

Classified Streets Project

June 2022 | **FINAL REPORT**



Acknowledgments

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Introduction

The City of Knoxville has adopted traffic and speed calming measures for their local roads. The purpose of this study is to develop a “toolbox” of speed calming options for Knoxville’s classified roadways (collectors and arterials) for long-range planning and programming. Through the use of available traffic, roadway characteristics, and crash data, classified roads that would benefit most from speed mitigation strategies are identified. Mitigation options are evaluated for applicability based on the traffic and roadway characteristics, adjacent land use context, and other community factors. The toolbox of speed mitigation options provides the City with a structured approach toward identifying potential speeding problem locations and implementing the appropriate mitigation strategy. This study was funded by the Tennessee Department of Transportation (TDOT).

This study builds upon recent policy and safety initiatives enacted by the City, including the October 2021 adoption of Resolution R-330-2021, endorsing a Vision Zero goal to eliminate traffic fatalities and serious injuries on the City’s streets. As of mid-2022, the City staff is working with a coalition of stakeholders to develop an Action Plan covering engineering, education and enforcement strategies. Several key principles for Vision Zero are:

- Death and serious injuries on our streets are unacceptable
- Humans are vulnerable
- Humans make mistakes
- Safety is proactive
- Responsibility is shared among all of us.

Of primary emphasis relative to this study is the fact that vehicle speed reduction and traffic calming strategies are a proven method to reduce the severity of vehicle crashes and reduce serious injuries and fatalities. Knoxville’s neighborhood traffic safety program has since 2018 installed over 200 speed reduction/traffic calming devices (such as speed tables, lane chokers, traffic circles). Speed reductions of 17% have been realized, and an additional 180 speed tables are proposed for installation along neighborhood streets by the end of 2022.

The speed mitigation options evaluated in this study are for “classified” roadways – collector and non-State maintained arterial roads. These classified roads carry a greater daily volume of vehicles than neighborhood roads, at a higher posted speed limit, and experience a greater number of crashes.

The purpose of this study is to develop a “toolbox” of speed calming options for Knoxville’s classified roadways (collectors and arterials) for long-range planning and programming.

Knoxville Classified Streets Methodology

A critical component of the study was to develop a prioritized list of candidate roadway locations for further evaluation of traffic calming strategies. Final recommendations were vetted by City and TDOT staff as well as by public input through the use of online surveys. The purpose of this study is to understand the extent of speeding exhibited on Knoxville's classified roadways from a variety of perspectives as well as develop a "toolbox" of speed mitigation options for long-range planning and programming.

Figure 1:
Methodology Process



Big Data Analysis (Level 1 Screen)

Four sources of data were used for this analysis. The sources include E-TRIMS roadway data from TDOT, 3-1-1 data on speeding complaints, E-TRIMS crash data, and INRIX speed data also from TDOT. The methodology for cleaning and selecting the data is located below.

1. E-TRIMS Roadway Data

First, functionally classified streets were downloaded from TDOT E-TRIMS data portal for Knox County. Only those street segments within the City of Knoxville functionally classified as "Major Collector" or "Arterial" were selected for analysis. This list was then used as input to query the City's 3-1-1 data on speeding complaints.

2. 3-1-1 Data

Staff at the City of Knoxville provided 3-1-1 information for the period January 2019 through May 2021. 3-1-1 is a special telephone number that provides access to non-emergency municipal services. It is intended to divert routine inquiries and non-urgent concerns from the 9-1-1 number which is reserved for emergency services.

The data provided included two (2) tables, a sampling of enforcement requests that the City of Knoxville deemed as being “mostly speeding enforcement requests” and a second extracted dataset of call records that mention “speed” or “speeding”.

3. E-TRIMS Crash Data

Crash data was downloaded using the TDOT E-TRIMS web portal for Knox County from 2015 to 2019. The crash data was then queried to include only the City of Knoxville. The “First Harmful Event” category was used to select out crashes that likely occurred due to speeding.

4. INRIX Data

TDOT provided access to INRIX Speed data which provides a comprehensive collection of historic speed and travel time data to help analyze how traffic responded to a specific moment in time. INRIX Speed data is downloaded in daily increments.

Like the three (3) other datasets, this dataset was parsed to include roadway segments within the municipal limits of Knoxville. For each roadway segment provided, the INRIX data provides the overall daily average speed recorded, the average maximum speed recorded, and average minimum speed recorded.

The methodology for developing ranking scores for each roadway is summarized below.

1. Roadway Scoring

Each 3-1-1 table was queried individually using the list of roadway names. Roadway names that appeared in the 3-1-1 tables received a score based on the number of times it showed up in the tables. For example,

Morrell Road appeared in the 3-1-1 tables five times and therefore received a score of 5. All roadways that did not appear in the 3-1-1 tables were then removed from the traffic calming candidate list.

Crashes due to speeding were then evaluated. A score was given to each roadway based on the number of crashes that showed up on that roadway. For example, Morrell Road did not have any speed-related crashes occur on the roadway and was therefore given a score of 0. The scores were then combined to provide a composite score.

2. INRIX Speed Data

After determining composite score, INRIX speed data was added for each roadway. The INRIX speed data included three speed metrics: average speed, maximum speed, and minimum speed. The segments for each roadway were combined and the average speed for each category (i.e., average speed, maximum speed, and minimum speed) was calculated.

3. Ranking

Composite score was used to determine roadway rank for speeding. For those roadways with a tied composite score, the difference was taken between maximum speed recorded and speed limit. The higher the difference, the higher the rank.

The Working Group reviewed this initial ranking to cull the list down to ten roads that should have vehicle speed data collection efforts conducted. Summary meeting minutes are provided in Appendix A.

Observations and comments from the working group include the following:

- Alcoa Highway has been the subject of numerous recent studies and improvement design plans and should not be included.
- State roads should be excluded from this study effort.
- Deane Hill Road should be added to the list.

Figure 2: Initial Roadway Ranking

Street Name	From	To	Distance (miles)	Classification	# Lanes (typical)	ADT (2019)	3-1-1 Speeding Call Instances	Speeding Crashes (Jan 2015- Dec 2019)	Posted Speed	Average Speed	Avg. Max Speed	Avg. Min Speed	Avg. Max over Posted	Composite Score ¹	Rank ²
Alcoa Hwy	John Sevier Hwy.	I-40	5.3	Principal Arterial	4	49,603	1	7	40	53	65	33	25	33	1
Main St	Henley St.	Central St.	0.4	Principal Arterial	4	4,677	1	1	30	18	57	9	27	29	2
Western Ave	Schaad Rd.	Broadway	7.3	Principal Arterial	2	18,371	4	1	35	31	47	18	12	17	3
Northshore Dr	Morrill Rd.	I-40	3.4	Minor Arterial	2	16,638	9	0	40	32	46	20	6	15	4
Morrill Rd	Northshore Dr.	Kingston Pike	2.0	Minor Arterial	2	16,848	5	0	35	26	41	15	6	11	5
Broadway	W. 5th Ave.	Mineral Springs Ave.	3.1	Principal Arterial	2	8,704	5	2	40	27	44	16	4	11	6
Kingston Pke	I-140	Alcoa Hwy.	10.5	Principal Arterial	4	25,640	3	4	45	31	49	17	4	11	7
5th Ave	University Ave.	Hall of Fame Dr.	1.1	Principal Arterial	2	5,380	2	1	25	22	32	14	7	10	8
Sutherland Ave	Westwood Rd.	Middlebrook Pike	3.4	Major Collector	2	11,417	3	1	35	29	41	17	6	10	9
Texas Ave	Western Ave.	I-275	1.4	Major Collector	2	13,518	4	0	30	28	36	19	6	10	10
Washington Pke	Broadway	I-640	3.6	Minor Arterial	2	10,113	4	0	40	30	44	19	4	8	11
Cedar Ln	Central Ave. Pike	Broadway	2.8	Minor Arterial	2	11,059	5	2	40	29	41	18	1	8	12
Lyons View Pke	Northshore Dr.	Kingston Pike	1.6	Minor Arterial	2	11,827	1	2	40	31	44	17	4	7	13
Chapman Hwy	John Sevier Hwy.	Blount Ave.	5.9	Principal Arterial	4	32,213	4	0	50	37	53	22	3	7	14
Pleasant Ridge Rd	Western Ave.	Clinton Hwy.	4.4	Minor Arterial	2	13,230	2	1	40	32	43	21	3	6	15
Central St (N&S)	W. Hill Ave.	Heiskell Ave.	3.0	Minor Arterial	2	7,833	3	1	30	19	32	11	2	6	16
Middlebrook Pke	Gallaher View Rd.	Western Ave.	7.5	Minor Arterial	2	22,858	4	1	50	34	50	19	0	5	17
Woodland Ave	Central St.	Broadway	0.9	Minor Arterial	2	15,179	7	0	40	27	38	18	-2	5	18
Cherokee Trl	Alcoa Hwy.	Scottish Pike	2.0	Major Collector	2	12,707	3	0	40	29	39	20	-1	2	19
Other Candidates															
Deane Hill Dr.	Morrill Rd.	Kingston Pike	1.8	Major Collector	2	5,795	0	0	40	34	48	23	8	8	TBD
Cecil Ave.	Broadway	N. Cherry St.	0.9	Major Collector	2	5,280	0	0	30	25	33	16	3	3	TBD
Gleason Dr.	Ebermezer Rd.	Morrill St.	2.7	Major Collector	2	8,947	0	0	35	32	42	22	7	7	TBD
Inskip Rd./ Bruhin Rd.	Dutch Valley Dr.	Cedar Lane	1.5	Major Collector	2	6,128	0	0	30	27	35	19	5	5	TBD
Bob Gray Rd.	Lovell Rd. (SR 131)	Cedar Bluff Rd.	3.1	Major Collector	2	3,227	0	0	40	29	38	20	-2	-2	TBD
Lonas Dr.	Weisgarber Rd.	Middlebrook Pike	2.5	Major Collector	2	5,801	0	0	35	32	42	20	7	7	TBD

State Routes identified

1 Composite score = sum of speeding complaints + speeding crashes + maximum speed over the posted speed
 2 The Rank for equal Composite scores based on maximum speed over posted speed; then alphabetical

Public Outreach & Survey

This study included a public survey to gain community insight into the location of vehicle speeding concerns and preferred roadway improvements to provide traffic and speed calming. The survey used interactive mapping responses (created on MetroQuest) that allowed participants to specifically identify perceived traffic issues, providing valuable information to the study team. The survey was open from January 10th through January 23, 2022 and was available through the City of Knoxville website and social media pages. A total of 1,653 participants provided responses. A report by Fairpointe Planning (the study's public outreach specialist) detailing the survey results is provided in Appendix B.

Key takeaways from the survey included the following:

- Participants represented 15 ZIP Code areas in the Knoxville area.
- 40% of respondents specifically identified speeding problems on the study's evaluated roadways
- 38% identified specific locations they perceived as having safety concerns, including bicycle and pedestrian concerns
- Top preferred traffic and speed calming strategies include roundabouts, traffic circles, speed tables, raised crosswalks, lane narrowing, radar feedback signage, and pavement painting.

The results of the survey have been incorporated into the Speed Mitigation Toolbox as one of the measures of effectiveness – Public Acceptability.

From the initial roadway ranking, field vehicle speed data collection efforts were agreed to at the following locations (Level 2 Screen):

1. Central Street – north of E Depot Ave.
2. Washington Pike – east of Haun St.
3. Bruhin Road – south of Adair St.
4. Cedar Lane – east of Paula Rd.
5. Pleasant Ridge Road – south of Murray Rd.
6. Sutherland Avenue – east of Carr St.
7. Lyons View Pike – north of Cherokee West Cliff Dr.
8. Deane Hill Drive – east of Glen Ives Way
9. Morrell Road – north of Devonshire Dr.
10. Gleason Drive – west of Dublin Drive.

The speed data collections consisted of five consecutive day continuous readings from February 23 through the 27, 2022. Data reported includes 85th percentile speed (the speed at or below which 85% of vehicles travel under free-flow conditions), traffic volumes, and vehicle classification information. Most engineering approaches to setting speed limits are based on the 85th percentile speed.

A comparison of the 85th percentile speed and the posted speed identified the top three roads that currently exhibit speeding issues: Washington Pike, Bruhin Road, and Morrell Road (Level 3 Screen). The next phase of the study is to prepare concept plans for potential speed mitigation strategies along these roads. City staff noted that the characteristics of Morrell Road vary north and south of Westland Drive so concepts for those two segments of Morrell were developed.

Figure 3: Field Data Collection Results

Site #	Street Name	Data Collection Location	# Lanes	Posted Speed	85th Percentile Speed ¹	85th to Posted Difference	Percentage Difference	ADT (2019)
1	Central St (N&S)	North of E Depot Ave	2	30	21	-9	-30%	7,833
2	Washington Pke	East of Haun St	2	35	44	9	26%	10,113
3	Bruhin Rd.	South of Adair St	2	30	37	7	23%	6,128
4	Cedar Ln	East of Paula Rd	2	40	39	-1	-3%	11,059
5	Pleasant Ridge Rd	South of Murray Rd	2	40	46	6	15%	13,230
6	Sutherland Ave	East of Carr St	2	35	39	4	11%	11,417
7	Lyons View Pke	North of Cherokee West Cliff Dr	2	40	46	6	15%	11,827
8	Deane Hill Dr.	East of Glen Ives Way	2	40	45	5	13%	5,795
9	Morrell Rd	North of Devonshire Dr	2	35	42	7	20%	16,848
10	Gleason Dr.	West of Dublin Dr	2	35	39	4	11%	8,947

¹ Collected 2/23/22 through 2/27/22

Speed Mitigation Strategies

Successful roadway safety programs address the “4E’s” of Education, Enforcement, Engineering and Emergency Response. For speeding concerns, local government typically focus on education, enforcement and engineering. Education may consist of community awareness campaigns, public service announcements, temporary signage or message boards, or social media posts. Enforcement of speed limits may be incorporated with educational strategies, such as High Visibility Enforcement activities that use let the community know through visible elements (message boards, signs) that speed enforcement is occurring. For purposes of this study, we focus on the engineering strategies that may be employed for speed mitigation.

It is noteworthy that the speed mitigation strategies presented herein advance elements of the Vision Zero Action Plan currently under development by the City. Recognizing that Knoxville’s classified roads serve not only vehicle but accommodate non-motorized transportation modes such as bicycling and walking. Such users are more vulnerable to serious injury or death if involved in a vehicular crash. Vision Zero goals are directed toward all roadway users, and speed mitigation measures significantly reduce the severity of crashes.

One of the strategies that was assessed within the study was land modifications or lane repurposing (frequently termed “road diets”). A research project conducted by the University of Tennessee Knoxville for TDOT (May 31, 2021) evaluated the performance and benefits of road reconfigurations in Tennessee.

The report analyzed three Knoxville roads – Cumberland Avenue, Broadway, and Sevier Avenue. These reconfigurations involved reconfigurations of 4-lane and 3-lane existing roadway segments to 2-lane to 3-lane configurations with the introduction of extensive streetscape improvements and bicycle lanes where appropriate.

Key conclusions from analyzing pre- to post-reconfiguration included the following:

- There was an approximate 50% reduction in crashes involving “vulnerable road users” (cyclists, pedestrians)
- There was a statistically insignificant reduction in vehicle crashes
- The 85th percentile was marginally impacted due to the reconfiguration.

The primary objectives of a road reconfiguration are to enhance the use of the corridor by all modes (including bicycle and pedestrian), support redevelopment and similar economic growth initiatives, calm traffic through residential, commercial, college, or similar distinct planning areas, improve safe access to local or regional transit services, and generally enhance the quality of life for local residents and business operators. Road reconfigurations involve significant capital resources, elected officials and public support, and extensive planning and design efforts. This comprehensive land use and transportation policy and implementation strategy is beyond the objectives of just reducing vehicular speeds. As a result, this speed reduction study recommends deferring the consideration of roadway reconfigurations to more comprehensive planning efforts.

The study developed and evaluated FOUR general speed control strategies – horizontal deflection, vertical deflection, lane elimination/repurposing, and signage – noting their effectiveness on speed reduction, bicycle and pedestrian safety, and numerous other measures of effectiveness. Each general strategy has several specific speed mitigation options as presented in the Speed Mitigation Toolbox spreadsheet in the next section of the report. Prior to presenting that information, the next section outlines the public outreach and survey efforts conducted.

