Lakeway Forward: LAMTPO 2050 MTP Update

Technical Advisory Committee (TAC) – Meeting #2
February 15, 2024

TDOT Department of Transportation
Stantec

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Agenda

1. Welcome / Introductions
2. Review of Schedule / Outreach
3. FHWA Requirements
4. Visioning Discussion
5. Funding Trends
6. Action Items

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Project Team

Steve Neilson
Interim MTPO Coordinator
sneilson@mymorristown.com

Michelle Christian
Sr. Community Transportation Planner
michelle.a.christian@tn.gov

Troy Ebbert
Planning Supervisor, Region 1
troy.j.ebbert@tn.gov

Mike Rutkowski
Project Director
mike.rutkowski@stantec.com

Timothy Tresohlavy
Project Manager
timothy.tresohlavy@stantec.com

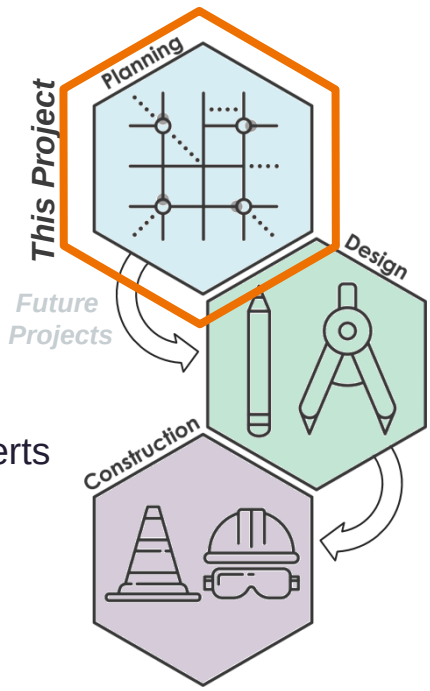
Roles

Stantec—the 'process'

- Synthesizing information
- Facilitation
- Technical assistance and best practices

Advisory Committee—the local experts

- Meeting logistics, scheduling
- Local area knowledge & community vision
- Identifying the "***who***" needs to be involved?
  - *YOU know YOU better than us!*



Agenda

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Schedule

20-month time frame
Sept 2023 – May 2025

WE ARE HERE!

Outreach + Data Assembly	Round #1	Needs Assessment + Initial Recommendations	Round #2	Refining Recommendations + Reporting
Fall / Winter 2023	*February 2024*	Spring / Summer 2024	*Summer / Fall 2024*	Winter / Spring 2025

- ☑ Digital Public Outreach
  - Project website
  - Online survey
  - Interactive map
- ☑ Existing Conditions review
  - Data assembly
  - Prior plans / documents
- Focus Group "listening sessions"

- Synthesis of regional vision/goals
- Mobility gap analysis
- Planning factors / Performance Measures
- Financial projections to 2050
- Scenario planning & project review

- Synthesis of public feedback
- Prioritization
- Draft Plan
  - Public Comment Period
- Final Plan / Adoption

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Outreach Strategy

What to expect…

- ☑ **Website + Online Survey + Interactive Map**
  - Digital outreach 24-hours / 7-days
- **Technical Advisory Committee (TAC)**
  - Total of eight (8) – half virtual
- **Community Events:** two (2) rounds
  - ☑ *Issues & Vision:* citizens provide direction
  - *Priorities:* citizens provide feedback
- **Focus Groups:** up to four (4), virtual "listening"
  - Topics identified – need help *identifying the 'who'*

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Outreach to date

- **110+** unique visitors to website
- **120+** survey participants
- **72** point of interest added
- Community Open House Event:
  - Thursday evening 4-7 pm

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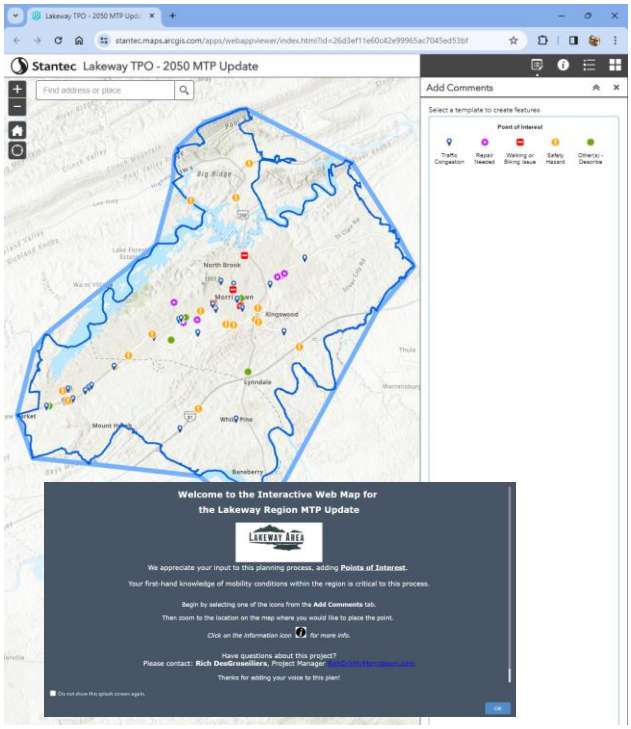
Interactive Map

Point of Interest

72 points added

- Traffic Congestion
- Repair Needed
- Walking or Biking Issue
- Safety Hazard
- Other(s) - Describe

24-hours per day – thru Spring 2024



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FHWA Guidance

- *"… development of a transportation plan addressing **at least 20+ years** horizon, featuring both long-range and short-range strategies to develop an **integrated intermodal** transportation system that facilitates the efficient movement of **people** and **goods**."*
  - Identify congestion management strategies, meeting 23 CFR part 500
    - Demonstrate a systemic approach to address current & future transportation demand
    - Identify SOV projects that result in congestion reduction
  - Identify pedestrian walkways, and bicycle transportation facilities 23 USC 217(g)
  - Include a financial plan with historical trends and *projected* revenue sources

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Good News!

- Much of this work has been accomplished through *other* projects/plans
  - Lakeway – Morristown Complete Streets Report (2022)
  - ETHRA – Agency Safety Plan (2020)
  - Lakeway TPO – Bike/Pedestrian Plan (2019)
  - Morristown Fixed Route Study (2018)
- Our strategy is to:

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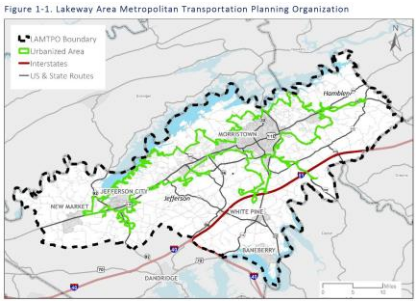
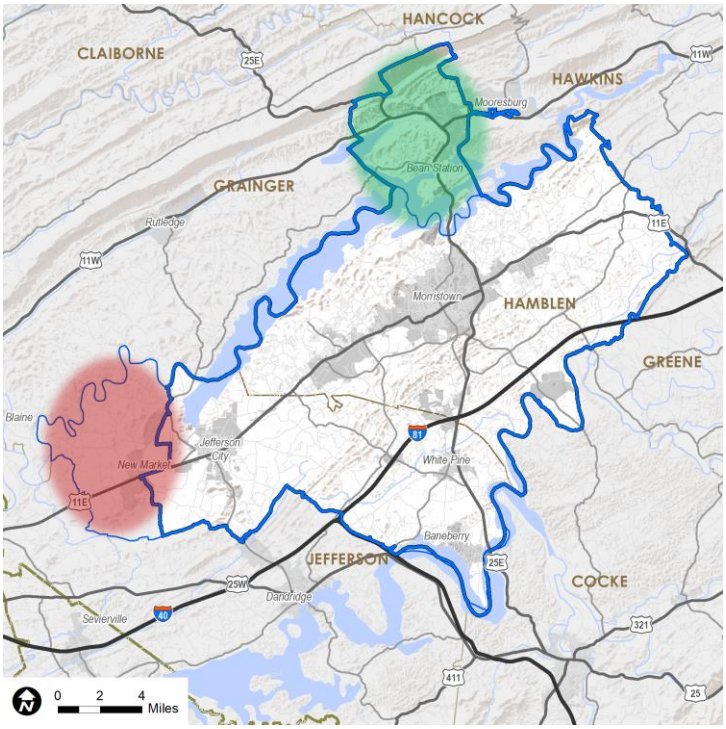
LAMTPO Boundary

Adjustments since 2021

- **Added** to LAMTPO
- **Removed** from LAMTPO
- Net change:
  - +1.37 square miles (+0.44%)





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Agenda

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TAC#1 Meeting we discussed…

- US Census data / Demographics
- Employment
- Transit Service
- Current TIP projects
- Goals

- Now let's discuss…
  - What we do with this, and
  - How we project population growth

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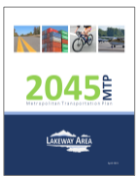
Population growth projections

From the 2045 Mobility Plan →

- **2018 Base Year**
- **Data sources:**
  - LAMTPO Travel Demand Model
  - *Others?*
- **Projections for:**
  - Total population (+15k by 2045)
  - Land Uses

    Agricultural land conversion:
    - Residential (+37%)
    - Commercial (+35%)
    - Industrial (+12%)



Land Use	2018 Land Use (Acres)	2045 Land Use (Acres)	Change (2018-2045)	% Change (2018-2045)
Agriculture	89,964.1	73,269.2	-16,694.8	-18.6%
Commercial	3,246.1	4,375.3	1,129.2	34.8%
Industrial	4,371.9	4,875.4	503.5	11.5%
Public Lands	8,705.5	8,705.5	0.0	0.0%
Residential (High-Density)	6,073.2	6,996.0	922.7	15.2%
Residential (Low-Density)	64,333.4	78,504.1	14,170.7	22.0%
Total	176,694.2	176,725.5	-	-

Source: LAMTPO, 2020

Table 5-2. Lakeway Region Change in Population, 2018 to 2045

County	2018	2045	Change (2018-2045)	% Change (2018-2045)
Hamblen	64,569	72,535	7,966	12.3%
Jefferson (MTPO Portion)	28,500	35,709	7,209	25.3%
Total	93,069	108,244	15,175	16.3%

Source: LAMTPO Travel Demand Model, 2020

+0.6% annual growth

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Let's discuss…

- **What worked well?** ***What didn't?***
  - 2018 Plan relied heavily on the Travel Demand Model projections *(0.6% annual growth)*
  - Land use changes were included
  - Jefferson County growth: ½ within LAMTPO portion; ½ outside of LAMTPO

- **What TRENDS are impacting your region?**
  - Housing affordability? Spillover from adjacent Knoxville region?
  - Domestic migration?
  - Aging in place?
  - Other(s)?

- **TPO Boundary has grown for LAMTPO** (+1.37 square miles)
  - + portions Grainger County (Bean Station), Hawkins County
  - - portions of Jefferson County (New Market)

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Agenda

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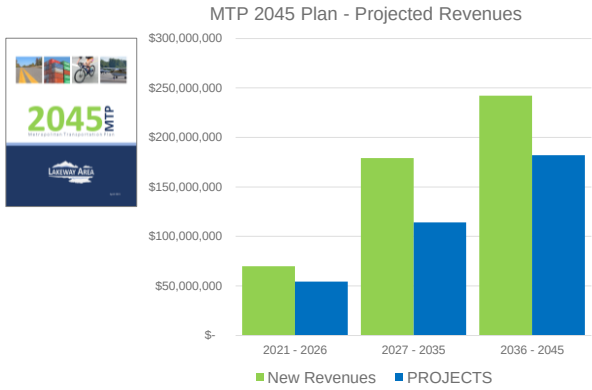
Financial Projections *(2045 plan)*

- Revenue projections for roadways
  - State funds ***only to supplement federal dollars***,
- Assumptions:
  - Revenue growth: **~2.5% per year**
  - Cost increase: **~3.6% per year**
- Are these assumptions still accurate?



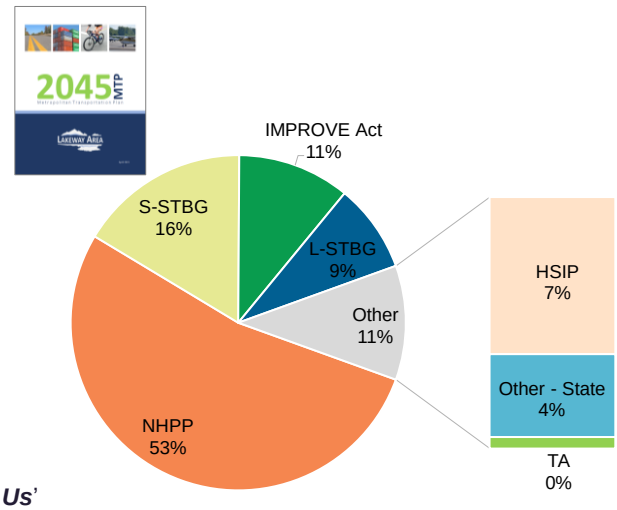
HORIZON	New Revenues	PROJECTS	% Total
2021 - 2026	$ 69,698,379	$ 54,492,914	*16%*
2027 - 2035	$ 179,191,475	$ 114,004,866	*33%*
2036 - 2045	$ 242,231,254	$ 181,946,106	*52%*
	$ 491,121,108	**$ 350,443,886**	

23

Let's Discuss…

- TDOT's recent **10-Year Plan** has implications for the region:
  - *How does this affect our projections?*
- The **IIJA Act** was passed, and **new funding programs are available**… such as…
- Year of Expenditure (YOE) costs
  - TDOT: 3.8% from 10-year plan – '***Build with Us***'
  - *This MTP should use… (discussion)*

Projects by Funding Programs



$350 Million by 2045 Horizon

24

Agenda

1. Welcome / Introductions
2. Review of Schedule / Outreach
3. FHWA Requirements
4. Visioning Discussion
5. Funding Trends
6. Action Items

28

Action Items

What don't we know?…

- Any knowledge gap(s)?
- Continue to **PROMOTE** the project website www.LAMTPOforward.com

STANTEC is working towards…

- Existing conditions / synthesis
- TAC #3 – *Spring 2024*
- Community Event – Round #1 TONIGHT!

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Agenda

Lakeway Area MTPO
2050 MTP Update

Technical Advisory Committee TAC
TAC#3 Meeting

May 2, 2024 @ 9 am (virtual)

Meeting Agenda

1. **Welcome / Schedule Update** (Stantec) – 5 min
2. **Outreach to Date** (Stantec) – 10 min
3. **Project Audit / Table** (of 2045 projects) – 10+ min
   a. Excel Spreadsheet
4. **Interactive Mapping Demo / Exercise** (Stantec) – 20+ min
   a. ArcGIS Online: <link>
5. **Action Items / Next Steps** (Team) - 5 min

Adjourn

Project Contacts

Project Manager(s)

Steve Neilson, Interim MTPO Coordinator — 423.586.3291 — sneilson@mymorristown.com

TDOT – Long Range Planning

Michelle Christian, Sr Community Trans. Planner — 865.594.0211 — michelle.a.christian@tn.gov
Troy Ebbert, Planning Supervisor, Region 1 — 865.594.2662 — troy.j.ebbert@tn.gov

Project Consultants — Stantec Project Team

Mike Rutkowski, PE, AICP, Project Director — 919.277.3106 — Mike.Rutkowski@stantec.com
Timothy Tresohlavy, AICP, GISP, Project Manager — 252.258.5193 — Timothy.Tresohlavy@stantec.com

Lakeway Forward: LAMTPO 2050 MTP Update

Technical Advisory Committee (TAC) – Meeting #3
June 6, 2024

1

2

Schedule

20-month time frame
Sept 2023 – May 2025

WE ARE HERE!

Outreach + Data Assembly	Needs Assessment + Initial Recommendations	Refining Recommendations + Reporting
Fall / Winter 2023	Spring / Summer 2024	Winter / Spring 2025
	February 2024 Round #1	***Summer / Fall 2024*** Round #2
☑ Digital Public Outreach • Project website • Online survey • Interactive map ☑ Existing Conditions review • Data assembly • Prior plans / documents ☑ Focus Group "listening sessions"	• Synthesis of regional vision/goals • Project Audit / New Project Needs • Mobility gap analysis • New projects needed • Planning factors / Performance Measures • Financial projections to 2050 • Scenario planning & project review	• Synthesis of public feedback • Prioritization • Draft Plan • Public Comment Period • Final Plan / Adoption

2

Outreach to date

- **696+** unique visitors to website
- **447** survey participants
- **406** point of interest added
- Community Open House Event:
  - Thursday Feb 15th, 4-7 pm

LAMTPOforward.com ☑

Survey ☑

Interactive Map ☑

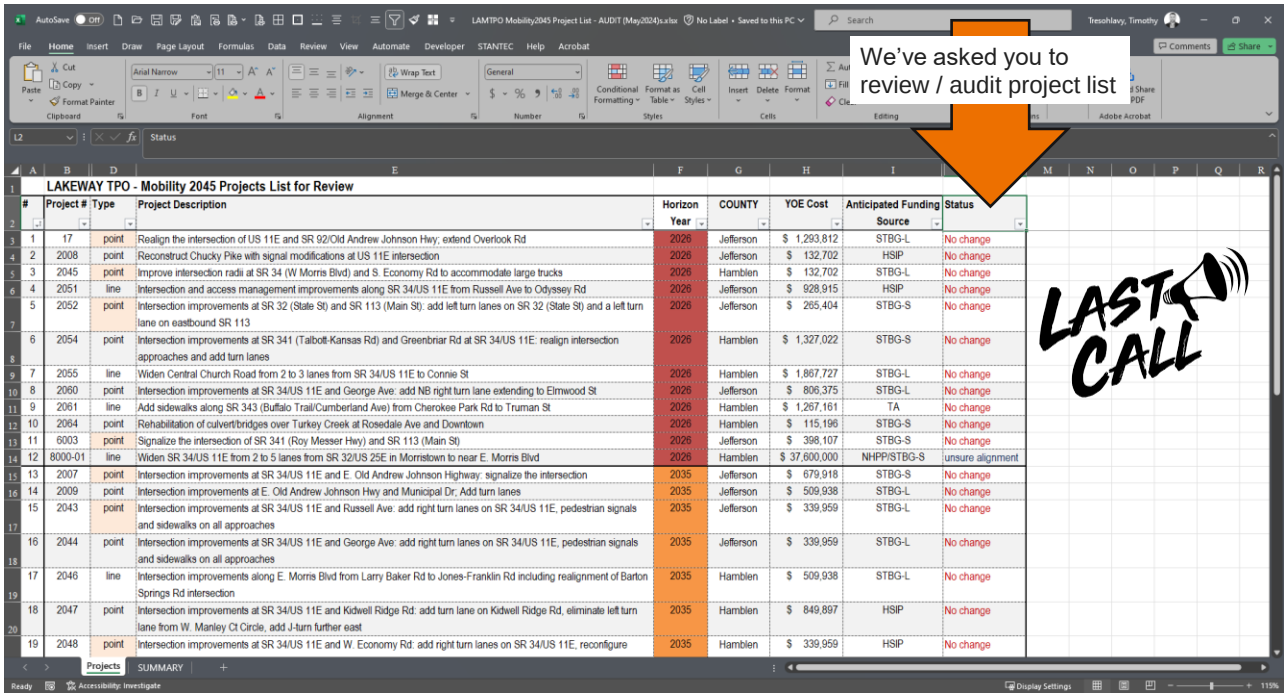
Focus Group 'listening sessions' (x5) ☑

Community Event – Round #1 ☑

Community Event – Round #2

Morristown 2/15

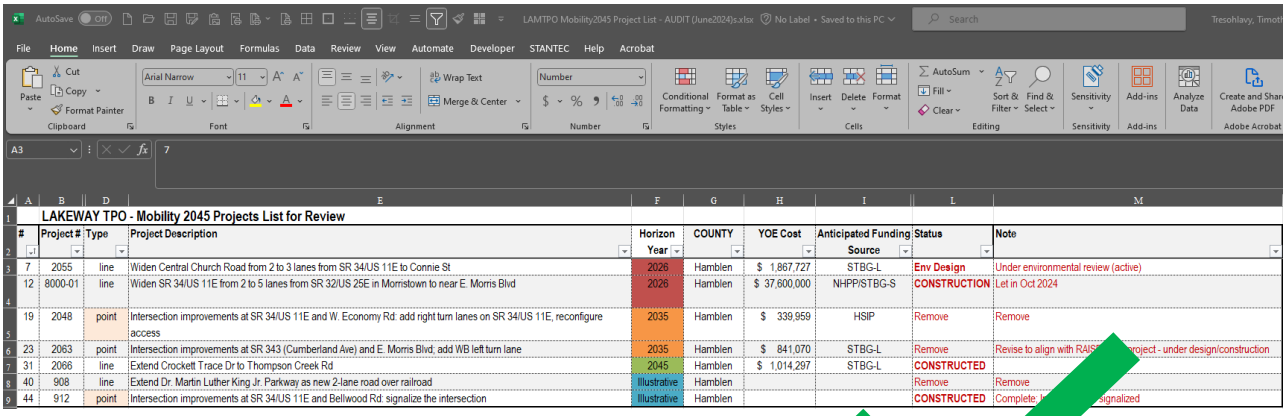
3



LAKEWAY TPO - Mobility 2045 Projects List for Review

#	Project #	Type	Project Description	Horizon Year	COUNTY	YOE Cost	Anticipated Funding Source	Status
1	17	point	Realign the intersection of US 11E and SR 92/Old Andrew Johnson Hwy; extend Overlook Rd	2026	Jefferson	$ 1,293,812	STBG-L	No change
2	2008	point	Reconstruct Chucky Pike with signal modifications at US 11E intersection	2026	Jefferson	$ 132,702	HSIP	No change
3	2045	point	Improve intersection radii at SR 34 (W Morris Blvd) and S. Economy Rd to accommodate large trucks	2026	Hamblen	$ 132,702	STBG-L	No change
4	2051	line	Intersection and access management improvements along SR 34/US 11E from Russell Ave to Odyssey Rd	2026	Jefferson	$ 928,915	HSIP	No change
5	2052	point	Intersection improvements at SR 32 (State St) and SR 113 (Main St): add left turn lanes on SR 32 (State St) and a left turn lane on eastbound SR 113	2026	Jefferson	$ 265,404	STBG-S	No change
6	2054	point	Intersection improvements at SR 341 (Talbott-Kansas Rd) and Greenbriar Rd at SR 34/US 11E: realign intersection approaches and add turn lanes	2026	Hamblen	$ 1,327,022	STBG-S	No change
7	2055	line	Widen Central Church Road from 2 to 3 lanes from SR 34/US 11E to Connie St	2026	Hamblen	$ 1,867,727	STBG-L	No change
8	2060	point	Intersection improvements at SR 34/US 11E and George Ave: add NB right turn lane extending to Elmwood St	2026	Jefferson	$ 806,375	STBG-L	No change
9	2061	line	Add sidewalks along SR 343 (Buffalo Trail/Cumberland Ave) from Cherokee Park Rd to Truman St	2026	Hamblen	$ 1,267,161	TA	No change
10	2064	point	Rehabilitation of culvert/bridges over Turkey Creek at Rosedale Ave and Downtown	2026	Hamblen	$ 115,196	STBG-S	No change
11	6003	point	Signalize the intersection of SR 341 (Roy Messer Hwy) and SR 113 (Main St)	2026	Jefferson	$ 398,107	STBG-S	No change
12	8000-01	line	Widen SR 34/US 11E from 2 to 5 lanes from SR 32/US 25E in Morristown to near E. Morris Blvd	2026	Hamblen	$ 37,600,000	NHPP/STBG-S	unsure alignment
13	2007	point	Intersection improvements at SR 34/US 11E and E. Old Andrew Johnson Highway: signalize the intersection	2035	Jefferson	$ 679,918	STBG-S	No change
14	2009	point	Intersection improvements at E. Old Andrew Johnson Hwy and Municipal Dr; Add turn lanes	2035	Jefferson	$ 509,938	STBG-L	No change
15	2043	point	Intersection improvements at SR 34/US 11E and Russell Ave: add right turn lanes on SR 34/US 11E, pedestrian signals and sidewalks on all approaches	2035	Jefferson	$ 339,959	STBG-L	No change
16	2044	point	Intersection improvements at SR 34/US 11E and George Ave: add right turn lanes on SR 34/US 11E, pedestrian signals and sidewalks on all approaches	2035	Jefferson	$ 339,959	STBG-L	No change
17	2046	line	Intersection improvements along E. Morris Blvd from Larry Baker Rd to Jones-Franklin Rd including realignment of Barton Springs Rd intersection	2035	Hamblen	$ 509,938	STBG-L	No change
18	2047	point	Intersection improvements at SR 34/US 11E and Kidwell Ridge Rd: add turn lane on Kidwell Ridge Rd, eliminate left turn lane from W. Manley Ct Circle, add J-turn further east	2035	Hamblen	$ 849,897	HSIP	No change
19	2048	point	Intersection improvements at SR 34/US 11E and W. Economy Rd: add right turn lanes on SR 34/US 11E, reconfigure	2035	Hamblen	$ 339,959	HSIP	No change

4



LAKEWAY TPO - Mobility 2045 Projects List for Review

#	Project #	Type	Project Description	Horizon Year	COUNTY	YOE Cost	Anticipatnd Funding Source	Status	Note
7	2055	line	Widen Central Church Road from 2 to 3 lanes from SR 34/US 11E to Connie St	2026	Hamblen	$ 1,867,727	STBG-L	Env Design	Under environmental review (active)
12	8000-01	line	Widen SR 34/US 11E from 2 to 5 lanes from SR 32/US 25E in Morristown to near E. Morris Blvd	2026	Hamblen	$ 37,600,000	NHPP/STBG-S	CONSTRUCTION	Let in Oct 2024
19	2048	point	Intersection improvements at SR 34/US 11E and W. Economy Rd: add right turn lanes on SR 34/US 11E, reconfigure access	2035	Hamblen	$ 339,959	HSIP	Remove	Remove
23	2063	point	Intersection improvements at SR 343 (Cumberland Ave) and E. Morris Blvd; add WB left turn lane	2035	Hamblen	$ 841,070	STBG-L	Remove	Revise to align with RAISE project - under design/construction
31	2066	line	Extend Crockett Trace Dr to Thompson Creek Rd	2045	Hamblen	$ 1,014,297	STBG-L	CONSTRUCTED	
40	908	line	Extend Dr. Martin Luther King Jr. Parkway as new 2-lane road over railroad	Illustrative	Hamblen			Remove	Remove
44	912	point	Intersection improvements at SR 34/US 11E and Bellwood Rd: signalize the intersection	Illustrative	Hamblen			CONSTRUCTED	Complete; signalized

Seven (7) projects have been removed / completed

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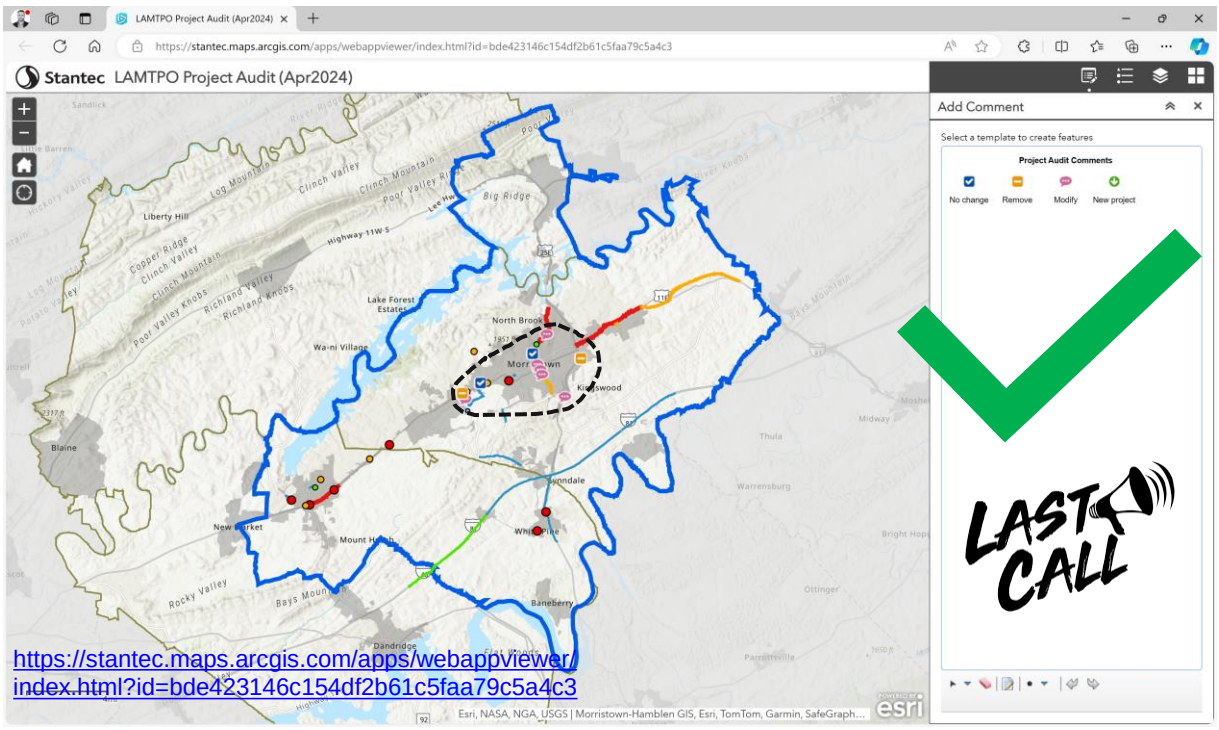

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Action Items

Looking ahead

- New projects needed
  - Preparing a 'call for projects' sheet to help describe and document new projects needed
- Continue to **PROMOTE** the project website www.LAMTPOforward.com

STANTEC is working towards…

- Financial revenue projections
- Performance review
  - Safety (PM1)
  - Maintenance (PM2)
  - Bottlenecks / Travel Time Reliability (PM3)
  - Sustainability & Resilience

Lakeway Forward: LAMTPO 2050 MTP Update

Technical Advisory Committee (TAC) – Meeting #4
July 10, 2024

1

2

General Timeline

20-month time frame
Sept 2023 – May 2025

WE ARE HERE!

Outreach + Data Assembly	Round #1	Needs Assessment + Initial Recommendations	Round #2	Refining Recommendations + Reporting
Fall / Winter 2023	*February 2024*	Spring / Summer 2024	*Fall 2024*	Winter / Spring 2025

- Public Outreach – Round #1
  - Digital and In-person events
- Existing Conditions assembly / review
- Regional vision / goals

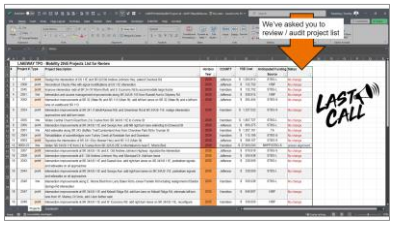
- Review of Performance Measures
- Financial projections to 2050
- Project review / audit
- New project needs
- Travel Demand Model deficiencies
- Project Lists / Maps – all modes

- Prioritization Public Outreach – Round #2
- Draft Plan
  - Public Comment Period
- Final Plan / Adoption

2

Last Month we shared…

- Outreach to date – metrics
- Review of 2045 projects
  - table format (XLSX)
  - ArcGIS Online format



3

Review of 2045 Projects

- **44 projects reviewed**
  - 3 project dropped / removed (7%)
  - 4 projects completed (9%)
  - 8 projects modified descriptions (18%)

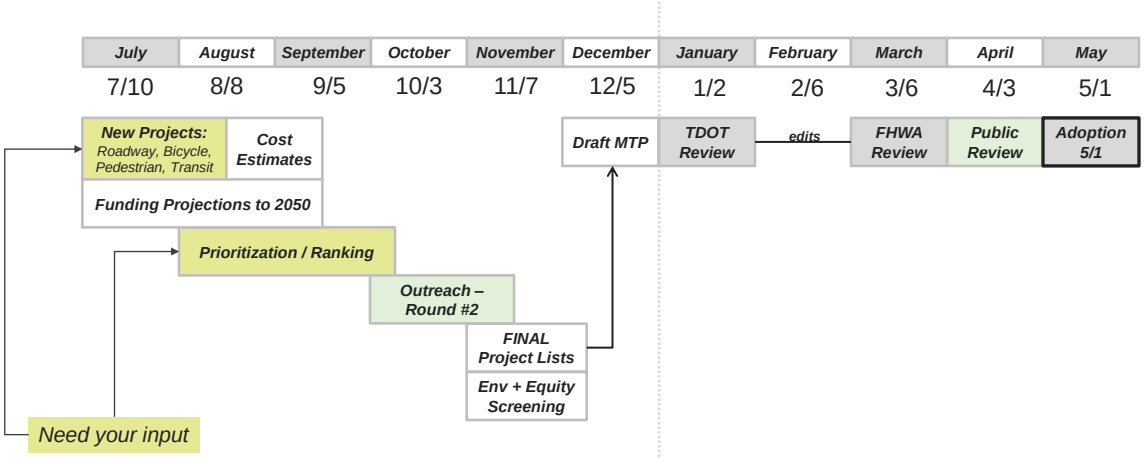
7 fewer projects

Revised Project List by Year

#	Year	Cost
11	2026	$ 7,177,334
13	2035	$ 94,258,292
3	2045	$152,831,149
10	Illustrative	$ -
37		**$254,266,775**

4

Working Backwards from Adoption



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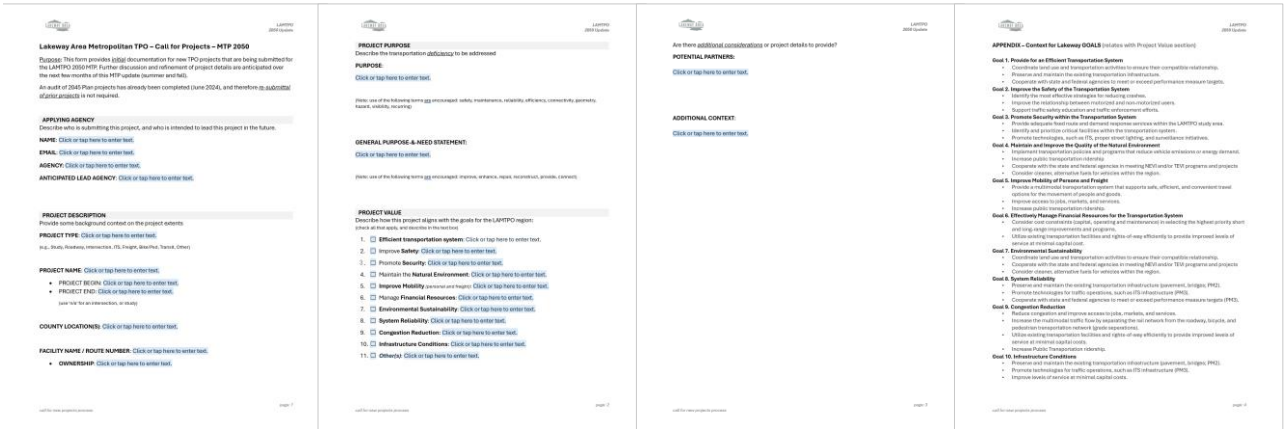
Our ***current task priorities*** are…

- New projects: **MTP** + ***TDOT SPP call for projects***
- Travel demand model: deficiencies in Base / Future Years
- Future revenue projections to 2050

6

New Projects / "Call for Projects"

- **MTP update** + **TDOT Statewide Partnership Program** (SPP) update
- Standard fillable form: MS Word format, 4 pages



Lakeway Area Metropolitan TPO – Call for Projects – MTP 2050

Purpose: This form provides initial documentation for new TPO projects that are being submitted for the LAMTPO 2050 MTP. Further discussion and refinement of project details are anticipated over the next few months of this MTP update (summer and fall).

An audit of 2045 Plan projects has already been completed (June 2024), and therefore re-submittal of prior projects is not required.

APPLYING AGENCY
Describe who is submitting this project, and who is intended to lead this project in the future.

NAME: Click or tap here to enter text.

EMAIL: Click or tap here to enter text.

AGENCY: Click or tap here to enter text.

ANTICIPATED LEAD AGENCY: Click or tap here to enter text.

PROJECT DESCRIPTION
Provide some background context on the project extents

PROJECT TYPE: Click or tap here to enter text.

(e.g., Study, Roadway, Intersection, ITS, Freight, Bike/Ped, Transit, Other)

PROJECT NAME: Click or tap here to enter text.

- PROJECT BEGIN: Click or tap here to enter text.
- PROJECT END: Click or tap here to enter text.

(use 'n/a' for an intersection, or study)

COUNTY LOCATION(S): Click or tap here to enter text.

FACILITY NAME / ROUTE NUMBER: Click or tap here to enter text.

- **OWNERSHIP:** Click or tap here to enter text.

PROJECT PURPOSE
Describe the transportation deficiency to be addressed

PURPOSE:

Click or tap here to enter text.

(Note: use of the following terms are encouraged: safety, maintenance, reliability, efficiency, connectivity, geometry, hazard, visibility, recurring)

GENERAL PURPOSE & NEED STATEMENT:

Click or tap here to enter text.

(Note: use of the following terms are encouraged: improve, enhance, repair, reconstruct, provide, connect)

PROJECT VALUE
Describe how this project aligns with the goals for the LAMTPO region:
(check all that apply, and describe in the text box)

1. ☐ **Efficient transportation system:** Click or tap here to enter text.
2. ☐ Improve **Safety**: Click or tap here to enter text.
3. ☐ Promote **Security:** Click or tap here to enter text.
4. ☐ Maintain the **Natural Environment**. Click or tap here to enter text.
5. ☐ **Improve Mobility** (personal and freight): Click or tap here to enter text.
6. ☐ Manage **Financial Resources**: Click or tap here to enter text.
7. ☐ **Environmental Sustainability**: Click or tap here to enter text.
8. ☐ **System Reliability**: Click or tap here to enter text.
9. ☐ **Congestion Reduction:** Click or tap here to enter text.
10. ☐ **Infrastructure Conditions**: Click or tap here to enter text.
11. ☐ **Other(s):** Click or tap here to enter text.

Are there additional considerations or project details to provide?

POTENTIAL PARTNERS:

Click or tap here to enter text.

ADDITIONAL CONTEXT:

Click or tap here to enter text.

APPENDIX – Context for Lakeway GOALS (relates with Project Value section)

Goal 1. Provide for an Efficient Transportation System
- Coordinate land use and transportation activities to ensure their compatible relationship.
- Preserve and maintain the existing transportation infrastructure.
- Cooperate with state and federal agencies to meet or exceed performance measure targets.

Goal 2. Improve the Safety of the Transportation System
- Identify the most effective strategies for reducing crashes.
- Improve the relationship between motorized and non-motorized users.
- Support traffic safety education and traffic enforcement efforts.

Goal 3. Promote Security within the Transportation System
- Provide adequate fixed route and demand response services within the LAMTPO study area.
- Identify and prioritize critical facilities within the transportation system.
- Promote technologies, such as ITS, proper street lighting, and surveillance initiatives.

Goal 4. Maintain and Improve the Quality of the Natural Environment
- Implement transportation policies and programs that reduce vehicle emissions or energy demand.
- Increase public transportation ridership.
- Cooperate with the state and federal agencies in meeting NEVI and/or TEVI programs and projects
- Consider cleaner, alternative fuels for vehicles within the region.

Goal 5. Improve Mobility of Persons and Freight
- Provide a multimodal transportation system that supports safe, efficient, and convenient travel options for the movement of people and goods.
- Improve access to jobs, markets, and services.
- Increase public transportation ridership.

Goal 6. Effectively Manage Financial Resources for the Transportation System
- Consider cost constraints (capital, operating and maintenance) in selecting the highest priority short and long range improvements and programs.
- Utilize existing transportation facilities and rights-of-way efficiently to provide improved levels of service at minimal capital cost.

Goal 7. Environmental Sustainability
- Coordinate land use and transportation activities to ensure their compatible relationship.
- Cooperate with the state and federal agencies in meeting NEVI and/or TEVI programs and projects
- Consider cleaner, alternative fuels for vehicles within the region.

Goal 8. System Reliability
- Preserve and maintain the existing transportation infrastructure (pavement, bridges; PM2).
- Promote technologies for traffic operations, such as ITS infrastructure (PM3).
- Cooperate with state and federal agencies to meet or exceed performance measure targets (PM3).

Goal 9. Congestion Reduction
- Reduce congestion and improve access to jobs, markets, and services.
- Increase the multimodal traffic flow by separating the rail network from the roadway, bicycle, and pedestrian transportation network (grade separations).
- Utilize existing transportation facilities and rights-of-way efficiently to provide improved levels of service at minimal capital costs.
- Increase Public Transportation ridership.

Goal 10. Infrastructure Conditions
- Preserve and maintain the existing transportation infrastructure (pavement, bridges; PM2).
- Promote technologies for traffic operations, such as ITS infrastructure (PM3).
- Improve levels of service at minimal capital costs.

7

This Fall we will be discussing…

- Prioritization of projects according to our (10) Goals
  - Efficiency, Safety, Security, Natural Environment, Mobility, Financials, Sustainability, Reliability, Congestion, Maintenance
- Project cost estimates
- Applying fiscal-constraints for 2030 / 2040 / 2050 projects
- Screening for *potential* impact to vulnerable populations & environmental

8

Action Items

YOU should be working towards…

- New projects needed
  - Roadways / Freight
  - Bike / Pedestrian
  - Transit
- New Policy changes?
  - Corridor / Access Management
  - ITS / Technology
  - Safety / Traffic Calming
- Outreach Round #2 venues

STANTEC is working towards…

- Survey for prioritization (*goals*)
- Financial revenue projections
- Performance review
  - Safety (PM1)
  - Maintenance (PM2)
  - Bottlenecks / Travel Time Reliability (PM3)
  - Sustainability & Resilience

Lakeway Forward: LAMTPO 2050 MTP Update

Technical Advisory Committee (TAC) – Meeting #5
October 3, 2024

1

2

General Timeline

20-month time frame
Sept 2023 – May 2025

WE ARE HERE!

Outreach + Data Assembly	Round #1	Needs Assessment + Initial Recommendations	Round #2	Refining Recommendations + Reporting
Fall / Winter 2023	*February 2024*	Spring / Summer 2024	*Fall 2024*	Winter / Spring 2025

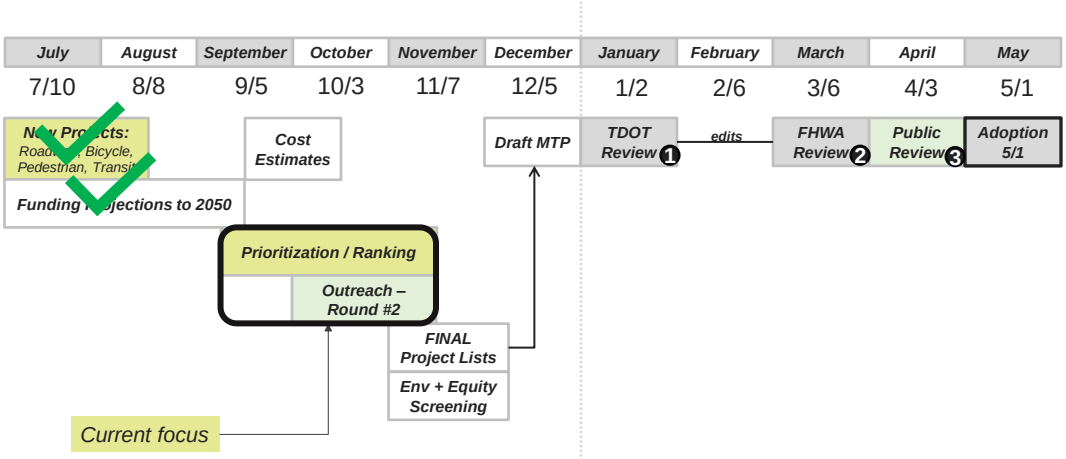
- **Public Outreach – Round #1**
  - Digital and In-person events
- Existing Conditions assembly / review
- Regional vision / goals

- Review of Performance Measures
- Financial projections to 2050
- Project review / audit
- New project needs
- Project Lists / Maps – all modes
- Travel Demand Model deficiencies

- **Public Outreach – Round #2**
- Draft Plan
  - Public Comment Period
- Final Plan / Adoption

2

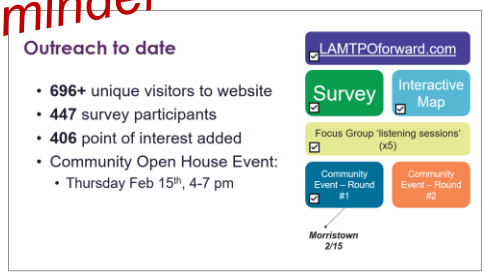
Working Backwards from Adoption

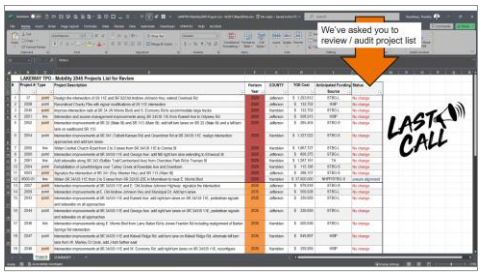


In June / July we shared…

Reminder

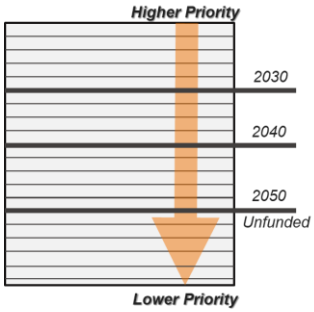
- Outreach to date – metrics
- Review of 2045 projects
  - table format (XLSX)
  - ArcGIS Online format





Our ***current task priorities*** are…

- New projects: **MTP** + ***TDOT SPP call for projects***
- Future revenue projections to 2050
- Travel demand model: deficiencies in Base / Future Years
- **Prioritized** list of projects, by mode
  a) "objective" data-driven process
  b) "subjective" adjustments by TAC members
- **Fiscal constrained** list of projects
  - Represents your regional needs for 25+ years!



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Action Items

YOU should be working towards…

- Outreach Round #2 – promote the Mountain Makin Festival 2024:
  - Friday 10/25 + Saturday 10/26 @ Rose Center for the Arts – Morristown, TN

STANTEC is working towards…

- Survey for prioritization (*goals*)
  - <click here>
- Performance review
  - Safety (PM1)
  - Maintenance (PM2)
  - Bottlenecks / Travel Time Reliability (PM3)
  - Sustainability & Resilience

6

Lakeway Forward: LAMTPO 2050 MTP Update

Executive Board Update – Meeting #6
January 8, 2025

1

2

General Timeline

20-month time frame
Sept 2023 – May 2025

WE ARE HERE!

Outreach + Data Assembly	Round #1	Needs Assessment + Initial Recommendations	Round #2	Refining Recommendations + Reporting
Fall / Winter 2023	*February 2024*	Spring / Summer 2024	*Oct 2024*	Winter / Spring 2025

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- Regional vision / goals

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- Project Lists / Maps – all modes
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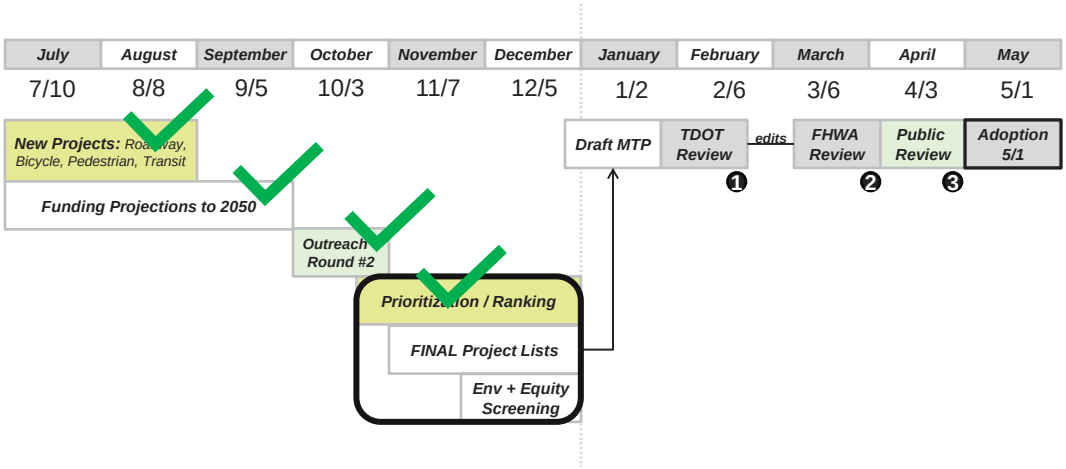
- **Public Outreach – Round #2**
- Draft Plan
  - Public Comment Period
- Final Plan / Adoption

2

Working Backwards from Adoption



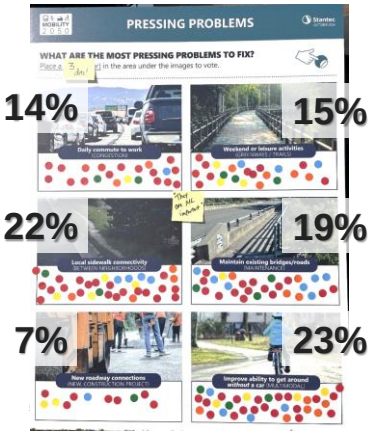
Outreach to date

- **717+** unique visitors to website
- **475** survey participants
- **412** point of interest added
- Community Open House Event:
  - Thursday Feb 15th, Morristown Landing
  - Saturday Oct 26th, Mtn. Makin Festival

MOBILITY 2050

Community Event Round #2

60+ participants



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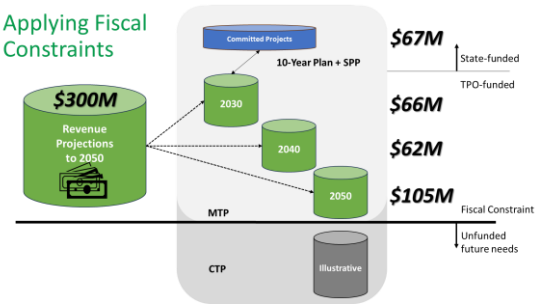
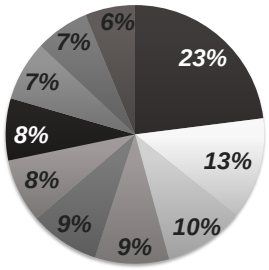
Our ***current task priorities*** are…

- ✓ New projects: **MTP** + ***TDOT SPP call for projects***
- ✓ Future revenue projections to 2050
- ✓ **Prioritized** list of projects, by mode
  a) "objective" data-driven process
  b) "subjective" adjustments by TAC members
- **Fiscal constrained** project list
  - Represents your regional needs for 25+ years!



6

GOALS – Survey Results



1. Improve **Safety** (23%)
2. Effectively manage **Financial Resources** (13%)
3. Reduce **Congestion** (10%)
4. An **Efficient** transportation system (9%)
5. Infrastructure **Conditions** (9%)
6. Maintain & improve the quality of the **Natural Environment** (8%)
7. Promote **Security** (8%)
8. Improve **Mobility** (personal & freight) (7%)
9. System **Reliability** (7%)
10. Environmental **Sustainability** (6%)

7

Action Items

YOU should be <u>anticipating</u>…

- List of Prioritized Projects
  - For review and 'manual' adjustments
- Draft MTP document
  - For review and comment

STANTEC is finalizing…

- Prioritization into horizon years
- Fiscal constraints
- Draft MTP document for review
  - Incorporate edits → Final MTP document

9

Appendix D

Public Engagement

Engagement Activities

* Project website traffic
* Online survey
* ArcGIS Online interactive map
* Focus Group "listening sessions"
* Public Workshop #1 - Feb 2024
* Public Workshop #2 - Oct 2024
    * Promotion in local newspapers

Project Website

www.LAMTPOforward.com

Fall 2023 to
Spring 2025

2050 Metropolitan Transportation Plan Update

ABOUT

The Lakeway Area Metropolitan Transportation Planning Organization (LAMTPO) operates as the regional transportation planning agency for portions of the urbanized areas in Morristown, Jefferson City, White Pine, Bean Station, and portions of Hamblen, Jefferson, Grainger, and Hawkins Counties, also closely coordinating with the Tennessee Department of Transportation throughout planning activities. LAMTPO is responsible for carrying out a continuing, cooperative, and comprehensive regional transportation planning process.

Why this MTP?

The Metropolitan Transportation Plan (MTP) update spans the next quarter-century and represents the collective transportation goals of city and county governments, transit agencies, and TDOT.

Including an analysis of current regional trends as well as projections for what to expect in the future, including identifying how partners intend to invest federal transportation dollars to improve transportation across The Lakeway Region. The MTP represents community goals and priorities for transportation investment.

The plan outcomes serve to represent the region's top priorities for state funding, based on current funding levels authorized by Congress from federal transportation dollars that are distributed by formula to states and metropolitan planning areas.

Project Timeline

The previous MTP was last adopted in April of 2021.

Click Here to review the previous MTP

Our Partners

2050 Metropolitan Transportation Plan Update

OUTREACH

Your input is an essential element of this process. We want you to guide the project team. Help us out by visiting the following links, and please also share them on Facebook, Twitter, Instagram, and YouTube so your friends and neighbors can also contribute.

Survey

We want to hear from you!

The Project Survey is the first line of engagement. The survey is completely confidential, and participation is voluntary. The answers you provide will be collected and aggregated. Survey results will be shared here, during public meetings, and in the resulting MTP report.

Be sure to share the link with your friends, family, and neighbors.

Click Here

Interactive Map

Visit the interactive online map to leave comments and suggestions for the Metropolitan Transportation Plan update. You'll be able to make comments directly onto the map by zooming in to areas, streets, or specific intersections. This creates valuable feedback that is already linked directly to specific locations.

If you leave your comment early on in the planning process, be sure to come back again to see how the map grows over time!

Click Here

Let's Talk!

Do you have questions, comments, or other insights to share with the project team?

Feel free to reach out to the Project Manager:

Steve Neilson, Morristown Development Director, Lakeway TPO Coordinator
SNeilson@mymorristown.com

Want project updates?

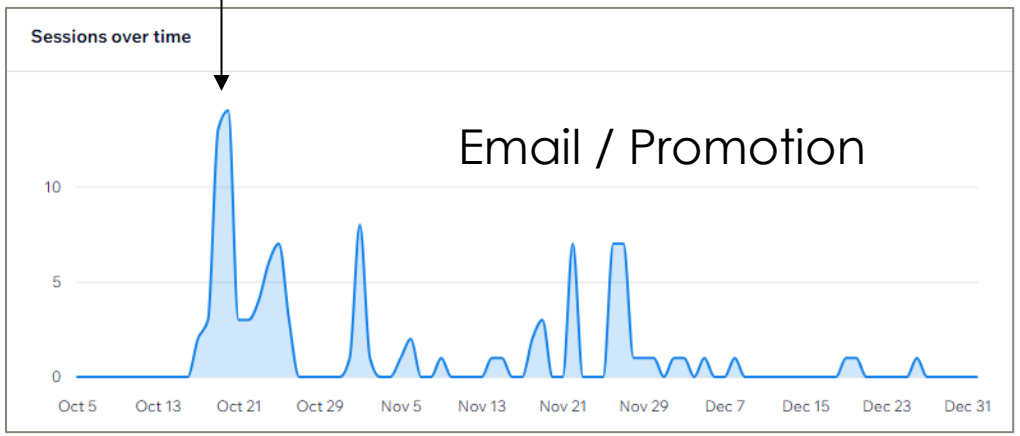
Subscribe to receive future updates:

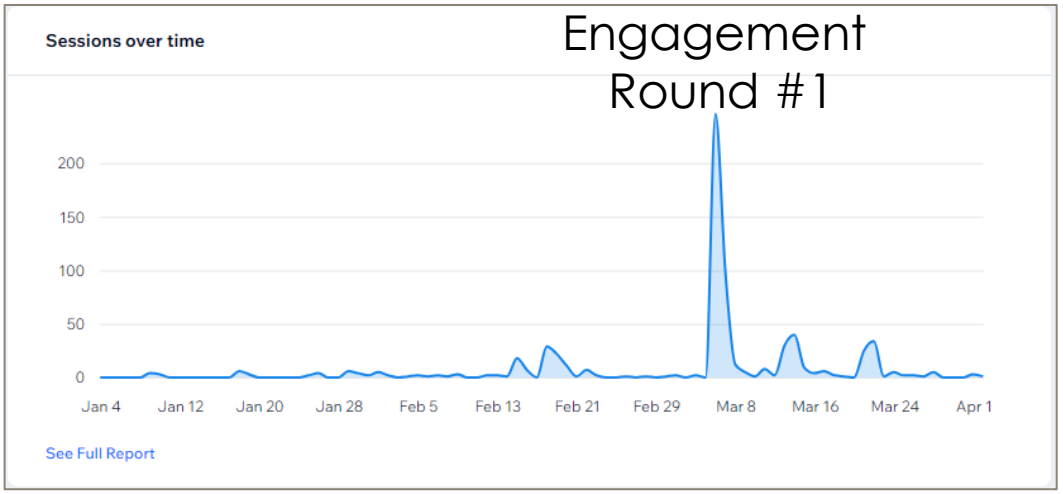
*Full Name**

*Email**

Website Traffic

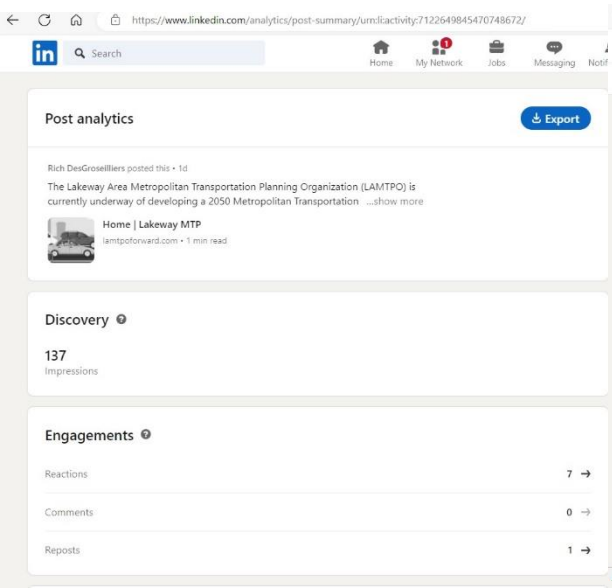
Website Launch

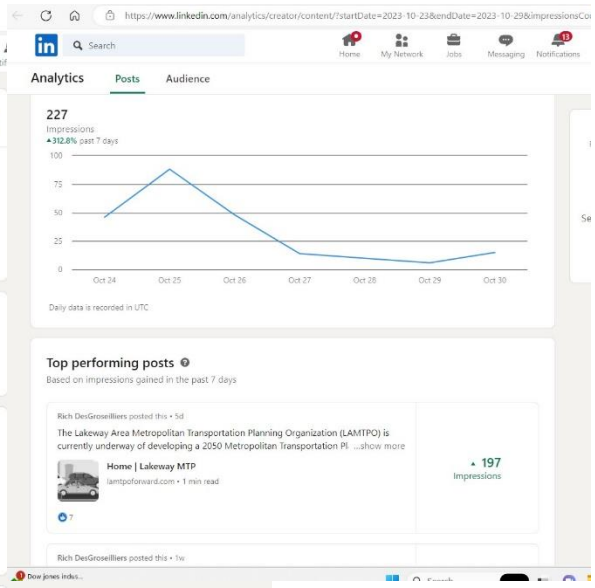


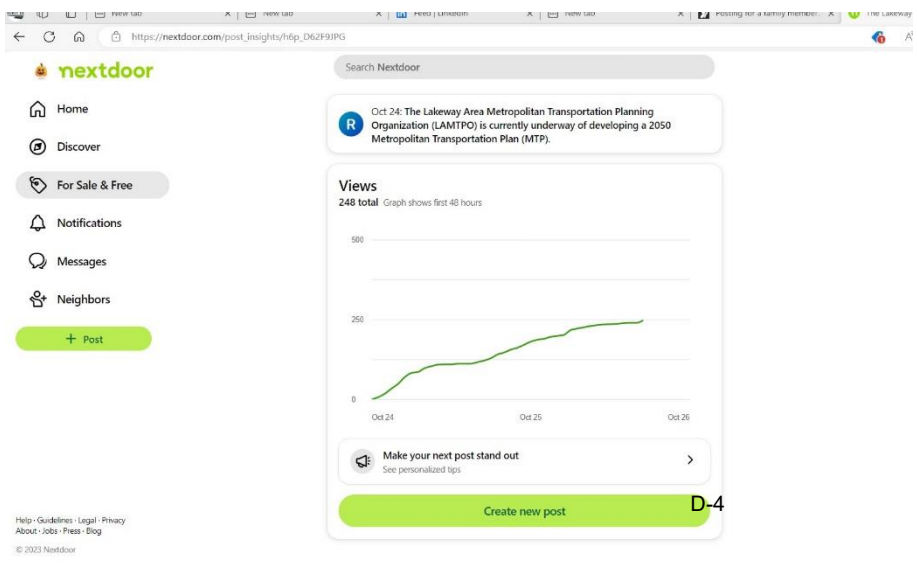


Oct 2023 — **Jan 2024** — **Apr 2024**

Promotion on Facebook / LinkedIn / NextDoor







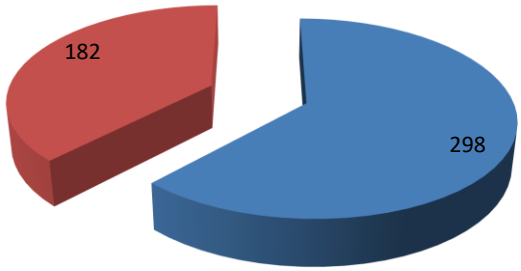
D-4

2050 MTP: Lakeway Area Metropolitan Transportation Planning Organization (LAMTPO)

Survey Results

Fall 2023 – Fall 2024

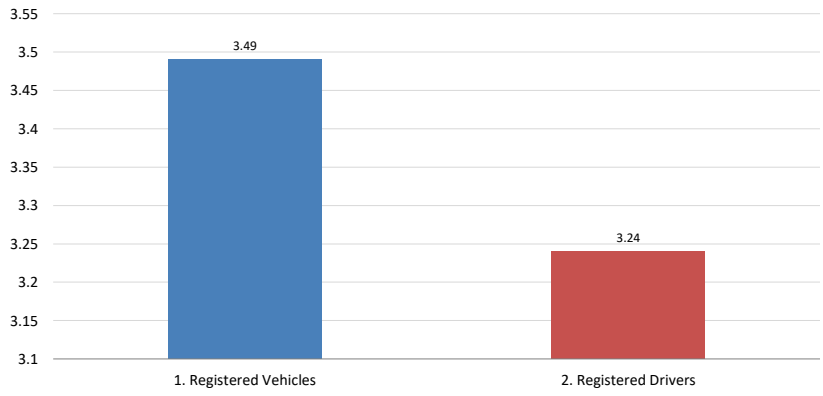
Completion / Dropout



Full Completion 62%
Partial Completion 38%
480 Total Respondents

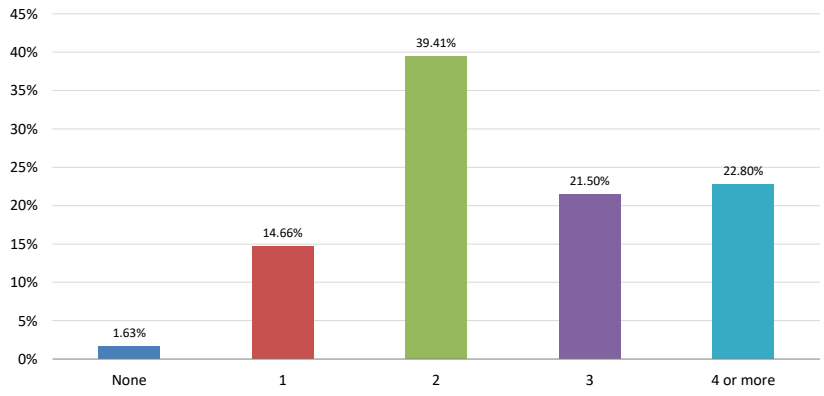
1

1. In your household, how many of the following do you have?



2

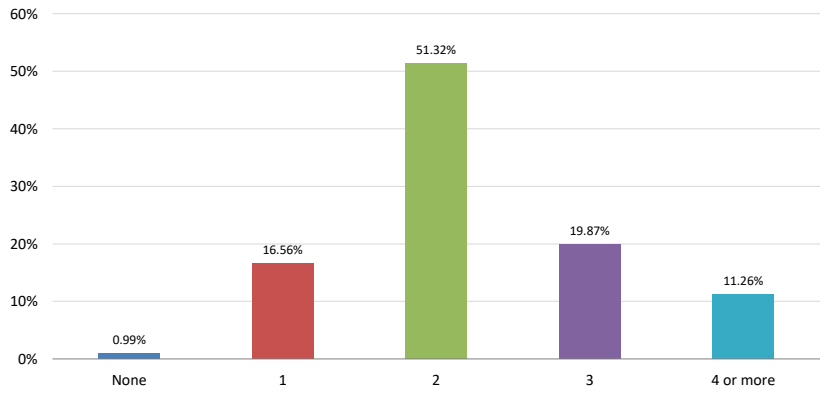
Registered Vehicles



Mean : 3.492 | Confidence Interval @ 95% : [3.375 - 3.609] | Standard Deviation : 1.049 | Standard Error : 0.060

3

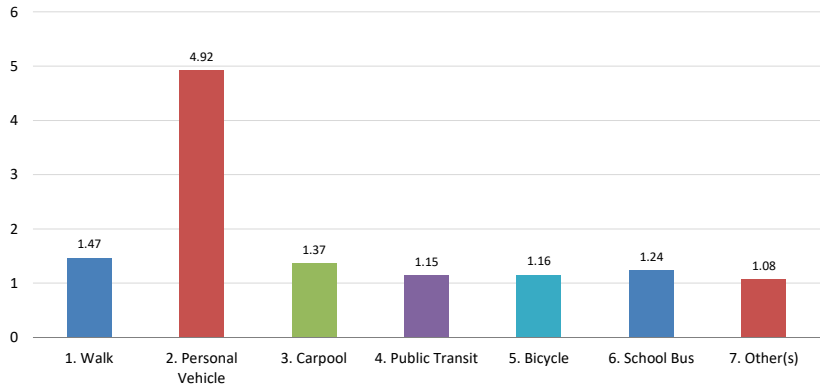
Registered Drivers



Mean : 3.238 | Confidence Interval @ 95% : [3.138 - 3.339] | Standard Deviation : 0.894 | Standard Error : 0.051

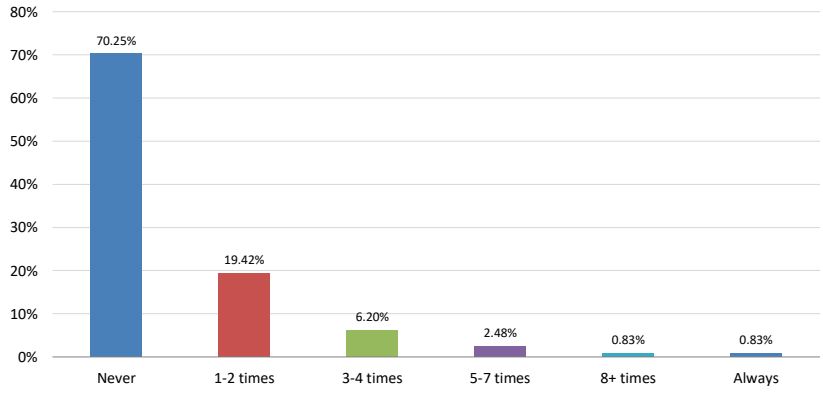
4

2. How many times EACH WEEK do you make a trip using the following modes?



5

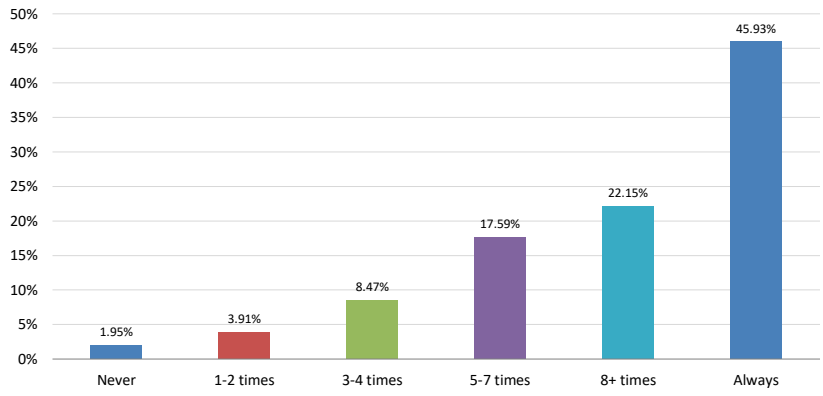
Walk



Mean : 1.467 | Confidence Interval @ 95% : [1.355 - 1.579] | Standard Deviation : 0.888 | Standard Error : 0.057

6

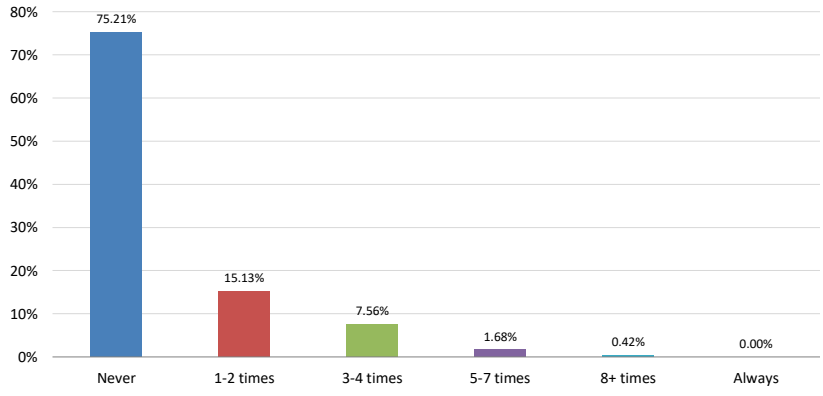
Personal Vehicle



Mean : 4.919 | Confidence Interval @ 95% : [4.775 - 5.062] | Standard Deviation : 1.280 | Standard Error : 0.073

7

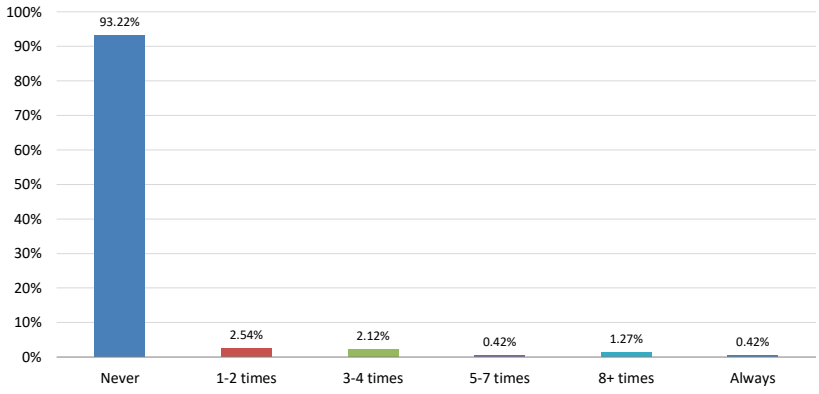
Carpool



Mean : 1.370 | Confidence Interval @ 95% : [1.277 - 1.463] | Standard Deviation : 0.733 | Standard Error : 0.048

8

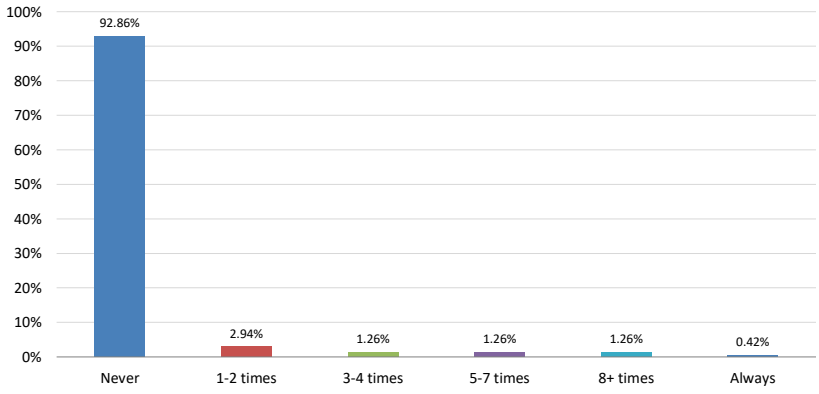
Public Transit



Mean : 1.153 | Confidence Interval @ 95% : [1.068 - 1.237] | Standard Deviation : 0.660 | Standard Error : 0.043

9

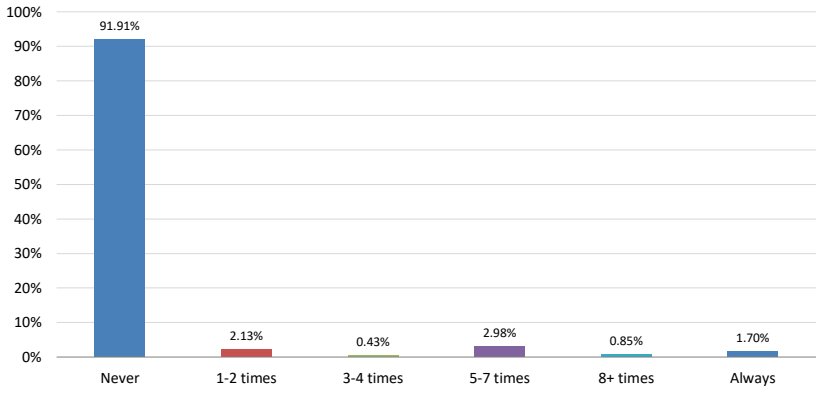
Bicycle



Mean : 1.164 | Confidence Interval @ 95% : [1.076 - 1.251] | Standard Deviation : 0.689 | Standard Error : 0.045

10

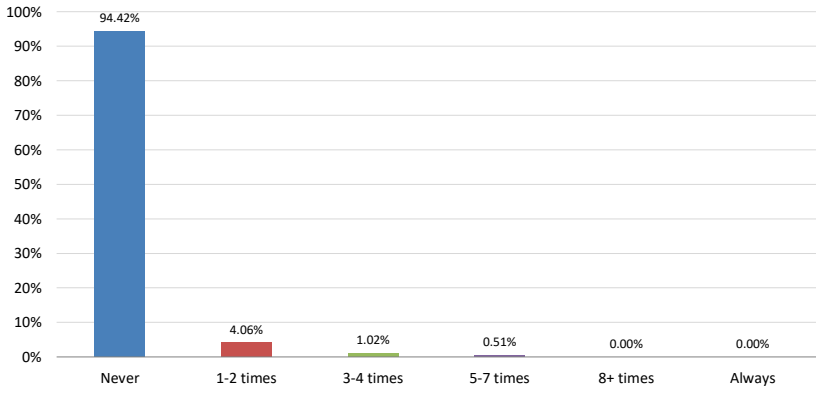
School Bus



Mean : 1.238 | Confidence Interval @ 95% : [1.123 - 1.354] | Standard Deviation : 0.903 | Standard Error : 0.059

11

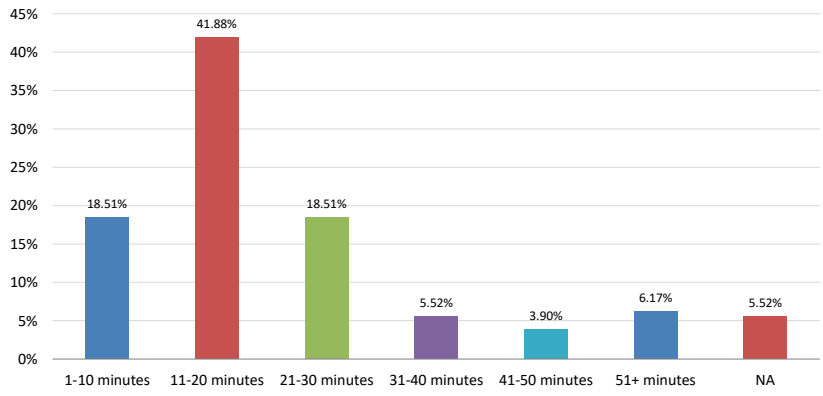
Other(s)



Mean : 1.076 | Confidence Interval @ 95% : [1.027 - 1.125] | Standard Deviation : 0.349 | Standard Error : 0.025

12

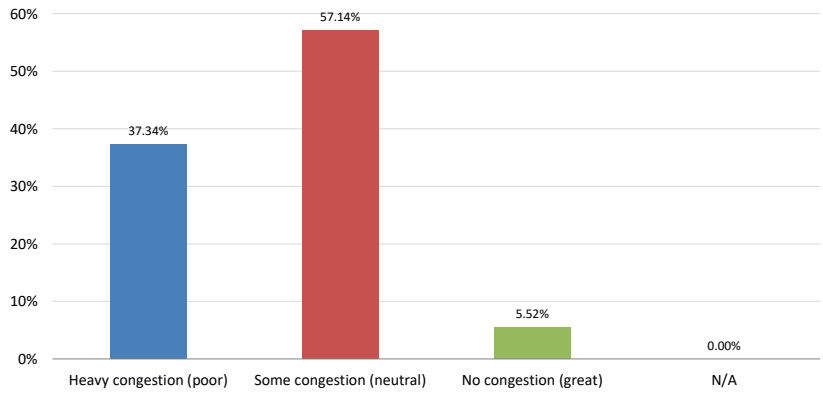
3. How long is your TYPICAL (1-way) commute time?



