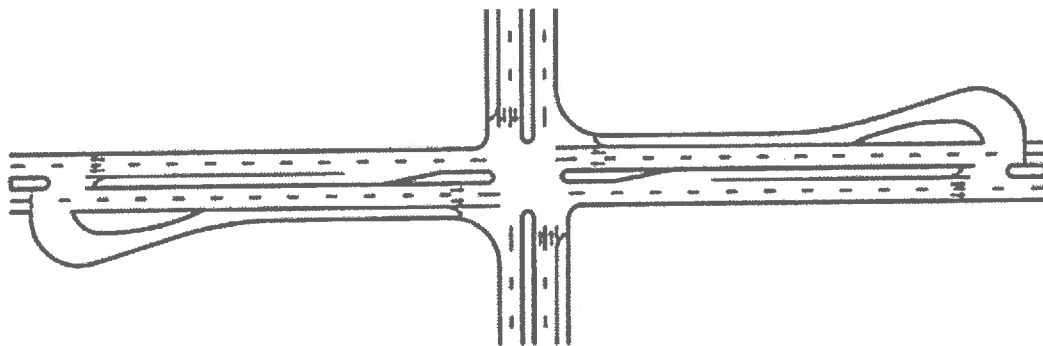


Prepared for:
Kentucky Transportation Cabinet
District Seven



US 27 Access Management Plan *Fayette and Jessamine Counties* **Final Report**



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Executive Summary

US 27 is classified as an Urban Principal Arterial. This type of roadway is intended to function with a high level of mobility and low-level of access. Currently, there are pockets of development that have a high density of access points. Studies have shown that high numbers of access points can disproportionately increase crash rates on our highways.

The elected leadership for the City of Nicholasville and Jessamine County realized that an Access Management Plan was needed for US 27 between Nicholasville and Lexington. While economic development has slowed, there is still considerable development potential remaining in the corridor. Now is the time to act and implement a plan.

The intent of this plan is to supplement the transportation component of the comprehensive plans for Jessamine and Fayette counties. This plan has been developed for the purposes of increasing safety and mobility, preserving the traffic carrying capability of the existing facility, and providing more efficient access connections between US 27 and the adjacent properties.

This plan is enacted through a Memorandum of Understanding (MOU). The memorandum is a multi-agency agreement that outlines the roles and responsibilities of the Kentucky Transportation Cabinet and local planning agencies, establishing a commitment to the vision and purpose of this plan.

Local access spacing and design requirements are often different from KYTC's requirements, and this has created confusion with respect to which set of requirements should take precedence in a particular situation. The primary goal of this plan is to establish a unique set of access permitting guidelines to be accepted and enforced by multiple reviewing agencies. This establishes both a common vision for the future and the desire to follow through with that vision for these agencies.

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Introduction

In 2010, officials from Jessamine County approached the Kentucky Transportation Cabinet's (KYTC) District Seven personnel in Lexington to evaluate the existing access on US 27. Realizing the importance of the corridor to the entire region, an Access Management Study was performed to develop new access permitting guidelines. The intent of the study was to improve existing safety and congestion as well as plan for future development in the corridor. The study area for the project was defined as the area between the future East Nicholasville Bypass intersection in Jessamine County and the Man o' War intersection in Fayette County. This is illustrated below in **Figure 1**.

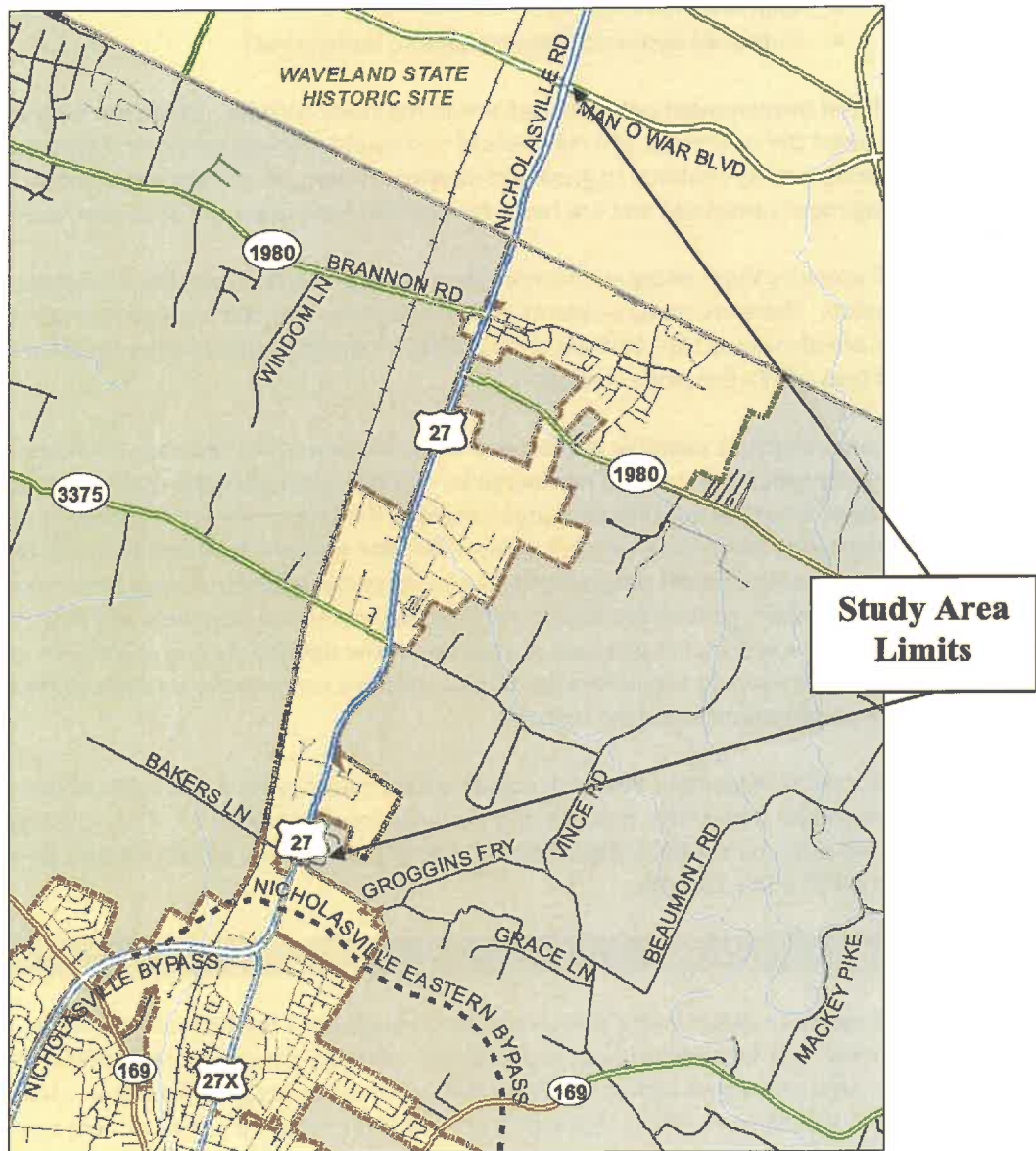


Figure 1: Project Study Corridor

Access Management is the systematic planning of the design, location, spacing, and operation of driveways, median openings, interchanges, and street connections to a roadway. Access management provides several benefits:

- Improved safety and capacity
- Extends the functional life of roadways
- Increases efficiency and reliability of transportation systems
- Preserves integrity of the roadway system
- Preserves public investment in roadway infrastructure
- Preserves private investment in properties
- Improves travel time
- Improved aesthetics (less pavement, more green)

Significant development potential remains in the study corridor. While the recent economic downturn has slowed the residential and commercial real estate markets, southern Fayette and northern Jessamine County continue to grow and develop. Today, several parcels adjacent to US 27 are held by development companies and are ready for development when the economy recovers.