Figure 4:
Horizontal Deflection Options Comparison

Factors	Traffic Circle	Roundabout/ Mini-Roundabout	Chicane	Narrowed Lane
Effects				
Vehicle Speed	Highly effective speed reduction	Highly effective speed reduction dependent upon design of vehicle deflection	Moderately effective dependent upon design elements and context of the roadway	Low to moderately effective dependent upon design elements (including pavement markings) and roadway context
Bicycle/Pedestrian Mobility/Safety	Cyclists share the lane; pedestrian effects based on presence of sidewalk	Cyclists either share the lane or may be provided a bicycle lane/ cycle track; pedestrian cross walks should be incorporated	Cyclist track may be incorporated; pedestrian effects based on presence of sidewalk	Cyclists either share the lane or may be provided a bicycle lane/cycle track
Large Vehicle Mobility	Poor due to raised obstruction; large vehicles forced to make a left-turn in front of the circle	Acceptable mobility as mountable median circle allows overtaking	Acceptable	Acceptable to poor depending on the road narrowing design including curbing
Public Acceptability <i>(Source: Knoxville public survey Jan. 2022)</i>	Moderate	High	Moderate	High
Cost <i>(approximate/order of magnitude)</i>	\$10,000 to \$60,000	\$150,000 to \$1,000,000	\$10,000 to \$80,000	\$12,000 to \$55,000
Appropriate Context				
Intersection or Segment/Mid-block	Intersection	Intersection	Mid-block	Mid-block
Road characteristics	Local collectors, urban design curb & gutter	Local and minor collectors, minor or major arterials	Single directional lane roadway (two-way or one-way street)	Single directional lane roadway (two-way or one-way street)
Posted speed	Max. speed of 35 mph	Advised max. speed of 40 mph	Max. speed of 35 mph	Advised max. speed of 40 mph
Volume	Low volumes <3,500 vpd	Greater volumes than a traffic circle; highly dependent upon design elements	Low to moderate volumes (< 10,000 vpd)	Moderate volumes
Land Use Context	Typically residential or neighborhood commercial areas	Residential to regional commercial areas	Residential to neighborhood commercial	Typically used in a transitioning context (i.e. from regional commercial to residential)

Figure 5:
Vertical Deflection Options Comparison

Factors	Speed Tables	Raised Crosswalks	Rumble Strips	Textured / Colored Pavement
Effects				
Vehicle Speed	Highly effective (designed to slow vehicle to approximately 20 mph)	Highly effective (designed to slow vehicle to approximately 20 mph)	Low to moderate dependent upon road characteristics and land use context	Low to moderate effectiveness dependent upon road characteristics and land use context
Bicycle/Pedestrian Mobility/Safety	Minimal impact/effect	Enhanced visibility of pedestrian crossing	Minimal impact/effect	May help define the area as having a greater number of cyclists and pedestrians
Large Vehicle Mobility	Poor	Poor	Acceptable	Acceptable
Public Acceptability (Source: Knoxville public survey Jan. 2022)	High	High	Low	Low
Cost (approximate/order of magnitude)	\$2,000 to \$8,000	\$4,000 to \$10,000	\$500 to \$1,000	Moderate to high costs dependent upon pavement treatments and size of area to be treated
Appropriate Context				
Intersection or Segment/Mid-block	Mid-block	Mid-block	Mid-block or approach to an intersection	Mid-block or intersection
Road characteristics	Local and minor collectors	Local and minor collectors	Local (non-residential) collectors	Collectors to minor arterials
Posted speed	Max. speed of 35 mph	Max. speed of 35 mph	Max. speed of 35 mph	Max. speed of 45 mph
Volume	Low volumes <7,500 vpd	Low to moderate volumes <10,000 vpd	Low volumes <7,500 vpd	Low to moderate volumes <10,000 vpd
Land Use Context	Residential to neighborhood commercial	Residential to neighborhood commercial; larger retail areas with higher pedestrian activity	Neighborhood commercial (NOT favored within residential areas)	Typically used to delineate areas of higher pedestrian activity
Design Considerations	Can interfere with transit, snow plow and emergency vehicles operations; increases roadway noise.	Requires accompanying pedestrian crossing signage/markings; can interfere with transit, snow plow and emergency vehicles operations; increases roadway noise.	Can be raised strips or grooved cuts in pavement	High maintenance

Figure 6:
Lane Elimination / Lane Repurposing Options Comparison

Factors	Lane Elimination	Lane Repurposing
Effects		
Vehicle Speed	Low to moderate effectiveness	Moderate effectiveness as the driver is made aware of the change in roadway character and context supporting greater walkability
Bicycle/Pedestrian Mobility/Safety	Moderate to high dependent upon design elements that may enhance bicycle/pedestrian mobility and safety	High - Enhances bicycle/pedestrian mobility and safety as well as local transit access
Large Vehicle Mobility	May impeded the through movement of large vehicles, and may introduce traffic operations delays associated with on-street truck loading/unloading	Acceptable though may result in on-street truck loading/unloading delays to roadway operation
Public Acceptability (Source: Knoxville public survey Jan. 2022)	Low	Low
Cost (approximate/order of magnitude)	Moderate to high cost depending on the level of modifications to the curbing and edge of pavement, and related signage, pavement marking and traffic signal modifications	High cost associated with Complete Street infrastructure and associated pedestrian amenities
Appropriate Context		
Intersection or Segment/Mid-block	Segment	Segment
Road characteristics	All collectors and minor to major arterials	All collectors and minor to major arterials
Posted speed	Max. of 45 mph	Max. of 35 mph
Volume	Moderate to high volume roads (traffic diversion to parallel facilities may result)	Moderate volume < 15,000 vpd
Land Use Context	Commercial corridors	Urban/suburban downtown mixed use area
Design Considerations	Signage and pavement markings well in advance of reconfiguration	Part of a corridor-wide redevelopment

Figure 7:
Signage

Note: These signage options may be used in conjunction with other mitigation strategies.

Factors	MUTCD Warning Signs (W3-5; W16-1P)	Permanent Radar Feedback Signs
Effects		
Vehicle Speed	Low to moderately effective in providing notice to drivers of speed limit changes of the presence of cyclists	Moderately effective; more highly effective when combined with educational and enforcement activities
Bicycle/Pedestrian Mobility/Safety	Low to moderately effective depending on roadway characteristics and context	Low to moderately effective depending on roadway characteristics and context
Large Vehicle Mobility	No effect	No effect
Public Acceptability (Source: Knoxville public survey Jan. 2022)	Moderate	High
Cost (approximate/order of magnitude)	\$1,000 to \$2000	\$4,000 to \$8,000
Appropriate Context		
Intersection or Segment/Mid-block	Mid-block	Mid-block
Road characteristics	All collectors and minor to major arterials	All collectors and minor arterials
Posted speed	Max. of 55 mph	Max. of 55 mph
Volume	Any volume	Moderate volume < 25,000 vpd
Land Use Context	Any land use context	Any land use context
Design Considerations	May be incorporated with other mitigation options	May be incorporated with other mitigation options

Classified Roads Speed Mitigation Toolbox

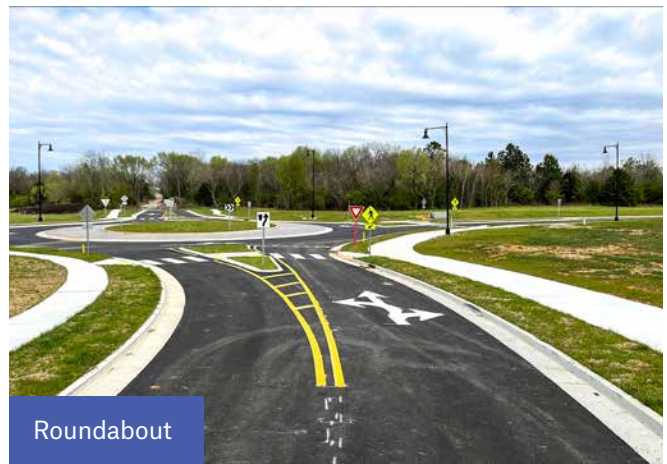
The Knoxville classified roads speed mitigation toolbox has been developed to provide guidance for the evaluation of alternative strategies. The effectiveness measures presented herein are to be considered guidelines for planning purposes and vehicle speed mitigation strategy development. The following pages provide the alternative strategies, specific options, and evaluation factors.

Figure 8:
Horizontal Deflection



Source: City of Knoxville

- Non-mountable



Source: City of Knoxville

- Mountable apron
- Vehicle diversion prior to entry



Source: City of Knoxville

- Lateral shift may include median barriers, raised curbing



Source: City of Stockton, California

- Options for bike lanes, curb extensions, on-street parking modifications

Figure 9:
Vertical Deflection

Source: Safety.FHWA.dot.gov



Speed Table

- May create unwanted noise



Raised Crosswalks

- Emphasizes concentrated area of pedestrian activity

Source: City of Lakeland, Florida

Source: City of San Antonio



Rumble Strips

- Located across the travel lane for speed mitigation
- NOT for lane departure warning
- May be raised or milled into the pavement



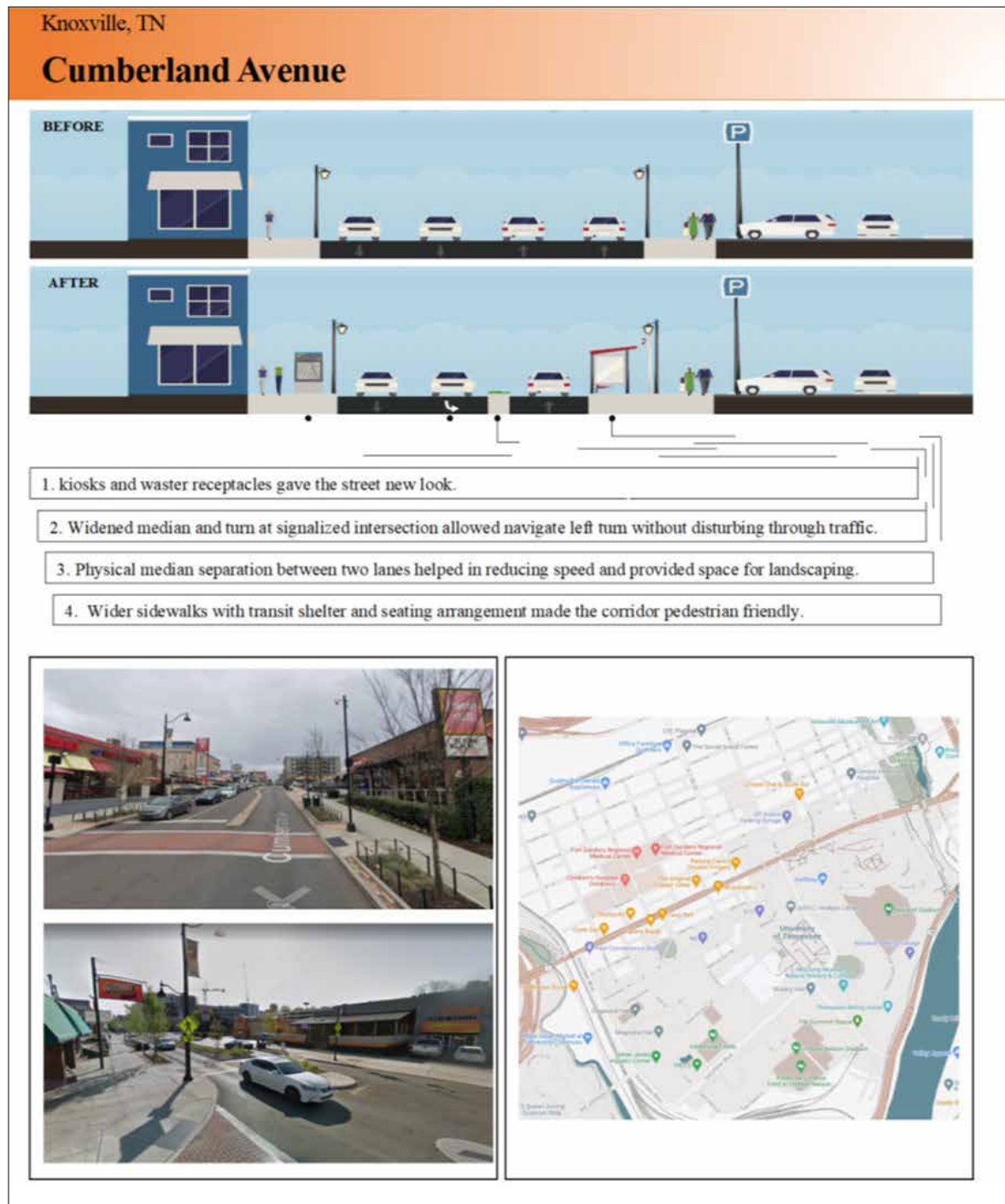
Textured / Colored Pavement

- Ongoing maintenance cost

Source: Google Earth

Figure 10:
Lane Elimination / Lane Repurposing

- Should be considered part of a more comprehensive corridor management project
- May include Complete Street elements for multimodal mobility and safety



Source: TDOT & University of Tennessee Knoxville Report RES2020-16

Sample Speed Mitigation Concepts

This study's methodology included the identification of three locations where concept plans were developed to illustrate possible speed mitigation measures on classified roadways. These three concept plans in conjunction with the speed mitigation toolbox are intended to serve as a template for future speed calming mitigation implementation efforts. The concept plans are representative of potential improvements that could be implemented. They are not to be considered preliminary designs for final engineering of any specific project. Opinions of probable costs for the implementation of the proposed concept plans are also provided. The three locations are:

1. Bruhin Road / Inskip Road from Dutch Valley Road to Cedar Lane
2. Morrell Road – 2 separate concepts:
 - A. 2-lane segment from S. Northshore Drive to Westland Drive
 - B. 5-lane segment from Westland Drive to north of Gleason Drive

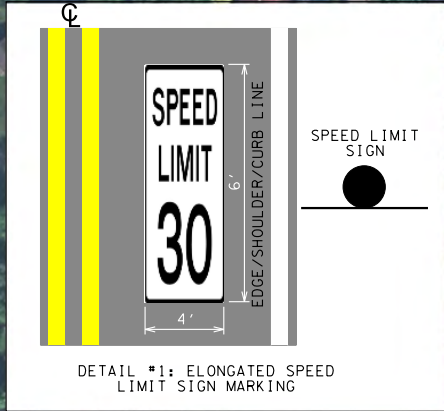
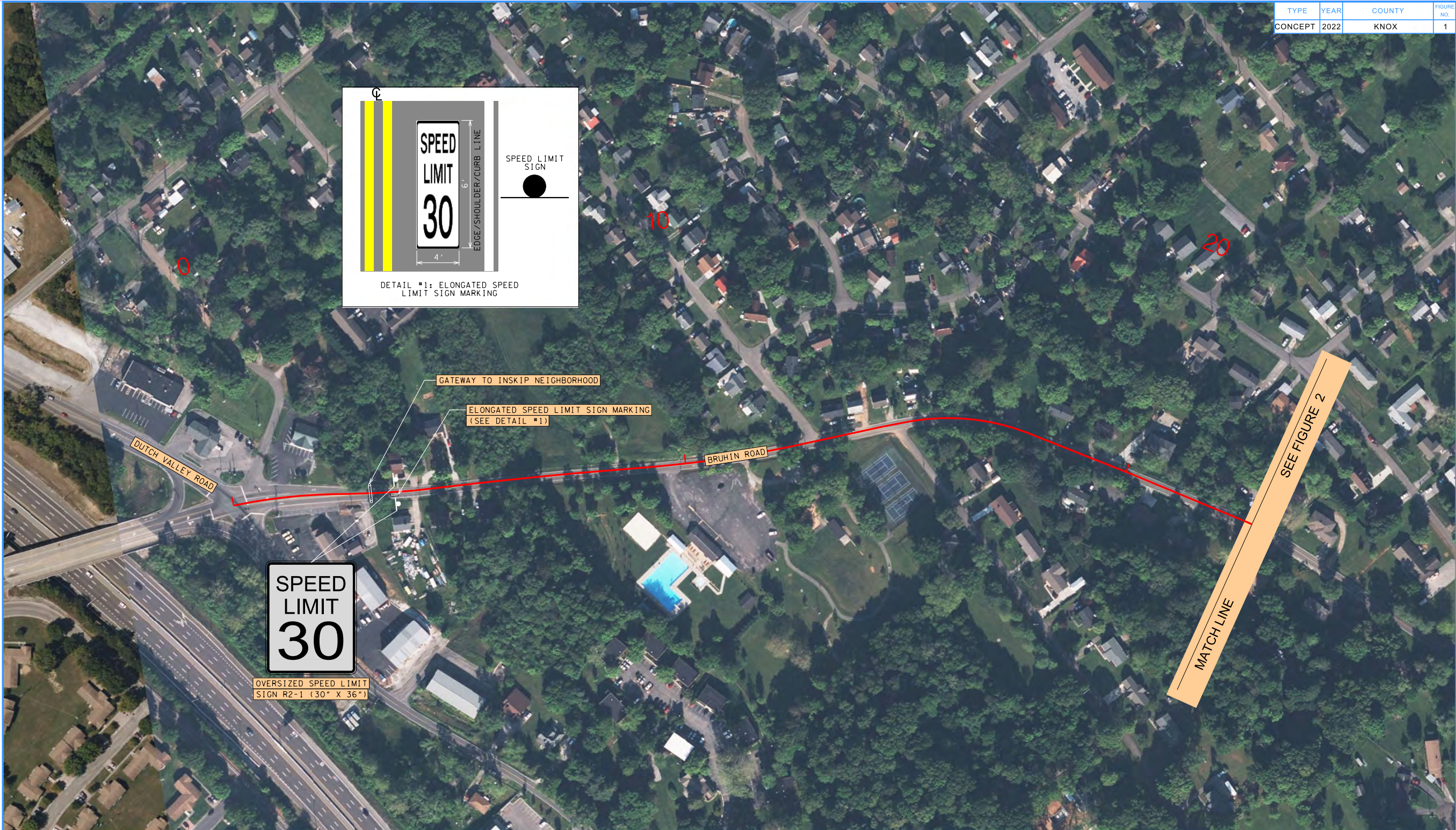
3. Washington Pike Whittle Springs Road to Millertown Pike

- A. Two options are provided for the Washington Pike intersection with Washington Ridge Way and with Millertown Pike.

