PLANNING STUDY

Signalized Portion of New Circle Road

KENTUCKY TRANSPORTATION CABINET

LEXINGTON FAYETTE URBAN COUNTY GOVERNMENT KENTUCKY 1775



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Palmer ENGINEERING

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EXECUTIVE SUMMARY

Overview

The 6.1 mile section of New Circle Road Northeast, from Georgetown Road to Richmond Road, has experienced significant increases in traffic volumes, accidents, and delay, becoming a linear bottleneck seemingly without a feasible solution. Motorists traveling the corridor encounter numerous commercial access points, congested intersections, poor traffic signal progression, frequent accidents, and a very low level of service especially during peak hours. Initially, a study was funded by the Lexington-Fayette Urban County Government in 1987 to recommend a solution but none of the recommendations were approved for implementation. In 1999, a study of the 14 mile fully controlled access portion of New Circle Road was completed for the Kentucky Transportation Cabinet. The study highlighted an eight and a ten lane alternate. The eight lane alternate was recommended at a cost of $218 million, but no funds have been committed to that portion of New Circle Road as of this date. That study did not include recommendations for New Circle Northeast other than proposed improvements for the interchanges at Georgetown Road and Richmond Road. In August 1999, the Kentucky Transportation Center at the University of Kentucky College of Engineering completed Research Report KTC-99-55, *Conversion of New Circle Road to a limited Access Facility.* The study compared the addition of one lane in each direction with the use of median U-turn and restricted left turn strategies at selected intersections. The innovative research report was presented to the Lexington Metropolitan Planning Organization and is considered to have been the impetus for the development of this planning report.

The Kentucky Transportation Cabinet (KTC) and the Lexington Area Metropolitan Planning Organization placed renewed emphasis on finding a solution to the New Circle Road Northeast corridor problem. Adequate resources were committed to the New Circle Road Northeast Planning Study beginning with the project authorization on December 1, 1999. The purpose of the study is to find a solution that will increase safety, mobility and system linkage to support continued and sustainable economic development along the Northeast portion of New Circle Road. The firms of Palmer Engineering and American Engineers were contracted to conduct the study.

Early discussions centered on the need for an extensive public involvement effort, involving business owners, area neighborhoods, and the public in general.

PROJECT DESCRIPTION

Purpose and Need

The purpose of the project is to increase safety, mobility, and system linkage to support continued and sustainable economic development. This portion of New Circle Road links Georgetown Road (US 25), Newtown Pike (KY 922), Russell Cave Road (KY 353), North Broadway/Paris Pike (US 27/68), Bryan Station Road (KY 57), Winchester Road (US 60), Liberty Road (KY 1927), and Richmond Road (US 25). Numerous access points and high traffic volumes result in a high number of accidents in the corridor. Traffic congestion deters potential customers from the area. Traffic volumes along New Circle Road have steadily increased over the years and will continue to grow due to development on the north side of Lexington. In addition to improving safety and reducing traffic congestion, the proposed project will need to preserve and promote business and sustainable economic development along the roadway.

Existing Conditions

New Circle Road is classified as an Urban Freeway between Georgetown Road and Newtown Pike and as an Urban Principal Arterial between Newtown Pike and Richmond Road, ranging from a posted speed of 55 mph in the Urban Freeway section to 45 mph for the 5.2 miles of the Urban Principal Arterial section. The roadway consists of four 12' lanes throughout the entire section with a 20' raised grass median in the Urban Freeway portion and 8'-20' raised non-mountable median in the Urban Principal Arterial section.

New Circle Road (KY 4), Newtown Pike (KY 922), North Broadway/Paris (US 27/68), Winchester Road (US 60), and Richmond Road (US 25) are all part of the National Truck Network, Defense Highway Network, National Highway System, and State Primary System. They are specially designed for trucks with increased dimensions to accommodate trailers and semitrailers. Georgetown Road (US 25), Russell Cave Road (KY 353), Bryan Station Road (KY 57), and Liberty Road (KY 1927), are all secondary roads.

There are four existing interchanges located at Georgetown Road (US 25), Newtown Pike (KY 922), Winchester Road (US 60), and Richmond Road (US 25). In addition, there are fifteen signalized intersections located at Boardwalk/Colesbury Circle, Russell Cave Road (KY 353), North Broadway/Paris Pike (US 27/68), Limestone Street/Old Paris Pike, Bryan Avenue/ Bryan Station Road (KY 57), Meadow Lane, Industry Road/Sunshine Lane, Eastland Parkway, Pridemore Court/Jingle Bell Lane, Trade Center Drive, Family Circle, Liberty Road (KY 1927), Young Drive, Palumbo Drive, and Woodhill Drive. Floyd Drive, Christian Road and Creative Drive do not have traffic signals. Businesses are located along both sides of New Circle Road for the entire length of the project and have direct access.

Methodology

The study began with the review of the existing conditions. Traffic and accident statistics were researched, existing travel times measured, MPO travel model output was obtained, and a computer Corridor Simulation Model (CORSIM) was calibrated to predict future travel times and the relative effect of different alternatives. Because the properties adjoining the corridor are already developed, any proposed solutions need to achieve a workable balance between the factors of safety, local business interests, concerns of local residents, and cost.

A decision was made early in the process to rely heavily on public involvement. There have been a series of three widely publicized public meetings in addition to forming a focus group composed of local residents and business owners to supply guidance to the planning process. The first public meeting was held to solicit input as to the current conditions and future needs and also to recruit volunteers for the focus group. Following the first public meeting, the focus group reviewed traffic and accident statistics, and output from a computer Corridor Simulation Model (CORSIM) used to predict future travel times and the future effectiveness of improvement alternates. Various options were considered and grouped into three preliminary alternates.

The consulting team used the feedback from the focus group to develop the three improvement alternates. These alternates were taken back to the focus group for the discussion of the pros and cons of the various features of each alternate and to decide on the final configuration of the three preliminary alternates to be presented at the second public meeting. Public comments concerning the three preliminary alternates were solicited during the second public meeting. The alternates were

also shown to various businesses and to the MPO for additional comment. Using input from the public meetings, the three preliminary alternates were revised, cost estimates prepared, estimates of vehicle delay calculated for each alternate, and a draft of this report was written. The resulting three alternatives and their respective cost estimates and vehicle delay figures were listed in twelve sections so that improvements for each section could be mixed and matched to create a fourth alternate. The alternates were taken to the interdisciplinary team members for their input to create a fourth alternate. The results of the interdisciplinary team effort were taken to the focus group for their comment and the fourth alternate was further modified to create the preferred alternate. A final public meeting was held on February 18, 2002 to give the general public one last chance to comment on the preferred alternate.

Previous Studies

There have been two studies of this section of New Circle Road and an additional study of the fully controlled access portion of the road. The first study for New Circle Northeast was completed in 1987 with cost estimates ranging from $13.3 million to $32.1 million. However, no funding was appropriated for the improvements recommended by this study. James-Winstead and Associates, Inc completed the study of the fully controlled access portion of New Circle Road in 1999. The eight lane option, costing $218 million was recommended but no funding has been appropriated for construction in this section of New Circle. The second study concerning New Circle Road Northeast was completed by the Kentucky Transportation Center at the University of Kentucky College of Engineering. It was a research report titled *Conversion of New Circle Road to a Limited Access Facility*. This study utilized 1999 traffic data in a CORSIM model to find a low cost, short term solution to traffic congestion within the signalized portion of New Circle Road. The study compared the addition of one lane in each direction with the use of median U-turns and restricted left turn and restricted left turn strategies at selected intersections. The research report was presented to the Lexington Metropolitan Planning Organization and is considered to have been the impetus for the development of this planning report.

Accident Studies

There were a total of 1,823 accidents on New Circle Road between Georgetown Road and Richmond Road between July 1996 and July 1999. This is an average of 1.66 accidents per day. Of the accident total, 488 were injury accidents resulting in 726 injuries and 5 fatalities. The critical rate factor for this corridor is 1.73, which is significantly higher than the statewide critical rate and indicates that these accidents may not be random occurrences. Of the 1,823 accidents on New Circle Road, 1,157 of those accidents were located at intersections or interchanges, 792 of which were at signalized intersections. High accident intersections along New Circle Road are as follows: Newtown Pike, Russell Cave Road, Bryan Station Road, Liberty Road, Young Drive, Woodhill Drive, and Richmond Road.

Alternates

After giving due consideration to the "no build" alternate and investigating and discussing various project features, the focus group decided on three build alternates.

No-Build Alternate

Without improvements in the area, traffic congestion and a high accident rate will deter potential businesses and customers from traveling in this corridor. Traffic volumes are expected to continue to increase making the need for roadway expansion a necessity. The No-Build Alternate will result in a reduction in system speed, a corresponding increase in travel time, and a decrease in safety. Increased traffic in the corridor will encourage neighborhood cut-through traffic. This alternate will result in no direct residential, commercial, or environmental disturbances, and no construction delays nor the expenditure of funds. Although these are positive aspects of this alternate, long term goals that would provide the area with the potential for expansion, are neglected.

Build Alternate 1

This alternate consists of widening the existing four lanes to six with curb and gutter and reducing the number of signalized intersections from 15 to 11. The alternate provides access to businesses by establishing right-turn lanes and using a raised median to prohibit left turns except via designated mid-block U-turn lanes. The estimated cost for this alternate is $67.2 million.

Build Alternate 2

This alternate consists of widening the existing four lanes to eight lanes with curb and gutter, eliminating a signalized intersection, and reconfiguring selected intersections. This alternate will provide median access points, right-turn entrances, and designated mid-block U-turns. The estimated cost for this alternate is $81.9 million.

Build Alternate 3

This alternate consists of widening the existing four lanes to six with grade-separated interchanges at high traffic intersections. This will reduce the number of signalized intersections from 15 to 6. Retaining walls will be used to minimize the affected area and frontage roads to provide access to the existing businesses. The median will be closed at less critical intersections permitting right-in and right-out turning movements. Left turns will be accommodated via median U-turn lanes located at mid block on each side of the intersection. The estimated cost for this alternate is $163.8 million.

Build Alternate 4 (Preferred Alternate)

Alternative 4 is a combination of the three original alternates and represents the preferences of the interdisciplinary team as well as the focus group. The alternate consists primarily of widening the existing four lanes to six with curb and gutter except between Woodhill Drive and Liberty Road where there will be eight lanes. The Georgetown Road interchange and the Richmond Road interchange will not be a part of this project and should be considered separately. There will be no changes to the intersections at North Limestone/Old Paris Pike, Bryan Station Road (with the exception of adding dual left-turn lanes from eastbound New Circle Road to Bryan Station Road), Industry/Sunshine Lane, Eastland Drive (with the exception of an additional left-turn lane to Eastland Drive from southbound New Circle Road), Trade Center Drive, Young Drive, and Palumbo Drive (with the exception of a three lane median allowing a full left turn lane into Young Drive and dual left-turn lanes from southbound New Circle Road to Palumbo Drive and from Palumbo to New Circle Road).

Single Point Urban Interchanges will be constructed at Newtown Pike and Russell Cave Road. Medians will be closed at Boardwalk/Colesbury Circle, Meadow Lane, Floyd Drive, Pridemore Court/Jingle Bell Lane, and Family Circle. Left turns will be accommodated at these intersections via mid-block U-turn lanes to either side of each intersection.

North Boadway will be realigned to the east of the CSX railroad, bridging over New Circle Road and passing over or under the railroad to tie back into existing Paris Pike. The remaining stubs of N. Broadway and Paris Pike will connect to the relocated road via T-intersections on each side of New Circle Road. The T-intersections will be signalized with dual left turn lanes, dual through lanes, and single right turn lanes. There will be a short signal for right turns on New Circle Road and the two stub ends of N. Broadway and Paris Pike at New Circle Road will have dual right-turn lanes entering and exiting New Circle.

Only thru and right turn movements will be permitted at the intersection of Liberty Road. Roundabouts are to be placed in the intersection of Liberty Road at Christian Road and similarly at Creative Drive. The intersections of Christian Road and Creative Drive at New Circle Road will permit only right-turns in and out. Left turn movements will be accommodated via the "bowtie" created by the Christian Road and the Creative Drive loops. Woodhill Drive will continue to be an at-grade, signal controlled intersection retaining all existing movements. An additional left-turn lane from northbound New Circle Road to Woodhill Drive and a thru/left-turn lane from Woodhill Drive to southbound New Circle Road will be added to the existing configuration. The estimated cost for this alternate is $96.1 million.

When money becomes available for the design phase, each intersection will need to be re-evaluated for its optimized functionality in redesigning New Circle Road. Roundabouts will need to be re-evaluated at Liberty Road to see if this type of intersection improvement is the most effective design. Some of the intersections that are currently at-grade were studied to be grade separated in the Planning Study. These grade-separated intersections will need to be re-evaluated for right of way impacts, utility relocations as well as how well they will function in redesigning New Circle Road. The focus group will be asked to provide their input so that the Highway Department will be able to make sound engineering decisions for each intersection within the limits of the project.

Construction Projects and Sequencing

Due to the near 100 million dollar cost of the project, construction will have to be sequenced. The project will be broken down into six construction projects, each costing from 8 to 25 million dollars. The section sequence is listed below:

Winchester Road to Liberty Road	$8,500,000
Liberty Road to Woodhill Drive	$11,500,000
North Limestone to Winchester Road	$15,300,000
North Broadway/Paris Pike	$24,100,000
Boardwalk to Russell Cave Road	$21,100,000
Newtown Pike interchange	$15,600,000
Total	$96,100,000

It is important to know that each of these construction projects can be built and used as stand alone improvements without any of the other projects being built. This allows the complete improvement to be built in pieces, as funding is available.

Traffic Analysis

Traffic volumes currently range from a high of 48,800 vehicles per day north of Richmond Road to a low of 37,300 vehicles per day between Winchester Road and Eastland Drive. A travel time study has been done for the PM peak hour, which indicated that it currently takes 16.73 minutes to travel southbound from Georgetown Road through the corridor at 5:00 PM and 22.12 minutes at 5:30 PM. Traveling the reverse direction from Richmond Road, it took 14.0 minutes at 5:00 PM and 20.55 minutes at 5:30 PM. For both directions, there was an approximate five-minute increase in travel time between 5:00 and 5:30 PM.

2022 traffic forecasts for the corridor range from 60,000 to 75,000 vehicles per day with traffic estimated to be over 100,000 vehicles per day south of Richmond Road.

The overall travel times for the no build, the three original build alternates, and Alternate #4 are shown below:

Direction	No Build Travel Time (min)	Alternate #1 Travel Time (min)	Alternate#2 Travel Time (min)	Alternate #3 Travel Time (min)	Alternate #4 Travel Time (min)
Southbound	55.7	22.2	22.3	18.8	20.4
Northbound	52.2	29.4	24.2	18.0	19.4

All build alternates show a significant reduction in travel time from the no-build alternate. More detail may be seen in the Traffic Analysis chapter.

Public Involvement

An extensive public input effort has been undertaken for this study. There have been a series of three highly publicized public meetings held at Yates Elementary School, right in the area proposed for improvement. In addition, a focus group was formed primarily of local residents and business owners. A series of three meetings were held with this group, which played a key role in selecting the combination of improvements used to form Alternate 4. In addition, two presentations to the Lexington MPO, two presentations to the combined LFUCG Transportation Technical and Incident Management Committees, a presentation the Lexington-Fayette Urban County Council, Bluegrass Area Development District, Lexington Corridors Committee, the U of K student chapter of the Institute of Transportation Engineers, the Lexington Optimists Club, and the Lexington Chamber of Commerce were made as well.

There was a significant amount of coordination with state, local, and federal officials and agencies. Lastly, beginning in April 2001, a project web site (www.newcircleroad.com) was established explaining the planning study in detail and providing notification of public meetings and of events where attendance is desired.

Environmental Overview

As a part of the Environmental Overview it has been determined that community cohesion in the residential units or small clusters along the secondary and side roads in the project area will not be adversely affected by the small number of displacements required. Disproportionately high and adverse human health or environmental effects on minority and low-income populations are not anticipated. No significant adverse social and economic impacts are anticipated: however, these preliminary findings will require validation through appropriate detailed environmental base studies in subsequent phases. Pursuant to the 1990 Clean Air Act Amendments, Fayette County has been designated as an air quality "Maintenance Area" and is not currently required to implement any transportation control measures. Project level emission inventories are not required because this

project originates from a conforming STIP. Highway noise levels are not expected to be a major concern on this project.

The northwest portion of the project crosses into the Royal Springs Wellhead Protection Area. Three springs occur near the roadway. There is one intermittent surface stream, Cane Run, which flows through the northwestern portion of the project area. No wild and scenic rivers or Outstanding Resource Waters are found in the project study area. National Wetlands Inventory maps indicate that two wetlands occur within the project area. There are no floodplain areas that will be impacted within the project corridor. Information from the United States Fish and Wildlife Service indicates that there are no federally listed endangered species located in the project area. However, the Kentucky Depart of Fish and Wildlife indicates that the federally endangered Indiana Bat inhabits this area but the presence of this species is extremely unlikely in the affected corridor due to the small amount of potential habitat.

Sixty-one UST and/or HAZMAT sites of environmental concern were identified with 20 of them classified as significant. However, all of them are in compliance and pose no problem.

The primary cultural resources potentially affected in the area are the Parkette Drive-in, the Paul Miller Showroom, the Catalina Motel neon sign and possibly Idle Hour Park. There are five known archaeological sites in the area but only two are within proximity of the road and may be impacted. Although neither prehistoric nor historic site density is expected to be high, a systematic archaeological reconnaissance survey of the preferred alternate is recommended during the NEPA project phase.

Pedestrians and Bikeways

Currently, there are no designated bikeways along New Circle Road. It would be difficult to safely incorporate either a lane or a shared use path within the corridor due to the numerous driveway access points (potential bicycle conflict points) and the additional right of way that would be needed. Currently, very few bicyclists can be seen using New Circle Road. However, pedestrian activity within the corridor has increased. Sidewalks have recently been added on both sides of New Circle Road from Trade Center Drive to Industry Road as part of the improvements to the Winchester Road Interchange. The proposed typical section for improvements to Winchester Road all contain a curb

and gutter section with a five foot sidewalk on both sides, similar to the area recently improved around the Winchester Road Interchange. Crosswalk striping and signalization is absent or inoperable in many locations throughout the corridor. Pedestrian overpasses are expensive and experience has shown that they are seldom used. Signal timing could be adjusted to accommodate pedestrians crossing the corridor and digital clock timers could be used to provide pedestrians with the amount of time left in the walk phase of the signal.

1.0 PROJECT DESCRIPTION

1.1 Purpose and Need

The purpose of this study is to propose ways to increase safety, mobility, and system linkage in order to support continued and sustainable economic development along the Northeast portion of New Circle Road. This portion of New Circle Road links Georgetown Road (US 25), Newtown Pike (KY 922), Russell Cave Road (KY 353), North Broadway/Paris Pike (US 27/68), Bryan Station Road (KY 57), Winchester Road (US 60), Liberty Road (KY 1927), and Richmond Road (US 25). Mobility on the existing roadway is limited by congestion caused by high traffic volumes and several signalized intersections. Numerous access points along the corridor combined with the high traffic volumes result in a high number of accidents along the roadway. Traffic congestion deters potential customers from using businesses in the corridor. Traffic volumes along New Circle Road have steadily increased over the years and will continue to increase due to development on the north side of Lexington. In addition to improving safety and reducing congestion, the proposed project will need to preserve and promote business and sustainable economic development along the roadway.

1.2 Existing Conditions

Existing New Circle Road has the following design features:

Section:	Georgetown Rd. to Newtown Pike	Newtown Pike to Richmond Rd.
Milepoints:	8.7 to 9.6	9.6 to 14.8
Functional Classification:	Urban Freeway	Urban Principal Arterial
Posted Speed:	55 mph	45 mph
Access:	Partially Controlled	By Permit
Number of Lanes:	Four 12' lanes	Four 12' lanes
Median:	20' raised grass	8'-20' raised non-mountable
Shoulders:	12'	12'
Minimum Radius:	4,625'	2,250'
Maximum Grade:	2%	4%
Interchanges:	2	1
At Grade Intersect:	0	18
At Grade Railroad X-ings	0	0

New Circle Road (KY 4), Newtown Pike (KY 922), North Broadway/Paris Pike (US 27/68), Winchester Road (US 60), and Richmond Road (US 25) are all part of the National Truck Network, Defense Highway Network, National Highway System, and State Primary System. These roads are specifically designated for use by trucks with increased dimensions (8.5'Wx13.5'H, 28'L trailers, 53'L semitrailers) and are important to the nation's economy, defense, and mobility.

Georgetown Road (US 25), Russell Cave Road (KY 353), Bryan Station Road (KY 57), and Liberty Road (KY 1927), are all secondary roads.

Four existing interchanges are located at Georgetown Road (US 25), Newtown Pike (KY 922), Winchester Road (US 60), and Richmond Road (US 25)

The fifteen existing signalized intersections are located at Boardwalk/Colesbury Circle, Russell Cave Road (KY 353), North Broadway/Paris Pike (US 27/68), Limestone Street/Old Paris Pike, Bryan Avenue/Bryan Station Road (KY 57), Meadow Lane, Industry Road/Sunshine Lane, Eastland Parkway, Pridemore Court/Jingle Bell Lane, Trade Center Drive, Family Circle, Liberty Road (KY 1927), Young Drive, Palumbo Drive, and Woodhill Drive.

Floyd Drive, Christian Road, and Creative Drive do not have traffic signals where they intersect with New Circle Road.

Businesses line both sides of New Circle Road for the length of the Project and many have direct access to New Circle Road.

1.3 Methodology

Because the study area is already developed and any changes will involve balancing safety, the interests of local businesses and residents, and cost, the decision was made to rely heavily on public involvement for the study.

First the existing conditions were researched including traffic and accident statistics. Existing travel times were measured and used to calibrate a computer Corridor Simulation Model (CORSIM) that was used to predict future travel times and the effects of different alternates.

Next a public meeting was held to solicit input from the public as to the current conditions and future needs and also to recruit volunteers for focus groups made up of local residents and business owners.

The focus groups met, considered the no-build alternate and looked over the existing conditions and statistics, and came to a consensus on various solution options that were grouped into four

preliminary alternates (no-build and three build alternates). In addition, the focus group reached the consensus that a build alternate was preferable to a no-build alternate.

The three preliminary build alternates were developed using the suggestions of the focus group as a guide. Some additional options that were discovered during development of the three preliminary build alternates were developed for small sections of the project.