US 27 provides the primary connection for Jessamine, Garrard, and Boyle counties to the south to Lexington. There are many residents in these counties that commute to Lexington each day for work. There are also many trips to/from work generated by employment sites along the corridor as well as retail trips within the study corridor.

The comprehensive planning process is a "living and breathing" process. Comprehensive plans are frequently supplemented and reinforced by more detailed planning studies and the incorporation of this document would be considered a supplement to the transportation component of the plan. The transportation component of a comprehensive plan typically covers definitions, planned roadway projects, special corridor designations, the local roadway system, future improvements to the local roadway system, general roadway standards, general access standards and multimodalism. This plan will provide a specific set of access guidelines for the defined section of US 27 in Jessamine and Fayette counties and serve in conjunction with the applicable comprehensive plans to facilitate and manage future development along the corridor.

This Access Management Plan will provide strong guidance for a more robust permitting process to accommodate both traffic mobility and business access along US 27. The access guidance in this adopted plan and the MOU developed for this plan supersede all other access permitting requirements in the US 27 study corridor.

Purpose and Need

US 27 has been designated a safety corridor through all of the District 7 counties. As such, US 27 has had many improvement projects and targeted safety countermeasures performed over its entire length. The project study area carries nearly 56,000 vehicles per day at high rates of speed and over rolling terrain. In addition to these characteristics, significant roadside development exists in certain areas. With dense development often comes a proliferation of access points. Studies have shown that a high density of access points can disproportionately increase crash rates on roadways.

These same studies show that approximately 76 percent of the crashes that occur at development entrances and exits involve left turning vehicles. Not without coincidence, left turn collisions are often more severe in high-speed areas.

The solution: Remove direct left turns from existing traffic patterns where possible and replace them with indirect left turns resulting from employed Access Management techniques. The proposed technique to reduce direct left turns is through the use of restrictive medians. Median openings would be spaced at regular intervals to allow U- turns at predetermined locations thus greatly reducing conflict points for left turning vehicles.

Implementation of this Access Management Plan will have a significant positive impact upon motorist safety as well as some increase in the capacity of the roadway while not eliminating any existing property access. Several follow-up studies to Access Management projects have determined that there are also benefits for businesses. Safe and orderly ingress/egress to commercial retail sites has been proven to increase sales by expanding the area or customer base a business can serve.

Existing Conditions

ROADWAY CHARACTERISTICS

US 27 has been categorized into four distinct sections based on the existing roadside development. Table 1 illustrates the number of access points and named roads off of US 27.

Table 1: Roadside Development

Start Mile Point	End Mile Point	Start and End Description	Number of Entrances (Cross Roads are counted as two)	Density (Entrances /mile)
11.1	13.7	Approximate location of New Bypass intersection to Industry Pkwy.	63	24
13.7	14.8	Industry Pkwy. to Brannon Dr.	15	14
14.8	15.3	Brannon Dr. to Fayette County Line	4	8
0.0	1.0	Jessamine County Line to Man o' War Blvd.	10	10

The speed limit on the corridor is 55 MPH. Speeds on US 27 are constrained by peak hour congestion and several traffic signals. Certain intersections are very congested during peak periods. As an example, the Man o' War Boulevard intersection causes a significant northbound traffic queue during the morning peak period. Conversely, the Brannon Road traffic signal creates a bottleneck for southbound traffic during the afternoon peak. Table 2 on the next page presents the existing traffic signal locations and intersection geometrics.

Table 2: Existing Signalized Intersections

Intersection	Milepoint	NB Number of Lanes			SB Number of Lanes		
		Left	Thru	Right	Left	Thru	Right
Elizabeth St. and Turkey Curve Loop	11.807	1	2	1	1	2	1
Catnip Hill Road and Vince Road	12.808	1	2	1	1	2	1
Kohl's Drive and Commerce Drive	13.480	1	2	0	1	2	1
Bradley Drive (Proposed Removal)	13.586	0	2	0	1	2	0
Industry Pkwy. (Proposed Install)	13.695	1	2	0	1	2	0
Ashgrove Road	14.445	0	2	1	1	2	0
Brannon Rd. and East Brannon Rd.	14.807	1	2	1	2	2	1
Southpoint Drive – Fayette Co.	0.240	0	2	1	1	2	0
Man O' War – Fayette Co.	0.945	2	2	1	2	2	1

EXISTING ACCESS CONTROL

Currently, KYTC access control on the corridor is Access by Permit. The current KYTC Access by Permit criteria is relatively simple. Entrance access could possibly be given to US 27 anywhere provided the KYTC safety requirements and interests of the highway user are met. The most specific standard is the Six Second Visibility Rule: “Generally, entrances will be permitted where a minimum visibility time of six seconds in both directions is available. This six second rule applies to whichever is smaller; the 85th percentile or the posted speed limit.” Also, the number of entrances to a single property cannot exceed three. Other factors at the site can also be considered. As an example, it is preferable that entrances are in line with each other across a roadway. Shifting entrances slightly to create a properly aligned intersection is common practice.

It is also important to note that any existing residential driveway or farm field entrance can be converted into a commercial access point. In sparsely developed areas, those who are first to develop set the access spacing pattern. As more and more development surrounds the initial developments, finding the best locations for new access points becomes progressively more difficult. Therefore advantages of establishing all future access points now are that:

- All adjacent parcels and access points can be treated consistently through a defined policy
- Safety and capacity enhancements can begin in advance of future development
- Future land use changes can be made in concert with a holistic corridor plan rather than a case-by-case or spot basis

Local access spacing and design requirements are often different from KYTC’s requirements, and this has created confusion with respect to which set of requirements should take precedence in a particular situation. The primary goal of this plan is to establish a unique set of access permitting guidelines to be accepted and enforced by multiple reviewing agencies. This establishes both a common vision for the future and the desire to follow through with that vision for these agencies.

EXISTING TYPICAL SECTIONS

The existing typical section throughout most of the corridor consists of five lanes plus 10-foot shoulders. The five lanes are designated as two lanes northbound and two lanes southbound with a two-way left-turn lane (TWLTL) in between the two. Right turn lanes are provided at some intersections. The Brannon intersection has dual left-turn lanes in the southbound direction. There is also a raised mountable median on the north end of the corridor at the Waveland intersection.

Planned Projects and Proposals

PLANNED HIGHWAY PROJECTS

There are a few projects in the enacted 2012-2014 Six-Year Highway Plan in the vicinity of the project corridor, although none of them connect US 27 directly. The most significant project near the corridor is the proposed East Nicholasville Bypass, which is immediately south of the project limits.

The recommended alternative within this plan has no funding at the time of this report. Similarly, the Lexington MPO's top ten unfunded projects list includes a project to widen this section of US 27 to six lanes.

RECOMMENDED ALTERNATE

The consultant and the project advisory team developed a phased alternative involving a short term plan, that provides partial implementation at three key locations, and a longer term plan to implement a "highly managed" access management plan through the study corridor.

Access Management Plan

Access management involves a compromise between engineering principles and the access needs of the surrounding land use. In many cases it will not be practical to provide desirable separation distances for driver decision-making and vehicle maneuvering. The standard selected should maximize access opportunities while remaining as faithful as possible to the most critical operational and safety principles.

The above paragraph is an excerpt from the Access Management Implementation in Kentucky Technical Support Document and Status Report. This document produced by the Kentucky Transportation Center (published in May 2008 - KTC-08-05/SPR290-05-2F) provided the guidance for establishing the access spacing goals for this plan. The three words underlined in the paragraph above were focused upon in these ways:

- **Compromise** - While this plan establishes strong goals for access spacing, spacing requirements could not be met in most cases. Therefore, the future access points were defined by determining the best fit possible.
- **Practical** – The implementation of the recommended alternative can be considered a practical solution to major widening.
- **Maximize** – While intuitively access management may be interpreted as restricting access, the overarching goal was to provide the maximum amount of access within the proposed parameters.