Mean : 2.750 | Confidence Interval @ 95% : [2.565 - 2.935] | Standard Deviation : 1.660 | Standard Error : 0.095

13

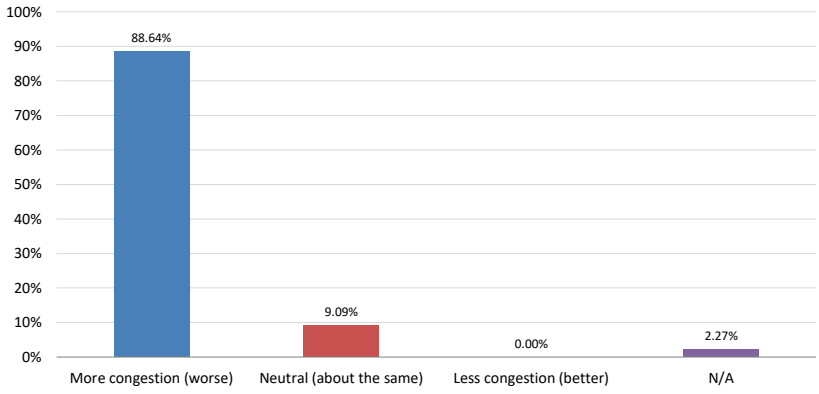
4. How would you rate the level of traffic CONGESTION on a typical day?



Mean : 1.682 | Confidence Interval @ 95% : [1.618 - 1.746] | Standard Deviation : 0.573 | Standard Error : 0.033

14

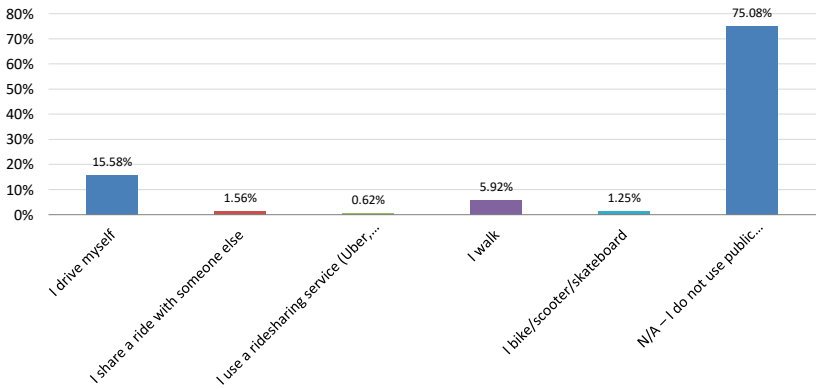
5. In your opinion, how have roadways CHANGED in the past five years?



Mean : 1.159 | Confidence Interval @ 95% : [1.101 - 1.217] | Standard Deviation : 0.521 | Standard Error : 0.030

15

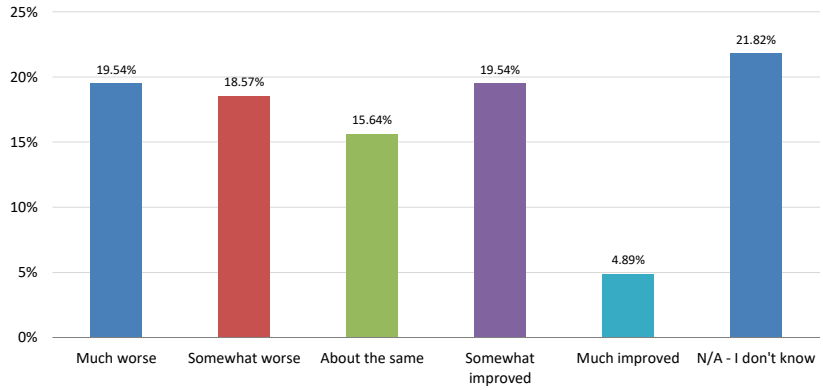
6. If you use Lakeway Transit, how do you travel to and from transit stops? (Select all that apply)



Mean : 5.009 | Confidence Interval @ 95% : [4.805 - 5.213] | Standard Deviation : 1.865 | Standard Error : 0.104

16

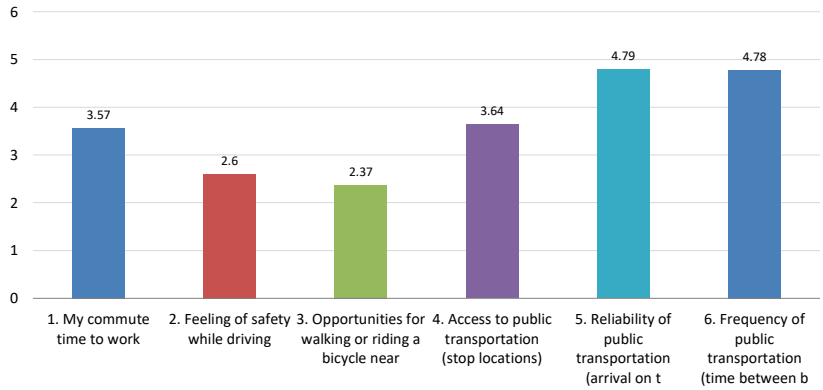
7. Over the past 5 years, do you think the TRANSPORTATION SYSTEM in the region is…



Mean : 3.371 | Confidence Interval @ 95% : [3.171 - 3.571] | Standard Deviation : 1.787 | Standard Error : 0.102

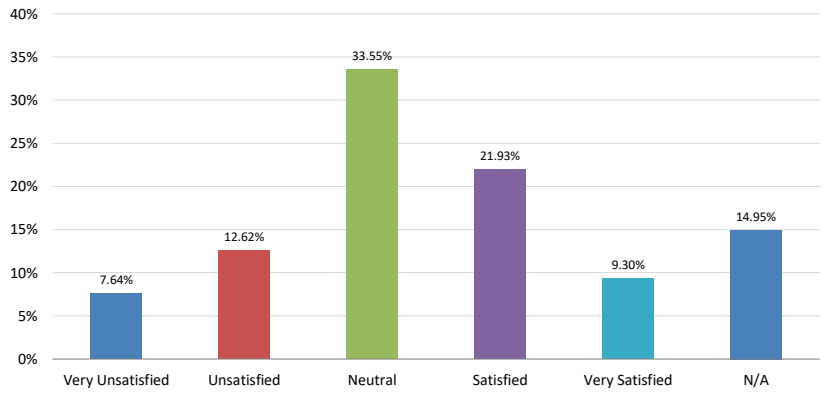
17

8. How SATISFIED are you with the following conditions?



18

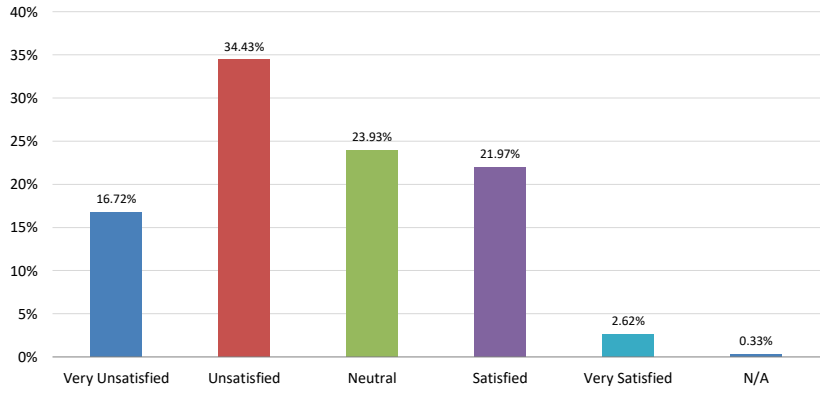
My commute time to work



Mean : 3.575 | Confidence Interval @ 95% : [3.413 - 3.736] | Standard Deviation : 1.430 | Standard Error : 0.082

19

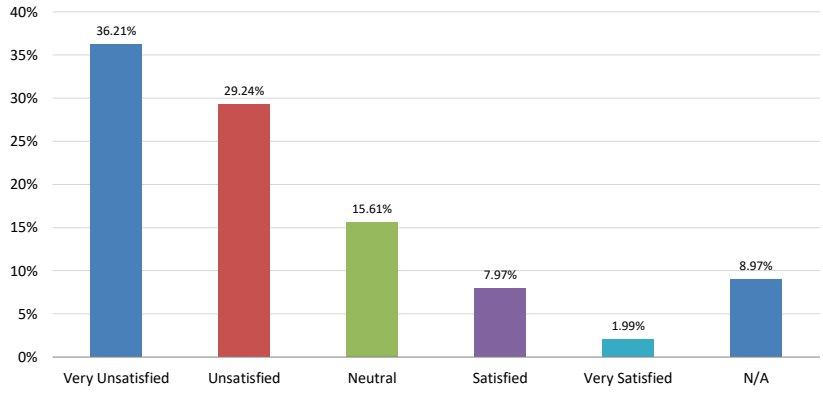
Feeling of safety while driving



Mean : 2.603 | Confidence Interval @ 95% : [2.480 - 2.727] | Standard Deviation : 1.102 | Standard Error : 0.063

20

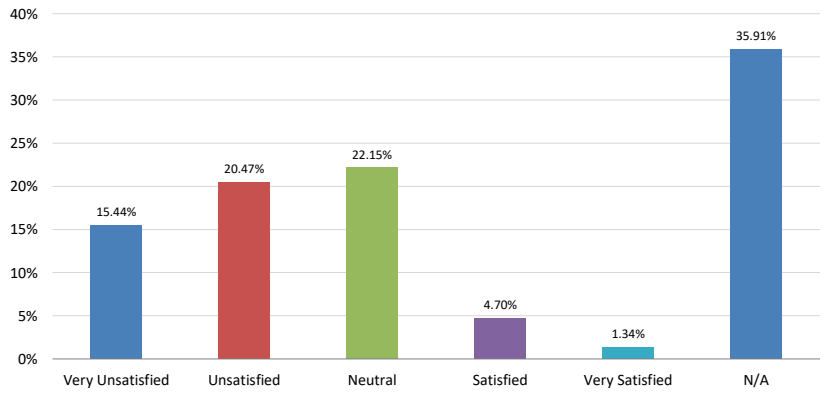
Opportunities for walking or riding a bicycle near my home



Mean : 2.372 | Confidence Interval @ 95% : [2.200 - 2.544] | Standard Deviation : 1.524 | Standard Error : 0.088

21

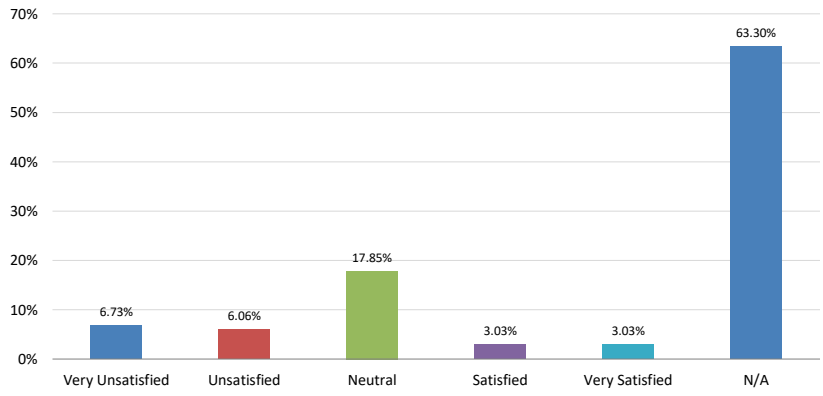
Access to public transportation (stop locations)



Mean : 3.638 | Confidence Interval @ 95% : [3.417 - 3.858] | Standard Deviation : 1.939 | Standard Error : 0.112

22

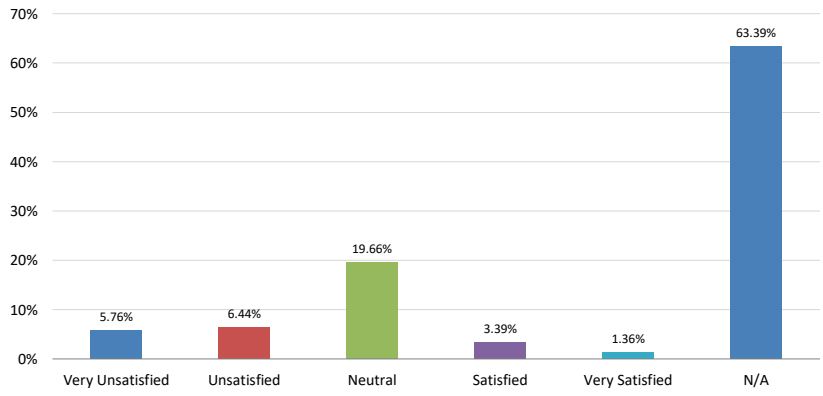
Reliability of public transportation (arrival on time)



Mean : 4.795 | Confidence Interval @ 95% : [4.599 - 4.991] | Standard Deviation : 1.723 | Standard Error : 0.100

23

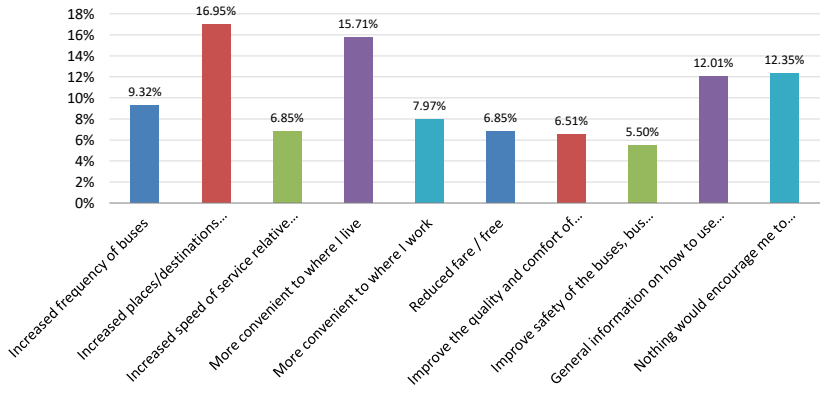
Frequency of public transportation (time between buses)



Mean : 4.783 | Confidence Interval @ 95% : [4.588 - 4.978] | Standard Deviation : 1.708 | Standard Error : 0.099

24

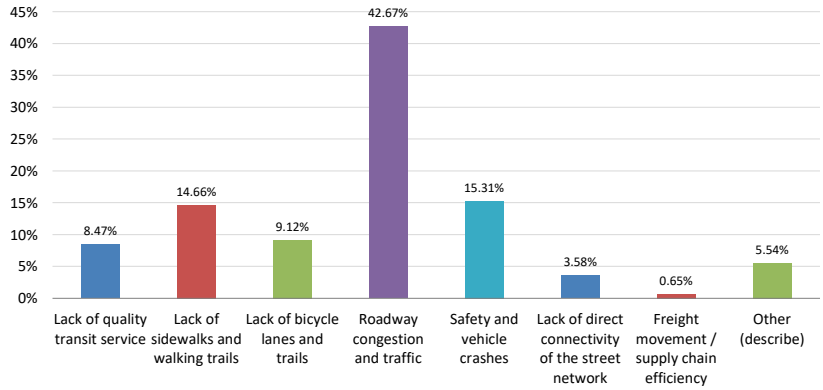
9. What might ENCOURAGE you to use Public Transportation more often? (Select all that apply)



Mean : 5.286 | Confidence Interval @ 95% : [5.087 - 5.485] | Standard Deviation : 3.034 | Standard Error : 0.102

25

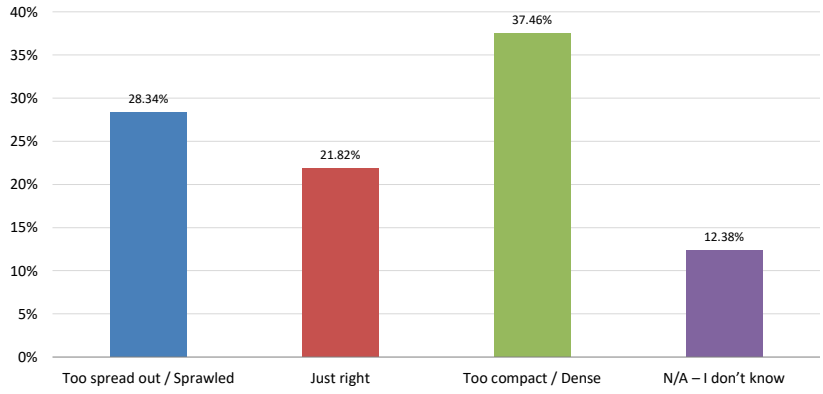
10. In your opinion, what is the most CRITICAL transportation problem that needs to be addressed?



Mean : 3.827 | Confidence Interval @ 95% : [3.645 - 4.010] | Standard Deviation : 1.631 | Standard Error : 0.093

26

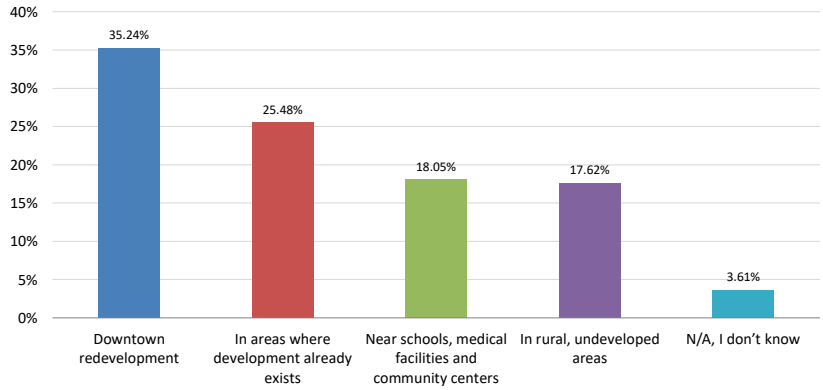
11. In your opinion, DEVELOPMENT in the region over the past 10+ years has been...



Mean : 2.339 | Confidence Interval @ 95% : [2.225 - 2.453] | Standard Deviation : 1.021 | Standard Error : 0.058

27

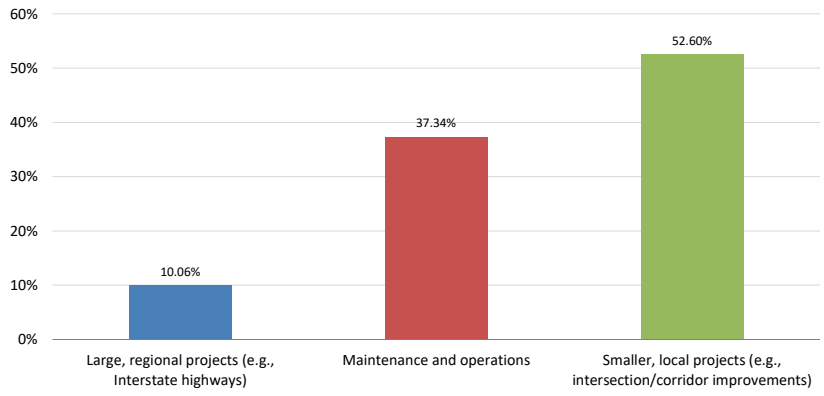
12. In your opinion, where should FUTURE DEVELOPMENT be focused? (Select all that apply)



Mean : 2.289 | Confidence Interval @ 95% : [2.179 - 2.399] | Standard Deviation : 1.218 | Standard Error : 0.056

28

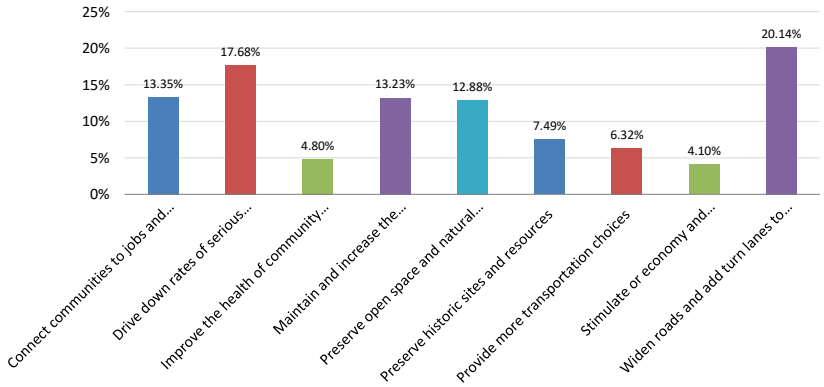
13. What type/size of transportation projects are MOST important to you?



Mean : 2.425 | Confidence Interval @ 95% : [2.351 - 2.500] | Standard Deviation : 0.669 | Standard Error : 0.038

29

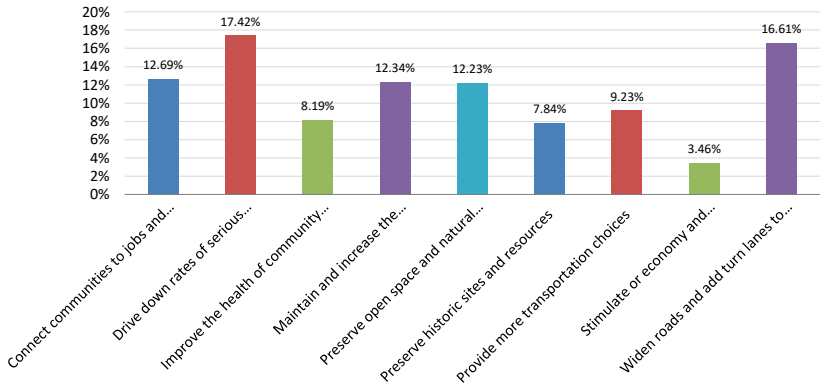
14. Consider projects that are regional and large in scale (e.g., Interstate widening). Which three of the following factors should be the most important when evaluating large, regional projects? (Choose up to three)



Mean : 4.837 | Confidence Interval @ 95% : [4.648 - 5.026] | Standard Deviation : 2.820 | Standard Error : 0.097

30

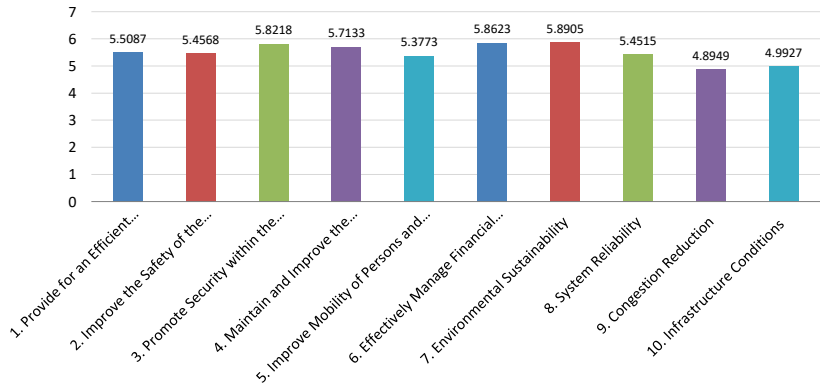
15. Now, consider small-scale, local projects (e.g., intersection improvement, streetscaping, new sidewalk). Which are the three most important factors when evaluating smaller, local projects? (Choose up to three)



Mean : 4.714 | Confidence Interval @ 95% : [4.533 - 4.895] | Standard Deviation : 2.719 | Standard Error : 0.092

31

16. How important are each of these 2045 Mobility Plan goals (rank 1-10)



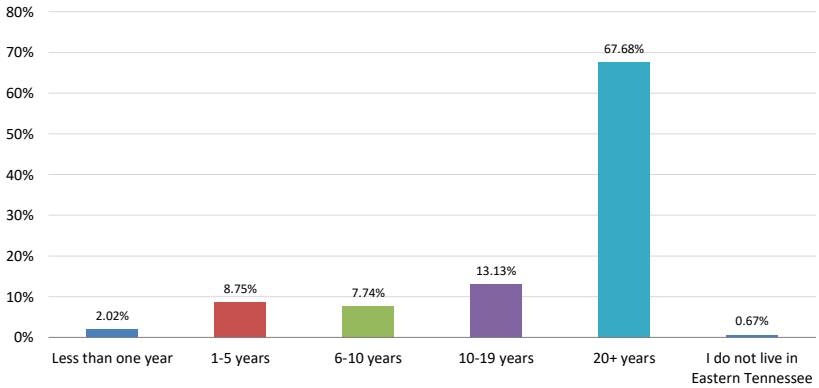
32

17. Is there anything else we should know about transportation in your area?

Response ID	Response
35104118	Implement access management on U.S. Route 25E between Bean Station and Morristown, add frontage roads/interchanges. Lakeshore Drive (TN 375) in Bean Station needs to be an interchange with 25E.
35071006	Biking infrastructure, Sidewalks, Less enormous parking lots, more greenery, invest in public transportation. ROUNDABOUTS INSTEAD OF TRAFFIC LIGHTS. stop making things bigger, wider, less walkable, and instead make things more efficient, get these 1000s of cars off the road with buses, light rail, etc. make our cities more connected by bringing people, and businesses together.
34958092	Rural roads need repaving
34848718	I think a red light installation would be very successful. There is heavy congestion as the west end grows to help expand the east end and help flow of traffic all over.
34731977	no
	132 comments received

33

18. How long have you lived within Eastern Tennessee (this region)?



Mean : 4.377 | Confidence Interval @ 95% : [4.254 - 4.500] | Standard Deviation : 1.084 | Standard Error : 0.063

48

19. What is the zip code where you LIVE?

Response ID	Response
35104118	37708
35101361	37814
35071006	37877
35040176	37820
34958092	37877
34848718	37813
34731977	30144
34729464	37877
34608154	37814
34606636	37814

#	%	19. What is the zip code where you LIVE?
150	53%	37814
55	19%	37813
20	7%	37877
12	4%	37860
7	2%	37725
5	2%	37708
5	2%	37760
4	1%	37890
3	1%	37891
3	1%	37914
3	1%	37820
2	1%	37876
2	1%	37711
2	1%	37861

284 responses

49

20. What is the zip code where you work/attend school?

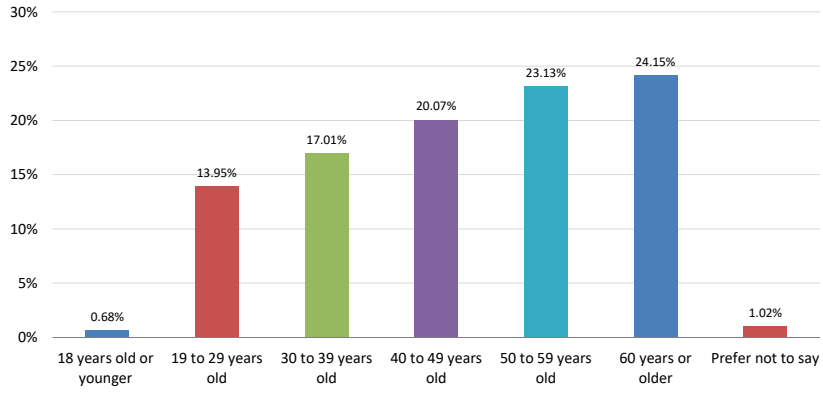
Response ID	Response
35104118	37849
35101361	37877
35071006	37813
35040176	37814
34958092	37814
34848718	37814
34731977	30144
34729464	37813
34608154	Retired
34606636	37814

#	%	20. What is the zip code where you work/attend school?
150	55%	37814
56	20%	37813
8	3%	N/A
6	2%	37877
4	1%	37914
3	1%	37708
3	1%	37725
2	1%	37890
2	1%	37660
2	1%	Retired
2	1%	37821
2	1%	37863

274 responses

78

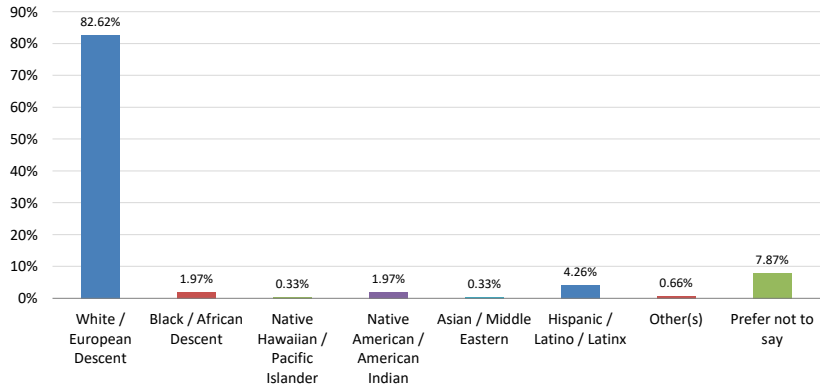
21. What is your approximate age category?



Mean : 4.276 | Confidence Interval @ 95% : [4.113 - 4.438] | Standard Deviation : 1.417 | Standard Error : 0.083

106

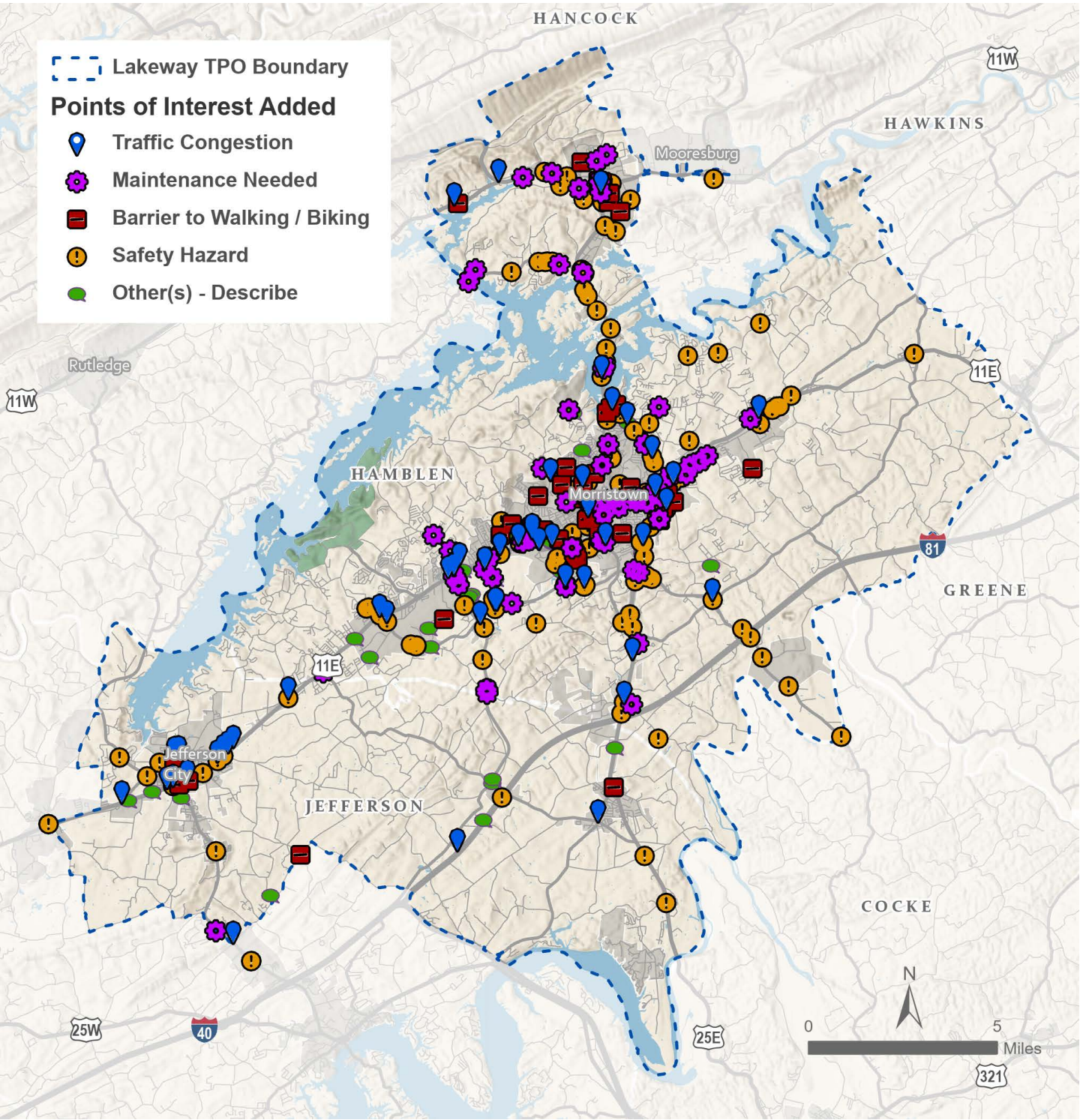
22. What best describes your race/ethnicity? (Select all that apply)



Mean : 1.902 | Confidence Interval @ 95% : [1.660 - 2.143] | Standard Deviation : 2.150 | Standard Error : 0.123

107

Interactive Map Output - Points of Interest



Lakeway TPO - ArcGIS Online Interactive Map Contributions

TYPE	COMMENT
Safety	several crashes here, left turning movements an issue
Safety	several accidents at this location
Congestion	
Maintenance	
Congestion	
Maintenance	
Maintenance	Widen and make more effective interconnect with Veterans to W AJ
Maintenance	Needs to be improved to provide North South Connection to 160 and relieve WAJ congestion.
Congestion	
Safety	
Safety	
Safety	
Congestion	Needs an improved intersection
Congestion	
Safety	Needs improved turning movement
Multimodal	
Multimodal	Corridor needs bike walk greenway
Safety	Needs proper road alignment
Congestion	
Safety	
Congestion	Need better flow from Lorino Park and food service
Maintenance	Signal Project needed
Maintenance	US11e Project will add pressure here.
Other	Improvement for residential development
Other	
Other	
Congestion	
Congestion	
Congestion	
Congestion	
Congestion	
Safety	
Safety	
Congestion	better traffic signal timing
Safety	
Congestion	
Safety	
Congestion	
Congestion	
Safety	
Safety	problems making left turns, several severe accidents
Congestion	
Congestion	
Multimodal	no sidewalks, people walk in the street constantly
Safety	severe accidents here
Safety	severe accidents here
Safety	need a R turn lane, better signage
Safety	problems with L turns
Safety	narrow bridge
Congestion	issues with tractor trailers trying to make turns
Congestion	
Congestion	school traffic congestion mainly
Congestion	turning movements is an issue
Congestion	turning movements is an issue
Congestion	
Safety	
Congestion	new traffic signal is coming
Safety	tractor trailers park in shoulder, traffic backs up onto the interstate
Safety	high accident area
Safety	high accident area
Safety	severe accidents here
Multimodal	sidewalks needs repair
Safety	new traffic signal is coming
Other	Proposed Multi-use Path
Congestion	need to update ITS Traffic Signal Coordination along 11E

#	%	TYPE
178	43%	Safety
64	16%	Maintenance
58	14%	Congestion
56	14%	Multimodal
56	14%	Other
412		

ArcGIS Online Interactive Map

Initiated in October 2023

Closed in November 2024

425+ days

Lakeway TPO - ArcGIS Online Interactive Map Contributions

TYPE	COMMENT
Multimodal	SR343 will become a Complete Street from 11E to Sr160
Congestion	ITS Traffic Signal Coordination to occur within a few years
Congestion	11E to be widen from 2 to 4 lanes
Other	
Maintenance	Resurfacing needed
Other	Complete connection of Veterans to Morris for East West flow
Other	Connection to 4th leg of intersection improovement
Other	Improvement needed for connection from B Trail to Residential development
Other	Widen to 6 lanes
Safety	Unsafe intersection
Congestion	Needs to be improved to handle the residential development
Safety	Consider traffic signal for better flow and access to Hospital
Other	Provide north south connection to 160 and address school flow
Other	Connect to Fairmont for better flow
Multimodal	Need to connect Walters State, Commercial, residential and Park
Other	Needs overpass bridge/interchange to tie-in SR 375 and Broadway Drive to prevent collisions
Congestion	Red light gets backed up bad, trucks run red light all the time, look at tying in with the close by bridges
Congestion	Congestion from left turns by trucks, lengthy traffic signal phasing
Other	remove driveways on US 25E between the Cherokee Lake bridge and I-81. Look at Alcoa Highway with its interchanges and frontage/feeder roads, close at grade intersections or replace them with overpasses or interchanges, better traffic flow, improve safety
Safety	
Safety	Collisions, remove access and have them get on at SR 160, make US 25E controlled access
Other	Speed trap, 55 to 35, fix.
Multimodal	provide tunnel or bridge for cyclists/multi-use over US 25E freeway from Buffalo Trail to Cherokee Park
Safety	poor sight distance, blind spot for northbound traffic, needs a realigned restricted intersection or interchange (j-turn, right-in-right-out)
Safety	Lots of wrecks, needs overpass bridge with Lakeshore Drive
Safety	narrow bridge, especially when meeting trucks on bridge, replace with wider and safer bridge
Safety	Bottleneck, needs left turn lane from oak grove road to lakeshore BP
Congestion	pointless traffic signal (very little nobo/sobo traffic, replace with right-in/right-out, J-turn.
Safety	bad wrecks, needs a flyover bridge/overpass
Multimodal	needs better sidewalks
Multimodal	maybe close to cars, make like Market Square, full pedestrian street
Congestion	trains stopping for industries/factories block this road all the time, maybe relocate railroad or add a overpass bridge
Other	extend 160 expressway bypass to Jefferson City since AJ Highway/11E is getting more development and signals
Safety	unsafe access, tie-in to collegewood or pritchard drive to prevent unsafe crossings on US 25E highway?
Congestion	add a signal or roundabout?
Safety	students run this stop sign all the time, maybe replace with a roundabout?
Multimodal	shared-use path or greenway to connect Walters State to apartments, park, and mall?
Safety	better speed limit signage
Safety	wrecks, redo intersection with right-in/right-out, J-turn?
Congestion	backups, redo interchange in the future, lots of truck traffic
Congestion	widen to four-lanes to Blaine
Multimodal	add protected crosswalk, roundabouts
Congestion	add a bridge to connect sugar hollow to mayes? lots of wrecks, congestion for turns
Congestion	right-turn lane on shoulder
Congestion	congestion from school and school zone, maybe relocate school off of main truck route?
Congestion	add an overpass, interchange here, lots of back-ups
Congestion	back ups, put a bridge and not a light
Safety	running red lights, bad wrecks, bad light
Safety	Install J Turns - eliminate left turn movement
Safety	Eliminate left turn movement to 160 - J turn needed
Safety	need major intersection improvement
Safety	Need major intersection improvement
Other	
Other	Bring county road to city standards to handle increasing residential flow
Other	Upgrade the corridor to handle additional traffic flow
Multimodal	Trails needed
Multimodal	Add safe area for walking and biking on Walters

Lakeway TPO - ArcGIS Online Interactive Map Contributions

TYPE	COMMENT
Congestion	Widen and improve this block
Safety	Queue in road for Pal's
Maintenance	Add turn lane and enhanced intersection
Maintenance	
Maintenance	Road not well maintained and undersized for residential traffic load
Other	Extend Veterans to Sugar Hollow
Other	Disperse traffic with better interconnections.
Safety	Difficult intersection
Multimodal	Need sidewalks or shared use walk bike path
Multimodal	Need better pedestrian and biking options
Multimodal	Sidewalks or shared use trail needed
Other	Fixed route buses need to serve MAID for employee commutes
Other	Fixed route bus line needs to serve ETVID for workers
Other	add a bridge here or some frontage roads, hard to cross traffic
Other	Protect scenic corridor
Multimodal	Greenway for walking or biking
Multimodal	Need to connect WSCC to Lorino Park
Maintenance	remove
Multimodal	needs bike trail separated from highway from bean station city to elementary school
Safety	way too many conflict points between where 11W splits from 25E on both ends
Safety	blind spots, lots of cross collisions, make a right-in/right-out or j-turn restricted intersection.
Safety	make a right-in/right-out, unsafe to cross median
Safety	make a right-in/right-out or J-turn restricted intersection, lots of T-bone and side collisions here
Safety	right-in/right-out or J-turn intersection, wrecks
Safety	get rid of the boat launch, put somewhere else, bad spot, takes too long to cross, people won't let you over
Congestion	backups to turn onto boat launch
Safety	people run through this stop sign all the time, put a roundabout
Other	add a interchange/overpass bridge to tie in with sulpher springs
Multimodal	add a separated bike path
Maintenance	tie-in both sides of pearce drive
Maintenance	add or replace one travel lane with dedicated left turn lane
Safety	add dedicated left-turn traffic signal phasing
Maintenance	add a four-way stop or a roundabout, congestion
Maintenance	remove railroad crossing and traffic signal, unsafe left turns
Multimodal	complete sidewalk and bike path to mall from downtown
Other	add a westbound merge ramp from US 25E southbound, traffic signal takes too long
Safety	add a frontage road to keep school bus off main highway
Maintenance	preserve high-speed connection on 25E between Bean Station and Morristown, NO TRAFFIC LIGHTS
Safety	remove
Other	NO TRAFFIC LIGHTS
Safety	remove access, put on frontage road
Safety	BAD TRAFFIC LIGHT, GET RID OF AND ADD RAMPS
Other	NO TRAFFIC LIGHTS
Other	NO TRAFFIC LIGHTS
Other	two stop lights is too much
Multimodal	add protected crosswalks and a roundabout
Maintenance	roundabout here please
Multimodal	add a protected bike-ped path across bridge from campus to mountain bike/hiking trails near soccer fields
Maintenance	tie in mall road to wilder
Other	Traffic light needed, or some other way to deal with people turning left onto main road
Safety	unsafe driveways, make 25E a high-speed road
Safety	NO TRAFFIC LIGHTS
Safety	NO TRAFFIC LIGHTS
Maintenance	tie in SR 113 and SR 343 to flyover/overpass bridge, make an interchange
Safety	NO TRAFFIC LIGHTS
Safety	BAD TRAFFIC LIGHT, ADD A BRIDGE
Multimodal	make this street more multimodal
Safety	poor sight distance, add four way stop or roundabout
Safety	left turns off of buffalo trail, t-bones at brights pike, add a signal to tie in with the one there
Maintenance	add a left turn lane
Safety	left turn lane
Safety	Unsafe intersection. Remove this street?
Safety	Not a good intersection

Lakeway TPO - ArcGIS Online Interactive Map Contributions

TYPE	COMMENT
Maintenance	ROW too wide. Narrow road and add pedestrian / bike access to the school
Safety	Connection to 25E is difficult to see and use.
Safety	Terrible Intersection
Safety	Bad design for an intersection. Could be removed with a project to improve old Russelville pike.
Other	Upgrade intersection to include access to Fulton-Hill Park
Safety	Intersection needs enhanced safety for school access
Safety	Improved RR crossing needed for increased traffic volume
Safety	needs left-turn lane, tie-in truman with shields ferry, maybe add a traffic signal
Maintenance	extend/add right turn/merge lane
Maintenance	add J-turn/right-in/right-out intersection design
Maintenance	tie-in noes chapel to cole road, put in a roundabout or four-way stop
Maintenance	fix this curve, put in a roundabout
Maintenance	roundabout
Maintenance	needs better sight distance
Other	Add Interconnection from Massengill Springs to W Economy for better flow and dispersed traffic
Maintenance	Bridge is way too old and narrow, hard to cross without almost clipping mirrors
Maintenance	Poor sight distance
Safety	Too many wrecks, needs a bridge
Safety	Put in a J-turn or right-in/right-out intersection
Safety	NO TRAFFIC LIGHT, keep SR 160 high speed connection
Safety	Poor sight distance, queuing/congestion, add a traffic signal or roundabout
Safety	Most dangerous intersection in the county
Maintenance	Get rid of this signal
Safety	Poor sight distance, left turn lane needed
Maintenance	Left turn lane
Multimodal	
Multimodal	
Other	widen to four-lane with median, relocate around downtown white pine
Safety	Narrow shoulders, little spacing between bridge piers
Congestion	Poor intersection, stop light running, replace with roundabout, add sidewalks
Multimodal	Add sidewalks and bike path between morris and first north
Other	extend road to connect to AJ highway at lumbardy
Other	
Other	Extend to first north street
Safety	Roundabout, bike path
Safety	Bad curve
Other	Extend veterans parkway to Martin Luther King Boulevard
Other	Extend SR 92 to here
Safety	Bad stop light
Multimodal	Raised crosswalks, protected bike lane, roundabout
Maintenance	Realign to tie-in, traffic signal
Safety	median barrier to prevent folks from crossing through here illegally and unsafe like
Safety	median barrier to prevent folks from crossing through here illegally and unsafe like
Safety	median barrier to prevent folks from crossing through here illegally and unsafe like
Multimodal	Poor sidewalks, no crosswalks, look at signal or roundabout
Multimodal	make main street in downtown a pedestrian street like Market Square in Knoxville, close to traffic
Multimodal	protected bike lane underneath highway bridge to connect apartments to mall and walters state
Maintenance	extend progress parkway to promote development
Safety	congestion, add left turn lane for trucks entering landfill
Safety	narrow old bridge, replace
Safety	add left turn lanes here
Safety	stop light
Safety	bad intersection, hard to cross traffic, add traffic signal here
Maintenance	extend peatchtree across railroad to reduce traffic on terrace lane
Safety	poor sight distance, add four-way stop or traffic signal
Other	is this massive interchange really necessary?
Maintenance	retime/rephase signals to all dedicated left turns separate from through traffic
Multimodal	marked crosswalks
Multimodal	improve bike and pedestrian access, existing facilities are in poor condition
Multimodal	poor sidewalks, no bike lane
Multimodal	add a bike lane on main street from downtown to the morningside neighborhood
Multimodal	marked crosswalk for students
Multimodal	marked crosswalk
Maintenance	fix switchback
Safety	left turn lane

Lakeway TPO - ArcGIS Online Interactive Map Contributions

TYPE	COMMENT
Safety	four-way stop or roundabout
Safety	unsafe intersection
Safety	sharp curve
Safety	unsafe intersection, poor sight distance
Safety	poor sight distance
Safety	rear-end collisions, add a left turn lane
Multimodal	add sidewalks and bike lane
Multimodal	needs sidewalks
Multimodal	needs sidewalks
Multimodal	sidewalks
Safety	unsafe, make this a three-way stop
Safety	three-way stop
Safety	left turn lane
Safety	add left-turn lane, right-turn lane
Maintenance	bad intersection
Maintenance	three-way stop or left-turn lane
Multimodal	need sidewalks to park
Multimodal	redesign intersection to add better access for pedestrians and bicycle users
Maintenance	messy intersection
Maintenance	make this a michigan-left (J-turn interesection)
Safety	left-turn lane
Safety	left-turn lane
Multimodal	add sidewalks/bike-lane in city limits
Multimodal	add sidewalks and bike lane on walters from sandstone drive (food city access) to cherokee drive
Congestion	roundabout please
Safety	four-way stop
Congestion	school bus backs up main highway when stopping here
Safety	realign to tie-in to dalton ford, make a four-way stop or roundabout
Safety	four-way stop or roundabout
Safety	four-way stop or roundabout
Safety	improve intersection
Safety	left turn lane
Safety	Difficult intersection
Multimodal	If possible then side walk on both sides of Sulphur springs would help
Maintenance	Please repair and expand the parking on south Cumberland in front of La monarca
Multimodal	need sidewalk on school side
Multimodal	need sidewalk
Safety	Install J turns. Very hard to determine speed of west bound traffic along with a blind hill.
Maintenance	The holes here at the beginning of Pauline from Sulphur Springs is getting bad again. The entire section of Pauline from Sulphur to Dice St is very uneven.
Multimodal	The sidewalks on Pauline are usually covered in debris or blocked by vehicles. Yard mud, debris, garbage cans and trash is common.
Safety	Itâ€™s still a super highway especially when TCAT and West High letâ€™s out. Screeching tires, revving motors and 60mph is common. By the time vehicles hit the intersection of Dice/Pauline itâ€™s a racetrack. No one cares. I have complained and complained.
Maintenance	steep/unsafe jump at rail crossing
Maintenance	add a interchange/overpass
Maintenance	round about
Other	add center turn lane and protected bike trail from downtown to cherokee park
Maintenance	roundabout
Maintenance	poor sight distance, add roundabout or left turn lane
Safety	poor sight distance, add roundabout or left-turn lane
Multimodal	add protected shared used path from buffalo to park entrance, safe crosswalk
Safety	bad intersection, add J-turn, right in-right out
Maintenance	needs better mobility/access management
Safety	too many intersections
Maintenance	needs better access control
Maintenance	needs better access control
Maintenance	implement access control, grade separation
Maintenance	needs better access control
Other	preserve high-speed connection for commuters like me
Other	needs better access control
Multimodal	better street connection and sidewalks
Safety	bad intersection
Multimodal	better separation between road and pedestrian/bicycle users

Lakeway TPO - ArcGIS Online Interactive Map Contributions

TYPE	COMMENT
Other	add road connection to city center and community center and george avenue light
Other	better signage for speed limit decrease or raise the speed to 45
Maintenance	Construction has done a number on this high traffic area
Safety	Ppl turn on this rd and others behind them still going 55. Seen lots of almost wrecks
Safety	Iâ€™m shocked there arenâ€™t more wrecks here
Congestion	Low key if yâ€™all would just synchronize all the red lights there would be a lot less traffic congestion.
Congestion	Agree with pals comment
Safety	Really need light to go sandstone then pals traffic both at the same time gets very dangerous.
Safety	Wrecks all the time
Maintenance	Road conditions horrible
Safety	
Safety	This is a death trap crossing across 160 in rush hour traffic. Turning left going to west high
Safety	Death trap turning left off 160 onto mlk and just as bad for mlk turning left onto 160
Congestion	Traffic piles up here everyday.
Multimodal	Sidewalk ends
Maintenance	left lane southbound is a complete tire muncher!
Safety	Dangerous intersection!! it would be awesome to see this turned into an exit like highway 66
Safety	Needs a turn lane for left on south Cumberland or no left turn and make them do down to the next turn at dentist/ regions bank
Safety	Need more fines or ways to stop people from blocking traffic for Akita. Maybe make them us the side entrance and use the lane they have blocked at very front of business. Would make their line stay out of the road
Safety	Need a accelerate lane when turn off Carroll road left onto morris Blvd hard to see over the hill and you get stuck out in the middle alot
Other	Would be so much better if this could be cut out straight without all the curves. Would really open it up so you donâ€™t turn the curves with someone on your side. Also target for people throwing trash/litter out. All over the sides of the road & hillside
Safety	Straighten the road so no blind curves
Maintenance	The whole for the drain is a big dip for a car. Do t know why this wasnâ€™t looked at when they paved. Should have be fixed better
Maintenance	Drain whole
Safety	Semi trucks pull out in front of traffic because they are tired of waiting. Ive had to slam my brakes multiple times and come to a co olete stop to avoid hitting then.
Congestion	Bad traffic congestion before and after school causing impatient drivers to pull out in front of traffic.
Safety	Bad traffic congestion before and after school causing impatient drivers to pull out in front of traffic.
Congestion	Bad traffic congestion before and after school causing impatient drivers to pull out in front of traffic.
Other	Separate left turning lane needed going West. The only spot in town where there is not its own turn lane.
Safety	Dangerous when having to turn left.
Other	Traffic Lights are needed here.
Safety	Most dangerous intersection. Its poorly laid out
Multimodal	Sidewalk desperately needed
Safety	
Safety	
Safety	Blind spots, canâ€™t see when cars are coming while at stop sign ,even if you wait for any cars you still cannot see and they can speed through the corner
Maintenance	
Maintenance	At red light
Maintenance	Repave Street (the entire street has dips and patched)
Safety	Dangerous intersection
Maintenance	POT HOLES
Safety	Terrible intersection
Safety	Horrible intersection I will drive through town to avoid it with my son in the car
Safety	This area is heavily congested. There is no traffic control device present. Speeds are above the limit in those traveling 25. Crossing the lanes is dangerous!
Safety	Numerous bad wrecks. High rates of speed coming through this intersection
Safety	Very congested. No traffic control device. High rates of speed of vehicles on 25
Safety	High traffic. No turning lane onto Alex Hall from 25. Lots of high rate of speed drivers in this area. No traffic control devices but some are needed
Safety	Needs left turn lane into school. Cars block the roadway 20-30 mins prior to school dismissal causing cars to enter opposite lane to pass stopped cars. Dangerous area. Could block off both entrances on Russellville pike and use Harvey dr to luther proffit

Lakeway TPO - ArcGIS Online Interactive Map Contributions

TYPE	COMMENT
Multimodal	Sidewalk strangely stops in East Hampton
Safety	This intersection should have been redesigned a long time ago. Turning left off MLK onto 160 is terribly dangerous. The view up the hill is partially blocked when trying to turn left onto 160.
Safety	Worst intersection in Morristown. Cannot see the on ramp to 25 E toward White Pine at night. At minimum, we need directional reflectors and street lights when turning from 160.at night
Safety	Need spped reduction signs, signals approaching this busy area with 2 dangerous left turns on 25.
Safety	Turning vehicles do not keep right side of roadway. Risk of head-on crashes.
Congestion	
Safety	
Safety	Needs lane dividers and stop signs. Risk of head-on crashes.
Safety	
Safety	This intersection needs a four way flashing red light. Many drivers drive through the stop signs daily.
Safety	Traffic is congested and people turn unsafely in all directions.
Safety	Traffic is congested and people turn unsafely
Congestion	
Congestion	
Congestion	
Safety	Accidents happen here constantly.
Safety	Accidents happen here constantly. People come flying through the cirve and veer intot he opposite lane due to speed and force drivers in the other lane off the road.
Safety	
Maintenance	
Maintenance	
Other	People have decided to make their own median crossing rather than go a few feet down the road to use the turn lane. Very dangerous situation of people pulling into traffic.
Other	People have decided to make their own median crossing rather than go a few feet down the road to use the turn lane. Very dangerous situation of people pulling into traffic.
Safety	
Maintenance	
Congestion	Red light on 11E side does not give enough time for traffic to flow smoothly
Safety	add a left-turn lane or just restrict people from making left-turns
Safety	NO TRAFFIC LIGHTS, right-in/right out.
Other	Don't put a traffic light here, just remove the crossing here and have people use the interchange.
Safety	NO TRAFFIC LIGHTs, add a bridge
Safety	Congested and dangerous intersection
Safety	Dangerous intersection during school hours.
Congestion	
Safety	Incredibly dangerous to cross. Heavily congested area
Congestion	
Safety	Drive thru line for Pals is in the road and prone for accidents
Safety	Should be right turn only. Too many conflicting movements and poor driver decision making.
Safety	Make right turn only. No left turn due to poor driver decision making.
Safety	Typically I'm opposed to traffic signals, but based on development, this would be a great spot for one
Other	Better road alignment needed on Morris with additional left turn lane badly needed driving on east Morris
Safety	Would be a great street to remove. Very unneeded
Other	Great intersection for a round a bout
Other	love climbing this mountain!
Multimodal	Dumplin Valley Rd. E has NO walking or bike paths. Those who access in that manner risk being injured.
Other	Residential development here with no plan for alternate transport or addressing infrastructure.
Safety	Horrible intersection. Difficult to access 160. All of 160 access needs to be examined.
Safety	Access to the college is HORRIBLE! People do not understand ingress/egress. It is confusing. Roundabout cannot accommodate large vehicles.
Other	
Safety	
Safety	
Safety	
Safety	
Safety	
Safety	

Lakeway TPO
Focus Group "Listening Sessions"

March 26-28, 2024
(facilitated on **MURAL** website)

Three Focus Groups:
A. Economic Development / Tourism / Mayors
B. State / Federal Transportation Planning / Performance Measures
C. Equity / Transportation Disadvantaged / Public Transit

Attendees: 9 + 10 + 6 = **25 total**

Lakeway TPO MTP Update Focus Groups • Stantec

https://app.mural.co/t/stantec8401/m/stantec8401/1709756696269/8c8332909068a548bad89c01ae77ef137e2a9533

Events | Lakeway TPO MTP Update Focus

https://app.mural.co/t/stantec8401/m/stantec8401/1709756696269/8c8332909068a548bad89c01ae77ef137e2a9533

Because YOU are the local experts in/around Lakeway...
ECONOMIC DEVELOPMENT / TOURISM / MAYOR

~9 attendees

2050

What do YOU find *unique* about the Lakeway region, and why?

Proximity to great outdoor opportunities

Lakes

Great access to multiple interstates

Morristown development requirements include sidewalks built by developers

how do we include this policy within other municipalities in the region?!

demonstrate the link between good planning - preserving lands / economic development

$$$$$

Preserving / maintaining the transportation network quality - conditions

DOWNTOWN SIDEWALKS

Economic hub - between Knoxville & Tri-Cities

INDUSTRIAL BASE- JOBS

Post-secondary education opportunities

Small town feel with larger town amenities

Workforce development

Multiple unique downtown areas - Jefe City, Dandridge, in addition to places like Johnson City, etc.

DIVERSE CULTURE → Hispanic

'Hola - active community organization

Task Force on Diversity

Men of Vision

https://www.facebook.com/people/Men-of-Vision/100077563780697/?sk=about

https://www.holalakeway.org/

Carson Newman

Walters State Community College

TCAT - Tenn College of Applied Technologies

Highway system - easy travel → Why? Can move around the town quickly and safety (for the most part)

Corridor Management Areas designated in prior plans → SR363, US 11E, SR66 - others?

Describe YOUR experience (or perspectives) relating with MOBILITY

What can be improved? How? Why?

More sidewalks - more pedestrian-friendly access → *why what are benefits?*

Take less space than roadways

Ability to move around without cars. Increase healthy travel options...

Safety issues, health benefits

Offer additional options for transit - It seems that stops are limited.

As a student as WSCC- Every movement was single vehicle occupancy

Not bike friendly - wscc → BFU - resources

We get some low marks (surveys) on biking accessibility. However, there are lots of areas in our community where biking may not be realistic (terrain)

There seems to be lots of asks for sidewalks but very few users. Chicken or the egg? → Bridges: we never justify the need for a bridge by the # of people swimming across the river...

Can we required new developments to include additional options related to mobility.

research the # of campuses; locations; courses available - look for regional transit opportunities

https://ws.edu/campuses/index.aspx

Ability to park and ride, → entry to ride transit more often

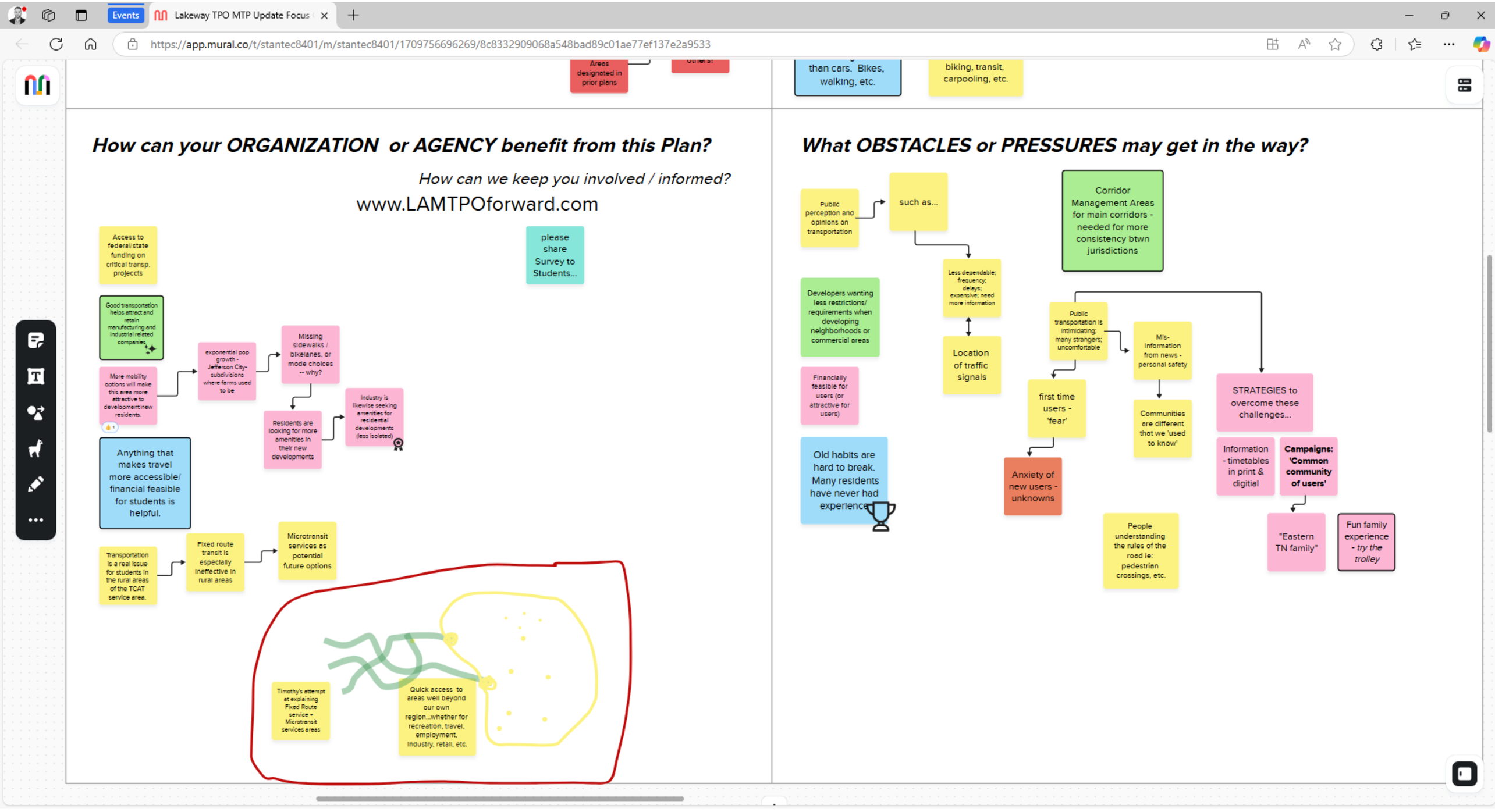
regional hubs / campuses - several counties → certain classes or units are offered in different campus locations

It's obvious that mobility hasn't been considered in much planning. Sidewalks in many areas are non-existent or too small.

To me, mobility is more than just accessibility. It is the ability to use other things other than cars. Bikes, walking, etc.

Younger generations are looking for more options - walking, biking, transit, carpooling, etc.

GROUP A – Economic Development / Tourism / Mayors



Because YOU are the local experts in/around Lakeway...
STATE / FEDERAL TRANSPORTATION PLANNING / PERFORMANCE MEASURES

6 attendees

What do YOU find <u>unique</u> about the Lakeway region, and why?