The three preliminary build alternates were then taken back and presented to the focus group along with analysis of the traffic effects of each alternate. The focus group then discussed the pros and cons of the various features of each alternate and decided on the final configuration of the three preliminary build alternates to be presented at the second public meeting.

The second public meeting solicited comments about the three preliminary build alternates. These alternates have also been shown to various businesses and the Metropolitan Planning Organization.

Using input from the public meeting the three preliminary build alternates were revised and subdivided into 12 decision sections that could be mixed and matched among the alternates. Cost estimates were prepared for each decision section, and the draft of this report was written. The draft of the report and alternates were reviewed and revised by the interdisciplinary team (IDT) and the alternates were ranked for each decision section. The focus group reviewed the revised alternates and the IDT's rankings and chose a preferred alternate for each decision section. These choices were combined to make Alternate 4 (build alternate 4), which is the preferred alternate.

1.4 Previous Studies

The signalized portion of New Circle Road has been studied previously in an attempt to find solutions that will ease the traffic congestion concerns in a way that does not do extensive damage to the existing business environment. Two previous studies have been performed on this section as well as a study performed to look at widening the fully controlled access portion of New Circle Road. The following is a summary of each of these studies and their status:

1.4.1 1987 LFUCG Study

In June of 1987, Watkins and Associates, Inc. completed a study for the Lexington-Fayette Urban County Government concerning the Georgetown Road to Richmond Road corridor. The study considered four build alternates and two additional interchanges. The four alternates studied included: widening to six lanes with no additional median access control; widening to six lanes with a 40 foot median utilizing U-turns; widening to six lanes with a 40 foot median utilizing U-turns and one way frontage roads; and widening to six lanes with a 40 foot median utilizing U-turns and two way frontage roads. Total cost estimates ranged from $13.3 million to $32.1 million for the four alternates. The first alternate of widening to six lanes with no additional median access control was the lowest cost alternate and was selected as the preferred alternate.

In order to ease the congestion in the Liberty Road to Woodhill Drive segment a combined interchange was evaluated that would handle all Young Drive, Palumbo Drive, and Woodhill Drive traffic and make that segment fully access controlled. Variations with New Circle Road passing over and under the interchange were evaluated. Right of way impacts were considered too severe and the interchange was not recommended.

Traffic analysis performed in the study was based on traffic volumes projected to 2005. Interestingly, current 2001 traffic volumes exceed the projected 2005 traffic volumes by as much as 25% in some locations. Average travel speeds for the existing facility in 1986 were 43 MPH and the study projected that with the preferred six lane alternate, 2005 travel speeds would also be approximately 43 MPH. The study also presented a detailed list of drainage concerns within the corridor. No funding has been appropriated for improvements recommended by that study.

1.4.2 1999 KTC Study

In 1999, a study performed by James-Winstead and Associates, Inc. was completed for the Kentucky Transportation Cabinet. That study evaluated three alternate improvements to the 14 mile fully controlled access portion of New Circle Road between Richmond Road and Georgetown Road. The three alternates studied included an eight lane and a ten lane alternate. All of the alternates widened one lane to the inside with a barrier median and additional lanes on the outside with retaining walls utilized to reduce right of way impacts where possible.

The study considered minor modifications to most of the existing interchanges. A single point urban interchange was recommended at Tates Creek Road and a new interchange was studied at Reynolds Road. The new interchange at Reynolds Road was not recommended because of the traffic capacity problems it would create along with the additional right of way and construction cost.

A six lane alternate provided a level of service of E and was therefore not fully evaluated with cost estimates. The total cost estimated for the eight lane alternate was $218 million and the cost estimated for the ten lane alternate was $251 million. The eight lane alternate was selected due to lower cost and less right of way impacts. No public involvement was performed with this study and to date no funding has been appropriated for construction within this corridor.

1.4.3 1999 KTC Research Report

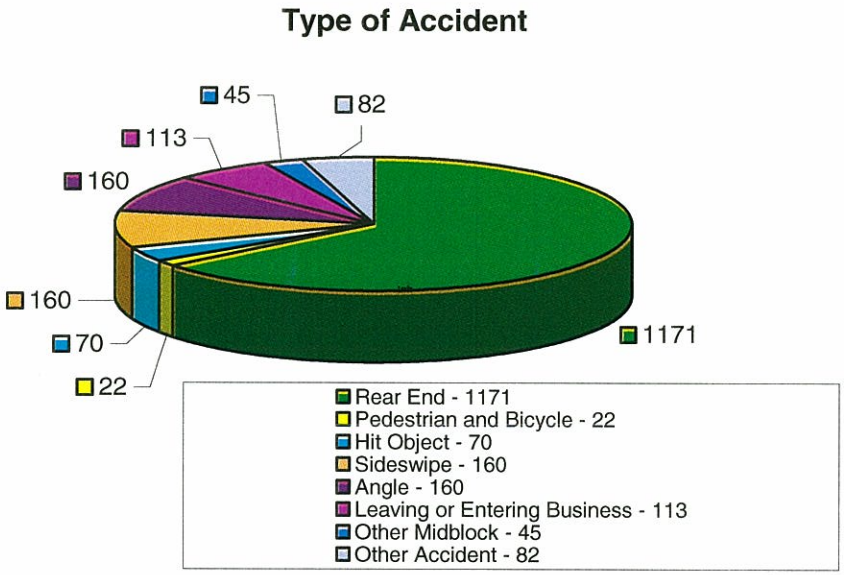
In August of 1999, the Kentucky Transportation Center at the University of Kentucky College of Engineering completed Research Report KTC-99-55, *Conversion of New Circle Road to a Limited Access Facility.* This study utilized 1999 traffic data in a CORSIM model to try to find low cost, short term solutions to the congestion within the signalized portion of New Circle Road. The CORSIM model was validated with travel time studies and several measures of effectiveness were selected for the evaluation of alternates.

The study compared the addition of one lane in each direction with the use of median U-turn and restricted left turn strategies at selected intersections. The recommended alternate closed the median and used median U-turns at the Palumbo Drive, Liberty Road, Eastland Drive, Meadow Lane, Bryan Station Road, and North Limestone Street intersections while maintaining a four lane New Circle Road section. The total delay for this alternate was decreased by 32 percent from the existing conditions while the average travel speed increased by 3.6 MPH.

No public involvement was conducted as part of this research report and no costs were estimated. The research report was presented to the Lexington Metropolitan Planning Organization and is considered to have been the impetus for the development of this planning report.

1.5 Accident Data

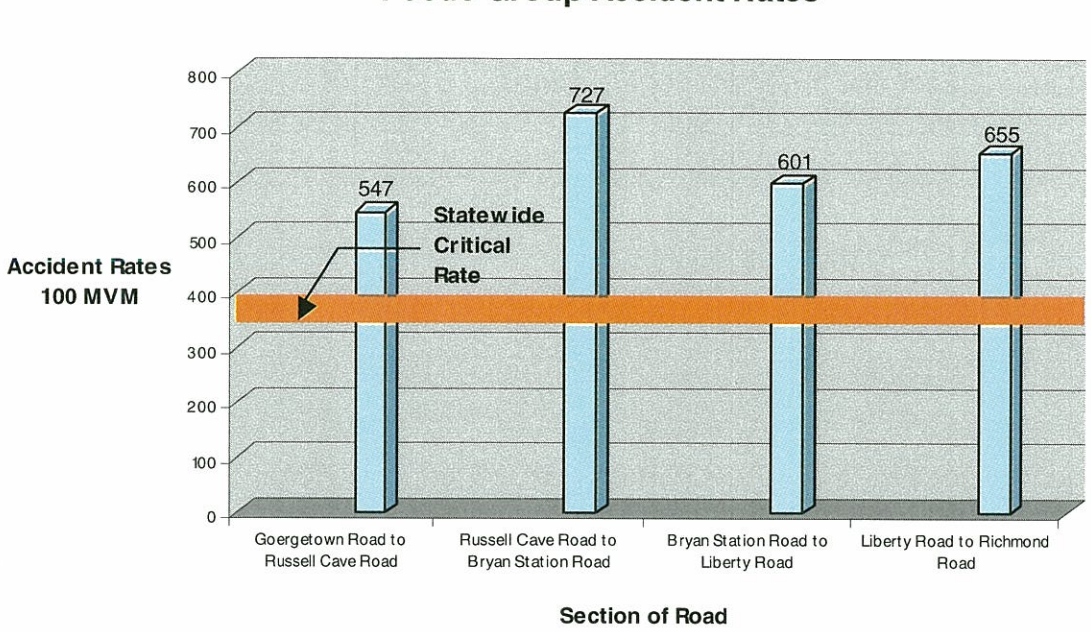
The Kentucky Transportation Cabinet provided accident data for the New Circle Road corridor for the time period from July 1996 to July 1999. Within that three year time period, there were a total of 1,823 accidents on New Circle Road between Georgetown Road and Richmond Road. This equates to approximately 1.66 accidents per day. Of these accidents, there were a total of 488 injury accidents resulting in 726 injuries and 5 fatality accidents resulting in 5 fatalities. The chart below is a summary of the different types of accidents.



The accident statistics for New Circle Road was compared to accident rates and statewide critical rates to help identify the significance of accident data in the analysis. Accident rates are compared on a 100 million-vehicle mile basis. The table below illustrates the overall accident rate for New Circle Road and for each focus group section.

Accident Analysis						
Segment	Length (miles)	Accidents (1996-1999)	ADT	Calculated Accident Rate (100 MVM)	Statewide Critical Rate[1] (100 MVM)	Critical Rate Factor
Entire Project	**5.8**	**1823**	**47,400**	**606**	**351**	**1.73**
Focus Group 1[2]	1.3	377	48,400	547	373	1.47
Focus Group 2[3]	1.0	360	45,200	727	382	1.90
Focus Group 3[4]	2.3	672	44,400	601	366	1.64
Focus Group 4[5]	1.2	414	48,100	655	377	1.74

[1] Analysis of Traffic Accident Data (1995-1999) pg 124 (Kentucky Transportation Center)
[2] Includes Russell Cave Intersection
[3] Includes Bryan Station Intersection
[4] Includes Liberty Road Intersection
[5] Includes Richmond Road Interchange



The above rates apply for all of the accidents located within each section, including accidents located at each individual intersection. Below is a table listing the total number of accidents located at each intersection along this section of New Circle Road. High accident intersections are highlighted.

Intersection Accidents	
Road Intersecting @ New Circle Rd.	**Number of Accidents**
Georgetown Road	67
Newtown Pike	99
Boardwalk/Colesbury Circle	44
Russell Cave Road	106
North Broadway	76
North Limestone/Old Paris Road	19
Bryan Station Road	106
Meadow Lane	23
Floyd Drive	27
Industry Road/Sunshine Lane	17
Eastland Drive	13
Winchester Road	53
Pridemore Road/Jingle Bell Lane	2
Mill Outlet/Trade Center Drive	11
Family Circle/Solid Platinum	48
Christian Drive	26
Liberty Drive	92
Young Drive	95
Quantrell Cadillac/Palumbo Drive	40
Woodhill Drive	100
Richmond Road	93

Of the total of 1,823 accidents on New Circle Road within the three-year period, 1,157 of those accidents were located at intersections or at the interchanges. Of the total accidents, 792 were located at signalized intersections.

The Critical Rate is the maximum accident rate for which it can be said with 99.5 percent confidence that accidents are occurring at random. The Critical Rate was determined by applying a standard deviation of 2.576 to the average accident rate for the five-year period from 1995-1999 as documented in the Analysis of Traffic Accident Data in Kentucky (1995-1999) by the Kentucky Transportation Center. The critical accident rate for an urban-four lane divided highway vary with traffic volume and highway segment length.

The Critical Rate Factor is determined by dividing the accident rate by the accident rate for the segment by the critical rate for the segment. Critical Rate Factors less than 1.0 indicate that accidents are occurring at random. If the Critical Rate factor is greater than 1.0, it is assumed that accidents cannot be attributed to random occurrence. As noted in the table above, all four focus group sections have a Critical Rate Factor above 1.0. This indicates that something else besides random occurrences are happening to cause accidents. In this section of New Circle Road, it appears that driver impatience and the numerous access points and signalized intersections are leading to the high number of accidents.

2.0 DISCUSSION OF ALTERNATES

2.1 Alternatives

Numerous ideas have been investigated and discussed during the course of this study. The focus group has lumped various features into three build alternates to allow traffic and cost analysis to be performed so that the alternates can be compared to each other and the No-Build Alternate. Plans for the proposed Build Alternates can be found in the exhibits section at the back of this report.

2.1.0 No-Build Alternate

The No-Build Alternate will deter potential businesses and customers from the area due to high congestion, long delays, and high accident rates. As traffic volumes continue to increase, the need for roadway expansion will become a greater necessity.

A problem associated with the No-Build Alternate is the reduction in system speed due to the high congestion of the facility. Other problems associated with high congestion are an increase in travel time and a decrease in economic efficiency of the system. Another concern is the safety of a system that is reaching capacity. As safety decreases, the risk of accidents along the corridor will increase, resulting in driver discomfort. Another community impact as a result of high levels of congestion is the promotion of cut-through traffic. Many drivers will begin to avoid the congested roadway, which will increase the traffic on neighborhood streets and low capacity side streets.

This alternate does not promote residential or commercial growth of the surrounding area, resulting in residents moving to less congested areas and a decline in new developments. The decrease in residents will result in existing businesses moving to more convenient locations and potential businesses will be more likely to expand in less congested locations.

The No-Build Alternate will result in no residential, commercial, or environmental disturbances to the area. Another positive aspect of this alternate is no construction delays or expenditure of funds. Although these are positive in the short term, this alternate neglects long-term goals that would provide the area with the potential for expansion.

2.1.1 Build Alternate 1

To reduce future congestion on New Circle Road, a variety of different strategies are implemented in this alternate: widening of the existing four lanes to six lanes with curb and gutter, reducing signalized intersections from 15 to 11, and reconfiguring selected intersections. This alternate will provide access to businesses by establishing right-turn lanes and redirecting median turns--with a raised median--to designated areas where permitted U-turn movements can occur. Reducing the total number of access points will reduce accidents by controlling where vehicles will enter and exit the highway. Following is a description of the proposed Alternate 1 improvements at each intersection:

Georgetown Road: There will be no change to this interchange.

Newtown Pike: The existing interchange will be modified by replacing the northeastern on-ramp with a left-turn lane on Newtown Pike. This will relocate the off-ramp from eastbound New Circle Road, resulting in less congestion at Newtown Court and eliminating the short weaving sections on New Circle Road and Newtown Pike.

Boardwalk/Colesbury Circle: The closing of the median will eliminate the need for a traffic signal by permitting only right-turning movements at the intersection. The left-turn movements from Boardwalk will require an exit prior to the intersection and use a fly-over ramp to access westbound New Circle. The left-turn movements from eastbound New Circle will make median U-turns and the left-turn access from Colesbury Circle and westbound New Circle will be eliminated.

Russell Cave Road: The signalized intersection will provide dual left-turn lanes and a dedicated right-turn lane at all four approaches.

North Broadway/Paris Pike: All four approaches of this intersection will be provided with dual left-turn lanes and a dedicated right-turn lane, while continuing to be controlled by a traffic signal.

North Limestone/Old Paris Pike: The modification of the signalized intersection will permit thru traffic but will require the use of median U-turn lanes for left-turn movements. The median U-turn lanes will be located on both sides of the intersection.

Bryan Avenue/Bryan Station Road: The existing signalized intersection configuration will remain unchanged, with the exception of dual left-turn lanes from eastbound New Circle Road to Bryan Station Road.

Meadow Lane: The closing of the median will eliminate the need for a traffic signal and permit only right-turn movements into and out of Meadow Lane. Left-turn movements must continue past the intersection on New Circle Road and use the median U-turn lanes located on each side.

Floyd Drive: The closing of the median will permit only right-turn movements into and out of Floyd Drive; left-turn movements must use the median U-turn lanes located on each side of the intersection.

Industry Road/Sunshine Lane: There will be no change to this intersection.

Eastland Drive: There will be no change to this intersection.

Winchester Road: There will be no change to this interchange.

Pridemore Court/Jingle Bell Lane: The closing of the median will eliminate the need for the existing traffic signal. The only movements permitted will be right-turn movements into and out of Pridemore Court/Jingle Bell Lane. The left-turn movements will use the median U-turn lanes located on each side of the intersection.

Trade Center Drive: There will be no change to this intersection.

Family Circle: The closing of the median will eliminate the need for a traffic signal. The only movements permitted will be right-turn movements into and out of Family Circle. Left-turn movements must continue past the intersection on New Circle and use the median U-turn lanes located on each side.

Christian Road/Liberty Road/Creative Drive: The only movements permitted at the intersection will be thru and right-turn movements. Roundabouts will be placed on Liberty Road to connect

Christian Road and Creative Drive. Left turns would use the right in/right out intersections at Christian Road and Creative Drive and cross New Circle on Liberty Road.

Young Drive: There will be no change to this intersection.

Palumbo Drive: The existing signalized intersection configuration will remain unchanged with the exception of dual left-turn lanes from eastbound New Circle Road to Palumbo Drive and from Palumbo Drive to New Circle Road.

Woodhill Drive: A traffic signal would remain to permit all turning movements at the intersection, while left-turn movements from Woodhill Drive can use the at-grade intersection, a fly-over can also access eastbound New Circle Road.

2.1.2 Build Alternate 2

To alleviate New Circle Road congestion problems in the future, a variety of different strategies are implemented in Alternate 2: widening of the existing four lanes to eight lanes with curb and gutter, eliminating a signalized intersection, and reconfiguring selected intersections. This alternate will provide median access points, right-turn entrances, and designated median turns. The widening of New Circle to eight lanes will reduce congestion and maintain similar business access. Following is a description of the proposed Alternate 2 improvements at each intersection:

Georgetown Road: There will be no change to this interchange.

Newtown Pike: The proposed modification will replace the existing interchange with a Single Point Urban Interchange.

Boardwalk/Colesbury Circle: The existing signalized intersection configuration will remain unchanged with the exception of dual left-turn lanes from Boardwalk onto westbound New Circle Road.

Russell Cave Road: This reconfiguration will relocate all turns from New Circle Road onto "Jug Handles" which provide left- and right-turn movements onto Russell Cave at intersections located on the right side of the intersection.

North Broadway/Paris Pike: This intersection will continue to be controlled by a traffic signal, with all four approaches providing dual left-turn lanes and a dedicated right-turn lane.

North Limestone/Old Paris Pike: There will be no change to this intersection.

Bryan Avenue/Bryan Station Road: The signalized intersection configuration will remain unchanged with the exception of dual left-turn lanes from eastbound New Circle Road to Bryan Station Road.

Meadow Lane: There will be no change to this intersection.

Floyd Drive: There will be no change to this intersection.

Industry Road/Sunshine Lane: There will be no change to this intersection.

Eastland Drive: The existing intersection configuration will continue to be controlled by a traffic signal and provide an additional left-turn lane from eastbound New Circle onto Eastland Drive.

Winchester Road: There will be no change to this interchange.

Pridemore Court/Jingle Bell Lane: The signalized intersection will provide left- and right-turn lanes at all four approaches.

Trade Center Drive: There will be no change to this intersection.

Family Circle: There will be no change to this intersection.

Christian Road: The closing of the median permits only right-turn movements into and out of Christian Road; left-turn movements must use the provided median U-turn lane.

Liberty Road: This intersection will continue to be controlled by a traffic signal. It will provide the same movements and number of turn lanes as the existing roadway with the exception of an additional left-turn lane provided to eastbound New Circle Road.

Creative Drive: The closing of the median permits only right-turn movements into and out of Creative Road; left-turn movements must use the provided median U-turn lane located at Young Drive.

Young Drive/Palumbo Drive: Young Drive will be relocated to the intersection at Palumbo Drive. This intersection will have dual left-turn lanes and a right-turn lane from Young and Palumbo Drive to New Circle and from New Circle to Palumbo Drive. There will be a single left-turn lane from westbound New Circle to Young Drive.

Woodhill Drive: This intersection will continue to be controlled by a traffic signal. It will provide the same movements and number of turn lanes as the existing roadway with the exception of an additional left-turn lane provided from eastbound New Circle Road to Woodhill Drive and a thru/left-turn lane from Woodhill Drive to eastbound New Circle Road.

2.1.3 Build Alternate 3

The proposed improvements to New Circle Road for Alternate 3 involve changing the existing four lanes to six lanes with grade separated interchanges at high traffic intersections. This will reduce the number of at-grade signalized intersections from 15 to 6. It uses retaining walls to minimize affected area and frontage roads to provide access to the existing businesses. The less critical intersections have a closed median and only permit right-in and right-out turning movements. The left-turning movements will use the median U-turn lanes located on each side of the intersection. Following is a description of the proposed Alternate 3 improvements at each intersection:

Georgetown Road: The proposed modification will replace the existing interchange with a Single Point Urban Interchange.

Newtown Pike: A Single Point Urban Interchange will replace the existing interchange.

Boardwalk/Colesbury Circle: The proposed modification will replace the existing at-grade intersection with a Single Point Urban Interchange.

Russell Cave Road: The existing intersection will be changed to a Single Point Urban Interchange.

North Broadway/Paris Pike: N. Broadway will be realigned to the east of the CSX railroad, bridging over New Circle Road and passing over the railroad to tie back to existing Paris Pike. The remaining stubs of N. Broadway and Paris Pike will connect to the relocated road with T-intersections on each side of New Circle Road. The T-intersections will be signalized with dual left turn lanes, dual through lanes, and single right turn lanes. There will not be cross traffic on New Circle Road and the two stub roads will have dual right-turn lanes entering and exiting New Circle. Traffic lights on New Circle will be actuated and only turn red when the right turning traffic on the stubs backs up. The result will be an interchange between N. Broadway and New Circle Road.

North Limestone/Old Paris Pike: There will be no change to this intersection.

Bryan Avenue/Bryan Station Road: The existing signalized intersection will provide the same movements and number of turn lanes, with the exception of an additional left-turn lane provided to Bryan Station from eastbound New Circle Road.

Meadow Lane: The closing of the median will eliminate the need for a traffic signal. The only movements permitted will be right-turn movements into and out of Meadow Lane; left-turning movements must use the median U-turn lanes located on each side of the intersection.

Floyd Drive: The closing of the median will permit only right-turn movements into and out of Floyd Drive. The left-turn movements must use the provided median U-turn lanes located on each side of the intersection.