IMPLEMENTATION – MEMORANDUM OF UNDERSTANDING

The implementation tool for this plan is a Memorandum of Understanding (MOU). A memorandum of understanding is a formal recognition of the agreement stakeholders have made to adhere to the guidelines set forth in this report. Although the MOU is not a binding legal document, it represents a good faith effort and strong commitment on the part of the stakeholders to promote good access management practices on the US 27 corridor that is addressed by this plan. The MOU can be found in **Appendix A**.

ACCESS SPACING GOALS

Just as there is a functional classification for roadways, there is also an access management classification system to define access management type. The access management standards are based on rural or urban classification, traffic speed, and traffic volume. The US 27 corridor is classified by this report as an Urban Access Classification I. Recommended minimum access spacing is shown in **Figure 2**.

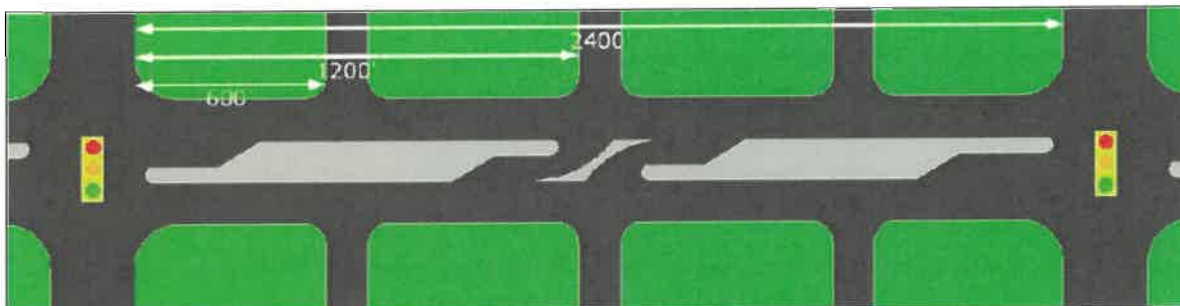


Figure 2: Access Spacing Goals-Urban Access Classification I

As illustrated in **Figure 2**, there are three different types of entrances. They are:

- **Type 1: Signalized Public Streets Or Significant Commercial Entrances**
 - Unrestricted Four-Way Intersections
 - Controlled By Traffic Signals
 - U-Turns Are Allowed
 - Minimum Desired Spacing Is 2,400 Feet
- **Type 2: Partially Controlled, Unsignalized Public Streets Or Commercial Entrances**
 - Left Turns And U-Turns Are Allowed On Major Street
 - Through And Left Turn Movements Are Not Allowed On Minor Street
 - Turns Are Restricted By Channelizing Medians
 - Intersections Are Not Signalized
 - Minimum Desired Spacing Is 1,200 Feet
- **Type 3: Minor Right In/Right Out Entrances**
 - Only Right Turns Allowed From Major Street
 - Only Right Turns Allowed From Minor Street
 - All Left Turns Are Restricted By Median
 - Minimum Desired Spacing Is 600 Feet

These spacing goals were used to determine the type and location of each future access point in the study corridor. These goals were not met in most conditions. It was very unlikely that the existing street locations and established entrances would fit the spacing template perfectly; however, in most cases the spacing goals were largely met. **Appendix B** lists the existing and proposed access types and approximate locations.

COMMERCE AND BRADLEY INTERSECTIONS – IMMEDIATE IMPROVEMENT

URS looked at these two existing signalized intersections that are approximately 500 feet apart. The close proximity of these two intersections creates both safety and operational problems for US 27 through traffic. Motorists sometimes try to “beat” one signal and then are stopped at the second one, creating a higher

speed approach to a potential stop condition. These two intersections have the highest number of crashes for any location in the corridor. Over three-fourths of the crashes are rear-ends.

Fundamentally, there are only two general ways to address this problem, assuming the traffic demand does not change: manipulate time or manipulate space. The specific two strategies at this location for addressing this problem are:

- Improve The Coordination Between The Two Signals
- Move One Of The Traffic Signals Farther Away From The Other

Both options were considered. Using one traffic signal controller to control both intersections was examined. Because of the relatively light side street left turn movements, it was decided that using one controller would not be worth the additional complication and potential for problems with future software maintenance. Using conventional signal system hardware, introducing a short offset between the two intersections, and some changes to the phase rotation would produce slightly less delay and improved travel speeds.

The second strategy is to increase the space between the two traffic signals. The existing spacing of approximately 500 feet falls far short of the recommended spacing. If the existing traffic signal at Bradley Drive could be moved northward to the Industrial Parkway intersection, spacing between the two signalized intersections would be dramatically improved. This change would allow the spacing between these two signalized intersections to be increased to approximately 1,100 feet.

This is well short of the signal spacing goals of this plan; it's an example of how engineering judgment and this plan can be flexible when dealing with the preexisting conditions on US 27. While falling short of proposed goals, an existing situation is being made better and no one loses access to the traffic signal.

Restricting the existing Bradley Drive intersection to right in/right out and moving the traffic signal to the Industrial Parkway intersection could possibly improve both safety and capacity along US 27. Signal coordination would be easier to achieve, and the queues from each intersection should not interfere with the other, as they do now. Traffic friction would be decreased because the operation of one of the signals would not affect the other. A traffic signal at this intersection is also closer to the center of the frontage for the property on the west side of US 27, facilitating future development.

SHORT TERM ALTERNATE

The short term alternate constructs a restrictive median in certain sections of the corridor that could possibly benefit from right in/right out access management. We are proposing this treatment at three locations along the corridor:

- Both north and south of the existing signal at Southpoint Drive;
- Between the Industry Parkway and Kohl's/Commerce intersections;
- And from Elizabeth Street north a distance of approximately 1500'.

Aerial maps that show these locations are located in **Appendix C**. U-turns at the end of the barrier median sections will be facilitated by the construction of "loons". A loon is a bump-out located on the shoulder to allow a vehicle to make a U-turn, as shown in **Figure 3**.

The estimated project cost for design and construction of the short-term alternate is \$1,000,000.

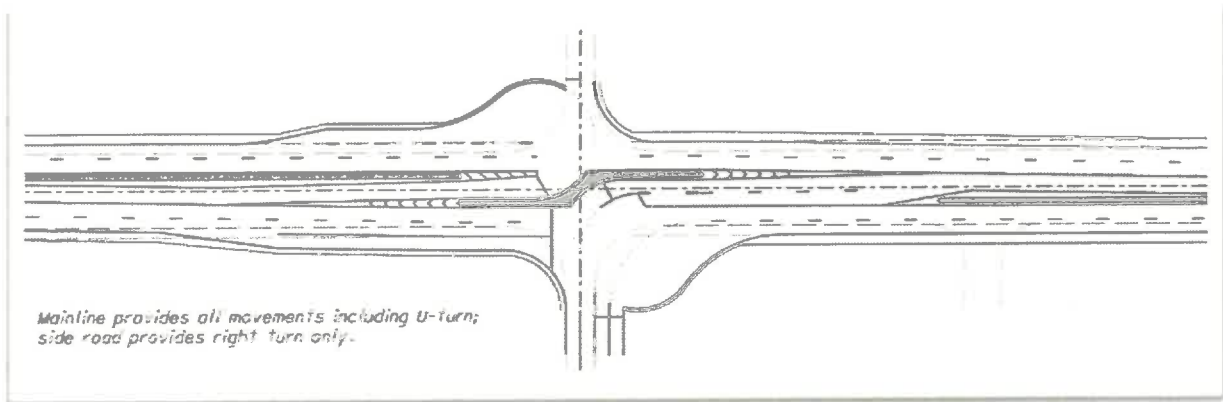


Figure 3: Illustration of Proposed Loon

LONG TERM ALTERNATE

The long term alternate is to highly manage the access to the corridor. Because the restrictive medians are placed in the center of the roadway, no future projects, such as major widening, transit, bike or pedestrian facilities are precluded. There are two implementation options for the preferred alternative.