- Outdoor activities
- National Weather Service Morristown Office
- Write any comment you would like!
- The interstate system is a major transportation link for the industry in the region
- Carson-Newman University
- 34 widening project in 2024 (25E to Morris Blvd)
- Appalachians affect road layout
- 66 Widening
- https://www.tn.gov/tdot/build-with-us/projects.html
- Morristown complete streets project (federal grant)
- TDOT PDN network → Multimodal Planning has review during NEPA
- Risk management sessions in 2023, working

Describe YOUR experience (or perspectives) relating with MOBILITY

- Pedestrian fatalities/ serious injuries have been increasing since 2010 in TN. I will send UT Knoxville published study. - Will
- Ranked on crash risk and severity, comparison to statewide avg → Railroad crossing projects (9 active) in Morristown and another near Morristown
- County or city jurisdiction - safety improvements
- signage, pavement markings, not really
- Local Road Safety Initiatives

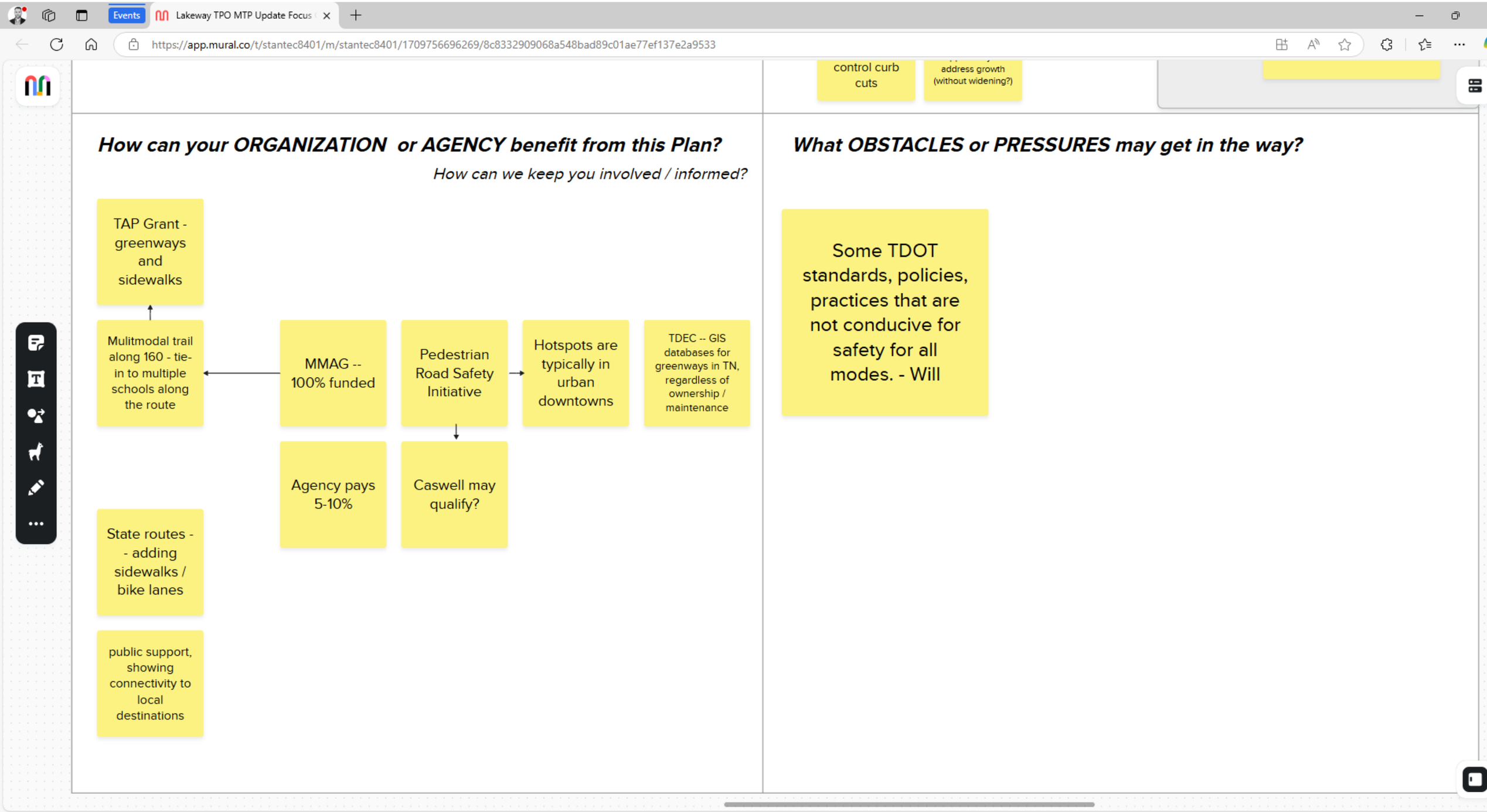
What can be improved? How? Why?

- 20% HL population, add'l that's uncounted
- Workforce transit?
- Contact trucking firms into Knoxville & Morristown on movement between regions
- first-/last-mile connectivity to transit
- TDOT Office of Mobility and Access to Transit
- SR 35 highway widening, realignment, next phases
- Low-income areas

- TDOT is updating/ integrating our travel demand model with our land use model out to 2050. I would look at those to see projections for this area.
- Industrial development nearby
- Acquisition of 200+ more acres for MAID
- Progress Center, MAID, ETVID
- Will drive further residential development
- 66 widening included agreement to control curb cuts
- Access Management needed -- opportunity to address growth (without widening?)

What have your CONSTITUENTS shared with you?

- Our 2022 survey results show that people are requesting bike facilities for utilitarian trips in rural and rural town areas. Bike facilities are not only for recreation. - Will

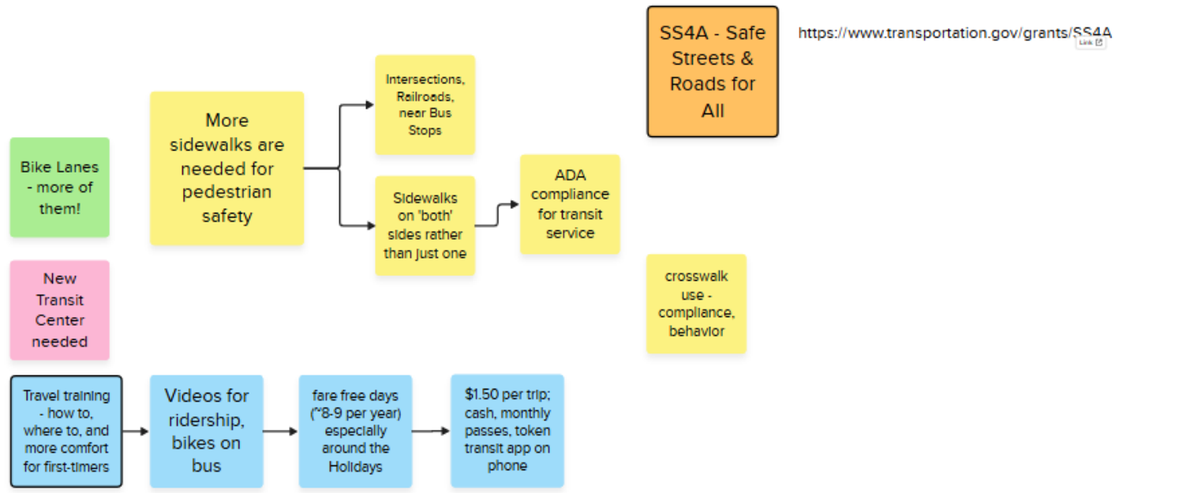

Events
Lakeway TPO MTP Update Focus
https://app.mural.co/t/stantec8401/m/stantec8401/1709756696269/8c8332909068a548bad89c01ae77ef137e2a9533
control curb cuts
address growth (without widening?)
How can your ORGANIZATION or AGENCY benefit from this Plan?
How can we keep you involved / informed?
TAP Grant - greenways and sidewalks
Mulitmodal trail along 160 - tie-in to multiple schools along the route
MMAG -- 100% funded
Pedestrian Road Safety Initiative
Hotspots are typically in urban downtowns
TDEC -- GIS databases for greenways in TN, regardless of ownership / maintenance
Agency pays 5-10%
Caswell may qualify?
State routes -- adding sidewalks / bike lanes
public support, showing connectivity to local destinations
What OBSTACLES or PRESSURES may get in the way?
Some TDOT standards, policies, practices that are not conducive for safety for all modes. - Will

Because YOU are the local experts in/around Lakeway...
EQUITY / TRANSPORTATION DISADVANTAGED / PUBLIC TRANSPORTATION

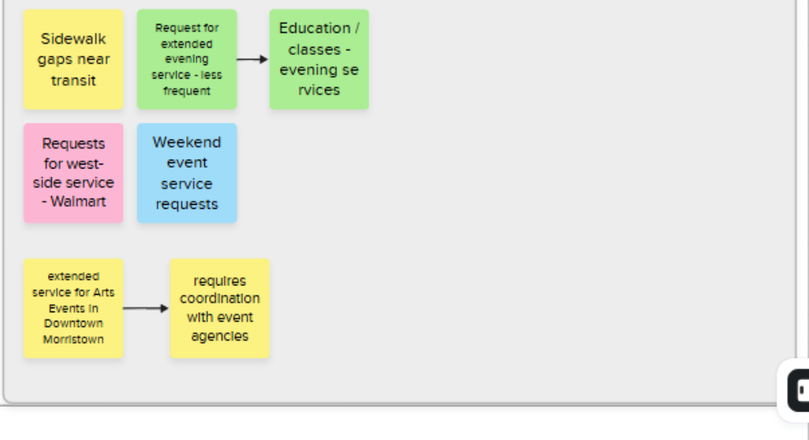
10 attendees

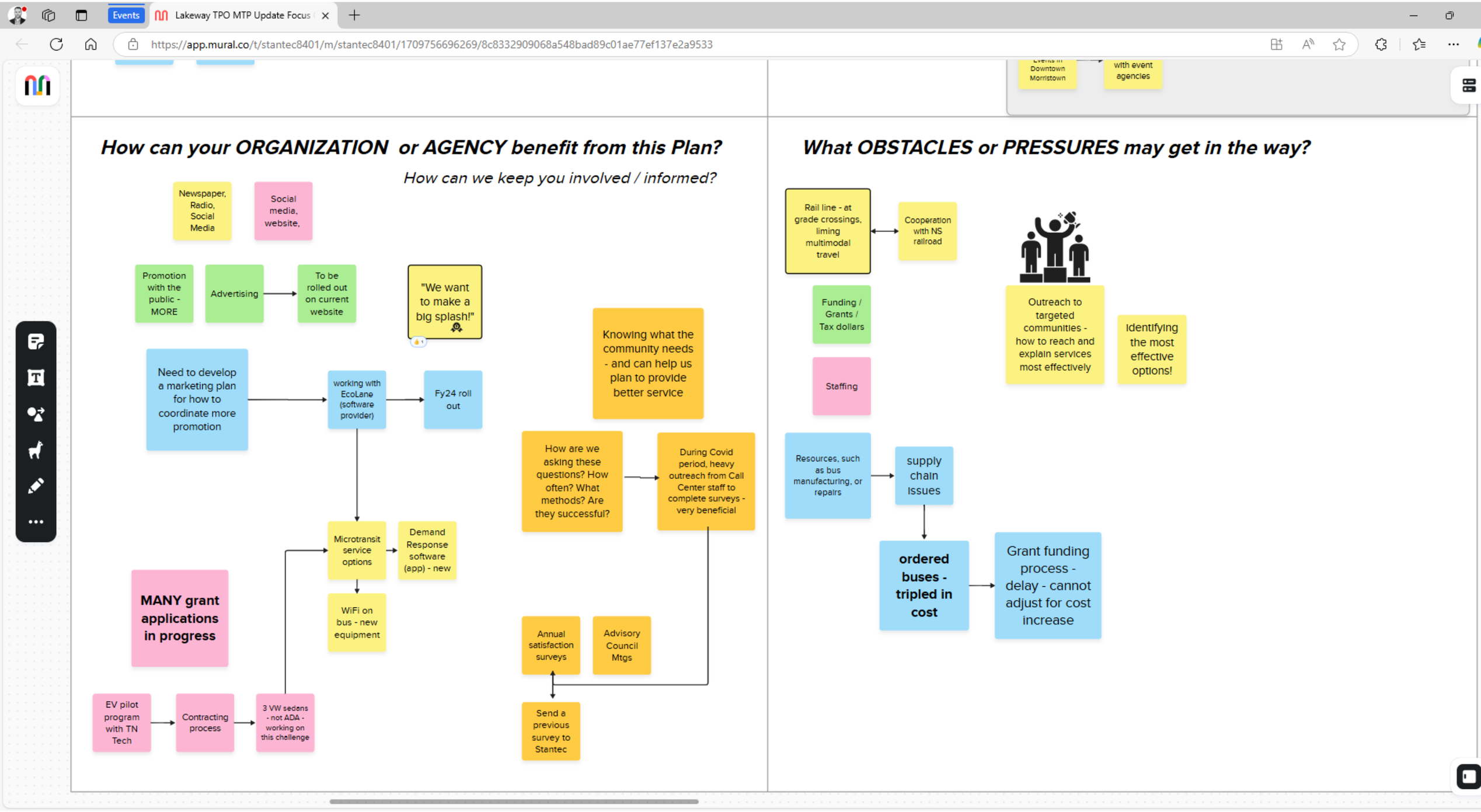
What do YOU find <u>unique</u> about the Lakeway region, and why?

Describe YOUR experience (or perspectives) relating with MOBILITY



What have your CONSTITUENTS shared with you?




Events
Lakeway TPO MTP Update Focus
https://app.mural.co/t/stantec8401/m/stantec8401/1709756696269/8c8332909068a548bad89c01ae77ef137e2a9533
Downtown Morristown
with event agencies
How can your ORGANIZATION or AGENCY benefit from this Plan?
How can we keep you involved / informed?
Newspaper, Radio, Social Media
Social media, website,
Promotion with the public - MORE
Advertising
To be rolled out on current website
"We want to make a big splash!"
Need to develop a marketing plan for how to coordinate more promotion
working with EcoLane (software provider)
Fy24 roll out
Knowing what the community needs - and can help us plan to provide better service
How are we asking these questions? How often? What methods? Are they successful?
During Covid period, heavy outreach from Call Center staff to complete surveys - very beneficial
Microtransit service options
Demand Response software (app) - new
WiFi on bus - new equipment
MANY grant applications in progress
EV pilot program with TN Tech
Contracting process
3 VW sedans - not ADA - working on this challenge
Annual satisfaction surveys
Advisory Council Mtgs
Send a previous survey to Stantec
What OBSTACLES or PRESSURES may get in the way?
Rail line - at grade crossings, liming multimodal travel
Cooperation with NS railroad
Funding / Grants / Tax dollars
Staffing
Outreach to targeted communities - how to reach and explain services most effectively
Identifying the most effective options!
Resources, such as bus manufacturing, or repairs
supply chain issues
ordered buses - tripled in cost
Grant funding process - delay - cannot adjust for cost increase

Summary

Lakeway Area Metropolitan TPO
2050 MTP Update

Public Outreach
Round #1

February 2024

Meeting Location

Round #1 – Community Engagement :

1. Thursday February 15, 2024 from 4-7 pm at Morristown Public Works Building (28+ participants)

Members of the project team hosted an in-person community event for the Mobility Plan update. Notification of these events were posted to the project website www.LAMTPOforward.com, shared via email from TPO staff to stakeholders and promoted by Technical Advisory Committee members to their local constituents. Materials generated for this event were provided to the TPO for use at future 'pop-up' events, as practical, to continue gathering feedback from additional stakeholders and venues.

In-Person Open House Format (4-7 pm)

Open House stations allowed attendees to learn and share their insights for the Mobility Plan, notably:

- **Regional Assets** – attendees were asked three prompts, recording their responses on post-it notes
  a) *Your favorite thing about this region is…*
  b) *One thing you would fix…*
  c) *Your life would be easier if…*
- **Visioning Exercise** – open-ended
  - *What could this region look or feel like by 2050*
- **Issues Mapping Station**: featuring a large-scale map of the regional roadway network
  a) *What places you visit often (or would like to)?*
  b) *What gets in your way?*
- **Interactive Word Cloud Station** – Mentimeter poll using a QR code to join
  - *What are your favorite places in/around this region? (up to five)*
- **Mental Mapping Exercise** – draw your commute to work/school, noting landmarks
- **Comment Station** – open-ended comments of items that we may have missed

Summary of Feedback Received – selected themes / consolidated

Favorite things about the Lakeway / Morristown / Eastern TN region…

- Outdoor recreation opportunities / events / scenery
  - Parks / Walking Trails / Mountains / Lakes
    - Frank Lorino Park
  - Fishing tournaments / Disc Golf tournaments / Soccer
- Historic Downtown Morristown
  - Hub for economy, healthcare, shopping
  - Small Town Feel / Not Bristol
    - Population is not too large or small

One thing I would fix…

- Traffic Flow / Operations / Signals / ITS

    - Improve flow, without additional delay at signals (roundabouts?)
    - State Route 160 / US11East / Economy road
    - Traffic light timing (ITS) and delay / Coordination of signals (progression)
- Safety near Schools / more crosswalks
- Safety as a bicyclist, unable to cross major corridors
    - Narrow bike lanes (no buffer; no separation from cars)
- Arts & Theatre / Cultural attractions / Sports team(s)
    - More active Downtown

My life would be easier if…

- Driver behavior changes
    - More visible crosswalks / slower traffic
- More sidewalks, bikeways and amenities (bike racks)
    - Consistency for greenway / sidepaths without crossing the street
- More transit stops and better promotion to grow ridership (Marketing)
- Housing prices would stabilize / in-migration of residents from outside of TN
- Development with mixture of uses (housing + grocery store + restaurants + open space)

What *could* this Region Look Like or Feel Like by 2050

- Bike lanes / Electric Bikes / Safe places to walk or bike
    - Promote walkability
- Mixed use (re)development / "Destination Community"
    - Consolidated residential areas with amenities (growth areas)
    - 'Simple pace of life"
    - S Cumberland St redevelopment RAISE grant
- Industrial zones + Green spaces
    - Recruit more quality industrial jobs
    - Conserve our open spaces / parks
- More EV charging stations
- Parallel route(s) besides US11East and SR160
- "Tunnel to Knoxville" – isn't this a Bus?
- Over-populated – hope not

Comment cards – Open Ended

- Look at the region from a 3,000 foot level and address traffic flow (big picture)
- Connections to greenways, sidewalks, shade trees
- More digital apps for Lakeway Transit – improve the convenience and arrival time
- Growth areas along US 25E, south of I-81 near White Pine. New residential and industrial.
    - Better daily commute from Jefferson City (alternative to US 11E or SR 160)

WHAT WE'VE DONE SO FAR:

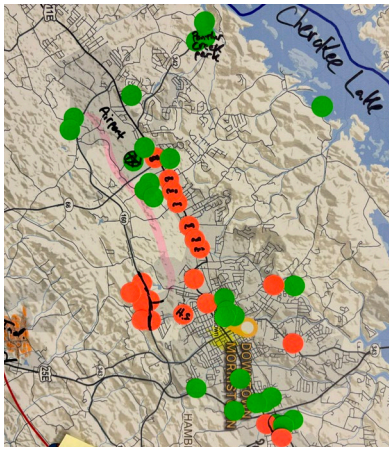
28+ participants total

1 Community Engagement Meeting

IN-PERSON

Stations allowed attendees to learn & share insights for the Mobility Plan. > **6 OPEN HOUSE STATIONS**

- *REGIONAL ASSETS*
- *VISIONING EXERCISE*
- *ISSUES MAPPING STATION*
- *INTERACTIVE WORD CLOUD STATION*
- *MENTAL MAPPING EXERCISE*
- *COMMENT STATION*



WHAT WE HEARD:

Favorite Things...

- Outdoor Recreation
- Small Town Feel (Historic)

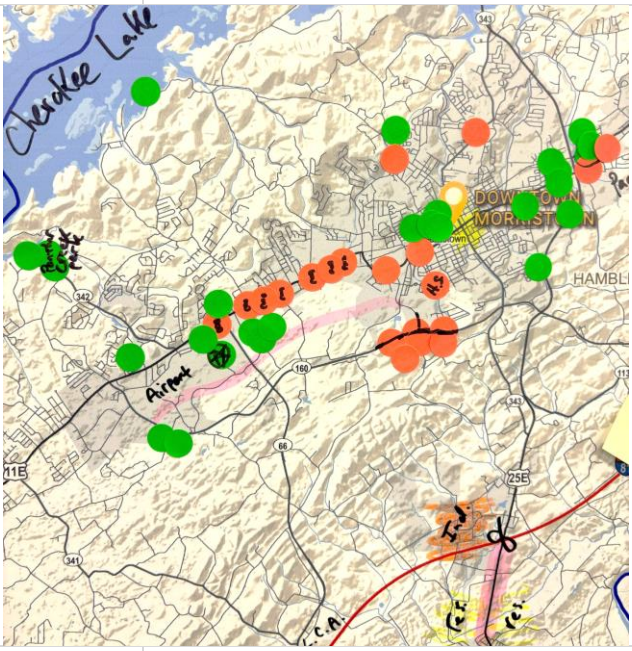
Current Needs & Wants...

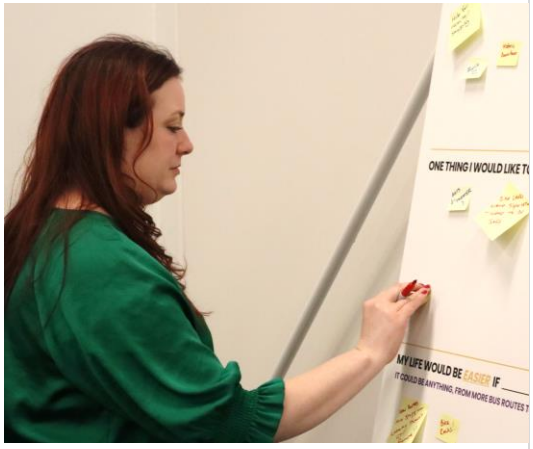
- Safety near schools
- Bicycle safety
- Traffic flow
- Arts & Culture

What this Region could look/feel like by 2050?

- Bike lanes
- EV charging stations
- Industrial jobs
- Safe ways to walk
- Green spaces
- Mixed use development

Example Photos from Open House Events





Interactive Word Cloud – *What are your favorite places in the region?* (70 contributions)

ATTACHMENTS

- Wordcloud and Visioning Exercise – What could this region look or feel like by 2050 – PDF
- Mental Mapping Exercise – Draw your commute to work/school from memory - PDF
- Comment Cards - PDF

Stay involved - Project website: www.LAMTPOforward.com

Wordcloud – YOUR favorite places…

MOBILITY 2050

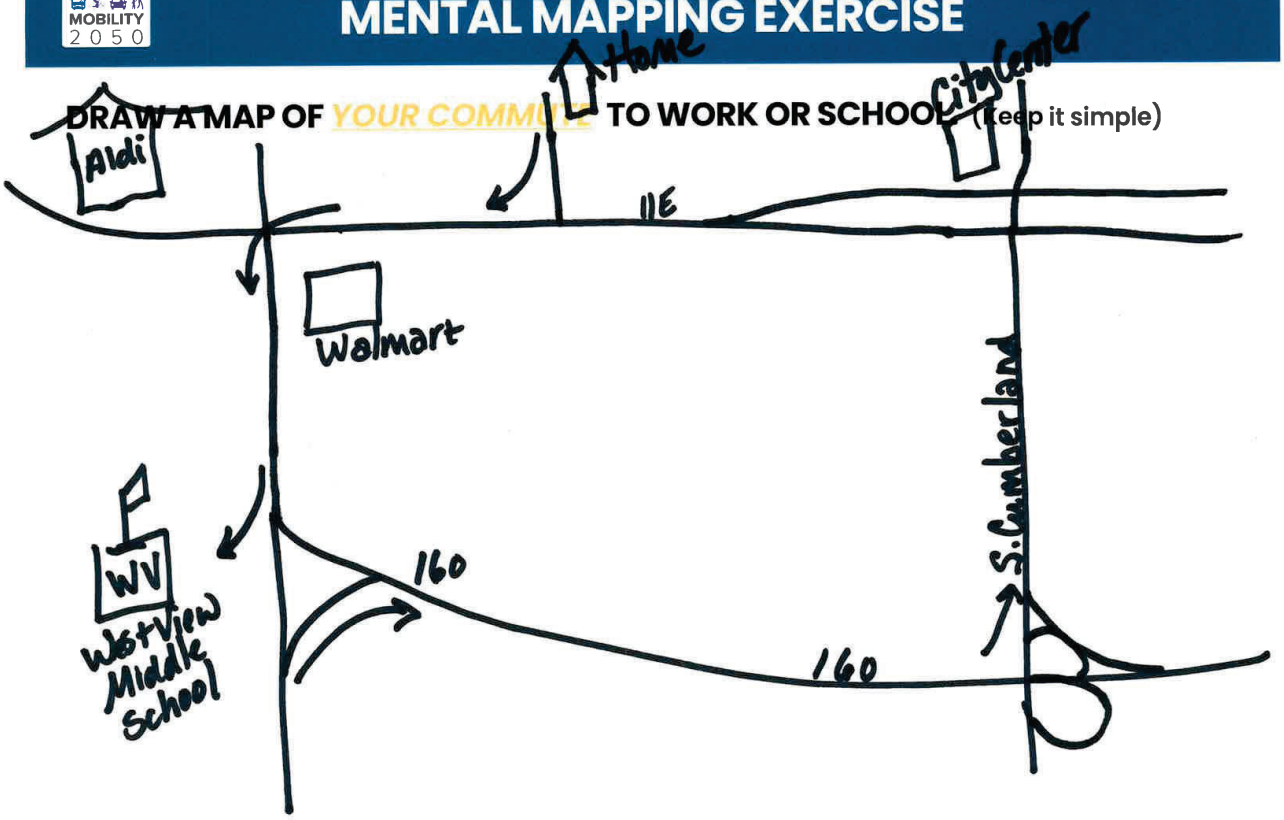
VISIONING EXERCISE

What COULD this region LOOK LIKE or FEEL LIKE by 2050?

Not drawn to scale

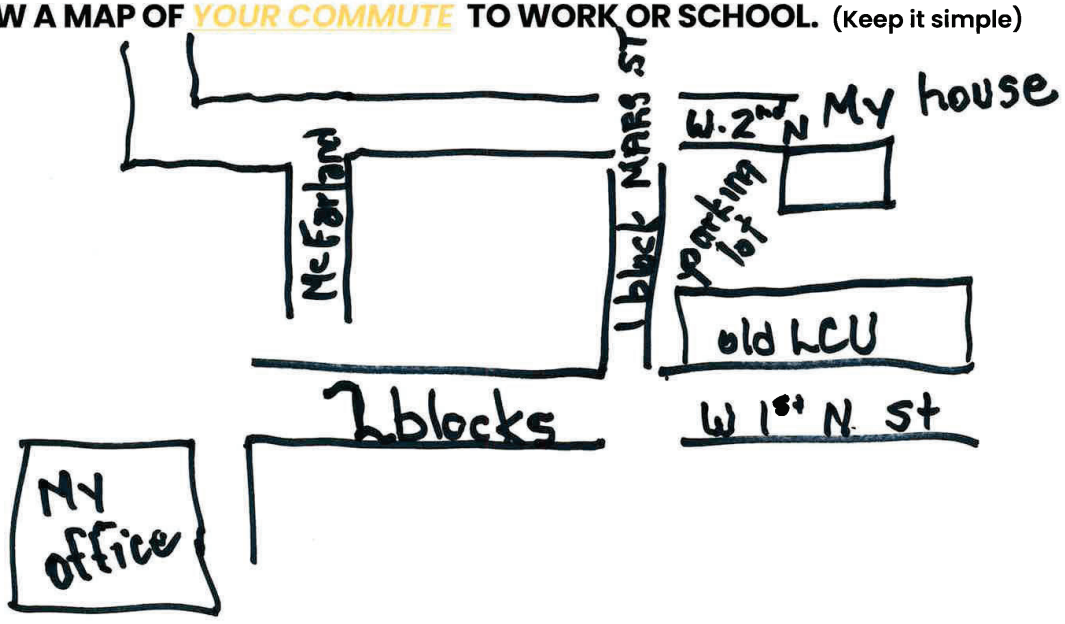
MENTAL MAPPING EXERCISE

DRAW A MAP OF YOUR COMMUTE TO WORK OR SCHOOL. (Keep it simple)



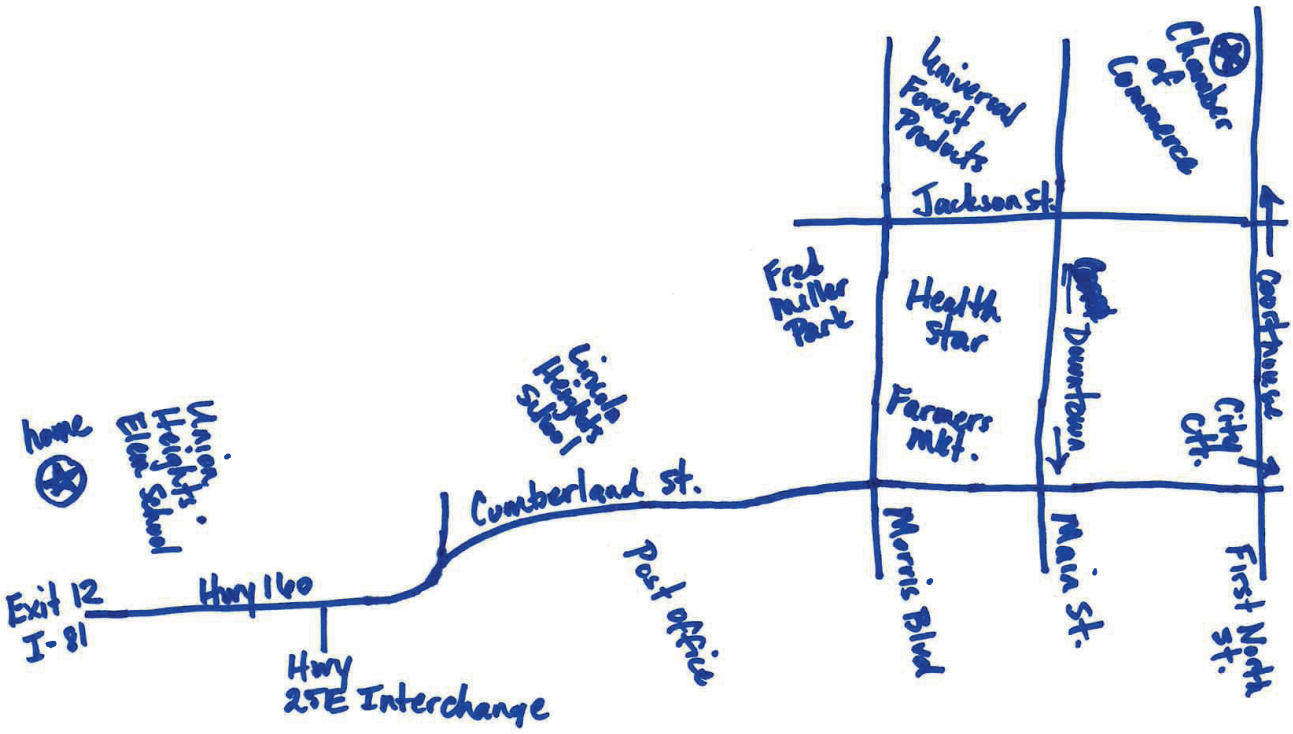
MENTAL MAPPING EXERCISE

DRAW A MAP OF YOUR COMMUTE TO WORK OR SCHOOL. (Keep it simple)



MENTAL MAPPING EXERCISE

DRAW A MAP OF *YOUR COMMUTE* TO WORK OR SCHOOL. (Keep it simple)



MENTAL MAPPING EXERCISE

DRAW A MAP OF *YOUR COMMUTE* TO WORK OR SCHOOL. (Keep it simple)

COMMENT CARD

MOBILITY 2050

Is there something we missed here today? Write it here!

No other comment - Thank You!

(continue on the back)

COMMENT CARD

MOBILITY 2050

Is there something we missed here today? Write it here!

When will the city & county release a report of today's data?
Look @ the transportation criteria/routes from a 3,000 foot level & determine the best plan to address traffic flow throughout the city and county. Big Picture!
Look at ingress/overlay ways to protect integrity of areas

Connection to freeways / Maintained sidewalks / Shade trees / Safe bicycle lanes /

Apps for Parking Transit / Bus transit apps /

(continue on the back)

COMMENT CARD

MOBILITY 2050

Is there something we missed here today? Write it here!

Consider:

A new pathway for Residents of Humblen County by extending 25E south of I 81. This would help develop for new residential areas for labor for the new additions coming to Industrial Park. This would help connect housing to work. Now we only have choices to live west and east and travel south.

(continue on the back)

Summary

Lakeway Area Metropolitan TPO
2050 MTP Update

Public Outreach
Round #2

October 2024

Meeting Locations

Round #1 – Community Engagement – Mountain Makins Festival – Rose Center, Morristown, TN

1. Saturday October 26, 2024 from 10-2 pm (75+ participants)

Members of the project team were present for the Mountain Makins Festival, a weekend folklife festival in Morristown. The festival honors the rich traditions of the past and supports modern interpretations of those traditions. More than just a fine art and craft show, visitors to the family-friendly event enjoy stages of mountain music, storytelling, prize-winning dancers, regional authors, children's activities, and abundant good food.

The project team worked at an event table and engaged festival goers as they passed. Notification of this event were posted to the project website, Citizen Tribune newspaper, Standard Banner newspaper, shared via email from TPO staff to stakeholder / newsletters, and promoted by Technical Advisory Committee members to their local constituents.

Festival Attendance (10 am – 2 pm)

A table was set up for attendees to learn and share their insights for the Mobility Plan, notably:

- **What we've heard so far** – attendees could view feedback to date
- **Project map and table of projects in the region** – attendees could view the list of ~80 projects by location and type of project (roadway, multimodal, ITS/Signal, or study)
- **Interactive stations** (x2)
    a) **Linear spectrum of: LARGE, regional-scale projects** that benefit everyone, or **SMALL, local-scale projects** that benefit a local community. With a middle line for maintaining a balance of both.
    b) **Most pressing problems to fix** (choose three of the six categories presented)
    c) **How do you want to see investment dollars spent?** (attendees were giving $10 to spend among six buckets of project types; total results were tallied and presented as % of total)

Summary of Feedback Received – selected themes / consolidated

Preference for a balance of regional/local projects

- Transportation benefits local residents as much as tourists, so a blend of both large/regional and small/local projects was favored as much as local projects were

Distribution of project funds toward all modes of transportation

- Fix (or maintain) what we have first (existing roads and bridges) before building new facilities
- Higher priority placed on improving sidewalk connectivity and moving around without a car
- Funding for maintenance, walking/biking, and transit were favored

Open-Ended Comments Received

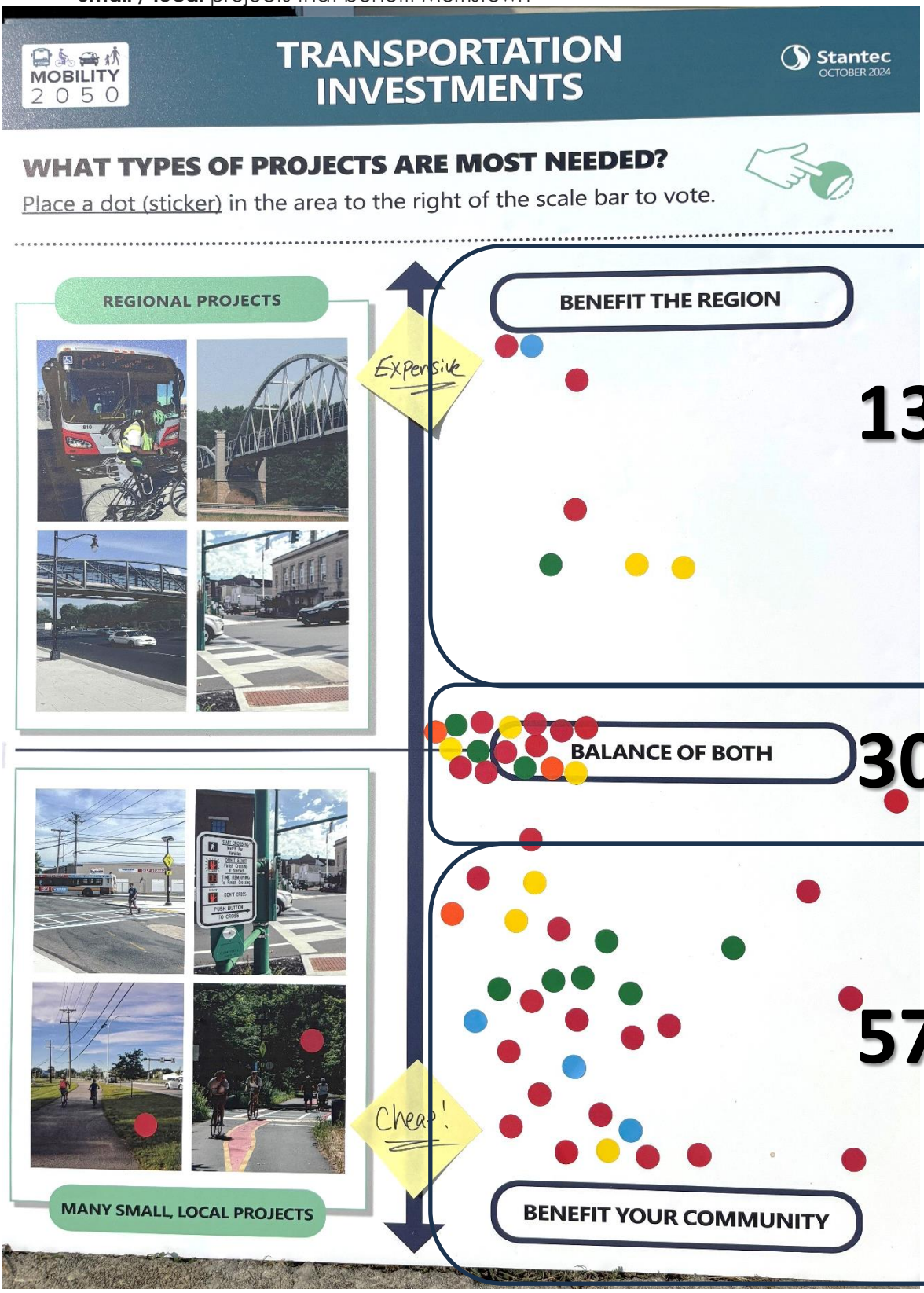
- *"Local parts are amazing. Well kept and fun for dog walking"*
- *"Need frontage roads along US11E / Andrew Johnson Highway"*

- *"S Cumberland Street is terrible at school time"*
- *"I-81 sucks!" – "No it doesn't"*
- *"Love roundabouts"*
- *"Fix roads first"*
- *"Trim overgrown vegetation" for improved visibility / safety*

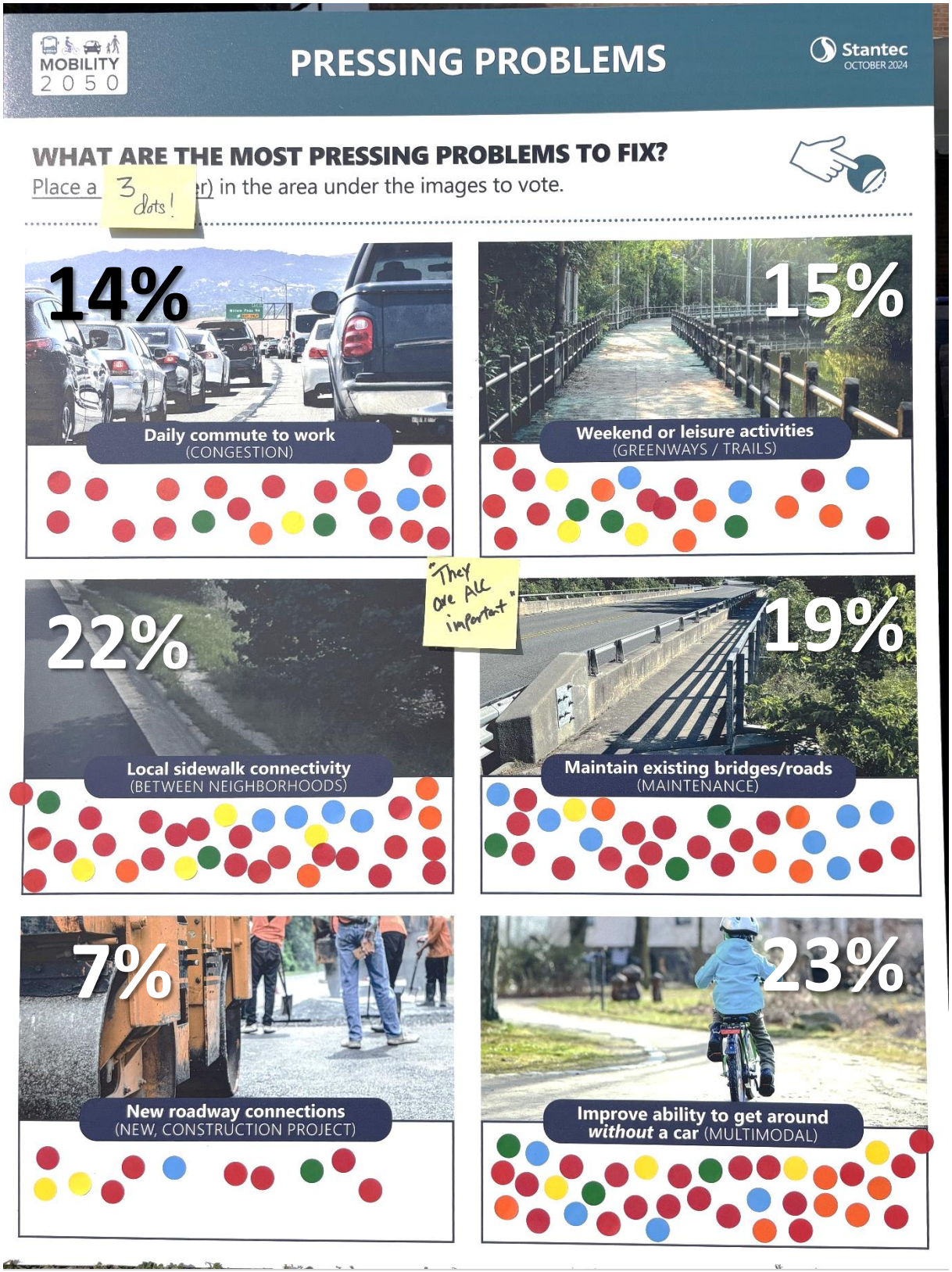
Photos from Open House Events

What types of projects are MOST NEEDED? 56 participants

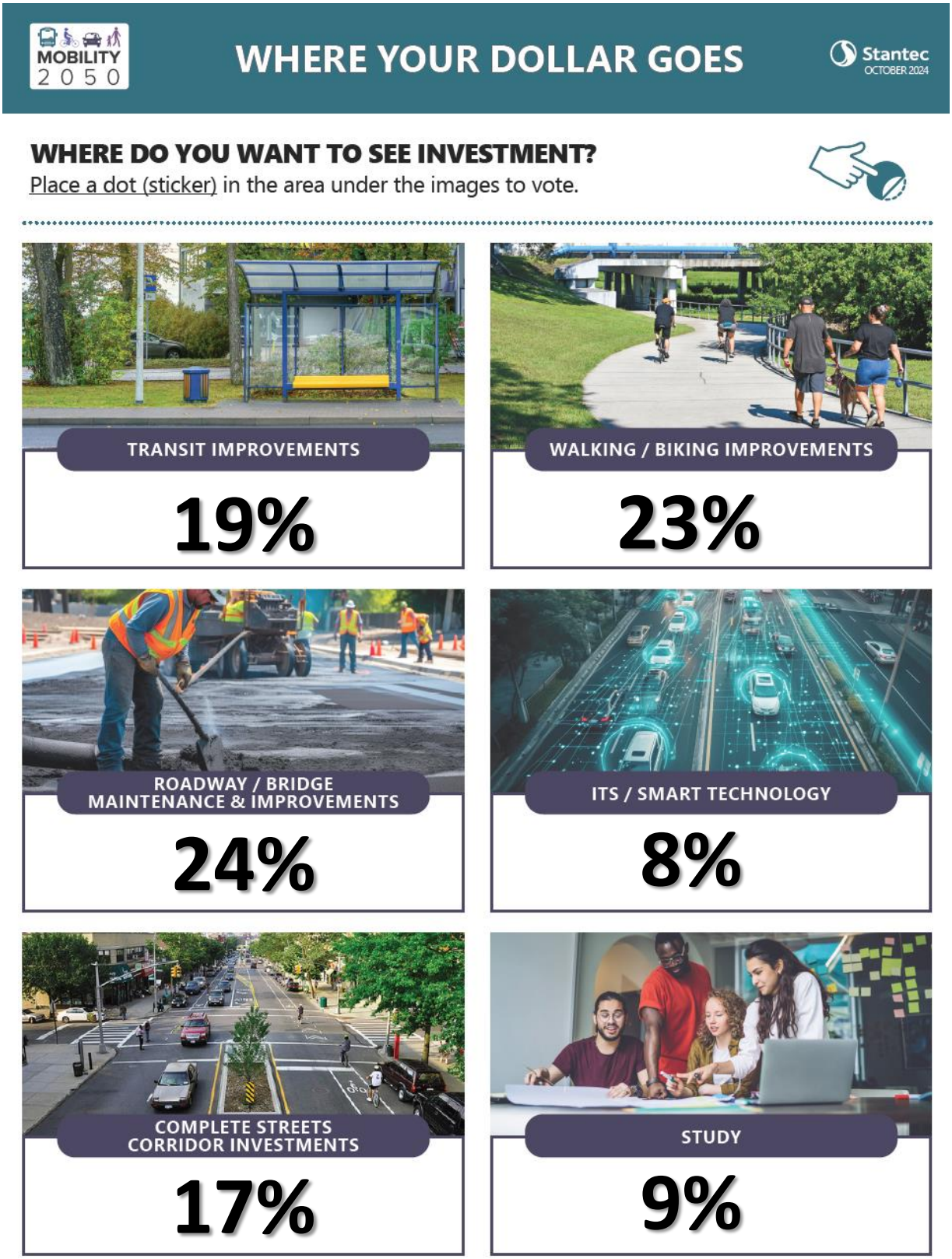
- **Regional** projects that benefit the larger network
- Balance of both small and regional
- **Small / local** projects that benefit Morristown



What are the MOST pressing problems to fix? 53 participants



Where do you want to see investment? 57 participants



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Contact	:		**Sub Section**	:	Classified Section
Address1	:	PO Box 1499	**Category**	:	Public Notices-130
Address2	:		**Dates Run**	:	10/11/2024-10/11/2024
City St Zip	:	Morristown TN 378161499	**Days**	:	1
Phone	:	(423) 581-0100	**Size**	:	1 x 10.50, 108 lines
Fax	:	(423) 585-4679	**Words**	:	194
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Notes	:				
Zones	:				

Public Notice

The Lakeway Area Metropolitan Transportation Planning Organization (LAMTPO) is updating its regional transportation plan, which examines the next 25+ years of transportation needs for the region. We are seeking your input on needs and priorities when it comes to driving, walking, biking, and traveling on public transportation.

We will have a public participation and information booth set up on October 26th at the Mountain Makins Festival located at the historic Rose Center in Morristown. All interested parties are invited to stop by to discuss and obtain information about the transportation plan.

La Organización de Planificación de Transporte Metropolitano del Área de Lakeway

Promotion in Citizen Tribune Newspaper Oct 2024

The STANDARD BANNER

P.O. Box 310 • Jefferson City, Tennessee 37760 • (865) 475-2081

Affidavit of Publication

PUBLIC NOTICE

The Lakeway Area Metropolitan Transportation Planning Organization (LAMTPO) is updating its regional transportation plan, which examines the next 25+ years of transportation needs for the region. We are seeking your input on needs and priorities as they relate to driving, walking, biking, and riding transit.

We will have a public participation and information booth at the Mossy Creek Fall Fest on October 5, 2024, from 9:00 a.m. to 12:00 p.m. The event will be held at 711 E. Main Street Jefferson City TN. 37760.

All interested parties are invited to stop by to discuss and get information on the transportation plan.

La Organización de Planificación de Transporte Metropolitano del Área de Lakeway (LAMTPO) está actualizando su plan de transporte regional, que examina los próximos 25+ años de necesidades de transporte para la región. Buscamos su opinión sobre las necesidades y prioridades en lo que se refiere a conducir, caminar, andar en bicicleta y viajar en transporte público.

Tendremos un puesto de información y participación pública en el Mossy Creek Fall Fest el 5 de octubre de 2024, de 9:00 a 2:00. El evento se llevará a cabo en el 711 E. Calle principal, Jefferson City, TN 37760.

Se invita a todas las partes interesadas a pasar para discutir y obtener información sobre el plan de transporte.
•9:26

State of Tennessee
County of Jefferson

Dale C. Gentry, being duly sworn, deposes and says that he is the Publisher of the Standard Banner, a weekly newspaper published at Jefferson City, Tennessee, and that the notice hereto attached was published for One consecutive weeks in said paper, and on the web at www.standardbanner.com and www.publicnoticeads.com, and that the total cost is $ 66.00, as indicated on the attached invoice.

Dale C. Gentry
Publisher

Sworn and subscribed before me this 26 day of September, 2024.

Teresa W. Gentry
Notary Public
My commission expires March 9, 2025

TERESA W. GENTRY NOTARY PUBLIC STATE OF TENNESSEE JEFFERSON COUNTY

Promotion in Standard Banner Newspaper Oct 2024

Appendix E

System Performance Summary

System Performance

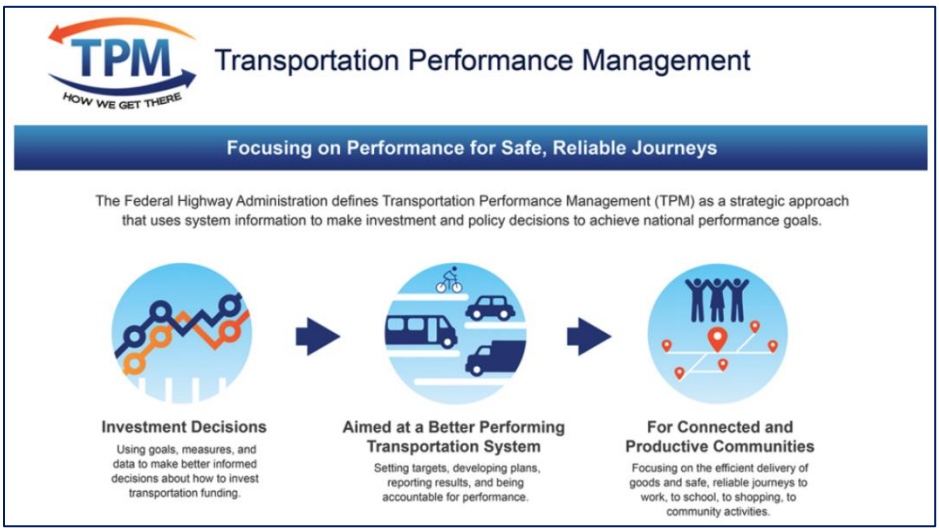
*Overview of Transportation Performance

*Performance Progress by Target Area

- *PM1 Safety
- *PM2 Maintenance
- *PM3 Reliability
- *Transit Performance

Overview of Transportation Performance

Transportation Performance Management (TPM) was introduced in Federal legislation that was passed in 2012 as a new requirement to incorporate a performance-based approach into the transportation planning process. The federal transportation bill known as Moving Ahead for Progress in 21st Century Act (MAP-21) required state Departments of Transportation, MPOs, and transit authorities to set coordinated targets, report on a required set of performance measures, and prioritize projects using a coordinated performance-based planning process. These performance tracking requirements were continued in subsequent transportation bills including the most recent one known as the Infrastructure Investment and Jobs Act (IIJA), also known as the Bipartisan Infrastructure Law (BIL).



TPM is specifically tied to the seven national performance goals for the Federal-aid Highway Program as established by Congress:

1. ***Safety:*** To achieve reduction in fatalities and serious injuries on all public roads.
2. ***Infrastructure Condition:*** To maintain highway infrastructure assets in state of good repair.
3. ***Congestion Reduction:*** To achieve reduction in congestion on the National Highway System.
4. ***System Reliability:*** To improve the efficiency of the surface transportation system.
5. ***Freight Movement and Economic Vitality:*** To improve freight networks, strengthen the ability of rural communities to access national and international trade markets, and support regional economic development.
6. ***Environmental Sustainability:*** To enhance the performance of the transportation system while protecting and enhancing the environment.
7. ***Reduced Project Delivery Delays:*** To reduce project costs, promote jobs and the economy, and expedite the movement of people and goods by accelerating project completion through eliminating delays in the project development and delivery process, including reducing regulatory burdens and improving agencies' work practices.

In addition to the performance measures established for the Federal-aid Highway Program, the Federal Transit Administration (FTA) has established performance measures in the areas of:

1. Transit Asset Management (TAM): The purpose of this performance measure area is to help achieve and maintain a state of good repair (SGR) for the nation's public transportation assets.
2. Public Transportation Agency Safety Plans (PTASP): Transit operators are required to develop and adopt a Public Transportation Agency Safety Plan (PTASP), which must include safety performance targets.

The following tables summarizes all of the applicable FHWA & FTA Performance Measures and current target value (note **blue text** indicates a TDOT statewide target:

FHWA PM's	Performance Measure	Federal Aid Program	Baseline (2019-2023) or 2021	Target (2021-2025) or 2025
PM 1: Safety For All Public Roads (Set Annually, 5-yr avg)	Number of Fatalities	Highway Safety Improvement Program (HSIP)	1,148.8	1,308.2
	Fatality Rate per 100M VMT		1.418	1.601
	Number of Serious Injuries		5,995.6	6,069.4
	Serious Injury Rate per 100M VMT		7.392	7.424
	Number of Non-Motorized fatalities and serious injuries		545.8	600.9
PM2: Infrastructure Condition National Highway System (4-Year Performance Period)	% of interstate pavement in good condition	National Highway Performance Program (NHPP)	70.8%	58.0%
	% of interstate pavement in poor condition		0.2%	1.0%
	% of non-interstate NHS pavement in **good** condition		40.3%	36.0%
	% of non-interstate NHS pavement in **poor** condition		4.1%	6.0%
	% of NHS bridges classified in **good** condition		32.5%	32.0%
	% of NHS bridges classified in **poor** condition		5.0%	6.0%
PM3: NHS & Freight Travel Time Reliability (4-Year Performance Period)	% of reliable person-miles traveled on the Interstate	National Highway Performance Program (NHPP) and National Highway Freight Program (NHFP)	92.1%	87.0%
	% of reliable person-miles traveled on the non-Interstate NHS system		93.4%	87.0%
	Truck Travel Time Reliability Index (TTTR)		1.32	1.55

FTA PM's	Performance Measure	Federal Aid Program	Exceeding Useful Life	Target
Transit Asset Management Plan (State of Good Repair)	Bus & Trolley	FTA Section 5307 Funds	n/a	n/a
	Cutaway Van (8 of 10 vehicles)		20%	<10%
	Transit Van		n/a	n/a
	Minivan		n/a	n/a

	Agency	Vehicle Type	Fatality Rate (per 100k mi)	Injury Rate (per 100k mi)	Total Collision Rate (per 100k mi)
Public Transportation Agency Safety Plan (2024-25)	ETHRA	Fixed Route	0.00	0.00	7.25
		Demand Response	0.00	0.03	1.80

TARGET SETTING OPTIONS

According to the USDOT, all state DOT's and transit agencies must set targets for the established performance measures within one year of respective final rule implementation, and all MPOs/TPOs must either: 1) establish their own quantifiable targets for their metropolitan planning area, or 2) support the statewide/regional targets as established by the state DOT or transit agency, no later than 180 days after the state adopts its targets. The TPO has typically chosen to support the TDOT statewide targets.

ASSESSMENT OF SIGNIFICANT PROGRESS

The assessment of significant progress for the Federal-aid Highway Program is conducted by FHWA at the state level wherein the FHWA determines whether TDOT has met or made significant progress towards meeting the adopted targets. FHWA does not directly assess the TPO's progress towards meeting targets; however, both FHWA and FTA will review TPO performance relative to targets as part of periodic transportation planning reviews, including MPO certification reviews, and reviews of adopted MTPs and TIPs.

Performance Progress by Target Area

PM1 – SAFETY

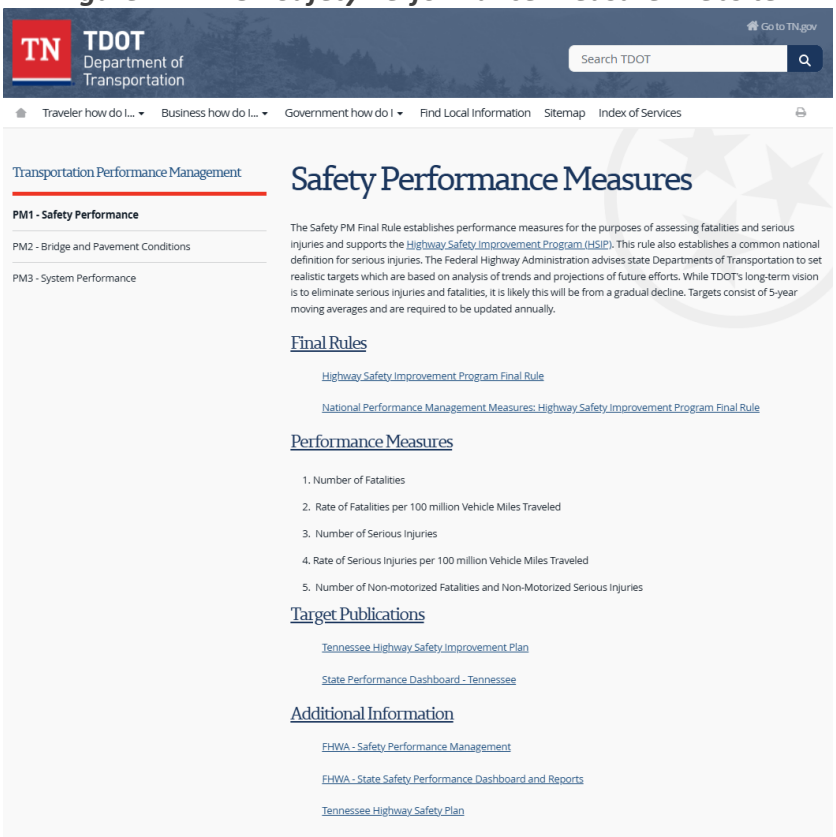
The Safety PM Final Rule establishes five performance measures (based on five-year rolling averages) to include:

1. **Number of Fatalities**
2. **Rate of Fatalities per 100 million Vehicle Miles Traveled (VMT)**
3. **Number of Serious Injuries**
4. **Rate of Serious Injuries per 100 million VMT**
5. **Number of Non-motorized Fatalities and Non-motorized Serious Injuries**

While the number of fatal crashes statewide has been increasing and decreasing over the past 10years, LAMTPO continues to strive for zero vehicular fatalities. The organization continually works with partners to monitor the performance of the transportation system as it relates to safety, as well as addressing safety issues through the implementation of a variety of programmatic approaches.

Traditionally, the Lakeway TPO has been supporting the TDOT statewide roadway safety targets due to staffing constraints. Through the TN Highway Safety Improvement Program (HSIP) TDOT reports its PM1 safety performance to USDOT, and maintains a Safety Performance website: https://www.tn.gov/content/tn/tdot/strategic-planning-home/strategic-planning/transportation-performance-management/safety-performance-measure.html

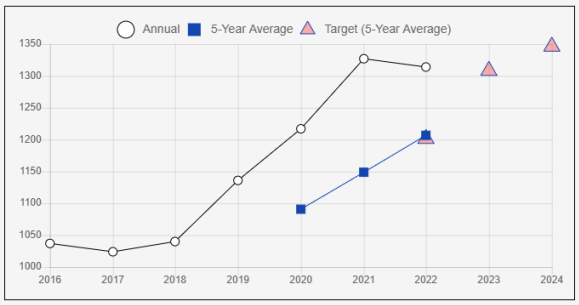
Figure E-1 TDOT Safety Performance Measure Website



The following figures display the actual number of fatalities, serious injuries, and non-motorized FSI trends within the State of Tennessee since 2016, as well as the rolling average targets for each.

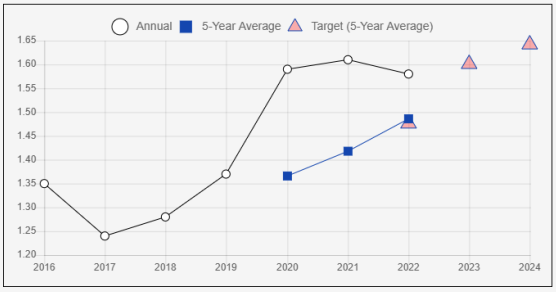
Figure E-2 TDOT Safety Performance Measure Trends

Number of Fatalities



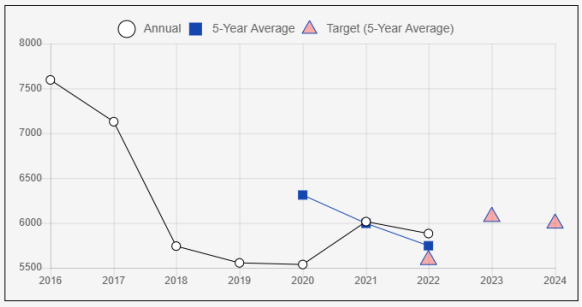
Number of Fatalities	2016	2017	2018	2019	2020	2021	2022	2023	2024
Annual	1,037	1,024	1,040	1,136	1,217	1,327	1,314		
5-Year Average					1,090.8	1,148.8	1,206.8		
Target (5-Year Average)							1,201.4	1,308.2	1,346.2

Fatality Rate (per 100 million VMT)



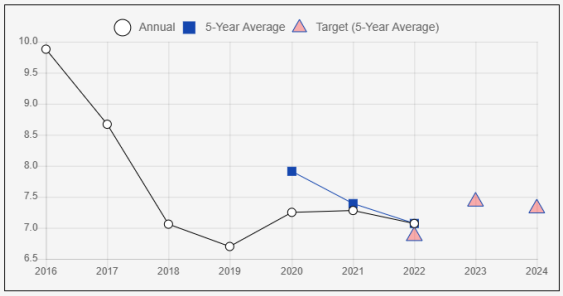
Fatality Rate (per 100 million VMT)	2016	2017	2018	2019	2020	2021	2022	2023	2024
Annual	1.35	1.24	1.28	1.37	1.59	1.61	1.58		
5-Year Average					1.366	1.418	1.486		
Target (5-Year Average)							1.476	1.601	1.642

Number of Serious Injuries



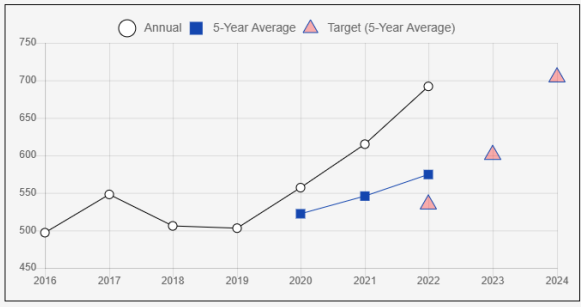
Number of Serious Injuries	2016	2017	2018	2019	2020	2021	2022	2023	2024
Annual	7,595	7,129	5,742	5,555	5,537	6,015	5,882		
5-Year Average					6,311.6	5,995.6	5,746.2		
Target (5-Year Average)							5,588.6	6,069.4	5,995.5

Rate of Serious Injuries (per 100 million VMT)



Rate of Serious Injuries (per 100 million VMT)	2016	2017	2018	2019	2020	2021	2022	2023	2024
Annual	9.88	8.67	7.06	6.70	7.25	7.28	7.07		
5-Year Average					7.912	7.392	7.072		
Target (5-Year Average)							6.869	7.424	7.315

Number of Non-Motorized Fatalities and Serious Injuries



Number of Non-Motorized Fatalities and Serious Injuries	2016	2017	2018	2019	2020	2021	2022	2023	2024
Annual	497	548	506	503	557	615	692		
5-Year Average					522.2	545.8	574.6		
Target (5-Year Average)							534.8	600.9	704.2

HIGHWAY SAFETY IMPROVEMENT PROGRAM (HSIP)

The PM1 measures are most directly tied to the Federal-Aid Highway formula funding program known as the Highway Safety Improvement Program (HSIP). The HSIP funds are administered by TDOT who are responsible for ensuring that they are used to make progress towards the goals that are established in the Tennessee Strategic Highway Safety Plan (SHSP). The **SHSP** was recently updated to cover the 5-Year Period from 2025-2029 and for the first time it incorporated a special **Vulnerable Road User Safety Assessment** that is used to identify set-aside HSIP funding for Pedestrian Road Safety Initiative (PRSI) projects. The SHSP identifies "Emphasis Areas" that direct priories for use of the HSIP funding.

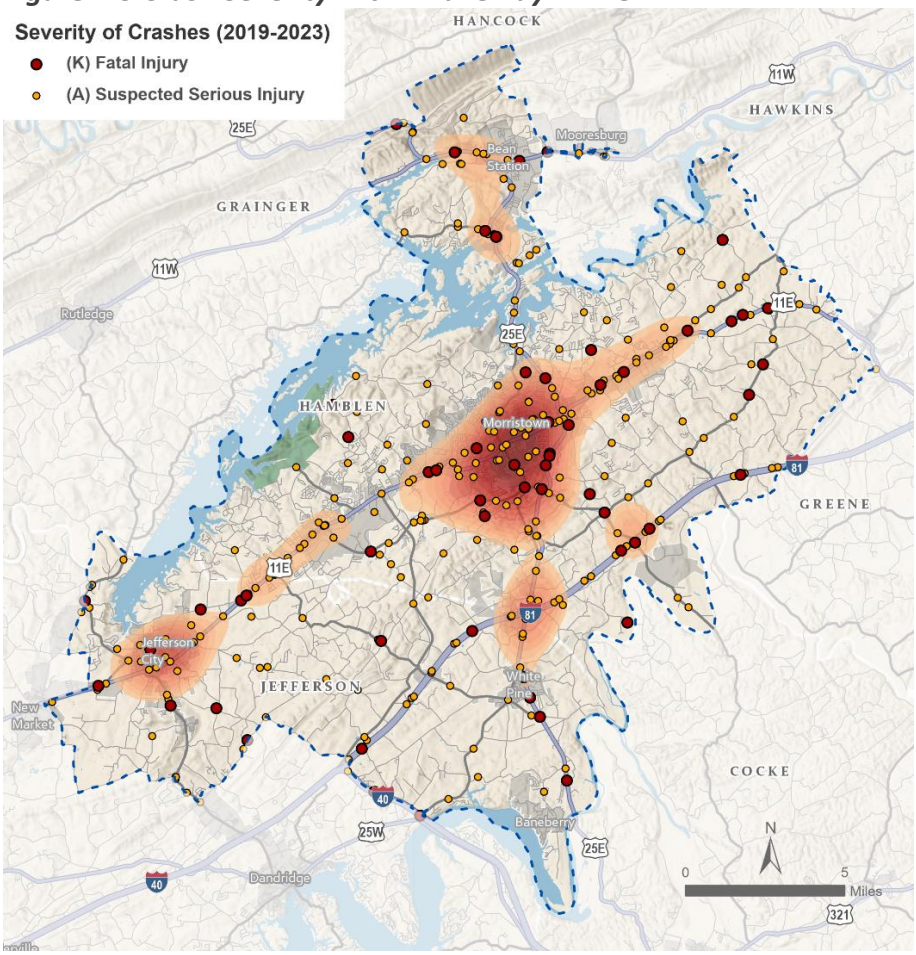
TDOT prepares an **HSIP annual report** each year that summarizes safety projects and initiatives included in the HSIP program that they administer statewide along with specific qualifying criteria. Some examples of separate initiatives that are part of TDOT's safety program include:

- Road Safety Audits / Local Road Safety Initiative (LRSI)
- Pedestrian Road Safety Initiative (PRSI) - ADA Improvements
- Spot Safety Program
- Resurfacing Program

SAFETY CONDITIONS – LAKEWAY AREA MTPO

As part of this Mobility Plan 2050 MTP update, safety data was extracted from the TDOT AASHTOWare platform and analyzed for the years 2019-2023. Tabular data and maps were generated to help prioritize projects.

Figure E-3 Crash Severity within Lakeway MTPO

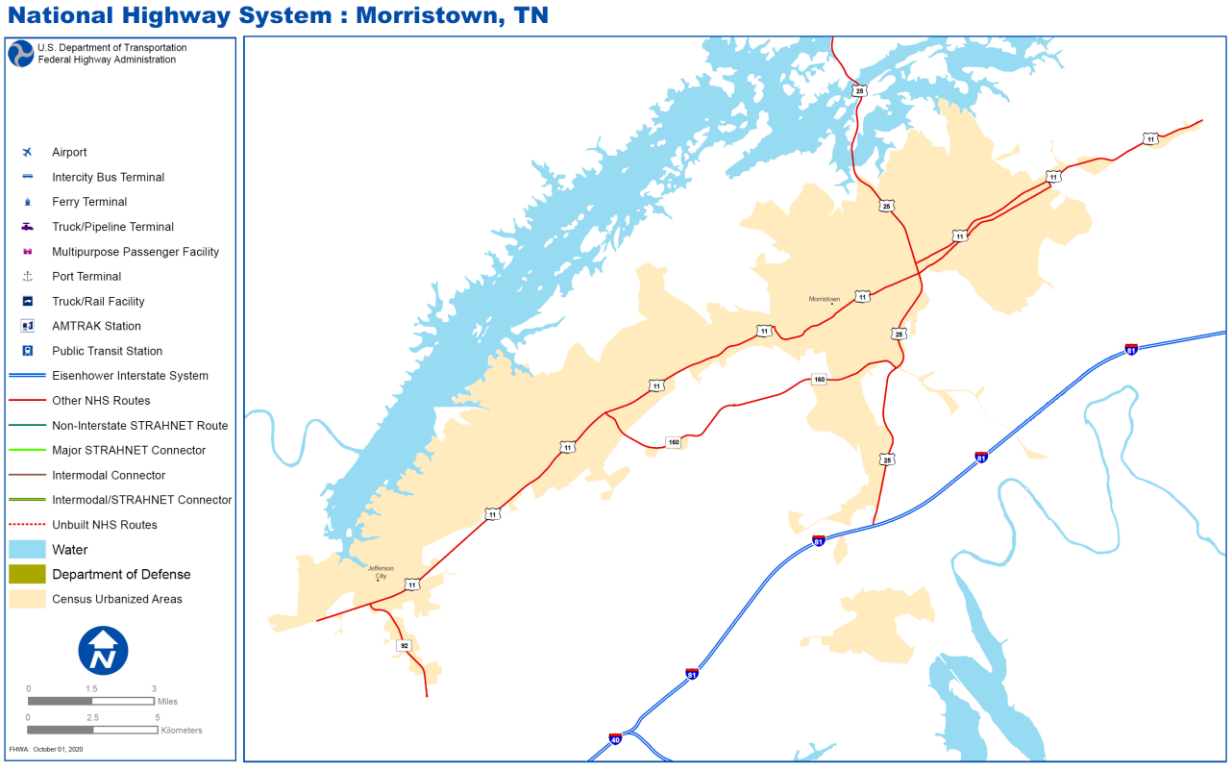


Source: TDOT Safety Platform – AASHTOWare - https://www.tn.gov/tdot/tdot-construction-division/transportation-construction-division-resources/aashtoware-project.html

PM2 – MAINTENANCE

This measure is specific to the pavement and bridge condition along roadways that are designated on the National Highway System (NHS), the vast majority of which are owned and maintained by the Tennessee Department of Transportation (TDOT). The Lakeway TPO has decided to support the statewide targets for these measures. TDOT develops its own statewide asset management process to determine appropriate funding allocations to address maintenance of pavements and bridges across the entire state and the TPO does not have direct input on where those funds are spent. The map below shows the NHS-designated roadway system in the region and subsequent sections provide information on current bridge and pavement condition targets.