Industry Road/Sunshine Lane: There will be no change to this intersection.

Eastland Drive: The existing signalized intersection will continue to provide the same configuration, with the exception of an additional left-turn lane to Eastland Drive from eastbound New Circle Road.

Winchester Road: There will be no change to this interchange.

Pridemore Court/Jingle Bell Lane: The median will be closed eliminating the need for a traffic signal. The only movements permitted will be right-turn movements into and out of Pridemore Court and Jingle Bell Lane; left-turn movements must use the median U-turn lanes located on each side of the intersection.

Trade Center Drive: There will be no change to this intersection.

Family Circle: The closing of the median will permit only right-turn movements into and out of Family Circle; left-turn movements will use the median U-turn lanes located on each side of the intersection.

Christian Road: There will be only right-turn movements into and out of Christian Road using the Liberty Road ramp.

Liberty Road: The proposed modification will replace the existing at-grade intersection with a Single Point Urban Interchange.

Creative Drive: There will be only right-turn movements into and out of Creative Drive using the Liberty Road ramp.

Young Drive/Palumbo Drive: The proposed modification will replace the existing at-grade intersection with a Single Point Urban Interchange. This modification will relocate Young Drive to Palumbo Drive and provide both approaches with dual left-turn lanes to New Circle.

Woodhill Drive: The proposed modification will replace the existing at-grade intersection with a Single Point Urban Interchange. No left-turn movements will be allowed from Woodhill Drive to southbound New Circle to discourage traffic from Todd's Road cutting through the residential neighborhood.

Richmond Road: The proposed modification will replace the existing interchange with a Single Point Urban Interchange.

2.1.4 Build Alternate 4

Alternate 4 is a combination the three original alternates and represents the preferences of the focus group. The following is a listing of all of the features of this alternate:

Georgetown Road: Replacing the existing interchange with a Single Point Urban Interchange should be considered as a separate project to benefit Georgetown Road.

Newtown Pike: A Single Point Urban Interchange will replace the existing interchange.

Boardwalk/Colesbury Circle: The median will be closed at Boardwalk/Colesbury Circle permitting only right turns into and out of these side streets. Left turns will be accommodated via U-turns at either Newtown Pike or Russell Cave Interchanges.

Russell Cave Road: A Single Point Urban Interchange will replace the existing intersection.

Paris Pike/Broadway: N. Broadway will be realigned to the east of the CSX railroad, bridging over New Circle Road and passing over the railroad to tie back into existing Paris Pike. The remaining stubs of N. Broadway and Paris Pike will connect to the relocated road with T-intersections on each side of New Circle Road. The T-intersections will be signalized with dual left turn lanes, dual through lanes, and single right turn lanes. There will not be cross traffic on New Circle Road and the two stub roads will have dual right-turn lanes entering and exiting New Circle. Traffic lights on New Circle will be actuated and only turn red when the right turning traffic on the stubs backs up. The result will be an interchange between N. Broadway and New Circle Road.

North Limestone/Old Paris Pike: There will be no change to this intersection.

Bryan Avenue/Bryan Station Road: The existing signalized intersection will provide the same movements and number of turn lanes, with the exception of an additional left-turn lane provided to Bryan Station from eastbound New Circle Road.

Meadow Lane to Winchester Road: The median will be closed at Meadow Lane and Floyd Drive permitting only right turns into and out of these side streets. Left turns will be accommodated via mid-block U-turn lanes along New Circle Road. There are no changes recommended for the Industry Road/Sunshine Lane intersection. At Eastland Drive, the existing signalized intersection will be unchanged with the exception of an additional left-turn lane to Eastland Drive from southbound New Circle Road.

Winchester Road: There will be no change to this interchange.

Pridemore Court/Jingle Bell Lane: The median will be closed eliminating the need for a traffic signal. The only movements permitted will be right-turn movements into and out of Pridemore Court and Jingle Bell Lane; left-turn movements must use the median U-turn lanes located on each side of the intersection.

Trade Center Drive: There will be no change to this intersection.

Family Circle: The closing of the median will permit only right-turn movements into and out of Family Circle; left-turn movements will use the median U-turn lanes located on each side of the intersection.

Christian Road/Liberty Road/Creative Drive: Roundabouts are to be placed on Liberty Road on either side of New Circle Road in a "bowtie" configuration at the intersection of Christian Road and another at Creative Drive. The New Circle Road intersections of Christian Road and Creative Drive permit only right turns in and out. Only thru and right turn movements will be permitted at the intersection of Liberty Road. Motorists wishing to turn left onto Liberty Road from either direction

will exit New Circle Road via a right turn on the Christian Road or Creative Drive loops, then make another right turn onto Liberty Road and cross New Circle Road as a thru movement.

Young/Palumbo: The existing signalized intersection configurations at Young Drive and Palumbo Drive will remain unchanged with the exception of a three lane median allowing a full left turn lane into Young Drive and dual left-turn lanes from southbound New Circle Road to Palumbo Drive. Dual left turns will also be added from Palumbo to southbound New Circle Road.

Woodhill Drive: This will continue to be an at-grade traffic signal controlled intersection. An additional left-turn lane from southbound New Circle Road to Woodhill Drive and a thru/left-turn lane from Woodhill Drive to southbound New Circle Road will be added to the existing configuration. All existing movements and turn lanes will be retained.

Richmond Road: Replacing the existing interchange with a Single Point Urban Interchange should be considered as a separate project to benefit Richmond Road.

When money becomes available for the design phase, each intersection will need to be re-evaluated for its optimized functionality in redesigning New Circle Road. Roundabouts will need to be re-evaluated at Liberty Road to see if this type of intersection improvement is the most effective design. Some of the intersections that are currently at-grade were studied to be grade separated in the Planning Study. These grade-separated intersections will need to be re-evaluated for right of way impacts, utility relocations as well as how well they will function in redesigning New Circle Road. The focus group will be asked to provide their input so that the Highway Department will be able to make sound engineering decisions for each intersection within the limits of the project.

2.2 Maintenance of Traffic

2.2.0 Maintenance of Traffic for Railroads

All build alternates will require replacing the two railroad bridges over New Circle Road and possibly the railroad bridge over North Broadway. To maintain rail traffic and allow for the rise in the railroad grades the new railroad bridges will be constructed parallel to the existing bridges. The new track will be laid parallel to the existing track for the distance required to bring the grade back down to match existing. This distance will be approximately 500 feet from the northeast end of the

bridge over New Circle near Broadway and extend to 400 feet from the southwest end of the bridge over North Broadway. Near Young Drive the new track will be laid approximately 300 feet from each end of the bridge. Once the railroad has approved both the bridge and the track, the new track will be tied to the old track at each end during a low rail-traffic time that will be coordinated with the railroad.

To save the expense and inconvenience of going through the transition twice, it is recommended that the new track become the permanent track. At the crossings near N. Broadway the old track and bridges will be removed. At the crossing near Young Drive the old bridge will be removed, but the old tracks will need to remain as a siding to serve the existing loading docks along the south side.

New Circle Road traffic will be maintained in four narrowed lanes on the existing road during construction of the railroad bridges. Traffic will be stopped only for setting and removing the beams and moving equipment. Railroad work will precede any work on New Circle in the same section.

2.2.1 Maintenance of Traffic for Alternate 1

While constructing Alternate 1, traffic will be maintained without additional right of way. Drainage work will be completed first, along with any frontage roads and outside curb and gutter. Next, construct the outside lanes and intersection widening.

After shifting traffic to the outer two lanes on each side of the highway, construct the median improvements.

The Lexmark bridge will be closed while it is replaced. New Circle Road traffic will be maintained on the existing road and stopped only for setting beams and moving equipment.

The flyover bridges associated with both the Boardwalk and Woodhill intersections can be constructed while maintaining traffic on the existing roads. Traffic will be stopped only for setting beams and moving equipment.

2.2.2 Maintenance of Traffic for Alternate 2

While constructing Alternate 2, traffic will be maintained without additional right of way. Drainage work will be completed first, along with any frontage roads and outside curb and gutter. Next, construct the outside lanes and intersection widening.

The Lexmark bridge will be closed while it is replaced. New Circle Road traffic will be maintained on the existing road and stopped only for setting beams and moving equipment.

The bridge for the single point urban interchange at Newtown Pike will be constructed in two halves. Construct left turn fillets at the Newtown Pike end of the three right turn ramps that don't have them. Temporarily reroute the traffic from the three loops onto the right turn ramps. Newtown traffic will be maintained with one lane each direction over one of the existing bridges while half of the new bridge is built. Then traffic will be maintained with one lane each direction over the newly constructed side of the new bridge while the remaining side is constructed along with the portions of the new ramps inside of the old right turn ramps. Lastly tie the ends of the new ramps into New Circle Road under traffic.

After shifting traffic to the outer two lanes on each side of into New Circle Road, construct the median improvements.

2.2.3 Maintenance of Traffic for Alternate 3

While constructing the at-grade portions of Alternate 3 traffic will be maintained without additional right of way. Drainage work will be completed first, along with any frontage roads and outside curb and gutter. Next, construct the outside lanes and intersection widening.

After shifting traffic to the outer two lanes on each side of New Circle Road, construct the median improvements.

The bridge for the single point urban interchange at Georgetown Road will be constructed in two halves. Georgetown traffic will be maintained with one lane each direction on one side of the existing bridge while the other half of the existing bridge is removed and half of the new bridge is built. Then traffic will be maintained with one lane each direction over the newly constructed side of

the new bridge while the remaining side is constructed along with the portions of the new ramps inside of the old ramps. Lastly tie the ends of the new ramps into New Circle Road under traffic.

The bridge for the single point urban interchange at Newtown Pike will be constructed in two halves. Construct left turn fillets at the Newtown Pike end of the three right turn ramps that don't have them. Temporarily reroute the traffic from the three loops onto the right turn ramps. Newtown traffic will be maintained with one lane each direction over one of the existing bridges while half of the new bridge is built. Then traffic will be maintained with one lane each direction over the newly constructed side of the new bridge while the remaining side is constructed along with the portions of the new ramps inside of the old right turn ramps. Lastly tie the ends of the new ramps into New Circle Road under traffic.

The Lexmark bridge will be closed while it is replaced. New Circle Road traffic will be maintained on the existing road and stopped only for setting beams and moving equipment.

The bridges at Boardwalk/Colesbury, Russell Cave, and Woodhill will be constructed in halves. First, temporarily widen New Circle Road on one side so that two lanes of traffic can be maintained in each direction while separated by a bituminous wedge curb and "Candy Canes." Second, construct the ramps and two thirds of the width of the roadway and bridges on the opposite side. Third, shift the New Circle Road traffic to the completed portion with two lanes in each direction and allow the exiting and entering traffic on the unfinished side to use portions of the temporary pavement while constructing the ramps on that side. Fourth, shift the exiting and entering traffic on the unfinished side to the newly finished ramps while constructing the remaining portions of the mainline roadway and bridges.

The relocation of N. Broadway can be constructed while maintaining traffic on existing roads. First the new railroad bridge that will cross over Broadway should be constructed along with the replacement of the other two railroad bridges. Second, construct the relocated portion of Broadway with New Circle Road traffic stopped only for setting beams and moving equipment. Third, construct the tie-ins to existing N. Broadway and Paris Pike under traffic. Finally continue New Circle Road construction the same as for an at-grade section.

For the Liberty Road interchange, construct the ramps first while maintaining traffic on the existing roads. Second, shift the New Circle Road traffic to the ramps with temporary paving to allow

through traffic to cross Liberty Road from an off ramp to an on ramp. Third, maintain one lane in each direction on Liberty Road while constructing half of the new bridge and New Circle Road underneath. Fourth, shift Liberty Road to the newly constructed half of the bridge and maintain one lane in each direction on Liberty Road while constructing the remaining half of the new bridge and New Circle Road underneath.

For the Young/Palumbo interchange, first construct the ramps and relocated Young Drive while maintaining traffic on the existing roads. Second, shift the New Circle Road traffic to the ramps with temporary paving to allow through traffic to cross Young/Palumbo from an off ramp to an on ramp. Third, construct the new bridge and New Circle Road. Fourth, shift New Circle Road traffic back to New Circle Road.

To construct the single point urban interchange at Richmond Road first shift New Circle Road traffic to the ramps with temporary paving to allow through traffic to cross Richmond Road from an off ramp to an on ramp. Second remove and replace the bridge over Richmond Road and construct the new portions of New Circle Road. Third, shift New Circle Road traffic back to New Circle Road. Finally construct the ramps and the changes to Richmond Road.

2.2.4 Maintenance of Traffic for Alternate 4

While constructing the at-grade portions of Alternate 4 traffic will be maintained without additional right of way. Drainage work will be completed first, along with any frontage roads and outside curb and gutter. Next, construct the outside lanes and intersection widening.

After shifting traffic to the outer two lanes on each side of New Circle Road, construct the median improvements

The bridge for the single point urban interchange at Newtown Pike will be constructed in two halves. Construct left turn fillets at the Newtown Pike end of the three right turn ramps that don't have them. Temporarily reroute the traffic from the three loops onto the right turn ramps. Newtown traffic will be maintained with one lane each direction over one of the existing bridges while half of the new bridge is built. Then traffic will be maintained with one lane each direction over the newly constructed side of the new bridge while the remaining side is constructed along with the portions of the new ramps inside of the old right turn ramps. Lastly tie the ends of the new ramps into New Circle Road under traffic.

The Lexmark bridge will be closed while it is replaced. New Circle Road traffic will be maintained on the existing road and stopped only for setting beams and moving equipment.

The bridge at Russell Cave, will be constructed in halves. First, temporarily widen New Circle Road on one side so that two lanes of traffic can be maintained in each direction while separated by a bituminous wedge curb and "Candy Canes." Second, construct the ramps and two thirds of the width of the roadway and bridges on the opposite side. Third, shift the New Circle Road traffic to the completed portion with two lanes in each direction and allow the exiting and entering traffic on the unfinished side to use portions of the temporary pavement while constructing the ramps on that side. Fourth, shift the exiting and entering traffic on the unfinished side to the newly finished ramps while constructing the remaining portions of the mainline roadway and bridge.

The relocation of N. Broadway can be constructed while maintaining traffic on existing roads. First the new railroad bridge that will cross over Broadway should be constructed along with the replacement of the other two railroad bridges. Second, construct the relocated portion of Broadway with New Circle Road traffic stopped only for setting beams and moving equipment. Third, construct the tie-ins to existing N. Broadway and Paris Pike under traffic. Finally continue New Circle Road construction the same as for an at-grade section.

2.3 Cost Estimate Summaries

Signalized Portion of New Circle Road
Alternative 1
Construction Cost Summary

Section #	Description	Length (mi.)	Construction Cost
1	Georgetown Road Interchange		$ 0
2	Newtown Pike Interchange	0.63	$ 3,310,000
3	Boardwalk/Colesbury	0.61	$ 8,530,000
4	Russell Cave Road	0.34	$ 4,130,000
5	Paris Pike/Broadway	0.34	$ 8,100,000
6	Limestone/Bryan Station	0.61	$ 6,765,000
7	Meadow to Winchester	1.29	$ 9,345,000
8	Winchester to Family Circle	0.72	$ 5,365,000
9	Liberty Road	0.45	$ 7,335,000
10	Young/Palumbo	0.40	$ 4,445,000
11	Woodhill Drive	0.34	$ 9,895,000
12	Richmond Road Interchange	___	$ 0
	Totals	**5.73**	**$ 67,220,000**

Signalized Portion of New Circle Road
Alternative 2
Construction Cost Summary

Section #	Description	Length (mi.)	Construction Cost
1	Georgetown Road Interchange		$ 0
2	Newtown Pike Interchange	0.63	$ 9,101,000
3	Boardwalk/Colesbury	0.61	$ 6,175,000
4	Russell Cave Road	0.34	$ 6,280,000
5	Paris Pike/Broadway	0.34	$ 8,875,000
6	Limestone/Bryan Station	0.61	$ 9,825,000
7	Meadow to Winchester	1.29	$ 13,895,000
8	Winchester to Family Circle	0.72	$ 7,950,000
9	Liberty Road	0.45	$ 6,765,000
10	Young/Palumbo	0.40	$ 9,890,000
11	Woodhill Drive	0.34	$ 3,115,000
12	Richmond Road Interchange	___	$ 0
	Totals	**5.73**	**$ 81,871,000**

Signalized Portion of New Circle Road
Alternative 3
Construction Cost Summary

Section #	Description	Length (mi.)	Construction Cost
1	Georgetown Road Interchange	0.63	$ 7,655,000
2	Newtown Pike Interchange	0.63	$ 15,610,000
3	Boardwalk/Colesbury	0.61	$ 16,075,000
4	Russell Cave Road	0.34	$ 13,845,000
5	Paris Pike/Broadway	0.34	$ 24,130,000
6	Limestone/Bryan Station	0.61	$ 5,565,000
7	Meadow to Winchester	1.29	$ 8,550,000
8	Winchester to Family Circle	0.72	$ 5,115,000
9	Liberty Road	0.45	$ 24,205,000
10	Young/Palumbo	0.40	$ 17,765,000
11	Woodhill Drive	0.34	$ 10,965,000
12	Richmond Road Interchange	0.63	$ 14,385,000
	Totals	**6.99**	**$ 163,865,000**

Signalized Portion of New Circle Road
Alternative 4
Construction Cost Summary

Section #	Description	Length (mi.)	Construction Cost
1	Georgetown Road Interchange		$ 0
2	Newtown Pike Interchange	0.63	$ 15,610,000
3	Boardwalk/Colesbury	0.61	$ 7,230,000
4	Russell Cave Road	0.34	$ 13,845,000
5	Paris Pike/Broadway	0.34	$ 24,130,000
6	Limestone/Bryan Station	0.61	$ 6,765,000
7	Meadow to Winchester	1.29	$ 8,550,000
8	Winchester to Family Circle	0.72	$ 5,115,000
9	Liberty Road	0.45	$ 7,335,000
10	Young/Palumbo	0.40	$ 4,445,000
11	Woodhill Drive	0.34	$ 3,115,000
12	Richmond Road Interchange	____	$ 0
	Totals	**5.73**	**$ 96,140,000**

2.4 Decision Matrixes

Decision Section 1 – Georgetown Road Interchange

	No-Build	Alternate 1	Alternate 2	Alternate 3	Alternate 4
Right of Way Cost ($ million)	$ 0	$ 0	$ 0	$ 0	$ 0
Utility Relocation Cost ($ million)	$ 0	$ 0	$ 0	$ 0.8	$ 0
Construction Cost ($ million)	$ 0	$ 0	$ 0	$ 6.9	$ 0
Total Cost ($ million)	$ 0	$ 0	$ 0	$ 7.7	$ 0
SB New Circle Road Ramp Delay (sec/veh)	198	-	-	30	-
NB New Circle Road Ramp Delay (sec/veh)	272	-	-	28	-
Georgetown Road Outbound Delay (sec/veh)	193	-	-	34	-
Georgetown Road Inbound Delay (sec/veh)	414	-	-	41	-
Business Relocations	0	0	0	0	0

Decision Section 2 – Newtown Pike Interchange

	No-Build	Alternate 1	Alternate 2	Alternate 3	Alternate 4
Right of Way Cost ($ million)	$ 0	$ 0	$ 0.1	$ 4.3	$ 4.3
Utility Relocation Cost ($ million)	$ 0	$ 0.5	$ 0.5	$ 0.9	$ 0.9
Construction Cost ($ million)	$ 0	$ 2.8	$ 8.5	$ 10.4	$ 10.4
Total Cost ($ million)	$ 0	$ 3.3	$ 9.1	$ 15.6	$ 15.6
SB New Circle Road Ramp Delay (sec/veh)	33	-	49	49	49
NB New Circle Road Ramp Delay (sec/veh)	168	-	42	42	42
Newtown Pike Outbound Delay (sec/veh)	34	-	38	38	38
Newtown Pike Inbound Delay (sec/veh)	709	-	28	28	28
Business Relocations	0	0	0	2	2

Decision Section 3 – Boardwalk/Colesbury

	No-Build	Alternate 1	Alternate 2	Alternate 3	Alternate 4
Right of Way Cost ($ million)	$ 0	$ 2.1	$ 0.7	$ 5.2	$ 2.1
Utility Relocation Cost ($ million)	$ 0	$ 0.7	$ 1.0	$ 0.8	$ 0.7
Construction Cost ($ million)	$ 0	$ 5.7	$ 4.5	$ 10.1	$ 4.4
Total Cost ($ million)	$ 0	$ 8.5	$ 6.2	$ 16.1	$ 7.2
SB New Circle Road Delay (sec/veh)	299	5	30	-	4
NB New Circle Road Delay (sec/veh)	28	12	10	-	5
Boardwalk/Colesbury Total Delay (sec/veh)	369	275	213	32	578
Business Relocations	0	0	0	3	0

Decision Section 4 – Russell Cave Road

	No-Build	Alternate 1	Alternate 2	Alternate 3	Alternate 4
Right of Way Cost ($ million)	$ 0	$ 0.8	$ 2.8	$ 5.1	$ 5.1
Utility Relocation Cost ($ million)	$ 0	$ 1.1	$ 1.1	$ 0.9	$ 0.9
Construction Cost ($ million)	$ 0	$ 2.2	$ 2.4	$ 7.8	$ 7.8
Total Cost ($ million)	$ 0	$ 4.1	$ 6.3	$ 13.8	$ 13.8
SB New Circle Road Delay (sec/veh)	251	157	92	-	-
NB New Circle Road Delay (sec/veh)	145	227	206	-	-
Russell Cave Road Total Delay (sec/veh)	371	208	558	121	57
Business Relocations	0	0	1	2	2

Decision Section 5 – Paris Pike/Broadway

	No-Build	Alternate 1	Alternate 2	Alternate 3	Alternate 4
Right of Way Cost ($ million)	$ 0	$ 1.8	$ 2.2	$ 4.8	$ 4.8
Utility Relocation Cost ($ million)	$ 0	$ 2.3	$ 2.2	$ 4.6	$ 4.6
Construction Cost ($ million)	$ 0	$ 4.0	$ 4.5	$ 14.7	$ 14.7
Total Cost ($ million)	$ 0	$ 8.1	$ 8.9	$ 24.1	$ 24.1
SB New Circle Road Delay (sec/veh)	150	53	30	18	18
NB New Circle Road Delay (sec/veh)	137	120	108	14	14
Broadway/Paris Pike Total Delay (sec/veh)	302	190	171	68	68
Residential Relocations	0	0	0	1	0
Business Relocations	0	1	1	1	1