Option 1

This option would be implemented in conjunction with the currently identified US 27 widening project. The widening of US 27 to six lanes would increase the ease of U-turns at the intersections and require smaller loons. As mentioned earlier, this is an unfunded project gradually moving up the list of project priorities within the MPO area. Given the current highway funding situation, this option would be many years away from securing funding.

Option 2 (Recommended)

This proposed option is to implement the highly managed corridor plan throughout the study area with the construction of “quadrant intersections.” This innovative type of intersection is described in the next section. A quadrant intersection simply involves constructing a short connector roadway between the minor and major streets in one of the intersection quadrants. This technique provides significant congestion relief at busy intersections without major widening.

The introduction of quadrant intersections at key locations can increase capacity enough to extend the lifespan of the existing four-lane roadway at greatly reduced construction costs compared to Option 1.

The long term alternative is displayed in **Appendix D**. The graphics illustrate the proposed median treatments as well as future access point locations and types. Existing access points that can be removed and replaced by a shared future access point are detailed.

It is also recommended, for either option, that service roads such as frontage, backage or other access roads be included in land development plans. These service roads will help reduce congestion on US 27 while providing mobility and access to the new residences and businesses that may be proposed along US 27. The long term alternate shows potential service roads at each signalized and mid block median cross over intersections for both Type 1 and Type 2 intersections. There may be other potential locations for service roads among the Type 3 entrances that could be deemed necessary that are not illustrated on the long term alternate.

Other Future Recommendation

INNOVATIVE INTERSECTION DESIGN

Engineers and roadway designers are always challenged to maintain design standards, accommodate roadway amenities, and provide necessary capacity. As our roadways are reconstructed wider, certain operational problems are encountered. Among them include:

- Unfriendly pedestrian environment
 - Long crossing distances and crossing time for pedestrians
- Drainage (Runoff Area)
- Maintenance of durable markings
- Traffic signal operations
 - Many movements under signal control
 - Long delays
 - Long clearance intervals
 - Red light running
- Right-of-Way
- Construction cost

A potential solution to reducing the intersection footprint is the quadrant intersection. Such an intersection can be constructed at multiple locations on US 27. Those locations include Man o' War Boulevard, Brannon Road, Ashgrove Pike, Industrial Parkway, Catnip Road, and Baker Lane.

A quadrant intersection, illustrated in **Figure 4** on the next page, uses three signalized intersections to spread the left-turning movements to three smaller intersections. Left turns are prohibited from the main intersection, which allows the use of a two-phase traffic signal. With fewer signal phases per intersection, the capacity for the major street through volume is greatly increased and delays are also greatly reduced. The intersection of the two main routes is a simple two-phase signal. **Table 3** below presents a Level of Service (LOS) comparison of the existing conventional and proposed quadrant intersections at US 27 and Brannon Road.

Table 3: Comparison of Existing and Quadrant Intersections at US 27 and Brannon Road

<i>Intersection Configuration</i>	<i>PM Level Of Service</i>
Existing Intersection (2011)	51 seconds/vehicle = D
Quadrant Intersection:	
Main Intersection	26 seconds/vehicle = C
US 27 at Loop Road	28 seconds/vehicle = C
Brannon Road at Loop Road	24 seconds/vehicle = B

The additional capacity gained by converting a large congested intersection to a quadrant intersection can be a practical solution targeted to address a specific capacity bottleneck (spot) in lieu of major widening. To delay the construction of an ultimate six-lane US 27 and gain the other advantages listed above, the quadrant intersection will prove to be a significant new tool in the KYTC's congestion management tool box.

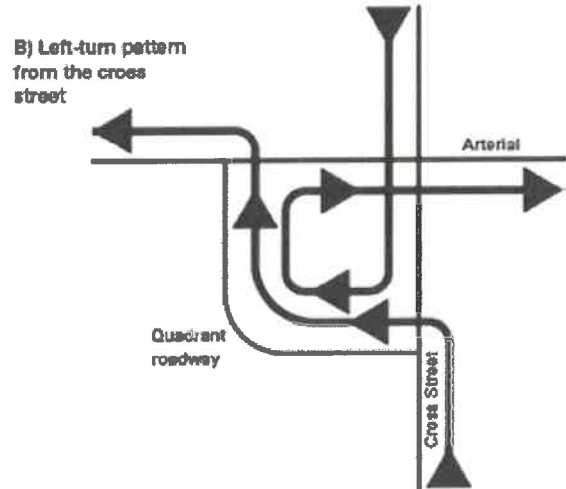
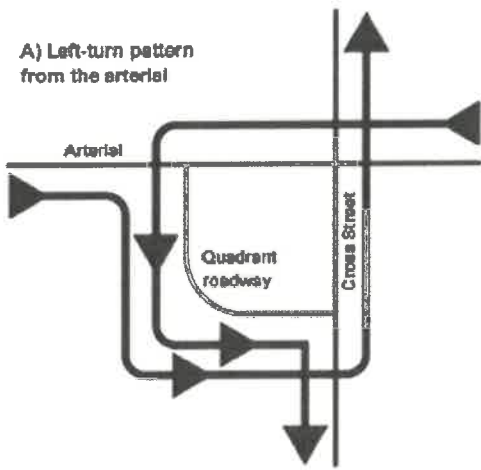
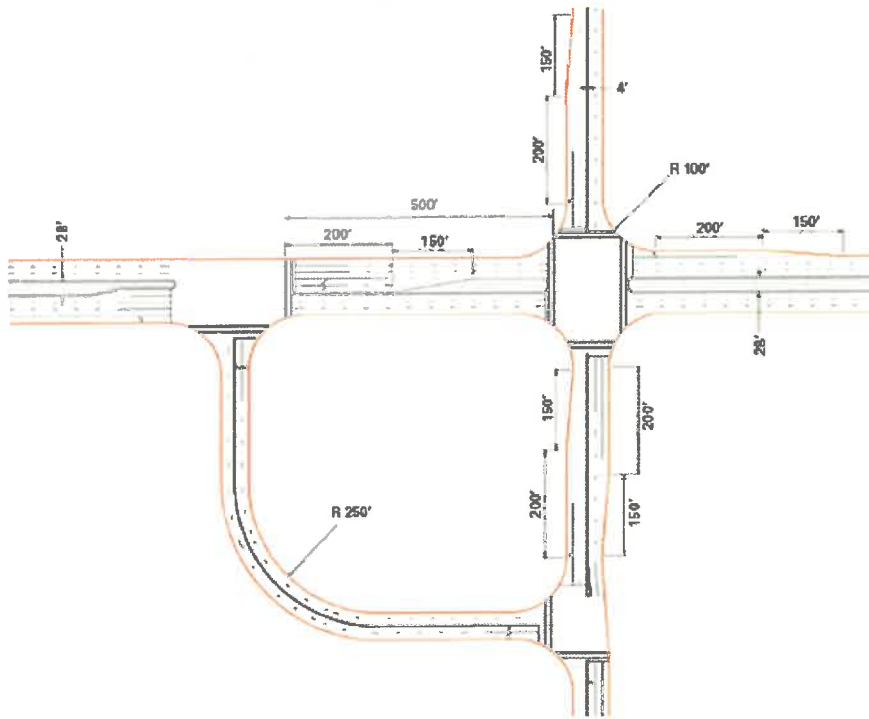


Figure 4: Illustration of Quadrant Intersection and Turning Patterns

Access Review Process

The access management review process has been generalized and represented in a flowchart in **Figure 5**. The purpose of the flowchart is intended to be a guide for those agencies involved with reviewing land development plans for access type and location. It is not intended to be a detailed step by step process as it is impractical to detail out the many scenarios that could be encountered by the various agencies involved when coordinating the land development reviews and access permit requests; however, it is intended to stress the importance of continued coordination between the District Office and the Local Planning Commissions. If during the review process, KYTC determines it is necessary to deviate from the access management plan, then all parties will be consulted for recommendations.