Figure E-4 National Highway System Roads within Lakeway TPO



Pavement Conditions and Targets

The FHWA performance measure areas related to NHS pavement condition are broken out into four total categories related to the percentage of lane-miles rated as either "Good" or "Poor" for both the Interstate system and other Non-Interstate NHS routes as follows:

1. Percentage (%) of pavements of the Interstate System in **Good** condition
2. Percentage (%) of pavements of the Interstate System in **Poor** condition
3. Percentage (%) of pavements of the non-Interstate NHS in **Good** condition
4. Percentage (%) of pavements of the non-Interstate NHS in **Poor** condition

Pavement ratings are comprised of different metrics including: International Roughness Index (IRI), Cracking, Rutting and Faulting. The following table shows the current amount of total statewide mileage of NHS routes by Interstate and Non-Interstate along with the current 2022-2025 four-year Performance Period targets established by TDOT and supported by the TPO:

Table E-5 Pavement Condition Summary (PM2)

Performance Measure	Baseline (2022)	Target (2025)
% of **Interstate** pavement in **Good** condition	64.5%	58.0%
% of **Interstate** pavement in **Poor** condition	0.4%	1.0%
% of **Non-Interstate** NHS pavement in **Good** condition	35.8%	36.0%
% of **Non-Interstate** NHS pavement in **Poor** condition	4.4%	6.0%

Source: FHWA performance measure dashboard – Tennessee – https://www.fhwa.dot.gov/tpm/reporting/state/condition.cfm?state=Tennessee

Bridge Conditions and Targets

The FHWA performance measure areas related to NHS bridge conditions are broken out into two total categories related to the percentage of bridges rated as either "Good" or "Poor" for all NHS routes (Interstate and Non-Interstate) as follows:

- Percentage (%) of NHS Bridges by Deck Area in **Good** condition
- Percentage (%) of NHS Bridges by Deck Area in **Poor** condition

Bridge conditions are measured based on three different aspects: Deck, Superstructure and Substructure. If any of those three items are rated as "Poor" then the entire bridge is considered as being in poor condition for purposes of the FHWA Performance Measures. The size of the bridge comes into play as well as its rating is weighted by the total deck area and factored into the total for the statewide value.
There are 4,211 NHS Bridges in TN with an average age approximately 48 years and since in general a bridge will transition from Good to Fair at around 20 years of age and from Fair to Poor at around 65 years it will be critical to maintain and increase funding for bridge projects to be able to keep them in a state of good repair. The below table shows the TDOT Statewide baseline and targets for bridge condition:

Table E-6 Bridge Condition Summary (PM2)

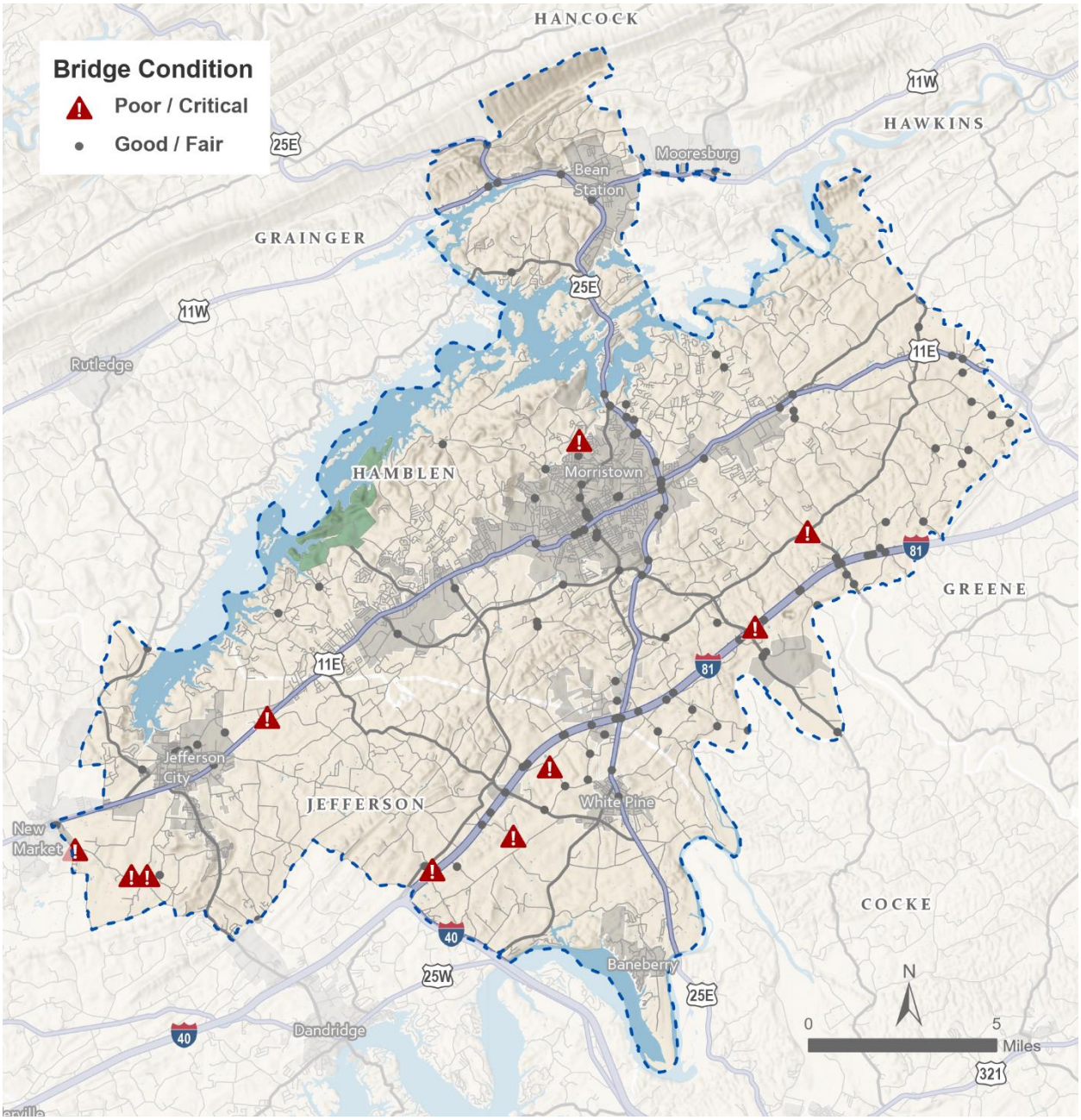
Performance Measure	Baseline (2022)	Target (2025)
% of NHS Bridges by Deck Area in **Good** condition	33.5%	32.0%
% of NHS Bridges by Deck Area in **Poor** condition	4.6%	6.0%

Source: FHWA performance measure dashboard – Tennessee – https://www.fhwa.dot.gov/tpm/reporting/state/condition.cfm?state=Tennessee

MAINTENANCE CONDITIONS – LAKEWAY AREA MTPO

As part of this Mobility Plan 2050 MTP update, bridge condition data was received from our TDOT partners and incorporated into the project prioritization process.

Table E-7 Bridge Maintenance Condition Reporting for the Lakeway TPO



Source: TDOT Geospatial Data Team (TDOT GIS) – Bridge Condition https://tn-tnmap.opendata.arcgis.com/maps/8d89d92e76d54ba08290b652b74c4549/about

PM3 – RELIABILITY

Travel Time Reliability is the broadest of all of the FHWA measures and covers multiple aspects of transportation performance including:

1. Measures to Assess Performance of the National Highway System – Travel Time Reliability (NHPP)
2. Measures to Assess Freight Movement on the Interstate System – Truck Travel Time Reliability (NHFP)
3. Measures to Assess the CMAQ Program – Traffic Congestion, Peak Hour Excessive Delay & Percent Non-Single Occupancy Vehicle Travel
4. Measure to Assess the CMAQ Program – On-Road Mobile Source Emissions

Similar to the PM2 measures, the PM3 measures are set based on a 4-Year Performance Period, with this now being the 2nd Performance Period since the initiation of FHWA TPM covering the years 2022-2025.

NHS Level of Travel Time Reliability (LOTTR) Measures and Targets

The FHWA performance measure areas related to Travel Time Reliability are broken out into two categories covering all Directional Mainline National Highway System (NHS) Roadways:

- Percent of Person miles Traveled on the Interstate that are Reliable
- Percent of Person miles Traveled on Non-Interstate NHS that are Reliable

The TPO decided to support the TDOT statewide targets for both Travel Time Reliability measures, primarily due to the National Highway Performance Program federal-aid formula funds being solely controlled by TDOT. The TPO works with TDOT to prioritize projects for NHPP funding but recognizes that TDOT must determine projects on a statewide basis for this funding. The TPO is however able to access the "big data" tools through the Regional Integrated Transportation Information System (RITIS) to allow for determination of local trends and identify the most unreliable segments of the NHS roadways in the TPO area.

Travel Time Reliability (TTR) can be defined as the *consistency or dependability* of travel times from day to day or across different times of the day. It was selected as a performance measure by FHWA since while it is related to traffic congestion, it is a mechanism to better describe the day-to-day experience of travelers and the importance of being able to reliably predict travel time, such as to an important appointment.

The calculation of Travel Time Reliability is very mathematically intensive and relies on large amounts of archived travel time data across many weeks, months, and even years. The reliability calculation involves the historic value for the 80th percentile travel time (congested time, in minutes) across a segment of roadway divided by the 50th percentile travel time (average, in minutes). This is known as Level of Travel Time Reliability (LOTTR) value. This computation is made for four different time periods during the day (AM, Mid-day, PM, and Off Peak) and if any one of these four calculations is greater than 1.50 then the entire segment is considered to be "Unreliable". That is, if a 15 minute trip under congested conditions should typical take only 10 minutes under normal conditions, then that segment of road is unreliable.

The following table shows the current Travel Time Reliability targets with the 4-year Targets having been adjusted at the midpoint based on worse than anticipated reliability when originally set:

Table E-8 Level of Travel Time Reliability (LOTTR)

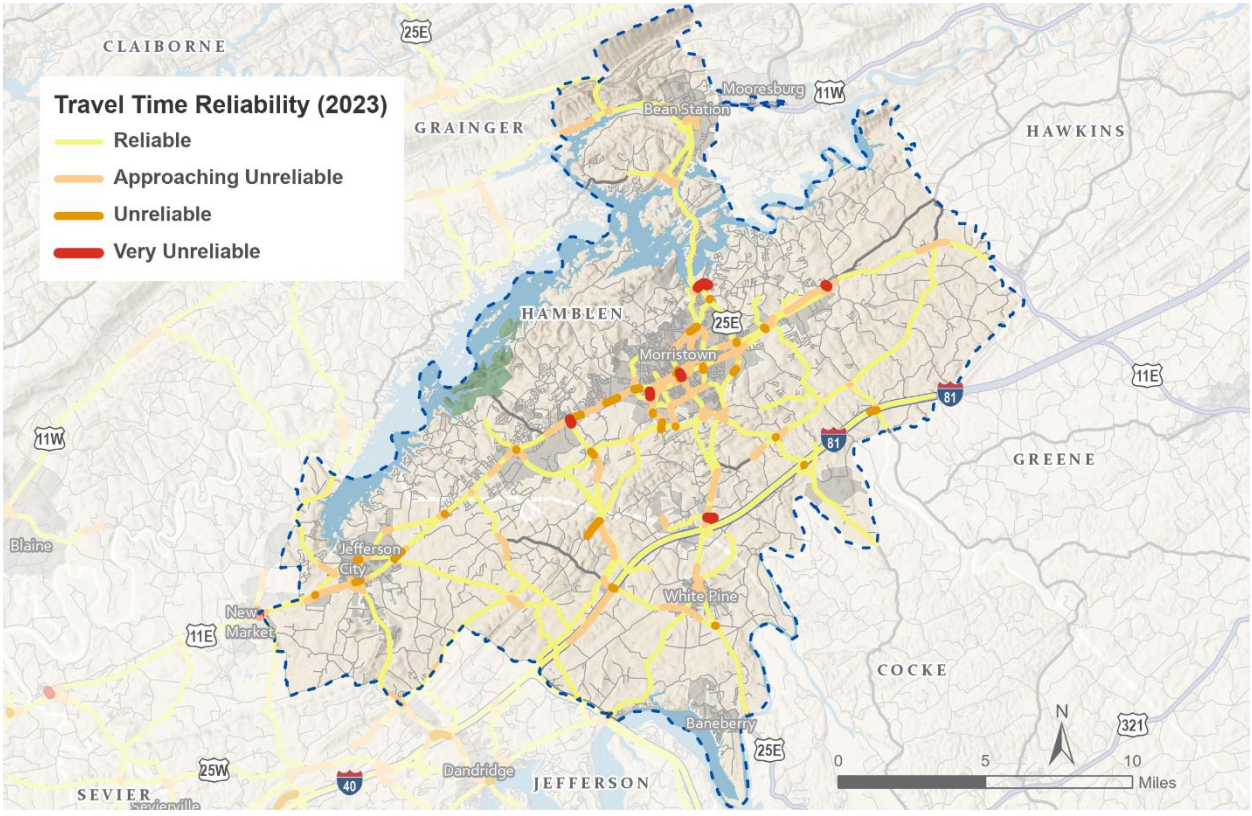
Performance Measure	Baseline (2022)	Target (2025)
Percent of Person Miles Traveled on the **Interstate** that are Reliable	90.0%	88.2%
Percent of Person Miles Traveled on the **Non-Interstate NHS** that are Reliable	93.4%	89.4%
Truck Travel Time Reliability Index for Interstates	1.39	1.35

Source: FHWA performance measure dashboard – Tennessee – https://www.fhwa.dot.gov/tpm/reporting/state/reliability.cfm?state=Tennessee

RELIABILITY CONDITIONS – LAKEWAY AREA MTPO

As part of this Mobility Plan 2050 MTP update, travel time reliability data (INRIX-XD) was received from our TPO partners (Knoxville TPO) and incorporated into the project prioritization process.

Table E-9 Travel Time Reliability for Lakeway Region



Source: Ritis / NPMRDS Probe Analytics platform - https://ritis.org/tools#dashboard

TRANSIT PERFORMANCE

Public transportation provides access to major attractions for those who do not own a personal vehicle, are unable to drive a vehicle, or choose not to drive. It is important to understand the areas within the Lakeway region that will *most likely benefit from transit*, such as areas with higher concentrations of people that are low income, minorities, or older residents, because these individuals tend to depend upon transit service for access and mobility more than other people.

The Lakeway region is served by the East Tennessee Human Resource Agency (ETHRA), who operates the fixed-route Lakeway Transit service within the City of Morristown, as well as the demand-response service that covers a 16-county area. Appendix H contains more details on these transit services.

Transit Asset Management

Transit Asset Management (TAM) is a strategic approach to managing transit assets such as bus and van useful life and replacement schedules. An assessment of State of Good Repair (SGR) is performed to gauge the condition of each asset to ensure it is able to operate at full level of performance & does not pose unacceptable risk. Each vehicle/asset is assigned Useful Life Benchmarks as the expected life cycle to plan 1for each of the assets. The age of vehicles is a primary metric in this evaluation but is just one guide.

The TPO target for rolling stock/equipment at 10% or less – or – a goal of at least 90% being classified in a state of good repair. Refer to the table below for each transit agency information related to the most recently established TAM targets:

Table E-10 Transit Asset Management (TAM) Plan – FY2025

Asset Class	Useful Life Benchmark (Years / Miles)	Agency	Total Assets	2025 # of Assets in Good Repair	2025 # of Assets in SGR Backlog	2025 % of Assets in SGR Backlog	2025 Target
Rolling Stock – All Revenue Vehicles – Percent of revenue vehicles that have met or exceeded their Useful Life Benchmark							
Bus	14 / 200k	ETHRA	--	--	--	--	<10.0%
Cutaway	5 / 150k	ETHRA	10	8	80%	20%	<10.0%
Ford Transit Van	7 / 100k	ETHRA	--	--	--	--	<10.0%
Minivan	8 / 100k	ETHRA	--	--	--	--	<10.0%
Automobile	8 / 100k	ETHRA	--	--	--	--	<10.0%
Equipment – Non-Revenue Vehicles – % of non-revenue vehicles that have met or exceeded their Useful Life Benchmark							
Support Vehicle	8 / 100k	ETHRA	--	--	--	--	--
Equipment >$50k – % of equipment with condition rating <3.0 on FTA's Transit Economic Requirements Model (TERM) scale							
Equipment	N/A	ETHRA	--	--	--	--	<65%
Facilities – All Buildings or Structures – % of facilities or structures with a condition rating <3.0 on FTA's TERM scale							
Facilities	N/A	ETHRA	1	1	100%	100%	100%
ETHRA = East Tennessee Human Resource Agency. Only includes ETHRA vehicles that operate in the TPO's urban area.							

It should be noted that the transit vehicle industry is still in recovery from COVID supply chain issues and rising inflation. Several agencies have new vehicles on order, which will bring these numbers closer in line with the specified targets.

Transit Safety Performance Targets

Operators of public transportation that receive FTA Section 5307 Urbanized Area Formula funds are required to produce Public Transportation Agency Safety Plans (PTASP). In the Lakeway urban area, ETHRA is obligated to meet this requirement. Federal regulations require transit agencies to develop Safety Plans that include the processes and procedures to implement a Safety Management System (SMS). SMS is a comprehensive, collaborative, and systematic approach to managing safety. Transit agencies in an urban area are required to share their PTSAP and safety targets with the TPO. **Table H-5** shows the 2024 Transit Safety Performance Targets for ETHRA, and reflect the best available information at the time of this MTP process.

Table E-11 Targets and Safety Plan – Lakeway Transit

2024 Transit Safety Performance Measure Targets		
Performance Measure	**Lakeway Transit** Fixed Route	**ETHRA** Demand Response
Number of Fatalities	0	0
Rate of Fatalities per 100K VRM	0	0
Number of Injuries	0	1
Number of Injuries per 100K VRM	0	0.03
Number of Safety Events (collisions)	5	60
Number of Safety Events per 100K VRM	3.4	1.8
Total Major Mechanical Failures	5	22
Miles Between Major Mechanical Failures	3.4	0.68

Source: ETHRA Public Transportation Agency Safety Plan (PTASP) – includes only the operations within the Lakeway Region

Appendix F

ITS Architecture

Lakeway Area Metropolitan Transportation Planning Organization – LAMTPO
ITS Technical Memo – Lakeway, TN Regional ITS Architecture
July 2024

PURPOSE

This report describes the role of current Intelligent Transportation Systems (ITS) operations in the Lakeway, TN region and their impact on the 2050 Knoxville-Lakeway Metropolitan Transportation Plan (MTP). It outlines the purpose and value of ITS, describes the current status of ITS deployments through Tennessee Department of Transportation (TDOT) ***SmartWays program***, and offers observations for future considerations by the Metropolitan Planning Organization (MPO). Also, this document highlights the potential of ITS to improve safety, mobility, and efficiency and suggests strategies for its effective integration into the long-term transportation plan.

What is ITS?

ITS encompasses a broad range of technologies that integrate information and communication with transportation infrastructure and vehicles. It can be applied to roads, vehicles, and travelers within transportation systems. Examples in Figure 1 include vehicle detection sensors (VDS), closed-circuit television (CCTV) cameras, dynamic message signs (DMS), and road weather information system (RWIS).

Figure 1. Examples of ITS technology

Also, ITS is the backbone of Traffic Management Centers (**TMCs**) as shown in Figure 2. TMCs rely on ITS data and technology to monitor traffic flow, identify incidents, and implement strategies to improve overall traffic management. ITS is applied in TMCs through the following:

- **Data Collection**: CCTV cameras, VDS, and weather stations gather real-time information on traffic conditions, weather, and road infrastructure. This data is fed into the TMC for analysis.
- **Traffic Monitoring**: TMC operators use the ITS data to monitor traffic flow, identify congestion points, and detect incidents like accidents or disabled vehicles.
- **Incident Response**: With real-time information on incidents, TMC operators can dispatch emergency services, activate variable speed limit signs, and update dynamic message signs to warn drivers about delays and suggest alternate routes.
- **Traveler Information**: TMCs can use ITS data to provide travelers with up-to-date information on road closures, accidents, and travel times through radio broadcasts, websites, and mobile apps.

From deployments of ITS technology, the TMC is provided with the critical data needed to proactively manage traffic flow, improve safety, and minimize congestion.

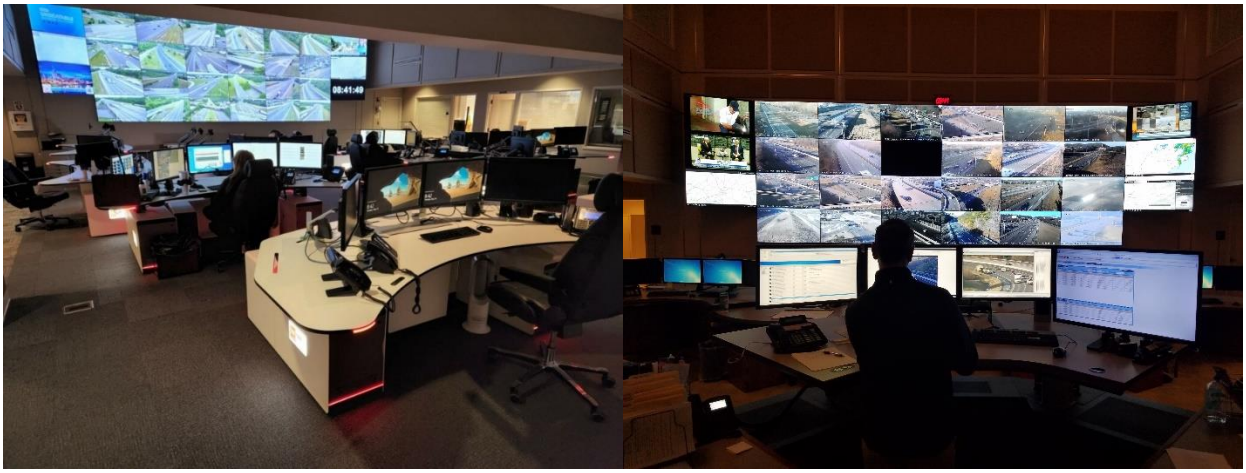


Figure 2. TMC Operations

Value of ITS for Residents

Effective ITS implementation can offer significant benefits for residents, including the following:

- **Improved Safety**: Reduced traffic congestion and accidents by providing drivers with real-time information about road conditions, hazards, incident response or other dangers.
- **Enhanced Mobility**: Smoother commutes and more reliable travel times through real-time traffic data from sensors and cameras and optimized signal control.
- **Reduced Environmental Impact**: Less emissions and fuel consumption from congestion mitigation and optimized traffic flow minimizes.
- **Increased Productivity**: More reliable travel times and efficient travel experience by providing travelers with information about the best route options, real-time arrival times for public transportation, and other services.

CURRENT STATUS

TDOT ITS Program

The Tennessee Department of Transportation (TDOT) maintains an ITS program known as TDOT ***SmartWay*** to focus on improving the efficiency and safety of the state's transportation network. TDOT SmartWay consists of live video cameras to monitor highways from TMCs across the state, sensors to detect and measure traffic flow, and electronic message boards to provide urgent traffic notices and safety messages to drivers on the highway. Currently, the cities of Memphis, Nashville, Chattanooga, and Knoxville have fully integrated TDOT SmartWay systems in the state. Their ITS devices can be viewed on the TDOT 511/SmartWay Map: https://smartway.tn.gov/traffic?features=cameras,incident,messageSign,traffic.

TDOT has also been deploying SmartWay ITS expansion design projects across the state. They include new CCTV cameras, radar detection systems (RDS), DMS, RWIS, travel time message signs (TTMS), fog warning beacons, and fiber optic communications. TDOT has been working closely with local TMC staff to ensure that the deployed projects meet the needs of the TMCs and provide value to the traveling public. In addition to the TDOT 511/SmartWay Map, TDOT uses a separate GIS database of ITS devices and communications including its fiber network along the interstate highways.

ITS Administration, Evaluation, and Deployment

In collaboration with the Lakeway Area Metropolitan Transportation Planning Organization (LAMTPO), TDOT oversees the administration, evaluation, and deployment of ITS in the Lakeway region. To achieve these functions, the Lakeway Regional ITS Architecture document was first developed in 2008. Since then, it has been updated in 2017, and is about to be updated again in 2024.

The Regional ITS Architecture document defines how different transportation systems and technologies will work together in a specific region (https://www.tn.gov/tdot/traffic-design/intelligent-transportation-systems/regional-architecture/lakeway-its-architecture.html). This resource serves as a roadmap that ensures all the ITS components including ITS devices communication networks are compatible and can be integrated within the region. Also, it allows stakeholders to plan for what they want their system to achieve and compartmentalize it into different components that can be deployed based on available funding. Developing a regional ITS architecture encourages interoperability and resource sharing among agencies and allows for cohesive long-range planning among regional stakeholders. Furthermore, the Federal Highway Administration (FHWA) and Federal Transit Administration (FTA) require completion and continue updates of the Regional ITS Architecture document before the region can use federal grant funding for ITS projects.

To recap, the Regional ITS Architecture document contains the following key components:

- **Function**: It ensures institutional agreement between local governments, and provides technical integration for implementing ITS projects within a region.
- **Benefits**: It improves communication and collaboration among different transportation agencies, leading to a more efficient and safer transportation system.

- **Components**: It outlines existing and planned transportation systems, how they connect, and the data they exchange.
- **Development**: a regional-scale investment like this is typically created by state Departments of Transportation (TDOT) and supported by MPOs (LAMTPO) that are similarly based on a national framework and customized for the specific needs of a region.

TDOT and LAMTPO collaborated on the latest update to the Lakeway Regional ITS Architecture in conjunction with the Mobility Plan 2045 effort. After the latest update in 2017, several ITS programs and projects have been implemented in the Lakeway Region. This includes the installation of additional closed-circuit television (CCTV) cameras at the I-81/I-40 interchange, new DMS installation, and upgrades to municipal signals maintained by the City of Morristown. Considering these changes in the ITS infrastructure, a scheduled maintenance and update to the regional ITS architecture is critical for reflecting the current conditions accurately and recording the changes in the region's needs and vision for ITS.

In the Lakeway region, the existing ITS infrastructure comprises CCTV cameras, DMS, and highway advisory radio (HAR) signs, along the interstate highways. Compared to the Knoxville region, the Lakeway region is less populated with different set of needs for ITS technology. Hence, more focus on rural ITS strategies will be recommended in coordination with the municipalities and other stakeholders. This may include, but is not limited to, the following:

- **Animal Warning System** (AWS): Alert Drivers of potential hazards due to wildlife presence on or near roads using sensors
- **Connected and Automated Vehicles** (CAV): Allow vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) for providing drivers with real-time information on current roadway conditions (i.e. crash, delay, work zone, road closure)
- **Fog warning beacons**: Detect fog, smoke, or other low-visibility conditions and warn drivers
- **RWIS**: Collect and distribute data about weather conditions (i.e. air temperature, precipitation, wind) and road surface conditions (i.e. temperature, ice, wetness)

OBSERVATIONS

Considerations for the MPO

As the 2050 Knoxville-Lakeway MTP is developed, several key considerations for LAMTPO should be addressed regarding ITS:

- **Prioritization**: Identify critical transportation challenges that ITS deployments can effectively address such as congestion "hot spots" or areas of recurring safety concerns.
- **Funding** Strategies: Explore various funding mechanisms for ITS projects, including public-private partnerships (P3) and federal grants.
- **Data Sharing and Integration**: Develop secure and efficient data-sharing protocols to allow for seamless integration between various ITS components and external data sources.

Improving ITS in 10+ Years

Looking ahead to the next 10 – 25 years, the LAMTPO should consider strategies for the following:

- **Emerging Technologies**: Advancements in CAV, artificial intelligence (AI), and big data analytics to enhance ITS capabilities and interoperability with other traffic systems or technologies.
- **Security**: Robust physical security and cybersecurity measures to protect ITS infrastructure from attacks that could disrupt critical operations in the transportation network.
- **Accessibility**: Ensure that ITS deployment benefits all residents, including those who may not have access to smartphones or other devices for communication.

ITS is a rapidly evolving field, and new technologies continue to be developed. As ITS continues to advance, it has the potential to make transportation safer, more efficient, and more environmentally friendly.

TPO Coordination Efforts

To prepare for the future, the LAMTPO can begin laying the groundwork through the following coordination efforts:

- **Public Engagement**: Educate the public about the values and benefits of ITS technology and gather feedback on their needs and concerns early.
- **Industry Collaboration**: Engage with technology companies, transportation service providers, and research institutions to collaborate and explore innovative ITS solutions that meets all stakeholders' needs and concerns.
- **Training and Development**: Invest in programs that train and equip the workforce with skills necessary to operate and maintain advanced ITS equipment and systems.

Appendix G

Multimodal Assessment

MEMORANDUM

To: Tennessee Department of Transportation, Stantec

From: Alta Planning + Design

Date: November 18, 2024

Re: Task 6: Multimodal Assessment for Lakeway Area Metropolitan TPO – Updated after TDOT Review

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Introduction

Stantec has been retained by the Tennessee Department of Transportation (TDOT), in partnership with the Lakeway Area MTPO (LAMTPO) to provide professional services in the preparation of the 2050 Metropolitan Transportation Plan Update for each TPO. The Metropolitan Transportation Plan (MTP) examines all modes of travel with a 25-year outlook and recommends fiscally constrained projects (those that could be reasonably funded).

Alta is responsible for leading the multimodal assessment task using available roadway data. As part of the multimodal assessment, Alta completed a level of traffic stress (LTS) analysis for the bicycle (BLTS) and pedestrian (PLTS) network in LAMTPO, ranking streets from low stress (LTS 1, suitable for children) to high stress (LTS 4, suitable only to "strong and fearless" bicyclists/pedestrians). The LTS scores were assigned to the TDOT Roadway Centerline data and the LTS was informed by OpenStreetMap data, as well as sidewalk and bicycle facility feature data received by Alta from Stantec.

The memorandum has been organized in the following sections with breakdowns for LAMTPO:

- A discussion of Bicycle Infrastructure, including an overview of the existing bicycle facilities, an analysis of Bicycle Level of Traffic Stress (BLTS), and a connectivity analysis.
- A discussion of Pedestrian Infrastructure, including an overview of the existing pedestrian facilities, an analysis of Pedestrian Level of Traffic Stress (PLTS), and a connectivity analysis.
- The Appendices section includes detailed methodologies for each of the analyses.

Bicycle Infrastructure

Existing Infrastructure

Bicycle infrastructure includes facilities along roadways and corridors that support people traveling by bike. It also includes trails and shared use paths that are off the main street network. These facilities were integrated into the street network and given an LTS of 1 since they are, by their nature off-street, low-stress facilities.

Lakeway

There are approximately 96 miles of bicycle facilities within the Lakeway area, including trails, greenways, shared use paths, and state bike routes. **Figure 1** breaks down the length of each facility type within the region, and **Figure 2** illustrates where each of these facilities is located within the MPO boundary.

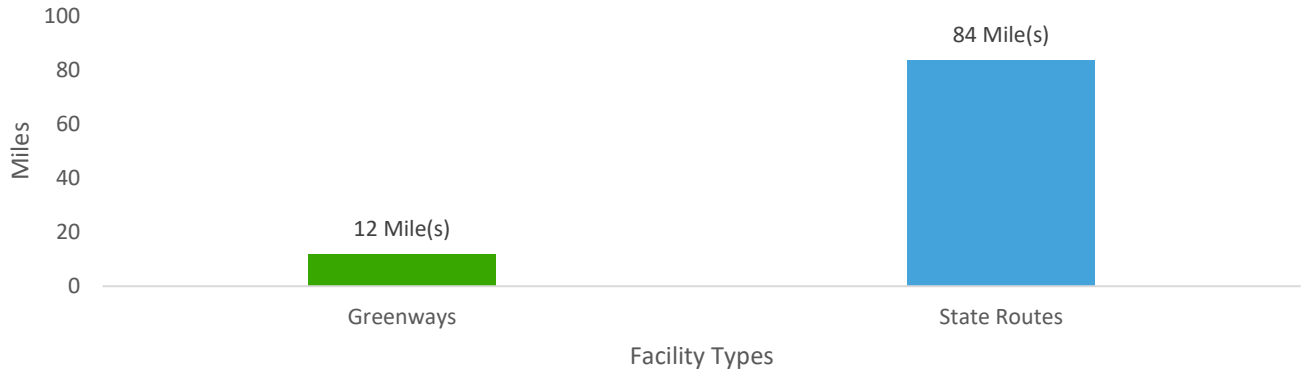

Figure 1. Miles of bike facilities in LAMTPO

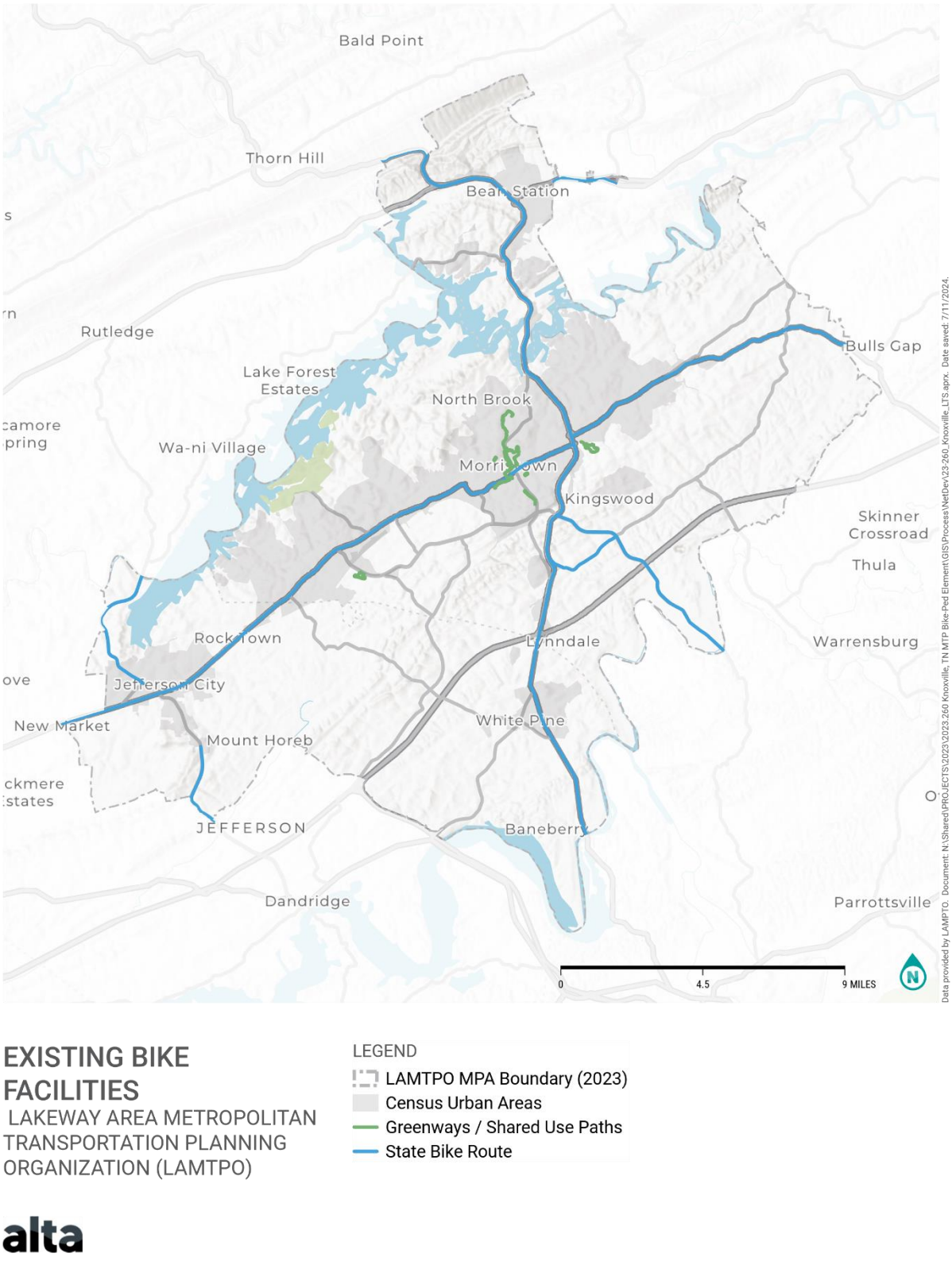

Figure 2. Existing Bike Facilities for LAMTPO

Bicycle Level of Traffic Stress (BLTS)

Alta assessed the bicycle level of comfort using the Level of Traffic Stress (LTS) methodology. The LTS analysis estimates the level of comfort for people biking on a given roadway segment. LTS scores are determined by characteristics of a given roadway segment that affect a user's perception of safety and comfort. Roadway characteristics like posted speed limit, number of lanes, and the presence of sidewalks or bike facilities affect BLTS outcomes. Our baseline assumptions deriving key attributes from OpenStreetMap (OSM) are documented in **Appendix A.** The combination of this criteria classifies a road segment into one of four levels of traffic stress:

- **BLTS 1** represents roadways where bicyclists of all ages and abilities would feel comfortable riding. These roadways are generally characterized by low volumes, low speeds, no more than two travel lanes, and traffic control measures at intersections. These roadways may have bicycle facilities; separated shared use paths for bicycles also fall into this category.
- **BLTS 2** represents slightly less comfortable roadways where most adults would feel comfortable riding.
- **BLTS 3** represents moderately uncomfortable roadways where most experienced bicyclists would feel comfortable.
- **BLTS 4** represents high-stress roadways where only strong and fearless bicyclists would feel comfortable riding. These roadways are generally characterized by high volumes, high speeds, several travel lanes, and complex transitions approaching and crossing intersections.

Figure 3 illustrates the level of comfort scores and how they relate to both the type of rider and the characteristics of a roadway. More detail on the BLTS analysis is also included in **Appendix B.**

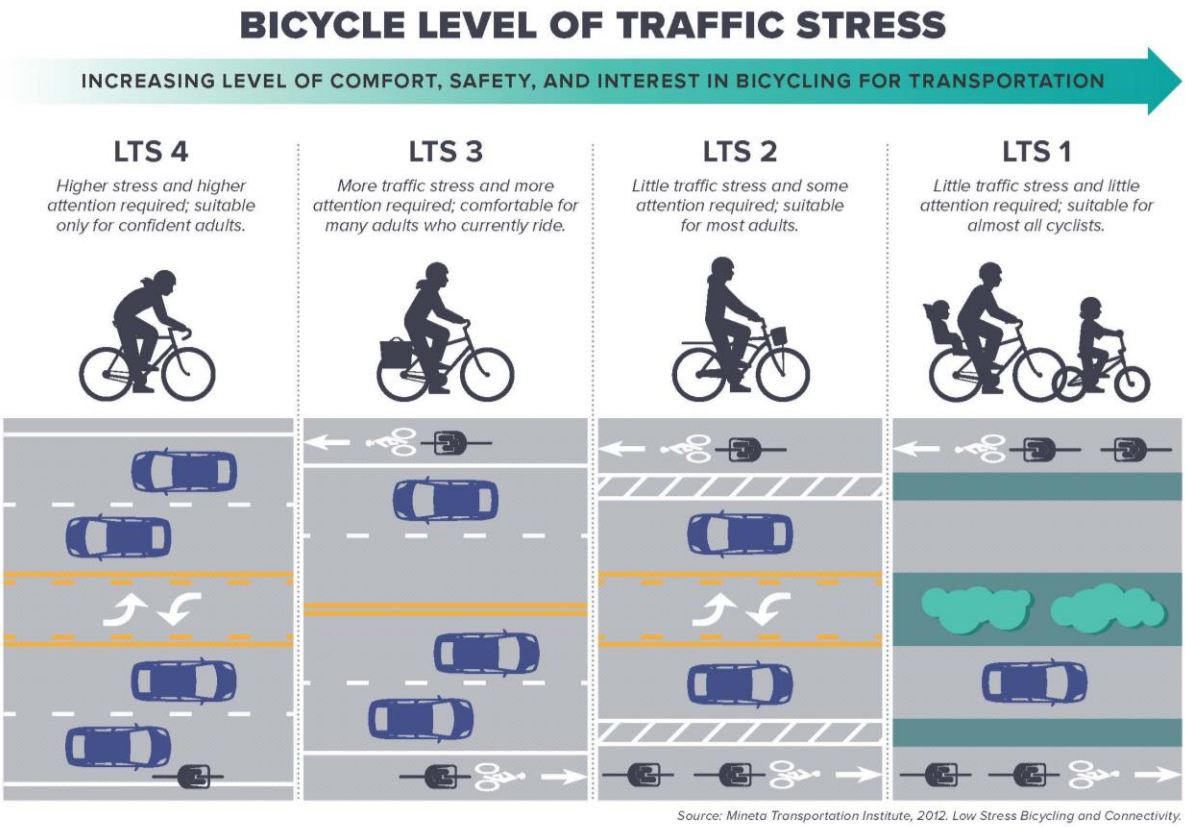

Figure 3. Bicycle Level of Traffic Stress Infographic

Lakeway

Lakeway mostly has streets with a bicycle LTS of 1. Lakeway is characterized by low-density residential streets with low traffic volumes and a low number of lanes. Furthermore, like Knoxville, the next highest LTS is 4 with over 300 miles of high-stress roads in the LAMTPO area. These streets have a high number of lanes and see a greater volume of auto traffic without any protected facilities, making a trip on these streets highly stressful. **Figure 4** breaks down the miles of network for each LTS group and **Figure 5** visualizes the LTS on the LAMTPO road network. Trails and other off-street facilities have been integrated with the street centerline network.

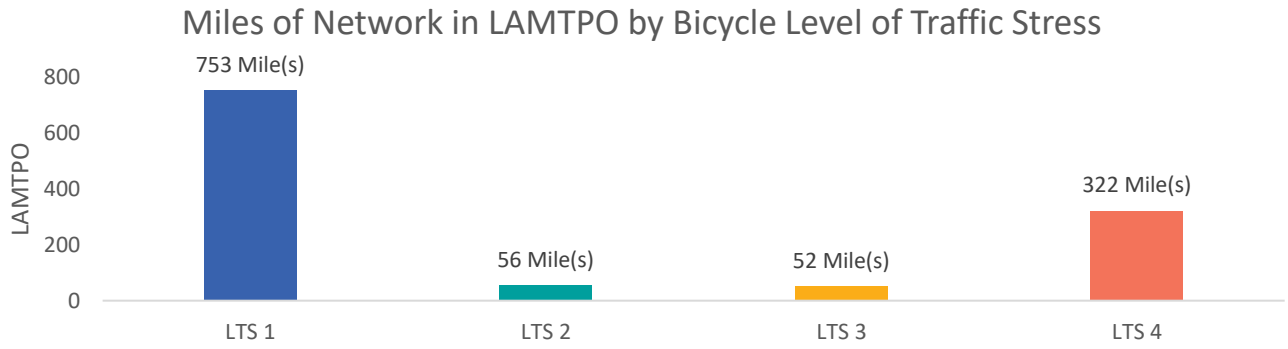

Figure 4. Miles of Network in LAMTPO by BLTS

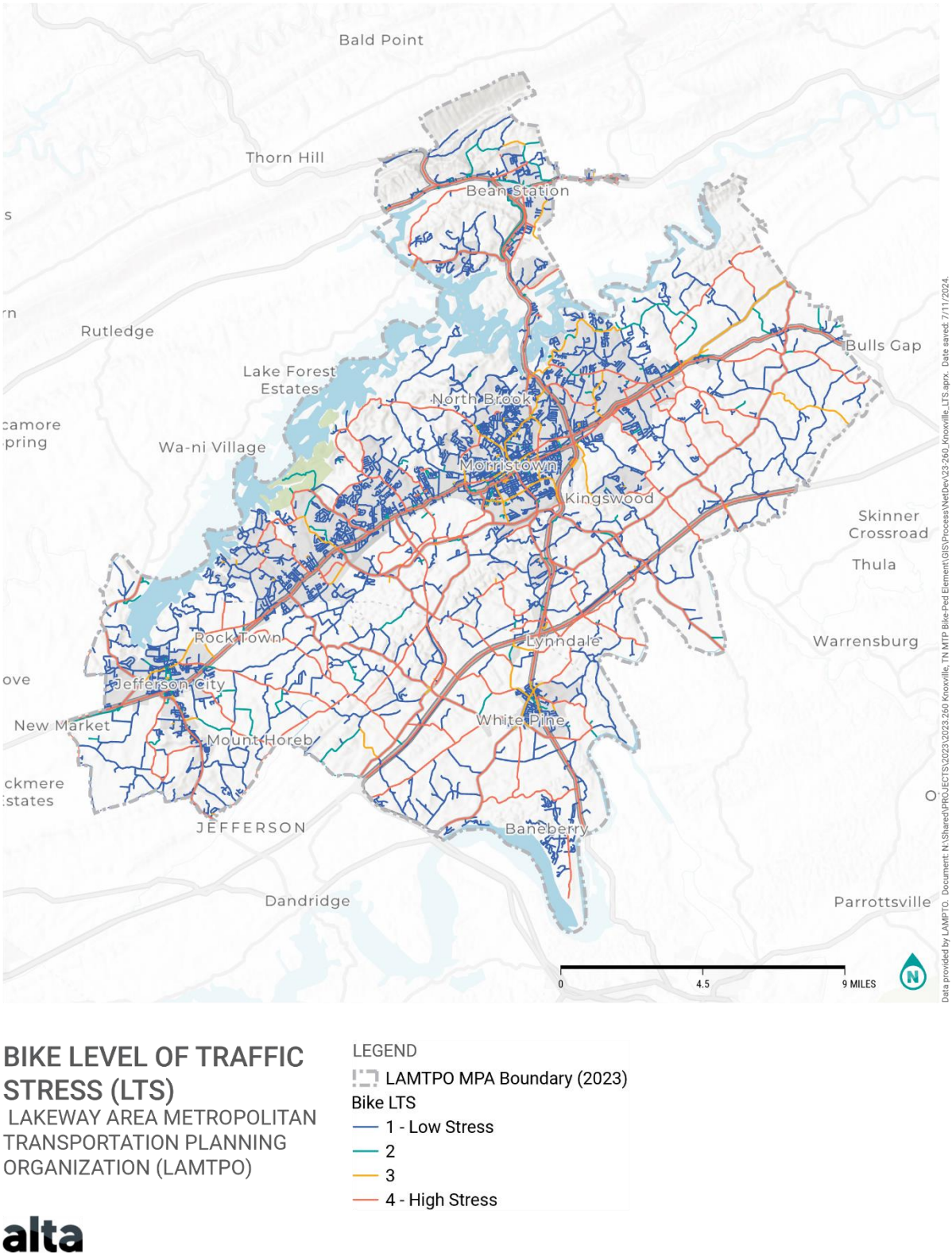

Figure 5. Bicycle Level of Traffic Stress for LAMTPO

Pedestrian Infrastructure

Existing Infrastructure

Pedestrian infrastructure includes sidewalks along roadways and includes trails and shared use paths that are off the main street network. Sidewalks and off-street facilities were integrated into the street network. Off-street facilities were given an LTS of 1 since they are low-stress facilities.

Lakeway

Over 95% of the street network in the Lakeway area does not have sidewalks. Error! Reference source not found.breaks down the mileage for sidewalks in the LAMTPO region. **Figure 7** illustrates where in the region these sidewalks are located—primarily in the downtown region of Morristown and Jefferson City.

Figure 6. Sidewalk coverage in LAMTPO

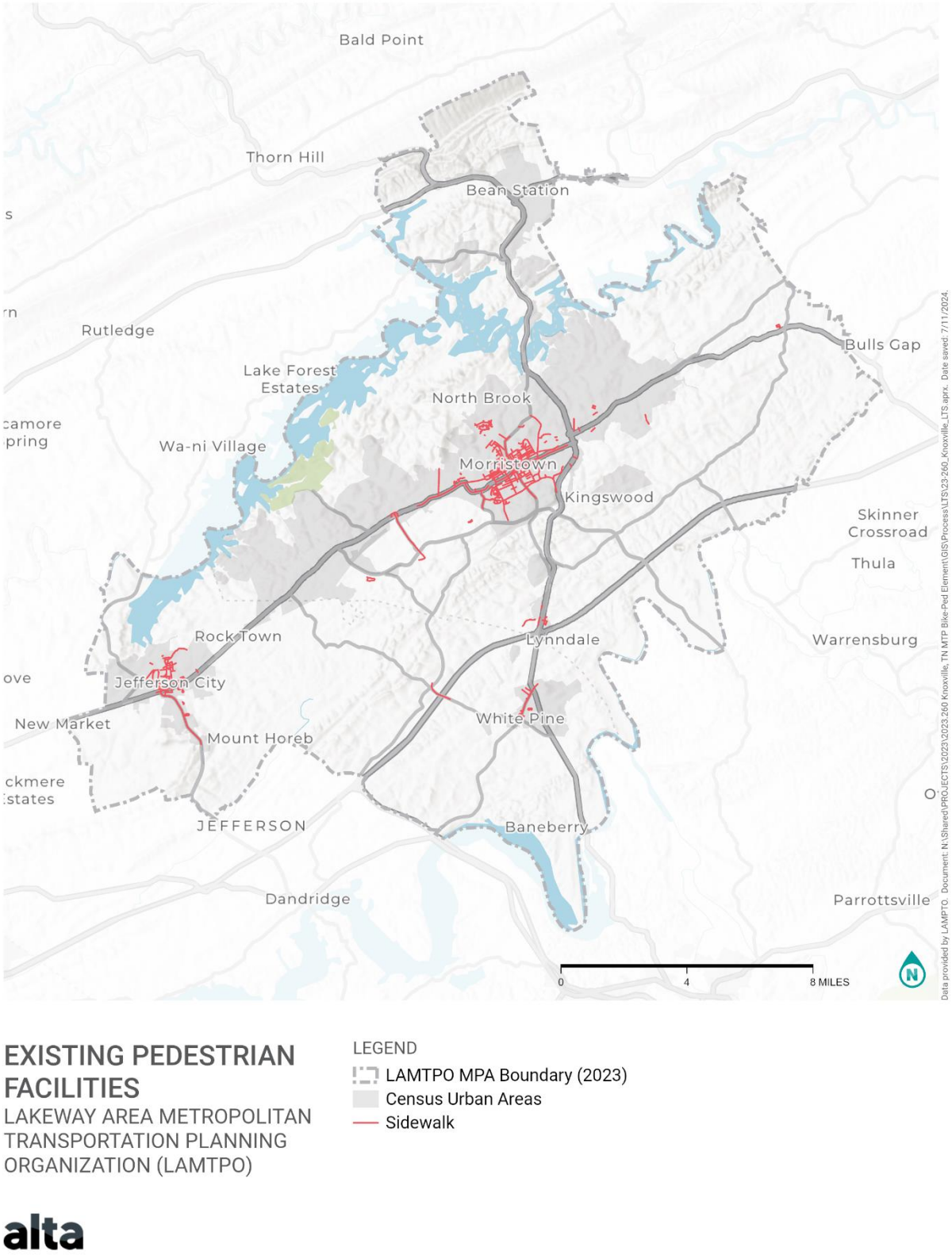

Figure 7. Existing Pedestrian Facilities for LAMTPO

Pedestrian Level of Traffic Stress (PLTS)

The Pedestrian Level of Traffic Stress (PLTS) methodology used in this analysis has been adapted from the Oregon Department of Transportation (ODOT) Analysis Procedures Manual[1] and is intended as a companion for BLTS. PLTS is determined by factors including sidewalk presence and width, sidewalk buffer width and type, posted speed limit, and number of travel lanes. Alta used available sidewalk data and conflated it with the baseline network for the purposes of imputing a pedestrian LTS. While there is a baseline sidewalk inventory for the region, it does not have attributes on buffer presence, vegetation, or tree canopy that is used to identify on-the-ground pedestrian comfort. These attributes were imputed, where available, from OpenStreetMap. PLTS scores classify road segments into one of four levels of traffic stress and, while similar to BLTS scoring, PLTS considers the level of attention required to safely walk in a specific environment in addition to the user experience:

- **PLTS 1** describes roadways where pedestrians of all ages and abilities would feel comfortable walking and require little attention to traffic.
- **PLTS 2** represents slightly less comfortable roadways that require more attention to traffic and are suitable for children over 10, teens and adults.
- **PLTS 3** represents moderately uncomfortable roadways, where most able-bodied adults would feel uncomfortable but safe.
- **PLTS 4** represents high traffic stress and would be used only by able-bodied adults with limited route choices.

Appendix C includes a more detailed description of the PLTS methodology.

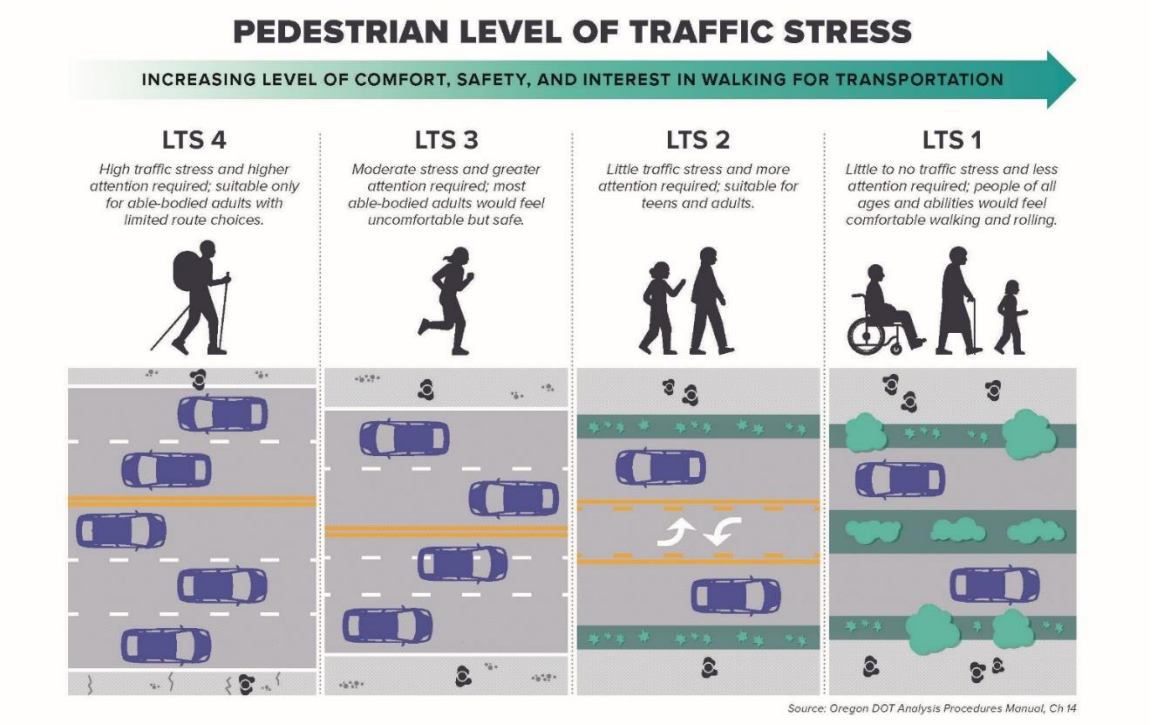

Figure 8. Pedestrian Level of Traffic Stress Infographic

[1] Oregon Department of Transportation (ODOT) Analysis Procedures Manual available online at https://www.oregon.gov/odot/planning/pages/apm.aspx

Lakeway

Similar to Knoxville**, Figure 9** shows that the majority of roads are PLTS of 2, followed by 4. This reflects the residential nature of many streets in the LAMTPO area. **Figure 10** shows the location of PLTS scored on the network, with a diversity of scores in the downtown of Morristown reflecting the fact that there are both sidewalks and higher traffic volumes in this area.

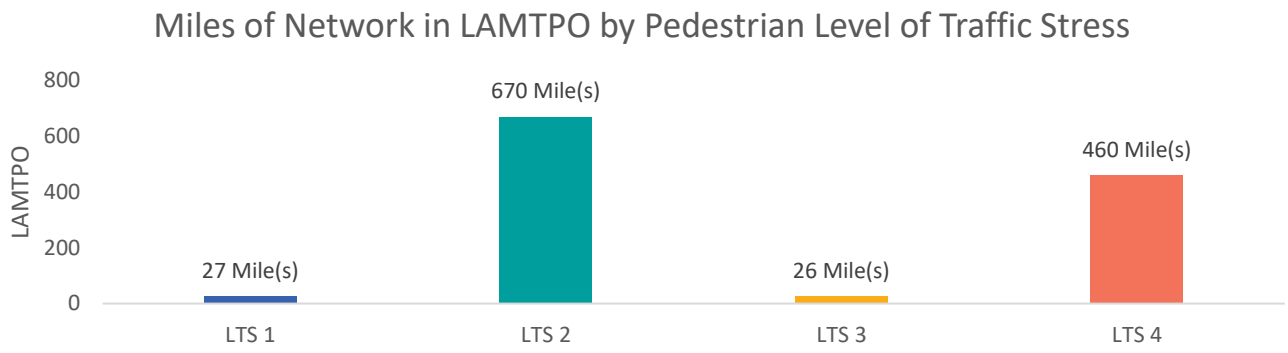

Figure 9. Miles of Network in LAMTPO by PLTS

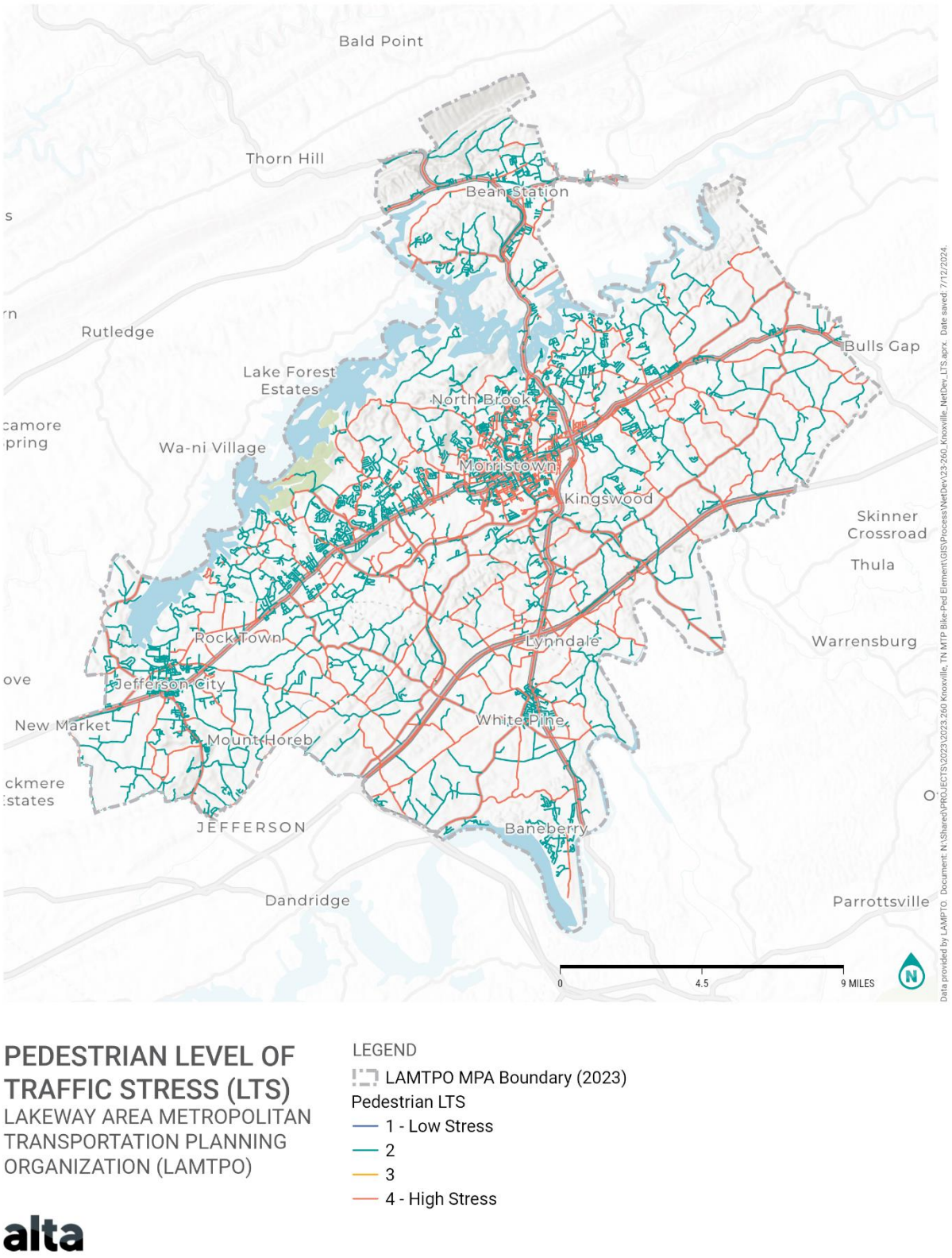

Figure 10. Pedestrian Level of Traffic Stress for the Lakeway Area Metropolitan Public Transportation Organization

Limitations

1. No crosswalks data.
2. Some roadway attributes the team had to make assumptions on when developing the LTS for both regions.
    a. Some assumptions needed to be made on roadway speed limits:
        i. Non-residential roads outside of urban areas were assumed to be 45 mph
        ii. Non-residential roads inside urban areas were assumed to be 35 mph
        iii. All other roads where the speeds were listed as 0 mph in the data, were assumed to be 25 mph
        iv. For all roads conflated using a line and whisker method with Open Street Map centerlines, speeds listed from Open Street Map were used.
    b. Some assumptions needed to be made on bike lane widths:
        i. If a bike lane existed, it was assumed to be 4 ft wide
    c. Some assumptions needed to be made on sidewalk widths:
        i. If a sidewalk existed, it was assumed to be 5 ft wide
    d. Some assumptions needed to be made on number of lanes:
        i. If number of lanes was missing, and the roads conflated using a line and whisker method with Open Street Map centerlines, number of lanes listed from Open Street Map were used.
        ii. If number of lanes was missing, and the roads did not conflate well using a line and whisker method with Open Street Map centerlines, the number of lanes for the roadway was assumed to be 2.
        iii. Otherwise, provided number of lanes was used.
    e. Some assumptions needed to be made on traffic volumes:
        i. Residential and Unclassified type roadways were assumed to have 1,500 vpd
        ii. Living, Track and Undefined type roadways were assumed to have 2,000 vpd
        iii. Tertiary type roadways were assumed to have 5,000 vpd
        iv. Secondary type roadways were assumed to have 10,000 vpd
        v. Primary type roadways were assumed to have 20,000 vpd
        vi. Trunk type roadways were assumed to have 30,000 vpd
        vii. Motorway type roadways were assumed to have 45,000 vpd
    f. Some assumptions needed to be made for one way, residential streets:
        i. For BLTS, one-way, residential streets were assumed to be maximum LTS 2

Appendix A: Level of Traffic Stress and OpenStreetMap Derivation Assumptions

Overview

Alta uses a tiered data collection framework for level of traffic stress (LTS) analysis that derives initial analysis inputs from readily accessible data, in order to determine where additional data collection will be of the most value to meet project goals. In the case of LTS analysis, Alta derives initial base analysis inputs from OpenStreetMap (OSM) data.[2] This appendix documents how Alta develops the input variables for this analysis.

Where OSM data includes values for lanes, posted speeds, bike lanes, sidewalks, parking lanes, and one-way tags, these tags are used to populate a database for LTS inputs. Once that database is populated, Alta uses the Mekuria et al., 2012 LTS methodology to score roadway segments. This initial LTS is intended to be augmented by automated or manual review of aerial imagery, local GIS data, and/or street view data. Once the base input values have been validated, the LTS scores can be refreshed using Alta's LTS calculation scripts. This enables evaluation of new scenarios as needed in addition to standardized network analysis.

OpenStreetMap Processing

When using OSM networks for LTS analysis, there are several considerations for creating a useful network for visualization and analysis. The following sections outline how Alta processes OSM data for LTS and related network analyses.

[2] OSM is a crowdsourced database of geographic features including administrative boundaries, street centerlines, points of interest, building footprints, physical and natural features, and other types of geographic information. OSM is one of the most prominent examples of volunteered geographic information, where community processes drive the contributions of geographic information to a shared database (2). These geographic features are tagged based on their attributes, and while community wiki pages provide guidance on which tags apply to which features, there is no centralized authority that authenticates these contributions. For example, street networks in OSM may include tags where contributors denote functional classification, number of lanes, one-way classification, speed limits, presence of sidewalks, and the type of bicycle facility that might be present on the network. While OSM is not always accurate, it has been benchmarked against comparable map data sources such as Google and found to have comparable or better accuracy for bike paths depending on the type of error (3). Multiple non-profits, academics, and practitioners have found OSM to be an acceptable base for initial derivation of LTS analysis (4,5,6,7).

Network Connectivity

OSM networks contain segments that are not ready for network analysis in most instances. There are various software processing packages such as the Open-Source Routing Machine and OpenTripPlanner that come with routines to prepare OSM networks for network analysis. Alta uses scripts built on the OSMnx[3] Python package to derive its geospatial networks. This package is used to ensure that extracted networks are valid and have appropriate end-to-end connectivity provided by network segments. This process compiles all OSM networks wherein the highway tag[4] is available and the corresponding geometry is a line. For cartographic presentations, it is often preferable to filter out features such as service roads (roads within parking lots) and footways (sidewalks drawn separately from the centerline). This is typically done to focus attention to facilities that jurisdictions and regions can reasonably improve.

Tag Processing

In many cases, OSM data includes tags for attributes such as lanes, posted speed, bicycle infrastructure, and other facility information recorded in the database. This data is more likely to be completed in urbanized areas globally, and on major facilities such as arterials and highways. There can be substantial variance in tag availability from location to location, but the presence of bike paths and a consistent indicator of functional classification is generally well recorded in OSM. In the case of bike lane blockage rates, Alta assumes these instances are rare unless manual review of commercial districts indicates otherwise. When tags are missing from OSM for the purposes of LTS analysis, the assumptions outlined in Table 1 are used as proxy values.

Table 1: Alta's OpenStreetMap Assumptions for Missing Inputs

Functional Class	Lanes[1,2,3]	Speed Limit[1,2,3]	Centerline Present[3]	AADT[3,4]
Residential	2	25	No	1,500
Living Street	2	25	No	2,000
Unclassified	2	25	Yes	1,500
Track	2	30	Yes	2,000
Tertiary	3	30	Yes	5,000
Secondary	4	35	Yes	10,000
Primary	4	45	Yes	20,000
Trunk	6	65	Yes	30,000
Motorway	6	65	Yes	45,000
OTHER	2	25	Yes	2,000

1. Lane assumptions for one-way streets are halved to reflect an accurate per-segment assumption. In addition, all one-way streets are assumed to have medians for the purposes of LTS computations.
2. These assumptions only apply if there is no tag provided for speed limit or number of lanes.
3. These assumptions were developed based on Wasserman et al. 2019 and Harvey et al. 2019.
4. Supplemental detail on road character assumptions and not utilized in LTS computation.

[3] Boeing (2017).
[4] Highway Tag. Key:highway - OpenStreetMap Wiki. (n.d.). https://wiki.openstreetmap.org/wiki/Key:highway.

LTS analysis also requires an understanding of other geometric considerations, such as bicycle facility width and parking lane width (if present). Alta begins with a "benefit of the doubt" approach for these attributes, meaning that if they are present, they are assumed to be of sufficient width. Validation is recommended for detailed LTS assessments, but this is typically less important for less rigorous, or large-scale (e.g., county-, region-, or state-wide) LTS-based analysis. Bicycle infrastructure-related tags are processed using assumptions outlined in Table 2.

Table 2: Alta's OpenStreetMap Assumptions for Bicycle Facilities

Cycleway Tag[1]	Bicycle Facility Type	Assumed Bicycle Facility Width (Feet)	Is Protected
Shared	Bike Route/Class III	0	No
Shared_lane	Bike Route/Class III	0	No
Lane	Bike Lane/Class II	4	No
Shared_busway	Bike Lane/Class II	4	No
Opposite_lane	Bike Lane/Class II	4	No
Cycleway[2]	Bike Path/Class I	10	Yes
Path	Bike Path/Class I	10	Yes
Track	Separated Bikeway/Class IV	8	Yes
Opposite_track	Separated Bikeway/Class IV	8	Yes
Buffered_lane	Separated Bikeway/Class IV	4	Yes
OTHER	NA	0	No

1. Alta processes nondirectional cycleway tags and directional cycleway tags as part of its conversion. The final LTS score is the worst-case score based on the direction of facilities.
2. Highway tags including the tag "cycleway" are also considered to be Class I facilities.

When parking lane-related tags are processed, assumptions related to their width and rates of bike lane blockage are outlined in Table 3.

Table 3: Alta's OpenStreetMap Assumptions for Parking Facilities

Parking Lane Tag	Assumed Parking Lane Width (Feet)
Parallel	8
Marked	8
Diagonal	16
Perpendicular	20
OTHER	NA

Citations

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Appendix B: Bicycle Level of Traffic Stress Analysis

Overview

The bicycle level of traffic stress (BLTS) analysis estimates the level of comfort for people biking on a given roadway segment. The BLTS analysis identifies where "gaps" or deficiencies in a bike network exist, and provides a measure of how likely different types of riders, based on ability and comfort level, are to use the facility.

Alta's BLTS analysis methodology is adapted from the 2012 Mineta Transportation Institute Report 11-19: *Low-Stress Bicycling and Network Connectivity*.[5] BLTS is determined by characteristics of a given roadway segment that affect a bicyclist's perception of safety and comfort, including posted speed limit, number of travel lanes, and the presence and character of bicycle lanes. The combination of this criteria classifies a road segment into one of four levels of traffic stress:

- **BLTS 1** represents roadways where bicyclists of all ages and abilities would feel comfortable riding. These roadways are generally characterized by low volumes, low speeds, no more than two travel lanes, and traffic control measures at intersections. These roadways may have bicycle facilities; separated shared-use paths for bicycles also fall into this category.
- **BLTS 2** represents slightly less comfortable roadways, where most adults would feel comfortable riding.
- **BLTS 3** represents moderately uncomfortable roadways, where most experienced bicyclists would feel comfortable riding.
- **BLTS 4** represents high-stress roadways where only strong and fearless bicyclists would feel comfortable riding. These roadways are generally characterized by high volumes, high speeds, several travel lanes, and complex transitions approaching and crossing intersections.