Decision Section 6 – Limestone/Bryan Station

	No-Build	Alternate 1	Alternate 2	Alternate 3	Alternate 4
Right of Way Cost ($ million)	$ 0	$ 2.3	$ 4.8	$ 1.2	$ 2.3
Utility Relocation Cost ($ million)	$ 0	$ 1.5	$ 1.5	$ 1.4	$ 1.5
Construction Cost ($ million)	$ 0	$ 3.0	$ 3.5	$ 3.0	$ 3.0
Total Cost ($ million)	$ 0	$ 6.8	$ 9.8	$ 5.6	$ 6.8
SB New Circle Road Total Delay (sec/veh)	83	79	144	115	79
NB New Circle Road Total Delay (sec/veh)	401	197	90	168	197
Limestone/Old Paris Pike Total Delay (sec/veh)	371	437	252	346	437
Bryan Station Total Delay (sec/veh)	369	239	166	239	239
Business Relocations	0	0	3	0	0

Decision Section 7 – Meadow to Winchester

	No-Build	Alternate 1	Alternate 2	Alternate 3	Alternate 4
Right of Way Cost ($ million)	$ 0	$ 3.1	$ 5.1	$ 2.4	$ 2.4
Utility Relocation Cost ($ million)	$ 0	$ 1.6	$ 1.7	$ 1.5	$ 1.5
Construction Cost ($ million)	$ 0	$ 4.6	$ 7.1	$ 4.7	$ 4.7
Total Cost ($ million)	$ 0	$ 9.3	$ 13.9	$ 8.6	$ 8.6
SB New Circle Road Total Delay (sec/veh)	113	158	118	158	158
NB New Circle Road Total Delay (sec/veh)	695	220	97	220	220
Meadow Lane Total Delay (sec/veh)	317	47	114	47	47
Industry Road Total Delay (sec/veh)	116	121	95	121	121
Eastland Drive Total Delay (sec/veh)	278	170	146	170	170
Business Relocations	0	1	1	2	1

Decision Section 8 – Winchester to Family Circle

	No-Build	Alternate 1	Alternate 2	Alternate 3	Alternate 4
Right of Way Cost ($ million)	$ 0	$ 1.2	$ 2.8	$ 1.3	$ 1.3
Utility Relocation Cost ($ million)	$ 0	$ 1.6	$ 1.3	$ 1.2	$ 1.2
Construction Cost ($ million)	$ 0	$ 2.5	$ 3.9	$ 2.6	$ 2.6
Total Cost ($ million)	$ 0	$ 5.3	$ 8.0	$ 5.1	$ 5.1
SB New Circle Road Total Delay (sec/veh)	531	40	50	40	40
NB New Circle Road Total Delay (sec/veh)	23	38	37	38	38
Jingle Bell /Pridemore Total Delay (sec/veh)	267	56	67	56	56
Trade Center Delay (sec/veh)	174	130	43	130	130
Family Circle Delay (sec/veh)	200	16	36	16	16
Business Relocations	0	0	0	0	0

Decision Section 9 – Liberty Road

	No-Build	Alternate 1	Alternate 2	Alternate 3	Alternate 4
Right of Way Cost ($ million)	$ 0	$ 2.9	$ 2.3	$ 13.1	$ 2.9
Utility Relocation Cost ($ million)	$ 0	$ 1.7	$ 1.8	$ 2.2	$ 1.7
Construction Cost ($ million)	$ 0	$ 2.7	$ 2.7	$ 8.9	$ 2.7
Total Cost ($ million)	$ 0	$ 7.3	$ 6.8	$ 24.2	$ 7.3
SB New Circle Road Delay (sec/veh)	287	44	56	-	44
NB New Circle Road Delay (sec/veh)	158	79	27	-	60
Liberty Road Total Delay (sec/veh)	268	191	158	22	123
Residential Relocations	0	2	0	1	2
Business Relocations	0	0	1	3	0

Decision Section 10 – Young Drive/Palumbo Drive

	No-Build	Alternate 1	Alternate 2	Alternate 3	Alternate 4
Right of Way Cost ($ million)	$ 0	$ 0.1	$ 4.5	$ 7.7	$ 0.1
Utility Relocation Cost ($ million)	$ 0	$ 1.3	$ 1.4	$ 0.9	$ 1.3
Construction Cost ($ million)	$ 0	$ 3.0	$ 4.0	$ 9.2	$ 3.0
Total Cost ($ million)	$ 0	$ 4.4	$ 9.9	$ 17.8	$ 4.4
SB New Circle Road Delay (sec/veh)	300	38	23	-	38
NB New Circle Road Delay (sec/veh)	310	57	30	-	57
Young Dr./Palumbo Dr. Total Delay (sec/veh)	491	97	61	52	97
Business Relocations	0	0	2	2	0

Decision Section 11 – Woodhill Drive

	No-Build	Alternate 1	Alternate 2	Alternate 3	Alternate 4
Right of Way Cost ($ million)	$ 0	$ 4.7	$ 0.3	$ 1.3	$ 0.3
Utility Relocation Cost ($ million)	$ 0	$ 0.9	$ 0.8	$ 0.9	$ 0.8
Construction Cost ($ million)	$ 0	$ 4.3	$ 2.1	$ 8.8	$ 2.1
Total Cost ($ million)	$ 0	$ 9.9	$ 3.1	$ 11.0	$ 3.1
SB New Circle Road Delay (sec/veh)	59	8	67	-	67
NB New Circle Road Delay (sec/veh)	304	10	30	-	30
Woodhill Drive Total Delay (sec/veh)	235	-	149	-	149
Business Relocations	0	3	0	0	0

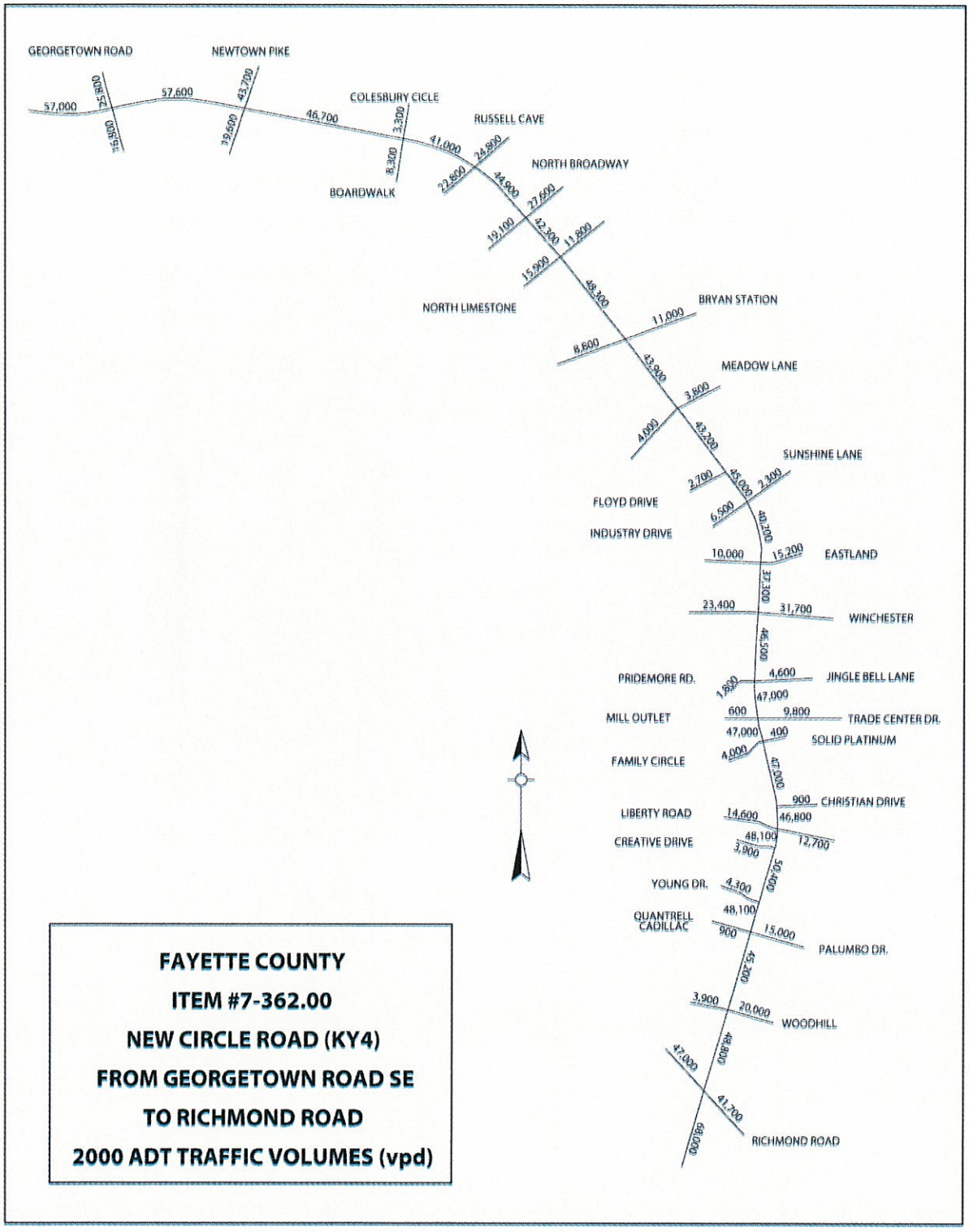
Decision Section 12 – Richmond Road Interchange

	No-Build	Alternate 1	Alternate 2	Alternate 3	Alternate 4
Right of Way Cost ($ million)	$ 0	$ 0	$ 0	$ 0.2	$ 0
Utility Relocation Cost ($ million)	$ 0	$ 0	$ 0	$ 2.6	$ 0
Construction Cost ($ million)	$ 0	$ 0	$ 0	$ 11.6	$ 0
Total Cost ($ million)	$ 0	$ 0	$ 0	$ 14.4	$ 0
SB New Circle Road Ramp Delay (sec/veh)	82	-	-	28	-
NB New Circle Road Ramp Delay (sec/veh)	300	-	-	31	-
Richmond Road Outbound Delay (sec/veh)	423	-	-	28	-
Richmond Road Inbound Delay (sec/veh)	110	-	-	19	-
Business Relocations	0	0	0	0	0

3.0 TRAFFIC ANALYSIS

3.1 Existing Traffic Volumes

Existing traffic volumes for the New Circle Road corridor were provided by the Kentucky Transportation Cabinet. The existing 2000 ADT are shown on the map below:



A travel time study of the existing corridor was performed during the PM Peak Hour in order to measure actual delay times. Two separate runs were made on two different days. On the first day, the travel time study began at 5:00 PM at the Georgetown Road Interchange and measured the southbound traffic travel time. At 5:30 PM, the travel time study measured the northbound travel time beginning at the Richmond Road Interchange. The following day the directions were reversed. Below is a table showing the overall results of the travel time study.

Beginning Intersection	Start Time	Travel Time (min)
Georgetown Road traveling SB	5:00 PM	16.73
Georgetown Road traveling SB	5:30 PM	22.12
Richmond Road traveling NB	5:00 PM	14.0
Richmond Road traveling NB	5:30 PM	20.55

For both directions, there was an approximate five-minute increase in travel time between the 5:00 PM and 5:30 PM start time. This indicates that the amount of traffic on New Circle Road increases as the peak hour progresses.

The average travel times between the two runs within each section are shown below.

Section	Direction	Average Travel Time (min)	Length (miles)	Avg. Speed (mph)
Georgetown Road to Russell Cave Road	SB	5.8	1.3	13.5
Russell Cave Road to Bryan Station	SB	4.1	1.0	14.6
Bryan Station to Liberty Road	SB	6.0	2.3	23.1
Liberty Road to Richmond Road	SB	3.6	1.2	20.0
Richmond Road to Liberty Road	NB	4.6	1.2	15.7
Liberty Road to Bryan Station	NB	5.3	2.3	26.2
Bryan Station to Russell Cave Road	NB	4.4	1.0	13.6
Russell Cave Road to Georgetown Road	NB	3	1.3	26

It is important to note that these travel times are measured from the moment that the vehicle passes through an intersection until it passes through the last intersection. Therefore, the 26 mph speed measured on the NB Russell Cave Road to Georgetown Road section only contains one signalized

intersection, Boardwalk. Excluding this section, the average speed on Sections 1, 2, and 4 is approximately 15 mph. The average speed in Section #3, Bryan Station Road to Liberty Road, is approximately 25 mph. The two intersections with the highest travel time measured were Broadway and Liberty Road. The average time for both directions to travel from the previous intersection through the Broadway intersection was approximately 2.5 minutes. The Liberty Road intersection was slightly higher at 2 minutes and 42 seconds.

The travel time study was used to calibrate the existing CORSIM model. The travel time given by the CORSIM model for the southbound direction was 24.22 minutes as opposed to 22 minutes actual time. For the northbound direction, the CORSIM model gave a travel time of 18.10 minutes as opposed to 20.55 minutes actual. The travel times given by the CORSIM model and the actual field measured travel times varied by approximately 10% for both directions of travel. The times given by the CORSIM model are based on an hourly average so will vary slightly with actual field test taken in the middle of the peak hour. Results at individual intersections varied by different percentages but overall the results given by the CORSIM model closely matched the field measured travel times.

Of the 24 minutes of travel time measured with the CORSIM model, approximately 18 minutes was spent in delay time for the southbound direction. For the northbound direction, approximately 13 minutes of the to 18 minutes was spent in delay time. Delay time constituted for 70 to 75 percent of the total travel on New Circle Road. The PM Peak New Circle Road delay times and the overall intersection delay times for the existing conditions are shown below:

Intersection	Average New Circle Delay (sec/veh)	Intersection Delay (sec/veh)	LOS
Boardwalk/Colesbury Circle	117.5	162.1	F
Russell Cave Road	76.1	139.8	F
North Broadway	29.1	126	F
North Limestone/Old Paris Road	93.9	116.9	F
Bryan Station Road	64	77.7	E
Meadow Lane	28.2	32.6	C
Floyd Drive	5.3	31.9	C
Industry Road/Sunshine Lane	12.9	18.8	B
Eastland Drive	60.6	82.2	F
Pridemore Road/Jingle Bell Lane	12.4	16.9	B
Mill Outlet/Trade Center Drive	43.3	48.7	D
Family Circle/Solid Platinum	19.7	23.4	C
Christian Drive	4	4.2	A
Liberty Drive	29.2	77.3	E
Young Drive	51.7	65.5	E
Quantrell Cadillac/Palumbo Drive	50.9	57.8	E
Woodhill Drive	25.8	90.8	F

From the existing analysis, the section between Boardwalk and Bryan Station Road is operating at Level of Services E and F and experiencing high delays. The middle section between Bryan Station Road is operating at acceptable Levels of Service expect for Eastland Drive. The section from Liberty Road to Woodhill Drive also experiences high delays.

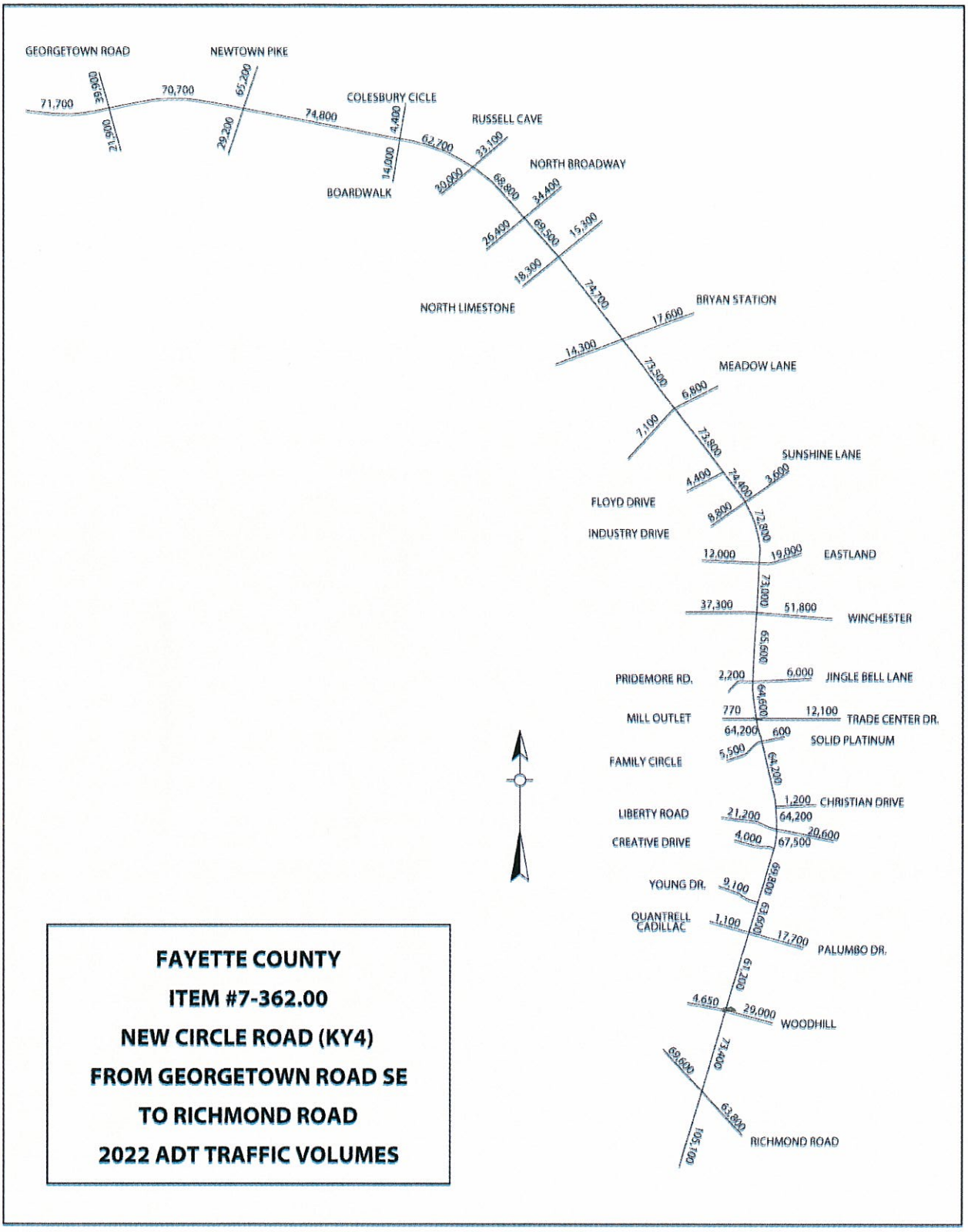
The section from Boardwalk to Bryan Station Road contains some high volumes intersections such as Russell Cave Road and Broadway, both of which have existing ADT's over 20,000 vpd. Also, with Boardwalk being the first signalized intersection on the north end, there is congestion due to vehicles leaving a 55 mph section and entering an urbanized section. The Bryan Station Road intersection has inadequate left turn storage on New Circle Road for traffic turning onto Bryan Station Road traveling east.

The middle section of the roadway from Bryan Station Road to Liberty Road does not contain many major through streets, except Winchester Road, which is elevated over New Circle Road. Also, much of this section from Industry Road to Trade Center has been widened to six lanes. The widening does cause some problems near Trade Center Drive for southbound New Circle Road traffic trying to merge back into two lanes. Eastland Drive is the only at grade intersection in this section with an ADT of over 10,000 vehicles. The Eastland Drive and New Circle Road intersection does operate at a Level of Service F. This is mainly due to the high number of left turns from New Circle onto Eastland Drive. The Eastland Drive left turn also now accommodates U-turns from vehicles accessing businesses between Industry Drive and Eastland Drive. The U-turn traffic has added to the delay on the left turn lane and also poses a safety concern for a number of vehicles turning right on red from Eastland Drive onto New Circle Road.

The section of Liberty Road to Richmond Road also contains heavy volumes on the cross streets. Existing traffic volumes on Liberty Drive, Palumbo Drive, and Woodhill Drive vary from 12,000 to 20,000 vpd. Traffic begins to get backed up at the Liberty Road intersection and remains backed up to Palumbo Drive. There are approximately 500 vehicles attempting to turn left off of New Circle Road onto Palumbo. Palumbo Drive serves as a cut through for traffic wanting to access Man O War. Palumbo has a single left turn lane that is short due to Young Drive being located approximately 700 feet to the north. The left turn traffic backs up out of the left turn lane and interferes with through traffic and the Young Drive intersection. The back up due to Palumbo Drive backs up past the railroad underpass and reaches to Creative Drive. This problem escalated the delay experienced at the Liberty Road intersection. Due to delays on Liberty Road at the New Circle Road intersection, a number of vehicles on Liberty Road wanting to access southbound New Circle Road use Creative Drive to travel southbound on New Circle Road. These vehicles join the queue from the Palumbo Drive intersection leaving little area for the vehicles that have just cleared the Liberty Road intersection. Due to this, the Liberty Road intersection becomes blocked and delays are increased. Approximately 600 vehicles turning left out of Woodhill Drive onto New Circle Road complicate the Woodhill Drive intersection.

3.2 Future Traffic Volumes

Future traffic volumes for the New Circle Road corridor were estimated using the LFUCG travel-forecasting model. The LFUCG planning department supplied 2025 traffic assignments for the New Circle Road corridor. The LFUCG traffic model divides the city of Lexington and the surrounding area into a number of traffic analysis zones. Each zone has a population and employment characteristic that convert to trip end productions and attractions. By using these zones, the model can generate trips for the entire urban area network. The traffic model is based on the projected land use for Fayette County. The LFUCG Comprehensive land use plan was updated for the year 2000. The model also makes assumptions for external trips and growth in surrounding counties. The LFUCG traffic model includes proposed roadways within the county that are expected to be completed by the year 2025. For example, the model assumes that Citation Boulevard will be completed to Russell Cave Road. The LFUCG traffic model generated trips based on a daily basis, not a peak hour basis. Based on the 2025 estimates, traffic for the year 2022 was estimated and used for this analysis. The 2022 traffic volumes for New Circle Road are shown below.