The concept plans and the associated opinions of probable cost are provided on the following pages.

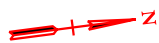
Opinions of probable construction cost are also provided for the concept plans.

TYPE	YEAR	COUNTY	FIGURE No.
CONCEPT	2022	KNOX	1



SPEED LIMIT 30
 OVERSIZED SPEED LIMIT SIGN R2-1 (30" X 36")

\$\$\$\$\$TIMES\$\$\$\$\$
 \$\$\$DGN SPEC\$\$\$\$\$



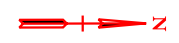
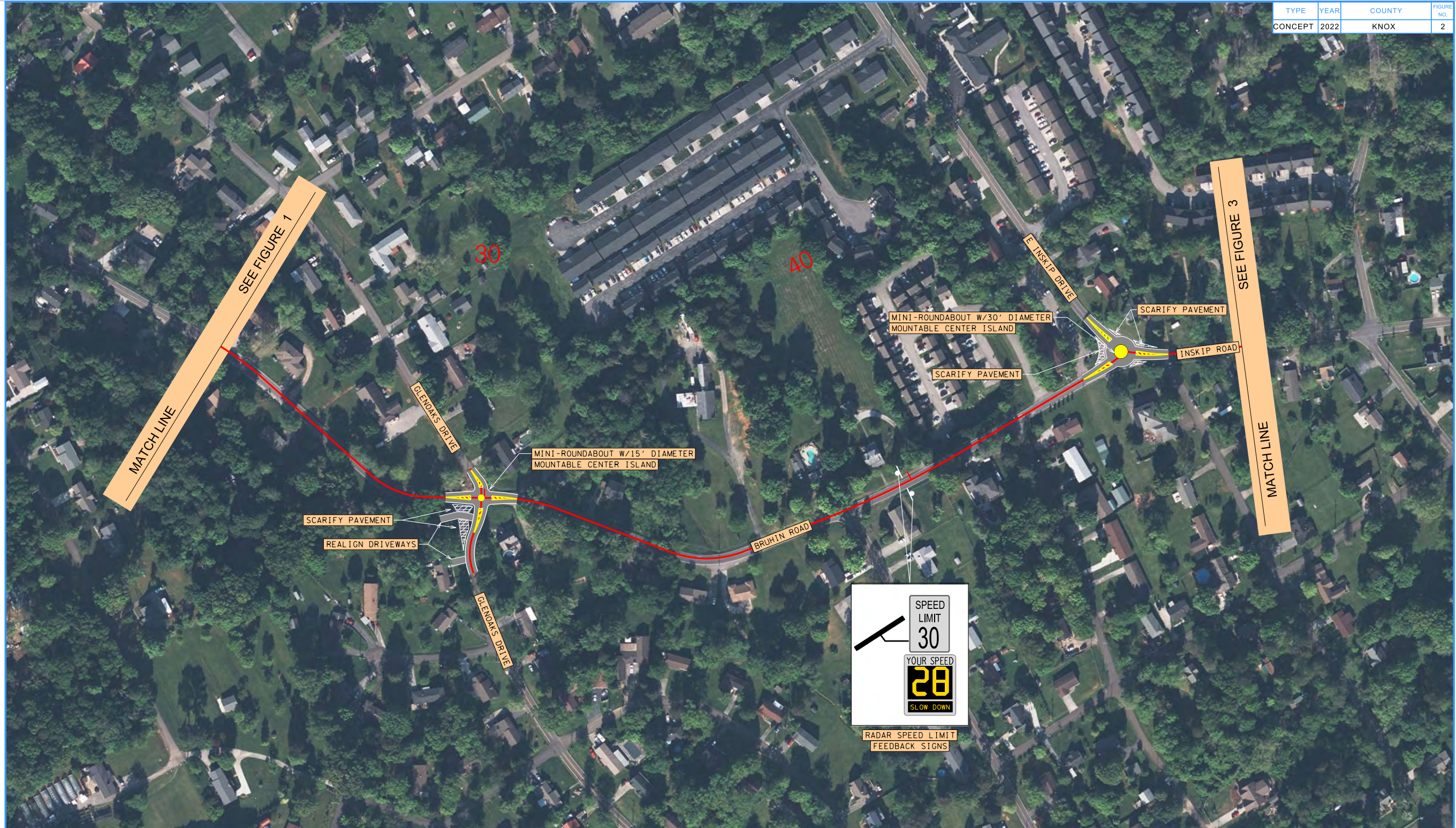
KNOXVILLE CLASSIFIED STREETS

BRUHN ROAD & INSKIP ROAD
 FROM DUTCH VALLEY ROAD
 TO CEDAR LANE

CITY OF KNOXVILLE

FIGURE 1
 BRUHN RD
 STATION 00+00
 TO
 STATION 23+00

TYPE	YEAR	COUNTY	FIGURE No.
CONCEPT	2022	KNOX	2



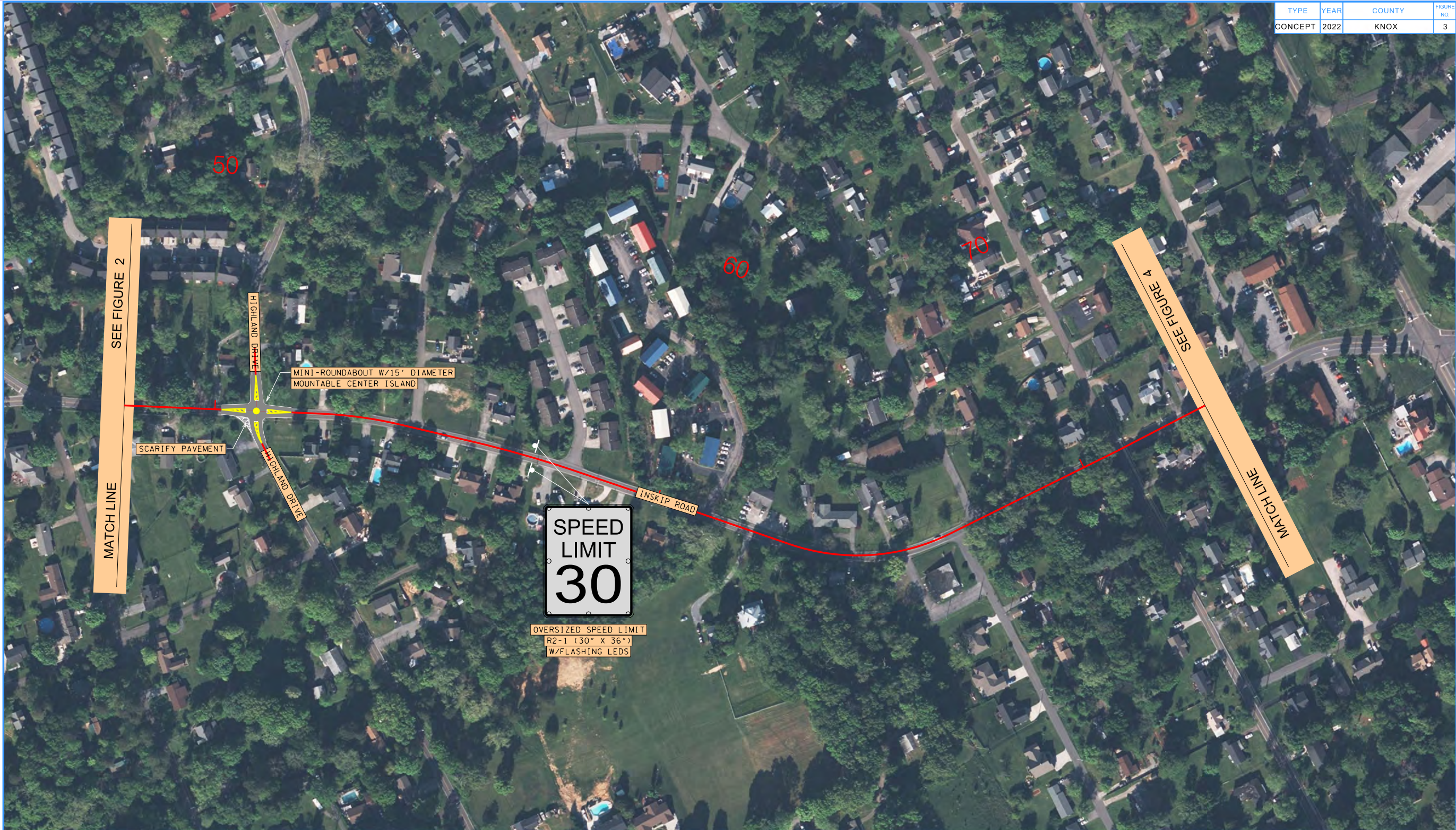
KNOXVILLE CLASSIFIED STREETS

BRUHIN ROAD & INSKIP ROAD
FROM DUTCH VALLEY ROAD
TO CEDAR LANE

CITY OF KNOXVILLE
FIGURE 2
BRUHIN RD & INSKIP RD
STATION 23+00
TO
STATION 48+00

\$\$\$\$\$TIMES\$\$\$\$\$
\$\$\$\$\$DGN\$\$\$\$\$
\$\$\$\$\$SPEC\$\$\$\$\$

TYPE	YEAR	COUNTY	FIGURE NO.
CONCEPT	2022	KNOX	3



KNOXVILLE CLASSIFIED STREETS

BRUHIN ROAD & INSKIP ROAD
FROM DUTCH VALLEY ROAD
TO CEDAR LANE

CITY OF KNOXVILLE
FIGURE 3
INSKIP RD
STATION 48+00
TO
STATION 73+00

\$\$\$\$\$TIME\$\$\$\$\$
\$\$\$\$\$DONSPEC\$\$\$\$\$

TYPE	YEAR	COUNTY	FIGURE NO.
CONCEPT	2022	KNOX	4



\$\$\$\$SYTIME\$\$\$\$
 \$\$\$DGN\$PC\$
 \$\$\$SYTIME\$\$\$\$



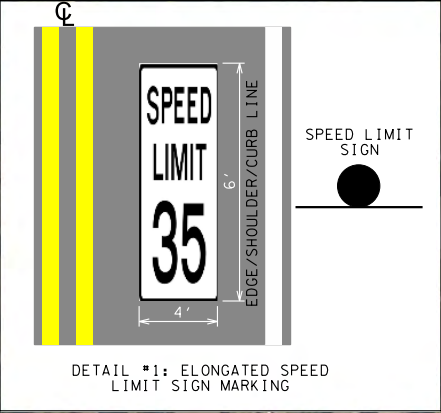
KNOXVILLE CLASSIFIED STREETS

BRUHIN ROAD AND INSKIP ROAD
 FROM DUTCH VALLEY ROAD
 TO CEDAR LANE

CITY OF KNOXVILLE

FIGURE 4
 INSKIP RD
 STATION 73+00
 TO
 STATION 78+26

TYPE	YEAR	COUNTY	FIGURE NO.
CONCEPT	2022	KNOX	5



\$\$\$\$\$TIMES\$\$\$\$\$
 \$\$\$DGN\$PEC\$

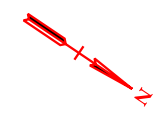
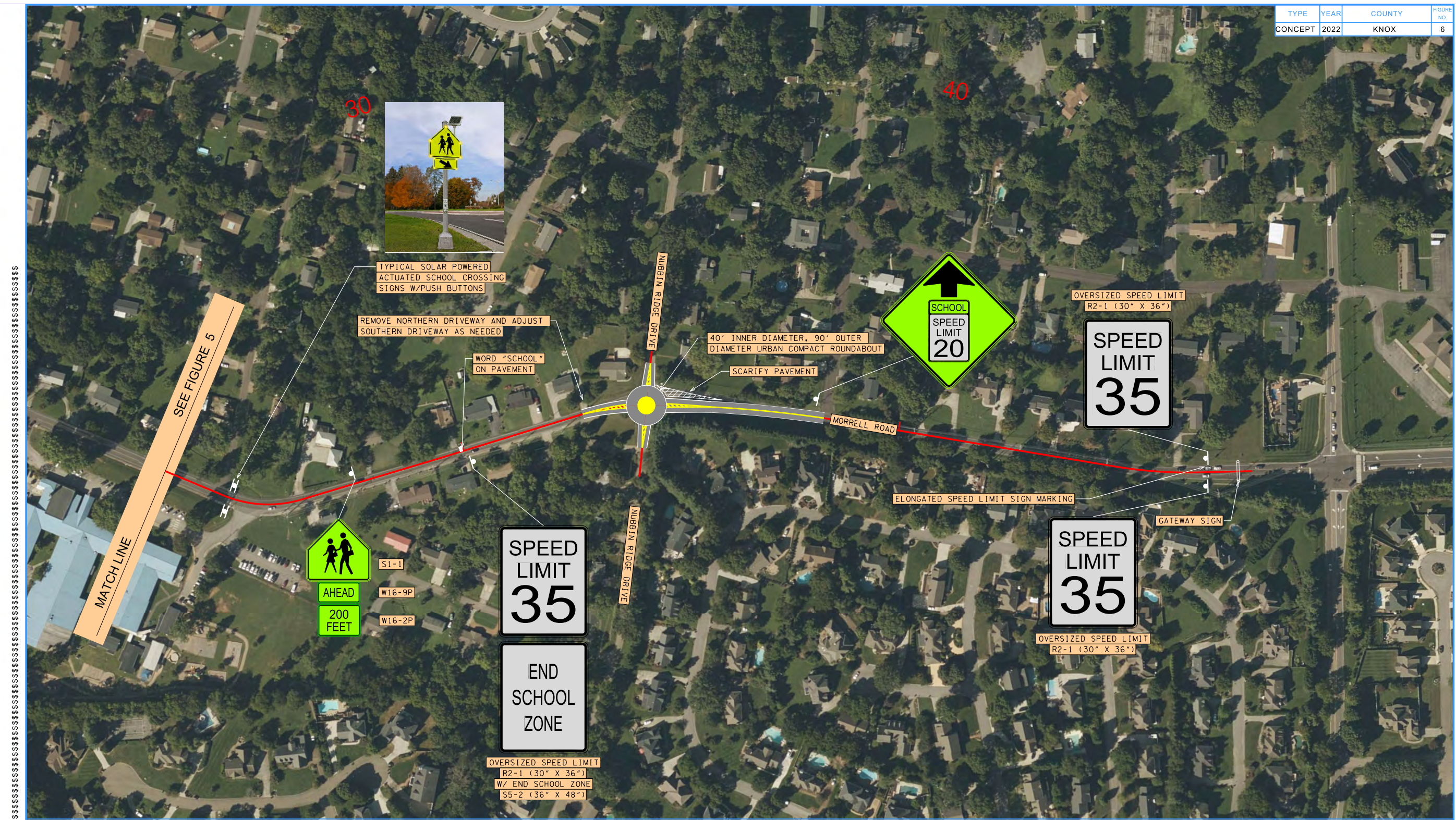