The results of the BLTS analysis identify existing areas that are low stress for many bicyclists, as well as the degree to which roadways must be improved in order to provide a comfortable experience for riders of all ages and abilities. Additionally, scenario testing can be used to determine how a roadway or route's level of stress may change with improvements.

Methodology

BLTS analysis is completed through an assessment of street segments using spatial data and aerial imagery. Each segment of the roadway is evaluated based on its characteristics; if multiple scores are present within a segment, the highest (most stressful) score is used as the overall segment score.

Figure 11 illustrates the overall BLTS scoring process. Notes on data inputs and assumptions are found in Table 4. Segment scores are assigned as shown in Table 2 through Table 5.

[5] Mineta Institute. Mekuria M., Furth P., Nixon H. *Low-Stress Bicycling and Network Connectivity*. 2012. https://transweb.sjsu.edu/research/Low-Stress-Bicycling-and-Network-Connectivity.

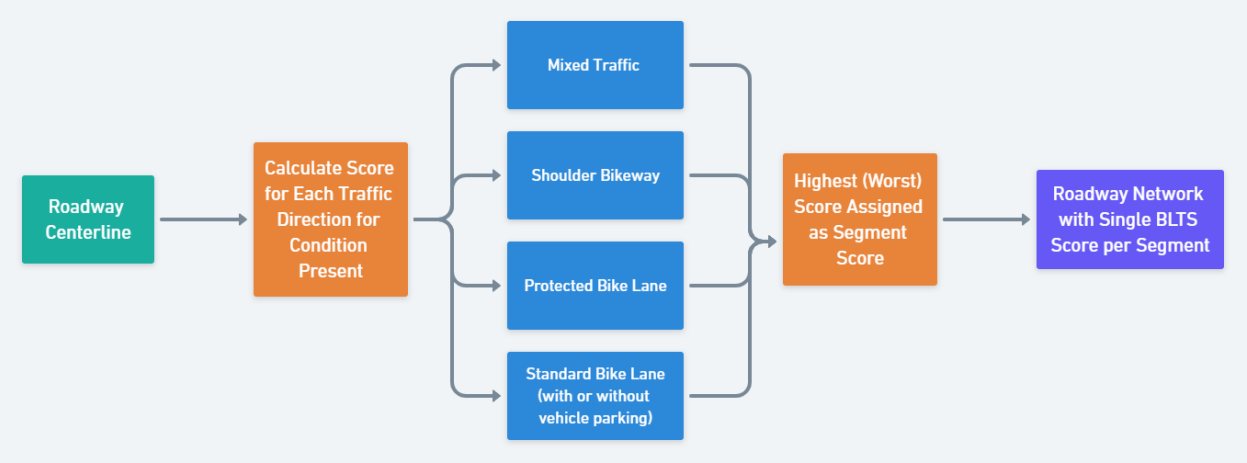


Figure 11: Bicycle Level of Traffic Stress Generalized Segment Scoring Process

Table 4: Data Inputs and Assumptions

Inputs	Notes	Assumptions
Bicycle Facilities	Bicycle lanes have a positive impact on BLTS and are a primary input for developing a BLTS model. The width of facilities can have an impact on the associated comfort level. Wider facilities provide greater comfort, especially on high-speed roadways.	For analysis purposes, a standard width of 4 feet was assumed for all bike lanes. Buffered bike lanes, which provide an additional degree of separation from motor vehicles and greater operating space for bicyclists, were considered to be greater than 6 feet, meeting the requirements for a BLTS 1 score as outlined in Table 2 and Table 3.
Speed Limit	High-speed roadways are considered to be less comfortable for bicyclists, particularly in mixed traffic or with minimal separation from motor vehicles. Low-speed roadways are considered more comfortable.	Speed limit data was available for a subset of roadways within the city limits. The BLTS evaluation was completed only for those roadways in which speed limit data was available.
Presence and Width of On-Street Parking Adjacent to Bicycle Lanes	On-street parking is particularly important for corridors on which bicycle lanes are present. BLTS is greater on bicycle lanes adjacent to parking than on bicycle lanes not adjacent to parking, due to the potential for "dooring" incidents.	A standard width of 7.5 feet was assumed for all parking lanes.
Number of Lanes	The number of travel lanes corresponds with an increase in the roadway width, which has an effect on bicyclists' level of stress. Roadways with fewer lanes are generally less stressful for bicyclists.	When data was not available or was inadequate, assumptions about number of lanes were made based on the roadway's functional classification according to OpenStreetMap or other available data.
Presence of Trails	Class I facilities can be a vital component of a municipality's active transportation network. Increased separation from motor vehicles can improve comfort and safety.	Class I facilities are scored as a BLTS 1.

Table 5 through Table 7 specify the scoring criteria based on roadway configuration, speed, and bike lane/parking lane presence and width. The criteria are adapted from the original 2012 Mineta Institute report. These tables are used in combination to assign an overall BLTS score; if multiple scores are present within a segment, the highest (most stressful) score is used as the overall segment score. These tables are used in combination to create the segment, approach, and intersection scores described previously.

Table 5: Criteria for Bicycle Level of Traffic Stress in Mixed Traffic

Prevailing Speed or Speed Limit (mph)	Street Width		
	2–3 Lanes	4–5 Lanes	6+ Lanes
≤ 25	BLTS 1 or 2	BLTS 3	BLTS 4
30	BLTS 2 or 3[1]	BLTS 4	BLTS 4
≥ 35	BLTS 4	BLTS 4	BLTS 4

1. Lower value is assigned to streets without marked centerlines or classified as residential with fewer than three lanes. Residential roadways are identified based on the Open Street Map "highway" tag.

Table 6: Criteria for Bike Lanes Not Alongside a Parking Lane

	BLTS 1	BLTS 2	BLTS 3	BLTS 4
Street Width (through lanes per direction)	1	2	More than 2	(no effect)
Bike Lane Width	6 feet or more	5.5 feet or less	(no effect)	(no effect)
Speed Limit (mph)	30 mph or less	(no effect)	35 mph	40 mph or more
Bike lane blockage[1]	Rare	(no effect)	Frequent	(no effect)

1. Bike lane blockage is part of Alta's analysis methodology, but assumed to be rare by default.

Table 7: Criteria for Bike Lanes Alongside a Parking Lane

	BLTS 1	BLTS 2	BLTS 3	BLTS 4
Street Width (through lanes per direction)	1	(no effect)	2 or more	(no effect)
Sum of Bike Lane Width + Parking Lane Width	15 feet or more	14 or 14.5 feet	13.5 feet or less	(no effect)
Speed Limit (mph)	25 mph or less	30 mph	35 mph	40 mph or more
Bike lane blockage[1]	Rare	(no effect)	Frequent	(no effect)

1. Bike lane blockage is part of Alta's analysis methodology, but assumed to be rare by default.

The tables above account for on-street bike lanes not separated from traffic. Protected bike lanes are automatically scored as an LTS 1.

Appendix C: Pedestrian Level of Traffic Stress Methodology

Overview

The pedestrian level of traffic stress (PLTS) analysis estimates the level of comfort for people walking on a given roadway segment. The PLTS analysis identifies where "gaps" or deficiencies in a pedestrian network exist, and provides a measure of how likely pedestrians are to use the facility, based on ability and comfort level.

Alta's PLTS analysis methodology is adapted from the Oregon Department of Transportation's *Analysis Procedures Manual*[6] and is intended as a companion for bicycle level of traffic stress (BLTS). PLTS is determined by characteristics of a given roadway segment that affect a pedestrian's perception of safety and comfort including sidewalk presence and width, sidewalk buffer width and type, posted speed limit, and number of travel lanes. PLTS scores classify road segments into one of four levels of traffic stress and, while similar to BLTS scores, PLTS considers the level of attention required in addition to the user experience:

- PLTS 1 represents roadways where pedestrians of all ages and abilities would feel comfortable walking and require little attention to traffic.
- PLTS 2 represents slightly less comfortable roadways that require more attention to traffic and are suitable for children over 10, teens, and adults.
- PLTS 3 represents moderately uncomfortable roadways, where most able-bodied adults would feel uncomfortable but safe.
- PLTS 4 represents high traffic stress and would be used only by able-bodied adults with limited route choices.

The results of the PLTS analysis identifies existing areas that are low-stress for pedestrians, as well as the degree to which roadways must be improved in order to provide a comfortable experience for pedestrians of all ages and abilities. Additionally, scenario testing can be used to determine how a roadway or route's level of stress may change with improvements. The analysis is intended for use in urban areas specifically; while it can be used in rural conditions where pedestrian facilities exist, the methodology will yield a high PLTS score (greatest discomfort) where high-speed traffic is present.

Methodology

PLTS analysis is completed through an assessment of street segments using spatial data and aerial imagery. Each segment of the roadway is evaluated based on its characteristics; if multiple scores are present within a segment, the highest (most stressful) score is used as the overall segment score.

PLTS considers elements of the pedestrian environment both individually (e.g., buffer type), and in combinations that are known to influence each other (e.g., sidewalk width and pavement quality). The analysis uses the following overall guiding principles:

- The presence of a complete sidewalk serves as the foundation of the pedestrian network.
- As the sidewalk width increases and sidewalk condition improves, the level of stress of the pedestrian environment decreases.
- Buffering width is the total distance between the sidewalk and motor vehicle travel lanes. As width increases, the amount of separation between pedestrians and motor vehicles increases, and the pedestrian environment becomes less stressful.

[6] Oregon Department of Transportation, Transportation Development Division Planning Section: Transportation Planning Analysis Unit. 2020. *Analysis Procedures Manual* Version 2. https://www.oregon.gov/odot/Planning/Pages/APM.aspx.

- Buffer type describes the quality of the buffer that separates the sidewalk from the travel lanes. The presence of a buffer itself provides both actual and perceived safety benefits for the pedestrian, thus decreasing the stress of the pedestrian environment. A buffer with vertical elements is especially effective at increasing the safety of the pedestrian. Landscaping serves to enhance the pedestrian's travel experience.

Scores for each element of the pedestrian environment are assigned to each segment of the roadway centerline, and the worst (highest scoring) of the elements is used. If two sidewalks are present on a street, the worst (highest scoring) result is mapped to the centerline.

Figure 12 illustrates the overall PLTS scoring process. Notes on data inputs and assumptions are found in Table 8. Segment scores are assigned as shown in Table 9 through Table 12 specify the scoring criteria based on sidewalk presence, sidewalk width and condition, buffer type, and buffer width, in relation to the existing roadway condition (factors such as speed and number of lanes). The criteria are adapted from the Oregon Department of Transportation *Analysis Procedures Manual*. These tables are used in combination to assign an overall PLTS score; if multiple scores are present within a segment, the highest (most stressful) score is used as the overall segment score.

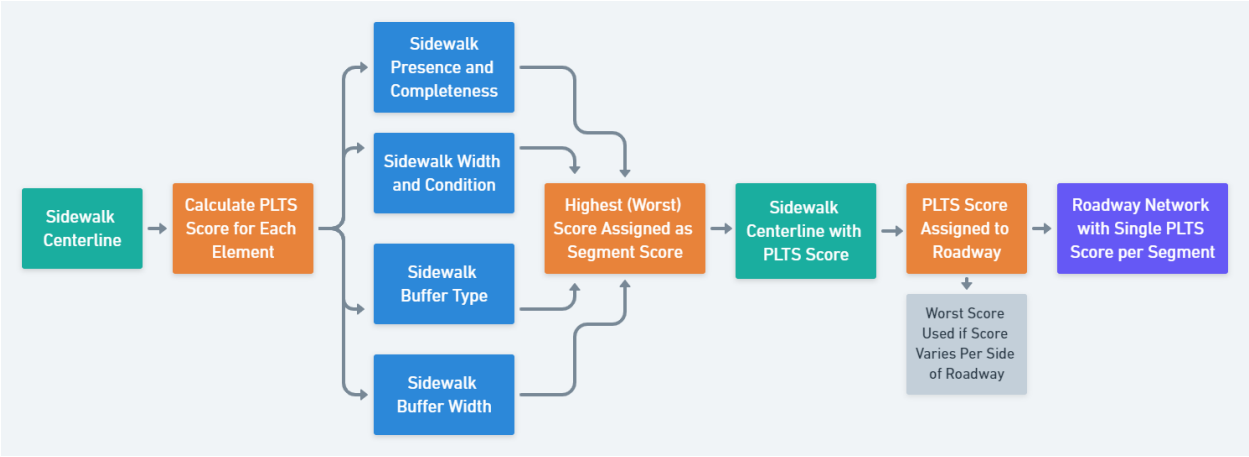


Figure 12: The Pedestrian LTS Scoring Process

Table 8. Data Inputs and Assumptions

Pedestrian Element	Rationale	Data Inputs
Sidewalk Presence and Completeness (Table 9)	The presence and completeness of sidewalk facilities is the baseline for measurement. At a minimum, sidewalks should be present and complete on most roadways to facilitate pedestrian travel.	Based on OpenStreetMap (OSM) data and supplemented by manual review within study area.
Sidewalk Width and Condition (Table 10)	The width of the sidewalk can have an impact on the associated comfort level. Wider sidewalks provide greater comfort, especially on high-speed roadways. The condition of the sidewalk is primarily based on concrete quality.	Based on OSM data and supplemented by manual review within the study area.
Sidewalk Buffer Type (Table 11)	The buffer type changes the pedestrian experience as it can offer a range of perceived and actual levels of protection. High-speed roadways are considered to be less comfortable, and a more substantial buffer increases pedestrian comfort.	Based on OSM data and supplemented by manual review within the study area.
Sidewalk Buffer Width (Table 12)	Total buffering width is the summation of the width of buffer, width of parking, width of shoulder, width of curb and gutter, and width of the bike lane on the same side of the roadway as the pedestrian facility being evaluated.	Based on OSM data and supplemented by manual review within the study area.

Table 9: Pedestrian Level of Traffic Stress Based on Sidewalk Presence and Completeness

Number of Travel Lanes	Posted or Prevailing Speed				
	≤ 25 mph		*30–35 mph*		*≥ 40 mph*
	2 Lanes	*> 2 Lanes*	*2 Lanes*	*> 2 Lanes*	*2 Lanes*
Complete Sidewalk on Both Sides[1]	LTS 1	LTS 2	LTS 2	LTS 3	LTS 3
Complete Sidewalk on One Side	LTS 2	LTS 3	LTS 3	LTS 4	LTS 4
No Sidewalk[2]	LTS 2	LTS 4	LTS 4	LTS 4	LTS 4

1. Partial sidewalk coverage on a block is not considered complete.
2. Residential (OSM Highway class local) roadways without sidewalk default to LTS 2; roadways without sidewalk default to LTS 4.

Table 10: Pedestrian Level of Traffic Stress Based on Sidewalk Width and Condition

		Sidewalk Condition[3]			
		Good	*Fair*	*Poor*	*Very Poor*
Actual/Effective Width (feet)[1,2]	< 4	LTS 4	LTS 4	LTS 4	LTS 4
	≥ 4 to < 5	LTS 3	LTS 3	LTS 3	LTS 4
	≥ 5	LTS 2	LTS 2	LTS 3	LTS 4
	≥ 6	LTS 1	LTS 1	LTS 2	LTS 3

1. Effective width is the available/usable area for the pedestrian clear of obstructions. Effective width does not include areas occupied by storefronts or curbside features.
2. For analysis purposes, a standard width of five feet was assumed for all sidewalks.
3. Sidewalk condition is assumed to be good unless other information is available.

Table 11: Pedestrian Level of Traffic Stress Based on Physical Buffer Type

Buffer Type[1]	Prevailing or Posted Speed			
	≤ 25 mph	*30 mph*	*35 mph*	*≥ 40 mph*
No Buffer (curb tight)	LTS 2[2]	LTS 3	LTS 3	LTS 4
Solid Surface	LTS 2[2]	LTS 2	LTS 2	LTS 2
Landscaped	LTS 1	LTS 2	LTS 2	LTS 2
Landscaped with Trees	LTS 1	LTS 1	LTS 1	LTS 2
Vertical	LTS 1	LTS 1	LTS 1	LTS 2

1. Combined buffer: If two or more of the buffer conditions apply, use the most appropriate (typically the lower-stress type).
2. If no centerline is present (residential street) or the street is traffic calmed (including sporadic vertical separation such as street furniture, street trees, lighting, planters, surface change, and so on), then the PLTS can be lowered by one PLTS level.

Table 12: Pedestrian Level of Traffic Stress Based on Physical Buffer Width[1]

Total Number of Travel Lanes (both directions)[3]	Total Buffering Width (feet)[2]				
	< 5	*≥ 5 to < 10*	*≥ 10 to < 15*	*≥ 15 to < 25*	*≥ 25*
≤ 2	LTS 2[4]	LTS 2	LTS 1	LTS 1	LTS 1
3	LTS 3[4]	LTS 2	LTS 2	LTS 1	LTS 1
4–5	LTS 4[5]	LTS 3	LTS 2	LTS 1	LTS 1
6 ≥	LTS 4[5]	LTS 4[5]	LTS 3	LTS 2	LTS 2

1. Source: Based on Oregon Department of Transportation *Analysis Procedures Manual*, Table 14-23.
2. Total buffering width is the summation of the width of buffer, width of parking, width of shoulder, width of curb and gutter, and width of the bike lane on the same side of the roadway as the pedestrian facility being evaluated.
3. One-way facilities are assumed to have their lanes multiplied by 2 to represent exposure to lane crossing.
4. If no centerline is present (residential street) or the street is traffic calmed (including sporadic vertical separation such as street furniture, street trees, lighting, planters, surface change, and so on), then the PLTS can be lowered by one PLTS level.
5. Sections with a substantial physical barrier/tall railing between the travel lanes and the walkway (such as might be found on a bridge) can be lowered to PLTS 3.

Appendix H

Transit Systems, Replacement, Safety Targets, & Financial Revenue Projections

Transit System Summary

*Transit Services
*Vehicle Replacement Schedule
*Safety Performance and Targets
*Transit Financial Analysis
*NTD Profiles – ETHRA 2019-2023

Transit Services

Public transportation provides access to major attractions for those who do not own a personal vehicle, are unable to drive a vehicle, or choose not to drive. It is important to understand the areas within the Lakeway region that will *most likely benefit from transit*, such as areas with higher concentrations of people that are low income, minorities, or older residents, because these individuals tend to depend upon transit service for access and mobility more than other people. This section provides a summary of the public transportation systems that operate within the Lakeway Area MTPO region.

East Tennessee Human Resource Agency (ETHRA)

Transit in the Lakeway region is currently provided by the East Tennessee Human Resource Agency (ETHRA), which is a nonprofit agency that offers demand response transportation service to 16 counties in East Tennessee. A demand response service supports door-to-door trips for customers that request it, and any resident in the Lakeway region may request a ride. ETHRA operates a transit fleet of approximately 100 vehicles everyday, with 400 staff.

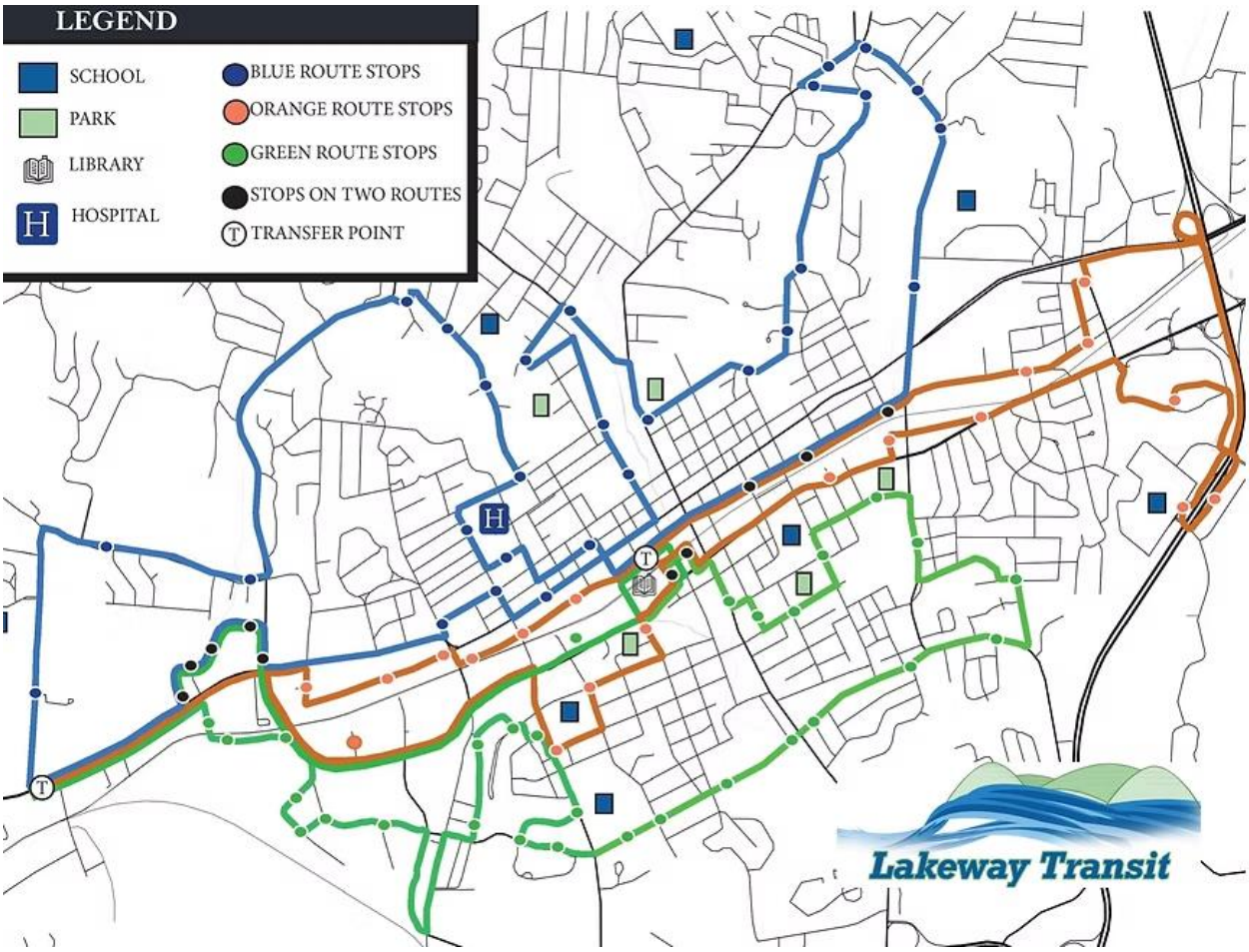
Figure H-1 ETHRA's 16-county service area

The cost to use ETHRA service is $3.00 per one-way trip made within the same county, with an additional $3.00 for each county line crossed. If the trip requires multiple stops between the origin and destination, there is an additional $1.00 charge for each stop. ETHRA's call center services run Monday through Friday from 8:00 AM to 4:30 PM.

Lakeway Transit Fixed Route Service

The Lakeway region also has a fixed route service within Morristown, TN. The three routes, which include connections to health-care facilities, shopping destinations, the library, and residential areas, will have at least one bus on each route, with wait times that will range from 30 to 60 minutes. The fare for the fixed route service will be $1.50, half the cost of a one-way demand-response ride, and will operate five (5) days a week from 7:00 AM to 6:00 PM. The ETHRA Passio-Go! App provides live routes tracking and fare payment.

Figure H-2 Lakeway Transit Fixed Route Service



Route information: www.lakewaytransit.com/routes

Other Transit Services in the Lakeway Region

Along with ETHRA and the Morristown fixed route service, there are various other private service providers that can be utilized by residents within the Lakeway region. Table below documents the other transit services in the Lakeway region.

Table H-3 Other Transit Services in the Lakeway Region

Service	Location	Contact Info	Service Type
Anderson Transportation	Sneedville, TN	(423) 733-4950	Non-Emergency Medical Transportation (Hamblen County Only)
Greyhound Bus Line	Morristown, TN	(423) 586-3841	Intercity Transit Service
People 2 Places Transportation, Inc.	Jefferson City, TN	(833) 285-8262	Curb-Side-Pickup, Student Transportation, Veteran Transportation, and Non-Emergency Transportation

Vehicle Replacement Schedule

To project capital funding needs, each agency's existing vehicle ages, life expectancies, and replacement schedules were examined. Average unit costs by vehicle type were provided by the respective transit agencies and were increased by 2.5% annually to determine a Year of Expenditure (YOE) cost for vehicle replacements. The resulting vehicle needs are shown in the Table below, and reflect the best available information at the time of this MTP process. Future updates are made through the short-range operations plan and in coordination with ETHRA, who operates the Lakeway Transit fixed route service.

Table H-4
Projected Vehicle Replacement Needs – Lakeway Transit (ETHRA)
YOE Cost

Agency	Vehicles	2025-2030	Vehicles	2031-2040	Vehicles	2041-2050
Cutaways (12+2 seating)	8	$1,106,734	6	$816,276	--	--

Source: ETHRA Vehicle Replacement Schedule (May2025); Only includes ETHRA Vehicle Needs for the TPO's urban area

Transit Asset Management

Transit Asset Management (TAM) is a strategic approach to managing transit assets such as bus and van useful life and replacement schedules. An assessment of State of Good Repair (SGR) is performed to gauge the condition of each asset to ensure it is able to operate at full level of performance & does not pose unacceptable risk. Each vehicle/asset is assigned Useful Life Benchmarks as the expected life cycle to plan 1for each of the assets. The age of vehicles is a primary metric in this evaluation but is just one guide.

The TPO target for rolling stock/equipment at 10% or less – or – a goal of at least 90% being classified in a state of good repair. Refer to the table below for each transit agency information related to the most recently established TAM targets:

Table E-4 Transit Asset Management (TAM) Plan – FY2025

Asset Class	Useful Life Benchmark (Years / Miles)	Agency	Total Assets	2025 # of Assets in Good Repair	2025 # of Assets in SGR Backlog	2025 % of Assets in SGR Backlog	2025 Target
Rolling Stock – All Revenue Vehicles – Percent of revenue vehicles that have met or exceeded their Useful Life Benchmark							
Bus	14 / 200k	ETHRA	--	--	--	--	<10.0%
Cutaway	5 / 150k	ETHRA	10	8	80%	20%	<10.0%
Ford Transit Van	7 / 100k	ETHRA	--	--	--	--	<10.0%
Minivan	8 / 100k	ETHRA	--	--	--	--	<10.0%
Automobile	8 / 100k	ETHRA	--	--	--	--	<10.0%
Equipment – Non-Revenue Vehicles – % of non-revenue vehicles that have met or exceeded their Useful Life Benchmark							
Support Vehicle	8 / 100k	ETHRA	--	--	--	--	--
Equipment >$50k – % of equipment with condition rating <3.0 on FTA's Transit Economic Requirements Model (TERM) scale							
Equipment	N/A	ETHRA	--	--	--	--	<65%
Facilities – All Buildings or Structures – % of facilities or structures with a condition rating <3.0 on FTA's TERM scale							
Facilities	N/A	ETHRA	1	1	100%	100%	100%

ETHRA = East Tennessee Human Resource Agency. Only includes ETHRA vehicles that operate in the TPO's urban area.

It should be noted that the transit vehicle industry is still in recovery from COVID supply chain issues and rising inflation. Several agencies have new vehicles on order, which will bring these numbers closer in line with the specified targets.

Safety Performance Measure Targets

Operators of public transportation that receive FTA Section 5307 Urbanized Area Formula funds are required to produce Public Transportation Agency Safety Plans (PTASP). In the Lakeway urban area, ETHRA is obligated to meet this requirement. Federal regulations require transit agencies to develop Safety Plans that include the processes and procedures to implement a Safety Management System (SMS). SMS is a comprehensive, collaborative, and systematic approach to managing safety. Transit agencies in an urban area are required to share their PTSAP and safety targets with the TPO. **Table H-5** shows the 2024 Transit Safety Performance Targets for ETHRA, and reflect the best available information at the time of this MTP process.

Table H-6
2024 Transit Safety Performance Measure Targets

Performance Measure	Lakeway Transit Fixed Route	ETHRA Demand Response
Number of Fatalities	0	0
Rate of Fatalities per 100K VRM	0	0
Number of Injuries	0	1
Number of Injuries per 100K VRM	0	0.03
Number of Safety Events (collisions)	5	60
Number of Safety Events per 100K VRM	3.4	1.8
Total Major Mechanical Failures	5	22
Miles Between Major Mechanical Failures	3.4	0.68

Source: ETHRA's PTASP (2024-25)

Transit Financial Analysis

With input from the public and stakeholders the transportation needs within the Lakeway region were assessed and prioritized for implementation. The 2050 MTP must be fiscally constrained, meaning that projects in these documents can be implemented using committed, available, or *reasonably available* revenue sources, with reasonable assurance that the federally supported transportation system. To that end, this appendix details the various sources of transportation funding and projections of available revenues over the next 25 years. The intent of these provisions is that Mobility Plan 2050 be fiscally constrained, only programming dollars it expects to receive.

FEDERAL FUNDING

Federal grant programs are one of the largest sources of funding for transit investments. Federal funds are allocated through each federal reauthorization of the surface transportation bill, with the most recent being the Infrastructure Investment and Jobs Act (IIJA). Federal Transit Administration (FTA) Section 5307, 5310, and 5339 funds are used to support transit and are described below.

5307 Urbanized Area

FTA provides funding to urbanized areas across the country through its 5307 – Urbanized Area Formula Grant program. Any incorporated area with more than 50,000 in population is eligible to receive these funds.

5310 Enhanced Mobility

The FTA 5310 – Enhanced Mobility of Seniors and Individuals with Disabilities formula funding program provides funds for improving the mobility of seniors and disabled people where existing transportation services may be insufficient, unavailable, or incapable of meeting their specific needs. The TPO is the designated recipient of the 5310 funds and is responsible for administering the funds to appropriate agencies, including non-profit organizations and human service agencies. Funds from the 5310 program can be used for capital and operating assistance.

5339 Bus and Bus Facilities

The FTA 5339 – Bus and Bus Facilities program is a combination of two formula allocations and a single competitive grant program that can be used to improve an agency's fleet of transit vehicles through rehabilitation, retrofitting, or replacement and to improve bus related transit facilities. To be eligible for the fund you must be a fixed route provider. The competitive portion of the program allocates funds based on the age and conditions of vehicles in a fleet as well as the plan for integrating low-or-no-emissions vehicles.

STATE FUNDING

The State provides transit funding through the Tennessee Department of Transportation (TDOT), which covers a portion of the required match for transit projects using FTA funding programs. Historically, this amount has equated to half of the non-federal share. TDOT also provides the Urban Operating Program (UROP), which goes to fixed-route providers and can be used for matching capital funds as well as transit operations.

OTHER FUNDING SOURCES

Local farebox revenues and discretionary grants are other sources of revenue for the urban area's transit agencies. Farebox revenues can be highly variable, particularly noteworthy after the Covid-19 pandemic that dramatically reduced ridership and therefore revenues for many months in 2020. Discretionary grant programs are often viewed as *unreliable* sources of revenue as they are competitive in nature and reliant upon the availability of staff to apply for and manage the award contract.

REVENUE PROJECTIONS

LAMTPO staff provided transit revenues projections for the years 2015-2050 from the 2018 Mobility Plan. Data provided by the TPO included both total annual funds received by federal and state funding programs, whether formulaic or discretionary, as well as by matching funds provided (state or federal, in the case of federal funding sources, or federal and local, in the case of state funding sources). These figures were aggregated to a single annual total funds figure for each funding source. Following the methodology used in the 2045 Mobility Plan, a 3% increase in revenues was applied through the 2050 horizon year.

Revenue projections are assuming the best available information at the time of this draft document, and is intended to be reviewed or modified by project team members before finalizing within the MTP document (anticipated Spring 2025).

Table H-5. Projected Transit Revenues

FUNDING SOURCE	2024-2027	2028-2030	2031-2040	2041-2050	TOTAL
5303	$140,000	$250,000	$470,000	$630,000	**$1,490,000**
5307	$4,530,000	$8,300,000	$15,280,000	$20,530,000	**$48,640,000**
5310	$1,100,000	$2,000,000	$3,680,000	$4,940,000	**$11,720,000**
5316	$410,000	$750,000	$1,390,000	$1,860,000	**$4,410,000**
5317	$520,000	$940,000	$1,740,000	$2,340,000	**$5,540,000**
5339	$550,000	$1,000,000	$1,840,000	$2,470,000	**$5860,000**
UROP	$1,000,000	$800,000	$2,700,000	$3,000,000	**$7,500,000**
FARES	$215,000	$160,000	$750,000	$1,100,000	**$2,225,000**
SUBTOTAL	**$8,465,000**	**$14,200,000**	**$27,850,000**	**$36,870,000**	**$87,385,000**

Note that funding received from fares are assumed to be consistent from the 2045 plan, as more recent fare projections were not made available to the project team. Likewise, funds from Tennessee's State Operating Assistance Program are also assumed from the prior 2045 plan.

https://www.ethrapublictransit.org
9111 Cross Park Drive
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Knoxville, TN 37923

East Tennessee Human Resource Agency, Inc.

2019 Annual Agency Profile

Transportation Director: Mr. Michael Patterson
865.691.2551

General Information

Urbanized Area (UZA) Statistics - 2010 Census

Morristown, TN

60 **Square Miles**
59,036 **Population**
449 **Pop. Rank out of 498 UZAs**

Other UZAs Served

74 Knoxville, TN, 0 Tennessee Non-UZA

Service Area Statistics

6,563 **Square Miles**
1,176,033 **Population**

Service Consumption

285,197 **Annual Unlinked Trips (UPT)**

Service Supplied

4,710,774 **Annual Vehicle Revenue Miles (VRM)**
225,155 **Annual Vehicle Revenue Hours (VRH)**

Database Information

NTDID: 40190
Reporter Type: Reduced Reporter

Financial Information

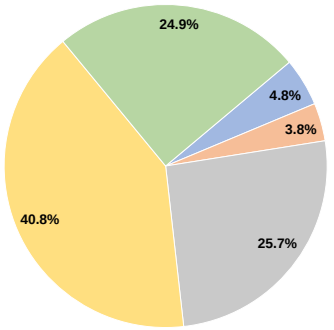
Sources of Operating Funds Expended

Fare Revenues	$505,111	4.8%
Local Funds	$399,195	3.8%
State Funds	$2,700,882	25.7%
Federal Assistance	$4,287,151	40.8%
Other Funds	$2,611,381	24.9%
Total Operating Funds Expended	**$10,503,720**	100.0%

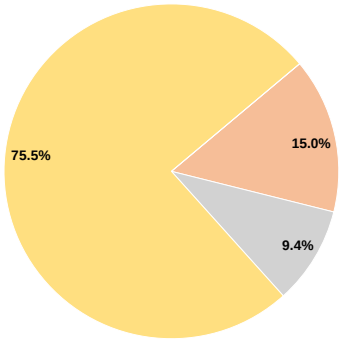
Sources of Capital Funds Expended

Fare Revenues	$0	0.0%
Local Funds	$129,830	15.0%
State Funds	$81,629	9.4%
Federal Assistance	$653,025	75.5%
Other Funds	$0	0.0%
Total Capital Funds Expended	**$864,484**	100.0%

Operating Funding Sources



Capital Funding Sources



Modal Characteristics

Operation Characteristics

Mode	Vehicles Operated at Maximum Service: Directly Operated	Vehicles Operated at Maximum Service: Purchased Transportation	Operating Expenses	Fare Revenues	Uses of Capital Funds	Annual Unlinked Trips	Annual Vehicle Revenue Miles	Annual Vehicle Revenue Hours	Average Fleet Age in Years[a]
Demand Response	84	-	$10,503,720	$505,111	$864,484	285,197	4,710,774	225,155	4.7
Total	**84**	**-**	**$10,503,720**	**$505,111**	**$864,484**	**285,197**	**4,710,774**	**225,155**	

Performance Measures

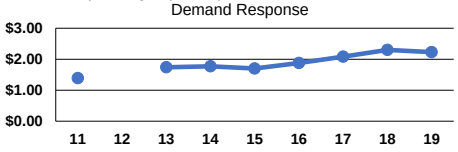
Service Efficiency

Mode	Operating Expenses per Vehicle Revenue Mile	Operating Expenses per Vehicle Revenue Hour
Demand Response	$2.23	$46.65
Total	**$2.23**	**$46.65**

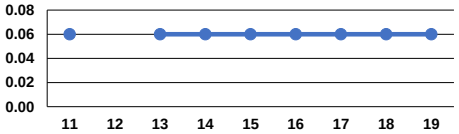
Service Effectiveness

Mode	Operating Expenses per Unlinked Passenger Trip	Unlinked Trips per Vehicle Revenue Mile	Unlinked Trips per Vehicle Revenue Hour
Demand Response	$36.83	0.1	1.3
Total	**$36.83**	**0.1**	**1.3**

Operating Expense per Vehicle Revenue Mile: Demand Response



Unlinked Passenger Trips per Vehicle Revenue Mile: Demand Response



Notes:

[a]Demand Response - Taxi (DT) and non-dedicated fleets do not report fleet age data.

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Service Area Statistics

6,563 **Square Miles**
1,176,033 **Population**

Service Consumption

247,644 **Annual Unlinked Trips (UPT)**

Service Supplied

4,051,673 **Annual Vehicle Revenue Miles (VRM)**
197,815 **Annual Vehicle Revenue Hours (VRH)**

Database Information

NTDID: 40190
Reporter Type: Reduced Reporter
Asset Type: Tier II
Sponsor NTDID: 4R08

Financial Information

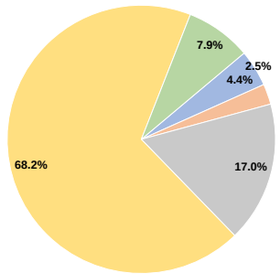
Sources of Operating Funds Expended

Fare Revenues	$434,221	4.4%
Local Funds	$242,005	2.5%
State Funds	$1,668,671	17.0%
Federal Assistance	$6,707,933	68.2%
Other Funds	$779,953	7.9%
Total Operating Funds Expended	**$9,832,783**	100.0%

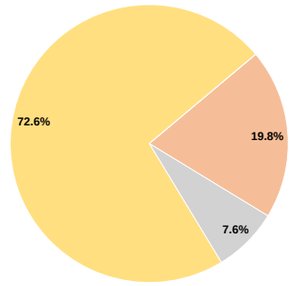
Sources of Capital Funds Expended

Fare Revenues	$0	0.0%
Local Funds	$289,699	19.8%
State Funds	$111,259	7.6%
Federal Assistance	$1,060,749	72.6%
Other Funds	$0	0.0%
Total Capital Funds Expended	**$1,461,707**	100.0%

Operating Funding Sources



Capital Funding Sources



Assets

Revenue Vehicles	**174**
Service Vehicles	**2**
Facilities	**1**

Performance Measure Targets - 2021

Performance Measure - Asset Type - Target % not in State of Good Repair
Equipment - Automobiles - 10%
Equipment - Trucks and other Rubber Tire Vehicles - 30%
Facility - Administrative / Maintenance Facilities - 25%
Facility - Passenger / Parking Facilities - 25%
Rolling Stock - AO - Automobile - 50%
Rolling Stock - BU - Bus - 15%
Rolling Stock - CU - Cutaway - 10%
Rolling Stock - MV - Minivan - 25%
Rolling Stock - OR - Other - 0%
Rolling Stock - VN - Van - 15%

Modal Characteristics

Operation Characteristics

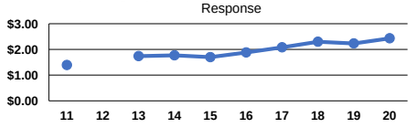
Mode	Vehicles Operated at Maximum Service: Directly Operated	Vehicles Operated at Maximum Service: Purchased Transportation	Operating Expenses	Fare Revenues	Uses of Capital Funds	Annual Unlinked Trips	Annual Vehicle Revenue Miles	Annual Vehicle Revenue Hours	Average Fleet Age in Years[a]
Demand Response	80	-	$9,832,783	$434,221	$1,461,707	247,644	4,051,673	197,815	4.4
Total	**80**	**-**	**$9,832,783**	**$434,221**	**$1,461,707**	**247,644**	**4,051,673**	**197,815**	

Performance Measures

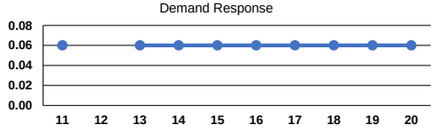
Service Efficiency

Mode	Operating Expenses per Vehicle Revenue Mile	Operating Expenses per Vehicle Revenue Hour
Demand Response	$2.43	$49.71
Total	**$2.43**	**$49.71**

Operating Expense per Vehicle Revenue Mile: Demand Response



Unlinked Passenger Trips per Vehicle Revenue Mile: Demand Response



Service Effectiveness

Mode	Operating Expenses per Unlinked Passenger Trip	Unlinked Trips per Vehicle Revenue Mile	Unlinked Trips per Vehicle Revenue Hour
Demand Response	$39.71	0.1	1.3
Total	**$39.71**	**0.1**	**1.3**

Notes:

[a]Demand Response - Taxi (DT) and non-dedicated fleets do not report fleet age data.

https://www.ethrapublictransit.org
9111 Cross Park Dr Ste D100
Suite D100
Knoxville, Tn 37923-4517

East Tennessee Human Resource Agency, Inc.
2021 Annual Agency Profile

Mr. Michael Patterson
865.691.2551

General Information

Urbanized Area (UZA) Statistics - 2010 Census

Morristown, TN

60 **Square Miles**
59,036 **Population**
449 **Pop. Rank out of 498 UZAs**

Other UZAs Served

74 Knoxville, TN, 0 Tennessee Non-UZA

Service Area Statistics

6,563 **Square Miles**
1,176,033 **Population**

Service Consumption

196,822 **Annual Unlinked Trips (UPT)**

Service Supplied

3,153,963 **Annual Vehicle Revenue Miles (VRM)**
161,024 **Annual Vehicle Revenue Hours (VRH)**

Database Information

NTDID: 40190
Reporter Type: Reduced Reporter
Asset Type: Tier II
Sponsor NTDID: 4R08

Financial Information

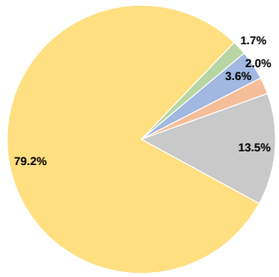
Sources of Operating Funds Expended

Fare Revenues	$321,641	3.6%
Local Funds	$181,719	2.0%
State Funds	$1,217,340	13.5%
Federal Assistance	$7,155,207	79.2%
Other Funds	$155,291	1.7%
Total Operating Funds Expended	**$9,031,198**	100.0%

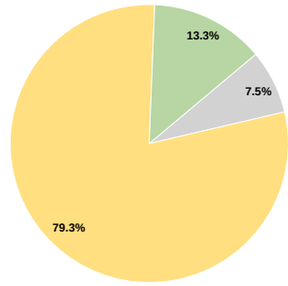
Sources of Capital Funds Expended

Fare Revenues	$0	0.0%
Local Funds	$0	0.0%
State Funds	$11,423	7.5%
Federal Assistance	$121,424	79.3%
Other Funds	$20,311	13.3%
Total Capital Funds Expended	**$153,158**	100.0%

Operating Funding Sources



Capital Funding Sources



Assets

Revenue Vehicles	**159**
Service Vehicles	**2**
Facilities	**1**

Performance Measure Targets - 2022

Performance Measure - Asset Type - Target % not in State of Good Repair
Equipment - Automobiles - 25%
Equipment - Trucks and other Rubber Tire Vehicles - 30%
Facility - Administrative / Maintenance Facilities - 25%
Facility - Passenger / Parking Facilities - 25%
Rolling Stock - AO - Automobile - 50%
Rolling Stock - BU - Bus - 15%
Rolling Stock - CU - Cutaway - 10%
Rolling Stock - MV - Minivan - 30%
Rolling Stock - OR - Other - 0%
Rolling Stock - VN - Van - 25%

Modal Characteristics

Operation Characteristics

Mode	Vehicles Operated at Maximum Service: Directly Operated	Purchased Transportation	Operating Expenses	Fare Revenues	Uses of Capital Funds	Annual Unlinked Trips	Annual Vehicle Revenue Miles	Annual Vehicle Revenue Hours	Average Fleet Age in Years[a]
Demand Response	65 [1]	-	$9,031,198 [1]	$321,641	$153,158 [1]	196,822	3,153,963	161,024	3.8
Total	**65**	**-**	**$9,031,198**	**$321,641**	**$153,158**	**196,822**	**3,153,963**	**161,024**	

Performance Measures

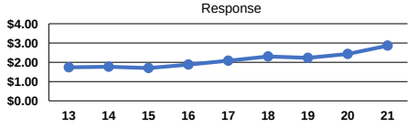
Service Efficiency

Mode	Operating Expenses per Vehicle Revenue Mile	Operating Expenses per Vehicle Revenue Hour
Demand Response	$2.86	$56.09
Total	**$2.86**	**$56.09**

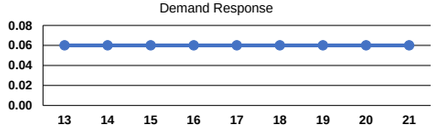
Service Effectiveness

Mode	Operating Expenses per Unlinked Passenger Trip	Unlinked Trips per Vehicle Revenue Mile	Unlinked Trips per Vehicle Revenue Hour
Demand Response	$45.89	0.1	1.2
Total	**$45.89**	**0.1**	**1.2**

Operating Expense per Vehicle Revenue Mile: Demand Response



Unlinked Passenger Trips per Vehicle Revenue Mile: Demand Response



Notes:

[a]Demand Response - Taxi (DR/TX) and non-dedicated fleets do not report fleet age data.
[1]Includes data for a contract with another reporter.
*This agency has a purchased transportation relationship in which they sell service to Amerigroup (NTDID: Entity that Does Not Report to NTD), and in which the data are captured in this report for mode DR/DO.
*This agency has a purchased transportation relationship in which they sell service to United Health Care Community Plan (NTDID: Entity that Does Not Report to NTD), and in which the data are captured in this report for mode DR/DO.
*This agency has a purchased transportation relationship in which they sell service to Southeastrans (NTDID: Entity that Does Not Report to NTD), and in which the data are captured in this report for mode DR/DO.

2022 Annual Agency Profile - East Tennessee Human Resource Agency, Inc. (NTD ID 40190)

Mailing Address: 9111 CROSS PARK DR
KNOXVILLE, TN 37923-4517

Website: https://www.ethrapublictransit.org

Geographic Coverage

Primary Urbanized/Rural Area	Morristown, TN
Service Area Population	1,176,033
Service Area Sq. Miles	6,563
Other Areas Served:	Tennessee Non-UZA,Knoxville, TN

Service Consumed

Annual Unlinked Trips (UPT)	236,818

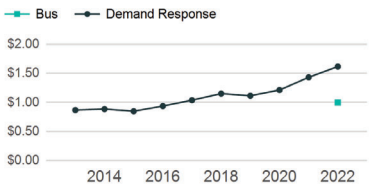
Assets

Revenue Vehicles	149
Service Vehicles	2
Facilities	1

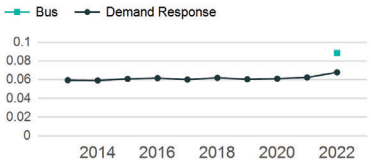
Service Supplied

Annual Vehicle Revenue Miles (VRM)	3,479,458
Annual Vehicle Revenue Hours (VRH)	169,250
Vehicles Operated in Maximum Service (VOMS)	71

Operating Expenses per Vehicle Revenue Mile



Unlinked Passenger Trip per Vehicle Revenue Mile



Modal Characteristics

Mode	Annual Unlinked Passenger Trips	Directly Operated VOMS	Purchased Transportation VOMS	Annual Vehicle Revenue Miles	Annual Vehicle Revenue Hours
Demand Response	207,621	66	0	3,058,193	156,223
Bus	29,197	5	0	421,265	13,027
Total	**236,818**	**71**	**0**	**3,479,458**	**169,250**

Metrics

	Service Efficiency		Service Effectiveness		
Mode	**OE per VRM**	**OE per VRH**	**UPT per VRM**	**UPT per VRH**	**OE per UPT**
Demand Response	$3.23	$63.29	0.1	1.3	$47.62
Bus	$1.36	$44.14	0.1	2.2	$19.69
Total	**$3.01**	**$61.81**	**0.1**	**1.4**	**$44.18**

2022 Annual Agency Profile - East Tennessee Human Resource Agency, Inc. (NTD ID 40190)

2022 Funding Breakdown

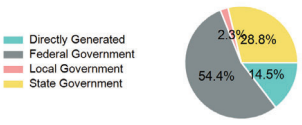
Summary of Operating Expenses (OE)

Mode	Operating Expenses	Fare Revenues
Demand Response	$9,886,792	$1,502,547
Bus	$575,009	$17,962
Total	**$10,461,801**	**$1,520,509**

Sources of Operating Funds Expended

Directly Generated	$1,520,509
Federal Government	$5,692,462
Local Government	$237,684
State Government	$3,011,146
Total Operating Funds Expended	**$10,461,801**

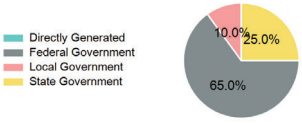
Operating Funding Sources



Sources of Capital Funds Expended

Directly Generated	$0
Federal Government	$1,470,387
Local Government	$226,214
State Government	$565,533
Total Capital Funds Expended	**$2,262,134**

Capital Funding Sources



2022 Asset Management

Transit Asset Management (TAM) Tier	Tier II	**TAM Sponsor NTD ID**	4R08

Metrics

2022 Performance Measure - Asset - 2023 Target (% not in State of Good Repair)

Mode	Average Fleet Age in Years
Demand Response	3.7
Bus	4.9

2023 Annual Agency Profile - East Tennessee Human Resource Agency, Inc. (NTD ID 40190)

Mailing Address: 9111 CROSS PARK DR
KNOXVILLE, TN

Website: https://www.ethrapublictransit.org

Geographic Coverage

Primary Urbanized/Rural Area	Morristown, TN
Service Area Population	1,176,033
Service Area Sq. Miles	6,563
Other Areas Served:	Tennessee Non-UZA,Knoxville, TN

Service Consumed

Annual Unlinked Trips (UPT)	244,937

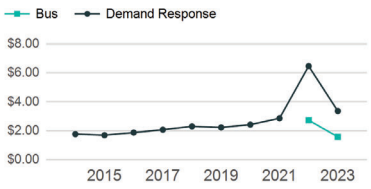
Assets

Revenue Vehicles	135
Service Vehicles	2
Facilities	1

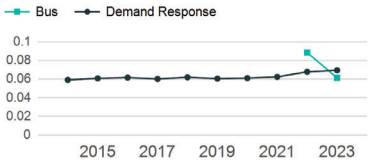
Service Supplied

Annual Vehicle Revenue Miles (VRM)	3,567,539
Annual Vehicle Revenue Hours (VRH)	178,823
Vehicles Operated in Maximum Service (VOMS)	70

Operating Expenses per Vehicle Revenue Mile



Unlinked Passenger Trip per Vehicle Revenue Mile



Modal Characteristics

Mode	Annual Unlinked Passenger Trips	Directly Operated VOMS	Purchased Transportation VOMS	Annual Vehicle Revenue Miles	Annual Vehicle Revenue Hours
Bus	23,503	5	0	382,969	12,905
Demand Response	221,434	65	0	3,184,570	165,918
Total	**244,937**	**70**	**0**	**3,567,539**	**178,823**

Metrics

	Service Efficiency		Service Effectiveness		
Mode	**OE per VRM**	**OE per VRH**	**UPT per VRM**	**UPT per VRH**	**OE per UPT**
Bus	$1.58	$46.91	0.1	1.8	$25.76
Demand Response	$3.36	$64.58	0.1	1.3	$48.39
Total	**$3.17**	**$63.30**	**0.1**	**1.4**	**$46.22**

2023 Annual Agency Profile - East Tennessee Human Resource Agency, Inc. (NTD ID 40190)

2023 Funding Breakdown

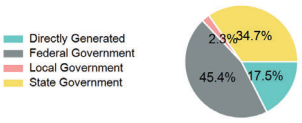
Summary of Operating Expenses (OE)

Mode	Operating Expenses	Fare Revenues
Bus	$605,352	$0
Demand Response	$10,714,695	$0
Total	**$11,320,047**	**$0**

Sources of Operating Funds Expended

Directly Generated	$1,983,220
Federal Government	$5,141,358
Local Government	$263,025
State Government	$3,932,444
Total Operating Funds Expended	**$11,320,047**

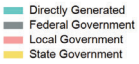
Operating Funding Sources



Sources of Capital Funds Expended

Directly Generated	$0
Federal Government	$0
Local Government	$0
State Government	$0
Total Capital Funds Expended	**$0**

Capital Funding Sources



2023 Asset Management

Transit Asset Management (TAM) Tier	Tier II	**TAM Sponsor NTD ID**	4R08

Metrics

Mode	Average Fleet Age in Years
Bus	6.0
Demand Response	4.1

Appendix I

Resiliency Planning / Policy / Security

Contents

* Resiliency & Sustainability
* Security Considerations

RESILIENCY AND SUSTAINABILITY

1.1 Overview

Resiliency and sustainability are critical principles for transportation that address the long-term viability and robustness of a transportation network. These principles are essential for creating transportation infrastructure that is not only efficient and reliable but also environmentally responsible and adaptable to climate change. The importance of integrating resiliency and sustainability into transportation planning ensures the continuity of essential services, supports economic stability, and contributes to the overall health and well-being of communities.

This section explores the definitions, significance, and practical applications of resiliency and sustainability, reviews existing plans and policies related to resiliency and sustainability, and identifies potential strategies to build resiliency and sustainability, all in the context of transportation.

While resilience and sustainability are related, they have different definitions and accomplish different goals. Sustainability in transportation planning is addressed through emissions regulations, carbon reduction actions, utilizing innovative materials, as well as through routine operation and maintenance programs. In 1987, the United Nations defined **sustainability** as "meeting the needs of the present without compromising the ability of future generations to meet their own needs."[1] **Resiliency** is the ability to anticipate, prepare for, and adapt to changing conditions and withstand, respond to, and recover rapidly from disruptions.[2] Resiliency in transportation planning is focused on creating, or improving redundancy and reliability, and facilitating rapid response and recovery to emergency events. A key component of sustainability is minimizing the severity of climate change through mitigating actions, compared to resiliency that focuses on lessening the impacts of natural hazards and climate change . Transportation actions to improve resiliency and sustainability are often intertwined and can both improve responses to natural hazards while reducing carbon emissions. Examples of resilient and sustainable actions and the relationship between the two principles are shown in **Figure 1.**

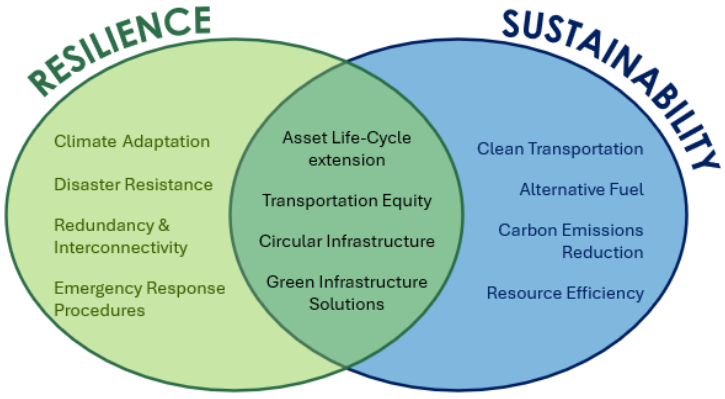


Figure 1 – Resilience and Sustainability Examples

[1] United Nations (UN). (1987). Report of the World Commission on Environment and Development: Our common future. Retrieved from 5987our-common-future.pdf (un.org).
[2] Federal Highway Administration (FHWA). (2014). "FHWA Order 5520." Retrieved from https://www.fhwa.dot.gov/legsregs/directives/orders/5520.cfm#par6.

The role of transportation in sustainable development was first recognized at the 1992 United Nation's Earth Summit and are currently crucial components in several Sustainable Development Goals (SDGs).[3] Nationally, there is a growing recognition of the opportunity to advance sustainability goals, climate mitigation, and resilience efforts through the transportation sector. The USDOT's recent efforts include supporting smart community design, improving efficiency through transit, rail, and high-efficiency vehicles, and transitioning to clean options with zero-emission vehicles and fuels. The Bipartisan Infrastructure Law (BIL) and the Inflation Reduction Act have made historic investments in resilient infrastructure for transit, rail, active transportation, and electric vehicles (EV)[4] in response to the challenges faced by transportation systems. Climate change and extreme weather events increasingly threaten the safety, reliability, and sustainability of transportation infrastructure.

Hamblen County, Tennessee has faced 10 presidential disaster declarations and Jefferson County Tennessee has faced 16 presidential disaster declarations between 1969 and April 2023. [5] Disasters have routinely impacted transportation infrastructure in the region, and climate change is expected to increase the frequency and severity of these events. The *Hamblen County Multijurisdictional Hazard Mitigation Plan* states that all localities within the county have areas within the 100-year floodplain and issues with smaller localized flooding. The Plan includes an inventory of 13 roadways with frequent flooding. Additionally, the plan notes previous impacts from flooding such as multiple bridges washed out (1997), widespread flooding and road closures (1999, 2002, 2003, 2009, 2011,2016, 2019), and mudslides (2003). The *Jefferson County Multi-Jurisdictional Hazard Mitigation Plan* includes an inventory of eight roadways and areas with frequent flooding. The County has reported 12 flooding events between 1997 and 2019 or approximately one flooding event every two years.

Many new funding programs support transportation resiliency and sustainability as shown in **Table 1**. Several funding programs through the BIL provide states with formula funds to use at their discretion. For multiple programs, states can use formula funds to support local projects and initiatives.

Table 1 – Resiliency and Sustainability Funding Programs

Funding Program	Icon	Description
Promoting Resilient Operations for Transformative, Efficient, and Cost-saving Transportation Program (PROTECT)		Funding under the BIL to support resilience improvements of the surface transportation system to extreme weather events, and climate impacts. The program includes state formula funds[6] and discretionary grants[7].
Carbon Reduction Program (CRP)		Funding under the BIL for projects designed to reduce transportation emissions from on-road highway sources. The funds are administered as state formula funds.[8]

[3] United Nations. (UN). (n.d.) Sustainable Transport. Retrieved from Sustainable transport | Department of Economic and Social Affairs (un.org)
[4] USDOT. (n.d.) Fact Sheet: Climate Action at the United States Department of Transportation, Retrieved from COP Fact Sheet_new 11_17_22FINAL.pdf (transportation.gov)
[5] TEMA. (2023). Tennessee State Hazard Mitigation Plan 2023. Retrieved from Tennessee State Hazard Mitigation Plan 2023 | Plans (arcgis.com).
[6] USDOT. (2022). Promoting Resilient Operations for Transformative, Efficient, and Cost-Saving Transportation (PROTECT) Formula Program. Retrieved from Bipartisan Infrastructure Law - Promoting Resilient Operations for Transformative, Efficient, and Cost-Saving Transportation (PROTECT) Formula Program Fact Sheet | Federal Highway Administration (dot.gov).
[7] USDOT. (2023). Promoting Resilient Operations for Transformative, Efficient, and Cost-saving Transportation Program (PROTECT). Retrieved from Promoting Resilient Operations for Transformative, Efficient, and Cost-saving Transportation Program (PROTECT) | US Department of Transportation
[8] USDOT. (2024). Carbon Reduction Program. Retrieved from Carbon Reduction Program | US Department of Transportation.

Funding Program	Icon	Description
Building Resilient Infrastructure and Communities (BRIC)		Pre-disaster mitigation initiative by FEMA that funds communities to carry out large scale infrastructure mitigation and adaptation activities through grants.[9]
Hazard Mitigation Grant Program (HMGP)		Funding to support hazard mitigation planning at state, local, tribal, and territorial government level.[10]
National Electric Vehicle Infrastructure (NEVI) program		Funding under the BIL to support a nationwide network of electric vehicle (EV) charging stations to promote EV adoption and transportation decarbonization. The funds are administered as state formula funds.[11]
Charging and Fueling Infrastructure Grant Program		Funding under the BIL to strategically deploy publicly accessible electric vehicle charging infrastructure and other alternative fueling infrastructure. The funds are administered through discretionary grants.[12]
Low-Carbon Transportation Materials		Grants under the IRA to incentivize the use of construction materials that have lower levels of embodied greenhouse gas emissions. The funds are provided through reimbursement or incentives for using eligible materials.[13]

1.2 Existing Conditions Assessment

The Existing Conditions Assessment identifies existing resiliency and sustainability strengths and opportunities for the region after reviewing current plans, policies, and programs.

1.2.1 Existing Plans, Policies & Programs

There are several plans related to resilience and sustainability within the region. Many of the state and regional plans ensure eligibility for grants that can support sustainable and resilient transportation projects. Additionally, some of the plans identify transportation resilience and sustainability related actions for the region. The plans reviewed are summarized below with more detail, including funding implications, found in **Appendix 1.**

Five statewide plans were identified that relate to transportation sustainability and resiliency. Many of the plans are associated with new funding streams through the BIL. Some of the programs require plans to program funds (e.g., CRP and NEVI). Other BIL programs incentivize plan development with an improved cost-match (e.g., PROTECT). TDOT has adopted or is in the process of adopting a plan from each of these programs, maximizing the state's federal funding. Additionally, the state maintains an approved state hazard mitigation plan, enabling the state to leverage and distribute a variety of FEMA programs.

[9] FEMA. (2024). Building Resilience Infrastructure and Communities. Retrieved from Building Resilient Infrastructure and Communities | FEMA.gov.
[10] FEMA. (2023). Hazard Mitigation Grant Program (HMGP). Retrieved from Hazard Mitigation Grant Program (HMGP) | FEMA.gov.
[11] UDSOT. (2022). National Electric Vehicle Infrastructure Formula Program. Retrieved from Bipartisan Infrastructure Law - National Electric Vehicle Infrastructure (NEVI) Formula Program Fact Sheet | Federal Highway Administration (dot.gov)
[12] USDOT. (2023). Charging and Fueling Infrastructure Grant Program. Retrieved from Charging and Fueling Infrastructure Grant Program | US Department of Transportation
[13] USDOT. (2023). Low-Carbon Transportation Materials Grants.

For hazard mitigation planning, the planning area is a part of the *Hamblen County Multi-Jurisdictional Local Hazard Mitigation Plan (HMP)* and *Jefferson County Multi-Jurisdictional Local Hazard Mitigation Plan (HMP).* Both plans are currently active, maintaining eligibility for hazard mitigation FEMA funds. The reviewed plans are shown in **Figure 2.**

Figure 2 – Reviewed Plans

In addition, Hamblen County maintains a floodplain management program to regulate the floodplain and reduce impacts from flooding, although the current ordinance expired in February 2024. The County meets the requirements for the National Flood Insurance Program (NFIP) but does not exceed them.[14] Development is allowed within the floodplain, but it must meet floodproofing requirements certified by a professional engineer. Jefferson County also maintains a flooding zoning ordinance and participates in NFIP. Most development is prohibited in flood hazard areas and is regulated.[15]

1.2.2 Identified Strengths

The region has made progress to be more sustainable and resilient. Both Hamblen and Jefferson County have floodplain requirements. Additionally, both jurisdictions maintain active hazard mitigation plans which make them eligible for certain FEMA funds.

In addition, TDOT has undertaken several plans and programs related to sustainability and resilience that benefit the planning area. The TDOT *CRS*, *TEVI*, and *RIP* allow for the State to leverage federal funds for sustainability and resilience. For the CRS, the Morristown region receives funding based on population, and the region's apportionment is approximately $841,540.

1.2.3 Identified Opportunities

While the region has taken some steps to improve sustainability and resilience, most of the current actions are maintaining plans and ordinances to meet minimum federal program requirements. The climates and hazards historically faced by the community are changing so existing measures may be insufficient.

[14] Hamblen County. (1990) Hamble County Zoning Resolution. Retrieved from 022724-Zoning-Regulations-Updated-Jan-2023-Final.pdf (hamblencountytn.gov).
[15] Jefferson County (2010). Jefferson County Land Use Plan. Retrieved from Jefferson-County-Land-Use-Plan-2010-2020.pdf (jeffersoncountytn.gov).

By 2050, Morristown is expected to experience 15 more days per year above 95° F and a 12% increase in days with heavy precipitation.[16] Current transportation design standards and practices may need to be updated to prepare for future climate conditions within the lifecycle of an asset. For example, historically, the region has struggled with flooding and has identified roadways with routine flooding issues. However, existing design storms may not reflect current climate trends. Additionally, extreme temperatures will be worsened by the Urban Heat Island effect as areas continue to develop.

While the area has not been identified for exceeding air quality regulations, air quality and vehicle emissions should be monitored as the planning area continues to develop. TDOT CRS contains maps of equivalent carbon dioxide emissions by county. While the planning area is not in the top list of carbon dioxide generating counties, both counties generate higher carbon dioxide emissions as a part of a metropolitan area compared to rural areas. Jefferson County (likely given its proximity to Knox County), is in one of the moderate categories compared to the rest of the state for emissions.

1.3 Strategies and Actions to Create a Resilient and Sustainable Transportation Network

The following strategies and actions are recommended to increase sustainability and of the transportation network within the region. TDOT has made progress on many of these strategies and actions through the *CRS*, *RIP*, and *TEVI* Plan. Projects can often incorporate both resilience and sustainability strategies to complement each other and additional transportation priorities. Examples of transportation infrastructure incorporating resilience and sustainability strategies are presented in **Figure 3** and **Figure 4**. A menu of strategies and actions for increasing transportation sustainability and resilience are presented in

Plan Name	Icon	Year	Description	Funding
Hamblen County Multi-Jurisdictional Local Hazard Mitigation Plan (HMP)		2023	The HMP was developed to identify the community's notable risks and specific vulnerabilities, and then create/implement corresponding mitigation projects to address those areas of concern. The planning includes Hamblen County and the City of Morristown. The plan identifies several roads with flooding issues and issues with sinkholes within public right of ways.	The plan makes the County eligible for FEMA funds such as Hazard Mitigation Grant Program Post Fire, Hazard Mitigation Grant Program (HMGP) planning grant, HMGP project grant, Building Resilient Infrastructure and Communities (BRIC) project grant, Safeguarding Tomorrow Revolving Loan Fund Program, Flood Mitigation Assistance (FMA) project grant, and Rehabilitation of High Hazard Potential Dam (HHPD) Grant Program. Plans must be updated every 5 years to remain eligible for funding.

[16] Headwaters Economics. (n.d). Neighborhoods at Risk. Retrieved from Neighborhoods at Risk (headwaterseconomics.org) on April 15, 2024.

Plan Name	Icon	Year	Description	Funding
Jefferson County Multi-Jurisdictional Local Hazard Mitigation Plan (HMP)		2019	The HMP was developed to identify the community's notable risks and specific vulnerabilities, and then create/implement corresponding mitigation projects to address those areas of concern. The HMP includes Jefferson County, Town of Dandridge, and the City of Jefferson City. The plan identifies several roads with flooding issues.	The plan makes the County eligible for FEMA funds such as Hazard Mitigation Grant Program Post Fire, Hazard Mitigation Grant Program (HMGP) planning grant, HMGP project grant, Building Resilient Infrastructure and Communities (BRIC) project grant, Safeguarding Tomorrow Revolving Loan Fund Program, Flood Mitigation Assistance (FMA) project grant, and Rehabilitation of High Hazard Potential Dam (HHPD) Grant Program. Plans must be updated every 5 years to remain eligible for funding.

Appendix 2. A few priority strategies and actions are highlighted below for the region.

For sustainability, the Region should focus on reducing vehicle emissions. This directly relates to two of the sustainability strategies of Drive Less and Drive Wise. The region should prioritize transportation actions that reduce the number of vehicle miles traveled (VMT) and single occupant vehicles (SOVs). When the trips must be made, the focus should be on driving wise or reducing the impact of the trip.

For resilience, the region should focus on minimizing risk and building capacity. While the goal is to eliminate risk, it is often expensive to relocate transportation infrastructure. The region has noted issues with roadway flooding and stormwater management. The region should focus on developing policies and best practices to incorporate resilience into projects and development such as utilizing nature-based solutions (NBS) for stormwater management. The region should also focus on including resilience in large infrastructure projects moving forward to protect large regional investments.