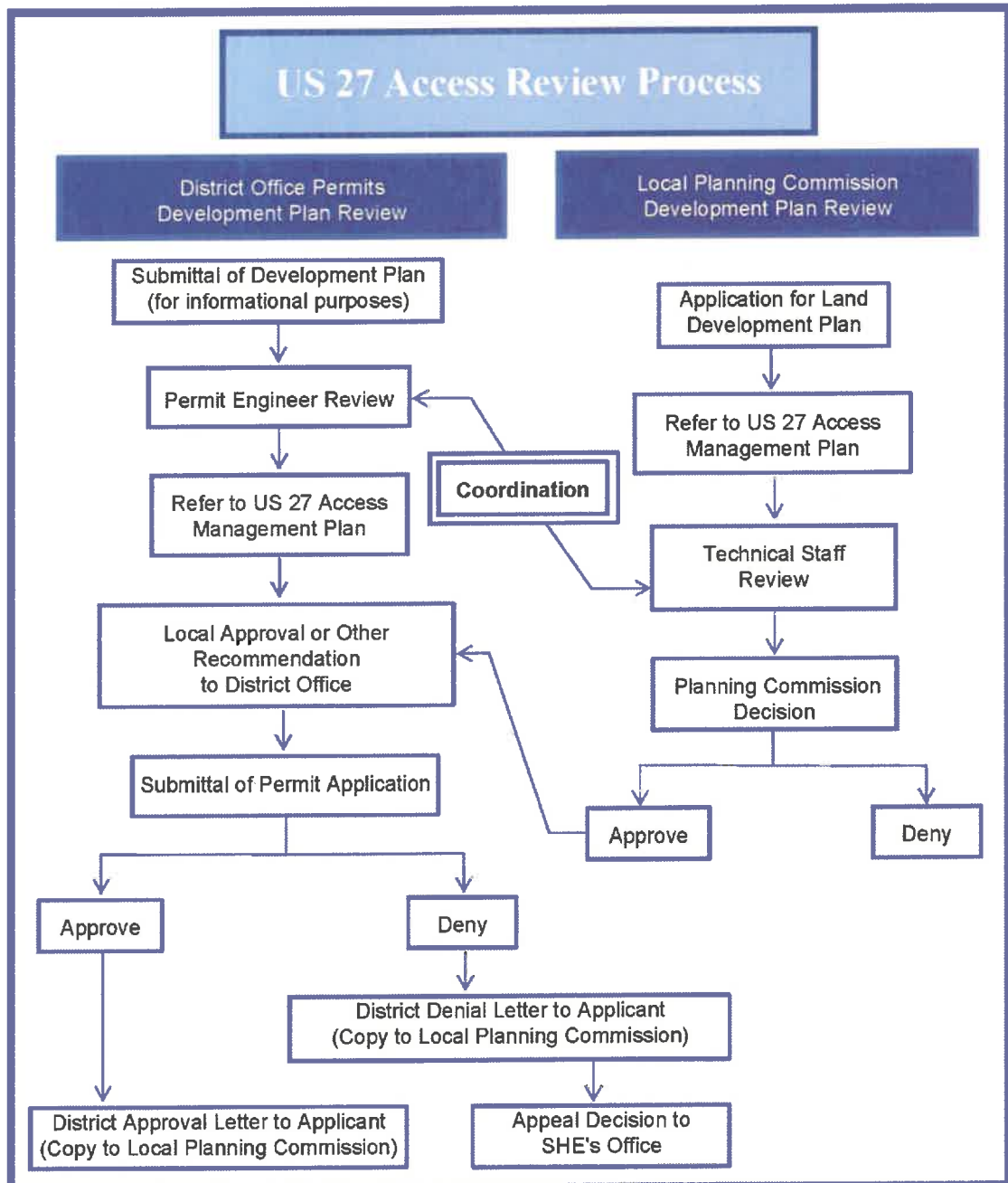


Figure 5: Access Review Process

Appendix A

Memorandum of Understanding

Appendix B

Existing & Proposed Access Locations

US 27 Existing Access Locations		
Mile Point	West	East
0.95	Man O' War Blvd.	Man O' War Blvd.
0.89		commercial
0.82		Toronto Road
0.47	Waveland Museum Lane	Cobblestone Way
0.32		commercial
0.24		Southpoint Drive
0.16		commercial
0.12		commercial
0.11		commercial
0.07		commercial
0.00 / 15.28	Fayette / Jessamine County Line	
15.20		farm
15.04		residential
14.94	residential	residential
14.88		commercial
14.81	Brannon Road (KY 1980)	East Brannon Road
14.61		commercial
14.54		commercial
14.45		Ashgrove Pike (KY 1980)
14.43	farm	
14.35		residential
14.21	farm	
14.23		commercial
14.10	residential	
14.06		commercial
14.05	residential	
14.02		commercial
13.99		residential
13.92		commercial
13.91	farm	
13.89		residential
13.76	residential	
13.69		Industry Parkway
13.59		Bradley Drive
13.48	Kohls Drive	Commerce Drive

US 27 Existing Access Locations		
Mile Point	West	East
13.37	commercial	
13.36	commercial	
13.35	residential	
13.32		commercial
13.31	residential	
13.28		Park Central Avenue
13.25	commercial	
13.22	commercial	
13.20	residential	
13.13	farm	
13.12		residential
13.10	farm	
13.08	residential	
13.07	residential	
13.06		residential
13.02		commercial
13.00	commercial	
12.99		commercial
12.96		commercial
12.93	commercial	
12.92		commercial
12.91	commercial	
12.90		commercial
12.88		commercial
12.87	commercial	
12.86		residential
12.84		residential
12.81	Catnip Hill (KY 3375)	Vince Road
12.76	commercial	
12.67		commercial
12.66		residential
12.64		farm
12.59	commercial	
12.53		farm
12.37		residential

US 27 Existing Access Locations		
Mile Point	West	East
12.29	commercial	
12.23		residential
12.17		commercial
12.11		farm
12.04		commercial
12.00	Howard Street	commercial
11.96		commercial
11.81	Elizabeth Street	Turkey Curve Loop
11.72		residential

US 27 Proposed Access Location Type		
Mile Point	West	East
0.82	3	
0.70	2	
0.59	3	
0.35		3
0.24	1	
0.07		3
0.00 / 15.28	Fayette / Jessamine County Line	
15.18	2	2
15.00		3
14.97	3	
14.62	3	
14.45	1	
14.34	3	3
14.23	2	
14.15		3
14.08	3	
13.92	2	2
13.78	3	
13.69	1	
13.59	3	
13.32		3
13.28	2	
13.17	3	3
13.05	2	
12.93	3	3
12.67	3	3
12.53	2	2
12.42	3	3
12.29		1
12.17	3	3

Type 1: Signalized Intersection/Entrance
Type 2: Partial Intersection/Entrance with full movements on US 27
Type 3: Right In / Right Out Intersection/Entrance