Future traffic volumes on New Circle Road range from 60,000 to 75,000 vehicles per day. Traffic estimates for the New Circle Road south of Richmond Road are over 100,000 vpd. Based on the LFUCG 2025 traffic model, the growth factor for traffic on New Circle Road ranges from 1.0% to 3.0% per year. A comparison of the growth on the major cross streets is shown below:

Intersection	2000 ADT Inside NC	2000 ADT Outside NC	2022 ADT Inside NC	2022 ADT Outside NC	Growth West	Growth East
Georgetown	16,800	25,800	21,900	39,900	1.21%	1.98%
Newtown	19,600	43,700	29,200	65,200	1.81%	1.82%
Boardwalk	8,300	-	14,000	-	2.38%	-
Russell Cave	22,800	24,800	30,000	33,100	1.25%	1.31%
Broadway	19,100	27,600	26,400	34,400	1.47%	1.00%
Limestone	15,900	11,800	18,300	15,300	0.64%	1.18%
Bryan Station	8,800	11,000	14,300	17,600	2.21%	2.14%
Meadow	4,000	3,800	7,100	6,800	2.61%	2.65%
Industry	6,500	-	8,800	-	1.38%	-
Eastland	10,000	15,200	12,000	19,000	0.83%	1.01%
Winchester	23,400	31,700	37,300	51,800	2.12%	2.23%
Trade Center	-	9,800	-	12,100	-	0.96%
Liberty	14,600	12,700	21,200	20,600	1.70%	2.20%
Young	4,300	-	9,100	-	3.41%	-
Palumbo	-	15,000	-	17,700	-	0.75%
Woodhill	-	20,000	-	29,000	-	1.69%
Richmond	47,000	41,700	69,600	63,800	1.78%	1.93%

Within the proposed corridor, the main areas of concern with regards to traffic growth are along the Newtown Pike corridor, the Winchester Road corridor and the Richmond Road corridor. The traffic on all three of these of these corridors will exceed 50,000 vpd in the year 2022. Volumes on Newtown Pike and Richmond Road are expected to approach 65,000 vehicles per day. Georgetown Road is expected to approach 40,000 vpd in 2022. Both Broadway and Russell Cave Road will approach volumes of nearly 35,000 vpd. With the anticipated traffic growth on New Circle Road and the cross streets in the next twenty years, traffic congestion on New Circle Road will continue to worsen without improvements. The results of the traffic analysis for the no build alternate for the future traffic is presented in Section 2.4.

3.3 Traffic Modeling Procedure

In order to analyze the New Circle Road corridor alternates, a traffic simulation model, CORSIM was chosen. The CORSIM model has the ability to simulate an urban arterial and develop a series of measures of effectiveness for the entire arterial, as well as each intersection within the arterial. By producing these measures of effectiveness, it is possible to evaluate the performance of a roadway and also compare different alternates for improvement. The simulation is based on random numbers that generate driver characteristics such as gap acceptance, car following patterns, and lane changing. The CORSIM model also generates ten different driver types to simulate a variety of drivers. The CORSIM model simulates road networks based on actual field conditions such as lane geometry, signal timing, and traffic volumes.

Due to the spacing and number of intersections along the New Circle Road corridor, a standard Highway Capacity analysis is not applicable. A Highway Capacity analysis only has the ability to analyze a single intersection and cannot account for the impacts of surrounding intersections due to progression or backups at surrounding intersections.

For the design year 2022, five different alternates were simulated. The four alternates are the no-build alternate, six lane alternate, eight lane alternate, limited access alternate, and the focus group alternate, which is a combination of the first three build alternates. The alternates are described in detail in Section 2.0. The PM Peak analysis was chosen for analysis since this represents the worst time period with regard to traffic volumes. Travel time and delay will be used to compare the alternates. For each alternate, the signal timings were retimed and coordinated with one another. This analysis, and the alternates presented, deals primarily with the traffic on New Circle Road. Basic intersection improvements are provided with the alternates on the crossroads. The signals have been timed to maximize progression and give priority to New Circle Road traffic.

3.4 Traffic Modeling Results

For the purposes of quantifying the traffic results, the project has been broken into twelve decision sections. The twelve sections are shown below:

1. Georgetown Road Interchange
2. Newtown Pike Interchange
3. Newtown Pike to Russell Cave
4. Russell Cave Road Intersection
5. Broadway Intersection
6. Broadway to Bryan Station
7. Bryan Station to Winchester Road
8. Winchester Road to Liberty Road
9. Liberty Road Intersection
10. Liberty Road to Palumbo
11. Woodhill Drive Intersection
12. Richmond Road Interchange

The overall travel times for the no build, the three original build alternates, and Alternate #4 are shown below:

Direction	No Build Travel Time (min)	Alternate #1 Travel Time (min)	Alternate#2 Travel Time (min)	Alternate #3 Travel Time (min)	Alternate #4 Travel Time (min)
Southbound	55.7	22.2	22.3	18.8	20.4
Northbound	52.2	29.4	24.2	18.0	19.4

The no build alternate experiences extremely high travel times. With only two lanes in each direction, New Circle Road will exceed capacity by the year 2022. With the no build alternate, the future traffic volumes exceed capacity at the intersections and vehicles simply cannot access New Circle Road. Traffic volumes that were recorded by CORSIM as actually passing through an intersection for the no build alternate were 1,000 to 1,500 vehicles less than projected traffic volumes. Vehicles are waiting on the major crossroads and simply cannot access New Circle Road.

For the PM Peak period, it is estimated that the traffic on New Circle Road in each direction will exceed 4,000 vehicles in some locations. Saturation flow rate for a signalized intersection is

approximately 2,000 passenger cars per hour of green time per lane. If a movement had 60 minutes of green time, then 2,000 vehicles per lane could pass through the intersection. With the existing four lane typical, New Circle Road traffic would need the entire amount of green in order to accommodate the through traffic. With the signal timing, the capacity on New Circle Road is approximately 1,200 to 1,300 vehicles per lane. For this reason, the models of the build alternates pass more traffic volume than the no build alternate. This is evident for the northbound traffic at the Newtown Pike Interchange. Alternate #1 is simulating approximately 1,000 more vehicles during the peak hour than the no build alternate.

Future traffic projections predict the number of vehicles wanting to travel on a given road. Because of congestion at the busiest intersections, traffic flow is restricted from reaching some of the internal intersections near the middle of the project. Therefore, the number of vehicles per hour reaching some intersections will be less then the number wanting to travel that route. With relatively small volumes on some of these crossroads, the intersection operates with little delay in the no build scenario. Alternate #1 is experiencing a longer travel time than the no build alternate in some instances, because it is passing more vehicles. All of the build alternates can pass the projected traffic volume. The additional volume passed by the build alternates increases the travel time in some of the sections.

The travel time for each of the four focus groups is shown below:

Section and Direction	No Build Travel Time (min)	Alternate #1 Travel Time (min)	Alternate#2 Travel Time (min)	Alternate #3 Travel Time (min)	Alternate #4 Travel Time (min)
Georgetown – Russell Cave Southbound	22.05	5.01	5.10	3.52	3.52
Russell Cave to Bryan Station Southbound	4.26	4.89	5.15	4.36	4.36
Bryan Station to Liberty Road Southbound	20.89	8.75	8.19	8.65	8.76
Liberty Road to Richmond Road Southbound	8.50	3.61	3.83	2.27	3.72
Richmond Road to Liberty Road Northbound	15.81	5.67	3.75	2.09	3.77
Liberty Road to Bryan Station Northbound	20.28	9.19	6.85	8.72	8.72
Bryan Station to Russell Cave Northbound	12.63	8.73	9.75	4.32	4.32
Russell Cave to Georgetown Northbound	3.25	5.89	3.79	3.02	2.63

The overall travel time from Alternate #1 and Alternate #2 are approximately equal. Alternate #1 does experience more delay on the northbound, mainly due to the Newtown Pike Interchange alternate and some of the internal signalized intersections. When no other improvements were made to an intersection rather than widening and adding additional turn lanes, the eight lane alternate appeared to function better for New Circle Road traffic. Alternate #3 produces the shortest travel times. Alternate #4 produces travel times similar to Alternate #3 but produces higher travel times in the section from Liberty Road to Richmond Road due to signalized intersections remaining in this section.

Alternate #1 reduces the number of signalized intersections form 15 to 11. Alternate #2 eliminates the signalized intersection at Young Drive. Alternate #3 reduces the signalized intersections from 15 to 6. Eliminating a signalized intersection greatly improves the operation of through traffic. Delay is not only experienced by stopping at an intersection, but is also added by deceleration and acceleration that occurs before and after a signal. Eliminating signals help reduce the stop and go traffic, and therefore improves traffic flow. Alternate #4 reduces the number of signalized intersections from 15 to 10.

Georgetown Road Interchange

Alternate # 3 in the only alternate that affects the Georgetown Road Interchange. Alternate #3 replaces the existing diamond interchange with a single point diamond interchange. Due to the expected growth along Georgetown Road outside of New Circle Road, there are over 1,000 vehicles during the peak hour in both directions of New Circle Road that exit New Circle and travel northbound out Georgetown Road. With the existing diamond interchange, the heavy left turn movement from southbound New Circle must travel through two signals. With the single point urban interchange, the left turn will only travel through one intersection, which will reduce delay times on Georgetown Road. The average delay times for the Georgetown Road no build and the single point urban interchange are shown below:

Georgetown Road Interchange

	No Build Avg. Delay (sec/veh)	Single Point Avg. Delay (sec/veh)
NB Off Ramp Left	272.4	28.1
SB Off Ramp Left	198.1	29.3
Through Outbound	192.7	33.8
Through Inbound	414.4	41.1

Newtown Pike Interchange

The Newtown Pike Interchange contains two very heavy movements that create problems within the interchange. The left turn from southbound Newtown Pike to eastbound New Circle has a volume of 1,480 vehicles per hour. The existing left turn lane for this movement has a short storage length of 250 feet. The right turn from westbound New Circle Road to northbound Newtown Pike has a volume of 1,670 vehicles per hour. The existing interchange contains loops and weaving movement that cause problems also. The major weaving movement is on Newtown Pike where 1,550 vehicles exiting New Circle westbound to northbound Newtown Pike weave with 640 vehicles attempting to access westbound New Circle from northbound Newtown Pike. This move is complicated by the traffic signal at Newtown Court approximately 300 feet fro the exit ramp and the 1,670 vehicles exiting New Circle westbound traveling northbound. The right turn from southbound Newtown Pike has a volume of 1,050 vehicles per hour but does not interfere greatly with the operation of the interchange due to the free flow lane onto the ramp.

Due to capacity problems with the no build model, the Newtown Pike Interchange alternatives were modeled as an isolated interchange. There are two build alternates for the Newtown Pike Interchange. The first alternate involves the removal of the northeast loop. The second involves the reconstruction of the interchange as a single point urban interchange.

In the existing condition, the left turn from southbound Newtown Pike to eastbound New Circle is operating well over capacity. The delay time for all the southbound vehicles is approximately 160 seconds per vehicle. The short left turn lane backs up and blocks the through traffic, preventing them form proceeding through the intersection. The 1,480 vehicles attempting to make this left turn must yield to approximately 1,300 through vehicles on that section of Newtown Pike. The off ramps from New Circle onto Newton northbound also experience heavy delays due to weaving movements.

In Alternate #1, the removal of the northeast loop and reconstruction of the westbound exit ramp to northbound Newtown Pike does remove the weaving movement for the 1,550 vehicles from eastbound New Circle. This alternate does not address the left turn form southbound Newtown Pike to New Circle Road. This alternate is also still greatly affected by the signal at Newtown Court. The 1,670 vehicles from northbound New Circle are still trying to merge with 2,200 vehicle on Newtown Pike. The delay on the ramp is approximately 140 veh/sec.

With the high turn volumes at the Newtown Pike/New Circle Road Interchange, the existing free flow intersection will not function in the future. A signal will need to be added in order to accommodate the turning movements. With the single point urban interchange, the interchange does function. The 1,480 vehicles turning left from Newtown southbound onto New Circle does require a large amount of green time. However, when this movement does have the green arrow, the 1,670 vehicles from the New Circle Road northbound exit can free flow onto Newtown Pike northbound. Enough green time must also be given to the New Circle Road southbound left turn, 1,550 vehicles, in order to avoid backup on New Circle Road. The through movement on Newtown Pike is relatively minor when compared to the turns. The average delay times for the no build and the single point urban interchange are shown below:

Newtown Pike Interchange

	No Build Avg. Delay (sec/veh)	Single Point Avg. Delay (sec/veh)
NB Off Ramp Right	167.6	42.1
SB Off Ramp Left	33.4	49.3
Through Outbound	34.4	38.2
Through Inbound	709.4	28.4

Due to the heavy traffic volumes and the large number of trucks on Newtown Pike, Newtown Pike should be widened to at least six lanes. Also, consideration to removing the signal at Newtown Court or rerouting that traffic should be given. This will improve the flow of Newtown Pike and the interchange.

Newtown Pike to Russell Cave

The section of New Circle Road between Newtown Pike and Russell Cave Road primarily contains the Boardwalk intersection. With the addition of Wal-Mart off of Boardwalk, the left turn movement from Boardwalk to New Circle Road is a heavy movement. Over 800 vehicles are expected to make this left turn in 2022. The delay times for the Boardwalk intersection are shown below:

Boardwalk/Colesbury Circle

Alternate	**SB New Circle Delay (sec/veh)**	**NB New Circle Delay (sec/veh)**	**Boardwalk Delay (sec/veh)**	**Colesbury Circle Delay (sec/veh)**
No Build Alt.	298.96	27.89	148.53	215.79
Alternate #1	4.9	12.15	239.91	35.28
Alternate #2	30.34	10.15	155.65	57.15
Alternate #3	-	-	21.52	10.55
Alternate #4	*3.5*	*5.2*	*239.91*	*337.86*

The elimination of the signal at Boardwalk in Alternate #1 allows the New Circle Road traffic to move through the intersection with little delay. However, because of the limited access facility upstream from Boardwalk, there are not adequate gaps provided in the traffic stream for vehicles to turn right out of the intersection. The delay experienced by the Boardwalk traffic has been increased by approximately 100 sec/veh. Vehicles wanting to turn left onto Boardwalk that must now U-turn past the intersection also are experiencing delays due to the lack of adequate gaps in the oncoming traffic stream. The U-turn movement backs up out of the median and blocks through traffic. The U-turn located between Boardwalk and Russell Cave Road does function adequately with little delay or backup.

Both Alternate #1 and Alternate #2 eliminate much of the delay at the Boardwalk intersection. The northbound movement through the Broadway intersection is metered by the Russell Cave Road intersection for all the alternates except the limited access alternate. This reduces much of the delay for this movement. With Alternate #3, the delay on New Circle with the removal of traffic control is minimal. The delay on Boardwalk is also reduced significantly with the removal of the New Circle Road traffic.

In Alternate #4, the signal is removed at Boardwalk and the left turn from Boardwalk is moved to the Russell Cave Road Interchange through an existing road behind Wal-Mart. This additional 835 left turning vehicles at the Russell Cave Road Interchange will require a dual left lane onto New Circle Road. Due to the absence of upstream signals on both ends of Boardwalk, right turns out onto New Circle Road will become more difficult, increasing delay on Boardwalk and Colesbury. However, in reality, a majority of the vehicles will travel to the Russell Cave Road Interchange to turn right onto New Circle Road. A frontage road is planned with Alternate #4 on the north side of New Circle Road that will allow Colesbury traffic to access Russell Cave Road.

Russell Cave Road Intersection

The Russell Cave Road intersection experiences heavy delays with the no-build alternate due to a high number of left turns from New Circle onto Russell Cave in both directions. Russell Cave Road also has a heavy through movement. The delay times for the Russell Cave Road intersection are shown below.

Russell Cave Road

Alternate	**SB New Circle Delay (sec/veh)**	**NB New Circle Delay (sec/veh)**	**Russell Cave Inside Delay (sec/veh)**	**Russell Cave Outside Delay (sec/veh)**
No Build Alt.	250.72	144.43	202.37	168.73
Alternate #1	157.30	227.07	127.50	80.44
Alternate #2	92.0	206.47	245.71	312.22
Alternate #3	-	-	101.83	18.73
Alternate #4	-	-	*20.6*	*36.2*

The jug handle alternate presented in Alternate #2 does perform better than Alternate #1, particularly in the southbound direction. However, backup does occur on New Circle Road northbound creating some delay. From New Circle Road northbound, 1,200 vehicles travel on the jug handle and want to access Russell Cave Road. This places a strain on the jug handle and Russell Cave Road. The delay time for vehicles using the jug handle from northbound New Circle is over 400 veh/sec. Adequate time must be given to the jug handle movement on Russell Cave Road in order to minimize the backup. This increases the delay time on Russell Cave Road. Due to the short distance between

signals on Russell Cave Road and the long cycle length on New Circle Road, timing of the three signalized intersections along Russell Cave Road becomes very complicated.

In Alternate #4, a dual left turn lanes onto New Circle Road at the interchange have reduced the delay time on Russell Cave Road itself over Alternate #3. The dual left turns lanes are required due to the addition of the left turns from the Boardwalk intersection.

Broadway Intersection

In the case of the Broadway intersection, the six-lane alternate experiences approximately the same delay as the no build alternate does. However, the six-lane alternate does increase the capacity of the intersection and allow more vehicles to pass through the intersection. The limited access alternate, which includes the relocation of Broadway, performs the best of all the alternates. The delay times for the Broadway intersection are shown below.

Broadway

Alternate	**SB New Circle Delay (sec/veh)**	**NB New Circle Delay (sec/veh)**	**Broadway Inside Delay (sec/veh)**	**Broadway Outside Delay (sec/veh)**
No Build Alt.	149.51	137.46	145.77	156.72
Alternate #1	53.17	120.34	110.29	79.65
Alternate #2	30.48	108.44	65.88	105.57
Alternate #3	17.90	13.93	59.65	8.0
Alternate #4	*17.90*	*13.93*	*59.65*	*8.0*

In Alternate #4, a signal was kept at Broadway in order to help the right turn exit. With the limited access facility upstream of the intersection, the right turn movement does not receive adequate gaps and cannot exit Broadway. A short greet time can be given to the Broadway movement in order for them to enter New Circle Road. For relocated Broadway, two new signalized intersections were added with Alternate #4. For the northbound Broadway traffic, the total delay time at these two intersections is 13.30 sec/veh. For the southbound Broadway traffic, the total delay time of 46.01 sec/veh. The relocation of Broadway greatly improves the operation of the Broadway intersection. The delay experienced by the intersection is essentially split into three intersections, the one on New

Circle and the two on Broadway. The turning traffic volume is also divided between the three intersections improving the operation.

Broadway to Bryan Station Road

The section between Broadway and Bryan Station contains the intersection of N. Limestone/Old Paris Pike and Bran Station Road. The delay for the two intersections are shown below:

N. Limestone/Old Paris

Alternate	**SB New Circle Delay (sec/veh)**	**NB New Circle Delay (sec/veh)**	**N. Limestone Delay (sec/veh)**	**Old Paris Pike Delay (sec/veh)**
No Build Alt.	52.09	198.13	110.80	259.83
Alternate #1	38.47	58.80	145.81	290.80
Alternate #2	45.08	69.26	99.23	153.14
Alternate #3	74.0	29.48	131.03	215.03
Alternate #4	*74.0*	*29.48*	*131.03*	*215.03*

Bryan Station

Alternate	**SB New Circle Delay (sec/veh)**	**NB New Circle Delay (sec/veh)**	**Bryan Station Inside Delay (sec/veh)**	**Bryan Station Outside Delay (sec/veh)**
No Build Alt.	31.13	203.14	239.07	129.95
Alternate #1	40.51	138.35	183.41	55.26
Alternate #2	98.43	20.72	92.51	73.36
Alternate #4	*40.51*	*138.35*	*183.41*	*55.26*

The removal of left turns from New Circle Road does decrease the delay time on New Circle Road slightly. The U-turn movement performs well until backup from the Broadway intersection interferes with the ability to access the median U-turn. Backup from the Broadway intersection also interferes with the operation of the Limestone signal. The extra green time given to the New Circle Road through movement places a greater demand on the Broadway intersection. In Alternate #4, the delay at the Broadway intersection for the northbound traffic is eliminated resulting in less delay time for the N. Limestone northbound movement. For the southbound direction, the removal of the

delay at the Broadway intersection places a greater demand on the N. Limestone intersection, resulting in more delay and backup. Due to this, left turns were placed back in the intersection for Alternate #4. The median U-turn north of the intersection could not function properly due to the backup and lack of gaps from the Broadway intersection. Dual left turn lanes were modeled in order to reduce delay.

The Bryan Station intersection is helped by the addition of dual left turn lanes on New Circle Road with the build alternatives. In general, the eight-lane alternate performs better than the six-lane alternate. Some additional delay is experienced for the southbound New Circle Road movement however.

Bryan Station to Winchester Road

The section from Bryan Station to Winchester Road contains the signalized intersections of Meadow Lane, Industry Road, and Eastland Drive. The delay times for each intersection are shown below.

Meadow Lane

Alternate	**SB New Circle Delay (sec/veh)**	**NB New Circle Delay (sec/veh)**	**Meadow Lane Inside Delay (sec/veh)**	**Meadow Lane Outside Delay (sec/veh)**
No Build Alt.	26.01	37.25	225.17	91.80
Alternate #1	16.07	73.93	26.62	20.22
Alternate #2	39.02	37.11	55.84	58.60
Alternate #4	*16.07*	*73.93*	*26.62*	*20.22*

Industry Road

Alternate	**SB New Circle Delay (sec/veh)**	**NB New Circle Delay (sec/veh)**	**Industry Road Station Inside Delay (sec/veh)**	**Industry Road Outside Delay (sec/veh)**
No Build Alt.	19.06	304.56	60.40	55.96
Alternate #1	60.68	94.01	65.89	55.44
Alternate #2	10.17	9.43	47.82	46.85
Alternate #4	*60.68*	*94.01*	*65.89*	*55.44*

Eastland Drive

Alternate	SB New Circle Delay (sec/veh)	NB New Circle Delay (sec/veh)	Eastland Drive Inside Delay (sec/veh)	Eastland Drive Outside Delay (sec/veh)
No Build Alt.	67.65	353.52	85.98	192.32
Alternate #1	81.16	52.01	95.09	75.39
Alternate #2	68.52	50.37	72.09	74.12
Alternate #4	*81.16*	*52.01*	*95.09*	*75.39*

The operation of the northbound New Circle Road movement at Meadow Lane is affected by the Bryan Station Road intersection. The Bryan Station Road intersection also affects the performance of the median U-turn operation north of Meadow Lane. The U-turn south of Meadow Lane does function properly. The right in right out operation in Alternate #1 on Meadow Lane has reduced the delay at the intersection approach. There are adequate gaps available for vehicles to turn right out of Meadow Lane. The no build alternate appears to perform better than it actually will do to the lack of volume that cannot access New Circle at the major crossroads. In the central portion, there are not a lot of major crossroads. It is important to not that this analysis deals with 2022 volumes. The backup from the Bryan Station intersection that is interfering with the Meadow Lane intersection will not occur until the future. The median U-turn does function properly without the backup. The elimination of right turns on red at the Bryan Station intersection would create more gaps for vehicles U-turning in the median north of Meadow Lane.