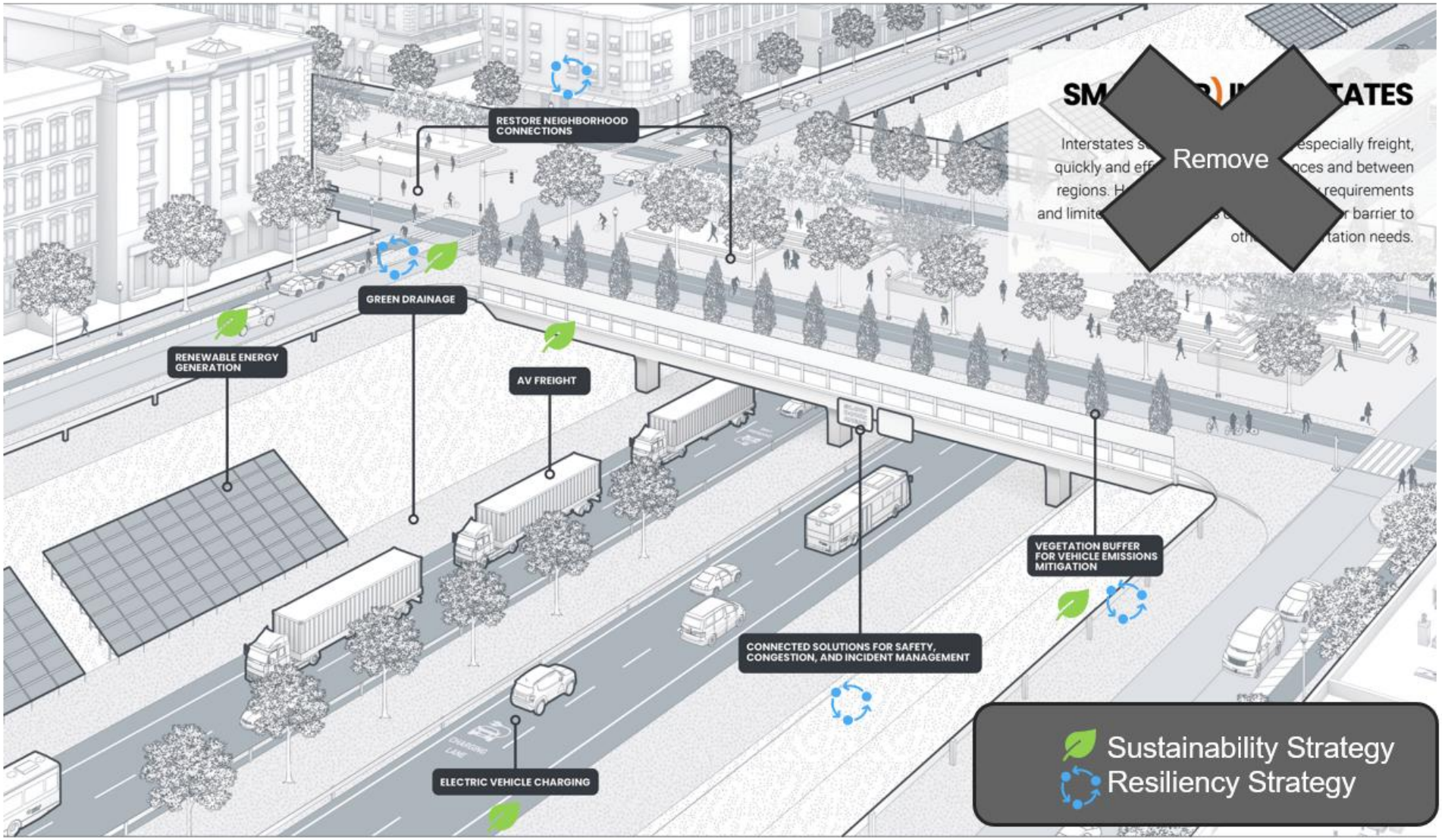


Figure 3 – Freight Corridor incorporating Sustainability and Resiliency Strategies

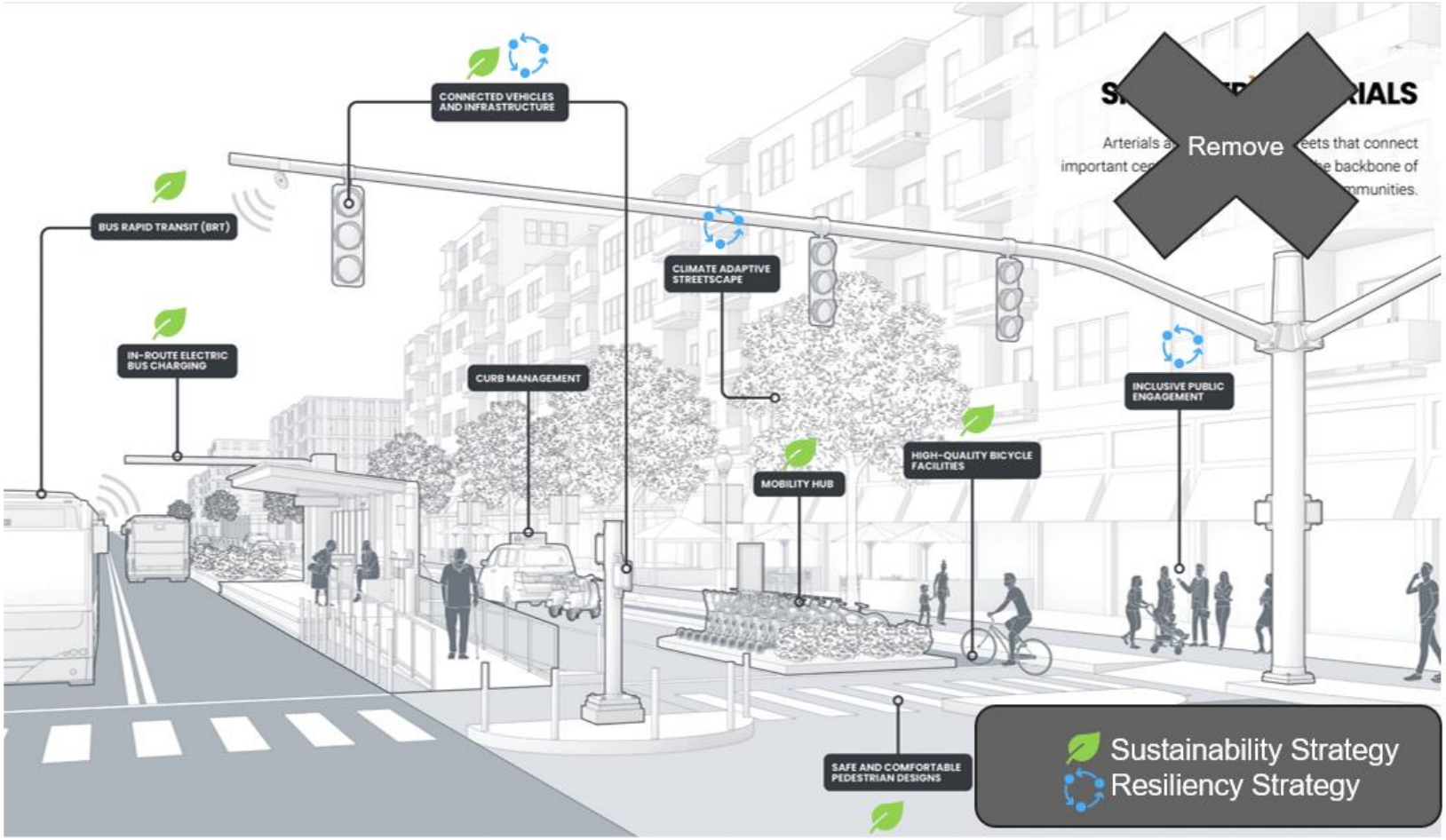


Figure 4 – Urban Corridor incorporating sustainability and resiliency strategies

1.4 Appendix 1 – Literature Review

The following appendix details the resiliency and sustainability related plans reviewed. State plans are shown in **Table 2** and local plans are shown in **Table 3**.

Table 2 – State Plans

Plan Name	Icon	Year	Description	Funding
TDOT Transportation Asset Management Plan (TAMP)		2022	The TAMP establishes a framework to consider the full life cycle when investing in transportation assets and infrastructure. The plan helps ensure the agency considers the full life cycle of assets which includes resilience. The TAMP includes *23 CFR Part 667 Periodic Evaluation of Facilities Repeatedly Requiring Repair and Reconstruction Due to Emergency Events.* In this analysis, TDOT evaluates emergency response data to identify pavement or bridges that have required repeated repair. None were within the planning area.	The TAMP is required by several federal programs including Moving Ahead for Progress in the 21st Century (MAP-21) Act, Fixing America's Surface Transportation (FAST) Act, and the Infrastructure Investment and Jobs Act (IIJA).
Tennessee Electric Vehicle Infrastructure (TEVI) Deployment Plan Update		2023	The TEVI plan outlines Tennessee's approach to planning, procuring, deploying, and administering NEVI (National Electric Vehicle Infrastructure) formula program funding. Through NEVI Formula Program funding, TDOT expects to receive approximately $88.3 million over five years (FY2022-2026) and must update the TEVI plan annually to meet program obligations. The vision for the TEVI Program is to "develop a safe, convenient, accessible, reliable, and equitable EV charging network that promotes the state's economic vitality and environmental stewardship while improving EV "range of confidence" and supporting EV adoptions throughout Tennessee".	TDOT has developed the TEVI NOFO to solicit applications for grant funding. Awardees will purchase, install, own, operate, maintain, and report on program-funded EV charging infrastructure. The first issuance of awards is expected in Spring 2024. Tennessee will primarily work with third parties to deploy the infrastructure.
Tennessee State Hazard Mitigation Plan (HMP)		2023	The State HMP shows Tennessee's commitment to pursue risk-reduction initiative for assets exposed to natural and technological hazards. The plan includes a statewide	The Plan makes the State eligible for a variety of FEMA funds which it can administer to local entities.

Plan Name	Icon	Year	Description	Funding
			evaluation of hazards and risks, capability assessment, and mitigation strategy. The mitigation strategy identifies key mitigation actions to reduce risk. The goal of the Tennessee Mitigation Program is to support and make effective long-term investments to lessen the impacts of disasters.	The State is eligible FEMA funds including Public Assistance (PA), Fire Mitigation Assistance Grants (FMAG), Hazard Mitigation Grant Program Post Fire, Hazard Mitigation Grant Program (HMGP) planning grant, HMGP project grant, Building Resilient Infrastructure and Communities (BRIC) planning grant, BRIC project grant, Safeguarding Tomorrow Revolving Loan Fund Program, Flood Mitigation Assistance (FMA) planning grant, FMA project grant and Rehabilitation of High Hazard Potential Dam (HHPD) Grant Program.[17]
TDOT Carbon Reduction Strategy (CRS)		2023	TDOT's CRS establishes baselines and expectations for TDOT's Carbon Reduction Program (CRP). Tennessee is expected to receive $139 million over five years (FY2022-2026) for carbon reduction through the Infrastructure Investment and Jobs Act (IIJA). Tennessee is required to have a CRS to utilize the funding. TDOT in consultation with the MPO's identified eight focus areas to identify eligible projects, programs, policies, and processes to utilize CRP funds. The eight focus areas are active transportation, alternative fuels, fleets and facilities, freight, green construction, transit, transportation demand management, and transportation system management and operations.	From the program requirements, 65 percent of funds must be distributed relative to population shares. Morristown's estimated apportionment is approximately $841,540.
TDOT Resilience Improvement Plan (RIP)		2024*	TDOT's RIP is currently in development. The plan will include a review of current transportation resilience practices, identification of transportation vulnerabilities, and project identification and prioritization for PROTECT funding.	The plan reduces TDOT's federal cost share requirements for utilizing formula PROTECT funding. Additionally, the plan can be used to support discretionary grant applications.

*The plan is currently under development but is expected to be completed in 2024.

[17] FEMA. (2023). Mitigation and Planning Grants. Retrieved from Mitigation Planning and Grants | FEMA.gov on April 15, 2024.

Table 3 – Local Plans

Plan Name	Icon	Year	Description	Funding
Hamblen County Multi-Jurisdictional Local Hazard Mitigation Plan (HMP)		2023	The HMP was developed to identify the community's notable risks and specific vulnerabilities, and then create/implement corresponding mitigation projects to address those areas of concern. The planning includes Hamblen County and the City of Morristown. The plan identifies several roads with flooding issues and issues with sinkholes within public right of ways.	The plan makes the County eligible for FEMA funds such as Hazard Mitigation Grant Program Post Fire, Hazard Mitigation Grant Program (HMGP) planning grant, HMGP project grant, Building Resilient Infrastructure and Communities (BRIC) project grant, Safeguarding Tomorrow Revolving Loan Fund Program, Flood Mitigation Assistance (FMA) project grant, and Rehabilitation of High Hazard Potential Dam (HHPD) Grant Program.[18] Plans must be updated every 5 years to remain eligible for funding.
Jefferson County Multi-Jurisdictional Local Hazard Mitigation Plan (HMP)		2019	The HMP was developed to identify the community's notable risks and specific vulnerabilities, and then create/implement corresponding mitigation projects to address those areas of concern. The HMP includes Jefferson County, Town of Dandridge, and the City of Jefferson City. The plan identifies several roads with flooding issues.	The plan makes the County eligible for FEMA funds such as Hazard Mitigation Grant Program Post Fire, Hazard Mitigation Grant Program (HMGP) planning grant, HMGP project grant, Building Resilient Infrastructure and Communities (BRIC) project grant, Safeguarding Tomorrow Revolving Loan Fund Program, Flood Mitigation Assistance (FMA) project grant, and Rehabilitation of High Hazard Potential Dam (HHPD) Grant Program.[19] Plans must be updated every 5 years to remain eligible for funding.

[18] FEMA. (2023). Mitigation and Planning Grants. Retrieved from Mitigation Planning and Grants | FEMA.gov on April 15, 2024.
[19] FEMA. (2023). Mitigation and Planning Grants. Retrieved from Mitigation Planning and Grants | FEMA.gov on April 15, 2024.

1.5 Appendix 2 – Strategies and Actions

Sustainability strategies and actions are presented in **Table 4** and resilience strategies and actions are presented in **Table 5**.

Table 4 – Sustainability Strategies and Actions

Implementation Strategies for Sustainability	Description	Example Actions	Related Plans
Drive Less	To improve sustainability, reduce the number of vehicle miles traveled especially by single occupant vehicles (SOVs).	**Projects** • Promote mode shift to multimodal transportation options by improving bicycle and pedestrian facilities. • Invest in transit infrastructure such as electrifying the transit fleet, increasing transit efficiency (bus rapid transit), and establishing mobility hubs. **Policies and Processes** • Enhance laws protecting multimodal roadway users. • Develop standards and development requirements to prioritize multimodal infrastructure and transportation. **Programs** • Partner with businesses to promote remote work or alternative work schedules. • Incentivize carpooling, ridesharing, and multimodal transportation. • Encourage public transit ridership.	*TDOT Carbon Reduction Strategy (CRS)*
Drive Wise	When trips cannot be reduced, reduce the impact of the trip.	**Projects** • Transition fleet vehicles and transit vehicles from fossil fuel powered vehicles to electric vehicles. • Invest in Transportation System Management and Operations (TSMO) solutions to increase efficiency and reduce idling. Examples include traffic signal optimization, traveler information, ramp metering, and high-occupancy vehicle (HOVs) lanes. • Invest in electric vehicle infrastructure such as EV charging stations. **Policies and Processes**	*TDOT Carbon Reduction Strategy (CRS)* *Tennessee Electric Vehicle Infrastructure*

Implementation Strategies for Sustainability	Description	Example Actions	Related Plans
		• Develop guidelines and initiatives to foster the integration of connected and autonomous vehicles (CAVs) to improve travel efficiency and safety. • Collect and analyze transportation data to understand trip behavior and congestion. **Programs** • Invest in traffic incident management solutions to reduce delay caused by incidents. • Incentivize the transition to electric vehicles for personal vehicle trips when necessary.	*(TEVI) Deployment Plan Update*
Build Wise	When maintaining and constructing new transportation infrastructure, integrate sustainable options while understanding the impact of the project.	**Projects** • Transition traditional street lighting to energy-efficient alternatives. • Electrify fleet vehicles and construction vehicles. **Policies and Processes** • Develop standards and development requirements to encourage or require the consideration of sustainable options. • For large construction projects, inventory the emissions created by the project. • Incorporate ENIVISION certification/standards. • For large construction projects, increase public communication, traffic incident management strategies, and alternatives to reduce idling from construction. **Programs** • Review design standards and specifications to understand carbon emissions and impact of requirements. • Identify sustainable alternatives for commonly used materials and processes.	*TDOT Carbon Reduction Strategy (CRS)*

Table 5 – Resiliency Actions and Strategies

Implementation Strategies for Resiliency	Description	Example Actions	Related Plans
Eliminate Risk	To improve resiliency and mitigate impacts from natural hazards, eliminate or reduce risk by moving people, property, and infrastructure outside of hazard areas.	**Projects** • Move critical transportation facilities outside of hazard areas. For example, relocating facilities outside of floodplains. **Policies and Processes** • Strengthen floodplain management policies to ensure new investments are not increasing exposure to natural hazards. **Programs** • Invest in resilience planning to identify at-risk infrastructure. • Develop programs to support the relocation of critical infrastructure outside of hazard areas.	*Tennessee State Hazard Mitigation Plan (HMP)* *TDOT Resilience Improvement Plan (RIP)* *Hamblen County Multi-Jurisdictional Local Hazard Mitigation Plan (HMP)* *Jefferson County Multi-Jurisdictional Local Hazard Mitigation Plan (HMP)*
Minimize Risk	When risk cannot be eliminated, increase the resilience of infrastructure and users of the transportation system.	**Projects** • Elevate infrastructure to minimize flood risk. • Utilize nature-based solutions (NBS) to minimize stormwater flooding and sequester carbon. • Install transit shelters to minimize extreme heat risk. • Use trees and vegetation to reduce heat islands. **Policies and Processes** • Strengthen stormwater requirements for new development. • Develop design standards that consider existing and future natural hazards.	*Tennessee State Hazard Mitigation Plan (HMP)* *TDOT Resilience Improvement Plan (RIP)* *Hamblen County Multi-Jurisdictional Local Hazard*

Implementation Strategies for Resiliency	Description	Example Actions	Related Plans
		Programs • Develop solutions guides to encourage NBS. • Educate infrastructure operators and owners on changing risks.	*Mitigation Plan (HMP)* *Jefferson County Multi-Jurisdictional Local Hazard Mitigation Plan (HMP)*
Build Capacity	While resiliency actions can minimize risk, communities also need to be prepared to respond to natural hazards to reduce losses to people, property, and infrastructure. During emergency events, transportation systems can be strained by evacuations.	**Projects** • Invest in infrastructure and technology to improve communication with the public during emergencies. • Identify and strengthen critical infrastructure necessary for evacuations. **Policies and Processes** • Clearly document internal responsibilities and roles during emergencies. • Maintain up to date emergency contact lists and communication protocols. **Programs** • Hold collaborative emergency exercises with multiple agencies to understand each agencies' role during emergency response and evacuations. • Identify areas with limited capacity to respond to natural hazards. • Identify detour routes in advance for key corridors.	*Tennessee State Hazard Mitigation Plan (HMP)* *TDOT Resilience Improvement Plan (RIP)* *Hamblen County Multi-Jurisdictional Local Hazard Mitigation Plan (HMP)* *Jefferson County Multi-Jurisdictional Local Hazard Mitigation Plan (HMP)*

SECURITY CONSIDERATIONS

Security Considerations

A regional transportation network must be resilient and functional in the event of an emergency. Transportation system security ensures the continuation of service and considers many types of unforeseen emergencies. Security attacks can include everything from a terrorist attack to a cyber security attack through advanced technologies. Transportation security planning is crucial for many parts of the LAMTPO system, including:

- Roadways, bridges and tunnels;
- Freight facilities, including pipelines;
- Airports;
- Public transit systems; and
- Bicycle and pedestrian facilities.

Within transportation security planning, there are various federal, state, and local agencies that play a role in the preparation and response to emergency conditions. Table 1 outlines the various agencies that are involved with system security for the Lakeway Area MTPO, followed by a description of each agency's role. Coordination among agencies in emergency conditions is key, and LAMTPO plays an important central role in the execution of this coordination.

Table 1 – Security Planning by Agency and Sector

Agency	Transportation Security Planning by Sector			
	Roadways	Transit	Air	Freight
US Dept of Transportation	●	●	●	●
Federal Highways Administration (FHWA)	●	●		●
Federal Transit Administration (FTA)		●		
Federal Railroad Administration (FRA)		●		●
Federal Aviation Administration (FAA)			●	●
US Dept of Homeland Security	●	●	●	●
Federal Emergency Management Agency (FEMA)	●	●	●	●
Tennessee Dept of Transportation (TDOT)	●		●	●
Tennessee Dept of Safety & Homeland Security	●	●	●	●
Tennessee Emergency Management Agency (TEMA)	●	●	●	●
East Tennessee Human Resource Agency (ETHRA)		●		
Lakeway Area MTPO	●	●	●	●

National Security Efforts

U.S. Department of Transportation

Under the National Response Framework, the U.S. Department of Transportation (DOT) is the primary federal agency with authority to coordinate federal interagency support for a region's transportation system. Roles and responsibilities in emergency include:

- Aviation/airspace management and control;
- Transportation safety;

- Restoration/recovery of transportation infrastructure;
- Movement restrictions; and
- Damage and impact assessment.

In the LAMTPO region, four (4) agencies play a role in security planning: FHWA, FTA, FRA, and the Federal Aviation Administration (FAA). Covering different aspects of the overall transportation system, their specific roles in preparing the region for emergency conditions allows LAMTPO to promote resiliency and efficiency of the system as a whole.

Federal Highway Administration

Federal Highway Administration (FHWA) supports state and local governments in the design, construction, and maintenance of roadways included in the NHS and the Federal Lands Highway Program. By providing financial and technical assistance, they ensure the nation's roadways are safe and technologically up to date. FHWA coordinates with the U.S. Department of Defense (DOD) to identify roadways in the NHS system that would serve as primary routes in the event of a national disaster or threat to security, known as the Strategic Highway Network (STRAHNET).

- I-81 in the LAMTPO region is part of this national network.
- While not part of STRAHNET, U.S. Highway 25E is designated as an NHS High Priority Corridor, extending from Corbin, Kentucky, to Morristown, Tennessee, via Cumberland Gap. High Priority Corridors are designated by Congress and may be eligible for additional federal funding.

Federal Transit Administration

Federal Transit Administration (FTA) provides financial and technical assistance to public transit systems. FTA provides support to upkeep technology and implement safety measures. In their goal to modernize public transportation, FTA provides assistance for facilities, such as buses, subways, light rail, commuter rail, trolleys, and ferries. FTA investments provide local transit agencies the funding means to create and enhance their transit networks at a regional scale.

Federal Railroad Administration

The Federal Railroad Administration (FRA) is responsible for railroad safety laws, overseeing the movement of hazardous materials via rail, and reducing the number and severity of crashes on the nation's railway network. Railroad owners are responsible for maintaining at-grade crossings with roadways and are regularly inspected by the state. FTA has granted authority to TDOT to oversee the Rail Fixed Guideway Systems (RFGS), which includes facilities not regulated by the FRA, such as rapid transit systems, inclined planes, trolleys, and automated guideways. The Office of Rail Safety and Inspection regularly collects and analyses rail crash data to understand trends in rail safety issues, providing data for LAMTPO officials to identify areas in need of additional safety measures. In the Lakeway region, Norfolk Southern operates a Class I rail corridor.

Federal Aviation Administration

Federal Aviation Administration (FAA) regulates the aviation system, including pilot certification and operation of the air traffic control system. The only general use public aviation facility in the Lakeway region is the Morristown Regional Airport. FAA is responsible for programs related to airport safety, design, construction, and operation. The agency partners with the Transportation Security Administration under the Department of Homeland Security to prevent attacks on the transportation system.

U.S. Department of Homeland Security

Established in 2002 following the September 11, 2001 terrorist attacks, the U.S. Department of Homeland Security (DHS) oversees a coordinated national strategy to prevent and protect the U.S. from terrorist attacks, as well as improve the overall safety of the United States. The Department was created by merging 22 different federal departments and

agencies, promoting further coordination for the protection of the nation. The Department's work includes cybersecurity, emergency response to disasters, antiterrorism efforts, and immigration-related work. Furthermore, the Transportation Security Administration (TSA), an agency under the direction of DHS, develops broad policies relating to the transportation system; however, they are perhaps, best known for their security services relating to U.S. airports.

The Federal Emergency Management Agency (FEMA) is an agency within DHS that coordinates across the federal government to help people before, during, and after disasters. While they are the first response after a disaster, FEMA provides grants and assistance to equip the nation to prepare communities and their infrastructure for emergencies before they occur. FEMA provides several transportation specific grants, such as the Transit Security Grant Program, the Intercity Bus Security Grant Program, the Intercity Passenger Rail Program-Amtrak, and the Port Security Grant Program, which provide funds to eligible entities to protect critical infrastructure and people from acts of terrorism, as well as increase the overall resiliency of the system.

Statewide and Regional Efforts

At the state and regional level, Tennessee has multiple agencies that are involved with security and protection of the transportation network. The agencies described below are those that take a leadership role in planning for and evaluating the security of the transportation system in the Lakeway region. Tennessee Department of Transportation (TDOT).

With the mission to provide a safe and reliable transportation system that supports economic growth and quality of life, TDOT is a multimodal state agency responsible for transportation networks in the state, including aviation, public transit, waterways, railroads, bicycling, and walking. In 2016, TDOT published its 25-year Plan, which included a strategic approach to the safety, security, and resilience of transportation systems in Tennessee.

Tennessee Department of Safety and Homeland Security

The Tennessee Department of Safety and Homeland Security (TDOS) is made up of three divisions:

- Tennessee Highway Patrol (THP),
- Tennessee Driver License Services division, and
- Tennessee Office of Homeland Security.

Tennessee Emergency Management Agency

The Tennessee Emergency Management Agency (TEMA) coordinates emergency management in Tennessee, in partnership with FEMA. TEMA supports state government agencies and local jurisdictions during emergencies by assisting in the management of goods and services, coordinating critical emergency functions, and soliciting assistance from other partners. Following a disaster or emergency, TEMA coordinates assessments and federal assistance programs provided to assist in recovery. In addition, TEMA's Preparedness Division provides trainings and certification courses, as well as supports local jurisdictions in updating local Hazard Mitigation Plans.

LAMTPO and ETHRA

The Lakeway MTPO coordinates with federal, state, and other regional agencies for regional security and emergency planning efforts. The agencies listed above, local law enforcement, emergency personnel, and emergency management agencies work together to ensure a resilient region that can withstand and recover from emergencies. ETHRA's public transit drivers undergo regular training for safety requirements and emergency procedures. In the event of a local evacuation, ETHRA provides a critical service by assisting local safety agencies. Each ETHRA vehicle is equipped with the required equipment needed to ensure passenger safety in case of an emergency. ETHRA drivers can also assist to prevent emergencies and enhance community security by reporting suspicious items, vehicles, or activities they encounter while driving.

Appendix J

Travel Demand Model Documentation

Contents

* Travel Demand Model Performance Summary
* Base Year Model Calibration
* Future Year Model Development

Travel Demand Model Performance Summary

After finalizing the fiscally constrained project list, the TPO's regional travel demand model was used to assess the performance of the transportation system with and without the projects. A comparison of common transportation system performance metrics are provided below, both in the base year and the final horizon year of the Mobility Plan, which is 2050. For the year 2050 two separate scenarios were run in the model – one using the roadway network as it existed in 2022 and the other using the roadway network with all of the fiscally constrained road projects being implemented. This allows us a glimpse into what the future might look like if the population and employment growth expected in the TPO Region between now and 2050 all showed up overnight.

Travel Demand Model Output Statistics - 2050 Mobility Plan for TPO Planning Area

Performance Metric	2022 Base Year	2050 (Base Network)	2050 (Mobility Plan Projects)	% Change from 2022	% Change 2050 Scenarios
Population Estimate	756,349	913,935		20.8%	
DVMT (veh-miles per day)	20,011,194	23,842,698	24,691,675	23.4%	3.6%
DVHT (veh-hours per day)	511,166	657,086	645,228	26.2%	-1.8%
Daily Avg Speed (mph)	39.1	36.3	38.3	-2.2%	5.5%
Hours of Delay (hours per day)	119,433	188,164	165,644	38.7%	-12.0%
Percent Time Congested	16.3%	18.8%	17.6%	7.9%	-6.4%
VMT at LOS F	5,301,754	9,130,401	8,004,330	51.0%	-12.3%

An explanation of the metrics that were compared are as follows:

- Daily Vehicle Miles Traveled (DVMT) – This is a measure of total amount of vehicular travel on the regional roadway system on an average day. It is computed by multiplying the volume of traffic on a roadway segment by its length.
- Daily Vehicle Hours Traveled (DVHT) – Similar to DVMT, this is the total time spent by vehicles operating on regional roadways on an average day.
- Daily Average Speed – This is computed by dividing DVMT by DVHT and can provide an indication of operating efficiency or overall congestion.
- Hours of Delay – This is a metric computed from post-processing the travel demand model outputs and aggregating travel times where actual speed is less than the free-flow speed.
- Percent Time Congested – Also a metric computed by the model as a function of the overall time per day that vehicles experience poor "Level of Service" conditions indicating congestion.
- VMT at LOS F – This is a measure of the vehicle travel that occurs on roadway segments that are expected to operate at the poorest level-of-service, another indicator of congestion levels.

Therefore, the metrics shown in the above table indicate how efficiently the roadway system within the TPO's planning area operates with the planned project investments. It can be observed however that even with the implementation of all the fiscally constrained projects that the expected increase in travel activity from the higher population and employment will likely result in more delay and congestion in the year 2050 than was present in 2022. Some of the major takeaways are as follows:

- Vehicle Miles Traveled is expected to outpace the growth in population, which can be an indicator of the continued dispersed development patterns of population and employment in the Region leading to longer average trip lengths.
- Delay and Congestion both increase significantly in the future although the project implementation is shown to be very beneficial as metrics such as the VMT on roadways with level-of-service F rating and Hours of Delay are both around 12% less in the "build" versus "no-build" scenario.

The travel demand model was also an important tool used to evaluate each roadway's congestion level in order to help target those that are most congested for potential improvement projects.

It is important to note that the travel demand model is *not able to account for* improvements to the transportation system generated by projects that do not increase roadway capacity (e.g., greenway, sidewalk, transit, or bikeway projects) but these are also critical to achieving efficient mobility in light of constraints both fiscally and environmentally along with other impacts from major roadway construction.

The **Lakeway Area MTPO** study area is included **within** the K**noxville Regional TPO Boundary**, and therefore utilizes the same regional model inputs / outputs.

Knoxville Regional Travel Model 2022 Base Year Update – Development of Traffic Analysis Zone (TAZ) Socioeconomic Data and Roadway Network

Final

9/30/2024

Contents

List of Tables and Figures

I. Introduction

The purpose of this document is to provide details of the development of the updated base year socioeconomic data and transportation (roadway) network to represent year 2022 conditions for the Knoxville Regional Travel Demand Forecasting Model (KRTM). This update effort is being undertaken to support the regular 4-year update of the Metropolitan Transportation Plan (MTP) for the Knoxville Regional TPO Planning Area, known as Mobility Plan 2050. These elements are both integral to meeting federal transportation planning regulations (23 CFR 450.324) that state, in part – "In updating the transportation plan, the MPO shall base the update on the latest available estimates and assumptions for population, land use, etc.".

The remainder of this document is organized into two main sections - one covering the development of population, demographics and employment (collectively known as 'socioeconomic characteristics') for the base year (2022) Traffic Analysis Zone system (TAZ) as well as establishing future-year county level control totals for population and employment; and the other section covering the travel demand forecasting model 2022 base year roadway network update.

II. Socioeconomic Data

With each update of the MTP, it is important to establish an updated base year in which all necessary data is available for the attributes required to run the KRTM. This process also involves the formal establishment of future-year control totals of the key variables of population and employment through a review of previous forecasts to ensure that they are: (1) still valid and relevant and (2) if they need to be extended further into the future to match the MTP's updated horizon year. In the case of the Mobility Plan2050, it was determined that 2022 should be the base year since that was the most recent year with full data availability when the MTP development started in late 2023 and the population/employment forecast would need to be extended from the latest year available of 2045 in the previous MTP out to 2050. The year 2050 was chosen in order to cover the minimum required 20-year horizon beyond the adoption date of the new MTP in 2025.

BACKGROUND ON KRTM AND TAZ ATTRIBUTES

In order to project future conditions of the roadway system the TPO uses a computer-modeling tool known as a travel demand forecasting model. The Knoxville Regional Travel Demand Model (KRTM) is calibrated to closely replicate existing traffic patterns in the Knoxville Region to provide a means of forecasting future traffic volumes and resulting areas of potential congestion. It is also used to support the air quality conformity analysis that is required for the Knoxville Region since it is an air quality Maintenance Area for both Ozone and PM2.5. The model covers the primary roadway network in a 10-county area that includes Anderson, Blount, Grainger, Hamblen, Jefferson, Knox, Loudon, Roane, Sevier, and Union counties. To develop the model, mathematical relationships between travel activity and household socioeconomic characteristics were derived from extensive travel behavior surveys that were conducted in the years 2000 and 2008. In these surveys, approximately 3,000 households in the Knoxville Region were asked to record their travels in a one-day period including:

- Purpose of the trip
- Origin and destination of each trip
- Mode of transportation used
- Time of day trip was made

The model was developed based on the assumption that households with similar socio-economic characteristics such as household income, number of school-age children, and vehicle ownership would demonstrate similar travel activity. These household characteristics are available primarily from the U.S. Census Bureau and are input into the model based on their distribution across TAZs the Knoxville Region.

The current model has its origins back to 2012 when an update was completed to calibrate and validate the model using 2010 Decennial Census data. Since that time three minor updates have been completed – one for the prior Mobility Plan 2040 and Mobility Plan 2045 and one now for Mobility Plan 2050. In those minor updates the model has been validated against new base years of available data – 2014, 2018 and 2022 respectively. A major model update is being planned for the next Mobility Plan following this one since a major new household travel behavior survey is anticipated to be conducted in Spring 2025 and will not be available prior to this Plan adoption.

Table 1 on the following page provides an explanation of the data fields in the TAZ geographic file:

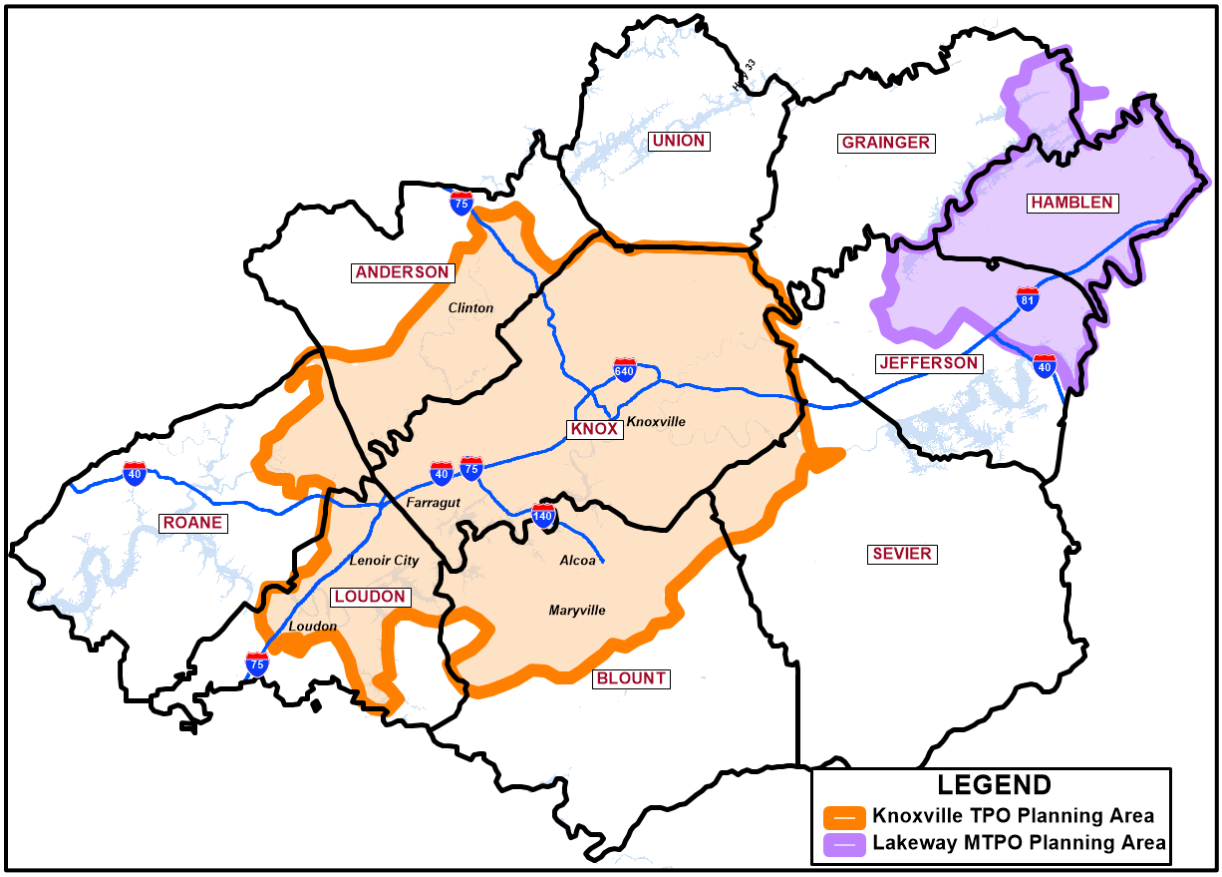
Table 1 – TAZ Attributes

Field Name	Description
TAZID	Unique ID
Area	Area of TAZ in sq. miles
CO_NAME	County Name
TOTPOP	Total Population
HHPOP	Population in Households
GQPOP	Population in Group Quarters
HH	Number of Households
AVGHHSIZE	Average Household Size
AVG_MEDHHINC	Average Median HH Income
WRKR_PER_HH	Workers per Household
STD_PER_HH	Students per Household
PCT_HH_W_SR	Percent of HH with Senior (65+)
Enroll_K12	K-12 School Enrollment
Univ_Stdnts	UT Student Residence Location
UNIV_ENROLL	College/University Enrollment
Basic Emp	Basic Employment
Industrial Emp	Industrial/Manufacturing Employment
Retail Emp	Retail Employment
Service Emp	Service Employment
Total Emp	Total Employment

POPULATION

The amount of travel activity in the Knoxville Region is directly related to the number of people living here, which is why it is important to establish the base year and future year population totals as a first step in each major update of the MTP. The official Planning Area boundaries of the Knoxville Regional TPO include portions of six counties including Anderson, Blount, Knox, Loudon, Roane and Sevier. Additionally, the TPO's travel demand model includes four other counties of: Grainger, Hamblen, Jefferson and Union for which population data is required. The travel demand model is also used to support the MTP update for the separate Lakeway Area Metropolitan Transportation Planning Organization (LAMTPO) which includes all of Hamblen County and a large portion of Jefferson County plus a small part of Grainger County. The entire study area along with the planning area boundaries of the Knoxville Regional TPO and LAMTPO are shown in Figure 1.

Figure 1 - Travel Demand Model Study Area



The population totals for each of the ten counties were obtained for the base year 2022 from the U.S. Census "Population Estimates Program" which are released on an annual basis and represent the estimated county-level population as of July 1 for the reference year. The future year 2050 population forecast for each county were selected through a process of reviewing two primary sources of population projection data – "2018 – 2070 Projections" from the University of Tennessee (UT) Center for Business & Economic Research (CBER) and "2023 Regional Projections" from Woods & Poole, Inc. (W&P). Following the review of the two sources, the TPO staff recommended using the W&P source for the population forecasts as it is similar to CBER's forecast for population changes and it also provides projections for several other needed socioeconomic variables. The TPO Executive Board endorsed the staff recommendation of W&P as the source for future year county-level population forecasts at its April 24, 2024 meeting. Table 2 provides the 10-county population totals for the base year 2022 and future years of 2030, 2040 and 2050 to support the Mobility Plan 2050 development and travel demand model.

Table 2 – Population Forecasts

County, Population	2022[1]	2030[2]	2040[2]	2050[2]
Anderson	78,913	81,214	83,170	84,591
Blount	139,958	150,620	163,105	175,416
Grainger	24,277	25,115	26,202	27,337
Hamblen	65,168	67,885	70,579	72,878
Jefferson	56,727	60,473	64,714	68,779
Knox	494,574	525,477	559,996	592,702
Loudon	58,181	63,414	69,770	76,239
Roane	55,082	56,264	57,079	57,511
Sevier	98,789	108,778	121,217	134,155
Union	20,452	21,166	22,094	23,062
Total	**1,092,121**	**1,160,406**	**1,237,926**	**1,312,670**

1 - From Census Annual County Population Estimates data series, 2022 vintage (as of July 1, 2022)

2 - From Woods & Poole Economics, 2023 Regional Projections and Database

The population forecasts for the Mobility Plan 2050 update are representative of a few competing recent trends affecting population change such as the continuation of overall declining birth rates and a recent increase in mortality likely due to the COVID-19 pandemic leading to reduced population, but these effects are balanced by the relatively high amount of net positive in-migration to the State of Tennessee and Knoxville Region leading to overall positive expected population growth.

In terms of disaggregating the county-level population control totals shown in the table above to the KRTM TAZ-level, the TPO staff utilized a product from the company Applied Geographic Solutions (AGS) known as the "Estimates and Projections" database which provided all variables needed for the 2022 base year at the smallest census geography of Census Blocks. The AGS data specifically corrects for new Census privacy and disclosure proofing that creates intentional errors at small geographic scales. AGS has several blog posts such as this **one** regarding implausible Census data that can show phenomena like "ghost communities" where there are Census Blocks showing occupied dwellings with zero population. The full AGS methodology is available at their website **here**.

EMPLOYMENT

In addition to population, another important variable influencing travel, and in particular the specific areas where travel occurs, is the amount of employment in the Knoxville Region. The locations of employment (jobs) represent trip attractions for both the basic need of the worker to be at their place of work as well

as locations where commerce or other necessary daily activities such as grocery shopping or attending medical appointments occur. The TPO travel demand model categorizes employment into four major types of: Basic (farming, construction), Industrial (manufacturing, wholesale trade), Service (professional, educational services) and Retail (shopping, accommodation, food services) since each type exhibits significantly different characteristics in the type of trips generated. For example, retail employment tends to attract trips from workers as well as patrons whereas industrial employment will attract primarily worker trips as well as commercial vehicle (truck) trips to distribute finished or unfinished goods.

Unlike population, there is not necessarily a definitive source of the amount of employment in each county that is enumerated as with the decennial Census. Two primary sources of employment data come from the Bureau of Economic Analysis (BEA) and the Bureau of Labor Statistics (BLS). In general, the BEA estimate of employment produces a significantly higher number of jobs than the BLS estimate for the same county. The BLS employment estimates are lower in part because agricultural workers, the military, sole proprietors and other miscellaneous workers are excluded. The manner in which proprietorship employment is treated appears to account for the largest difference in terms of the BEA versus BLS estimates for the Knoxville Region since there are no large military bases or significant amount of farm employment. For example, the BEA (and W&P) employment estimates will double-count a person who has a full-time salary job and in their "spare" time (nights/weekends) runs a small business (proprietorship) from their home.

After reviewing the data sources, the TPO staff developed a modified estimate of total county-level employment utilizing a combination of the BEA and BLS estimates at the 2-digit NAICS code level (see Appendix A for documentation of the factors that were applied to each category). The county-level totals derived using this combination compared favorably with the summation of individual establishment-level employment data that was obtained through the Tennessee Department of Transportation (TDOT) from the company known as InfoGroup that is described further in Appendix A. Since the base year 2022 employment derived by this method is lower than the W&P employment that is used to provide future-year employment projections, the TPO staff applied a growth factor from W&P to each of the future analysis years out to 2050 as shown in Table 3. Additionally, Table 4 shows the effects of the differing growth rates of employment by the major sectors previously documented of: Basic, Industrial, Retail and Service that continue the historical trends towards fewer manufacturing and similar job categories compared with more jobs in the retail and service sectors.

Table 3 - Employment Forecasts

County, Employment	2022[1]	2030[2]	2040[2]	2050[2]
Anderson	49,750	51,281	53,413	54,834
Blount	66,473	75,592	87,766	101,240
Grainger	6,760	7,029	7,450	7,834
Hamblen	38,475	40,477	42,718	44,869
Jefferson	19,139	20,727	23,005	25,356
Knox	306,232	339,499	381,864	424,343
Loudon	22,555	24,118	26,987	30,001
Roane	24,296	25,820	27,538	28,913
Sevier	62,834	72,500	85,817	100,899
Union	4,477	5,035	5,719	6,502
Total	**600,989**	**662,078**	**742,277**	**824,791**

1 - Developed from an adjustment of Bureau of Economic Analysis (BEA) and Bureau of Labor Statistics (BLS) employment data

2 - From Woods & Poole Economics, 2023 Regional Projections and Database - used percent growth to generate projection factor for 2022 base year

Table 4 - Employment Forecast by Sector

Employment Sector	2022	2030	2040	2050	Growth% (2022-2050)
Basic	51,347	50,159	50,913	51,710	2.4%
Industrial	102,896	102,045	104,316	106,294	4.6%
Retail	138,946	152,873	169,362	186,009	32.2%
Service	307,800	357,001	417,686	480,778	53.0%
Total	**600,989**	**662,078**	**742,277**	**824,791**	**35.9%**

SCHOOL ENROLLMENT

Updated school enrollment data for 2022 for both public and private schools throughout the 10-county travel demand model study area was obtained through the National Center for Education Statistics (NCES). The base year 2022 enrollment data was compared against the year 2022 estimated school-age (5-17) population count from the W&P data source and found to be in very good agreement. Therefore, the growth rate from the projected W&P data was applied to 2022 base year enrollment in order to develop the future-year projections at the county level as shown in Table 5:

Table 5 - School (K-12) Enrollment Forecasts

County, K-12 Enrollment	2022[1]	2030[2]	2040[2]	2050[2]
Anderson	12,303	11,838	11,718	11,751
Blount	19,008	19,826	20,454	22,302
Grainger	3,112	2,862	3,013	3,189
Hamblen	10,620	10,179	10,034	10,521
Jefferson	7,550	7,254	7,814	8,611
Knox	69,922	72,992	79,374	84,953
Loudon	7,394	7,086	7,467	8,249
Roane	7,805	7,353	7,366	7,435
Sevier	14,931	15,450	17,420	19,911
Union	2,869	2,576	2,676	2,794
Total	**155,514**	**156,347**	**167,243**	**179,716**

1 – National Center for Educational Statistics

2 - Growth rates applied from Woods & Poole Economics, 2023 Regional Projections and Database

DEMOGRAPHIC VARIABLES

The regional travel demand model utilizes average socioeconomic and other demographic variables to inform some travel behavior characteristics that differentiate one household type from another. The key variables used in the model that have been found to have statistically significant effects on trip making either directly or indirectly are: Median Household Income, Percent Households with Seniors (age > 65), Workers per Household and Students per Household. These variables were all updated utilizing the AGS product described previously in addition to the most current 5-year American Community Survey (ACS) data from 2018-2022, which is available at the Block Group level. Note, the Vehicles per Household variable is derived from a vehicle ownership model.

These types of demographic variables can be extremely challenging to forecast for out-years of the planning horizon at the sub-county level and most are used in terms of percentages and ratios, so they do not represent a specific number. Based on that fact, and In keeping with past practice, these variables with the exception of Percent Households with Seniors and Students per Household are left constant for all forecast years except in cases where it is known that a TAZ is experiencing major new greenfield developments or gentrification that are expected to significantly change existing TAZ characteristics. In these cases, the attributes from a similar existing TAZ are borrowed. In terms of the Senior Households variable, there is a known “aging of the population” phenomenon that is also exhibited in the W&P forecasts of the Senior population and its percentage of total county population. Table 6 shows the

county-by-county rates of increase of Senior population and these are applied as factors uniformly across the TAZs in each specific county. Similarly, along with overall aging population it would be expected that the number of students per household would decrease. Table 7 shows the county-by-county rates of change for Students per Household.

Table 6 – Senior Population (Age 65 years and older) Percentage of Total Population Forecast

County, % Senior Population	2022	2030	2040	2050
Anderson	21.9%	25.9%	28.3%	29.8%
Blount	22.1%	26.1%	28.1%	27.4%
Grainger	22.6%	26.2%	28.5%	26.9%
Hamblen	19.3%	22.4%	25.0%	25.4%
Jefferson	22.1%	26.3%	28.5%	26.9%
Knox	17.0%	19.4%	19.8%	19.6%
Loudon	28.7%	32.9%	35.5%	35.7%
Roane	25.1%	29.2%	31.2%	30.8%
Sevier	21.7%	25.5%	26.8%	25.2%
Union	20.1%	24.7%	26.5%	25.3%

Table 7 - Students per Household Forecast

County, Students per HH	2022	2030	2040	2050
Anderson	0.36	0.33	0.32	0.32
Blount	0.35	0.31	0.31	0.32
Grainger	0.33	0.29	0.29	0.30
Hamblen	0.41	0.37	0.36	0.37
Jefferson	0.35	0.31	0.32	0.33
Knox	0.36	0.34	0.35	0.36
Loudon	0.33	0.29	0.28	0.28
Roane	0.31	0.28	0.27	0.28
Sevier	0.35	0.32	0.33	0.34
Union	0.38	0.32	0.32	0.32

TAZ ALLOCATION

To this point the focus has been on the county-level basis for the needed variables, which are termed as the “Control Totals” when considering the forecasted values. The KRTM needs inputs of these variables to be allocated to much smaller levels of geography known as Traffic Analysis Zones (TAZ). There are

tradeoffs between the size of TAZ and the amount of confidence one can have in allocating future growth and the overall level of detail in the model. In general, the amount of TAZs is directly proportional to the level of detail of the roadway network as roadways generally form the boundaries of a TAZ. In a previous minor update of the KRTM, the number of TAZs was increased from 1,153 to 1,173 with the addition of greater roadway network detail in the LAMTPO Region of Hamblen and Jefferson counties. Knox County has the greatest number of TAZs at 508.

To allocate the future growth of population and employment from the county control total amounts to the smaller TAZs, the TPO staff consulted with planning staffs and stakeholders from each jurisdiction within the TPO and LAMTPO area. Information on locations of proposed developments and other likely development areas of the various jurisdictions was obtained to inform the allocation and then subsequently reviewed with stakeholders to determine the overall reasonableness. This exercise is inherently challenging due to the unforeseen things that can influence development patterns, but should provide a "best guess" that represents current knowledge and can be updated as needed to account for major changes with each subsequent Mobility Plan 4-year update cycle. Table 8 shows the amount of total population and employment increase for each county between 2022 and 2050 that must be allocated to the TAZs and Appendix D includes maps showing the general distribution of population and employment growth:

Table 8 - Population and Employment Allocation by County

2022- 2050 Allocation	Population	Employment
Anderson	5,678	5,084
Blount	35,458	34,767
Grainger	3,060	1,074
Hamblen	7,710	6,394
Jefferson	12,052	6,217
Knox	98,128	118,111
Loudon	18,058	7,447
Roane	2,429	4,618
Sevier	35,366	38,066
Union	2,610	2,026
Total	**220,549**	**223,802**

III. Model Roadway Network Data

ROADWAY NETWORK BACKGROUND

As previously mentioned, the KRTM is a mathematical representation of reality and its backbone in terms of inputs are the roadway network attributes and the socioeconomic characteristics at the Traffic Analysis Zone (TAZ) level.

The roadway network is represented in a Geographic Information System (GIS) as a system of links and nodes. Each link in the model represents a segment of roadway that is described by several attributes, including:

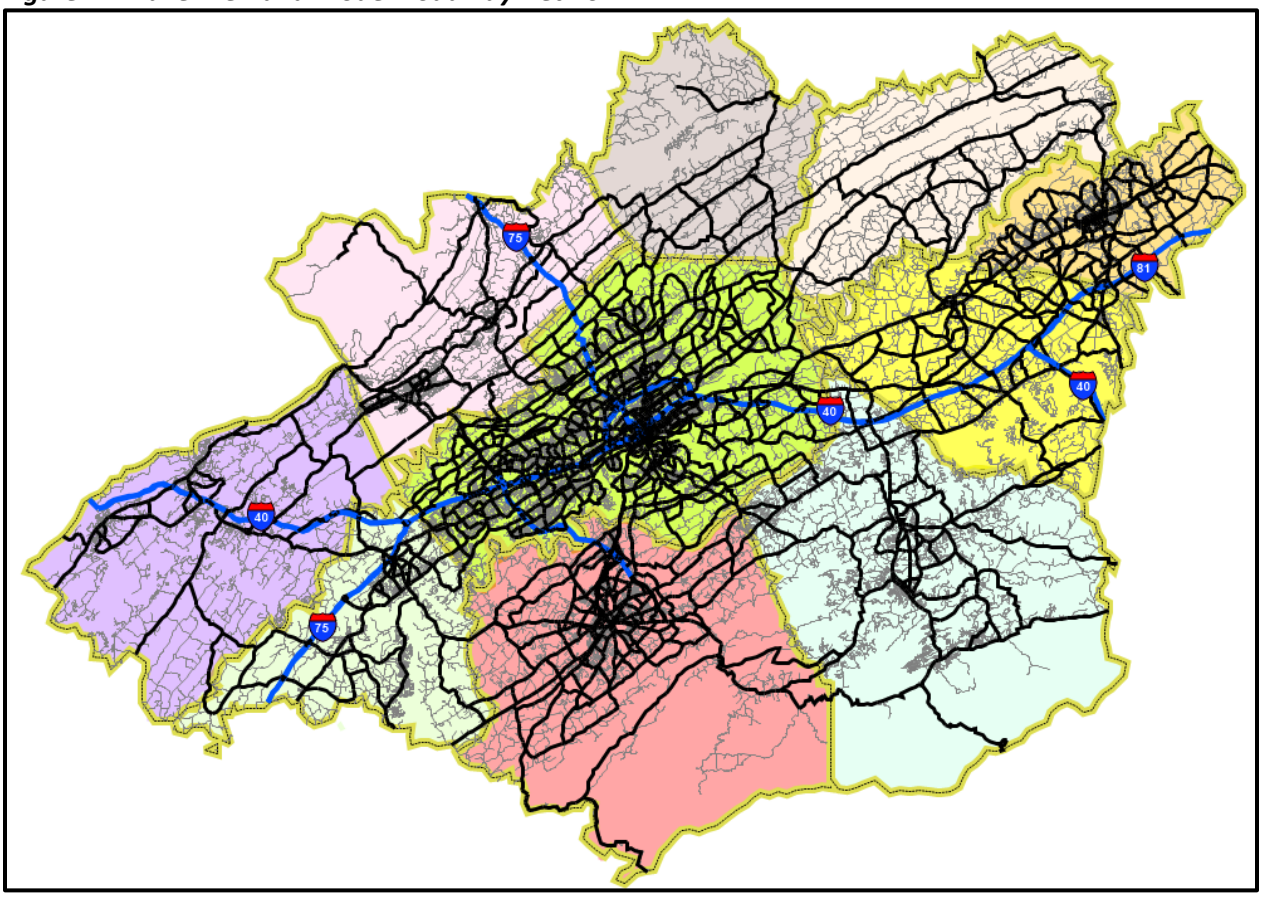
- Functional classification
- Speed limit
- Number of lanes
- Pavement width
- Level of access control
- Whether it is divided by a median

The Nodes represent intersections, locations of traffic signals, and places where roadway characteristics might change in the middle of a segment (such as where a road narrows). Roadway attributes are used to determine the vehicular capacity and travel time along each link in the model network. The model can therefore be used to test alternative improvement strategies by changing appropriate attributes such as increasing the number of lanes or by coding in a new link to represent construction of a new roadway.

In addition to the roadway attributes several other reference fields are coded into the roadway network including the actual traffic counts where available. Traffic counts are conducted on an annual basis by both TDOT and the Knoxville TPO and are important in being able to validate and ground-truth the model to ensure it is accurately replicating actual traffic patterns. More information on model validation is provided in a separate report, but an important aspect that was discovered in compiling count data is the potentially implausible Interstate count volumes for the base year of 2022. Appendix C provides details on the issues discovered and the updates that were made to correct for this.

The model primarily includes major roadways, i.e. ones that are functionally classified as Collector and higher since those are the facilities for which performance is of utmost importance. In total there are just over 3,250 centerline miles of roadways included in the KRTM network for the entire 10-county study area. Figure 2 illustrates the model network in the dark black lines plus the Interstate system which is shown in blue. The "non-modeled" network is shown in the light gray lines. In general, greater network detail is provided within the core Knoxville TPO and Lakeway MTPO planning regions as compared with the other, more rural areas of the model study area.

Figure 2 - Travel Demand Model Roadway Network



EXISTING PLUS COMMITTED ROADWAY NETWORK

The primary purpose of the model is to forecast needs and deficiencies for the roadway network in the future assuming that population and economic activity continue to grow, but no improvement projects are undertaken beyond what is known as the "Existing plus Committed" or E+C network. The model roadway network was first updated to account for changes that have happened since the prior base year of 2018 to the new 2022 base year that was used in the validation process– this is known as the "Existing"

network. The primary changes since 2018 resulted from roadway projects that were completed. Table 9 is a listing of major capacity-addition projects that were completed between 2018 and 2022.

Table 9 - Major Roadway Projects Completed between 2018 and 2022

Project Name	KRMP ID	Termini	Length (miles)	Project Description	Status
Alcoa Hwy (SR-115/US-129)	09-627	Maloney Rd to Woodson Dr	1.4	Widen 4-lane to 6-lane	Completed in 2022
Alcoa Hwy (SR-115/US-129)	09-208	Hall Rd (SR-35) to proposed interchange at Tyson Blvd	1.3	Widen from 4-lane divided to a 6-lane divided highway. Extend Tyson Boulevard under SR-115 and reconstruct Hunt Rd overpass	Completed in 2022
Chapman Hwy (US-441/SR-71)	09-626b	Evans Rd to Burnett Ln	0.9	Add center turn lane	Completed in 2021
Chapman Hwy (US-441/SR-71)	09-508	Boyds Creek Hwy (SR-338) to Macon Ln	1.2	Add center turn lane	Completed in 2022
Concord Rd (SR-332)	09-632	Turkey Creek Rd to Northshore Dr (SR-332)	0.8	Widen from 2 to 4/5 lanes	Completed in 2021
I-275 Industrial Park Access	09-618	W. Fifth Ave to Baxter Ave	0.5	Blackstock Ave: extend from Fifth Ave. to Bernard Ave.; Marion St: realign	Completed in 2022
I-640 at Broadway Interchange	09-611	I-640 at Broadway	0	Reconstruct and Relocate Ramps	Completed in 2021
Pellissippi Pkwy (SR-162/I-140) and Dutchtown Rd Interchange	09-623	I-40 to Dutchtown Rd Interchange	0.4	Widen Pellissippi Pkwy from 1 to 2 lanes westbound and lengthen storage of westbound off-ramp at Dutchtown Road interchange	Completed in 2021
Pellissippi Pkwy/Hardin Valley Interchange	09-634	Interchange at Hardin Valley Rd	0	Reconfigure existing interchange to improve safety and operations. Add new northbound on-ramp in NE quadrant	Completed in 2022
Robert C. Jackson Drive Extension	09-238	Lamar Alexander Pkwy (US-321/SR-73) to Morganton Rd	1.2	Construct new 2-lane roadway with sidewalks	Completed in 2021

Project Name	KRMP ID	Termini	Length (miles)	Project Description	Status
US 129 Widening	17-204	Mall Rd to Lamar Alexander Pkwy (US-321/SR-73)	0.7	Intersection improvements at W. Lamar Alexander Pkwy (US-321/SR-73) and addition of turn lanes	Completed in 2020
US 129 Widening	17-203	Foothills Mall Dr to Mall Rd	0.3	Intersection improvements at Foothills Mall Dr/Montgomery Ln and addition of turn lanes	Completed in 2022
US-321 (SR-73) Widening	09-423	E. Simpson Rd to north of SR-2 (US-11) in Lenoir City	1.4	Widen from 4 to 6 lanes	Completed in 2021
Western Ave (SR-62) Widening	09-610	Texas Ave to Major Ave	0.8	Widen from 2 to 5 lanes	Completed in 2020
US 411 Widening Jefferson County	N/A	SR-92 to Grapevine Hollow Rd	2.6	Widen 2-4 lane and new 4-lane	Completed 2022
SR-66 Relocated	N/A	North of I-81 to SR-160	5.7	Widen 2-4 lane and new 4-lane	Completed in 2020
Tesla Blvd	13-201	Associates Blvd to Hunt Rd (SR-335)	1.2	Construct new 4-lane	Completed in 2018
Marconi Blvd	13-206	Tesla Blvd to Springbrook Rd	0.8	Construct new 2-lane and 3-lane	Completed in 2022

In addition to the projects that were completed by 2022, other projects are considered to be "Committed" since it is reasonably certain that these will occur based on current expectations. The specific definition of a "Committed Project" for the purposes of Mobility Plan 2050 is that the project must either be currently under construction or is very likely to go to construction by July 2025 (when the new Mobility Plan takes effect). There is one minor exception to this rule that was made for two phases of Alcoa Highway (US-129/SR-115) which are not currently programmed for construction, but are assumed to be committed since all other segments of Alcoa Highway are either currently under construction or programmed for construction by FY 2026. The E+C projects form the baseline network with which subsequent roadway deficiency analyses and the Congestion Management Process analysis is undertaken with; however, it should be noted that this network does not necessarily represent the first air quality conformity horizon year (2026) since some projects such as a few Alcoa Highway segments are not

projected to be open to traffic by that year given their large magnitude and length of time it will take for construction to be completed. Table 10 provides a listing of the Committed projects and their status (either under construction or funded for construction) as of May 2024:

Table 10 - Committed Project List

Project Name	KRMP ID	Termini	Length (miles)	Project Description	Status as of May 2024
Alcoa Hwy (SR-115/US-129) Widening	09-216	Pellissippi Pkwy (SR-162) to Little River (Knox/Blount C.L.)	3.2	Widen 4-lane to 6-lane with frontage road system and new interchange at Topside Rd (SR-333). Reconfigure existing interchange at Pellissippi Pkwy (SR-162) and signalize ramps	In ROW, No Construction Funds yet but Consider entire Alcoa Hwy corridor as committed at this point
Alcoa Hwy (SR-115/US-129) Widening	09-628	North of Little River (Knox/Blount C.L.) to Maloney Rd	2.4	Widen from 4 to 6 lanes including pedestrian and bicycle facilities.	Under Construction, Completion target of mid-2025
Alcoa Hwy (SR-115/US-129) Widening	09-653	Woodson Dr. to Cherokee Trail interchange	1.3	Widen 4-lane to 6-lane including pedestrian and bicycle facilities.	Under Construction, Completion target of late-2027
Relocated Alcoa Hwy (SR-115/US-129)	09-257 / 09-258	Proposed interchange at Tyson Blvd. to Pellissippi Pkwy (SR-162)	2.9	Construct new 4-lane divided highway with auxiliary lanes and new interchanges	Stage 1 Under Construction, Completion target of late-2027; Stage 2 construction start in 2028
Chapman Hwy (US-441/SR-71)	09-626d	Hendron Chapel Rd to Simpson Rd	0.9	Add center turn lane	Under Construction, Completion target of mid-2025
Foothills Mall Drive Extension to Foch Street	13-211	US-129 Bypass (SR-115) to Foch St.	0.5	Construct new 2-lane road with center turn lane and sidewalks	Construction Complete in 2023

Project Name	KRMP ID	Termini	Length (miles)	Project Description	Status as of May 2024
Schaad Rd Extension	09-605	Middlebrook Pk (SR-169) to W of Oak Ridge Hwy (SR-62)	4.6	Construct new 4-lane roadway with sidewalks	Under Construction, Completion target of late-2024
Pleasant Ridge Rd	09-616	Knoxville City Limits to Merchant Dr	1.6	Improve 2-lane with turn lanes at major intersections	Construction beginning late 2024
Maynardville Hwy (SR-33)	N/A – Union County	Knox County line to SR-144	5.3	Widen 2-lanes to 4-lanes	Under Construction, Completion target of Fall 2026
Jake Thomas Rd	N/A – Sevier County	Teaster Ln to Veterans Blvd (SR-449)	1.9	New 4-lane with Center Turn Lane	Construction Complete in 2024
US 411 Widening and Realignment	N/A – Jefferson & Sevier	SR-92 to Sims Rd	3.5	Widen 2-4 lane and new 4-lane	Under Construction, Completion target 2026
State Route 34 (US 11E)	N/A – Hamblen County	US 25E to E Morris Blvd	3.4	Two 12-foot travel lanes in each direction and Continuous center turn lane	Construction beginning late 2024

Appendix A: Employment Data Development

The TPO staff undertook a comprehensive review of available employment data sources in order to develop the base year 2022 Countywide and TAZ-level estimates of place of work employment by the four major categories of: Basic, Industrial, Service and Retail. This Appendix describes first the process to arrive at a County-level control total of employment by major category and secondly, the allocation of employees at the TAZ-level.

COUNTY-LEVEL CONTROL TOTAL DEVELOPMENT

As noted in the main section of this document, there is no official "census" of employment as there is with population but there are various governmental and proprietary data sources available with which to derive estimates. It is important to note that in the context of the travel demand model, employment is specifically at the place of work, i.e. not the number of workers at the residence location. In other words, the model uses number of jobs, and accounts for the fact that persons can have more than one job.

The two primary governmental sources for counts of workers available at the county scale are the Bureau of Economic Analysis (BEA) and the Bureau of Labor Statistics (BLS). The TPO purchased socioeconomic projection data from Woods & Poole Economics, inc (W&P) as noted earlier in this document and it bases employment estimates on the BEA data source. It provides estimates of employment at the 2-digit summation level of the North American Industry Classification System (NAICS). The W&P technical documentation states the following (emphasis added):

> The employment data in the Woods & Poole database are a complete measure of the number of full- and part-time jobs by place of work. Historical data, 1969-2021, are from the U.S. Department of Commerce, Bureau of Economic Analysis, released in November 2022. The employment data include wage and salary workers, proprietors, private household employees, and miscellaneous workers. Wage and salary employment data are based on an establishment survey in which employers are asked the number of full- and part-time workers at a given establishment. Because part-time workers are included, a person holding two part-time jobs would be counted twice. Also, since the wage and salary employment data are based on an establishment survey, jobs are counted by place of work and not place of residence of the worker. **The employment data used by Woods & Poole comprise the most complete definition of the number of jobs by county. Woods & Poole data may be higher than that from other sources because they measure more kinds of employment.**

In contrast, the BLS data show much fewer jobs than BEA mainly due to the fact that some job categories are omitted from BLS such as agricultural workers, the military, proprietors, households and

miscellaneous employment The exclusion of sole proprietorships appears to be the most significant difference according to the W&P documentation. At the same time, based on TPO staff experience, the BEA estimate of total jobs seems to be too high and likely due to an overcounting of sole proprietorship employees. It is not certain as to the specific reasons for the overcounting although it may be likely that some self-employed individuals establish multiple "doing business as" names that each get counted but do not function as separate employers.

At the 10-County KRTM level there is a significant difference between the employment estimates from W&P (BEA) and BLS as shown below:

	Year 2022 Total Employment		
	W&P(BEA)	**BLS**	**Difference**
10-County KRTM Region	**666,585**	**496,274**	**170,311**

Guidance provided by the TPO's travel demand model development consultant; Vince Bernardin with Caliper Corporation, was obtained to develop a modified total employment estimate to reconcile between the two sources. The table on the following page shows the rationale for development of an in-between estimate to be used as county-level control totals from the W&P data.

10-County Knoxville TPO Travel Demand Model Area

2022 Employment Total Comparison between Woods&Poole (BEA) and BLS

		Year 2022 Total Employment				
2-Digit NAICS	Employment Category Description	W&P(BEA)	BLS	Final Estimate	Source	Rationale
N/A	Farm Employment (BEA only)	7,515		7,515	BEA	only one estimate available
11	FORESTRY, FISHING, RELATED ACTIVITIES	1,124	1,048	1,124	BEA	reasonable proprietorships
21	MINING	1,108	436	772	average	BEA too high
22	UTILITIES	454	3,196	3,196	BLS	Keep public utilities employees under utilities
23	CONSTRUCTION	38,738	24,701	38,738	BEA	expected to have significant proprietorships
31	MANUFACTURING	56,759	59,588	58,174	average	unknown reason for difference between BEA & BLS
42	WHOLESALE TRADE	20,157	18,453	19,305	average	proprietorships expected to be low
44	RETAIL TRADE	73,450	62,867	73,450	BEA	reasonable proprietorships
48	TRANSPORTATION and WAREHOUSING	25,412	20,267	25,412	BEA	reasonable proprietorships
51	INFORMATION	7,661	6,356	7,661	BEA	reasonable proprietorships
52	FINANCE and INSURANCE	29,153	14,395	21,774	average	BEA too high
53	REAL ESTATE and RENTAL and LEASE	31,321	7,056	10,584	1.5*BLS	known issue with BEA estimates
54	PROFESSIONAL and TECHNICAL SERVICES	45,179	29,958	37,569	average	proprietorships expected to be lower than BEA
55	MANAGEMENT of COMPANIES and ENTERPRISES	9,937	8,276	9,107	average	proprietorships expected to be lower than BEA
56	ADMINISTRATIVE and WASTE SERVICES	51,531	34,256	42,894	average	proprietorships expected to be lower than BEA
61	EDUCATIONAL SERVICES	10,820	36,242	36,242	BLS	keep public educators under education
62	HEALTH CARE and SOCIAL ASSISTANCE	66,780	59,493	66,780	BEA	reasonable proprietorships, non-profits
71	ARTS, ENTERTAINMENT, and RECREATION	17,842	10,625	14,234	average	BEA too high
72	ACCOMMODATION and FOOD SERVICES	65,496	60,435	65,496	BEA	reasonable proprietorships
81	OTHER SERVICES, EXCEPT PUBLIC ADMINISTRATION	36,865	13,216	19,824	1.5*BLS	BEA seems very high
92	GOVERNMENT	69,283	17,895	41,119	BEA	Subtracted Utilities and Educators
	TOTAL	**666,585**	**496,274**	**600,968**		

Summary by 4 Major Categories used by KRTM

Basic	48,939	29,381	51,345	higher because of public utilities and proprietorships
Industrial	102,328	98,308	102,891	essentially same as BEA
Retail	138,946	123,302	138,946	BEA
Service	376,372	237,768	307,786	essentially split the difference between BEA and BLS
TOTAL	**666,585**	**496,274**	**600,968**	

TAZ-LEVEL EMPLOYMENT ALLOCATION

The primary data source used to allocate employment by each of the four major categories to the KRTM Traffic Analysis Zones (TAZ) is the proprietary establishment-level data acquired by the Tennessee Department of Transportation known as InfoGroup data, which has recently rebranded as "Data Axle". The InfoGroup data is a comprehensive business database that contains several data attributes and most importantly an estimate of the number of employees at each business location which has been geocoded to its actual location where possible.

Since it is a national data provider it is important to perform quality control checks on the database and compare it against other data sources and local knowledge. The TPO staff spent significant time in reviewing the data and made several adjustments to improve its accuracy and completeness. The main quality control (QC) process involved reviewing the locations of highest employment such as hospitals, universities and major industries to ensure the proper employment category, number of employees and locations were accurate when comparing against other available data sources. An important data field in the InfoGroup database is the "match level code" which indicates the quality of its geocoding. The geocoding quality can range from exact match to the centroid of the zip code where it is located. Since the TAZs are a relatively small geographic unit it is extremely important to ensure that major employers are geocoded as closely as possible to their actual location.