Appendix C

Short Term Alternate

COUNTY OF	ITEM NO.	SHEET NO.
FAYETTE		1ST



US 27 NICHOLASVILLE ROAD
SHORT TERM PLAN



LEGEND

	CONCRETE MEDIAN
	E.G. RESIDENTIAL ENTRANCE
	E.G. COMMERCIAL ENTRANCE

COUNTY OF	ITEM NO.	SHEET NO.
PAVILIES		257



US 27 NICHOLASVILLE ROAD
SHORT TERM PLAN





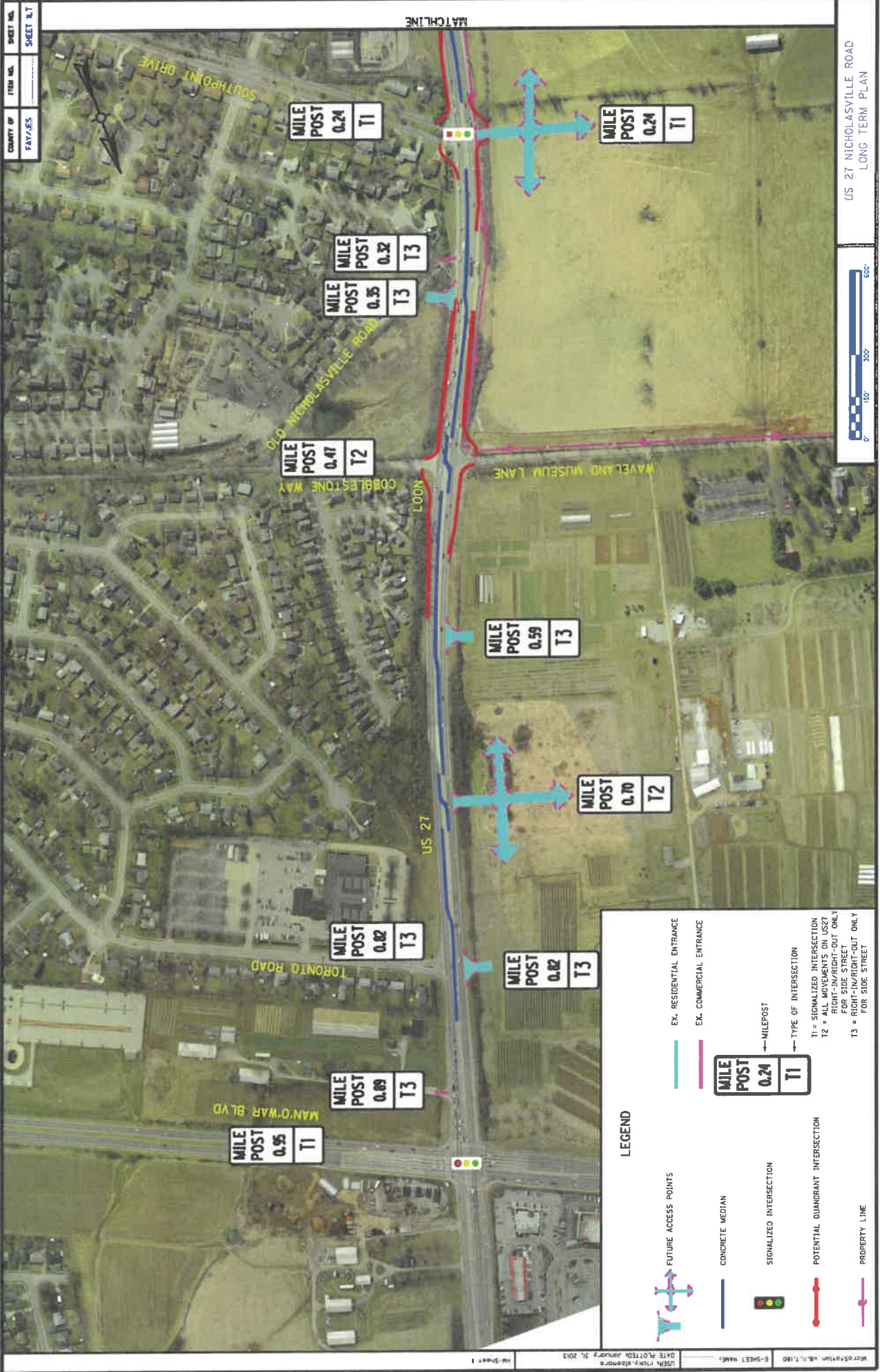
COUNTY OF	JTOW NO.	SHEET NO.
FAY/UES		SHEET 3ST

US 27 NICHOLASVILLE ROAD
SHORT TERM PLAN



Appendix D

Long Term Alternate



LEGEND

- FUTURE ACCESS POINTS
- EX. RESIDENTIAL ENTRANCE
- EX. COMMERCIAL ENTRANCE
- CONCRETE MEDIAN
- SIGNALIZED INTERSECTION
- POTENTIAL QUADRANT INTERSECTION
- PROPERTY LINE