In Alternate #1, the Industry Road intersection is handling an additional 235 vehicles in the left turn from Floyd Drive, causing some additional delay for the southbound movement. For the northbound movement at both the Industry Road and Eastland Drive Intersection, delay is experienced due to the large number of vehicle coming from Winchester Road. There are an estimated 1,900 vehicles from Winchester Road accessing New Circle Road northbound.

Winchester Road to Liberty Road

The section of Winchester Road to Liberty Road contains the intersections of Jingle Bell/Pridemore Court, Trade Center Drive, and Family Circle. Christian Drive is also located in this section but is more related with the Liberty Road intersection. The delays for these intersections are shown below:

Jingle Bell/Pridemore (Includes Winchester Road Ramp)

Alternate	**SB New Circle Delay (sec/veh)**	**NB New Circle Delay (sec/veh)**	**Pridemore Ct. Inside Delay (sec/veh)**	**Jingle Bell Outside Delay (sec/veh)**
No Build Alt.	289.58	5.55	149.7	117.69
Alternate #1	5.88	6.13	9.15	46.79
Alternate #2	22.01	11.12	25.69	40.99
Alternate #4	*5.88*	*6.13*	*9.15*	*46.79*

Trade Center

Alternate	**SB New Circle Delay (sec/veh)**	**NB New Circle Delay (sec/veh)**	**Trade Center Inside Delay (sec/veh)**	**Trade Center Outside Delay (sec/veh)**
No Build Alt.	187.53	7.50	-	174.01
Alternate #1	30.90	26.70	-	129.74
Alternate #2	23.12	11.22	-	43.35
Alternate #4	*30.90*	*26.70*	-	*129.74*

Family Circle

Alternate	**SB New Circle Delay (sec/veh)**	**NB New Circle Delay (sec/veh)**	**Family Circle Inside Delay (sec/veh)**	**Family Circle Outside Delay (sec/veh)**
No Build Alt.	53.66	10.08	200.01	-
Alternate #1	2.81	5.45	16.32	-
Alternate #2	4.86	15.00	36.08	-
Alternate #4	*2.81*	*5.45*	*16.32*	-

The no build alternate through this section experiences heavy delays southbound due to the lane drop at Trade Center Drive. The backup from Trade Center affects the operation of the Winchester Road entrance ramp onto southbound New Circle and creates delay for the ramp and through traffic. Both build alternates alleviate this situation and reduce delay. For the northbound no build, again there is a lack of volume in this section due to capacity problems at Liberty Road, Palumbo Drive, and Woodhill Drive. The traffic volumes reported by CORSIM are approximately1,500 less than projected, causing the intersections to operated with an acceptable delay. Eliminating the signals at Jingle Bell and Family Circle has reduced the delay at these intersections and also allowed the crossroads to operate at an acceptable delay. Some delay was added to Trade Center due to additional left turns/U-turns.

Liberty Road Intersection

The Liberty Road intersection experiences high turning movement in all directions and also contains relatively high through movements on Liberty Road. The delay times for Liberty Road are shown below:

Liberty Road

Alternate	**SB New Circle Delay (sec/veh)**	**NB New Circle Delay (sec/veh)**	**Liberty Road Inside Delay (sec/veh)**	**Liberty Road Outside Delay (sec/veh)**
No Build Alt.	286.88	157.65	144.45	123.69
Alternate #1	43.77	79.47	116.88	73.62
Alternate #2	55.66	26.76	106.83	51.60
Alternate #3	-	-	15.70	6.32
Alternate #4	*43.77*	*60.46*	*116.88*	*58.01*

Alternate #1 contains a bowtie concept for Liberty Road. The bowtie did reduce delay significantly in the intersection. For the northbound movement with Alternate #1 however, 800 vehicles turn right onto Liberty Road. This right turn movement has added some delay to New Circle Road. The bowtie has also placed more traffic on the Liberty Road approach, adding some delay to the approach. The elimination of the Young Drive has reduced some of the delay for northbound traffic in Alternate #2 by reducing some of the lost time and increasing the speed of the vehicles as they approach the Liberty Road intersection.

Alternate #4 improved over Alternate #1 slightly in the northbound direction due to the eight-lane section south of the intersection and improvements made at the intersection of Young Drive and Palumbo Drive.

Liberty Road to Palumbo Drive

Liberty Road to Palumbo Drive contains the signalized intersections of Young Drive and Palumbo Drive. Creative Drive is also in this section but is more related with the Liberty Road intersection. For the comparison purposes, the Young Drive and Palumbo intersection results for Alternate #1 have been combined. The results for Palumbo Drive and Young Drive are shown below:

Young Drive and Palumbo

Alternate	**SB New Circle Delay (sec/veh)**	**NB New Circle Delay (sec/veh)**	**Young Drive Inside Delay (sec/veh)**	**Palumbo Road Outside Delay (sec/veh)**
No Build Alt.	300.46	310.49	266.05	224.60
Alternate #1	38.35	56.65	47.44	49.93
Alternate #2	23.45	30.24	27.16	33.58
Alternate #3	-	-	20.58	31.52
Alternate #4	*27.50*	*33.39*	*64.50*	*38.66*

All of the build alternates greatly increase the operation of Young Drive and Palumbo Drive. The addition of dual left turn lanes at Palumbo Drive has reduced delays for the southbound movement. The relocation Young Drive to Palumbo Drive has improved the intersection in Alternate #2. The interchange in Alternate #3 experiences some delay on Palumbo due to the addition of the 1,095 left turns from Woodhill. The traffic volume on Young is small enough however, to allow the left turn from Palumbo onto New Circle to operate with relatively minor delay. Alternate #4 performs slightly worse than the Alternate #2 due to the intersections of Young Drive and Palumbo Drive not being combined.

Woodhill Drive Intersection

The Woodhill Drive Intersection is congested due to the estimates 1,095 vehicles that will turn left of the Woodhill Drive onto New Circle Road toward Richmond Road. Woodhill Drive is the first signalized intersection on the southern portion of New Circle Road. Like Palumbo Drive, Woodhill Drive serves as cut through for traffic from Man O'War that is avoiding Richmond Road. The delay time for the Woodhill alternates are shown below:

Woodhill Drive

Alternate	**SB New Circle Delay (sec/veh)**	**NB New Circle Delay (sec/veh)**	**Woodhill Drive Inside Delay (sec/veh)**	**Woodhill Drive Outside Delay (sec/veh)**
No Build Alt.	58.68	303.65	-	234.91
Alternate #1	8.40	10.39	-	-
Alternate #2	67.11	30.20	-	149.30
Alternate #3	-	-	-	-
Alternate #4	*67.11*	*30.20*	-	*149.30*

With the limited access alternate, the traffic coming from Woodhill Drive wanting to access New Circle must turn right and travel northbound on New Circle. The 1,095 vehicles that want to turn left onto to New Circle from Woodhill must now access the Palumbo Drive intersection. A good portion of this traffic will utilize Codell Drive now instead of going to Woodhill and turning right on New Circle Road. The through traffic on Woodhill Drive is minimal. Due to this, the delay on Woodhill Drive is almost eliminated with Alternate #3.

All of the build alternates eliminate the weaving movement that currently exists between entering Richmond Road traffic and New Circle Road traffic wanting to access Woodhill Drive. This has reduced most of the delay for the northbound traffic. Alternate #1 uses a partial interchange at Woodhill, which reduces much of the delay for New Circle Road and Woodhill Drive traffic. Alternate #4 experiences some delay southbound due to the lane drop that occurs at Woodhill Drive. Traffic is merging from four lanes back to three lanes.

Richmond Road Interchange

Alternate # 3 is the only alternate that reconfigures the Richmond Road Interchange. Most of the delay experienced on the interchange occurs on Richmond Road itself. To alleviate the congestion, Richmond Road has been widened considerably under New Circle Road. The reconfigures section contains three through lanes and dual left turn lanes onto New Circle Road. The reconfiguration of the interchange will considerably reduce the delay on Richmond Road. The existing interchange is a diamond interchange. Traffic becomes blocked under New Circle Road between the two intersections. A heavy left turn volume turning onto New Circle southbound backs up through the intersection and affects the through movement. The traffic exiting northbound New Circle cannot access Richmond Road due to the backup. This creates a backup on New Circle Road as well. With an urban interchange, the two signalized intersections are combined into one. Once a vehicle clears the one signal they have cleared the intersection. With the existing interchange, vehicles have to clear two intersections creating delay. The average delays for the no build alternate and the single point urban interchange are shown below.

Richmond Road Interchange

	No Build Avg. Delay (sec/veh)	Single Point Avg. Delay (sec/veh)
NB Off Ramp Left	300.1	31.2
SB Off Ramp Left	82.4	28.3
Through Outbound	422.7	27.8
Through Inbound	109.7	18.7

4.0 PUBLIC INVOLVEMENT

One of the primary functions of the New Circle Road N.E. Planning Study is to heavily involve the public in the process of defining a recommended Alternate to improve the traffic problems within the New Circle Road N.E. study corridor. From the study's inception, the public's input has had a large impact on the recommended Alternates in this report. This project was guided by a focus group made up of residents, business owners and elected officials. Numerous presentations have been made to organizations in addition to public meetings and focus group meetings. A chronology of these presentations and meetings follows.

4.1 Lexington MPO Presentation

The study officially commenced on January 30, 2001 with a presentation by Palmer Engineering to the Lexington Fayette Urban County Government's (L.F.U.C.G.) Metropolitan Planning Organization (M.P.O.). This presentation introduced the study and outlined its goals and schedules. During this presentation the M.P.O. was urged to participate in this study with any input possible.

4.2 Urban County Council Presentation

On April 26, 2001 the planning study was presented to 6th District Councilman, Al Mitchell. Mr. Mitchell's district would be impacted the most by the improvements to the New Circle Road N.E. corridor. The meeting consisted of looking over aerial photos of the entire project and discussing the different problem areas that Mr. Mitchell brought to light from his continuous experiences in this corridor. Mr. Mitchell has shown a great deal of interest in this project.

4.3 Public Meeting No. 1

On June 12, 2001 the first Public Meeting was held at Yates Elementary School. This Public Meeting was highly advertised to the public by various means including:

- A front page article in the Lexington Herald Leader
- Two Newspaper Ads
- Legal Ad in Newspaper
- Live TV News Reports at 5:00 and 6:00 the day of the Public Meeting
- Radio Interviews
- Government TV (Local Cable Channel 3)
- Variable Message Boards in the vicinity of Yates Elementary School
- 450 Flyers to Businesses within Project Corridor
- Web Site: *www.newcircleroad.com*

The public attendance for this meeting according to the sign-in sheet was 28. The public meeting was informal held in the open format style. The project scope, study corridor, and general information were presented and made available for review. No noticeable opposition to the project was indicated at this meeting. Conspicuous project support was represented by local government officials and citizens and included a recommendation / request to advance this project. The same questionnaire that was presented on the web site for Public Meeting #1 was offered to the public at this meeting. In addition to the questionnaire, a sign up sheet was available for those interested in volunteering to become a part of a focus group. Representatives from the private consulting firms that are involved with this project were also in attendance to answer any questions the public had concerning this project.

There is one main focus group that represents the following geographic locations along the New Circle Road N.E. corridor:

- Georgetown Road to Russell Cave Road *(Focus Group Section 1)*
- Russell Cave Road to Bryan Station Road *(Focus Group Section 2)*
- Bryan Station Road to Liberty Road *(Focus Group Section 3)*
- Liberty Road to Richmond Road *(Focus Group Section 4)*

4.4 Bluegrass Area Development District Presentation

The project was presented to the Transportation Advisory Committee of the Bluegrass Area Development District on July 9, 2001. The committee expressed a great deal of interest in the project and wanted to be kept up to date with the progress of the planning study.

4.5 Focus Group Meeting No. 1

The first Focus Group Meeting was held at KYTC District 7 on July 16, 2001 from 6:00 to 8:00 pm. Gary Bates presided over the meeting as facilitator. There were 12 focus group members and 13 design team members in attendance. Nick Stamatiadis from the University of Kentucky discussed alternate left turn solutions that could be applied along the New Circle Road N.E. corridor. The questionnaire results that were received via the web site and the first public meeting were presented to the focus group.

The defining statistic stemming from the questionnaire was the fact that 86% of the people saw traffic movement as the primary function of New Circle Road. In addition the recent construction

improvements made to New Circle Road near the Winchester Road area were discussed. The overall impression of the improvements made in this vicinity was very positive. Several of the focus group members did express their concern over the lack of pedestrian accommodations and landscaping with the newly constructed corridor.

Many of the focus group members felt that the Northeast section of New Circle Road should be made limited access as much as possible. This would involve the construction of interchanges, overpasses, and frontage roads in order to provide access to businesses. The consensus of the members of the focus group agreed that the existing frontage roads along Richmond Road were designed better than the ones along Nicholasville Road. The issue of bicycles and pedestrians were discussed by the focus group. It was the feeling of most of the focus group that bicycle access should not be given on New Circle Road itself, but that access across New Circle Road should be given to bicycles. The focus group also expressed their concerns for pedestrians at Bryan Station Road, Old Paris Pike, and Eastland Drive. Landscaping the New Circle Road N.E. corridor was also discussed by the focus group.

Overwhelmingly, the focus group agreed that any improvements to New Circle Road must first address the functionality and safety of the roadway. Landscaping did not appear to be a priority of most of the focus group, although they thought it would be nice to include if there was enough money and right of way available for aesthetic improvements.

The focus group also discussed several drainage concerns along the corridor of the project. Several focus group members expressed concern that the existing drainage ditches along New Circle Road N.E. did not drain properly and were not being maintained. Several members of the focus group would like to see the ditches eliminated and replaced with curb and gutter. Other drainage concerns for New Circle Road N.E. included beneath the railroad bridges at Broadway and Liberty Road as well the Bryan Station Road and N. Limestone Street areas.

In conclusion to this meeting the focus group was asked what their main expectations were for this project. The two main responses were improved traffic flow and a phased solution that ultimately leads to a limited access facility. Upon the conclusion of this meeting 3 Alternates were created incorporating the information attained from the first public meeting and focus group meeting.

The following is a list of Focus Group Members who attended at least one focus group meeting during the course of the planning study.

Name	Business/Agency	Address	City	Zip
David Black	Lexington Cartage	2180 Young Drive	Lexington	40505
Patrick Brewer	Lexmark, Bldg. 005	740 New Circle Rd.	Lexington	40550
Kelly Caldwell		569 East New Circle Rd.	Lexington	40505
Bill Cegelka		662 Mint Hill Lane	Lexington	40509
Janet Cerel	J.C. Enterprises, Inc.	1804 St. Ives Circle	Lexington	40502
Erin Childress		1548 Lindy Lane	Lexington	40505
Paul Clever	Freedom Dodge	1560 New Circle Rd NE	Lexington	40509
Harry Cohen	Suite 5	1555 East New Circle Rd.	Lexington	40509
J. H. Combs		453 Lin Wal Drive	Lexington	40505
Max Conyers		200 East Main Street	Lexington	40502
Julie Curry		1548 Lindy Lane	Lexington	40505
Bill Day		2773 Jessica Lane	Lexington	40511
Tim Diachum		P. O. Box 21770	Lexington	40522
Licia Duff		177 New Circle Rd.	Lexington	40505
Troy Fraebel		1703 Auburn Court	Lexington	40505
Holly Gardner		2204 Preakness Court	Lexington	40516
Billy Jones	Quantrell Cadillac	1490 New Circle Rd., N.E.	Lexington	40509
Doug Landers	Lexmark, Bldg. 001	740 New Circle Rd.	Lexington	40550
Patrick W. Madden	Attorney-at-Law	P. O. Box 12128	Lexington	40508
Pat McCray		577 BellCastle Rd.	Lexington	40505
Al Mitchell	Councilmember	200 East Main Street	Lexington	40502
Loris Points		424 West Sixth Street	Lexington	40508
Paul Schoninger	Council Research Analyst	200 East Main Street	Lexington	40502
William Schooler		1720 Scarburough Court	Lexington	40505
Whitfield Smith		175 E. New Circle Rd.	Lexington	40505
Billy Smith	The Gibson Co., Suite 100	1050 Monarch Street	Lexington	40513
Brent Swegar		330 West Broadway	Frankfort	40601
Jim Turner	Mr. Sparkle Car Wash	275 W. New Cirlce Rd.	Lexington	40505
Christine Vanderhoof		1817 Ranier Drive	Lexington	40505

4.6 Focus Group Meeting No. 2

These 3 Alternates were presented at the second focus group meeting on September 10, 2001 at KYTC District 7 from 6:00 to 8:00 P.M. Gary Bates, once again presided over the meeting as facilitator. There were 10 focus group members and 18 design team members in attendance. The three general Alternates presented were: (1) Six Lanes with Intersection Modifications, (2) Eight

Lanes, (3) Limited Access Facility. There were additional Alternates (Alternate 4 and Alternate 5) presented to the focus group for improvements at Broadway. It was explained to the focus group that these Alternates could be combined together and mixed and matched to produce a preferred overall Alternate.

Focus Group Section 1 (Georgetown Road to Russell Cave Road) was discussed first. Several of the focus group members liked the urban interchange presented in Alternate 3 at Georgetown Road. Many focus group members expressed concern with the weaving movements and sharp curves with the existing Newtown Pike Interchange. The interchange option presented in Alternate 1 seemed preferable to the focus group. This Alternate eliminated the loop from northbound Newtown Pike to westbound New Circle Road. The creation of an overpass with the elimination of the traffic signal at Colesbury Circle seemed favorable to the focus group. The focus group requested that the median U-turn between Boardwalk and Russell Cave Road presented in Alternate 1 be moved closer to Russell Cave Road to eliminate conflicts with the existing right in / right out access into Wal-Mart.

Next, focus group Section 2 (Russell Cave Road to Bryan Station Road) was discussed. The jug handles presented in Alternate 2 at Russell Cave seemed favorable to most of the focus group. It was suggested that the jug handles also be located past the intersection where traffic would come in on the side of Russell Cave Road that would allow right turns instead of left turns and not have to cross traffic.

Also in Section 2, five alternates were presented for the Broadway and New Circle Road intersection. Alternates 1 and 2 were six and eight lane at grade intersections respectively. There was concern from a few focus group members who were involved with businesses in this area about the closing of the median in Alternate 2. It was suggested that median U-turns, as shown in Alternate 1, be included in certain locations in Alternate 2 in order to improve access to businesses.

Because of the close spacing of the Broadway intersection from the railroad crossings of New Circle Road and of Broadway, Alternate 3 put New Circle Road on bridge structures over N. Broadway, the railroad, and N. Limestone. Traffic from N. Broadway would enter New Circle Road through the N. Limestone interchange. Roundabouts were used to combine the various ramps at N. Limestone. The focus group was divided on the use of roundabouts for this application. Concerns were expressed over the size of the roundabouts and the amount of traffic they can effectively handle. The focus

group also expressed concern with Alternate 4, which included an interchange between Russell Cave Road and Broadway. Many members of the focus group felt that Alternate 4 was too intrusive on the existing residential areas to the north of the proposed interchange. They also thought that it did not work with the traffic problem created toward Russell Cave Road. On the other hand, Alternate 5 was well received by the focus group. Alternate 5 realigned N. Broadway to the east of the railroad, bridging over New Circle Road and passing over or under the railroad North of New Circle to tie back to existing Paris Pike. Overall, the focus group felt Alternate 3 would be difficult to implement in this section due to the number of existing access points and number of businesses. Alternate 4 was discarded and Alternate 3 was revised to incorporate the relocation of Broadway shown in Alternate 5. Most of the focus group favored Alternate 1 for focus group Section 2.

Thirdly, focus group Section 3 (Bryan Station Road to Liberty Road) was discussed. The proposed access to the existing fire station between Meadow Lane and Bryan Station Road was discussed. One possible resolution discussed would be the implementation of dynamic median control. ***See Section 5.4***. In general, most of the focus group members favored Alternate 1 for focus group Section 3. As with focus group Section 2, the limited access facility (Alternate 3) would be difficult to implement due to the existing access points and number of businesses.

Lastly, focus group Section 4 (Liberty Road to Richmond Road) was discussed. Due to the wider right of way width in this section and the limited number of existing access points, the majority of the focus group members favored Alternate 3. Several focus group members liked the combined interchange at Young Drive and Palumbo Drive. The focus group also seemed receptive to the application of two roundabouts on Liberty Road to the north and south of New Circle Road. This application is commonly called a "bow tie".

Based on the discussion of the four different focus group sections, it was the general feeling of the focus group that an Alternate needs to be studied that includes Alternate 1 for focus group sections 2 and 3 and Alternate 3 for focus group sections 1 and 4. The end result of this was a new Alternate 3 that incorporated the Alternate 5 Broadway relocation as well as the Alternate 1 features in sections 2 and 3. The revised Alternate 3 only has traffic signals from North Limestone to Trade Center Drive. This would reduce the signalized portion of New Circle Road N.E. from 5.7 miles to 2.8 miles. It was also suggested by some focus group members that the intersection concepts presented in

Alternate 1 also be considered with eight lanes as well as with six lanes as presented. Alternate 2 was revised to show the mid block U-turns.

4.7 Public Meeting No. 2

On October 9, 2001 a second Public Meeting was held at Yates Elementary School. As before, the Public Meeting was highly advertised to the public by the same means as the first Public Meeting. The www.newcircleroad.com web site was updated with the three revised Alternates depicted along with a new questionnaire to get additional public comments on the proposed Alternates and concepts presented. The public attendance for the second public meeting increased to 58. The format of this meeting was the same as the first public meeting with an informal "open format" style.

The three revised Alternates, that were the result of focus group meeting #2, were presented to the overall public as well as visual renderings of some of the Alternates in various areas along the New Circle Road N.E. corridor. In addition, a traffic simulation / animation (CORSIM) demonstration was presented for the proposed Alternates at New Circle Road / Liberty Road and New Circle Road / Broadway. A paper copy of the same questionnaire offered on the web site was made available at this meeting for public input. As with the first public meeting, there seemed to be no noticeable opposition to the project in general.