After completion of the QC process the InfoGroup data was aggregated by employment category to each TAZ and the county totals were compared against the control totals discussed in the previous section of this Appendix. It was noted that the aggregation of the InfoGroup data at the county level compared very well with the "modified" control total as opposed to the original W&P (BEA) estimates which seems to further confirm that the BEA numbers are probably overstated. As a final step, the TAZ employment was factored up proportionally in order to exactly match the county-level control total. In most cases the only factoring needed was for the "Basic" employment category, which is to be expected due to the transient nature of some of these employees such as in the construction trades.

The tables on the following page show the original BEA county-level employment compared against the "modified" employment control totals and the aggregated InfoGroup totals for the four primary counties included in the TPO Planning Area of: Anderson, Blount, Knox and Loudon:

Anderson County	Original Woods & Poole (BEA)	Modified Employment Control Total	InfoGroup
Basic	3,068	3,358	2,802
Industrial	14,628	15,639	15,639
Retail	7,914	7,914	7,914
Service	27,126	22,839	22,839
Total	**52,736**	**49,750**	**49,194**

Blount County	Original Woods & Poole (BEA)	Modified Employment Control Total	InfoGroup
Basic	6,357	6,333	4,487
Industrial	13,919	13,980	13,980
Retail	14,415	14,415	14,415
Service	40,256	31,745	31,745
Total	**74,947**	**66,473**	**64,627**

Knox County	Original Woods & Poole (BEA)	Modified Employment Control Total	InfoGroup
Basic	21,370	22,676	19,848
Industrial	41,997	41,671	41,671
Retail	65,660	65,660	65,660
Service	211,418	176,225	176,225
Total	**340,445**	**306,232**	**303,404**

Loudon County	Original Woods & Poole (BEA)	Modified Employment Control Total	InfoGroup
Basic	2,979	3,262	1,766
Industrial	5,764	5,704	5,689
Retail	5,133	5,133	4,539
Service	11,863	8,456	8,312
Total	**25,739**	**22,555**	**20,306**

Appendix B: Master Network Attribute Fields

Field	Description	Codes/Units:	Files:	Maintained by:	Used for:
ID	TransCAD ID		Input & Output	TransCAD	Various
Length	Length	miles	Input & Output	TransCAD	Various
Dir	Directionality	0: two-way 1: one-way (A to B) -1: one-way (B to A)	Input & Output	TransCAD	Various
BusTime	Bus Travel Time	Minutes	Input & Output	User	Tour Mode Choice
STCO	State County Number		Input & Output		Post_Alt
FC_HPMS	Functional Classification			User	Reference
County	County Name			User	Reference
Lampto	Lakeway MTPO network link			User	Reference
PM25_Flag	Link within the PM2.5 Maintenance Area	0: not in 1: in		User	Reference
O3_Flag	Link within the Ozone Maintenance Area	0: not in 1: in		User	Reference
AreaType_FC	Urban or Rural indicator per the FC code			User	Reference
Cnt_Sta	Count Station ID		Input & Output	User	Reference
[2023_ADT]	2023 ADT		Input & Output	User	Reference
[2022_ADT]	2022 ADT		Input & Output	User	Reference

Field	Description	Codes/Units:	Files:	Maintained by:	Used for:
[2022_ADT_Corr]	2022 ADT corrected for potential Interstate volume errors		Input & Output	User	Reference
[2021 ADT]	2021 ADT		Input & Output	User	Reference
ADT_Model	ADT for validation		Input & Output	User	Cal_Rep
CO_NUM	County Number		Input & Output	User	
Corridor	User-defined Corridors		Input & Output	User	Post_Alt
AltVDF	Special Volume Delay Function	1, 3, 5, 6, 7: a = 2.0 b = 4.5 4: a = 0.2 b = 10.0	Input & Output	Developer	Speed-capacity
WaterWayXing	Major Waterway Crossing	1: Yes	Input & Output	User	Stop Location Choice
CountyXing	County Line Crossing	1: Yes	Input & Output	User	Stop Location Choice
Net(_#)	Flag field to indicate link is part of network scenario #	Active if = scenario # Inactive if <> #	Input & Output	User	GUI
FHWA_FC(_#)	Federal functional class	1: Rural Interstate 2: Rural Principal Arterial 6: Rural Minor Arterial 7: Rural Major Collector 8: Rural Minor Collector 9: Rural Local 11: Urban Interstate	Input & Output	User	Speed-capacity (only approach priority), Post_Alt, Cal_Rep

Field	Description	Codes/Units:	Files:	Maintained by:	Used for:
		14: Urban Principal Arterial 16: Urban Minor Arterial 17: Urban Collector 19: Urban Local 71: Off Ramp 72: On Ramp 73: Ramp (Major to Major Fwy) 74: Ramp (Minor to Major Fwy) 75: Generic Ramp 81: Median cross-over 99: Centroid Connector			
HOV(_#)	Flag field for HOV facilities	Greater than 0 indicates HOV only	Input & Output	User	Assignment
Divided(_#)	Flag field to indicated divided facilities	0: Undivided 1: Divided	Input & Output	User	Speed-capacity
Access(_#)	Access Control Level	1: None 2: Partial 3: Full	Input & Output	User	Speed-capacity
Lanes(_#)	Number of Lanes (not counting auxiliaries)		Input & Output	User	Speed-capacity
LN1DIR(_#)	Lanes in One Direction		Input & Output	User	Speed-capacity

Field	Description	Codes/Units:	Files:	Maintained by:	Used for:
AuxLanes(_#)	Number of Auxiliary Lanes		Input & Output	User	Speed-capacity
AB_Lane(_#)	Lanes in the AB direction		Input & Output	User	Speed-capacity
BA_Lane(_#)	Lanes in the BA direction		Input & Output	User	Speed-capacity
LN_Width(_#)	Lane width (feet)		Input & Output	User	Speed-capacity
RS_Width(_#)	Right shoulder width	Feet	Input & Output	User	Speed-capacity
Posted_Speed(_#)	Posted speed	Miles per hour	Input & Output	User	Speed-capacity
A_Signal	A node control	null: no control 1: signal 2: 2-way stop 3: all-way stop	Output	Speed-capacity	Reference
B_Signal	B node control	null: no control 1: signal 2: 2-way stop 3: all-way stop	Output	Speed-capacity	Reference
A_Priority	A node approach priority	1: High priority 2: Equal priority 3: Low priority	Output	Speed-capacity	Reference
B_Priority	B node approach priority	1: High priority 2: Equal priority 3: Low priority	Output	Speed-capacity	Reference
A_upSigs	Number of signals upstream from A		Output	Speed-capacity	Reference

Field	Description	Codes/Units:	Files:	Maintained by:	Used for:
B_upSigs	Number of signals upstream from B		Output	Speed-capacity	Reference
CanWalk	Pedestrian travel possible	0: No 1: Yes	Input	User	Walk Access to Transit

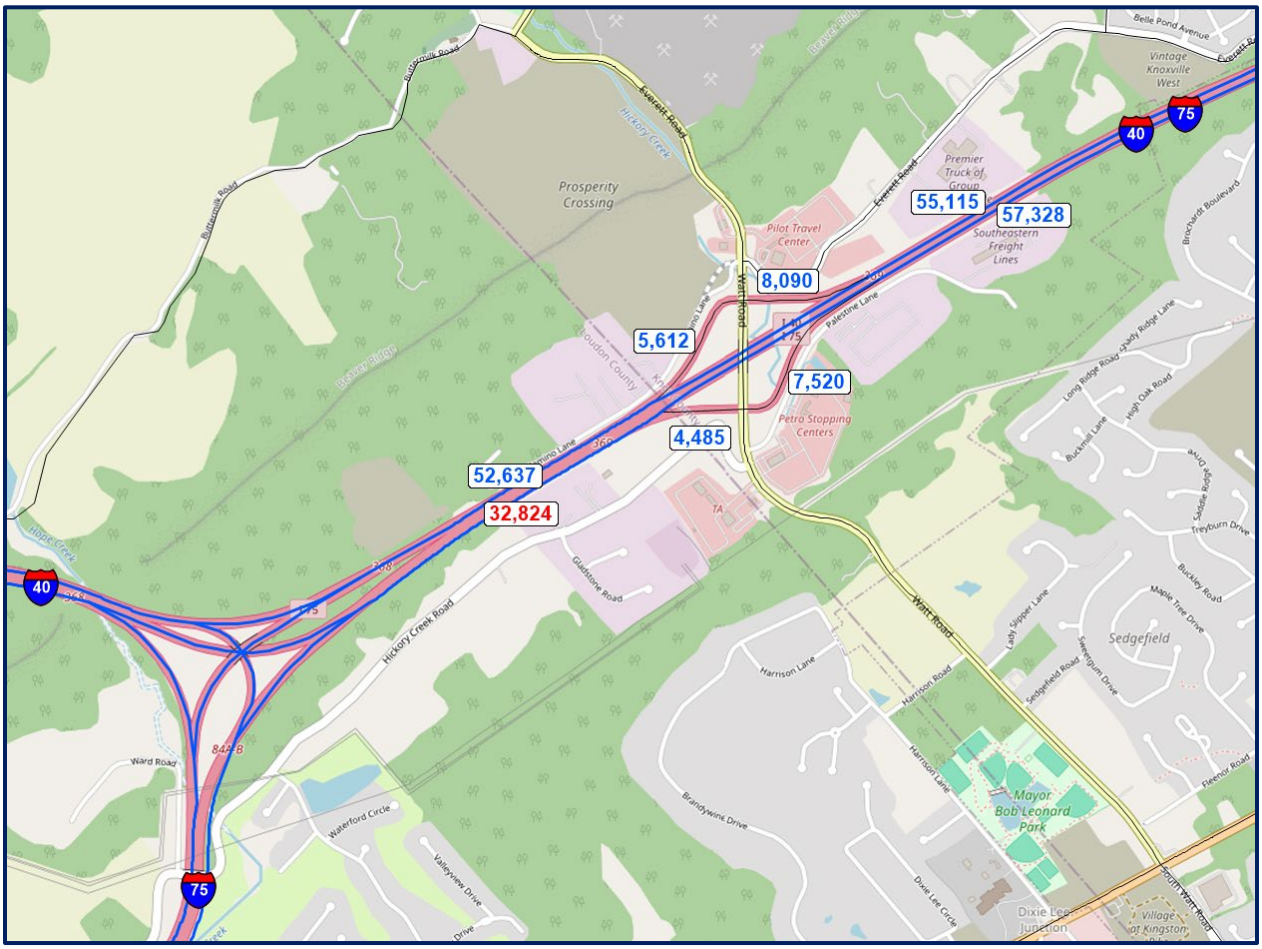
Appendix C: Interstate Count Modifications

As discussed in the main section of this report, actual traffic counts collected on the region's roadways are an important data source that is used to validate that the travel demand model is accurately replicating traffic volumes. A separate "Model Validation Report" is available that documents how well the updated 2022 base year KRTM is matching traffic volumes. The purpose of this appendix is to document changes that were made in order to correct potential errors that were observed in the year 2022 traffic count data.

The corrections were all for Interstate roadways in the Knoxville Region which present unique challenges for count data collection due to their high volumes and speeds. The normal process for collecting traffic count volumes is to place a pneumatic tube across the roadway which is hooked into a small device that can sense and tabulate each pulse of air that is created as a vehicle passes over it. This methodology is not feasible for a multilane high-speed facility such as an Interstate due to both safety concerns during its installation as well as being able to keep the tubes in place for the needed duration of time. Instead of using these types of counters on the mainline Interstate, TDOT instead counts the on and off ramps in between certain "control" points on the mainline where permanent inductive loops have been installed and estimates the volumes in between in a process known as "ramp-balancing". This process can be challenging due to several factors including variability in traffic patterns when ramps are counted that affect how well the real volume can be estimated as well as if control point volumes are in error.

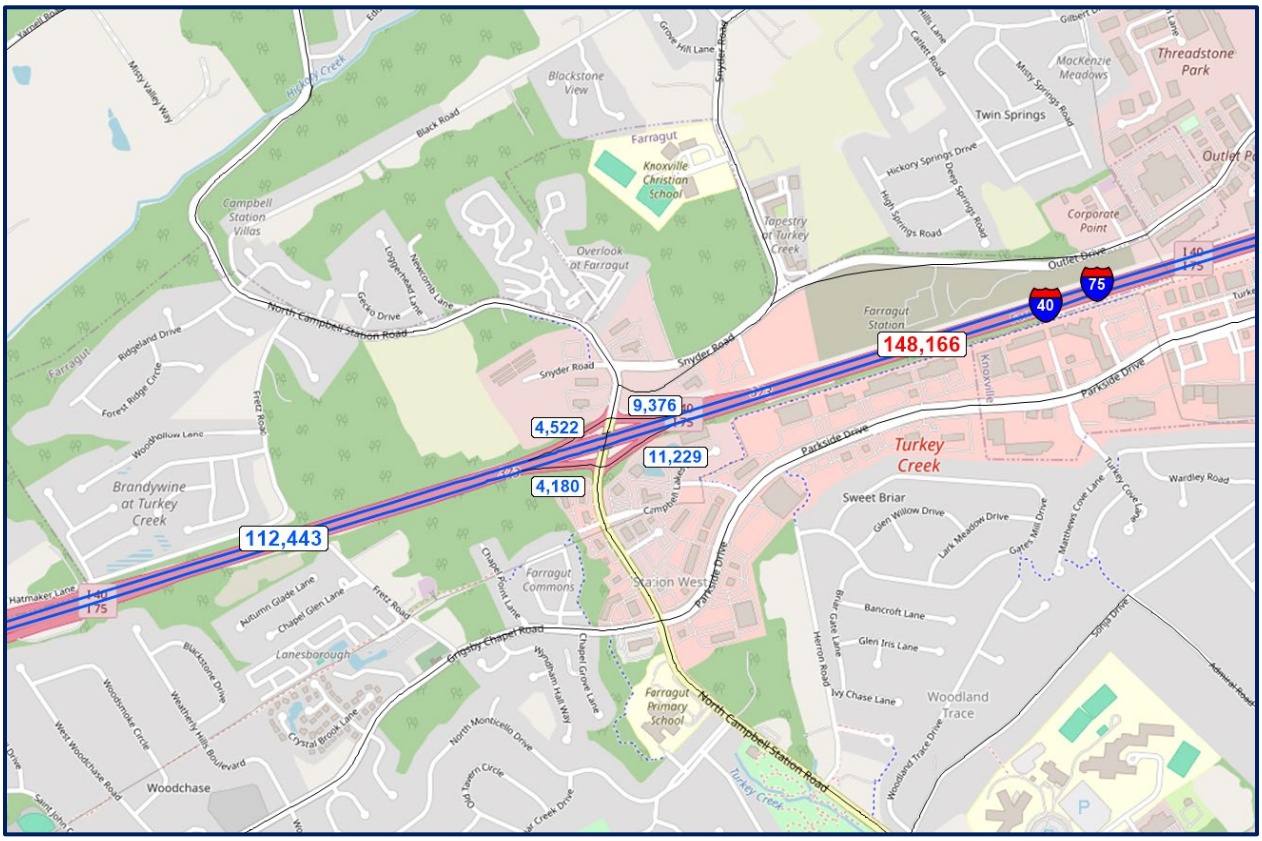
The primary error that was discovered was on the highest volume sections of Interstate in the Knoxville Region which are along the combined segments of I-40 and I-75 through west Knox County, which have the highest average daily traffic in the entire State of Tennessee at greater than 200,000 vehicles per day. In particular, there were obvious discrepancies at the extreme western end of I-40/75 between the junction of the two interstates and the next two interchanges to the east which are Watt Road and Campbell Station Road. Figure C-1 shows the discrepancy east and west of the Watt Road interchange and Figure C-2 shows the discrepancy east and west of the Campbell Station Road interchange. These errors essentially propagated through the rest of the network and had to be corrected for the segments going southward towards Loudon County and eastward towards downtown Knoxville. Other similar errors were corrected for where observed on sections of I-640, I-275, I-140.

Figure C-1 – Count Discrepancy at I-40/75 & Watt Road Interchange



In the figure above, it is obvious that the eastbound volume shown in red text of 32,824 is an anomaly when compared with the other mainline and ramp volumes shown. If one assumes that the eastbound volume of 57,328 shown east of the Watt Road Interchange is accurate (it is coming from a permanent TDOT count station as well) then after adding and subtracting the ramp volumes in the eastbound direction the actual count should instead be 54,293, calculated as follows: 57,328 – 7,520 + 4,485 = 54,293.

Figure C-2 – Count Discrepancy at I-40/75 & Campbell Station Road Interchange



The figure above shows the apparent discrepancy in total Interstate volume east and west of the Campbell Station Road Interchange. Again, if we assume that the count on the west side is accurate since it is coming from a permanent count station then it would be impossible to obtain the volume shown in red text of 148,166 vehicles per day based on the ramp volumes. The total volume at this location should instead be 124,346, calculated as follows: 112,443 - (4,522+4,180) + (11,229+9,376) = 124,346.

The TPO staff made some other minor adjustments in the final calculations such as modifying a few individual ramp volumes that seemed to be outliers compared with historical years or to correct for directional imbalances. Tables are provided on the following page that show the before and after volumes for the base year 2022 and compared against other historical count years. It can be seen that overall the corrected values tend to align with historical patterns and averages, which increases the confidence in their use.

I-75 South	Station ID	2019 ADT	2021 ADT	2022 ADT	2023 ADT	AVG	Corrected ADT
External Station - Pond Creek Rd	62000079	44,367	45,154	43,194	49,167	45,471	43,194
Pond Creek Rd - SR 72	53000069	45,826	46,084	44,443	50,662	46,754	44,443
SR 72 - Sugar Limb Rd	53000070	54,064	52,785	56,682	57,638	55,292	52,424
Sugar Limb Rd - US 321	53000071	56,236	55,134	53,454	54,683	54,877	54,324
US 321 - I-40 Junction	53000050	60,473	58,302	55,469	53,771	57,004	63,090

I-40/75	Station ID	2019 ADT	2021 ADT	2022 ADT	2023 ADT	AVG	Corrected ADT
I-40/75 Junction - Watt Rd	53000121	104,518	100,765	85,461	86,756	94,375	106,930
Watt Rd - CSR	ATR 37	109,381	79,585	112,443	112,023	103,358	112,443
CSR - Lovell Rd	47000165	125,373	93,462	148,166	132,443	124,861	126,492
Lovell Rd - I-140	47000254	142,671	114,045	163,925	147,689	142,083	142,251
I-140 - Cedar Bluff	47000164	195,109	154,869	196,701	170,970	179,412	179,242
Cedar Bluff - WS	47000253	206,559	166,251	207,271	191,951	193,008	189,812
WS - West Hills	47000252	206,396	173,049	214,055	194,969	197,117	196,596
West Hills - Papermill	47000124	211,494	179,856	218,583	201,281	202,804	201,124
Papermill Rd - I-640 West	47000170	215,216	182,502	211,587	204,861	203,542	203,770

I-640	Station ID	2019 ADT	2021 ADT	2022 ADT	2023 ADT	AVG	Corrected ADT
I-40 W - Western Ave	47000274	97,540	90,947	95,838	77,248	90,393	94,099
Western Ave - I-75	47000330	96,724	94,386	104,064	74,534	92,427	95,818
I-75 - Broadway	47000251	97,988	89,826	98,829	73,997	90,160	88,065
Broadway - Millertown Pk	47000331	79,741	71,684	76,691	52,840	70,239	65,927
Millertown Pk - I-40 E	47000332	74,397	69,368	70,244	47,561	65,393	59,480

I-275	Station ID	2019 ADT	2021 ADT	2022 ADT	2023 ADT	AVG	Corrected ADT
I-40 - Baxter Ave	47000256	72,488	67,587	61,084	64,319	66,370	77,228
Baxter Ave - Woodland Ave	47000249	71,386	64,366	59,409	62,518	64,420	75,553
Woodland Ave - Heiskell Ave	47000166	68,660	60,703	55,417	59,164	60,986	71,561
Heiskell Ave - I-640	47000250	67,702	63,125	54,478	59,832	61,284	70,622

I-140	Station ID	2019 ADT	2021 ADT	2022 ADT	2023 ADT	AVG	Corrected ADT
Cusick Rd - US 129	05000191	18,521	18,849	16,303	20,036	18,427	17,236
US 129 - Topside Rd	05000183	42,872	37,064	39,490	41,429	40,214	39,490
Topside Rd - Northshore Dr	05000184	49,414	43,920	47,687	50,430	47,863	47,687
Northshore Dr - Westland Dr	47000414	48,609	47,990	47,462	54,620	49,670	49,819
Westland Dr - Kingston Pk	47000415	55,861	54,523	55,194	65,616	57,799	57,262
Kingston Pk - I-40	47000419	64,579	60,213	65,390	74,676	66,215	67,458

The TPO staff essentially conducted its own "ramp balancing" process in order to obtain the corrected base year 2022 volumes shown in the table above. An example of how this was conducted is shown below for I-640 where directional volumes were used and ramp volumes were added and subtracted. The volumes on the right side of the table were plugged in to the columns on the left side to replace the original volumes where discrepancies were found.

			EB	ORIGINAL ADT	WB		checksum	EB	NEW ADT	WB
I-40 East		6,176				6,814				
		21,507				24,983				
			27,683	70,244	31,797		59,480	27,683	59,480	31,797
Mall		8,355				9,000				
		12,664				11,138				
			31,992	76,691	33,935		65,927	31,992	65,927	33,935
Broadway		6,530				6,986				
		17,779				17,875				
			43,241	98,829	44,824		88,065	43,241	88,065	44,824
Sharp Gap		22,361				23,901				
		26,891				27,124				
			47,771	104,064	48,047		95,818	47,771	95,818	48,047
Western Ave		10,527				11,300				
		9,791				10,317				
			47,035	95,838	47,064		94,099	47,035	94,099	47,064
I-40 West		44,704				45,978				
		7,438				5,314				

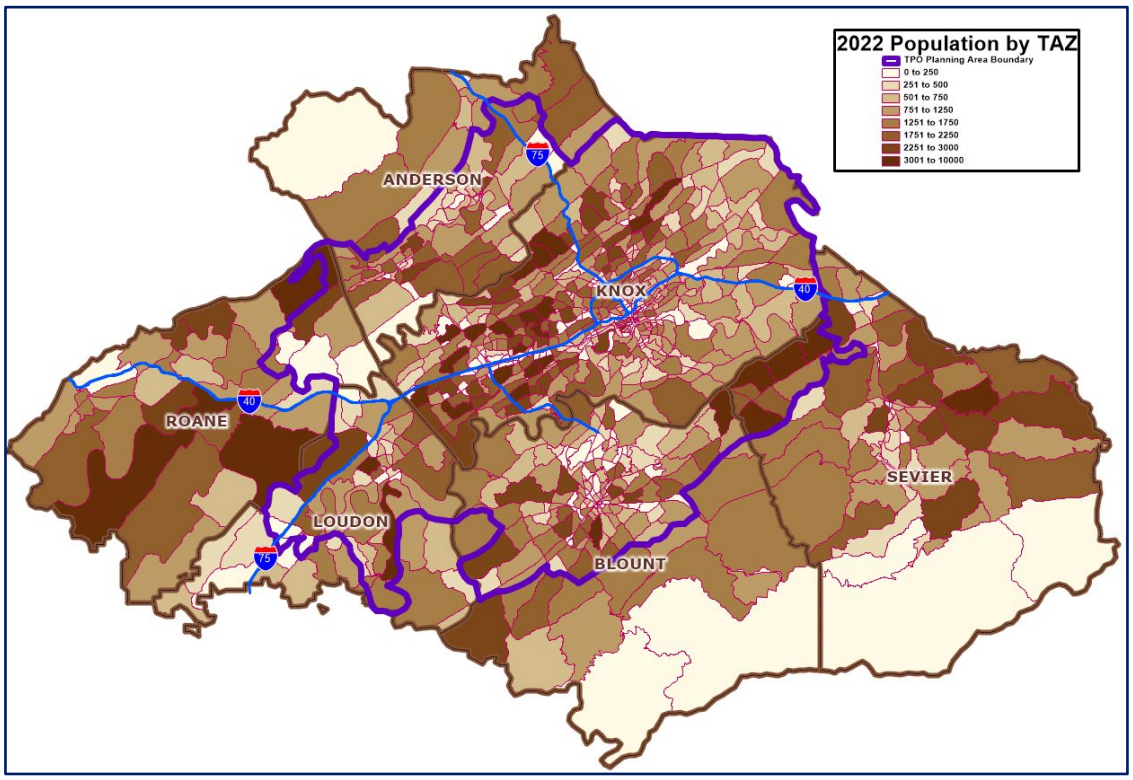
Appendix D: External Station Traffic Volume Forecast

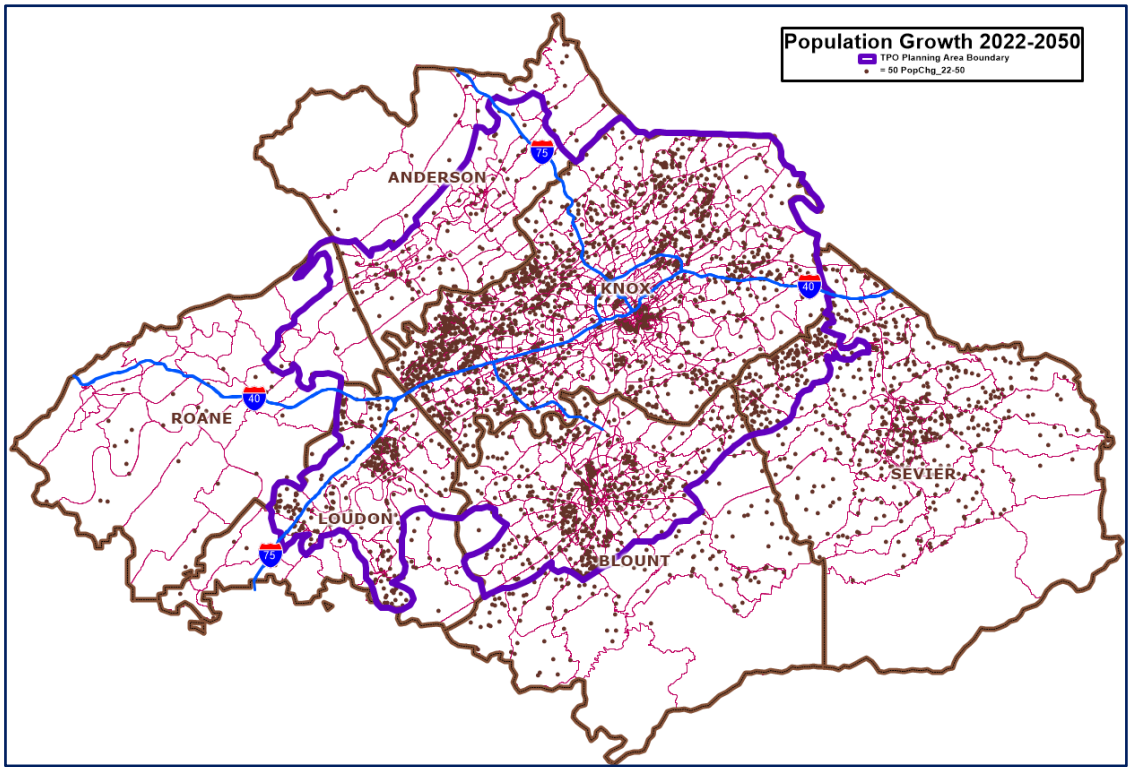
The External Station traffic growth methodology used was to extrapolate historical traffic count data from various timeframes and utilize judgement to select a reasonable growth rate. The primary methodology was to use the linear trend extrapolation in Excel utilizing 2010 - 2023 actual count data and going out to the year 2050. Other considerations were reviewing the linear trend starting back in 1995 and comparing with the TDOT Statewide Model volume predictions at these locations available for 2045.

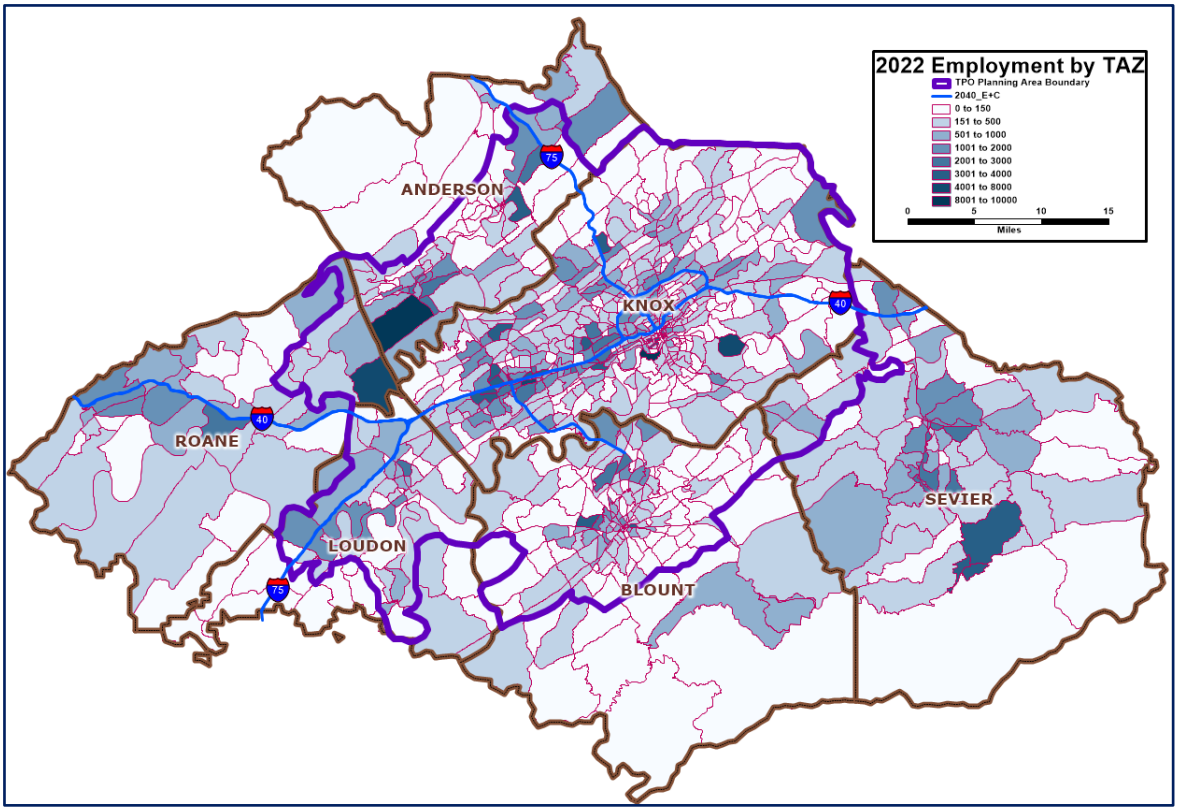
Some of the lower volume stations exhibited very low or even negative growth which was deemed to be unreasonable so a minimum factor of 1.14 times the base year 2022 volume was used which represents a linear rate of 0.5% per year over the 28-year time period between 2022 - 2050.

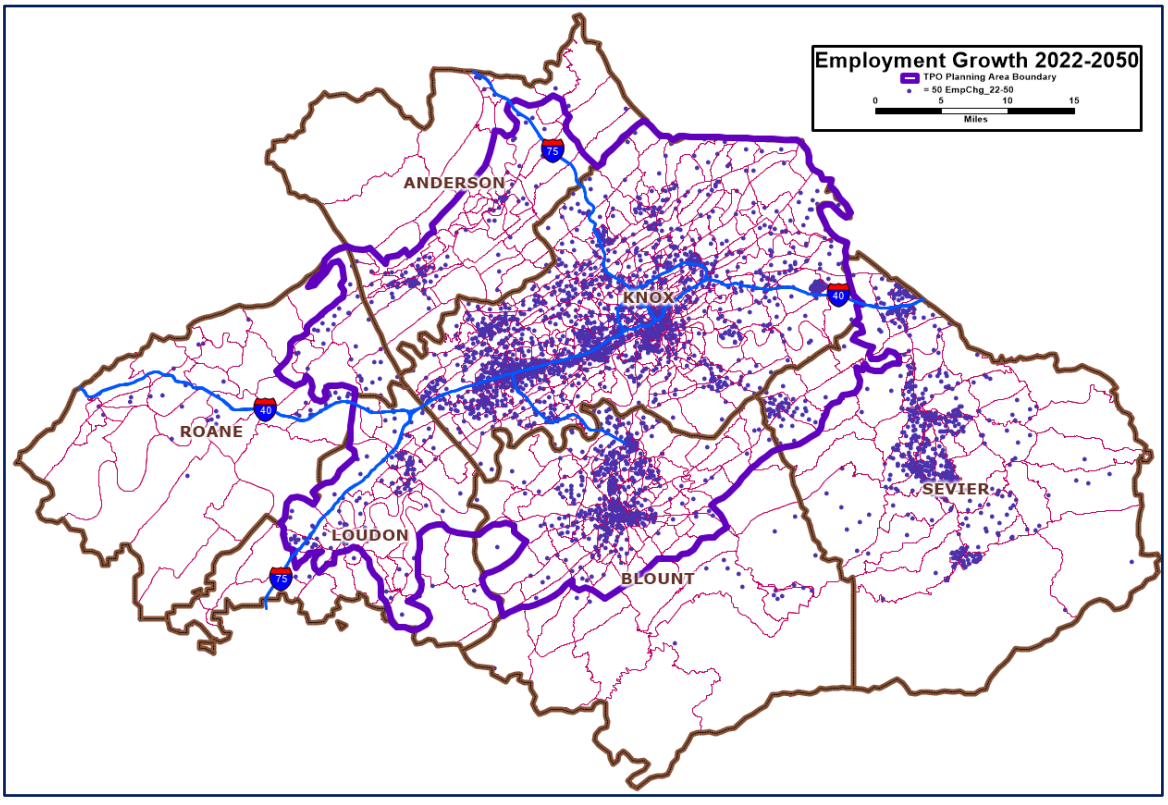
TAZID	Count Station	COUNTY	Route	LOCATION	Actual AADT_2022	Forecasted 2026	Forecasted 2035	Forecasted 2040	Forecasted 2050
9001	73000158	Roane	I0040	NEAR CUMBERLAND CO LINE	32,292	34,278	38,745	41,227	46,191
9002	73000007	Roane	SR029	NEAR MORGAN CO LINE	3,788	4,033	4,583	4,889	5,500
9003	65000038	Morgan	SR062	NEAR ANDERSON CO. LINE	9,604	10,386	12,145	13,122	15,077
9004	07000094	Campbell	I0075	(LOOPS) NEAR ANDERSON CO LINE	45,938	46,966	49,279	50,565	53,135
9005	07000075	Campbell	SR116	NEAR ANDERSON CO LINE	3,378	3,446	3,598	3,682	3,851
9006	87000005	Union	SR033	SR033 NORTH OF MAYNARDVILLE	8,430	9,073	10,519	11,322	12,929
9007	29000008	Grainger	SR032	SR032 N. OF THORN HILL	9,776	10,230	11,252	11,819	12,954
9008	29000001	Grainger	SR131	NEAR HANCOCK CO LINE	700	749	858	919	1,041
9009	29000053	Grainger	SR001	NEAR HAWKINS CO LINE	10,700	11,670	13,852	15,064	17,488
9010	32000001	Hamblen	02528	EAST OF NEEDMORE	254	259	271	277	290
9011	37000076	Hawkins	SR113	S.W. OF ST. CLAIR	3,028	3,089	3,225	3,301	3,452
9012	37000123	Hawkins	SR034	SR034 NEAR HAMBLEN CO. LINE	5,866	5,983	6,247	6,394	6,687
9013	32000080	Hamblen	02469	BEACON D - NEAR GREENE CO LINE	382	390	407	416	435
9014	30000120	Greene	I0081	[LOOPS] NEAR HAMBLEN CO LINE	39,896	42,401	48,039	51,170	57,434
9015	32000036	Hamblen	SR340	NEAR GREENE CO LINE	1,788	1,824	1,904	1,949	2,038
9016	15000001	Cocke	SR160	NEAR HAMBLEN CO LINE	2,128	2,171	2,266	2,320	2,426
9017	32000039	Hamblen	02461	W. MORRISTOWN	748	798	909	971	1,095
9018	15000019	Cocke	SR032	NW OF NEWPORT	7,352	7,499	7,830	8,014	8,381
9019	15000129	Cocke	I0040	[LOOPS] BETWEEN JEFFERSON CO LINE & SR-9	30,962	33,103	37,922	40,598	45,952
9020	15000020	Cocke	SR009	NEAR JEFFERSON CO LINE	5,376	5,484	5,726	5,860	6,129
9021	15000131	Cocke	05966	NEAR JEFFERSON CO LINE	14,050	14,692	16,137	16,939	18,544
9022	15000051	Cocke	SR339	NW OF COSBY	2,698	2,908	3,381	3,644	4,170
9023	15000057	Cocke	SR073	S OF COSBY	5,088	5,330	5,874	6,176	6,781
9024	78000068	Sevier	SR071	S. OF GATLINBURG	5,956	6,075	6,343	6,492	6,790
9025	05000088	Blount	SR115	NEAR MONROE COUNTY LINE	1,442	1,550	1,794	1,930	2,201
9026	16	Blount	SR115	NEAR MONROE COUNTY LINE	15,326	15,757	16,725	17,264	18,340
9027	62000106	Monroe	SR072	SR072 NORTHEAST OF MADISONVILLE	14,410	15,245	17,124	18,168	20,255
9028	62000001	Monroe	SR002	NEAR LOUDON CO LINE	3,628	3,701	3,864	3,955	4,136
9029	62000079	Monroe	I0075	NORTHWEST OF SWEETWATER	43,194	45,278	49,967	52,571	57,781
9030	53000086	Loudon	SR322	NEAR MONROE CO LINE	1,636	1,672	1,753	1,799	1,889
9031	73000032	Meigs	SR058	NEAR ROANE CO LINE	3,006	3,116	3,362	3,499	3,773
9032	72000046	Rhea	SR029	NEAR ROANE CO LINE	4,952	5,051	5,274	5,398	5,645
9033	18000029	Cumberland	SR001	NEAR ROANE CO. LINE	1,918	2,034	2,296	2,442	2,733

Appendix E: Knoxville TPO Area Future-Year Population and Employment Growth by TAZ

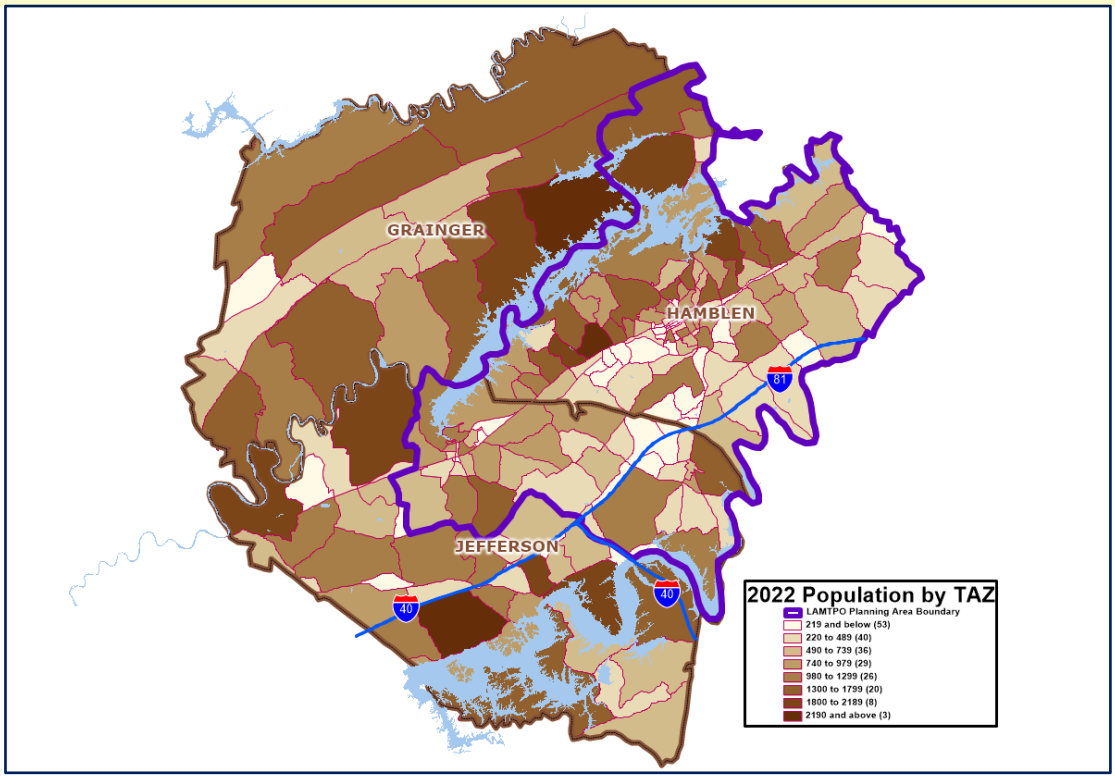


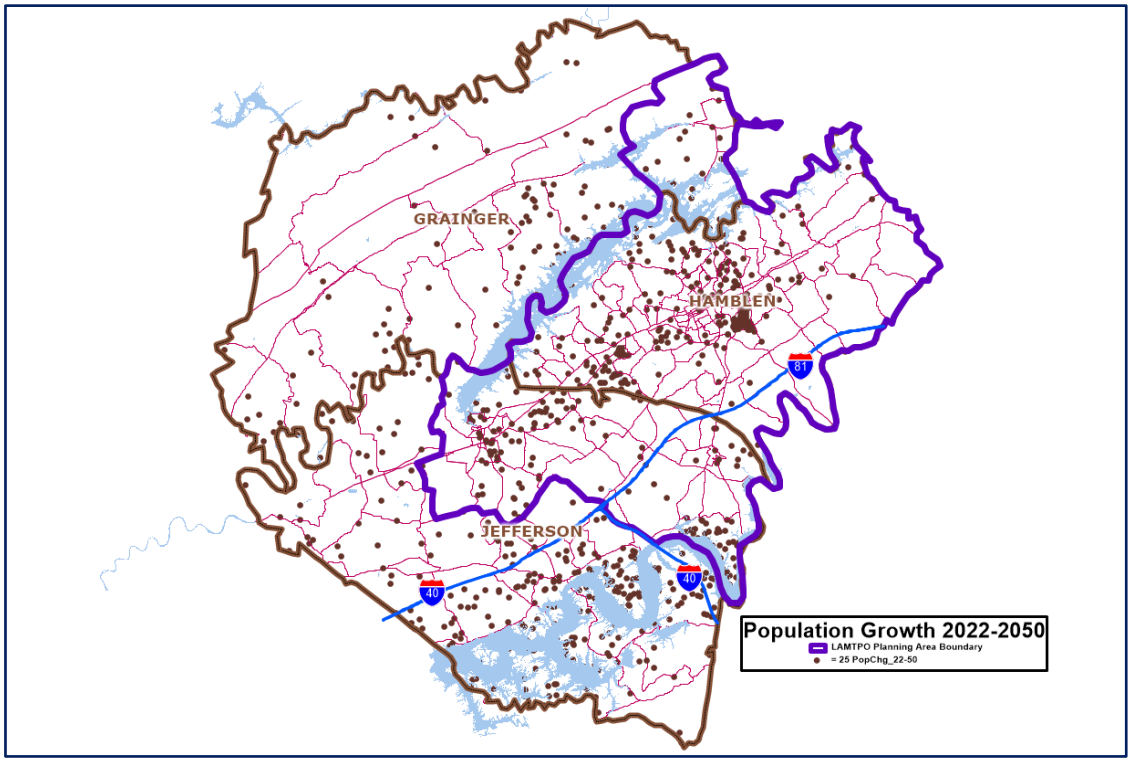


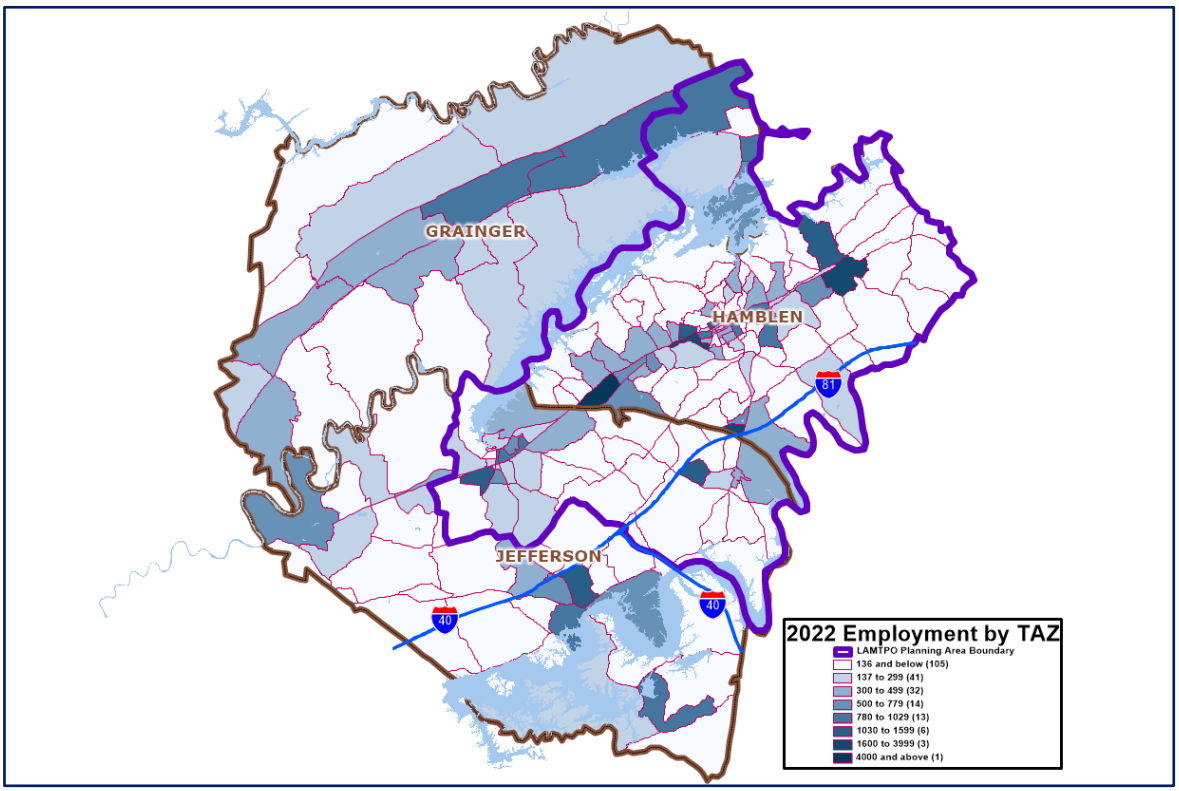

2022 Employment by TAZ
TPO Planning Area Boundary
2040_E+C
0 to 150
151 to 500
501 to 1000
1001 to 2000
2001 to 3000
3001 to 4000
4001 to 8000
8001 to 10000
0 5 10 15
Miles
ANDERSON
KNOX
ROANE
LOUDON
BLOUNT
SEVIER
75
40

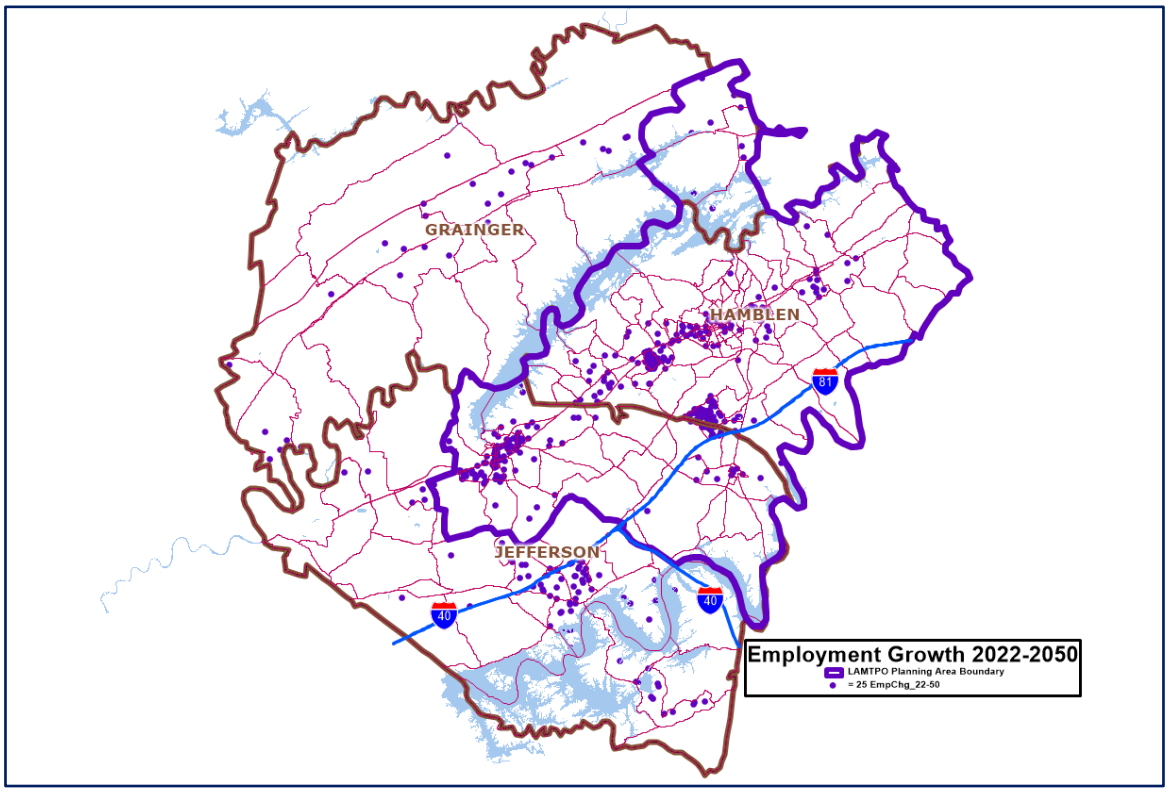

Employment Growth 2022-2050
TPO Planning Area Boundary
= 50 EmpChg_22-50
0 5 10 15
Miles
ANDERSON
KNOX
ROANE
LOUDON
BLOUNT
SEVIER
75
40

Appendix F: LAMTPO Area Future-Year Population and Employment Growth by TAZ



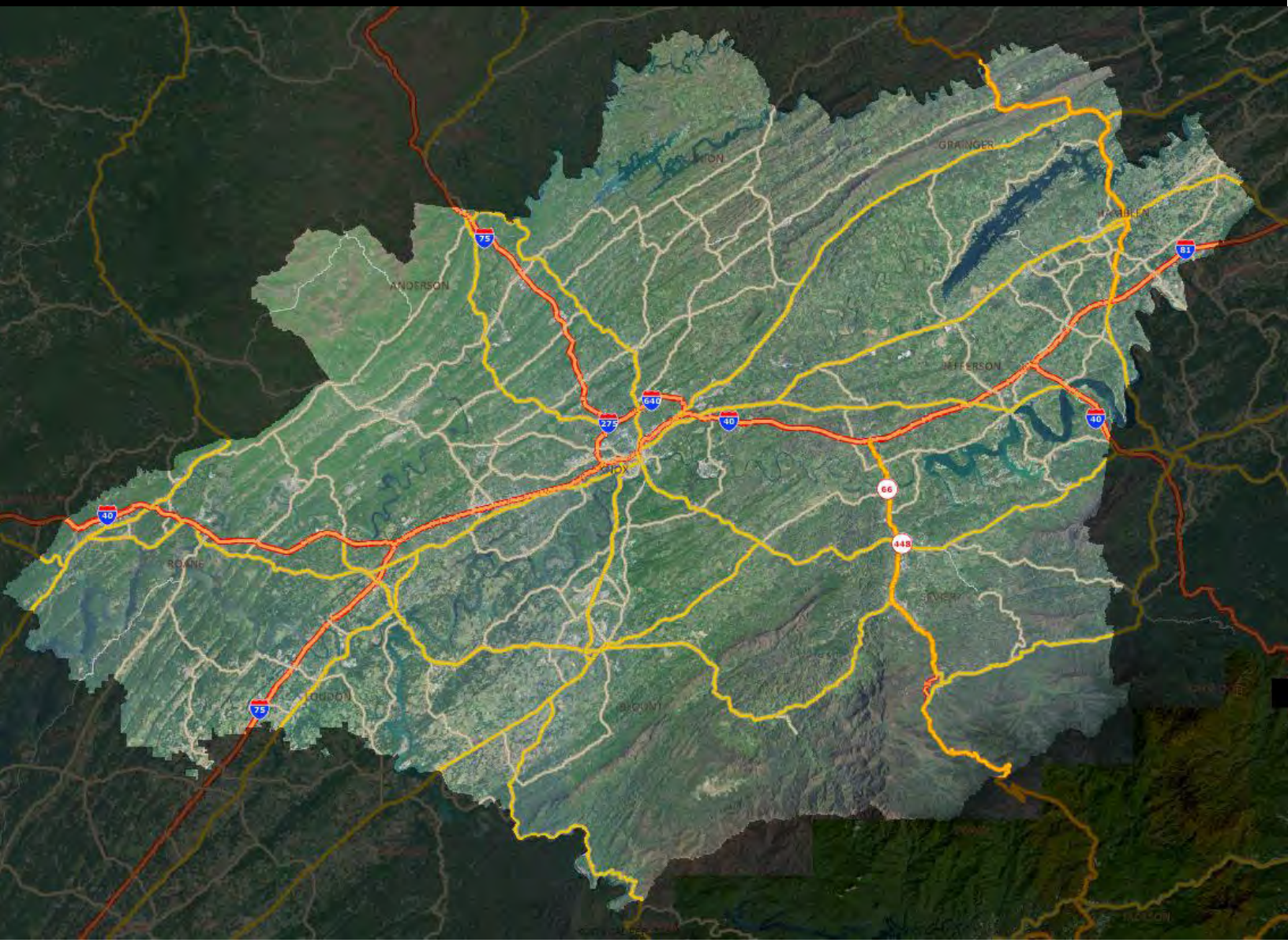



GRAINGER
HAMBLEN
JEFFERSON
81
40
40
2022 Employment by TAZ
LAMTPO Planning Area Boundary
136 and below (105)
137 to 299 (41)
300 to 499 (32)
500 to 779 (14)
780 to 1029 (13)
1030 to 1599 (6)
1600 to 3999 (3)
4000 and above (1)


GRAINGER
HAMBLEN
JEFFERSON
81
40
40
Employment Growth 2022-2050
LAMTPO Planning Area Boundary
= 25 EmpChg_22-50

Final Report for
Travel Demand Forecasting Model Update

Submitted by
Caliper Corporation



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Introduction

The purpose of this report is to document Caliper Corporation's 2024 recalibration and revalidation of the Knoxville Regional Travel Model (KRTM) for the new base year of 2022.

Background

This is the third update of the version of the KRTM originally developed by Bernardin, Lochmueller & Associates (BLA) in 2009 with a base year of 2006. This original hybrid version of the model was implemented in TransCAD version 5. At the time it was at the very forefront of the practice and represented a major improvement over its predecessor, which was a traditional, four-step sequential trip-based model (also developed by BLA in 2004 and updated in 2008). The hybrid model offered greatly improved policy sensitivity. In particular, the hybrid KRTM offers the following features which its predecessor lacked:

- Sensitivity to fuel prices
- Planning capability for transit, bicycle and pedestrian modes
- More realistic representation of special populations (seniors, low income, students)
- Sensitivity to urban design (mixed uses, development density, grid vs. cul-de-sac style street networks)
- Ability to represent shifts in the timing of travel (due to congestion, aging population, etc.)
- Consistency with tours and trip-chaining behavior
- Improved traffic impacts with halo effects around major developments (malls, factories, etc.)
- More accurate commuting patterns from destination choice models
- Improved representation of speeds and delays from traffic signals, stop signs, etc.
- Improved accuracy of alternatives analysis from new assignment algorithms
- Reduction of aggregation bias which can skew model results

Tour or activity-based models take considerable resources to develop and run. In 2009, most activity-based models took 24-48 hours to run. While computing has improved, many activity-based models still run overnight (~12 hour runtimes). The 2009 KRTM was developed in eight months and ran in less than four hours on a then standard dual core laptop.

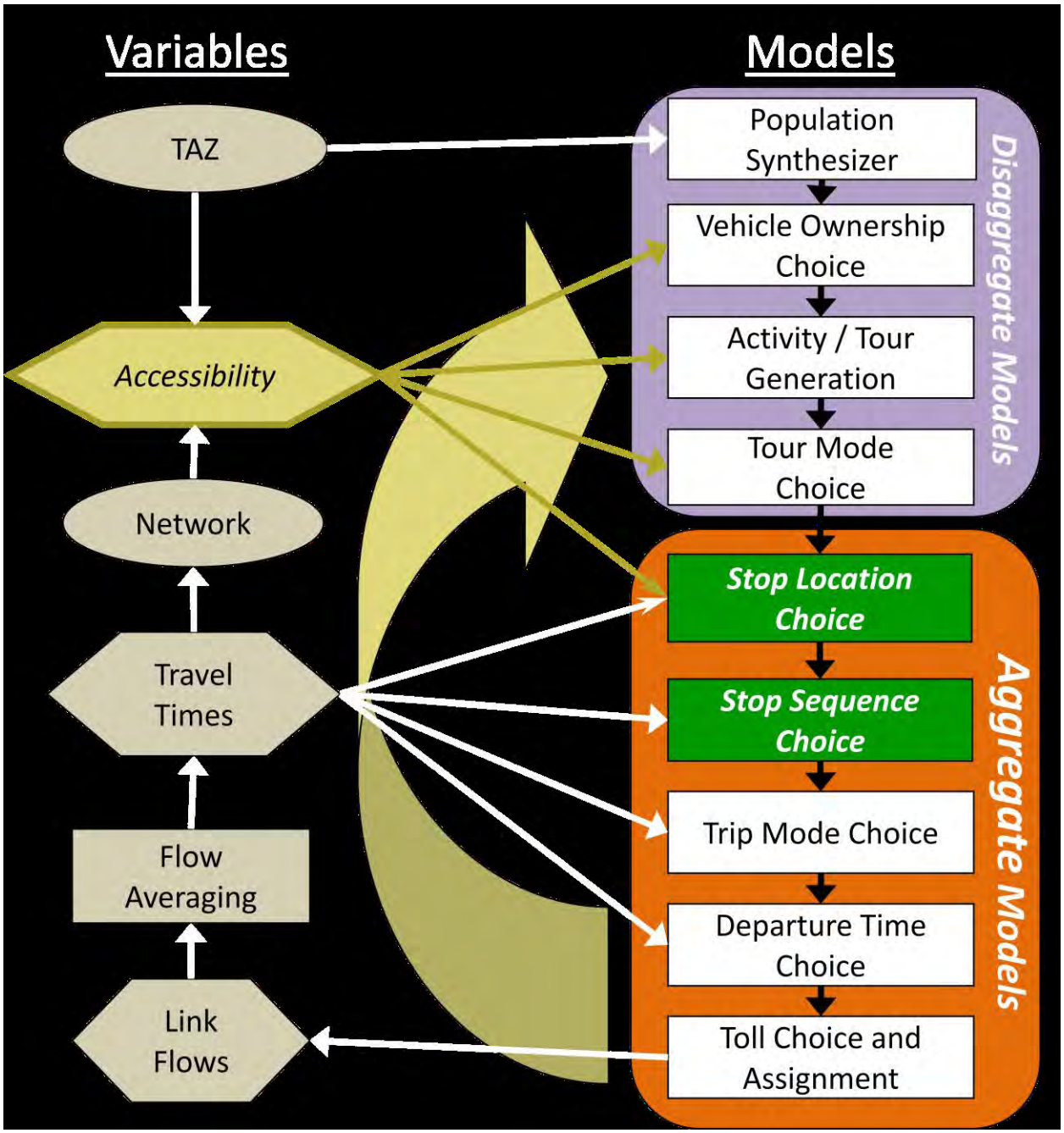

Figure 1. The 2009 KRTM's Hybrid Model Design

The speed of the hybrid KRTM was and is the result of its hybrid design. The architecture was based on based on research conducted by Dr. Vince Bernardin, Jr., as part of his doctoral studies with Profs. Frank Koppelman and David Boyce at Northwestern University and was funded in part by an Eisenhower Fellowship from the Federal Highway Administration. This hybrid model design combines some elements of traditional "four-step" and as well as several components from recent activity-based models, but is ultimately distinct, made possible by the stop location and sequence choice structure

original to the hybrid design. While more recent hybrid models have made use of an alternative, slightly simpler method of linking home-based and non-home-based trips, the KRTM paved the way for the development of over 20 hybrid models across the country and the number is still growing.

The KRTM modeling process, illustrated in Figure 1, begins by generating a synthetic population of individual households based on the aggregate characteristics of the population encoded in the traffic analysis zones (TAZ). Then a model predicting households‟ level of vehicle ownership is applied. The number of tours (sojourns beginning and ending at home) of various purposes (work, school, other, etc.) and the number of stops on these tours are predicted for each household. The dominant mode of travel (private automobile, school bus, public bus, walking/biking) is chosen for the household's tours of each purpose. Then, grouping households within the same TAZ together, probable locations of the stops on automobile tours are chosen. Next, for each probable stop location, a preceding location is chosen such that the resulting probable sequences of stops form tours which begin at home and proceed from one stop to the next until returning home. For each trip in the resulting travel pattern, the probability of walking, driving alone or with passengers is predicted, as is the departure time (in 15-minute time periods) and toll-eligibility. Finally, the trips are assigned to the roadway network and routes are chosen such that travelers minimize their travel time and costs. The resulting travel times are used to recalculate accessibility variables, and both are then fed back and used to repeat the process, beginning from the generation of tours and stops, until the changes from one iteration to the next in the resulting roadway volumes are minimal.

The adjective "hybrid" refers to two ways in which the new model design blends aspects of four-step and activity-based models and defies traditional categorization. First, the hybrid KRTM model can be described as trip-based in so far as it essentially produces aggregate trip table matrices of trips between origins and destinations rather than disaggregate records detailing individual travelers' activities. However, hybrid models like the KRTM can also be described as tour-based since the travel patterns they predict can be mathematically proven to be consistent with tours and all travel is segmented within the model by types of tours, eliminating non-home-based trips problematic in traditional models. Hence, models of this design are hybrid trip-based/tour-based models.

Second, perhaps more meaningfully, models like the KRTM are hybrid aggregate/disaggregate models. Unlike four-step models which were entirely aggregate and activity-based models which are entirely disaggregate, the KRTM and similar models include both aggregate and disaggregate component models. Yet despite its inclusion of disaggregate choice models, there are no random number draws or Monte Carlo simulation in the KRTM. As a result, the KRTM‟s model results are reproducible, unlike the results of activity-based or other simulation models. Any difference between two KRTM model

runs is directly attributable to differences in their inputs as with traditional trip-based models. Whereas, in simulation models, multiple model runs are necessary when comparing alternatives to ensure that the difference between model runs results from differences in the alternative inputs rather than from differences in the random numbers drawn for each run.

The shift from the disaggregate framework of individual households to the aggregate framework of trips between zones midway through the model distinguishes the hybrid approach. The use of disaggregate components minimizes aggregation bias in the early steps of the model, including the particularly sensitive primary or tour mode choice. At the same time, the approach minimizes model run times by taking advantage of the fact that it is computationally much easier to predict a set of trips which is consistent with tours than to predict the individual tours themselves.

The hybrid approach does have limitations. It lacks the explicit representation offered by activity-based models of the interactions among household members and of constraints in the timing of travel and activities (although these phenomena are still implicit in this framework). However, given its lower development costs and run time and the reproducibility of results, the hybrid model architecture presented a practical and cost-effective way of incorporating more sensitivity and realism in the KRTM to address the TPO's current and future planning issues. For more information on the original hybrid model refer to *Knoxville Regional Travel Model Update 2009: Model Development and Validation Report*.

In 2012 the Knoxville Regional Transportation Planning Organization (TPO) again contracted with BLA to update the KRTM, expanding its geographic coverage to also incorporate the planning region of the Lakeway Area Metropolitan Transportation Planning Organization (LAMTPO). The model was updated to TransCAD 6 with a new base year of 2010. The model was recalibrated and revalidated for the new base year, but no major changes were made to the model structure. For more information on the 2012 model refer to *Knoxville Regional Travel Model Update 2012: Model Development and Validation Report*.

More recently, the Knoxville Regional Transportation Planning Organization (TPO) contracted with Resource Systems Group (RSG) in 2020 to update the model to a new 2018 base year. The KRTM was updated to TransCAD version 8 and revalidated. The model was recalibrated and revalidated for the new base year, but no major changes were made to the model structure. Some minor functionality, was however added to allow the user to decrease trip rates associated with the

COVID pandemic. For more information on the 2012 model refer to the technical memorandum *KRTM Model Revalidation for 2018*, dated October 15, 2020.

Overview

For this third update to the hybrid KRTM, in 2024, the Knoxville Regional Transportation Planning Organization (TPO) contracted with Caliper Corporation to update the KRTM to a post-pandemic base year of 2022. As with the prior updates, no major changes were made to the model structure. A minor change was made to explicitly model remote work from home in order to be able to accurately reflect this phenomenon in the post-pandemic environment. Every major model component was recalibrated, and the model system as a whole was validated against new base year traffic counts. The details of this process are documented in the subsequent sections of this report.

Socioeconomic Data

The 2022 zonal socioeconomic data was developed and provided by the TPO staff using data from the Census Bureau. From the previous base year of 2018, the ten-county region's population grew by 53,466 people to a new 2022 regional population of 1,092,086. Over the same period, the region's total employment grew by 59,365 for a total regional employment of 600,976 in 2022. Growth by county generally reflected the existing distributions of population and employment with the strong majority of the growth in Knox County. However, growth rates varied from under 1% to nearly 13%. See Figures 2 – 4 and Table 1 for population and employment growth by county.

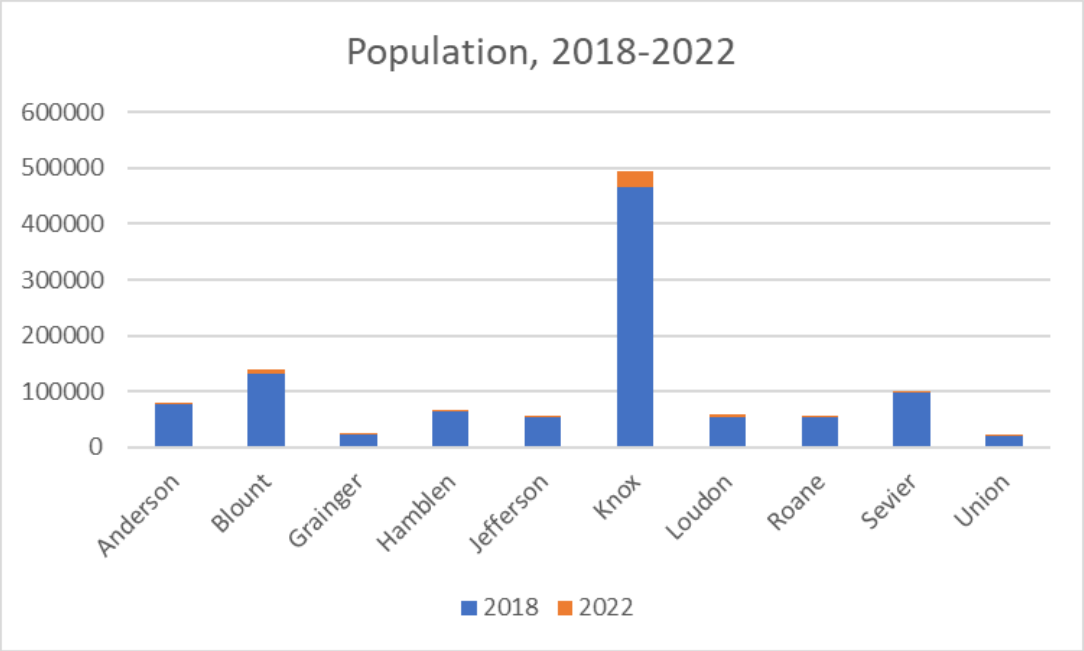

Figure 2. Population by County, 2018 vs. 2022

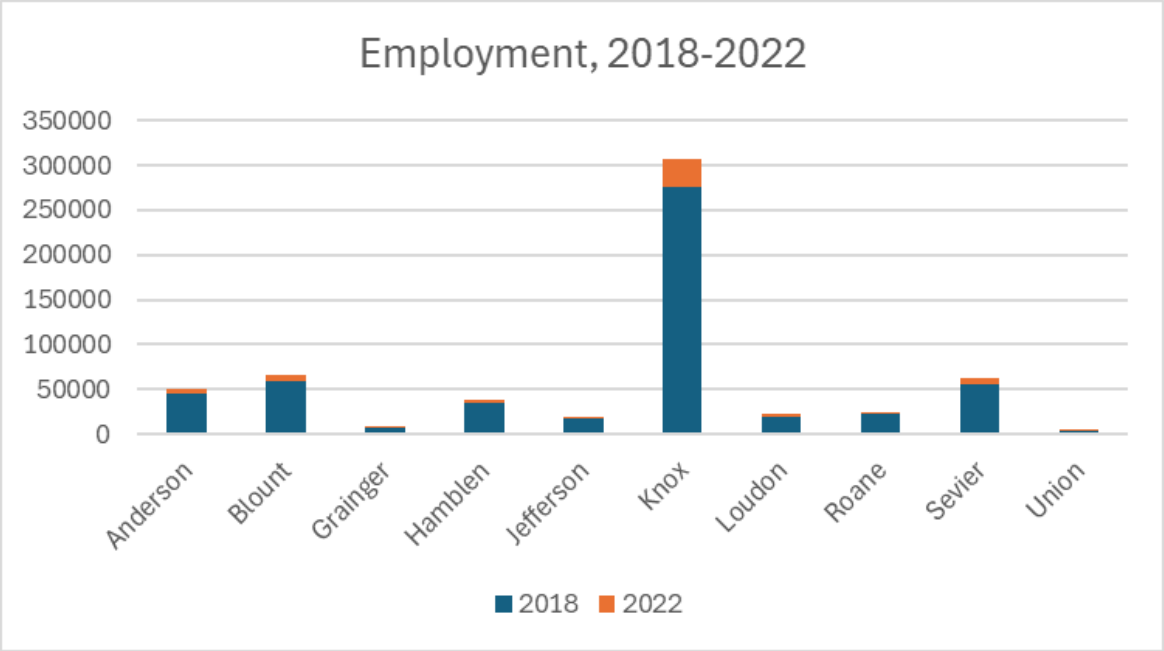

Figure 3. Employment by County, 2018 vs. 2022

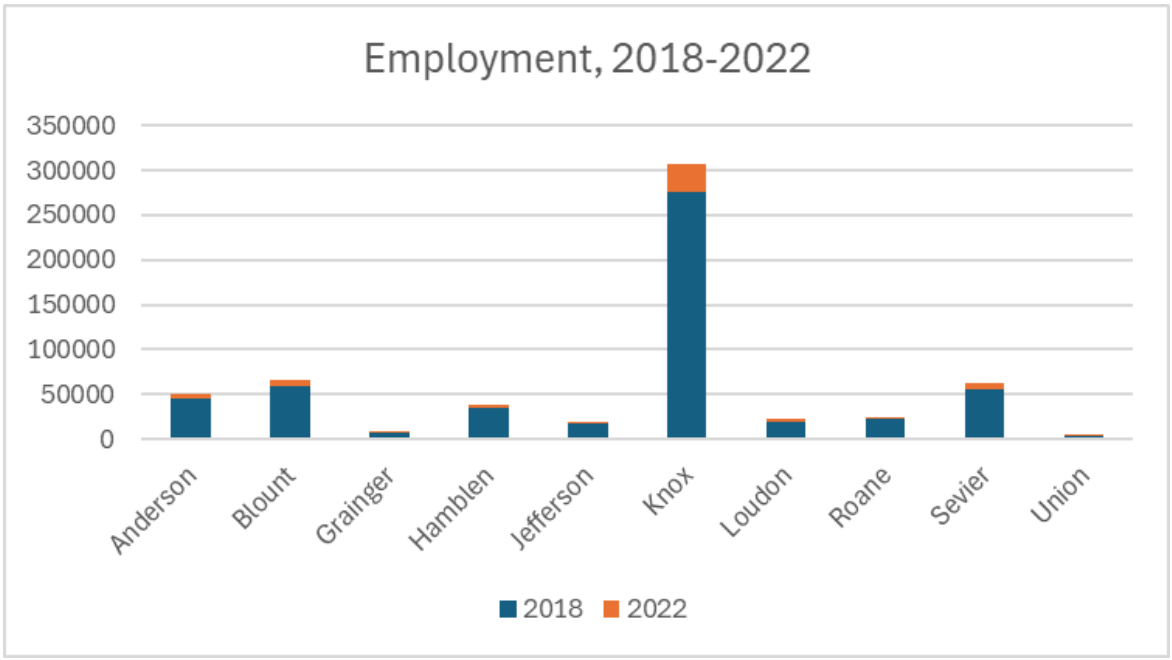

Figure 4. Population and Employment Growth by County

Table 1. Population and Employment Growth by County

County	Population				Employment			
	2018	2022	Growth	Rate	2018	2022	Growth	Rate
Anderson	76,482	78,913	2,431	3.2%	44,399	49,750	5,351	12.1%
Blount	131,349	139,958	8,609	6.6%	59,662	66,473	6,811	11.4%
Grainger	23,145	24,277	1,132	4.9%	6,432	6,760	328	5.1%
Hamblen	64,569	65,168	599	0.9%	35,495	38,475	2,980	8.4%
Jefferson	54,012	56,727	2,715	5.0%	17,371	19,139	1,768	10.2%
Knox	465,289	494,539	29,250	6.3%	276,450	306,232	29,782	10.8%
Loudon	53,054	58,181	5,127	9.7%	19,993	22,540	2,547	12.7%
Roane	53,140	55,082	1,942	3.7%	21,755	24,296	2,541	11.7%
Sevier	97,892	98,789	897	0.9%	55,952	62,834	6,882	12.3%
Union	19,688	20,452	764	3.9%	4,102	4,477	375	9.1%
Total	**1,038,620**	**1,092,086**	**53,466**	**5.1%**	**541,611**	**600,976**	**59,365**	**11.0%**

The distribution of growth at the level of the model's travel analysis zones (TAZ) can be seen in Figures 5 and 6. While there was population growth in every county, with the largest gains in western Knox County and Loudon County, there were some local declines in rural areas and Hamblen County.