MILE POST 0.24 T1

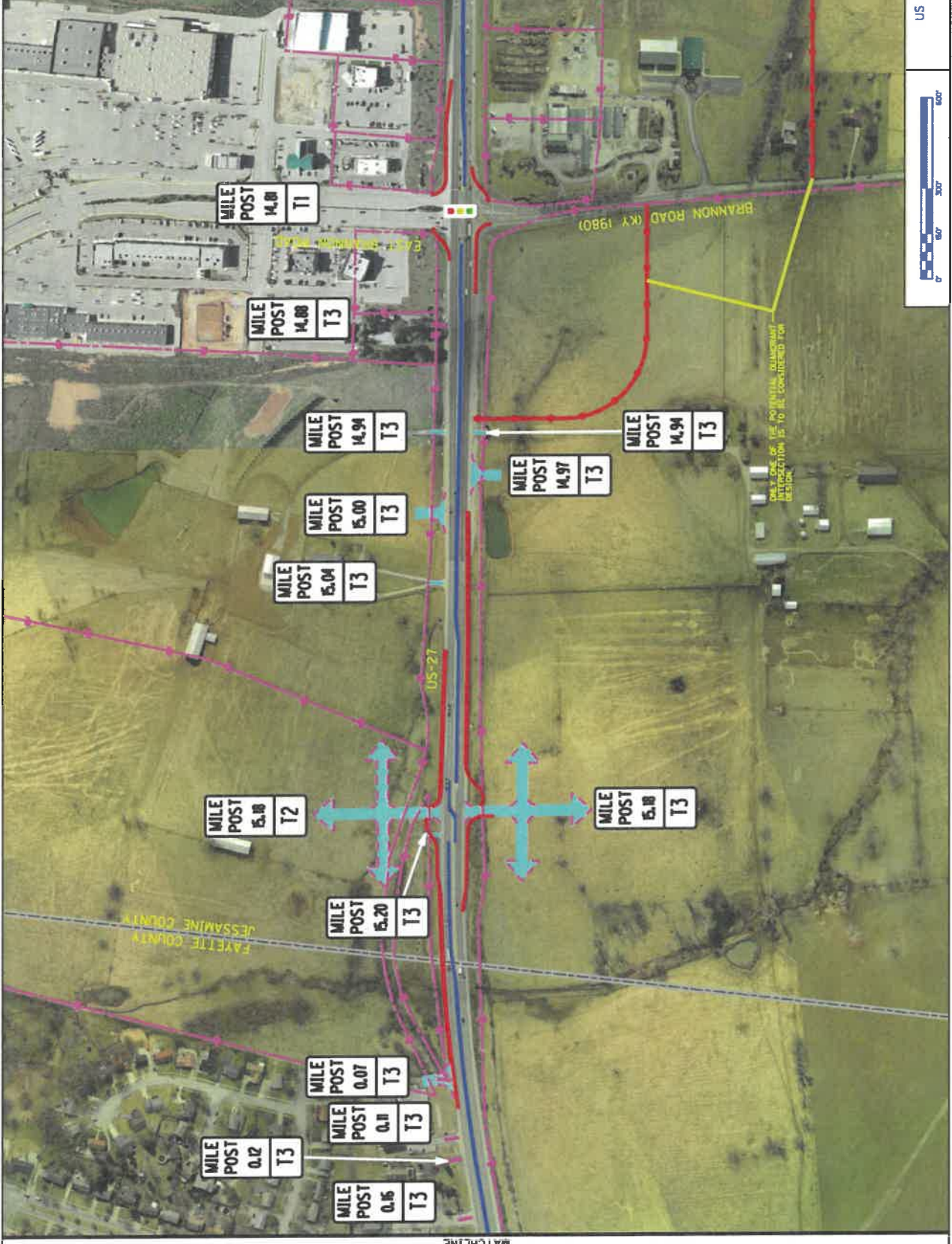
← MILEPOST

← TYPE OF INTERSECTION

T1 = SIGNALIZED INTERSECTION
T2 = ALL MOVEMENTS ON US27
RIGHT-IN/RIGHT-OUT ONLY
FOR SIDE STREET

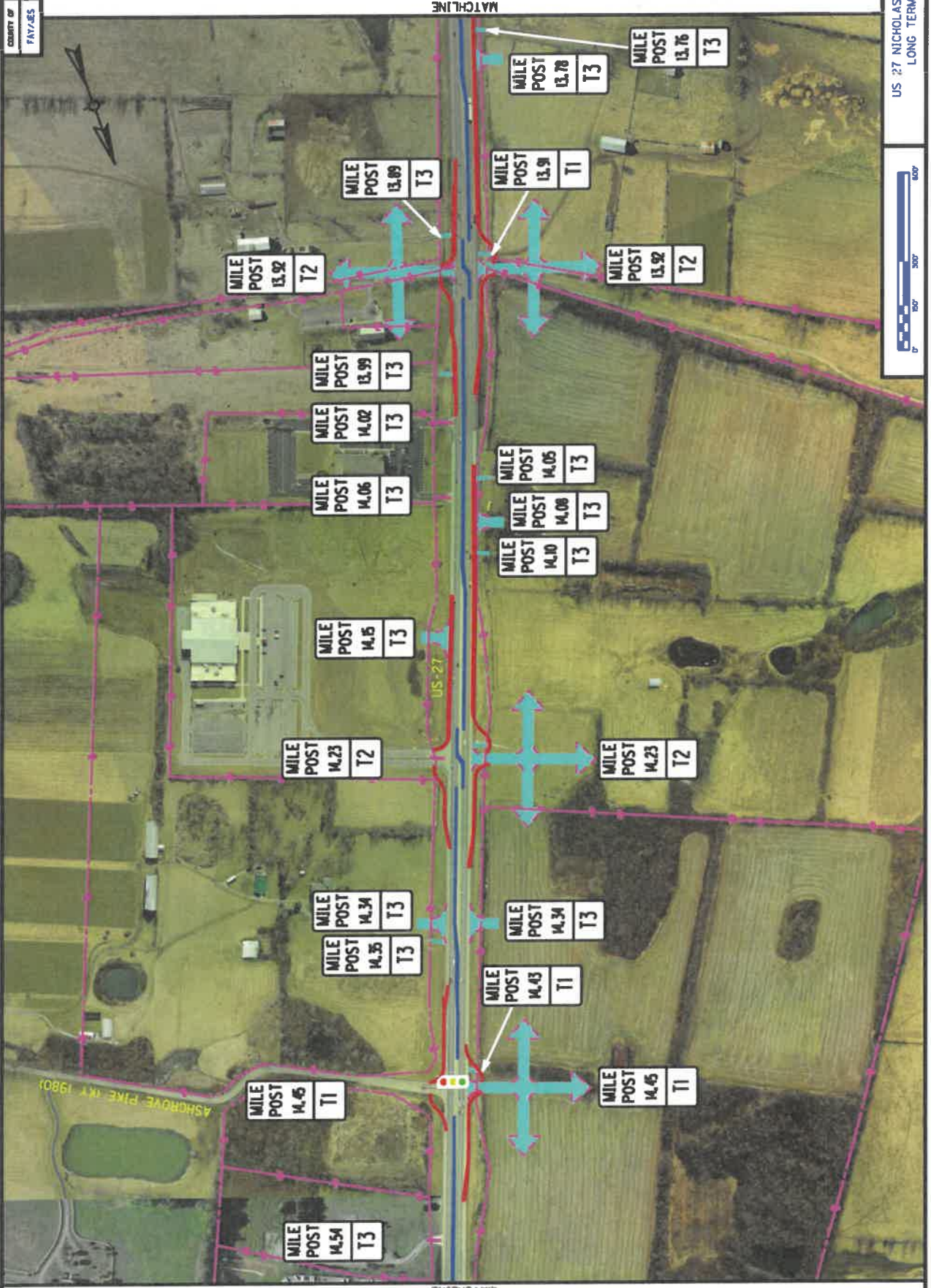
T3 = RIGHT-IN/RIGHT-OUT ONLY
FOR SIDE STREET