KNOXVILLE CLASSIFIED STREETS

MORRELL ROAD - 2 LANE SEGMENT
 FROM S NORTHSHORE DRIVE
 TO WESTLAND DRIVE

CITY OF KNOXVILLE
FIGURE 5 MORRELL RD - 2 LANE STATION 0+00 TO STATION 23+00

TYPE	YEAR	COUNTY	FIGURE NO.
CONCEPT	2022	KNOX	6

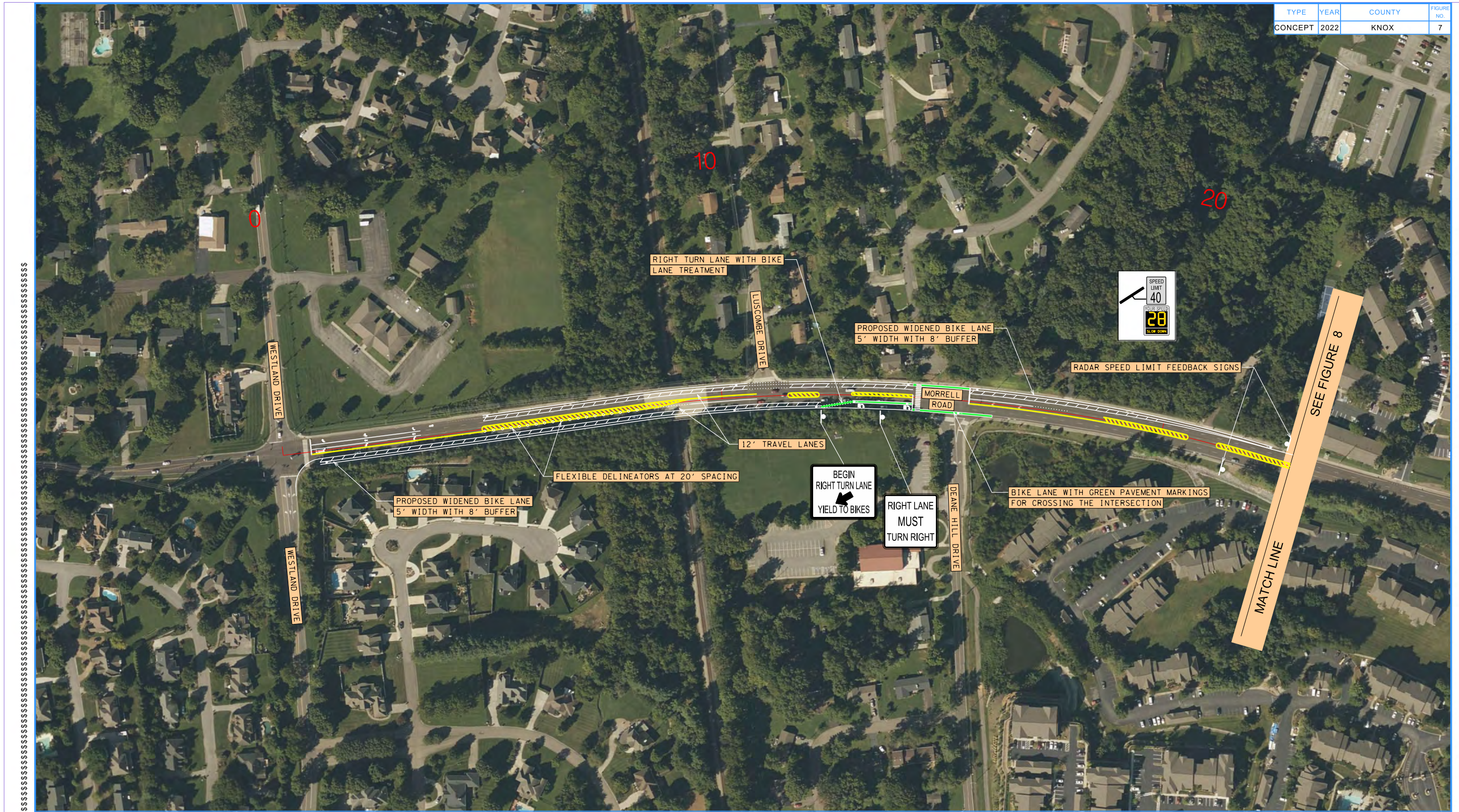


KNOXVILLE CLASSIFIED STREETS

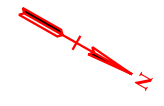
MORRELL ROAD - 2 LANE SEGMENT
FROM S NORTHSHORE DRIVE
TO WESTLAND DRIVE

CITY OF KNOXVILLE
FIGURE 6
MORRELL RD - 2 LANE
STATION 23+00
TO
STATION 48+00

TYPE	YEAR	COUNTY	FIGURE NO.
CONCEPT	2022	KNOX	7



\$\$\$\$\$TIME\$\$\$\$\$
 \$\$\$SDGNSPE\$\$\$\$\$

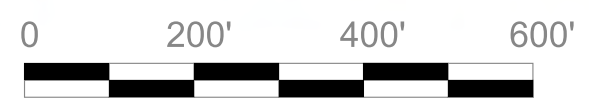


KNOXVILLE CLASSIFIED STREETS

MORRELL ROAD 5 LANE SEGMENT
 FROM WESTLAND DRIVE
 TO KINGSTON PIKE

CITY OF KNOXVILLE
 FIGURE 7
 MORRELL ROAD 5 LANE
 STATION 0+00
 TO
 STATION 23+00

TYPE	YEAR	COUNTY	FIGURE NO.
CONCEPT	2022	KNOX	8



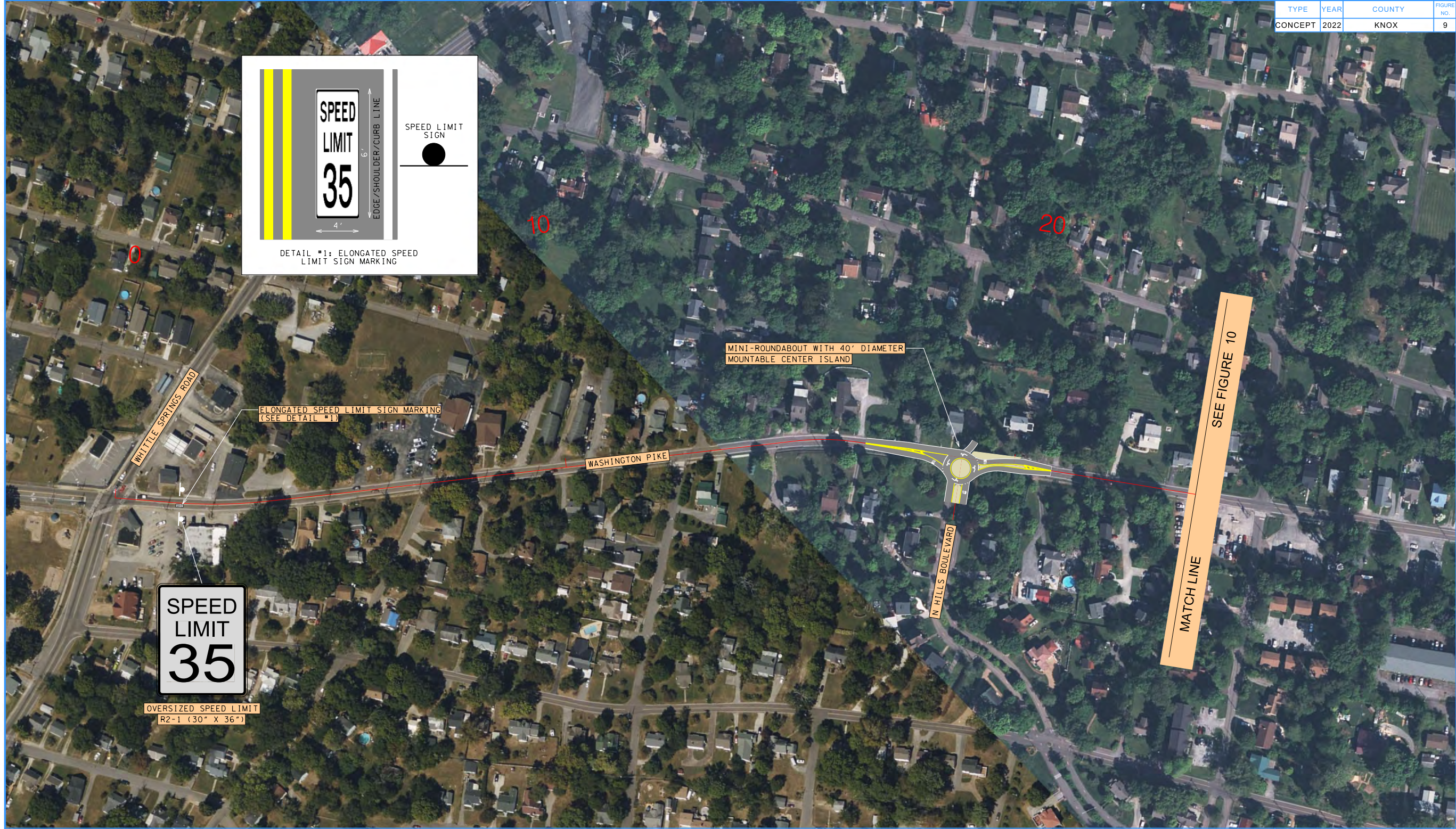
KNOXVILLE CLASSIFIED STREETS

MORRELL ROAD 5 LANE SEGMENT
FROM WESTLAND DRIVE
TO KINGSTON PIKE

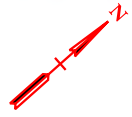
CITY OF KNOXVILLE
FIGURE 8
MORRELL ROAD 5 LANE
STATION 23+00
TO
STATION 47+85

\$\$\$\$\$TIMES\$\$\$\$\$
\$\$\$\$\$DGN\$\$\$\$\$

TYPE	YEAR	COUNTY	FIGURE NO.
CONCEPT	2022	KNOX	9



\$\$\$\$\$TIME\$\$\$\$\$
\$\$\$\$\$GNSPEC\$\$\$\$\$



KNOXVILLE CLASSIFIED STREETS

WASHINGTON PIKE
FROM WHITTLE SPRINGS ROAD
TO MILLERTOWN PIKE

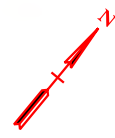
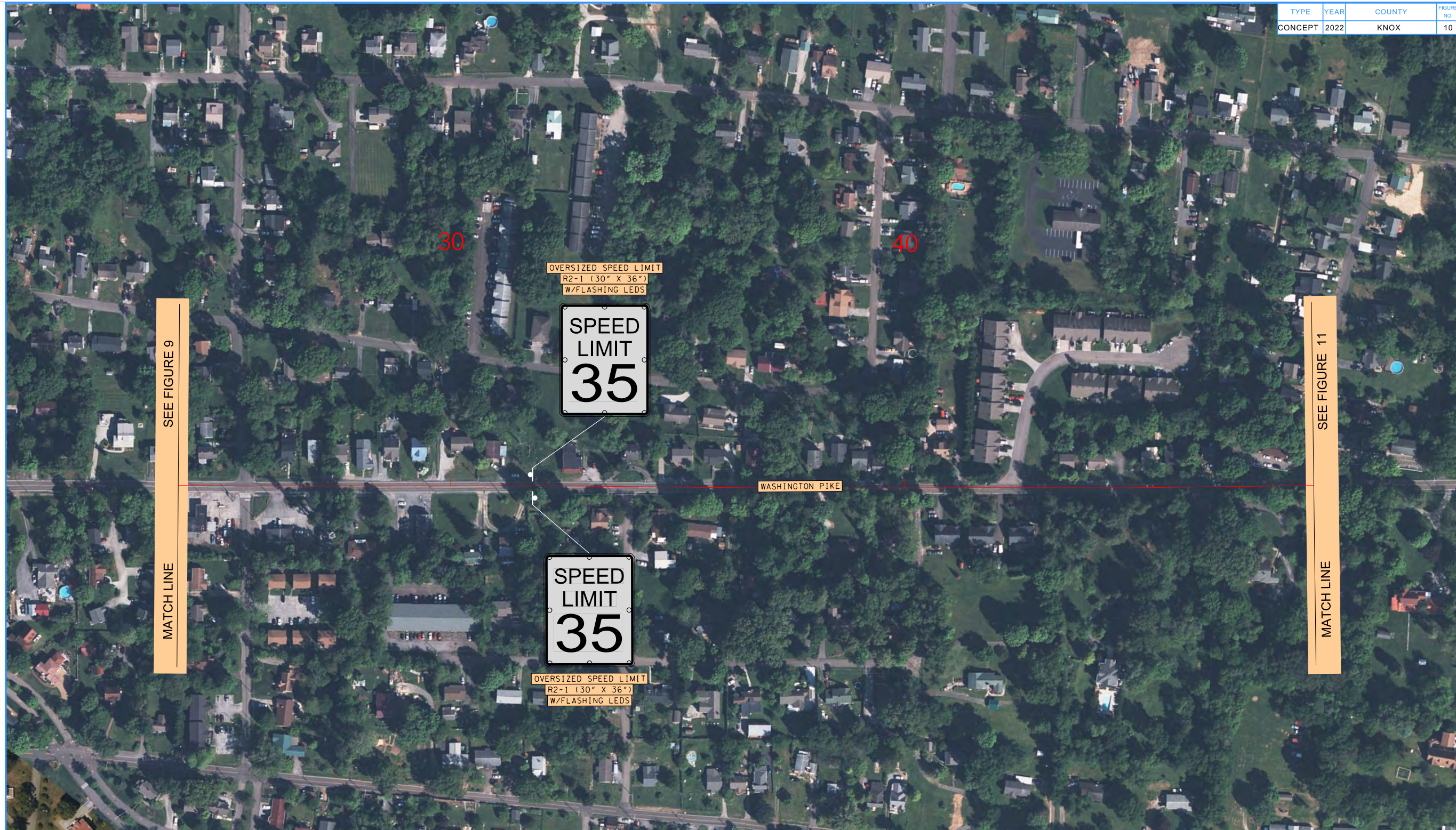
SEE FIGURE 10
MATCH LINE