4.8 Lexington Corridor Committee Presentation

On October 15, 2001 a presentation was made for the Lexington Corridor Committee meeting with a general project overview. A few of the committee members expressed the need to provide accommodations for pedestrians and bicyclists within the proposed alternates. Overall, the committee was very receptive to the proposed alternates. No noticeable opposition was apparent at this meeting.

4.9 LFUCG Technical and Incident Management Committees Presentation

On Wednesday, November 14, 2001 a presentation was made to a joint meeting of the LFUCG Technical and Incident Management Committees. The alternates were presented and several questions were asked. Some of the questions and comments involved the limited access alternate and the desire to have a limited access alternate throughout the section. The fire station between Bryan Station Road and Meadow Lane was discussed with regard to the median opening in front. The representative of the fire department was told that the median U-turn in front of the fire station had been situated and sized such that fire and emergency trucks could enter and exit the station with both left and right turns. This seemed to satisfy his concerns. He also expressed that the Broadway fire station would be helped by the Alternate 3 overpass for Broadway. Response times are expected to increase with a raised median, but neither of the representatives of the fire and police departments felt that it was a major issue.

4.10 U of K Institute of Transportation Engineers Student Chapter Presentation

On November 15th, a presentation was given to the University of Kentucky Institute of Transportation Engineers student chapter with a general project overview. The presentation dealt primarily with the traffic and safety issues associated with the roadway. Approximately 30 students attended the presentation.

4.11 Interdisciplinary Team Meeting

At 9:00 am on Tuesday, December 18, 2001, an Interdisciplinary Team Meeting was held at the KYTC District 7 Office concerning the New Circle Road Northeast Planning Study, Item No. 7-362.0. The text portions of the draft study were presented first with an opportunity for comments. The discussion of the text sections created the following comments:

1. There was discussion concerning whether or not the IBM overpass is still needed. There was some thought that the KYTC might be able to utilize the IBM bridge.

2. There was some speculation that the railroad spur behind the W.T. Young Warehouses might no longer be necessary, but it was pointed out that a meeting was held with representatives from W.T. Young and that uninterrupted rail access is considered essential even though the use of the spur is infrequent.

3. The New Circle Road design needs to accommodate the design and construction of new drainage pipes where needed including the 4 drainage points described by Darrell Bennett of the LFUCG Division of Engineering.

4. Water quality is also an issue to be considered during the construction period.

5. There is a need to show a larger utility strip on these drawings to accommodate the large number of various types of utilities.

The second part of the meeting included a description of each decision section and a ranking of the alternates in each section. Comments and section-by-section ranking:

Section 1 – Georgetown Road: Off ramps at the Georgetown Road interchange could be widened to keep back ups off of New Circle Road. It was the general consensus that the proposed Georgetown Road single point urban interchange (SPUI) could be done on an as needed basis as a separate project.

Section 2 – Newtown Pike: The comment was made that the Newtown Pike Interchange bridge cost had been left out of Alternate 1. The rankings of the alternates in this section were as follows:

1. Alternate 3 – Closing access on New Circle Road eliminates a known safety hazard.
2. Alternate 2
3. Alternate 1

Section 3 – Boardwalk & Colesbury: Discussion centered on the fact that Boardwalk and Colesbury have small traffic volumes so they could be made into right-in & right-out only intersections instead of the fly-over access proposed in Alternate 1. The heavy left turn movement from Boardwalk will be handled at the Russell Cave SPUI. The rankings of the alternates in this section were as follows:

1. Alternate 1 – Modified as described above.
2. Alternate 3
3. Alternate 2

Section 4 – Russell Cave: The smooth operation of New Circle Road is dependent upon the efficient operation of the Russell Cave intersection, which currently handles high left turn traffic volumes and experiences significant delays. The construction of a SPUI at Russell Cave Road would significantly reduce delay time in the corridor. It was mentioned that the construction of Jug Handles as proposed in Alternate 2 would cause unacceptable delays on Russell Cave Road. The rankings of the alternates in this section were as follows:

1. Alternate 3 – Because of reduced delay on both New Circle and Russell Cave.
2. Alternate 1
3. Alternate 2 – Jug handles cause unacceptable delay on Russell Cave.

Section 5 – Broadway: Alternate 3, consisting of right turns-in and right turns-out at the existing Broadway location with a new alignment and bridge over New Circle Road, paralleling the CSX Railroad would be the best alternative but the most expensive of the three proposed. The general consensus was that a grade separated Broadway should be considered as a separate project. The rankings of the alternates in this section are as follows:

1. Alternate 1 – For cost savings
2. Alternate 3 – Should be considered as a stand-alone project.
3. Alternate 2

Section 6 – N. Limestone & Bryan Station: Alternate 1 for this section eliminates left turns at the Limestone intersection which implements greater use of mid-block U-turns, whereas, the other two alternates allow left turns at the intersections of Limestone and Bryan Station. The consensus was to eliminate the frontage road proposed on Alternate 1. The rankings of the alternates in this section are as follows:

1. Alternate 1 – without frontage road
2. Alternate 3
3. Alternate 2

Section 7- Meadow Lane to Winchester Road: There is a need to spend more time looking at mid-block U-turns in this section. The rankings of the alternates in this section are as follows:

1. Alternates 1 & 3 – Right in/out @ Meadow & Floyd
2. Alternate 2

Section 8 – Winchester Road to Family Circle: The ranking of the alternates in this section were as follows:

1. Alternates 1 & 3
2. Alternate 2

Section 9 – Liberty Road: There was discussion concerning Alternate 1 with an at grade intersection at Liberty Road with no left turns and roundabouts being less expensive than the proposed SPUI in Alternate 3. The general consensus was that the SPUI could be done at a later time. The ranking of the alternates in this section were as follows:

1. Alternate 1 – w/ roundabouts to save money
2. Alternate 3 – preferred but very expensive, could be done later.
3. Alternate 2

Section 10 – Young Drive/Palumbo Drive: Alternate 2, with 8 lanes and Young Drive relocated saves an estimated $8 million over Alternate 3, which contains both a relocated Young Drive and a SPUI. The team felt that 8 lanes should be utilized from Liberty Road to Richmond Road. The ranking of the alternates in this section were as follows:

1. Alternate 2
2. Alternate 3
3. Alternate 1

Section 11 – Woodhill Drive: Alternate 3 seemed a good choice until it was combined with the choice for a traffic light at Palumbo. The heavy left turn movement currently at Woodhill Drive would be shifted to Palumbo where it might cause problems with the signalized intersection. Alternate 1, with the fly-over was chosen to handle the left turns. The ranking was:

1. Alternate 1
2. Alternate 3
3. Alternate 2

Section 12 – Richmond Road: The consensus was that while the Richmond Road interchange is in need of reconstruction that it should be done as a separate project in the future. In this section, the No-Build alternate is recommended.

After the ranking of the alternates, the Interdisciplinary Team discussed: Construction Section Breakout, Construction Sequencing, and Upcoming Meetings.

Next Steps

The consensus was that the sequence for construction in the corridor should be done in the following order:

1. Winchester to Woodhill
2. Winchester to Broadway
3. Broadway to Boardwalk
4. Boardwalk to Georgetown

4.12 Focus Group Meeting No. 3

Gary Bates, professional facilitator, presided over the third focus group meeting held on January 15, 2002 at KYTC District 7 from 6:00 to 8:00 P.M. There were 15 focus group members and 16 design team members in attendance. The focus group was given a brief overview of the input received from the second public meeting and the IDT meeting. The IDT meeting had involved representatives from the Kentucky Transportation Cabinet and the Lexington-Fayette Urban County Government. Four alternates were presented to the focus group, the three alternates previously presented and a new fourth alternate selected by the IDT consisting of a combination of the preferred features from the original three alternates. The New Circle Road Corridor was divided into twelve different decision sections, which were discussed in numerical order.

Section 1 (Georgetown Road Interchange) was discussed first. Due to the high cost of reconstructing the Georgetown Road Interchange and the relatively low benefit to New Circle Road itself, the Focus Group reached the consensus that the Georgetown Road Interchange should not be a part of the New Circle Road Improvement Project. There was a recommendation from some of the focus group members to widen the exit ramps to two lanes from New Circle Road to Georgetown Road to ease ramp traffic congestion.

Next, the focus group discussed Section 2 (Newtown Pike Interchange) reaching a consensus to reconstruct the Newtown Pike Interchange as a single point urban interchange (Alternate 4). There was a suggestion to widen the entrance ramp from southbound Newtown Pike to westbound New Circle Road to two lanes due to the large number of trucks.

Sections 3 and 4 (Boardwalk and Russell Cave) were next in the discussion. The focus group agreed with the IDT recommendation to eliminate the traffic signal at Boardwalk, making the intersection right in - right out only and constructing a grade separated interchange at Russell Cave Road. Concerns were expressed concerning the speed of traffic coming from Newtown Pike at Boardwalk. The focus group suggested that deceleration and acceleration lanes be added to New Circle Road for the right in - right out at Boardwalk. The focus group also stated that if the Boardwalk left turns were moved to Russell Cave Road, then a signal would be required at Russell Cave Road and Park Place behind Wal Mart.

Several members of the focus group did not agree with the IDT recommendation for Section 5 (Broadway Intersection). The IDT recommendation was for constructing Alternate 1 (at grade improvements) to the Broadway intersection and deferring the construction of an overpass of Broadway to a later date. Several focus group members were concerned that Alternate 1 did not solve the traffic problems at the intersection and that an additional sixteen million dollars to relocate Broadway over New Circle Road was warranted. Additionally, focus group members felt that if the relocation of Broadway were indefinitely delayed, the cost would be much higher in the future. It was decided to include the Broadway relocation over New Circle Road in Alternate 4. Because of the cost it should be considered as a single project in the construction sequence.

Section 6 (Limestone/Old Paris Pike to Bryan Station) was then discussed by the focus group and the consensus was that Alternate 4 was the preference. Alternate 4 consists of widening New Circle Road to six lanes. Because of the Focus Group's preference for the Broadway relocation alternate in Section 5, they modified Alternate 4 to allow all movements with a traffic light at the Limestone/Old Paris Road intersection. The focus group also suggested that a backage road be considered for the area behind the businesses on the south side of New Circle Road in addition to the possibility of consolidating some of the business accesses.

The consensus of the focus group for Section 7 (Meadow Lane to Winchester Road) was to endorse Alternate 4, which involves widening New Circle Road to six lanes and eliminating the signal at Meadow Lane. Concern was expressed about cutting off median access due to the location of a fire station in this section.

Once again, the focus group agreed with the Alternate 4 treatment for Section 8 (Winchester Road to Family Circle). In this section, Alternate 4 involves widening New Circle Road to six lanes and eliminating the signalized intersections at Jingle Bell Lane and Family Circle. Focus group members expressed some concern that business owners in this section might have some objections to eliminating a signalized intersection.

The focus group agreed with the IDT recommendation of Alternate 4 for Section 9 (Liberty Road Intersection). This improvement involves widening New Circle Road to six lanes and using roundabouts on Liberty Road in conjunction with a "Bow Tie" intersection configuration to

eliminate left turns at the Liberty/New Circle Road intersection. Concern was expressed over the performance of the two-lane roundabout at Reynolds Road. The focus group felt that a one-lane roundabout would function much better. Additional concern was expressed about driver expectations and the signage necessary to adequately inform the motoring public about left turn prohibitions on New Circle Road.

For Section 10 (Young Drive and Palumbo Drive Intersections), the focus group did not agree with the IDT recommendation of relocating Young Drive to connect directly across from Palumbo Drive. The general consensus was that the reduction in traffic delay resulting from combining the two intersections was not significant enough to justify the additional right of way cost. There were comments made about the large number of trucks using Young Drive and Palumbo Drive. The focus group suggested that the left turn lane from New Circle Road onto Young Drive be lengthened. Shifting New Circle Road slightly to the north and placing a full left turn lane between Young Drive and Palumbo Drive could accomplish this. In addition, there were several comments concerning traffic congestion on Palumbo Drive at the entrances to Woodhill Shopping Center. The proposed right in and right out intersections accessing Woodhill Shopping Center onto New Circle Road will help alleviate this congestion. Overall, the consensus of the focus group was a combination of Alternate 1 and Alternate 2, in which this section would be widened to eight lanes with Young Drive and Palumbo Drive continuing to be separate intersections.

Again, the focus group did not agree with the IDT recommendation for Section 11 of constructing a left turn flyover for Woodhill Drive onto New Circle Road. Concern centered on the short weaving distance this alternate created between the flyover ramp and the Richmond Road exit ramp. There was additional concern that the flyover ramp would encourage neighborhood cut through traffic from the residential area behind Woodhill Shopping Center. The consensus was that Alternate 2 was preferred for the Woodhill Drive Intersection. This alternate involves widening the intersection to eight lanes and is considerably cheaper than the other alternates.

Lastly, Section 12 (Richmond Road) was discussed. The focus group reached a consensus that, like the Georgetown Interchange, the Richmond Road Interchange should not be considered as part of the New Circle Road Improvement Project and that it should subsequently be considered as a separate

project. However, there was a recommendation from the focus group to widen the ramp from Richmond Road to New Circle Road northbound to two lanes. In addition, there were comments that the left turn lanes on Richmond Road to New Circle Road need to be lengthened.

In conclusion, construction sequencing was discussed. Due to the approximate 100 million dollar cost of the improvements, construction would be broken into approximately six construction projects, each costing from 8 to 25 million dollars as follows:

Winchester Road to Liberty Road	$8,500,000
Liberty Road to Woodhill Drive	$11,500,000
North Limestone to Winchester Road	$15,300,000
North Broadway/Paris Pike	$24,100,000
Boardwalk to Russell Cave Road	$21,100,000
Newtown Pike interchange	$15,600,000
Total	$96,100,000

4.13 Lexington MPO Presentation

On January 29, 2002, the preliminary results of the New Circle Road Northeast Planning Study were presented to the Transportation Policy Committee of the Lexington Area MPO. The policy committee members made several comments summarized below:

Dr. David Stephens asked how many access points along this section of New Circle Road would be eliminated as a result of the project. It was explained that each business would have an access to New Circle Road but that multiple accesses would be considered for elimination during the next phase of the project. Dr. Stephens stated that the number of access points needs to be reduced. He also expressed concern over traffic problems on Richmond Road at New Circle Road

Fred Brown expressed concern over constructing eight lanes in the Palumbo Drive and Woodhill Drive sections due to those intersections essentially being "T" intersections. It was explained that those two intersections served as cut through routes from Man o' War Boulevard and did carry a significant traffic volume. Mr. Brown also stated that the Newtown Pike Interchange should be

moved up in the priority list of construction sections since the Newtown Pike Extension will be constructed in a few years.

George Brown asked about the time frame for funding the project. Mayor Miller and John Carr both put funding for the project in the 2007 to 2008 timeframe. Mr. Brown requested that the public be informed that the project is still several years in the future.

Al Mitchell expressed concern over future traffic volumes for the No-Build alternate. He stated that the existing travel times are growing worse every year and by 2007 – 2008 they will be in the 30 minute range. Mr. Mitchell also expressed support for the project and the new and different ideas that had been presented. In addition, he stated that he was in favor of eliminating several of the signalized intersections. He asked that if the public had any questions or concerns about the project to call his office or the Transportation Cabinet.

4.14 Lexington Optimist Club

A presentation was made to seven members of the Lexington Optimist Club on February 8, 2002, at 12:30 PM at the Sheraton Inn in Lexington, Kentucky. The presentation focused on existing conditions in the New Circle Road corridor and the proposed improvements.

4.15 Public Meeting No. 3

The third public meeting was held on February 18, 2002 at the Yates Elementary School cafeteria from 4:00 PM to 7:00 PM. Eighty-six people attended the meeting and were given an opportunity to express their opinions. The www.newcircleroad.com web site was updated with the Alternate 4 as recommended by the focus group. A new questionnaire was created to get additional public comments concerning proposed Alternate 4. The format of this meeting was the same as the first two public meetings with an informal "open format" style. Alternate 4, preferred during Focus Group Meeting No. 3, was presented to the overall public as well as visual renderings of the previous three alternates. In addition, a traffic simulation / animation (CORSIM) demonstration was available for viewing for the proposed alternates at New Circle Road / Liberty Road and New Circle Road / Broadway. A paper copy of the same questionnaire offered on the web site was made available at this meeting for public input.

4.16 Lexington Chamber of Commerce

Alternate No. 4, the preferred alternate, for New Circle Road was presented to a sparsely attended meeting of the Lexington Chamber of Commerce on February 21, 2002 at 3:00 PM. A PowerPoint presentation was made to initiate an informal discussion of the salient features of the alternate. The presentation was further enhanced by a CORSIM animation illustrating the performance of the proposed improvements.

4.17 LFUCG Technical and Incident Management Committees Presentation

A final presentation of Alternate 4, the preferred alternate, was made to the combined Transportation Technical Coordinating Committee and the Incident Management Committee at 10:00 AM on April 10, 2002 in the fifth floor conference room of the Lexington-Fayette Urban County Government building.

4.18 Coordination With Other Agencies

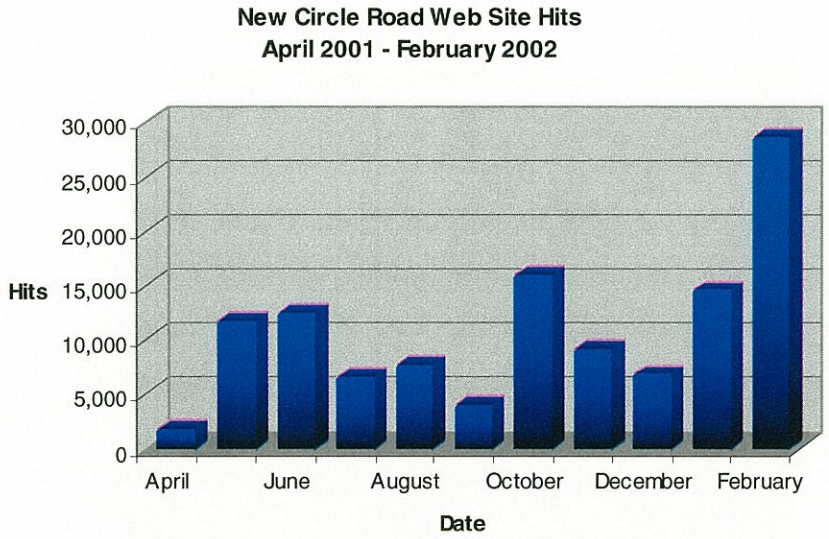
In addition to the public notification and involvement for this planning study, the following agencies and individuals were contacted by letter to solicit input and information, which would be material to the planning study:

U.S. Fish and Wildlife Service, Cookeville, TN*
Kentucky State Nature Preserves Commission, Frankfort, KY*
Kentucky Department of Fish and Wildlife Resources, Frankfort, KY
Kentucky Natural Resources and Environmental Protection Cabinet, Frankfort, KY*
U.S. Environmental Protection Agency, Atlanta, GA
Kentucky Heritage Council, Frankfort, KY
Office of State Archaeology, Lexington, KY
Fayette County Judge/Executive Sandra Varellas, Lexington, KY
City of Lexington Mayor Pam Miller
Greater Lexington Chamber of Commerce, Robert C. Douglass, Jr.
Bluegrass Area Development District, Jas Sekhon, Lexington, KY
Police Chief, Lexington, KY
12th District Council, Ms. Gloria Martin, Lexington, KY
6th District Council, Mr. Albert S. Mitchell, Lexington, KY
Director of Streets and Roads, Lexington, KY
Engineering Director, Lexington, KY
Traffic Engineering Division, Lexington, KY
State Environmental Clearinghouse, Frankfort, KY*
Lexington-Fayette Urban County Government, Lexington, KY*
U.S. Department of Housing and Urban Development, Louisville, KY*

*Denotes agencies/offices which responded in writing and telephone conversation.

4.19 Project Web Site

A project web site (*www.newcircleroad.com*) was made available to the public beginning in April 2001. This web site explained the planning study in detail and notified the public of meetings or events where their attendance was needed. The web site also contained a questionnaire the public was able to electronically complete and submit to the proper officials. Below is a break down of the number of hits on the *www.newcircleroad.com* web site through March 2002:



	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb
Hits	1,774	11,792	12,495	6,563	7,709	4,123	15,985	9,261	6,884	14,649	28,677

The project web site has proven to be a valuable tool throughout the planning study. It has given the public quick and easy access to project information as well as a convenient means of providing input to the study

There were a series of three public meetings. The first meeting was held on June 12, 2001, the second on October 8, 2001, with the final public meeting being held on February 18, 2002. The third public meeting received a significant amount of publicity from the Lexington Herald-Leader. In addition, this third meeting was the most heavily attended meeting of the series. There was a noticeable spike in the number of web site hits corresponding to the dates of the public meetings. The February public meeting registered over 28,000 hits.

To date, the web site has enhanced the quality and quantity of public involvement, playing an important role in steering the outcome of this planning study. Aided by the ability to access information via the web site, the people that have participated in the focus group and public meetings have been resourceful in determining alternates for improving the New Circle Road N.E. Corridor.

5.0 ADDITIONAL INFORMATION

5.1 Review of Comprehensive Plan

The Lexington Fayette Urban County Government updated their Comprehensive Plan in 2001. An important element of that Comprehensive Plan is the Land Use element. The 2001 Comprehensive Plan defines an Urban Service Boundary within the county. The Urban Service Boundary is a boundary in which most of the future development in Fayette County will occur, while preserving the rural portions of the county outside the boundary. Within the Urban Service Boundary, there are two major areas that are currently undeveloped or are beginning to develop. The first is the area outside of New Circle Road between Newtown Pike and Leestown Road. The second is the area along Winchester Road and Man O War Boulevard near Interstate 75. Both of these areas are located in the northern portion of the Urban Service Boundary. There is little available land within the southern portion of the county designated for future development. Due to future development in the northern section of the county, a greater demand will be placed on the infrastructure. Currently, New Circle Road is the only roadway, besides the interstate, that travels from east to west along the north end of the county. No future roadways are currently planned within the area. Due to this, New Circle Road will play a vital role for the economic development and quality of life for North Lexington.

The Transportation Goals and Objectives laid out in the 2001 Comprehensive Plan emphasize coordinating land use with transportation planning. Other items included in the Transportation Goals and Objectives include providing a balanced and coordinated multi-modal transportation system, encouraging and enhancing alternatives to motorized modes of transportation, minimizing disruption to neighborhoods and farming operations by new transportation improvement, and enhancing the visual character of all major transportation routes.