COUNTY OF	ITEM NO.	SHEET NO.
FAYETTE		201

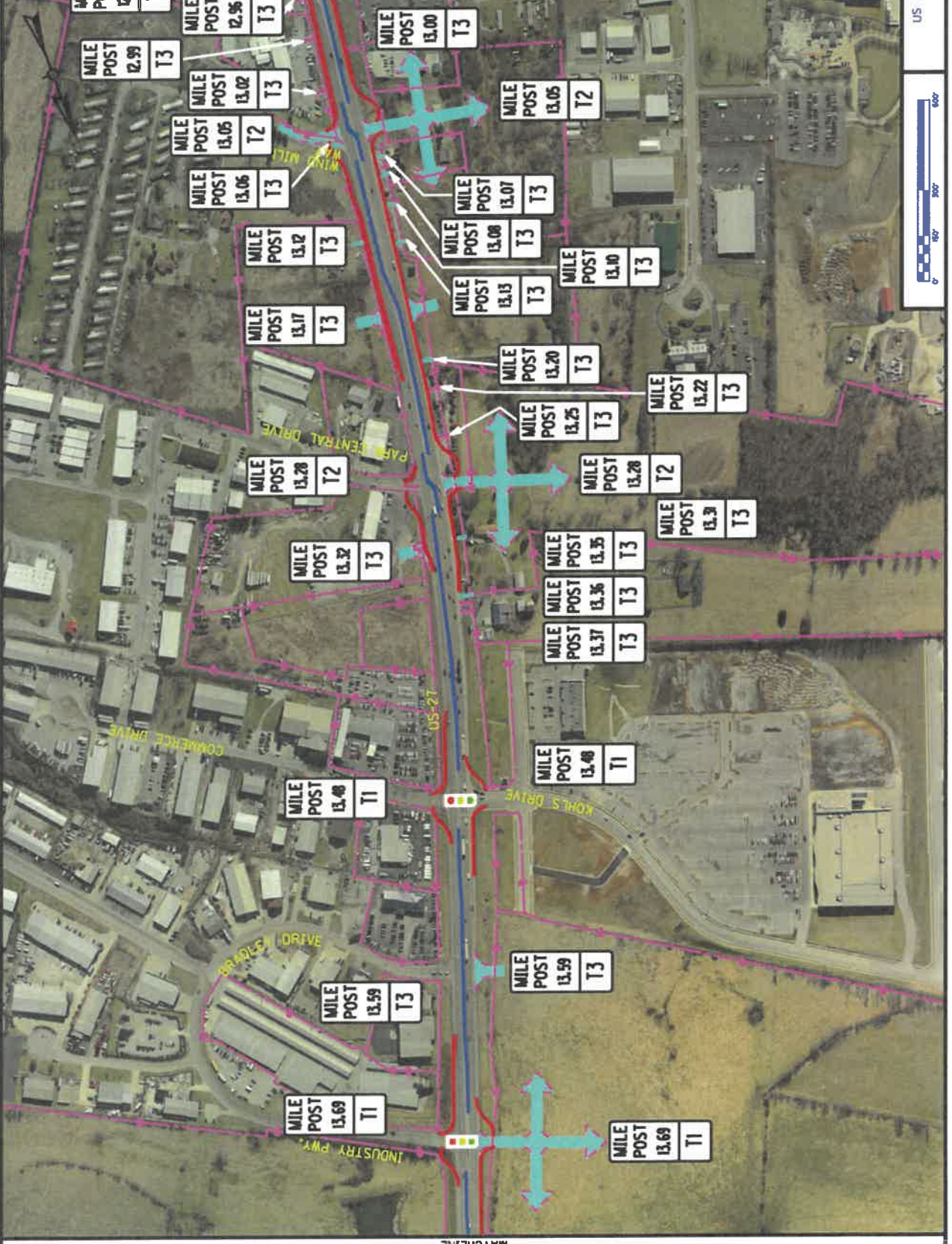


US 27 NICHOLASVILLE ROAD
LONG TERM PLAN





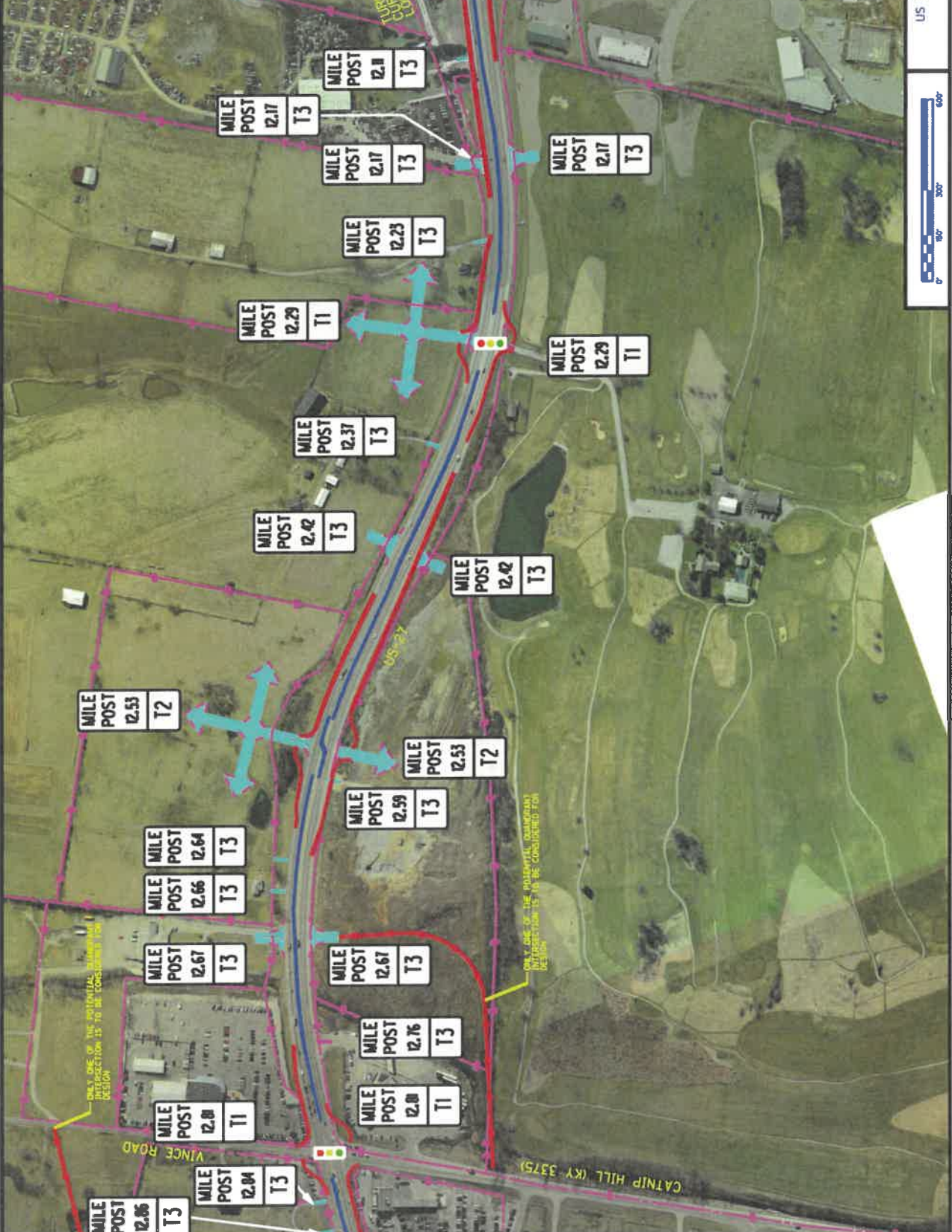
COUNTY OF FAYETTE SHEET NO. 4.7



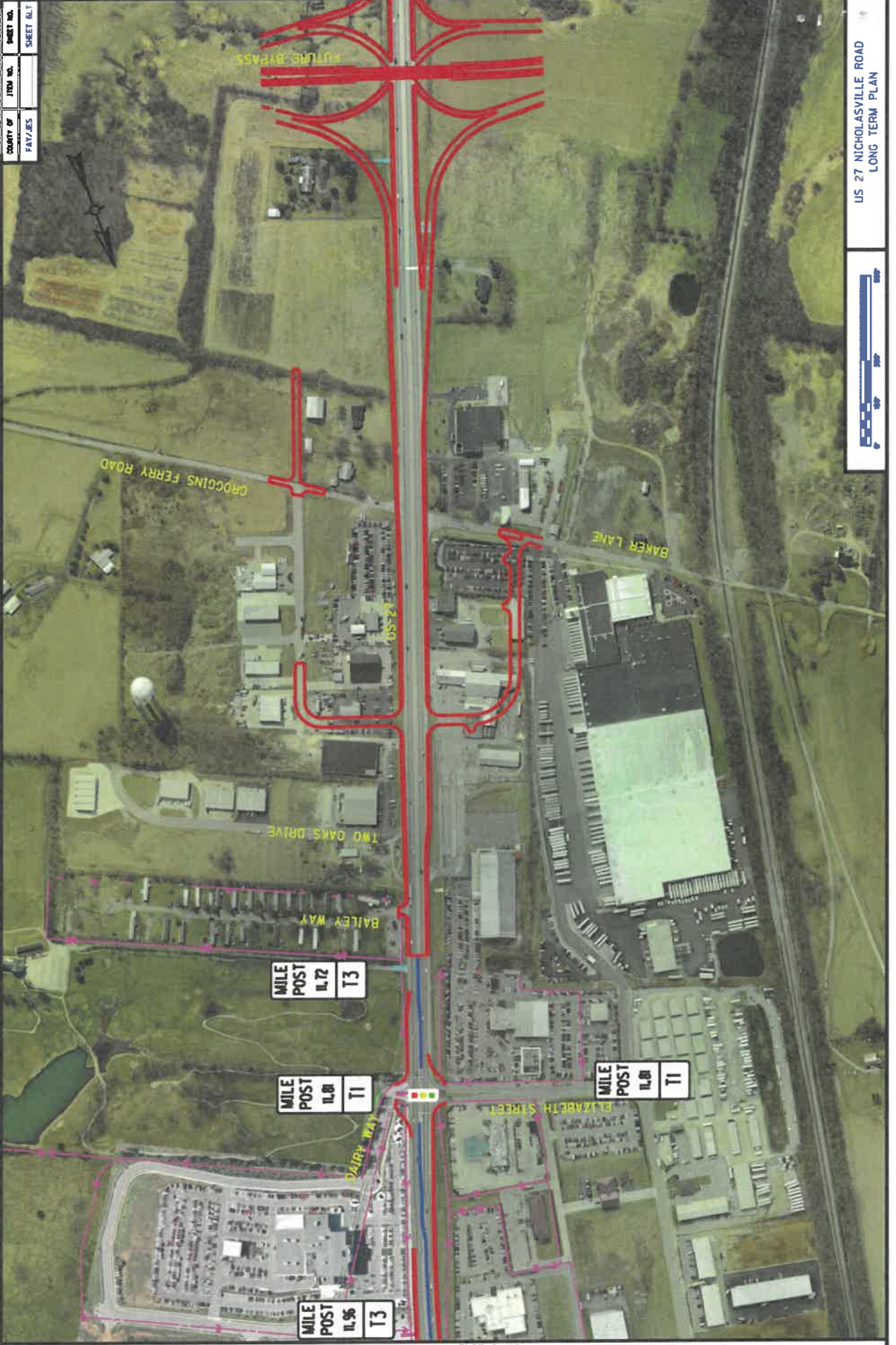
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COUNTY OF	ITEM NO.	SHEET NO.
FAY/LES		SHEET 51



COUNTY OF	JTM No.	SHEET No.
FAYETTE		BLT



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MATCHLINE