CITY OF KNOXVILLE

FIGURE 9
WASHINGTON PIKE
STATION 0+00
TO
STATION 24+00

TYPE	YEAR	COUNTY	FIGURE NO.
CONCEPT	2022	KNOX	10

\$\$\$\$SYTIME\$\$\$\$
\$\$\$\$DGN\$P\$C\$\$\$\$

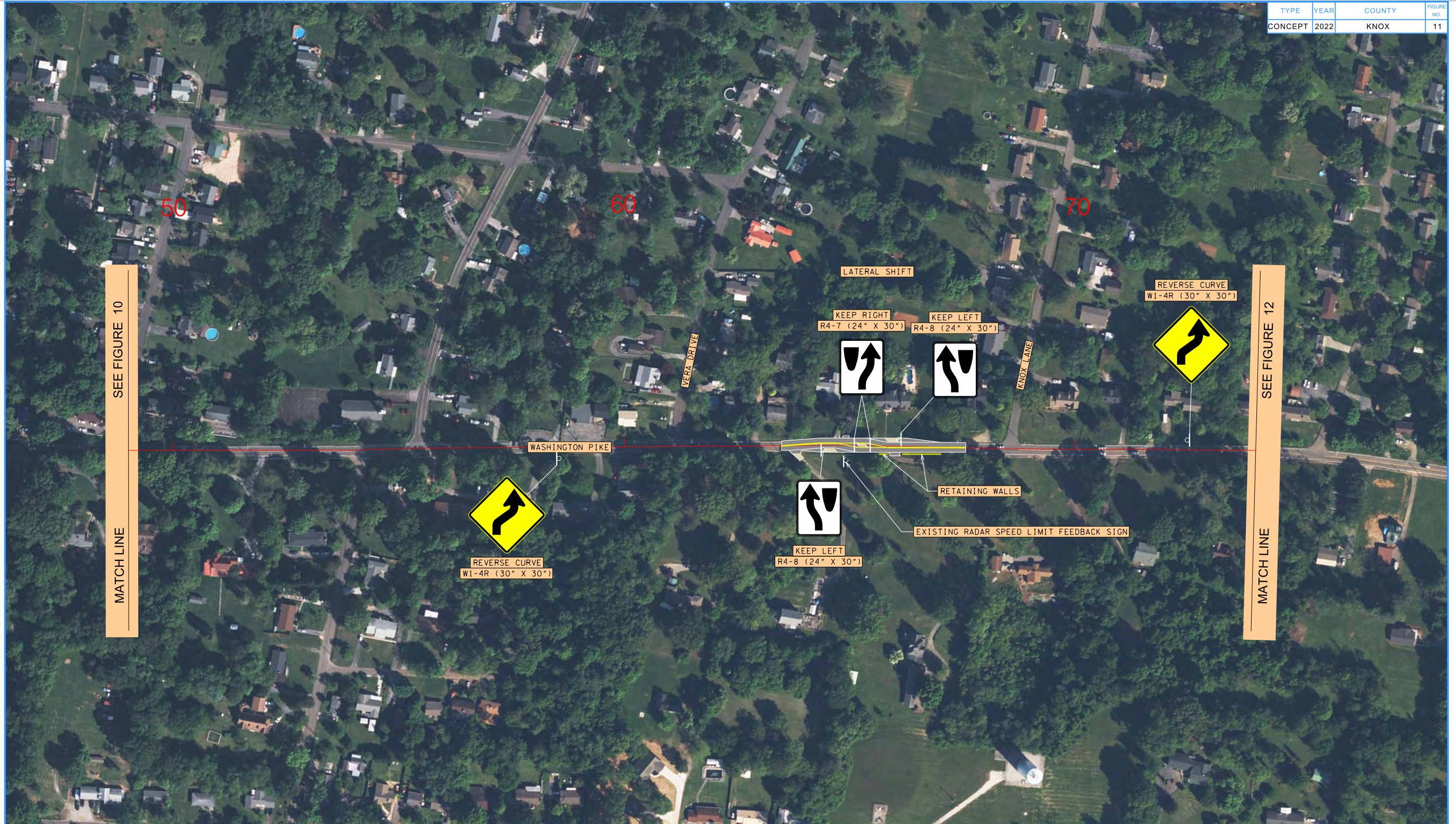


KNOXVILLE CLASSIFIED STREETS

WASHINGTON PIKE
FROM WHITTLE SPRINGS ROAD
TO MILLERTOWN PIKE

CITY OF KNOXVILLE
FIGURE 10
WASHINGTON PIKE
STATION 24+00
TO
STATION 49+00

TYPE	YEAR	COUNTY	FIGURE No.
CONCEPT	2022	KNOX	11



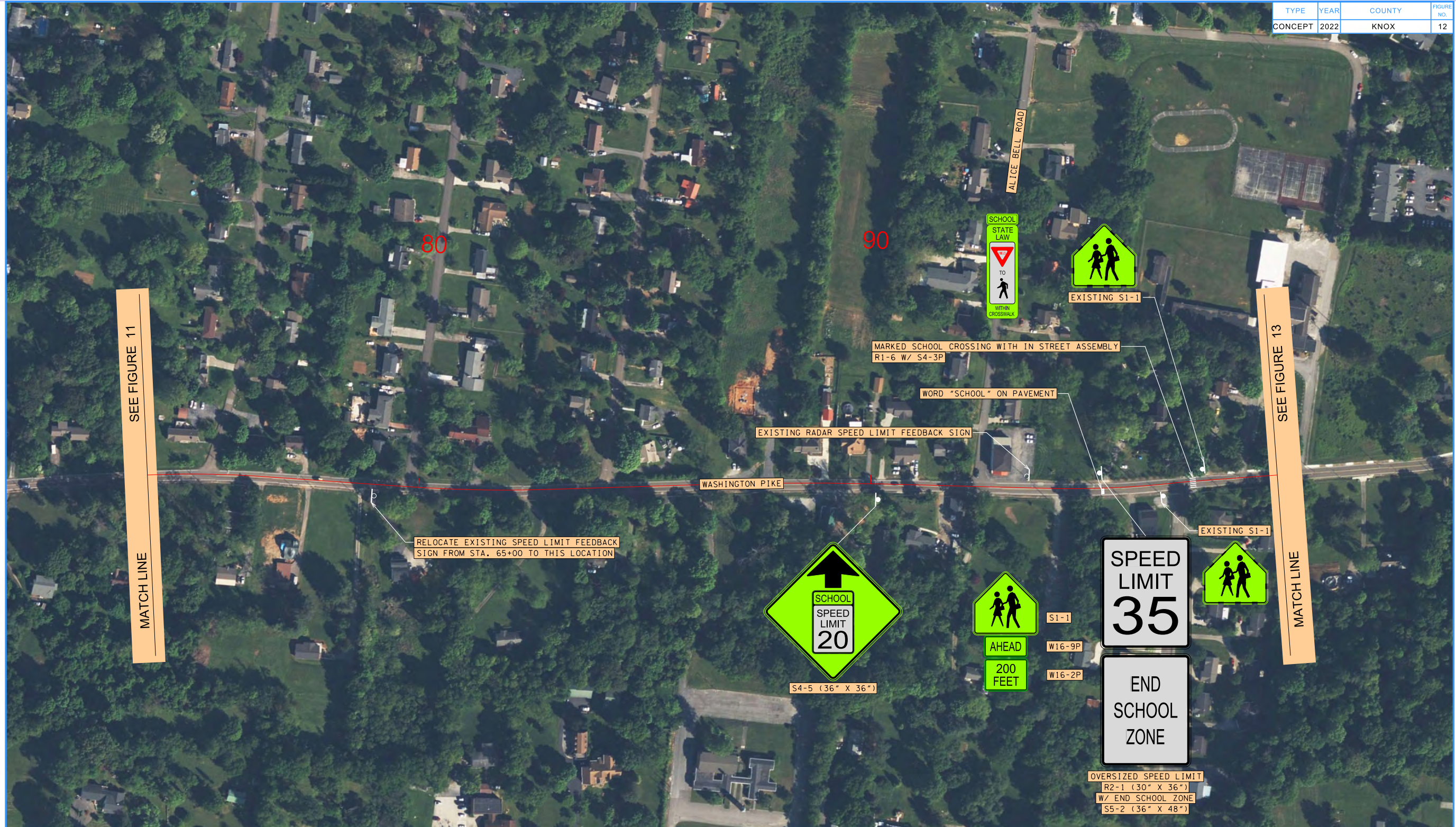
KNOXVILLE CLASSIFIED STREETS

WASHINGTON PIKE
FROM WHITTLE SPRINGS ROAD
TO MILLERTOWN PIKE

CITY OF KNOXVILLE
FIGURE 11
WASHINGTON PIKE
STATION 49+00
TO
STATION 74+00

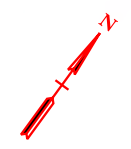
\$\$\$\$SYTIME\$\$\$\$
\$\$\$\$GNSPEC\$\$\$\$

TYPE	YEAR	COUNTY	FIGURE NO.
CONCEPT	2022	KNOX	12



SEE FIGURE 11
MATCH LINE

SEE FIGURE 13
MATCH LINE



KNOXVILLE CLASSIFIED STREETS

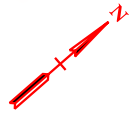
WASHINGTON PIKE
FROM WHITTLE SPRINGS ROAD
TO MILLERTOWN PIKE

CITY OF KNOXVILLE
FIGURE 12
WASHINGTON PIKE
STATION 74+00
TO
STATION 99+00

TYPE	YEAR	COUNTY	FIGURE NO.
CONCEPT	2022	KNOX	13



\$\$\$\$SYTIME\$\$\$\$
 \$\$\$SDGNSPECC\$\$\$\$

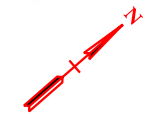
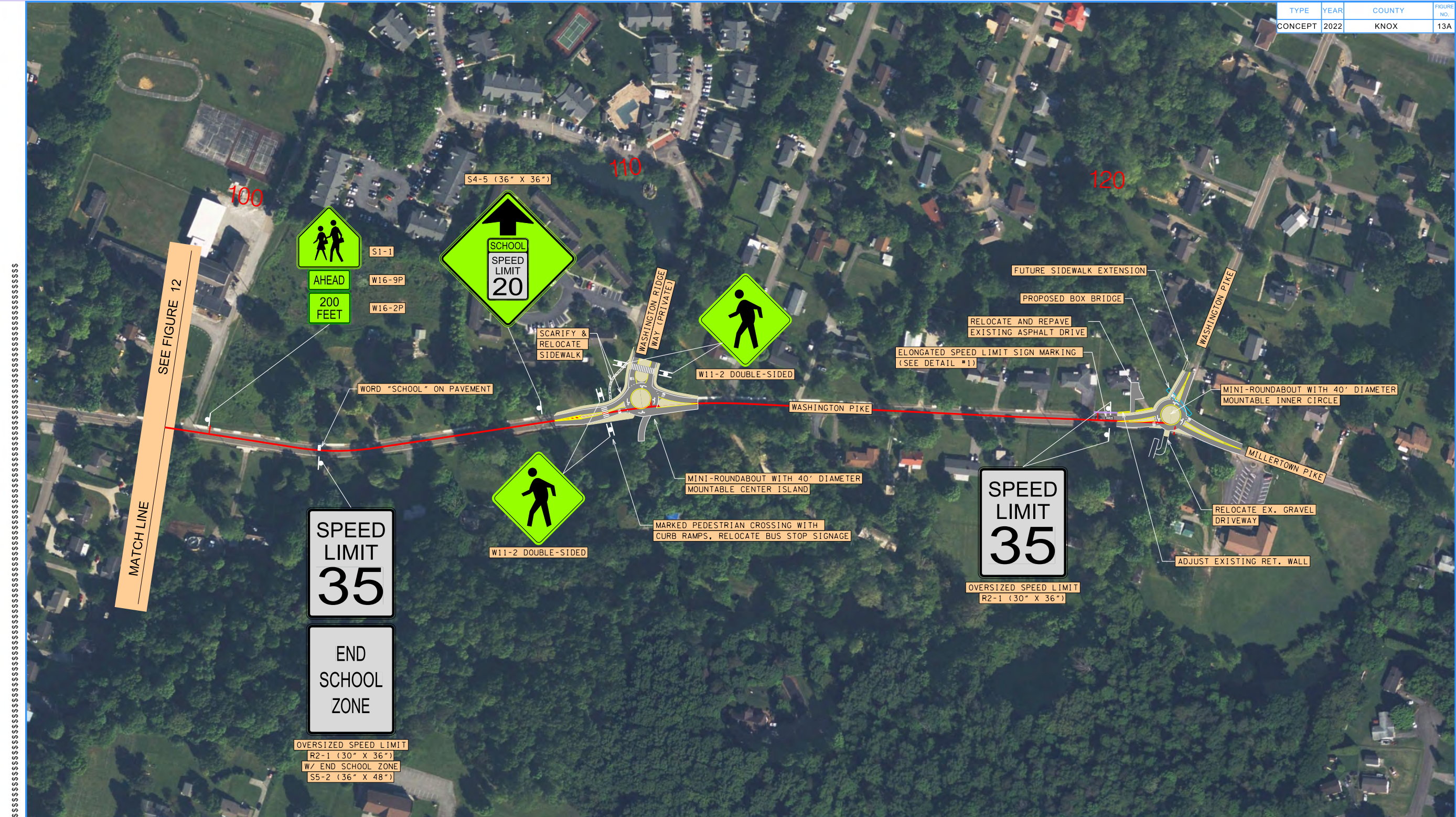


KNOXVILLE CLASSIFIED STREETS

WASHINGTON PIKE
 FROM WHITTLE SPRINGS ROAD
 TO MILLERTOWN PIKE

CITY OF KNOXVILLE
 FIGURE 13
 WASHINGTON PIKE
 STATION 99+00
 TO
 STATION 121+61

TYPE	YEAR	COUNTY	FIGURE NO.
CONCEPT	2022	KNOX	13A



KNOXVILLE CLASSIFIED STREETS

WASHINGTON PIKE
FROM WHITTLE SPRINGS ROAD
TO MILLERTOWN PIKE

CITY OF KNOXVILLE
FIGURE 13A
WASHINGTON PIKE
STATION 99+00
TO
STATION 121+61

Figure 11: Bruhin Road Opinion of Probable Construction Cost

Corridor - Station - Description	
Bruhin	
3+00	
Overhead Gateway Signage, Support & Foundations	\$15,000
Speed Limit Elongated Pavement Marking	\$1,500
Speed Limit Sign & Post (Oversized Signage)	\$2,000
30+00	
Roundabout at Bruhin & Glenoaks	\$298,244
40+00	
"Radar Speed Limit - Feedback w/ Variable Message Signage"	\$8,000
47+00	
Roundabout at Bruhin & Inskip	\$198,544
51+00	
Roundabout at Inskip & Highlands	\$166,472
58+00	
Perimeter Flashing Oversized Speed Limit Sign	\$8,000
75+00	
Overhead Gateway Signage, Support & Foundations	\$15,000
Speed Limit Elongated Pavement Marking	\$1,500
Speed Limit Sign & Post (Oversized Signage)	\$2,000
TYPICAL	
6" Thermoplastic Wet Reflective Lane Marking	\$7,800
Total	\$724,061

Figure 12: Morrell Road Opinion of Probable Construction Cost (north and south of Westland Dr.)

Corridor - Station - Description	
Morrell	
3+00	
Overhead Gateway Signage with Support and Foundations	\$15,000
Speed Limit Elongated Pavement Marking	\$1,500
Speed Limit Sign & Post (Oversized Signage)	\$2,000
15+00	
End School Zone w/ Speed Limit Sign	\$1,500
School Zone Advance Warning w/ Speed Limit	\$1,000
School Zone Elongated Pavement Marking	\$1,500
School Zone Flashers System	\$9,000
30+00	
End School Zone with Speed Limit Sign	\$1,500
School Zone Advance Warning with Speed Limit	\$1,000
School Zone Elongated Pavement Marking	\$1,500
School Zone Flashers System	\$9,000
School Zone Flashers System	\$9,000
34+00	
Remove Vegetation (Sight Distance)	\$500
School Crossing Advance Warning with Dist	\$2,000
School Crosswalk In Street Warning Sign Flexible	\$1,000
School Crosswalk Markings 24 foot Crossing	\$2,000
School Crosswalk RRFB w/ Pedestrian Button - SET	\$18,000
School Crosswalk ADA Ramp - Landing	\$7,500
35+00	
Overhead Gateway Signage with Support and Foundations	\$15,000
Perimeter Flashing for Oversized Stop Sign Each Side of Traffic Circle	\$8,000
Speed Limit Elongated Pavement Marking	\$1,500
Speed Limit Sign & Post (Oversized Signage)	\$2,000
Urban Compact Roundabout - Murrell & Nubbin Ridge	\$637,611
North of Westland	
Median - Painted with Delinators (12 Foot Hatched with Channelizers at 30 ft)	\$68,600
Perimeter Flashing Oversized Speed Limit Sign	\$8,000
Radar Speed Limit - Feedback with Variable Message Signage	\$8,000
Bike Lane Symbols	\$10,000
Bike Lane Buffer	\$7,000
Typical	
6" Thermoplastic Wet Reflective Lane Marking	\$20,800
Bike Sharrows	\$20,000
Total	\$867,011

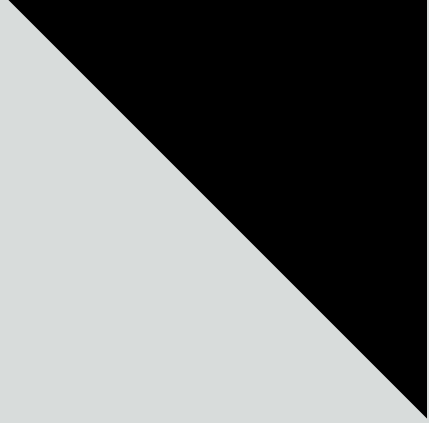
Figure 13: Washington Pike Opinion of Probable Construction Cost

Corridor - Station - Description	
Washington Pike	
3+00	
Speed Limit Elongated Pavement Marking	\$1,500
Speed Limit Sign & Post (Oversized Signage)	\$2,000
19+00	
Roundabout at Washington Pike and North Hills	\$1,025,728
60+00	
Perimeter Flashing Oversized Speed Limit Sign	\$4,000
Speed Limit Elongated Pavement Marking	\$1,500
61+00	
Perimeter Flashing Oversized Speed Limit Sign	\$4,000
Speed Limit Elongated Pavement Marking	\$1,500
65+00	
Lane Shift at Washington Pike near Knox Lane	\$372,861
65+00	
Radar Speed Limit - Feedback w Variable Message Signage	\$8,000
90+00	
School Zone Advance Warning with Speed Limit	\$1,000
93+50	
Radar Speed Limit - Feedback with Variable Message Signage	\$8,000
94+00	
End School Zone with Speed Limit Sign	\$1,500
School Zone Elongated Pavement Marking	\$1,500
School Zone Flashers System	\$9,000
School Zone Flashers System	\$9,000
96+50	
School Crossing Advance Warning with Dist	\$2,000

Corridor - Station - Description	
School Crosswalk In Street Warning Sign Flexible	\$1,000
School Crosswalk Markings 24 foot Crossing	\$2,000
School Crosswalk RRFB w/ Pedestrian Button - SET	\$18,000
School Crosswalk ADA Ramp - Landing	\$15,000
102+00	
End School Zone with Speed Limit Sign	\$1,500
School Zone Advance Warning with Speed Limit	\$1,000
School Zone Elongated Pavement Marking	\$1,500
School Zone Flashers System	\$9,000
110+00	
Roundabout at Washington Pike and Washington Ridge Way	\$811,189
121+00	
Speed Limit Elongated Pavement Marking	\$1,500
Speed Limit Sign & Post (Oversized Signage)	\$2,000
Roundabout at Washington Pike and Millertown Pike	\$552,222
Typical	
6" Thermoplastic Wet Reflective Lane Marking	\$47,840
Total	\$2,907,840

Bruhin/Murrell/Washington Pike **\$4,498,912**
GRAND TOTAL

Appendices



Appendix A – Working Group Summary Meeting Minutes

November 10, 2021

Meeting Notes

UTPG: CITY-WIDE CLASSIFIED STREETS PLAN FOR THE CITY OF KNOXVILLE
TDOT CONTRACT # 65524; TASK ORDER 65524-42
Gresham Smith Project No. 44606.04

Meeting Date: November 8, 2021; noon (ET)
Participants: Zach Roberts, Shawn Garner, Jeff Branham – City of Knoxville
Troy Ebbert, Michelle Christian – TDOT
Jason Brady, Patrick Fiveash, Greg Kern – Gresham Smith (GS)

Discussion: WORKING GROUP MEETING #1

Meeting Notes:

1. Greg provided a review of the data collection and analysis efforts to produce the draft list of candidate roadways.
2. Zach would like to add Deane Hill Dr. to the list.
3. Troy requested that all state roads be separated out of the list and provided to TDOT for their internal review prior to adding them to the “final” candidate list. GS will provide that state road list to Troy as soon as possible so TDOT may review it and provide guidance back to GS on the public engagement activities, specifically what state roads should be included on the candidate’s list.
4. The group discussed the availability of speed enforcement data from the Knoxville P.D. Such information would supplement the data currently used in this study. Zach will check with KPD on a contact. Gresham Smith will provide to Zach the most recent candidate roadways list which KPD could then review for comment.
5. Zach noted that many of the City’s classified roads have geometric constraints (R/W and travel lane width constraints) that will limit the speed mitigation options for those roadways. The group discussed options such as traverse pavement markings, delineators, rumble strips, painted road shields/speed limits on the roadway, etc. Gresham Smith will continue to research speed mitigation options applicable for such physically constrained roads.
6. Greg discussed public engagement tasks and approaches. This included using an interactive map for online access where the public could place an icon and provide a comment on their concern. The website would also show the speed mitigation options in table and graphic form. This could be presented in a “visual preference” format for consideration and comment by the public.
7. The City stated that there may be concerns by Legal about collecting data on traffic operations including safety and speeding concerns that would then be known by the City as a potential concern. Jeff requested GS provide a sample of the map, input screens, and reporting so the City could review and reach a decision.