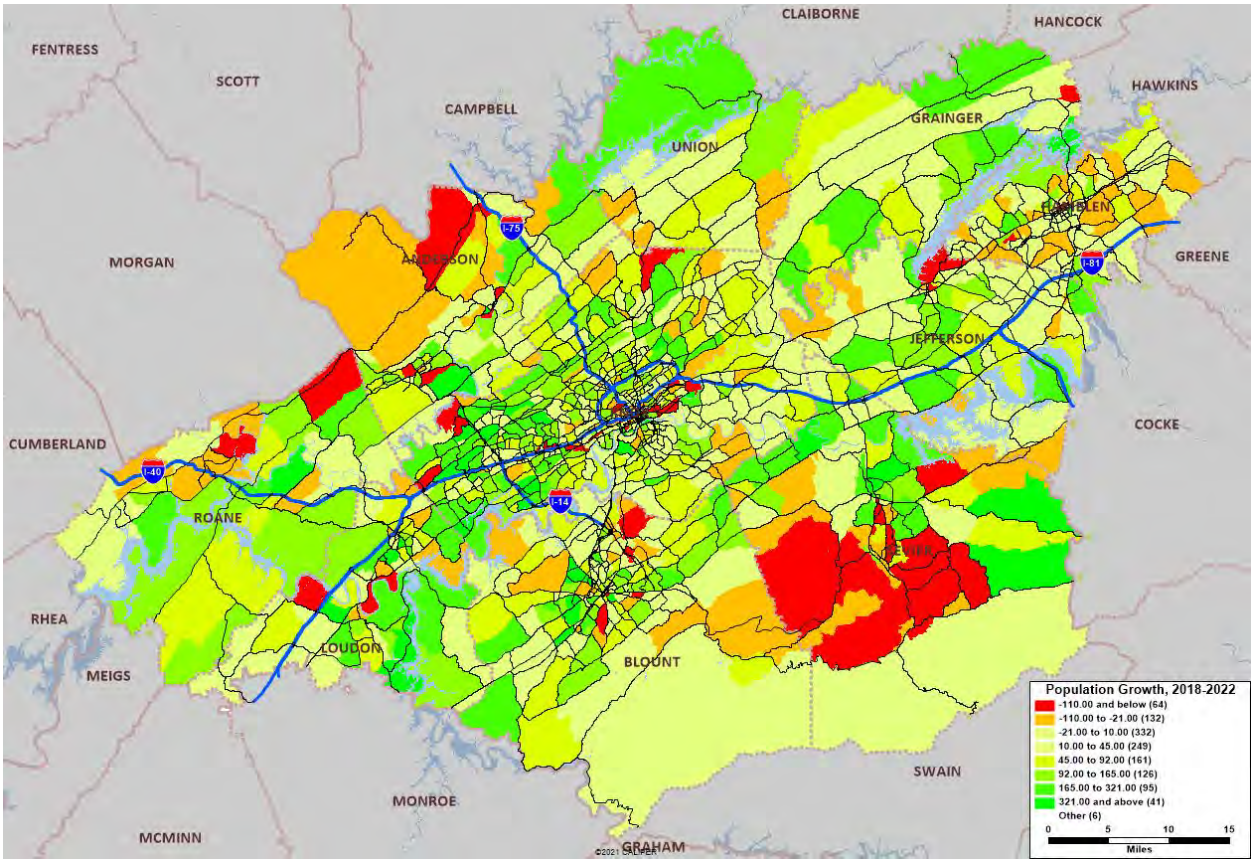

Figure 5. Population Growth by TAZ,, 2018-2022

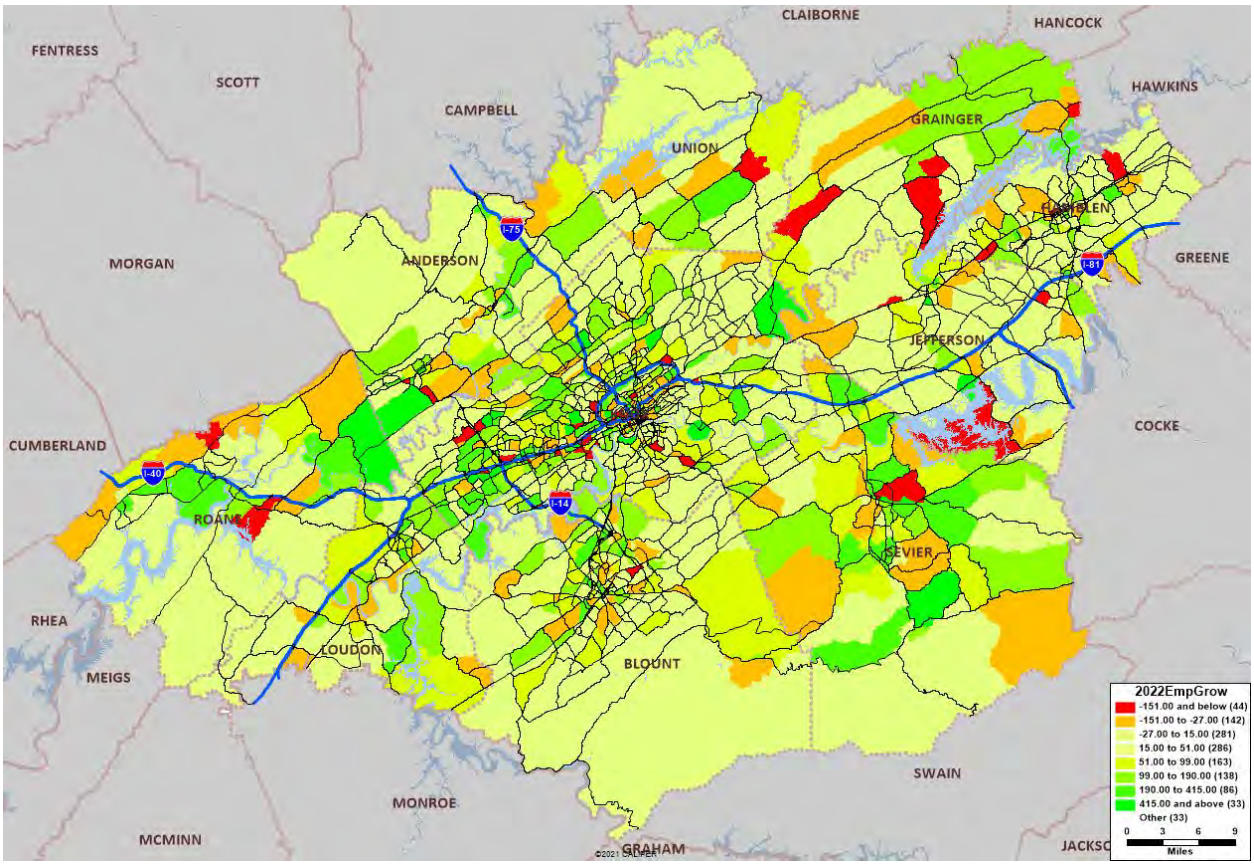

Figure 6. Employment Growth by TAZ, 2018-2022

Employment growth was slightly more dispersed than population growth with significant growth in all counties. Notable growth occurred in southwest Oak Ridge and parts of Sevier County.

While employment determines the location of many trips in the model, the number of trips is driven by the number of workers (by place of residence) as represented by the zonal number of workers per household in the model. Initial estimates of workers per household based on a proprietary dataset were low, with a regional average of 1.14 workers per household, in contrast to 1.24 workers per household in 2018. This represents too much unemployment and too few work tours. Therefore, TPO staff recalculated the workers per household using the actual Census' ACS data and obtained a regional average of 1. 22 workers per household, much more consistent with 2018. All other socio-economic variables appeared reasonable and consistent with previous data.

Tour and Stop Generation

It is evident from household surveys around the country and local traffic count and ACS data that trip-making has changed since the COVID pandemic. In particular, trip-making per capita, measured by tour and stop rates, has decreased. The largest and most notable decrease is associated with work travel where there has been a significant increase in remote work from home. School and other tour rates appear to be largely unaffected, but they have also seen a modest decrease in stops per tour.

Table 2. Regional Tour, Stop, and Trip Rates

	2000 + 2008 Survey	KRTM10	KRTM18	KRTM22
Work Tours	0.94	0.94	1.02	0.88
Work Stops	1.16	1.16	1.30	1.07
College Stops	0.03	0.02	0.02	0.02
Other Stops	0.90	0.88	0.98	0.82
School Tours	0.41	0.49	0.46	0.45
School Stops	0.42	0.50	0.47	0.46
Other Stops	0.21	0.22	0.22	0.21
Other Tours	1.48	1.55	1.54	1.54
Short Maintenance Stops	1.16	1.28	1.27	1.22
Long Maintenance Stops	0.70	0.80	0.80	0.78
Discretionary Stops	0.93	0.95	0.98	0.95
Tours/HH/day	2.84	2.98	3.02	2.87
Stops/HH/day	5.52	5.81	6.05	5.53
Trips/HH/day	8.35	8.79	9.07	8.39
Stops/Tour	2.06	1.95	2.00	1.93

It is valuable to look at both the typical travel behavior of individual travelers implied by tour and stop rates as well as the total numbers of tours, stops, and trips resulting from application to the population which has grown over time. Table 2 shows tour, stop, and trip rates from the original combined 2000 and 2008 household surveys used to develop the hybrid KRTM and the last three versions of the model. Prior to this new 2022 version of the KRTM the model's tour and stop rates were always higher than those observed in the survey. This is expected and due to the known phenomenon of under-reporting of trips in household surveys. Work and overall rates were highest in the 2018 model, while non-work rates were highest in the 2010 model. The 2022 model's rates are lower than previous versions of the model, significantly lower work tour and stop rates and just slightly lower school and other tour and trip rates. The non-work tour and stop rates as well as the overall rates remain just slightly higher than the survey rates, while the work tour and stop rates are clearly lower than the survey rates due to the

increase in remote work from home. Non-work tour rates are consistent with previous models, although the model shows a slight decrease in stops per tour (which may be explained by the substation of home delivery for shopping stops). The behavior in the model is reasonably consistent with the survey and previous models when allowing for the known increase in remote work from home.

Table 3 shows the total number of tours, stops, and trips in the region in the 2010, 2018, and 2022 base year models. Because the region is growing and the total number of households has been increasing, the number of tours has increased despite the decrease in work tours in 2022 versus 2018. The total number of stops and trips, however, decreased slightly from 2018 to 2022 in the model despite the larger population, due to decreases in the rates. There are clearly two different patterns, one for work travel, and one for non-work travel. Work travel increased from 2010 to 2018, but then fell in 2022. Non-work travel increased across the whole period from 2010 to 2022.

Table 3. Total Tour-, Stop-, and Trip-Making

		KRTM10	KRTM18	KRTM22
Work Tours		370,594	429,732	393,634
	Work Stops	458,234	548,716	477,177
	College Stops	9,188	9,586	8,372
	Other Stops	350,511	412,814	366,477
School Tours		193,056	193,218	200,339
	School Stops	197,535	197,700	204,987
	Other Stops	87,047	91,679	94,920
Other Tours		615,357	646,995	687,944
	Short Maintenance Stops	505,866	533,132	547,357
	Long Maintenance Stops	315,912	336,003	347,011
	Discretionary Stops	378,239	412,961	425,216
Tours/day		1,179,007	1,269,945	1,281,917
Stops/day		2,302,532	2,542,591	2,471,518
Trips/day		3,481,539	3,812,536	3,753,435
Total Households		396,156	420,516	447,242

Remote Work from Home

In order to recognize the phenomenon of remote work from home and to allow the user to test scenarios with higher or lower rates of remote work from home in the future, a simple module was added to change the number of tours and stops generated based on the rate of remote work from home. As the rate of remote work from home increases, the number of work tours and stops decrease; however, non-

work stops on work tours shift to become stops on Other Tours. This increase in non-work travel that partially offsets decreases in work travel has been observed in travel surveys and big data during and since the pandemic.

Table 4. Increase in Work from Home in the Census ACS Data

	2022			2010		
	Total Workers	Working from Home		Total Workers	Working from Home	
Knox	251,710	34,030	13.5%	204,933	7,670	3.7%
Anderson	32,457	3,006	9.3%	30,775	730	2.4%
Blount	65,700	10,400	15.8%	55,346	1,652	3.0%
Grainger	9,411	690	7.3%	9,103	408	4.5%
Hamblen	26,689	1,115	4.2%	25,738	810	3.1%
Jefferson	24,606	1,367	5.6%	21,459	578	2.7%
Loudon	24,262	2,318	9.6%	19,648	526	2.7%
Roane	23,119	1,915	8.3%	22,177	630	2.8%
Sevier	45,941	3,241	7.1%	42,033	1,327	3.2%
Union	8,124	743	9.1%	7,360	263	3.6%
All	512,019	58,825	11.5%	438,572	14,594	3.3%

Table 4 shows the increase in remote work from home from 2010 to 2022 in the Census Bureau's American Community Survey (ACS) data for the region. Although not shown in the table, it is important to recognize the uncertainty in these estimates due to the limited sample size of the ACS. It seems clear that for some of the smaller counties in particular (e.g., Grainger and Union in 2010 and Hamblen and perhaps Jefferson in 2022) the small sample size may well have resulted in errors in the rates. However, despite some errors. The pattern of increased work from home is clear and consistent across all counties.

Based on the ACS data, calibration of the 2022 model began from the assumption of 11.5% regional average in remote work from home. However, in validating the model to local traffic counts, it became evident that the ACS data may have under-estimated work from home in the Knoxville region. ACS estimates of work from home for the State of Tennessee (14.0%) and the nation as a whole (15.2%) are higher than those for the Knoxville region and simple sampling error may partially explain the lower regional rate. Therefore, the assumed rate of work from home for the region in 2022 was incrementally increased to 12.5% in the final validated model, still lower than, but slightly closer to the estimate for Tennessee as a whole and to the estimates for Knox and Blount Counties which may be more accurate due to their larger sample size.

Tour Mode Choice

The increase in remote work from home has not been the only recent change in travel behavior. Transit mode share has decreased. It was decreasing slowly prior to the pandemic and since the pandemic has been even lower. Unfortunately, this was not realized in the 2018 update of the model which substantially overpredicted transit ridership. For the 2022 base year update the tour mode choice model was recalibrated to match the ACS work mode shares and transit ridership (as reported in FTA's National Transit Database). ACS data for the region shows that transit mode share for journey to work (work tours) has decreased by nearly 50% from 2010 to 2022. Over that same period, observed KATS ridership has declined 40%. Since ACS only provides information on work tours, transit mode shares for UT, school and other tours must be inferred from total transit ridership. The ridership data suggests that the decrease in work transit trips accounts for the strong majority of the decrease in ridership, but slight decreases in transit mode share for the non-work tour types must have also occurred.

Table 5. Tour Mode Shares

Work Tours							
	Survey	ACS10	KRTM10	ACS18	KRTM18	ACS22	KRTM22
Auto	98.79%	97.86%	98.48%	98.50%	97.05%	98.09%	98.16%
Transit	0.62%	0.54%	0.75%	0.75%	2.15%	0.28%	0.28%
Walk/Bike	0.60%	1.60%	0.78%	0.75%	0.81%	1.62%	1.57%
UT Tours							
	Survey	KRTM10		KRTM18		KRTM22	
Auto	90.01%	82.56%		92.03%		87.26%	
Transit	1.95%	2.49%		1.34%		4.81%	
Walk/Bike	8.05%	14.96%		6.64%		7.94%	
School Tours							
	Survey	KRTM10		KRTM18		KRTM22	
Auto	81.15%	81.07%		81.51%		81.56%	
Transit	0.18%	0.14%		0.54%		0.18%	
Walk/Bike	1.07%	1.29%		0.87%		1.09%	
School Bus	17.59%	17.51%		17.09%		17.17%	

Other Tours				
	Survey	KRTM10	KRTM18	KRTM22
Auto	98.19%	97.84%	98.19%	98.13%
Transit	0.10%	0.12%	0.33%	0.11%
Walk/Bike	1.71%	2.04%	1.48%	1.77%

Table 5 shows tour mode shares from the original combined 2000 and 2008 survey, and ACS and model results for 2010, 2018, and 2022. The mode shares in the KRTM generally reflect the mode shares in

the original survey used to develop it. However, the KRTM 2022 has been recalibrated, primarily to match the latest ACS data on work tour mode shares. Table 6 shows the total KATS ridership over time both as modeled by the KRTM and reported by FTA. In 2010 the KRTM's ridership was about 10% higher than reported. In 2018, the model was not well calibrated for transit ridership, estimating over four times too much ridership. The 2022 KRTM has been recalibrated to match observed ridership (in linked trips).

Table 6. KATS System Ridership

Transit Ridership	2010	2018	2022
Modeled	10,126	31,279	6,149
Observed	9,194	7,217	6,225

The updated tour mode choice also reflects updated input variables for 2022. Since the 2010 model, the KRTM has been calibrated to use year 2010 dollars, so bus fares and gas prices must be adjusted for inflation. KATS fares have decreased in both nominal and real dollars. KATS single trip fare is now $1 which is only $0.75 in year 2010 dollars. As can be seen in Figure 7, gas prices are always fluctuating, and gas prices experienced a minor spike from March to August of 2022, but over the whole of 2022, they averaged about $3.60/gallon in current year dollars. Converting to year 2010 dollars this comes to a price of $2.65/gallon. As Knoxville gas prices have averaged something more like $3.10/gallon through 2023 and early 2024 ($2.21 in year 2010 dollars), it may be reasonable to use a lower gas price along these lines in forecasting as with the exception of the 2022 spike, local gas prices have been reasonably flat over the past decade (see Figure 8).

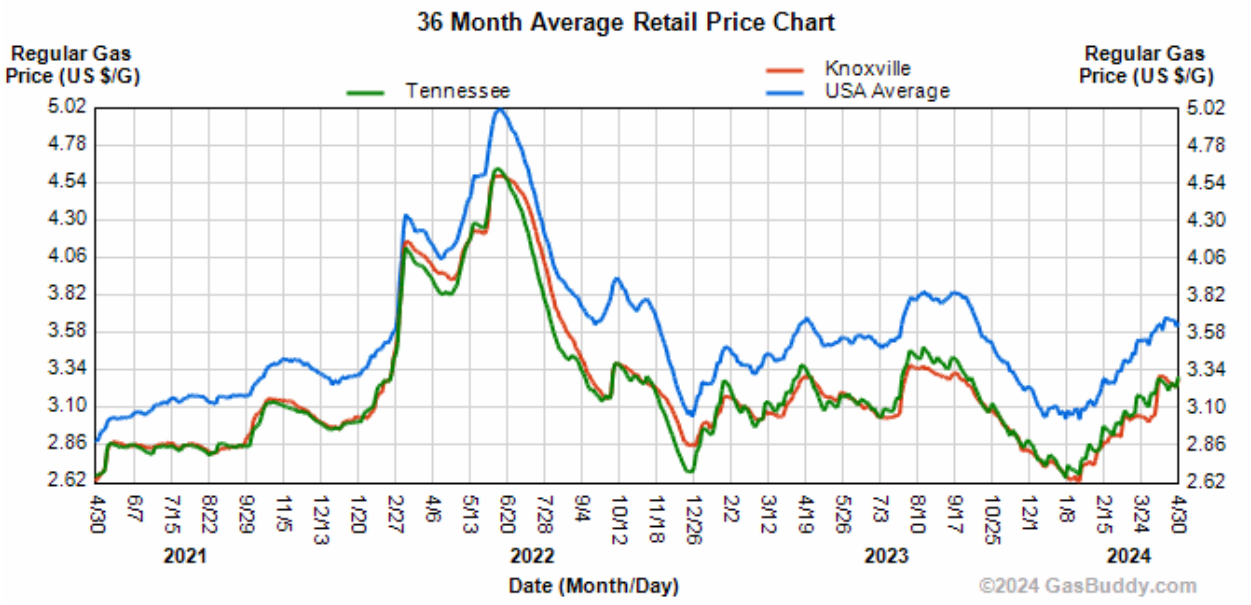

Figure 7. Knoxville Gas Prices 2021-2024 (GasBuddy.com)

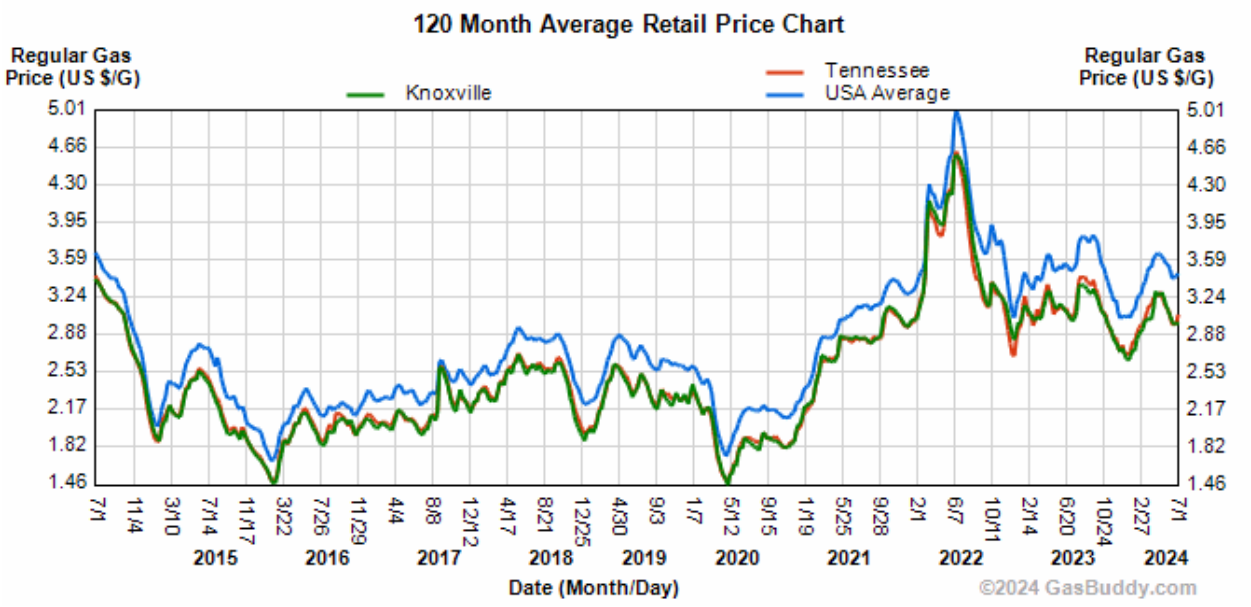

Figure 8. Knoxville Gas Prices over the Past Decade (GasBuddy.com)

Stop Location Choice

Stop location choice or destination choice is not expected to have changed significantly from prior to the pandemic, although new survey data would help to confirm this or measure any changes that have occurred. However, some adjustments to the model parameters were necessary in order to reproduce observed travel times from home and intrazonal percentages from the original survey. As in the prior updates, the main adjustment was to the parameters for residential accessibility interacted with travel time and the intrazonal parameter; however, as it was observed that county cutlines and river crossings were high versus counts, the parameters for the impact of these psychological barriers were increased. A 60% increase in the river crossing effect and a 65% increase in the county line crossing effect achieved better agreements of the resulting assignment with counts. However, the actual increase in terms of equivalent time for these barriers increased by less than these proportions since the impedance parameters also increased. Table 7 shows that updated model is well calibrated to the original survey data. However, given the need to adjust the model parameters, it is recommended that the next model update be based on new data.

Table 7. Comparison of Observed and Modeled Travel Times and Percent Intrazonal

		Mean Travel Time from Home		Intrazonal Percentage	
Work Tours		Observed	Modeled	Observed	Modeled
	Work (Low Income)	15.3	15.4	3.3	3.1
	Work Stops	18.5	18.7	3.0	3.3
	College Stops	20.8	20.8	0.0	0.4
	Other Stops	14.6	14.9	4.2	4.0
UT Tours					
	Other Stops	15.9	15.7	4.2	3.7
School Tours					
	School Stops	10.1	9.8	11.3	11.3
	Other Stops	12.4	12.9	8.8	5.6
Other Tours					
	Short Maintenance Stops	11.7	11.7	7.6	7.7
	Long Maintenance Stops	15.0	15.1	3.4	3.6
	Discretionary Stops	14.2	14.4	6.6	6.8

Stop Sequence Choice

The second spatial choice model in the KRTM which ensures the consistency of its trip tables with tours is stop sequence choice. In this model, the home locations and stops from stop location choice are connected to form trips consistent with closed tours. The goodness-of-fit of these models is determined by comparing the observed and modeled trip lengths (in travel time) and percent diagonal or intrazonal. For each tour time home-based and non-home-based trips can be separately compared though they are produced by the same model. As Table 8 shows, the updated model reproduces the observed trip characteristics from the original survey very well, and notably better than the previous updates, particularly regarding intrazonals.

Table 8. Observed and Modeled Trip Lengths and Percent Intrazonal

					Percent Diagonal			
Trip Type	Observed	KRTM10	KRTM18	KRTM22	Observed	KRTM10	KRTM18	KRTM22
Work Tours	14.9	14.5	14.7	15.0	5.1	4.0		5.2
Work Tours - Home-Based	16.3	16.1	16.5	16.4	4.1	5.0		4.2
Work Tours - Non-Home	12.4	11.7	11.7	12.5	7.0	2.1		6.9
UT Tours	15.0	10.6	11.2	15.2	1.2	1.6		1.7
UT Tours - Home-Base	16.3	10.8	11.4	16.3	0.6	2.0		1.4
UT Tours - Non-Home	12.1	9.9	10.5	12.6	2.7	0.3		2.2
School Tours	10.5	10.5	10.5	10.5	10.7	8.8		10.9
School Tours - Home-Based	10.3	10.2	10.3	10.4	11.0	10.3		11.1
School Tours - Non-Home	11.2	12.2	11.9	11.1	9.8	0.6		9.8
Other Tours	12.1	11.9	12.0	12.3	8.5	5.5		8.8
Other Tours - Home-Based	12.7	12.7	12.5	12.6	7.6	7.4		8.5
Other Tours - Non-Home	10.6	9.9	9.5	10.6	10.8	1.2		10.6

The final distribution of passenger trips for the region, reflecting the combined results of stop location and stop sequence choices, was also validated by comparing the final total passenger origin-destination (OD) trips with the distributions observed in the combined 2000-2008 survey and the 2022 Transography data. The tables below compare the aggregate county-to-county OD flows. To facilitate comparison because Hamblen and Grainger counties were not included in the survey data, they have been omitted in all the tables.

Table 9. All trips from the 2000-2008 survey

	Anderson	Blount	Jefferson	Knox	Loudon	Roane	Sevier	Union
Anderson	7.9%	0.0%	0.0%	1.1%	0.0%	0.8%	0.0%	0.0%
Blount	0.0%	9.9%	0.0%	1.7%	0.2%	0.0%	0.2%	0.0%
Jefferson	0.0%	0.0%	3.8%	0.3%	0.0%	0.0%	0.1%	0.0%
Knox	1.1%	1.7%	0.3%	49.3%	0.6%	0.3%	0.9%	0.4%
Loudon	0.0%	0.1%	0.0%	0.6%	4.0%	0.2%	0.0%	0.0%
Roane	0.7%	0.1%	0.0%	0.3%	0.2%	3.3%	0.0%	0.0%
Sevier	0.0%	0.2%	0.1%	0.9%	0.0%	0.0%	6.9%	0.0%
Union	0.0%	0.0%	0.0%	0.4%	0.0%	0.0%	0.0%	0.9%

Table 10. All trips from the 2023 Transography data

	Anderson	Blount	Jefferson	Knox	Loudon	Roane	Sevier	Union
Anderson	6.8%	0.1%	0.0%	1.0%	0.0%	0.3%	0.0%	0.0%
Blount	0.1%	12.0%	0.0%	1.2%	0.2%	0.0%	0.3%	0.0%
Jefferson	0.0%	0.0%	3.1%	0.3%	0.0%	0.0%	0.2%	0.0%
Knox	1.0%	1.2%	0.3%	48.2%	0.6%	0.2%	0.6%	0.2%
Loudon	0.0%	0.2%	0.0%	0.6%	3.9%	0.1%	0.0%	0.0%
Roane	0.3%	0.0%	0.0%	0.2%	0.1%	3.6%	0.0%	0.0%
Sevier	0.0%	0.3%	0.2%	0.6%	0.0%	0.0%	10.5%	0.0%
Union	0.0%	0.0%	0.0%	0.3%	0.0%	0.0%	0.0%	0.8%

Table 11. All trips from the 2022 KRTM

	Anderson	Blount	Jefferson	Knox	Loudon	Roane	Sevier	Union
Anderson	5.2%	0.0%	0.0%	1.5%	0.0%	0.4%	0.0%	0.1%
Blount	0.0%	12.0%	0.0%	1.6%	0.3%	0.0%	0.4%	0.0%
Jefferson	0.0%	0.0%	2.6%	0.3%	0.0%	0.0%	0.3%	0.0%
Knox	1.6%	1.6%	0.3%	47.1%	1.0%	0.4%	1.0%	0.4%
Loudon	0.0%	0.3%	0.0%	1.0%	2.7%	0.2%	0.0%	0.0%
Roane	0.4%	0.0%	0.0%	0.4%	0.2%	3.0%	0.0%	0.0%
Sevier	0.0%	0.4%	0.3%	0.7%	0.0%	0.0%	11.0%	0.0%
Union	0.1%	0.0%	0.0%	0.3%	0.0%	0.0%	0.0%	0.8%

All the sources agree that the majority of trips are intra-county, with just under half of all trips in the region occurring entirely within Knox County. The 2022 KRTM's distribution matches the 2022 Transography data slightly better than the 2000-2008 survey distribution, perhaps indicating that the model is accurately reflecting some real, albeit minor changes in OD patterns in the region. The KRTM appears it may be slightly high on inter-county trips and slightly low on intra-county trips, but the error is small. Re-estimating the county boundary psychological barrier term from new data would be expected to fix this in a new model.

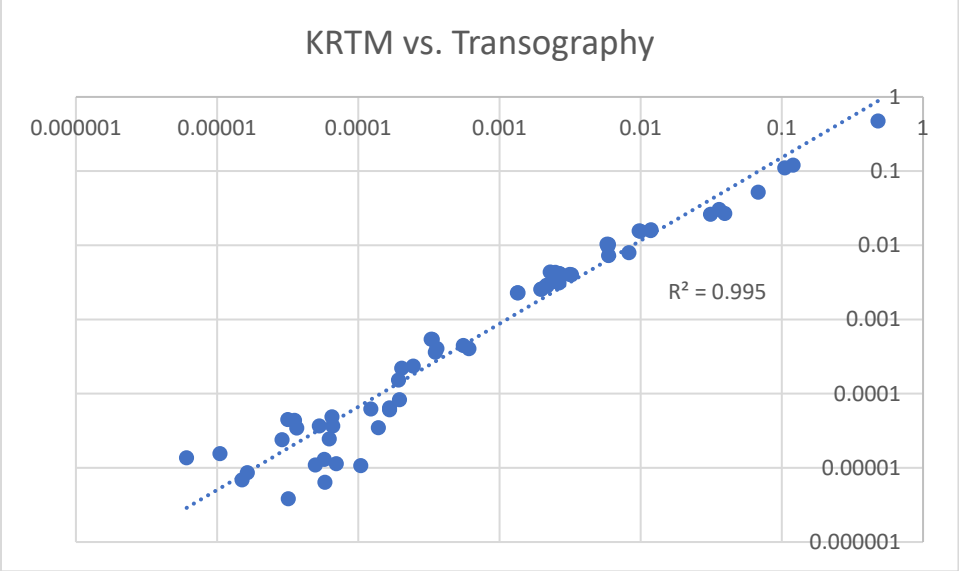

Figure 9. County-to-County OD flows, KRTM vs. Transography

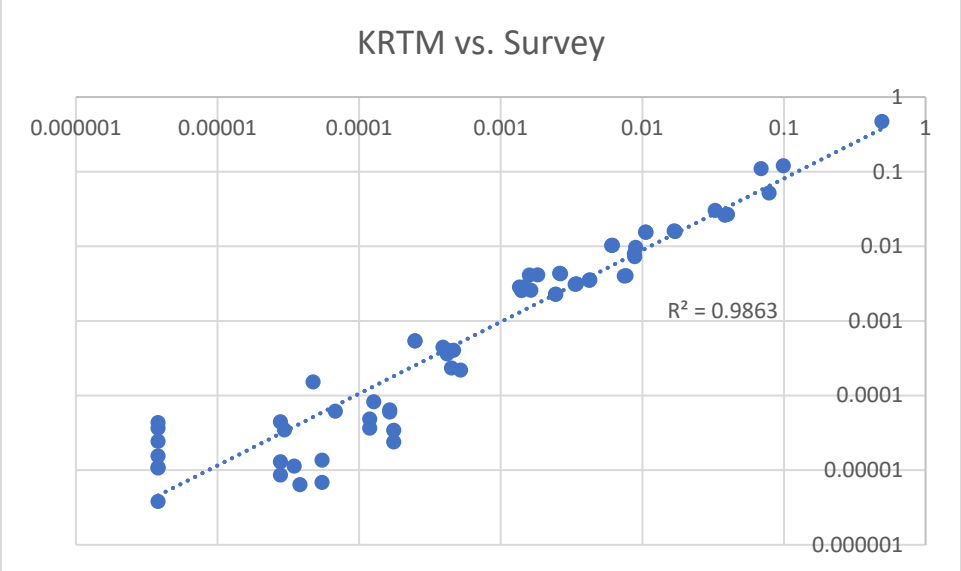

Figure 10. County-to-County OD flows, KRTM vs. Survey

Because the county-to-county flows are dominated by intra-county trips, it is also helpful to look at just the inter-county trip patterns. Again, it is clear that all three sources present basically the same pattern. The model appears to be doing a very good job of reproducing observed flows at least at a high level.

Table 12. Intercounty OD flows from 2000-2008 Survey

	Anderson	Blount	Jefferson	Knox	Loudon	Roane	Sevier	Union
Anderson		0.3%	0.1%	7.6%	0.3%	5.5%	0.0%	0.2%
Blount	0.3%		0.1%	12.2%	1.2%	0.3%	1.3%	0.0%
Jefferson	0.1%	0.1%		2.4%	0.0%	0.0%	1.0%	0.0%
Knox	7.6%	12.0%	2.5%		4.4%	1.9%	6.4%	3.1%
Loudon	0.3%	1.0%	0.0%	4.4%		1.7%	0.0%	0.0%
Roane	5.4%	0.4%	0.0%	1.9%	1.8%		0.0%	0.0%
Sevier	0.1%	1.1%	1.1%	6.3%	0.0%	0.0%		0.1%
Union	0.2%	0.0%	0.0%	3.0%	0.0%	0.0%	0.1%	

Table 13. Intercounty OD flows from 2022 Transography data

	Anderson	Blount	Jefferson	Knox	Loudon	Roane	Sevier	Union
Anderson		0.6%	0.1%	9.1%	0.3%	2.9%	0.2%	0.3%
Blount	0.5%		0.2%	10.8%	1.8%	0.2%	2.4%	0.1%
Jefferson	0.1%	0.2%		2.4%	0.1%	0.1%	2.0%	0.0%
Knox	8.9%	10.8%	2.4%		5.3%	2.3%	5.4%	2.3%
Loudon	0.3%	1.8%	0.0%	5.4%		1.2%	0.1%	0.0%
Roane	3.0%	0.2%	0.0%	2.1%	1.2%		0.1%	0.0%
Sevier	0.2%	2.4%	2.0%	5.4%	0.1%	0.1%		0.0%
Union	0.3%	0.0%	0.0%	2.3%	0.0%	0.0%	0.0%	

Table 14. Intercounty OD flows from 2022 KRTM

	Anderson	Blount	Jefferson	Knox	Loudon	Roane	Sevier	Union
Anderson		0.3%	0.0%	9.8%	0.2%	2.6%	0.1%	0.3%
Blount	0.3%		0.0%	10.0%	1.6%	0.1%	2.6%	0.0%
Jefferson	0.0%	0.0%		2.0%	0.0%	0.0%	1.8%	0.0%
Knox	9.9%	10.2%	2.0%		6.5%	2.7%	6.1%	2.3%
Loudon	0.3%	1.6%	0.0%	6.5%		1.4%	0.0%	0.0%
Roane	2.5%	0.1%	0.0%	2.7%	1.4%		0.0%	0.0%
Sevier	0.1%	2.6%	1.8%	4.6%	0.0%	0.0%		0.0%
Union	0.3%	0.0%	0.0%	2.2%	0.0%	0.0%	0.0%	

External Trips

The KRTM's external trips were also updated using the 2022 Transography data. This is the first time new data has been available to update the model's external trips since the 2009 model development. The new data shows both similarities and differences in the external travel patterns for the region.

Based on the 2007 license plate matching study, 19% of all external trips were through trips. However, given the loose limit on elapsed time between the captures this includes trips that made a stop (i.e., for gas or food) in the region. The Transography commercial vehicle data, on the other hand, considers trips making a stop within the region as an EI and an IE trip (two trips) rather than a single, through EE trip. For that reason, the Transography data shows 10.5% of external trips as through trips. However, since the model was designed for the looser definition of through trips, the EE trips from Transography were scaled up to be loosely consistent with the previous level of through trips.

Both datasets show the dominance of the interstates, but the 2022 Transography data shows the I-75 through movement as more dominant; whereas, the 2007 license place study, the I-75 and I-40 through movements and exchanges were more balanced in magnitude. The difference is meaningful, but not necessarily implausible suggesting some real change in long distance travel patterns through the region. The 2022 KRTM accordingly reflects the newer data.

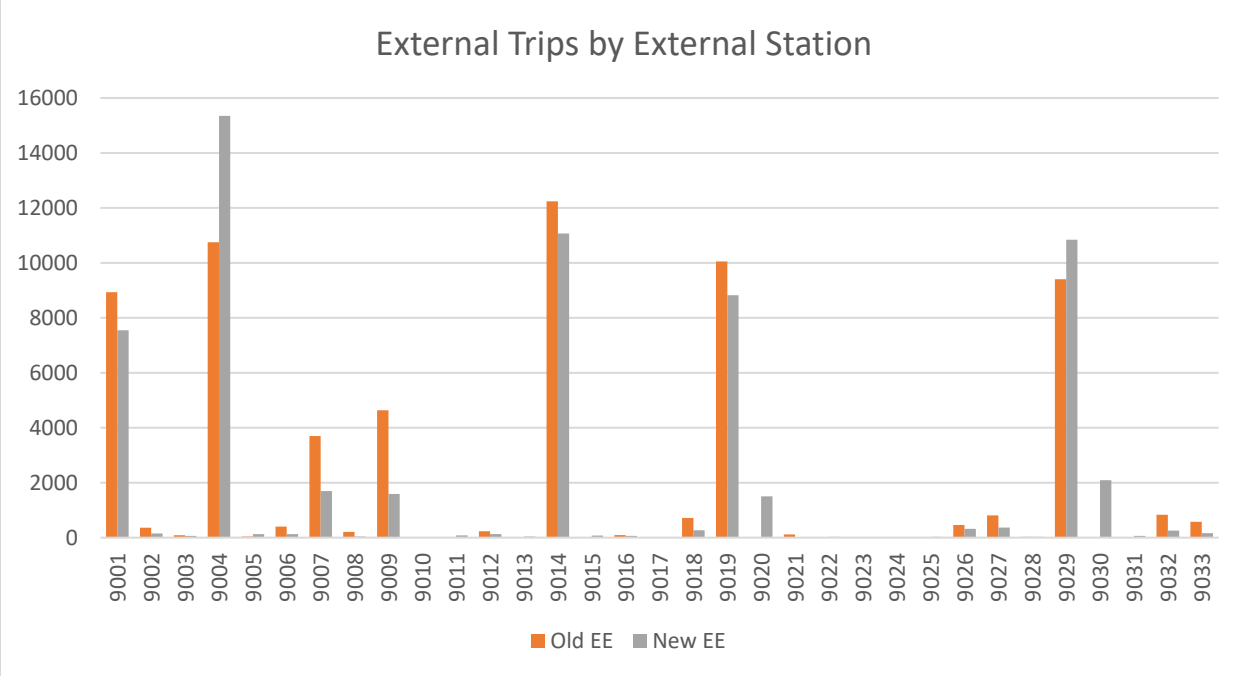

Figure 11. External Trips by External Station

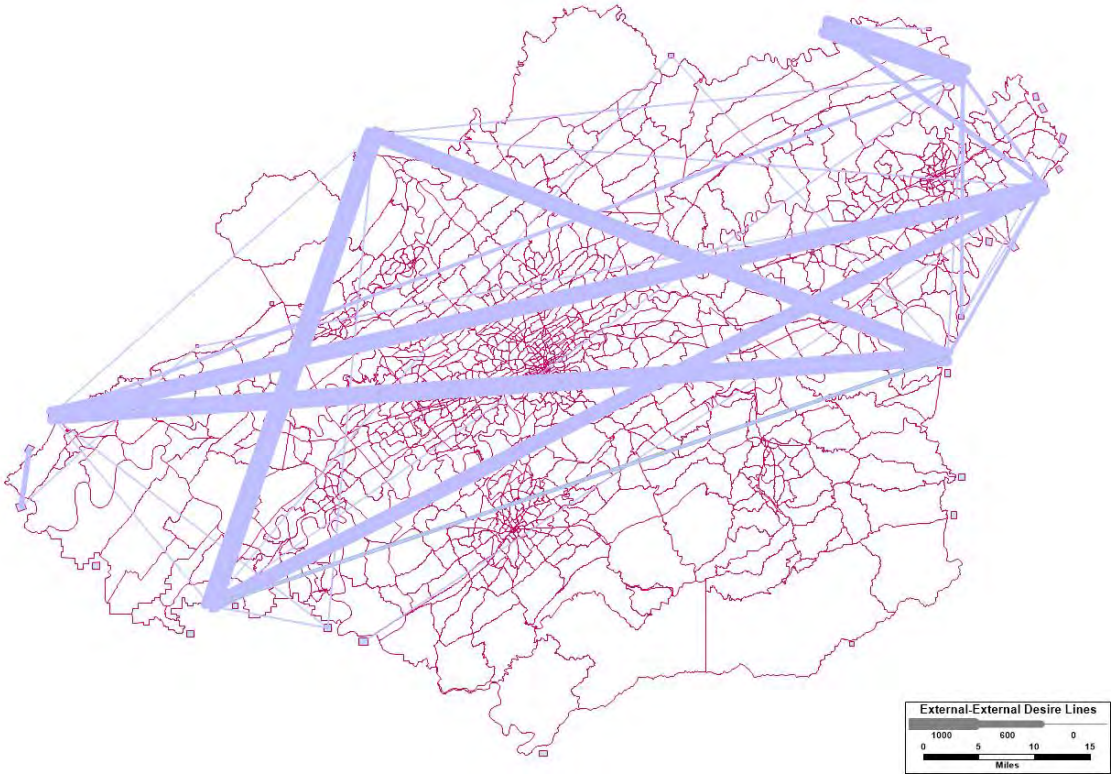

Figure 12. EE Desire Lines based on 2007 Survey

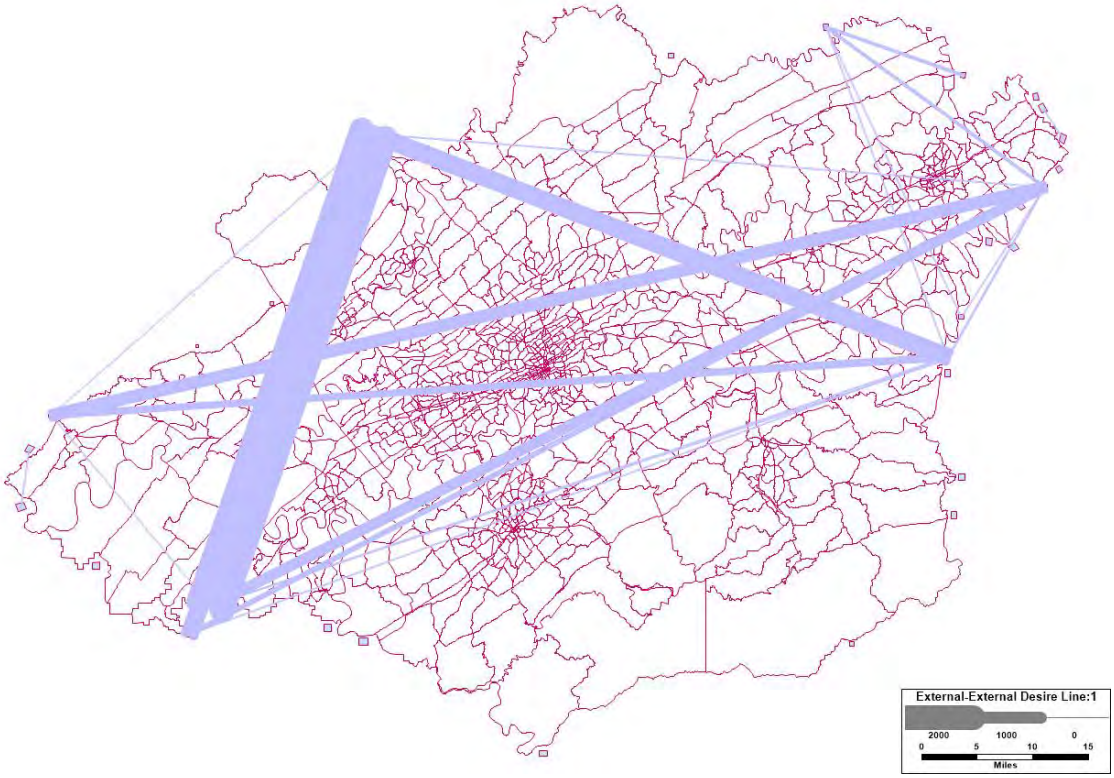

Figure 13. EE Desire Lines based on 2022 Transography data

Table 15. External Trip Time-of-Day Distributions

	All External Cars 2007	EE 2022	EI 2022
AM	7.82%	10.51%	11.89%
PM	20.75%	21.96%	23.24%
OP	71.43%	67.54%	64.87%

The Transography data was also used to estimate new time-of-day factors for external trips. Again, as in the geographic patterns, there was overall similarity, but also some differences between the 2007 and 2022 data. The 2022 KRTM reflects slightly more external traffic in the AM and PM peak periods, although the majority of external trips remain in the off-peak period.

Assignment Validation

In the final step of the travel model, the vehicle trip tables for each class are assigned to the model network. External automobile trips and single and multiple unit trucks are loaded first, on the assumption that they do not divert do to congestion. Then, local automobile trips are assigned routes through the network on the "user equilibrium" assumption that only minimum congested travel cost routes are used. The Knoxville regional model makes use of TransCAD 9.0's origin-based algorithm to solve for the user equilibrium solution to a high level of precision (0.0001 relative gap). More precise or more tightly converged assignment solutions are more stable and have more localized sensitivity.

The CAL_REP module was used to create maps with a color theme based on loading error and a scaled symbol/width theme on absolute error as well as to report model performance for the:

- network as a whole,
- functional classes,
- volume group ranges,
- designated screenlines,
- designated corridors,
- area types, and
- counties.

The assignment loading error map is shown in Figure 14. As can be seen, the loading errors are generally randomly distributed, indicating that systematic errors have been addressed in calibration.

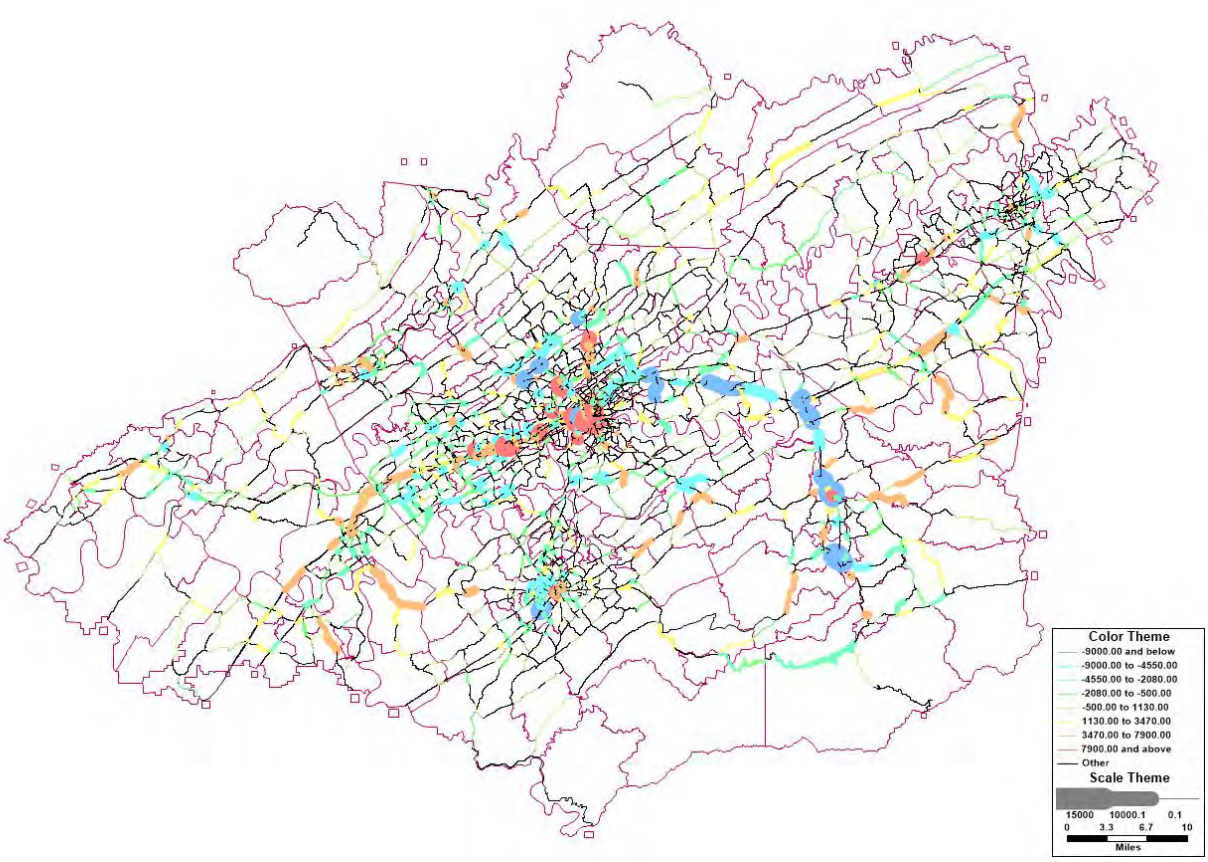

Figure 14. Model Loading Errors

Error statistics reported and used for diagnosing the possible sources of model error are:

- percent root mean square errors,
- systemwide average error,
- mean loading errors and percentage errors, and
- total VMT and percentage errors.

Attention is always needed to the traffic counts, themselves, since the validation is only as good as the counts. In the course of the model's validation, several suspicious counts were identified and removed or corrected in coordination with the TPO and TDOT. Arterial and collector counts appeared to be fine, but freeway counts appeared to have issues. This has been the case in at least the last four model validations for the region going back to at least 2004. The two issues which have indicated issues with the freeway counts have been large year-to-year variations and inconsistencies of counts at interchanges (where the sum of the counts going into a link do not equal the value of the count on the link). As in the past, suspicious freeway counts were reviewed and revised to improve their consistency with other counts (upsteam and downsteam as well as across years). Roughly one third (57 of 176) of all freeway counts were revised. The average adjustment was just over 1,700 or just under 5% of the count value. Thus, the adjustments were generally not large, but they were significant.

The Minimum Travel Demand Model Calibration and Validation Guidelines for State of Tennessee Updated 2016 identifies several guidelines for demonstrating that a model is well calibrated. However, as the document itself is clear to state, the fulfillment of these guidelines does not ensure that a model is well validated nor does the failure of a model to meet every target or standard mean the model is necessarily not well calibrated. The tables below correspond to the standards adopted by TNMUG. In each case they compare the modeled traffic volumes to observed traffic counts. A variety of error statistics are used. Most of the guidelines focus on the simple Percent Error.

Table 16 shows the three standards based on percent difference in value (by classification, by volume group, and by screenline). The model clearly meets all the standards (including preferred) with the exception of one sceenline which exceeds the standard by less than half a percent. This represents very good fit.

Table 16. Percent Difference in Volume Standards

Classification	Acceptable	Preferred	Model Value	Pass / Fail	Average Count	Average Modeled	Number of Observations
Freeways	7%	6%	1.9%	Pass	17,376	17,576	447
Arterials	15%	10%	-2.4%	Pass	14,277	13,920	601
Collectors	25%	20%	-11.5%	Pass	3,688	3,300	1,211
Volume Group	Acceptable	Preferred	Model Value	Pass / Fail	Average Count	Average Modeled	Number of Observations
0 - 1000	200%	60%	45.6%	Pass	634	947	188
1001 - 2,500	100%	47%	-3.6%	Pass	1,721	1,810	332
2,501 - 5,000	50%	36%	-0.5%	Pass	3,626	3,620	330
5,001 - 10,000	29%	25%	-4.5%	Pass	7,192	6,876	395
10,001 - 25,000	25%	20%	-2.2%	Pass	15,903	15,534	400
25,001 - 50,000	22%	15%	-1.3%	Pass	33,426	32,777	172
> 50,000	21%	10%	-0.6%	Pass	71,964	71,010	32
Screenline	Standard		Model Value	Pass / Fail	Average Count	Average Modeled	Number of Observations
External	1%		0.6%	Pass	10,304	10,241	33
Knox+Blount	10%		5.9%	Pass	12,913	13,448	21
Knox	10%		6.8%	Pass	19,942	21,157	39
Blount	10%		2.1%	Pass	11,722	12,002	10
Rivers	10%		7.2%	Pass	18,451	19,676	19

InnerKnoxville	10%	6.6%	Pass	24,847	26,459	19
West Counties	10%	10.5%	Fail	19,236	21,264	10
East Counties	15%	7.6%	Pass	6,589	7,544	7
North Counties	15%	10.1%	Pass	5,243	5,781	8
Knox-Blount	15%	3.6%	Pass	18,815	19,543	8
NW Counties	20%	12.6%	Pass	2,367	2,663	8

Figure 14 plots the difference between the model volumes and traffic counts. It also displays the line of fit and coefficient of determination (R^2). The TNMUG standard for R^2 is 0.88. The model clearly exceeds this at a value of 0.95.

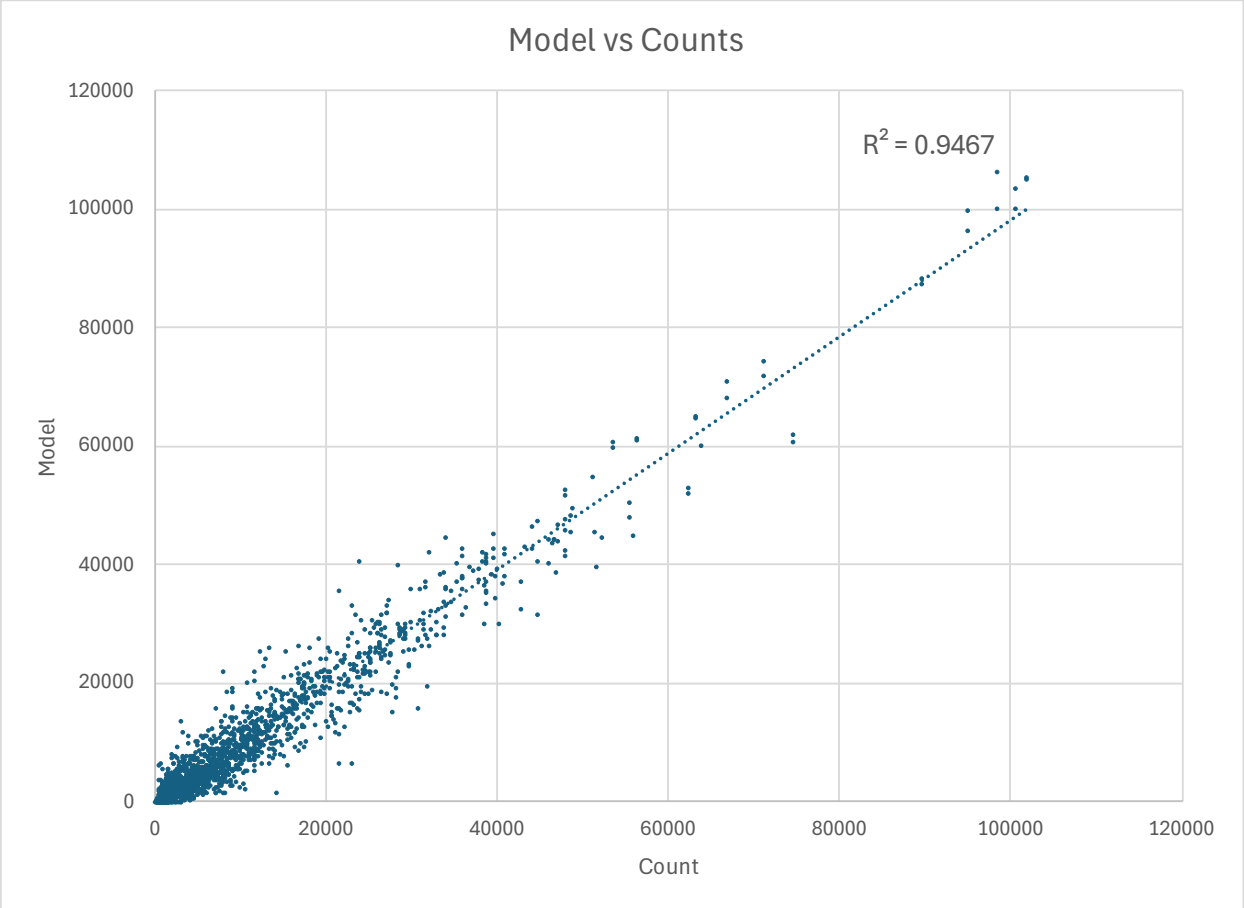

Figure 15. Scatterplot of Model Volumes versus Traffic Counts

Table 17 compares the model to the TNMUG standards for root mean square error. The Percent Root Mean Square Error (% RMSE) is used in addition to percent error and is the traditional and perhaps the single best overall error statistic for comparing loadings to counts. It has the following mathematical formulation:

$$\%RMSE = \frac{\sqrt{\frac{\sum(Count - Loading)^2}{Number\ of\ Observations}}}{Average\ Count} \times 100$$

The model meets the TNMUG standard for Acceptable for all categories and exceeds the Preferred for several categories and for the model overall.

Table 17. Root Mean Square Error (RMSE) Standards

Classification	Standard		Model Value	Pass / Fail	Average Count	Average Modeled	Number of Observations
Freeways	20%		18.4%	Pass	17,376	17,576	447
Major Arterials	35%		21.1%	Pass	19,805	20,412	231
Minor Arterials	50%		31.2%	Pass	10,825	9,867	370
Collectors	60%		58.6%	Pass	3,688	3,300	1,209
Volume Group	Acceptable	Preferred	Model Value	Pass / Fail	Average Count	Average Modeled	Number of Observations
0 – 4,999	100%	45%	71.9%	Pass	2,217	2,319	849
5,000 - 9,999	45%	35%	39.6%	Pass	7,192	6,876	395
10,000 - 14,999	35%	27%	29.4%	Pass	12,118	11,884	194
15,00 - 19,999	30%	25%	21.8%	Pass	17,178	17,264	118
20,000 - 29,999	27%	15%	20.2%	Pass	24,632	23,746	162
30,000 - 49,999	25%	15%	11.3%	Pass	38,186	37,366	98
50,000 - 59,999	20%	10%	11.0%	Pass	53,864	52,114	11
60,000+	19%	10%	7.1%	Pass	81,446	80,908	21
All	45%	35%	28.8%	Pass	10,355	10,178	1,848

The model meets all of the assignment validation standards set forth *Minimum Travel Demand Model Calibration and Validation Guidelines for State of Tennessee* with the exception of one screenline which is very close to the standard and may be attributable to small errors in the counts. The 2022 base year model performs very similarly, but perhaps just slightly better than the 2018 model (28.8% vs 31.3% RMSE, 0.95 vs 0.94 R^2) which was considered well validated. It is reasonable to conclude that the model is well calibrated and validated by observed traffic counts.

Finally, as an additional check, total Vehicle Miles of Travel (VMT) by functional classification from the model for the base year 2022 was compared to actual FHWA Highway Performance Management System (HPMS) data. Table 18 shows that the model is reasonably replicating total traffic and only minor adjustments will need to be utilized for the on-road mobile source emissions analyses for transportation conformity determinations.

Table 18. Model VMT versus HPMS VMT for Base Year 2022

	Rural Int	Rural Principal Arterial	Rural Minor Arterial	Rural Major Collector	Rural Minor Collector	Rural Local	Urban Int	Urban Freeway	Urban Principal Arterial	Urban Minor Arterial	Urban Major Collector	Urban Minor Collector	Urban Local	Total
ANDERSON HPMS	471,999	36,077	-	163,454	73,452	56,613	152,679	-	741,200	278,791	110,751	67,115	452,210	2,614,335
ANDERSON Model	481,397	29,543	-	138,741	11,320	6,005	156,492	-	732,056	258,945	81,154	36,067	13,366	1,945,087
HPMS Factor	0.98	1.22	N/A	1.18	6.49	9.43	0.98	N/A	1.01	1.08	1.36	1.86	34.58	1.34
BLOUNT HPMS	-	220,214	102,428	73,748	37,785	112,124	95,656	39,187	1,121,995	517,890	289,484	213,705	743,306	3,567,522
BLOUNT Model	-	247,432	112,740	71,381	26,051	17,321	95,798	42,598	1,125,981	472,064	189,590	151,843	21,383	2,574,183
HPMS Factor	N/A	0.89	0.91	1.03	1.45	6.47	1.00	0.92	1.00	1.10	1.53	1.41	34.76	1.39
HAMBLEN HPMS	345,793	19,066	-	54,452	45,409	55,520	38,626	-	794,225	234,371	153,033	29,807	299,739	2,069,041
HAMBLEN Model	403,524	2,049	-	61,762	15,305	1,953	26,574	-	702,425	204,169	101,398	9,776	11,876	1,540,811
HPMS Factor	0.86	8.82	N/A	0.88	2.97	28.42	1.45	N/A	1.13	1.15	1.51	3.05	25.24	1.34
JEFFERSON HPMS	1,547,244	20,930	369,499	220,566	137,452	148,336	33,266	-	165,287	91,143	17,147	6,276	49,185	2,796,331
JEFFERSON Model	1,588,236	-	432,327	329,280	95,722	11,061	42,042	-	188,018	86,198	13,661	3,605	2,500	2,792,648
HPMS Factor	0.97	N/A	0.83	0.67	1.44	13.41	0.79	N/A	0.88	1.06	1.26	1.74	19.67	1.00
KNOX HPMS	684,474	-	96,594	115,954	115,223	126,976	6,304,386	124,458	2,519,910	2,582,889	795,257	711,990	3,458,742	17,636,853
KNOX Model	647,239	-	107,893	103,803	91,804	20,865	5,685,272	95,468	2,503,585	2,140,622	652,935	553,879	236,561	12,839,927
HPMS Factor	1.06	N/A	0.90	1.12	1.26	6.09	1.11	1.30	1.01	1.21	1.22	1.29	14.62	1.37
LOUDON HPMS	461,656	134,626	73,623	46,462	61,979	53,767	793,014	-	279,284	275,349	60,456	59,552	199,024	2,498,786
LOUDON Model	510,227	167,569	113,018	60,485	22,669	-	908,837	-	277,182	290,461	33,061	21,696	326	2,405,532
HPMS Factor	0.90	0.80	0.65	0.77	2.73	N/A	0.87	N/A	1.01	0.95	1.83	2.74	610.78	1.04
ROANE HPMS	380,047	64,347	80,987	58,101	56,102	64,632	701,249	-	382,229	305,383	27,032	46,294	124,699	2,121,102
ROANE Model	343,291	68,956	87,644	54,487	11,902	-	687,259	-	410,112	152,854	20,541	22,561	17,611	1,877,218
HPMS Factor	0.96	0.93	0.92	1.07	4.71	N/A	1.02	N/A	0.88	1.34	1.32	2.05	7.08	1.13
SEVIER HPMS	-	221,771	527,198	184,606	163,796	542,714	371,369	-	1,352,602	231,582	273,622	54,448	684,574	4,608,282
SEVIER Model	-	221,683	567,606	193,271	54,572	48,421	360,311	-	1,118,487	325,371	196,290	26,825	27,324	3,139,162
HPMS Factor	N/A	1.00	0.93	0.96	3.00	11.21	1.03	N/A	1.21	0.71	1.40	2.03	25.05	1.47

	Total Interstate	Total Principal Arterial	Total Minor Arterial	Total Major Collector	Total Minor Collector	Total Local
ANDERSON HPMS	624,672	777,277	278,791	274,205	140,567	518,823
ANDERSON Model	637,889	761,599	258,945	219,896	47,388	19,371
HPMS Factor	0.98	1.02	1.08	1.25	2.97	26.78
BLOUNT HPMS	95,656	1,342,209	620,318	363,232	251,490	855,430
BLOUNT Model	95,798	1,373,413	584,804	260,971	177,894	38,704
HPMS Factor	1.00	0.98	1.06	1.39	1.41	22.10
HAMBLEN HPMS	384,419	812,291	234,371	207,485	75,216	355,259
HAMBLEN Model	430,099	704,474	204,169	163,159	25,081	13,830
HPMS Factor	0.89	1.15	1.15	1.27	3.00	25.69
JEFFERSON HPMS	1,580,510	186,217	450,642	237,713	143,728	197,521
JEFFERSON Model	1,630,278	188,018	518,525	342,940	99,327	13,561
HPMS Factor	0.97	0.99	0.87	0.69	1.45	14.57
KNOX HPMS	6,988,860	2,519,910	2,679,483	911,211	827,213	3,585,718
KNOX Model	6,332,511	2,503,585	2,248,515	756,739	645,683	257,426
HPMS Factor	1.10	1.01	1.19	1.20	1.28	13.93
LOUDON HPMS	1,254,670	413,910	348,972	106,918	121,525	252,791
LOUDON Model	1,419,064	444,751	403,478	93,547	44,366	326
HPMS Factor	0.88	0.93	0.86	1.14	2.74	775.79
ROANE HPMS	1,031,296	426,576	286,370	85,133	102,396	189,331
ROANE Model	1,030,550	479,068	240,498	75,029	34,462	17,611
HPMS Factor	1.00	0.89	1.19	1.13	2.97	10.75
SEVIER HPMS	371,369	1,574,373	758,780	458,228	218,244	1,227,288
SEVIER Model	360,311	1,340,170	892,977	388,561	81,397	75,744
HPMS Factor	1.03	1.17	0.85	1.18	2.68	16.20