MEETING NOTES

UTPG: City-Wide Classified Streets Plan for the City of Knoxville

Gresham Smith Project No. 44606.04

November 10, 2021

Page 2

- a. A subsequent phone discussion between GS and Fairpointe Planning noted that every public engagement activity raises issues and concerns that may not be part of the specific study or project for which the engagement is targeted. Fairpointe noted that it's preferable in communications to the public to request "what is your perceived concern". This way, the perceived concern can be passed on to the appropriate agency for consideration of any follow-up including engineering studies or similar research.
- 8. Greg discussed the tentative schedule and format for the first public meeting – tentatively the week of December 6th; a virtual meeting to introduce the project and direct persons to the online survey and resources. The City agreed that 2 weeks advance notice of this meeting is appropriate. A draft of the meeting content is to be reviewed by the Working Group as soon as possible. Zach noted that the City has a communications department that can review the format and content for consistency with City standards.
 - a. A subsequent discussion among GS staff noted that this first outreach activity could be a video/slide presentation viewable at any time vs. a scheduled virtual meeting. The public could view the site via a link and provide comments for a set period of time (for instance 2 weeks) which would then be used by the project team in vetting the candidate roadways.
- 9. The meeting adjourned at 1:00 pm (ET).

Action Items:

Item	Action Required	Assigned To	Due Date
A.	Revise the candidate roadways list to omit state roads and add Deane Hill Dr.; forward the revised list back to all Working Group members.	GS	11/12/21
B.	Research additional speed calming strategies especially for physically constrained roads and add to/revise the current draft list of options.	GS	11/19/21
C.	GS to provide candidate roads that are state routes to TDOT for review and guidance back to GS.	GS / TDOT	11/15/21
D.	Provide the City and TDOT with sample online public survey screens and reports for review and comment.	GS / Fairpointe	11/12/21
E.	Confirm with City Legal Dept. approach toward online public engagement	Zach R.	11/15/21
F.	Review candidate roadways list with KPD for enforcement/citation frequency	Zach R.	11/15/21
G.	Develop and provide to the Working Group a draft of the first public meeting materials	GS / Fairpointe	11/19/21

This represents our understanding of the items discussed at this meeting. If you have any questions, comments or required revisions, please contact me.

Prepared by: Greg Kern, AICP
Sr. Transportation Planner

Copy: Participants



December 15, 2021

Meeting Notes

UTPG: CITY-WIDE CLASSIFIED STREETS PLAN FOR THE CITY OF KNOXVILLE
TDOT CONTRACT # 65524; TASK ORDER 65524-42
Gresham Smith Project No. 44606.04

Meeting Date: December 15, 2021; 11:00 am (ET)
Participants: Zach Roberts, Jeff Branham – City of Knoxville
Troy Ebbert – TDOT
Craig Luebke – Knoxville TPO
Tanisha Hall, Veronica Allen – Fairpointe Planning
Jason Brady, Greg Kern – Gresham Smith (GS)

Discussion: WORKING GROUP MEETING #2
DISCUSSION OF PUBLIC ENGAGEMENT SURVEY AND ONLINE PROJECT
SITE

Meeting Notes:

1. Greg provided a review of the data collection and analysis efforts to produce the draft list of candidate roadways.
2. Veronica provided a review of the draft survey.
3. Zach noted that the City would like to site to reference the 3-1-1 system for collecting public comments.
4. Comments on Screen 2 (Map Markers):
 - a. Zach recommended a verbiage change to “Corridors which have previously been identified as priorities...”.
 - b. Jeff recommended a note to the user that they can zoom in to see street details.
5. Comments on Screen 4 (Traffic Calming Strategies):
 - a. Jeff requested we add the pavement marking of a speed limit sign as an option.
 - b. The option of rumble strips is to be deleted (due to maintenance issues and noise complaints).
 - c. The option of lane elimination is to be deleted (basically the same option as lane repurposing).
 - d. Craig asked about having callouts to explain to the survey user each option; Tanisha and Veronica responded that the MetroQuest program base for this survey does not really allow that additional text to be displayed.
 - e. GS with Zach’s help will provide replacement graphics for the traffic circle/roundabout/chicane options to better reflect local conditions and provide better differentiation.

MEETING NOTES

UTPG: City-Wide Classified Streets Plan for the City of Knoxville
 Gresham Smith Project No. 44606.04
 December 15, 2021

6. Comments on Screen 5:
 - a. Add a link/reference to the City's 3-1-1 system for the public to submit comments about transportation issues.
7. It was agreed that the survey should remain live for 3 to 4 weeks.
8. Tanisha and Veronica discussed putting together drafts for the Facebook site content. Also, a video on Facebook Live explaining the purpose of the study and other information can be recorded and put on the site for public viewing. This will be part of the discussion with the City's Communication Department – the text of the message, who would be on camera, etc.
9. The meeting adjourned at 11:50 am (ET).

Action Items:

Item	Action Required	Assigned To	Due Date
A.	Greg to provide the list of candidate roadways to Craig Luebke	GS	12/15/21
B.	Zach to provide photos he has on chicanes and roundabouts within the City	City	12/17/21
C.	Zach to coordinate with Eric Vreeland (Communications Dept) so GS and Fairpointe may develop content and coordinate on posting to the City's Facebook page	City	12/17/21
D.	Fairpointe will provide a sample of a Facebook Live video they have produced	Fairpointe	12/16/21

This represents our understanding of the items discussed at this meeting. If you have any questions, comments or required revisions, please contact me.

Prepared by: Greg Kern, AICP
 Sr. Transportation Planner

Copy: Participants



February 11, 2022

Meeting Notes

UTPG: CITY-WIDE CLASSIFIED STREETS PLAN FOR THE CITY OF KNOXVILLE
TDOT CONTRACT # 65524; TASK ORDER 65524-42
Gresham Smith Project No. 44606.04

Meeting Date: February 10, 2022; 3:00 pm (ET)
Participants: Zach Roberts, Shawn Garner – City of Knoxville
Troy Ebbert, Michelle Christian – TDOT
Craig Luebke, Ellen Zavisca – Knoxville TPO
Veronica Allen – Fairpointe Planning
Jeff Branham, Greg Kern – Gresham Smith (GS)

Discussion: WORKING GROUP MEETING #3
REVIEW PUBLIC SURVEY RESULTS & DISCUSS 10 LOCATIONS FOR
ADDITIONAL DATA COLLECTION

Meeting Notes:

1. Veronica provided a review of the survey results. Over 4,200 “markers” were placed on the map to indicate the locations of speeding concerns. Beyond the speed concerns, the survey provided the public’s perception on bicycle/pedestrian safety concerns, locations of excessive peak period traffic congestion, and other safety concerns.
2. On the survey’s assessment of preferred speed mitigation strategies, it was noted that Lane Repurposing/Lane Diets received no votes. Zach, Craig and Shawn noted removing travel lanes is never popular with local motorists.
3. Next steps were discussed and Gresham Smith will provide an updated table of roads that will include the ranking results from the survey, and will provide an accompanying GIS map showing proposed locations for the 10 vehicle speed data collection sites. Once the City decides on the 10 locations, Marr Traffic will coordinate with Gresham Smith and the City on specific locations for the tube counters.
4. The meeting adjourned at 3:35 pm (ET).

MEETING NOTES

UTPG: City-Wide Classified Streets Plan for the City of Knoxville
 Gresham Smith Project No. 44606.04
 February 11, 2022

Action Items:

Item	Action Required	Assigned To	Due Date
A.	Gresham Smith to provide an updated candidate roadways table showing the survey ranking results + provide a GIS map with the proposed approximate locations of the 10 data collection sites.	GS	2/11/22
B.	The City will recommend the locations for the 10 data collection sites.	City	2/16/22

This represents our understanding of the items discussed at this meeting. If you have any questions, comments or required revisions, please contact me.

Prepared by: Greg Kern, AICP
 Sr. Transportation Planner

Copy: Participants

Appendix B – Public Survey Summary Report

KNOXVILLE, TN

Classified Streets – Speed Study

Survey Summary

The public survey for the Classified Streets Speed Study in Knoxville, Tennessee, was created on MetroQuest by Fairpointe Planning in order to support preliminary traffic data analysis that identified initial priority roadways. The survey gathered public input on speeding and other traffic-related concerns around said priority corridors. The survey used interactive responses that allowed participants to locate perceived issues, select priority projects, and identify effective traffic calming strategies. The survey was open from January 10th to January 23rd, 2022 and was distributed through the City of Knoxville website and social media pages to engage a total of 1,653 participants. Some key takeaways are listed below:

Key Takeaways:

- The survey participants represented over 15 zip codes with at least 10 people participating from each area, which resulted in widespread data collection
- Participants identified speeding concerns on Knoxville roads, with almost 40% of participants marking a speed concern on the map and 40% of those markers citing that the speed is too fast on that specific street
- Out of the 18 previously identified priority corridors, 17 were marked as priority corridors for speed reduction measures by at least 100 participants.

Slide 2: Perceived Roadway Travel Issues

This survey section asked participants to drag three map markers to indicate where they perceived roadway travel issues. The marker options included a bike/ped concern, safety concern, speed concern, traffic congestion concern, or other concern. After placing each marker onto the map, participants were asked follow-up questions related to their concern, including the name of the marked street. Although participants were not limited to only marking priority streets, the priority corridors were highlighted in red to give additional guidance.

Image 1: Map Marker Overview

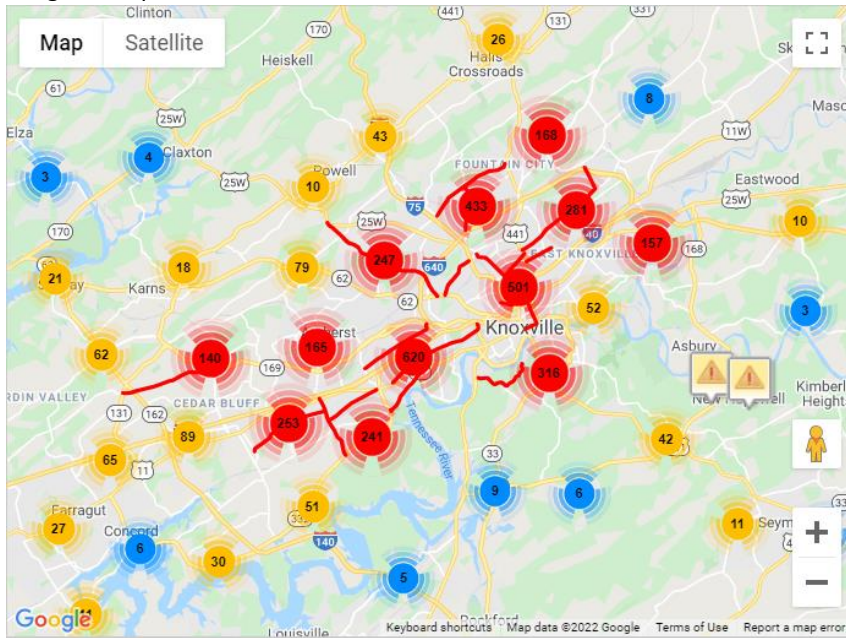
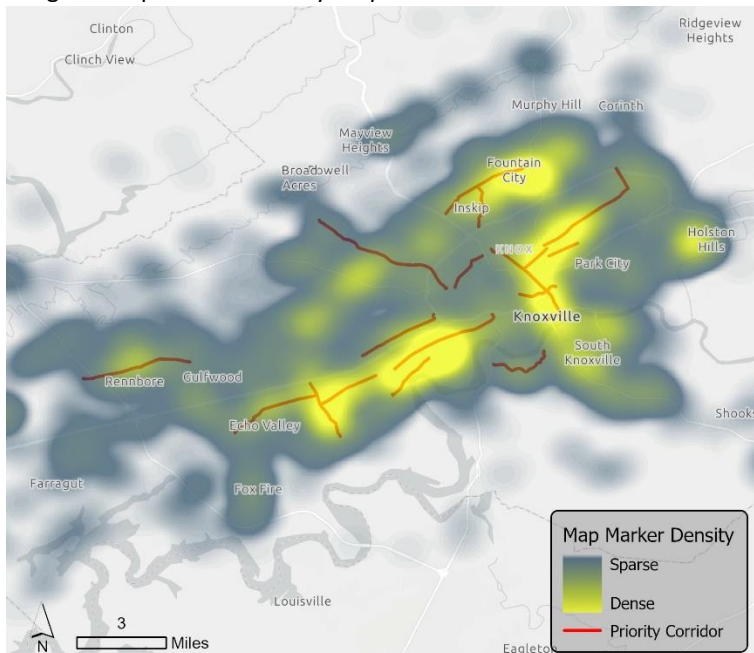
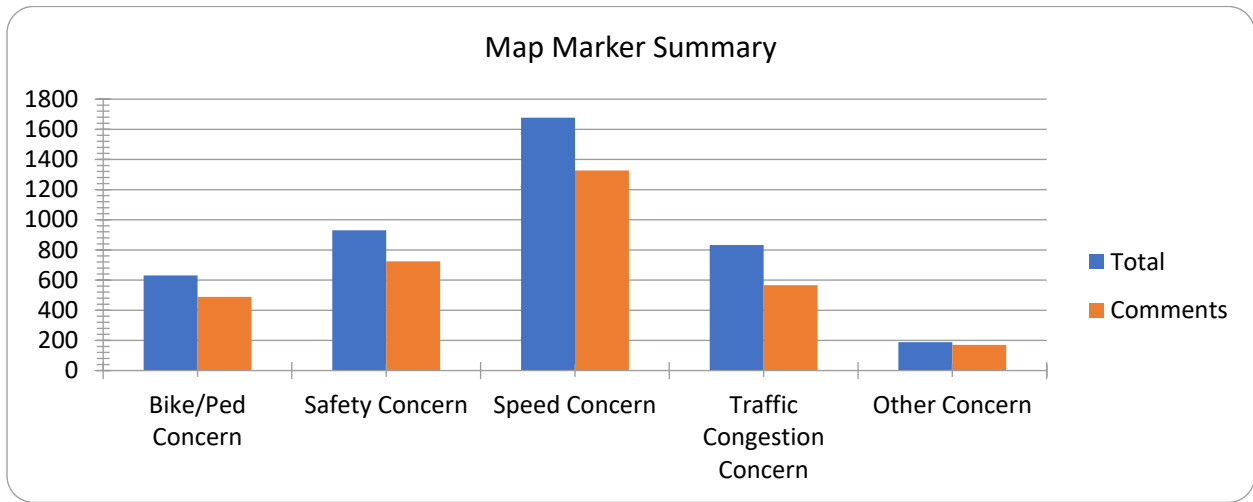


Image 2: Map Marker Density Map



Graph 1: Map Marker Summary



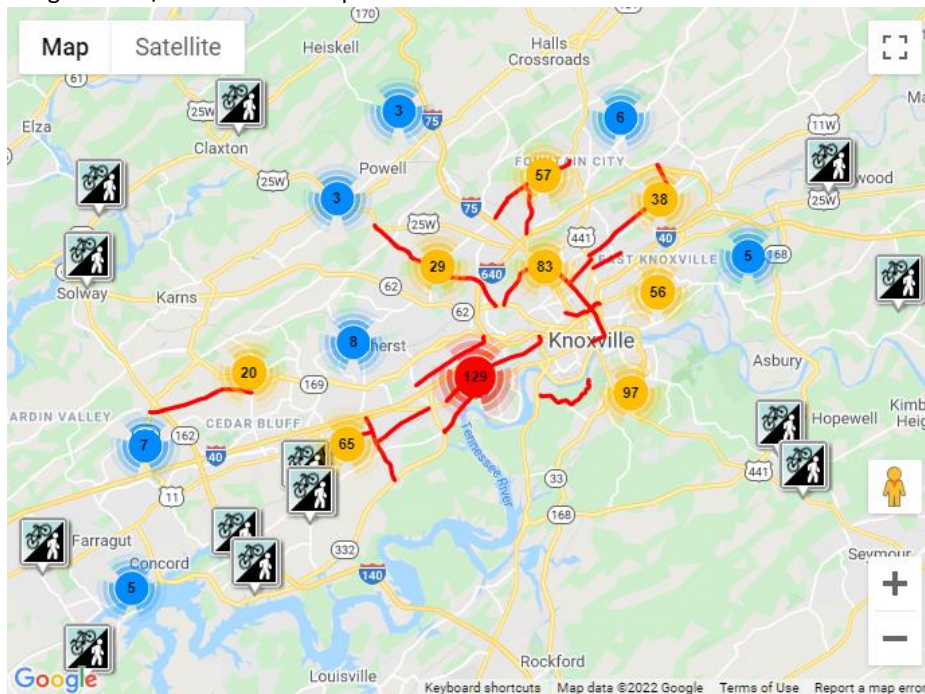
Key Takeaways:

- Speed concerns received the most markers of any category, with 39.4% of all markers.
- On average, each participant placed 2.58 markers.

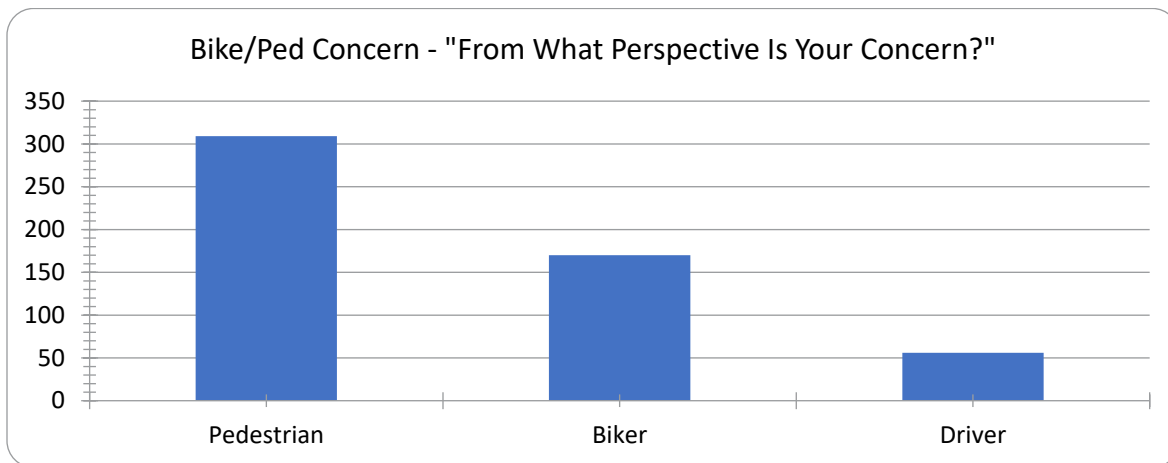
A. Bike/Ped Concern

The Bike/Ped marker allowed participants to indicate a specific location where they perceived an issue regarding pedestrian or cyclist activity. The follow-up questions asked participants to reveal their perspective of concern as either a driver, pedestrian, or cyclist. They were then asked to define their concern, including the street name.

Image 3: Bike/Ped Concern Map Marker Overview



Graph 2: Bike/Ped Concern Map Marker Question 1



Key Takeaways:

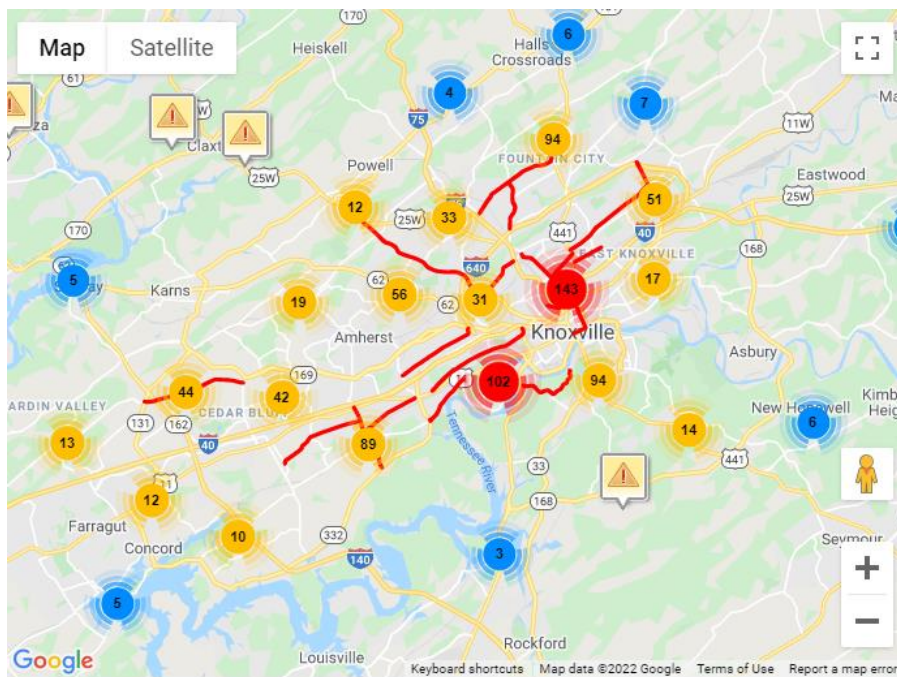
- Of the participants that placed the Bike/Ped Concern map marker, 57.8% are concerned as pedestrians
- The Bike/Ped markers are most concentrated around Sutherland Avenue, Lyons View Pike and Deane Hill Drive
- A lot of the concerns expressed the lack of space or lack of facilities for pedestrians and cyclists
- E. Woodland Avenue received a significant number of comments stating that the area’s bike/ped facilities were inadequate, especially with the activity Fulton High School brings. Comments included concerns about sidewalks, crosswalks, traffic speeding, and protection for bike lanes.

B. Safety Concern

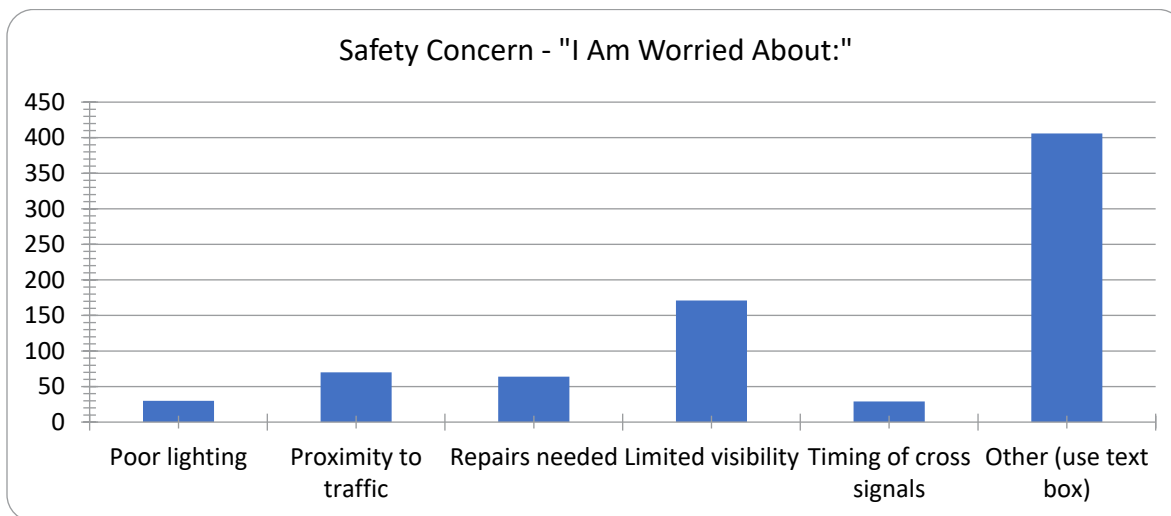
The Safety Concern marker asked participants to locate a specific area that they felt demonstrated a safety concern. The follow-up question provided a list of potential concerns for the participant to pick from. If their concern was not one of the options, participants could type their other safety concern in the text box, along with the street name associated with it.



Image 4: Safety Concern Map Marker Overview



Graph 3: Safety Concern Map Marker Question 1



Key Takeaways:

- Of the options provided, most safety concerns were related to limited visibility
- Safety concerns were most concentrated around Central St. and the Sequoyah Hills area from Kingston Pk. and through the neighborhood
- Other Concerns of Note:
 - Yarnell Rd and Campbell Station Rd intersection – people running stop signs
 - Deane Hill Dr. – no shoulders, steep drop-off combined with the proximity to traffic/narrow

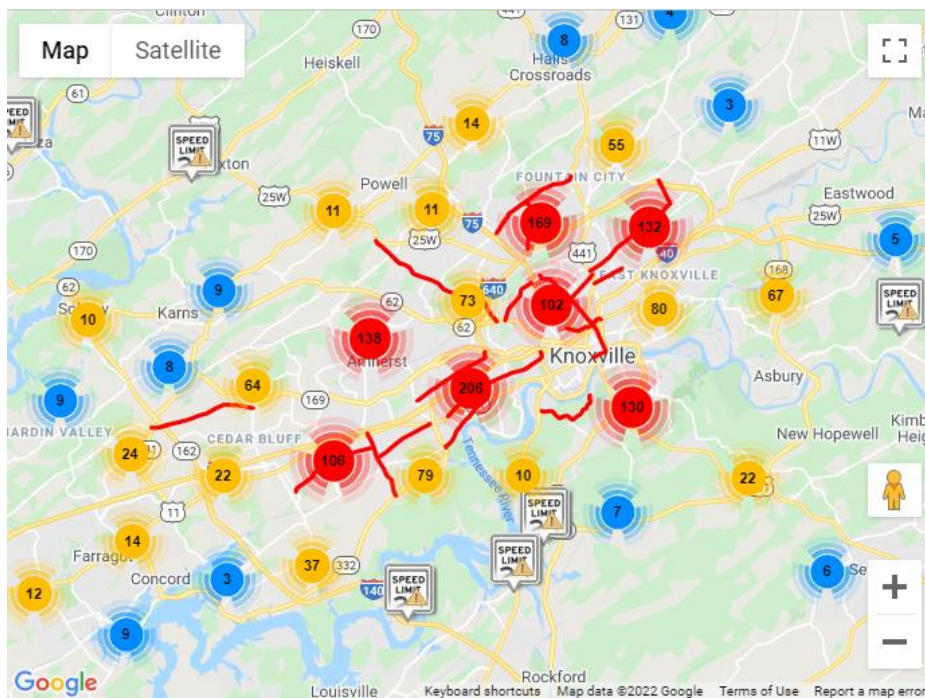


- Intersection concerns at Washington Pike and Whittle Springs Rd. – pedestrians and cars
- Speeding concerns along Greenwood Ave
- Bradshaw Garden Dr. – concern for pedestrians and speeding, elderly pedestrians that must cross the street to access the mailbox
- N. Broadway had several markers making concerns for the signal timing at certain intersections

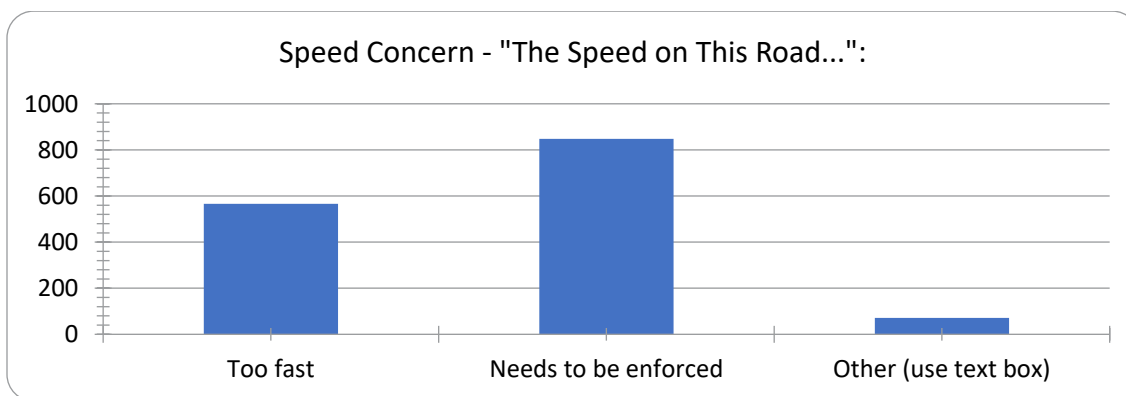
C. Speed Concern

The Speed Concern marker was used by participants to mark a location that they felt has speeding issues. The follow-up question asked participants to indicate if they felt the speed at the specified location was too fast or needed to be enforced. Participants were also given a text box for other requests and to include the street name.

Image 5: Speed Concern Map Marker Overview



Graph 4: Speed Concern Map Marker Question 1



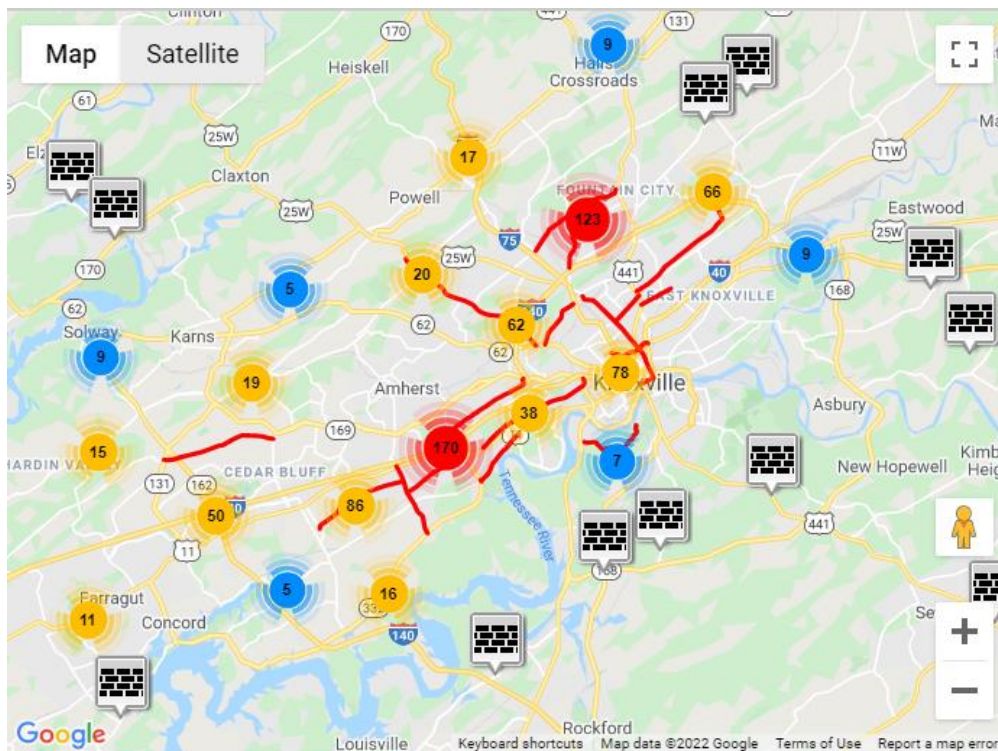
Key Takeaways:

- Speed concerns concentrated around Sutherland Ave and Bruhin Rd and Washington Pike
- 38.1% of speed concern markers noted that the speed in that location was too fast, while 57.1% requested that the speed be enforced
- The Amherst area received a significant number of speed concern markers, especially along Francis Rd. and Helmbolt Rd.
- Other roads of concerns were Palmetto Rd., Bradshaw Garden Dr., and Holston Hills Rd.

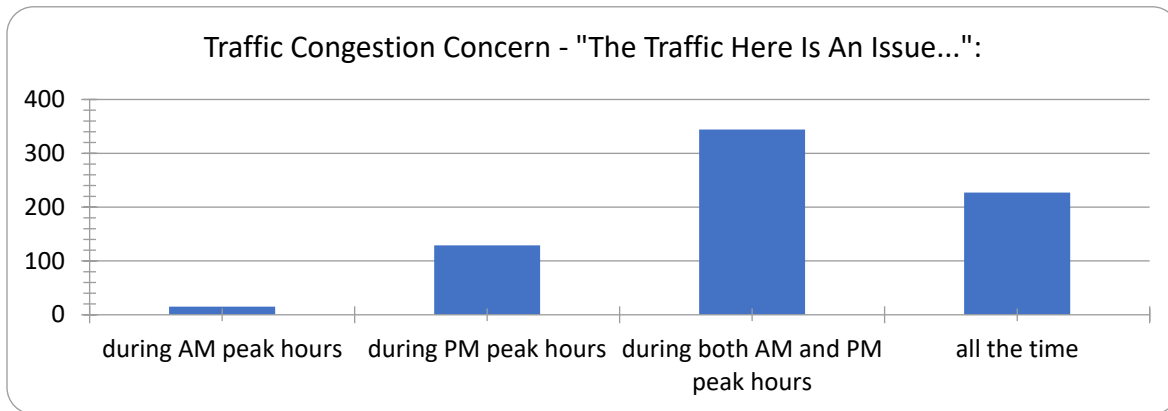
D. Traffic Congestion Concern

The Traffic Congestion concern marker allowed survey participants to identify streets they perceived to be congested. The follow-up questions asked the participant to specify if traffic was an issue during AM peak hours, PM peak hours, both AM and PM peak hours, or at all times. Additionally, they were asked to specify the street of concern.

Image 6: Traffic Congestion Concern Map Marker Overview



Graph 5: Traffic Congestion Map Marker Question 1



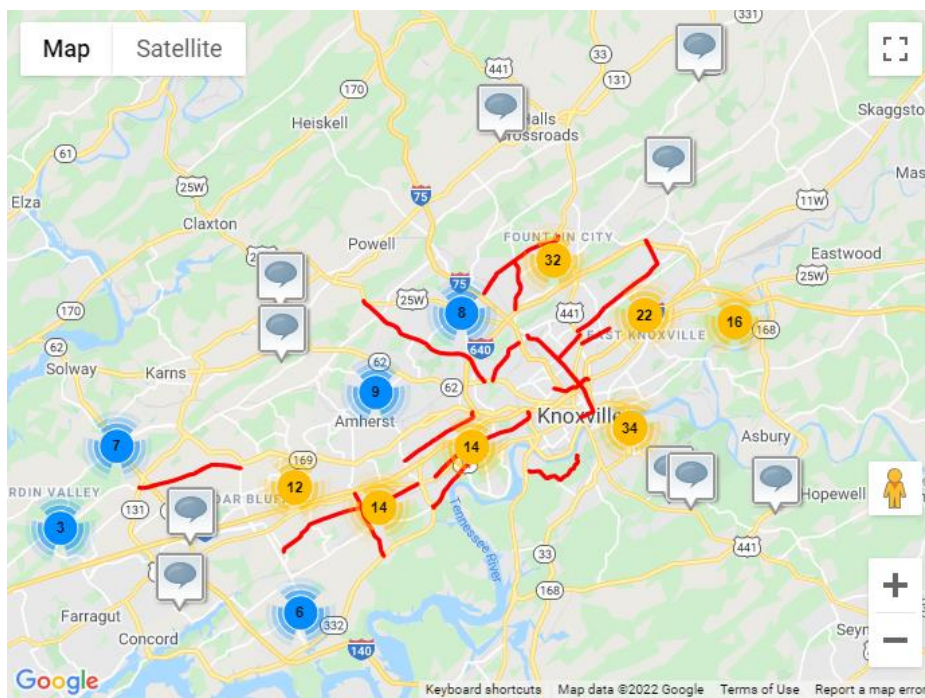
Key Takeaways:

- Traffic congestion concerns mainly at the Kingston Pike and Northshore Dr intersection, Morrell Rd, and at the N Broadway and Highland Dr intersection
- 79.9% of participants that placed a traffic congestion marker believed the traffic to be an issue during both AM and PM peak hours or all of the time

E. Other Concern

The other concern marker provided the opportunity to report any additional concern that was not covered by the previous marker options. The follow-up question allowed participants to define the street of concern as well as the specific concern.

Image 7: Other Concern Map Marker Overview



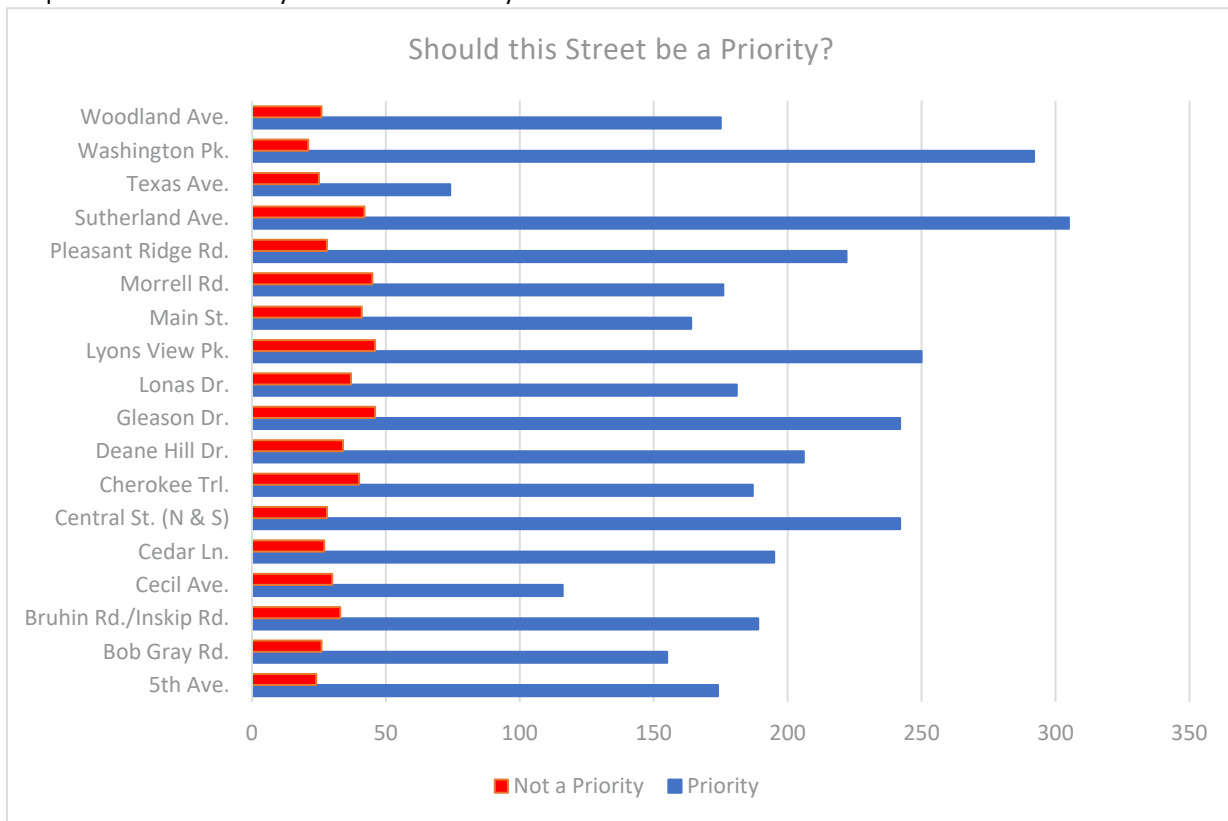
Key Takeaways:

- Other concerns noted areas in need of repair, stop sign locations that need to be enforced, and flooding issues

Slide 3: Potential Priority Streets

This survey section asked participants to select their five highest priorities for speed reduction measures. The 18 corridors that were previously identified as “priority” appeared on the map as colored segments and markers. As participants clicked on each marker, the name, stop/start points, and photo of the corridor was revealed and the question, “Should this be a priority?” was prompted with the choices of “Yes” or “No.” Survey participants could choose five corridors to respond “Yes” to, which comprised their top five streets for speed reduction measures.

Graph 6: Potential Priority Streets Identified by the Public



Key Takeaways:

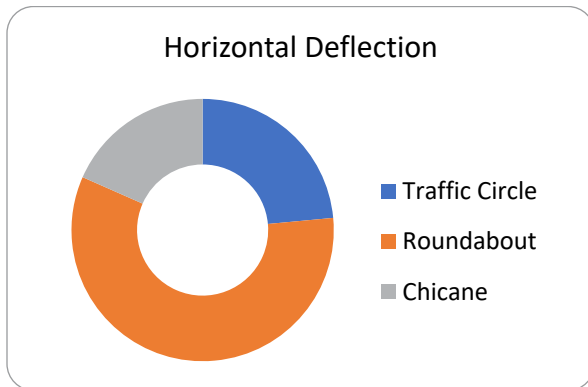
- Participants selected Sutherland Ave., Washington Pk., and Lyons View Pk. as the top three priority streets for speed reduction measures.



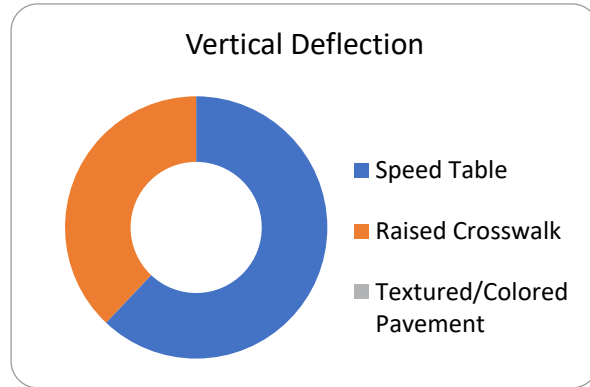
Slide 4: Speed Calming Strategy Review

This survey section asked participants to select their top preference in four separate categories of traffic calming strategies. The four categories were horizontal deflection, vertical deflection, lane modification/repurposing, and signage and each category had 2-4 strategies to choose from. Descriptions of each category were provided, along with pictures of each strategy.

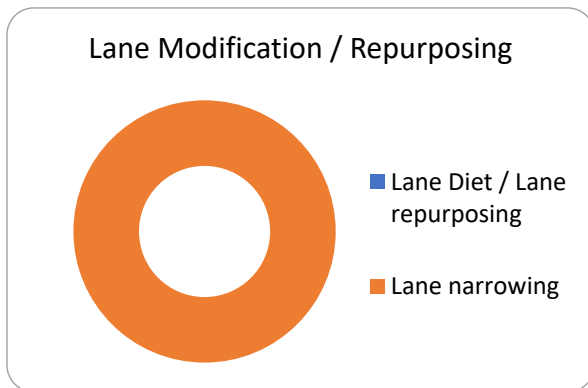
Graph 7: Horizontal Deflection Strategy Preference



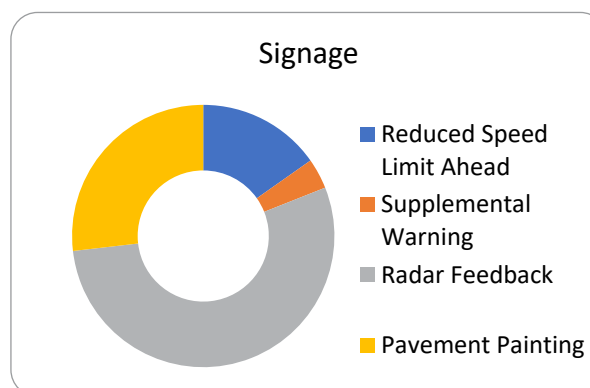
Graph 8: Vertical Deflection Strategy Preference



Graph 9: Lane Modification / Repurposing Strategy Preference



Graph 10: Signage Strategy Preference



Key Takeaways:

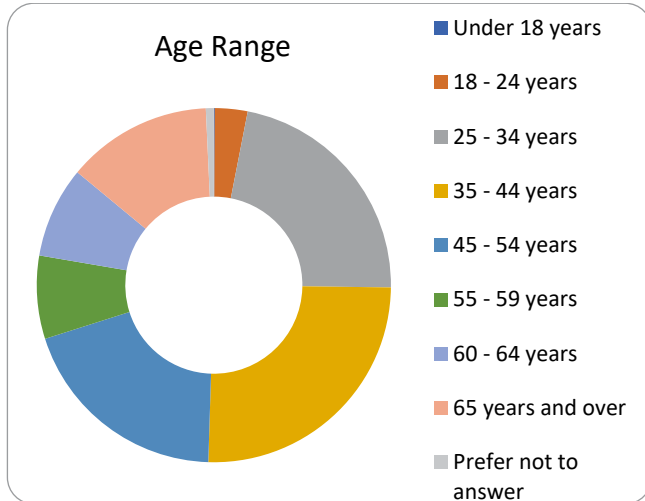
- The prevailing choices for each traffic calming strategy category are as follows: 58% of respondents prefer a roundabout as a horizontal deflection strategy, 62% prefer a speed table as a vertical deflection strategy, 100% of respondents prefer lane narrowing over lane diets/repurposing, and radar feedback is the preferred signage tool by 54% of the respondents.
- The least popular strategies were textured/colored pavement, lane diet/repurposing, and a supplemental warning sign



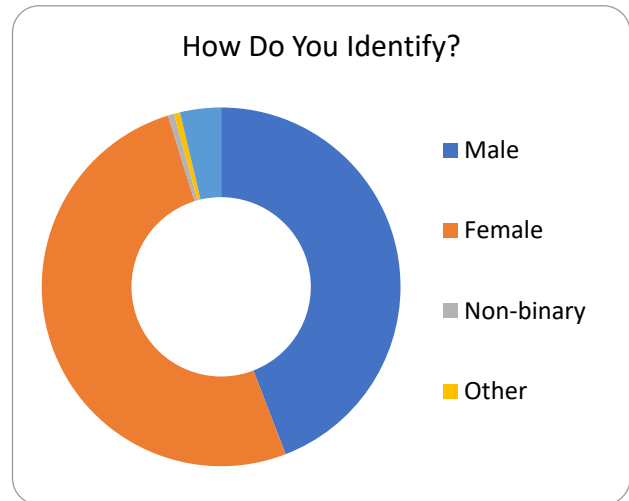
Slide 5: Wrap Up / Thank You

This optional data is collected to provide information on the demographic distribution of respondents to the survey.

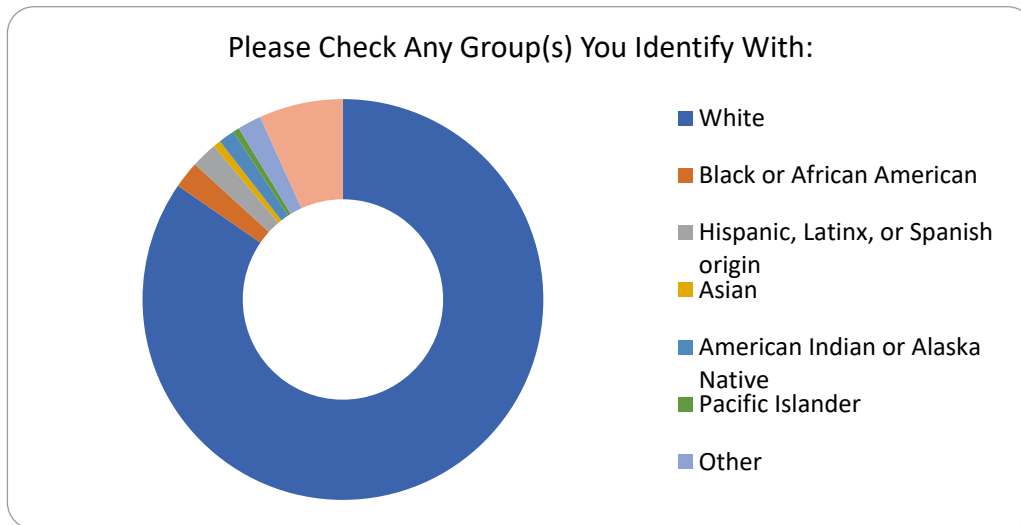
Graph 11: Age Range of Survey Participants



Graph 12: Gender Identity of Survey Participants



Graph 13: Racial Identity of Survey Participants



Graph 14: Yearly Household Income of Participants

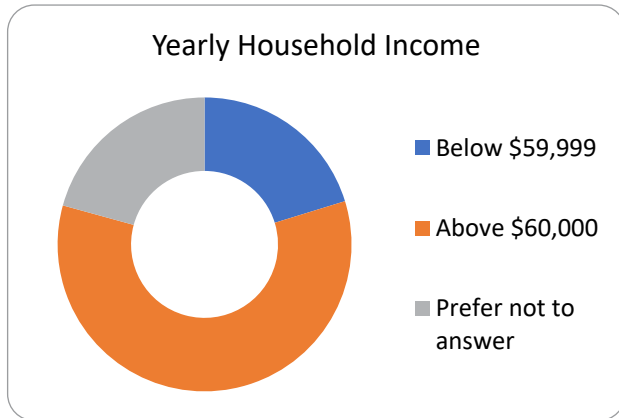


Table 1: Top Ten Zip Codes of Participants

Zip Code	Number of Participants
37919	178
37917	158
37918	134
37920	112
37914	69
37921	69
37923	64
37912	55
37909	51
37932	35





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