The existing land use along the New Circle Road corridor is mainly retail trade (RT), highway commercial (HC), professional service/office (PS) or warehouse and wholesale (WW). There are no residential land uses that directly connect to New Circle Road. The residential land uses are located behind the commercial uses that front New Circle Road and are accessed by the cross roads.

5.2 Environmental Overview

This section will determine the anticipated impacts and environmental consequences associated with construction and operation of various improvements. At the present time, three general alternates are being considered for this undertaking. Each of these three options is being comprehensively examined. The environmental data developed for each will be utilized as a part of the decision making framework employed by the Kentucky Transportation Cabinet in determining if this project should go forward and which of the study alternates should be advanced to the final design and construction project phases.

5.2.1 Socioeconomic Considerations:

The project study area is extensively urban in character, being comprised almost entirely of commercial and residential structures. There do not appear to be any neighborhoods or community units within the corridor which have a cohesive structure or display the type of characteristics as might be represented by similarities in design, style, age, ethnicity, race, culture, income, family composition, education, religion or usage. Therefore, relocation activities associated with the acquisition of a few homes will not be complicated by the need to maintain associated cultural groups or extended family units, and the overall character of the area will not be adversely affected. Infrastructure will be unaffected by the proposed project; and services, facilities and access to existing development will be maintained.

Current community segments that are associated with particular cohesive areas and which share common perceptions and psychological unity exist in the incorporated settlements that front on existing New Circle Road. Lexington is built along both sides of existing New Circle Road. Local traffic in Lexington currently must contend with a large volume of truck and through auto traffic on New Circle Road. After completion of the proposed project, regardless of Alternate selected, commerce and general well-being along existing New Circle Road are likely to be enhanced and quality of life improved because interaction between businesses will be easier with more centralized access points making through traffic easier for those traveling to nearby neighborhoods.

Community cohesion in the residential units or small clusters along the secondary and side roads in the project area will not be adversely affected by the small number of displacements required, and it is expected that these neighborhoods will continue to thrive. Some displaced residents will be able to

relocate on the same parcel, within the same crossroad cluster, or along the same road if they so choose.

The community resources located in the project corridor are one school (Yates Elementary School), two fire stations, and the Lexington Housing Authority. None of the alternates being considered will displace or adversely affect any of these community resources. Relieving traffic congestion should benefit all of these community resources and improve access and safety for emergency vehicles that service hospital facilities and police services located in and around Lexington.

Disproportionately high and adverse human health or environmental effects on minority and low-income populations are not anticipated on this project, regardless of Alternate selected, because windshield surveys of the project area and interviews with local officials revealed no such populations known to be present in the study area. However, more precise and alignment-specific investigations will be needed when the project advances to future phases. One other tool for analysis of environmental justice is the use of statistics (Z-test for census block groups) to determine if one area is unfairly affected (low income or minority status) as compared with the general population.

Based on the current level of information available, no significant adverse social and economic impacts are anticipated from any of the alternates currently under consideration; however, these preliminary findings will require validation through appropriate detailed environmental Base Studies required in subsequent phases.

5.2.2 Air Quality Considerations:

Pursuant to the 1990 Clean Air Act Amendments, Fayette County has been designated as an attainment area for all transportation-related pollutants (CO, HC, NOX, and particulates). This project is in an area that does not require transportation control measures. Therefore, the Amended Final Conformity Guidelines issued by the U.S. Environmental Protection Agency and the U.S. Department of Transportation will not apply for this project. With respect to the latest conforming State Transportation Improvement Program (STIP), the proposed project is located on pages 42 to 44 of the STIP, Fiscal Years 1999-2002; Lexington Area Metropolitan Planning Organization approved February of 1999.

In accordance with KYTC/DEA Position Paper 006-2000, a microscale analysis following the guidance specified in *Air Quality Guidance for Project Level Analysis*, revised October 2000, will be required for this project. Project level emission inventories shall not be developed because the project originates from a conforming STIP.

5.2.3 Highway Noise Considerations:

Highway noise levels, at this time, are not expected to be a major concern on this project. Most receptors are businesses fronting on New Circle Road and highway noise is generally not a problem. Land developed for residential use is separated from New Circle Road by the row of businesses. Since the businesses want visual exposure, noise mitigation by sound barriers is not anticipated on this project. When the project advances to the preliminary engineering phase a project specific noise impact analysis will be required to verify noise impact conditions using the procedures for conducting field monitoring based on FHWA requirements and the KTC Noise Abatement Policy.

5.2.4 Water Quality and Aquatic Ecosystems:

The Kentucky Natural Resources and Environmental Protection Cabinet - Division of Water (KNREPC-DOW) was consulted for information on surface and groundwater. The northwest portion of this project crosses into the Royal Springs Wellhead Protection Area, beginning at the intersection of Meadow Lane and New Circle Road and ending at the intersection of Georgetown Road and New Circle Road. Royal Springs is the municipal water-supply spring in Georgetown, Kentucky.

Several springs occur along New Circle Road, with three occurring near the existing road. Several other springs are found within the Royal Springs groundwater basin. Certain areas of the project corridor may be hydrologically sensitive where soluble limestone is present. One area is located to the west of the existing road.

One surface stream exists within the project corridor. Cane Run flows through the northwestern portion of the project area. This portion of Cane Run is listed as an intermittent stream with a low flow. No ponds exist within the project area.

5.2.5 Wild and Scenic Rivers:

No wild and scenic rivers or Outstanding Resource Waters, as reported by the KNREPC, are found in the project study area. There are no registered natural areas, no exemplary natural communities, and no wildlife or waterfowl refuges. There are no land and water areas or facilities established or funded from the Land and Water Conservation Fund Act in the project study area.

5.2.6 Wetlands:

The National Wetlands Inventory (NWI) maps for the Lexington East/West Quadrangles indicate that two wetlands occur within the project area. According to the map, an intermittent, riverine wetland with seasonal flooding is located just east of New Circle Road on the southeastern portion of the project. Another intermittent riverine wetland with season flooding is identified along portions of Cane Run.

A windshield survey of the project area was conducted in July 2001. The riverine wetland along Cane Run was located, but specific evidence of a riverine wetland was not seen. According to the map, the second riverine wetland occurs near a spring that forms a small intermittent stream. This area was not sited during the preliminary survey. Wetlands not identified on the NWI maps may exist. A formal survey of the project area will determine the location of other area wetlands.

5.2.7 Floodplains:

There are no floodplain areas that will be impacted within the project corridor

5.2.8 Threatened or Endangered Species and Terrestrial Ecosystems:

Information from the United States Fish and Wildlife Service (USFWS) indicates that there are no federally listed endangered or threatened species that occur in the project area. Records from the Kentucky Department of Fish and Wildlife Resources (KDFWR) Information System indicate that the federally endangered Indiana Bat (*Myotis sodalis*) occurs in this area. The species forms maternity colonies and roosts with its young under the bark of trees along streams and adjacent upland areas, usually from the mid-May to the mid-August. Potential summer habitat exists in the project area in the form of the narrow wooded riparian corridors of Wells Creek and Middle Run and scattered roosting snags along tributary streams. No known occurrences of Indiana bat have been reported from the project area and the presence of Indiana bat is extremely unlikely due to the small

amount of potential habitat, the low to no flow stream conditions, the frequency of human and domesticated animal activities, and the existence of higher quality habitat elsewhere in the region.

Records from the Kentucky State Nature Preserves Commission (KSNPC) indicate that the federally endangered and KSNPC threatened running buffalo clover (*Trifolium stoloniferum*) may occur in the project area. A search for running buffalo clover was conducted, during its flowering period, in a wooded area along a tributary of Cane Run, near Lexmark, Inc. No specimens were found.

Five additional KSNPC special concern species may occur within the project area. Henslow's sparrow (*Ammodramus henslowi*) and the Savannah sparrow (*Passerculus sandwichensis*) prefer open grasslands and meadows often around scrub-shrub areas. The sedge wren (*Cistothorus platensis*) is found locally in dry cultivated grainfields and in brushy grasslands during migration. The bobolink (*Dolichonyx oryzivorus*) occurs in tall grass areas and grass fields with alfalfa and clover. Finally, the barn owl (*Tyto alba*) can occur locally in open countryside, often around human habitation.

5.2.9 UST/Hazmat Considerations:

An inspection of records of the State Division of Waste Management (DWM) and USEPA databases was supplemented by a preliminary screening/windshield survey of the project area to locate any sites or facilities that may harbor hazardous substances or UST's. Based on this initial level of investigation, there are 61 sites of environmental concern in the project area. Several of the sites are service stations, tire stores, strip malls, auto dealerships, and other various commercial sites and businesses. Approximately 20 of the 61 sites are significant UST and/or HAZMAT sites that were encountered. Presently, all sites are in compliance and do not pose any problems.

An Environmental Site Assessment of the project area conducted in accordance with ASTM Practice E 1527 and KTC Guidance, should be accomplished during future "NEPA" phases of the project to formally confirm UST/Hazmat findings; however, based on currently available information, no significant hazardous materials or underground storage tank issues are anticipated for this project regardless of Alternate selected.

5.2.10 Cultural Resources:

As a result of this evaluation, three individual sites--the Parkette Drive-In, the Paul Miller Showroom, and the Catalina Motel neon sign--may hold the potential to meet the National Register criteria. In addition, Idle Hour Park, a public park, could be affected by any expansion of New Circle Road. Any proposed acquisition of Idle Hour Park would constitute a Section 4(f) issue.

The Parkette Drive-In, located at 1216 East New Circle Road, was built in 1951 by Joe Smiley prior to construction of New Circle Road. The Kentucky Heritage Council's website lists the Parkette as an outstanding example of Kentucky's Roadside Commercial Architecture 1920-1960, as well as the large neon-lit Parkette sign built in 1953/4 by the Ruggles Sign Company.

The Paul Miller Ford Showroom located at 965 East New Circle Road, was built in 1965. Although the showroom is not 50 years of age, it may be eligible for the NRHP due to its unique architectural style and design.

The Catalina Motel and sign are located at 1208 West New Circle Road. The sign and motel are reported to be around 30 years old. The Kentucky Heritage Council's website considers the sign an outstanding example of Kentucky's Roadside Commercial Architecture 1920-1960.

Idle Hour Park is located behind Lexington Mall and extends northeasterly until it adjoins New Circle Road. If any portion of this public park were affected, this would constitute a Section 4(f) issue. The park is comprised of 10.37 hectares (25.63 acres), with 2.82 hectares (6.98 acres) within the project area.

Cemeteries are also considered cultural resources, and are considered under federal law to be potential National Register properties if they meet the eligibility criteria. There are no known cemeteries in the project corridor.

In addition, detailed examination of the corridor will be necessary in subsequent project phases to ascertain the possible existence of other, previously unidentified resources and to establish specific historic site boundaries for those which are determined eligible for the National Register.

5.2.11 Archaeological Sites and Districts:

Archival and records research for archaeological resources was conducted for the corridor from the files of the Office of State Archaeology and the Kentucky Heritage Council. Based on this research, there are five known sites within the study corridor; however, only two of the five are within proximity of the road, and may be impacted by the proposed improvement. The first, 15Fa104, is a late Archaic site although OSA records do not describe the materials collected, and no publication is available for review. The second site, 15Fa9, is a large earth mound, possibly a fortification. Surface materials were collected but no excavation or further investigation was performed. No report discussing the findings is available for this site.

Although neither prehistoric nor historic site density is expected to be high, a systematic archaeological reconnaissance survey of the preferred project alternate is recommended during the NEPA project phase.

5.3 Winchester Road Business Access Loss Survey

The elimination of access points along New Circle Road will allow traffic to flow with fewer stop and go conditions, resulting in fewer accidents and less congestion. A section of New Circle Road where this strategy has been implemented is between Trade Center Drive and Industry Road/Sunshine Lane where the existing four-lane section was widened to six lanes. To evaluate the effectiveness of these modifications, a survey was performed which involved visiting all of the businesses along New Circle Road within this section. The survey compared previous access conditions to present access conditions based on changes in business activity and passing traffic. The survey gave the person contacted the option of expressing benefits and disadvantages to their businesses as a result of the modifications to New Circle Road.

The information obtained from the survey was broken down into categories based on previous vs. present access conditions. The three categories were: unchanged right- and left-turn access, right- and left-turn access changing to right-turn only access, and unchanged right-turn only access.

There were eight businesses that maintained a right- and left-turn access. Of these, only one business had a decline in customer activity; five remained unchanged; and two businesses had an increase in their customer activity. These businesses were also asked about the changes in traffic volumes on

New Circle Road. Seven businesses noticed no change, and one business noticed an increase in traffic volumes.

There were fourteen businesses that had their access changed from a right- and left-turn access to a right-turn only access. Of these, seven had a decline in customer activity; six noticed no change; and one business had an increase in customer activity. Seven businesses in this group observed that traffic volumes on New Circle Road had stayed the same, and seven businesses noticed an increase in traffic after the changes were complete.

The third group involved three businesses that maintained right-turn only access. Of these businesses, two had no change in customer activity; and one business had an increase. All of the businesses in this group saw no change in traffic volumes after the completion of construction.

The construction was a major inconvenience to all businesses in the area, but several businesses along New Circle Road commented that the implementation of the design throughout the area would decrease congestion. One business owner expressed that complaints were numerous at first; but as the customers adjusted to the design, the complaints have diminished. Some owners feel they have benefited from the change by making it easier for customers to enter and exit their business.

The elimination of access points and widening to six-lanes faced criticism during construction and after completion from business owners and customers; but these changes have resulted in less traffic congestion, and fewer accidents.

5.4 Dynamic Median Control

The proposed changes to New Circle Road will eliminate median turns with the exception of designated U-turns and intersections. This will improve the flow of traffic and safety in the system but will cause an inconvenience to some travelers and existing businesses. These changes do not allow flexibility along the median once construction is completed. During certain periods of the day median openings may not cause a problem but at other times these openings may contribute to congestion problems. Another problem associated with closing the median permanently is denying emergency vehicles access from their desired route. An application in which dynamic median control could provide left-turn access on New Circle Road is the fire station located between Bryan Station Road and Meadow Lane. The median access would be controlled by the fire station and would be

opened only during emergency situations.

The median openings could be controlled by several different measures: dynamic turn signs, dynamic delineators, closed circuit television (CCTV) camera, and enforcement cameras. The dynamic turn sign will display whether a particular movement is permitted at that time. The dynamic delineator is a flexible pylon that bends under pressure and then returns to its original position; it can be raised and lowered as needed. This device can be activated at set times or by a person monitoring the area by a CCTV, and enforcement cameras can be used to catch motorists who violate the prevented movement.

Dynamic Median Control can be used throughout a system or at a particular location depending on the conditions of the system. It allows the median to be altered at specific times of the day or for specific traffic conditions and, conceivably, could increase public acceptance of median closures.

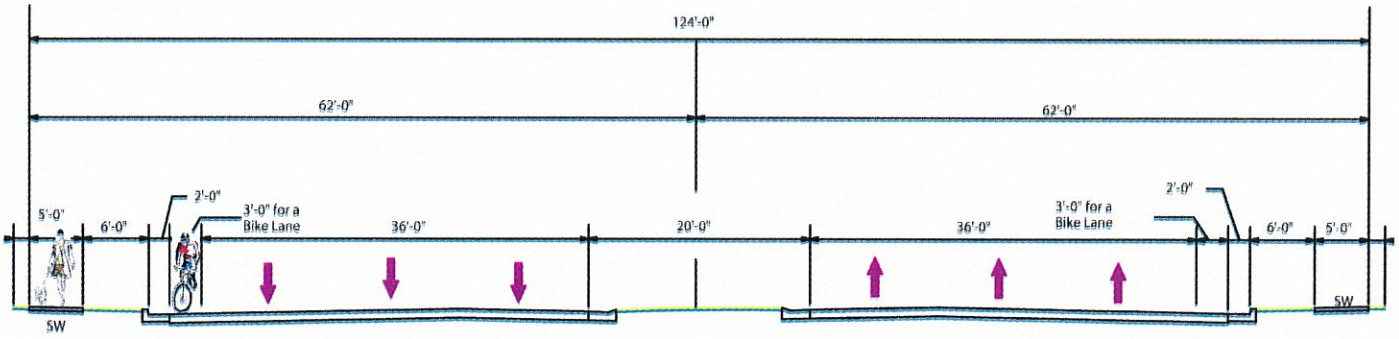
5.5 Pedestrian and Bikeways

Currently, there are no designated bikeways along this section of New Circle Road. Sidewalks have been recently added with the improvements to the Winchester Road interchange. Sidewalks have been added on both sides from Trade Center Drive to Industry Drive through most of this section. The sidewalk is absent however through the immediate Winchester Road bridge and ramp area. New Circle Road contains no other sidewalks other than this area.

The proposed typical section for improvements to Winchester Road all contain a curb and gutter section with a 5 foot sidewalk on both sides, similar to the Winchester Road improvement area. A bike lane or a shared use path has also been included as options. A bike lane is defined as a portion of a roadway that has been designated by striping, signing and pavement markings for preferential or exclusive use of bicycles. A shared use path is defined as a bikeway physically separated from motorized vehicular traffic by an open space or barrier and either within the highway right of way or within an independent right of way. Shared use paths may also be used for pedestrians, skaters, joggers, and other non-motorized uses.

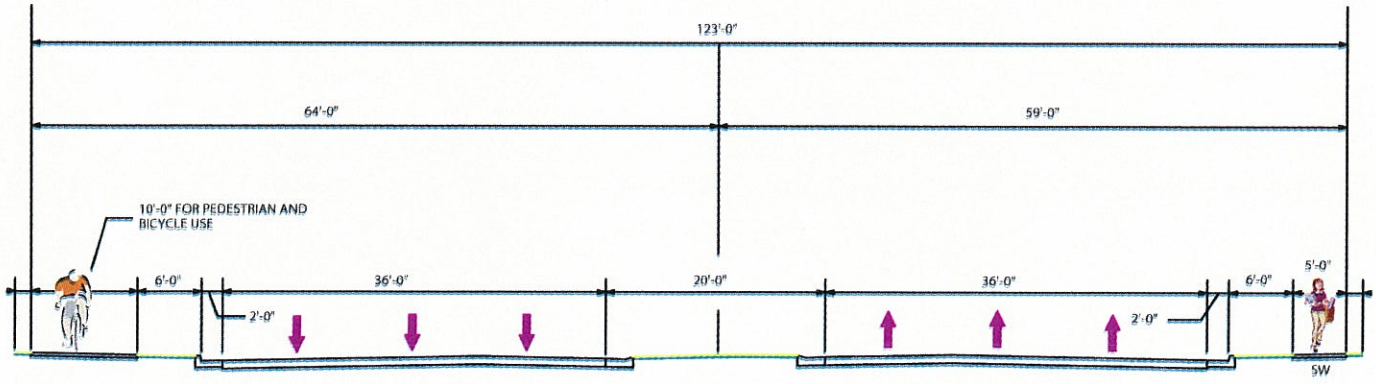
According to the AASHTO Guide for the Development of Bicycle Facilities, a one-way bike lane must be a minimum of 5 feet in width for a curb and gutter typical. Two feet of this lane can be the curb and gutter. By including the curb and gutter, placing bike lanes on both sides of New Circle

Road would add 6 feet to the typical section. Because bike lanes share the same pavement as vehicular lanes, they must be dealt with at intersections with regard to turning vehicles. This becomes more complicated with the use of right turn lanes. The numerous access points along New Circle Road may also cause safety problems for bike lanes and vehicles turning in front of them. With the numerous signalized intersections and access points, careful consideration will need to be given to the design of bike lanes on New Circle Road. However, due to the number of access points, a bike lane would be the preferable way to accommodate bicycles on New Circle Road since bicycles would have the right of way and be more visible to turning vehicles.



6 - LANE SECTION WITH A THREE FOOT BIKE LANE

For a shared use path, the minimum recommended width is 10 feet. The shared use path would also incorporate the sidewalk on one side of the roadway. A share use path can be used as a two-way bikeway. This would eliminate the need for a bicycle facility on one side of the roadway. Due these factors, a shared use path would require an additional five feet of right of way on one side of the roadway. The number of signalized intersections and access points will also pose problems for a shared use path along New Circle Road. AASHTO recommends a minimum of 5 feet between a shared use path and the roadway. A physical barrier is recommended for separations less than 5 feet.



6 - LANE SECTION WITH A TWO-WAY, DUAL ACCESS BIKE LANE

Other ways to accommodate bicyclists are allowing them to use paved shoulders and frontage roads. A paved shoulder would add a minimum 12 feet to the typical section for the shoulder plus the drainage would still need to be addressed. Frontage roads along New Circle Road are not consistent and therefore would not likely be used by bicyclists. For the limited access alternative, bicyclists and pedestrians would not be allowed on the limited access portion of New Circle Road.

Currently, very few bicyclists can be seen using New Circle Road. However, pedestrian activity within the corridor has increased. With the addition of the North Park Wal-Mart, pedestrian activity near Russell Cave Road has increased. Pedestrians have also been observed near Woodhill Drive, Bryan Station, Old Paris Pike, and Eastland Drive. Crosswalk striping and crosswalk signals are absent from many of the signalized intersections along New Circle Road. Some intersections, such as Russell Cave Road, have crosswalk signals that are not functioning properly. Due to these factors, pedestrian movements along New Circle are uncontrolled, creating safety concerns. Possible solutions to pedestrian safety on New Circle Road include the construction of pedestrian overpasses. However, pedestrian overpasses are costly and little used. The pedestrian demand would need to be great to justify the construction of a pedestrian overpass.

Another solution to pedestrian concerns is the use of pedestrian countdown buttons. Pedestrian countdown buttons are pedestrian signals that contain a digital clock timer that count counts down the amount of time left in the walk phase of the signal. The use of these buttons may instill confidence in the pedestrian signals and encourage people to use them more. The signal timing for New Circle Road also discourages pedestrians from crossing with the pedestrian signals. Due to the traffic demand, a long cycle length is used with a good proportion of the green time given to New Circle Road traffic. Pedestrians crossing New Circle Road cross with the cross street through traffic. The cross street traffic needs to be given enough green time to accommodate pedestrian crossing time

5.6 Lextran Bus Stops

Lextran currently has several bus routes that encompass the New Circle Road Northeast area. The following Lextran bus route either travel on or cross this section of New Circle Road:

5.6.1. Red Route #1 (Georgetown Road –Woodhill Drive) – This route crosses over New Circle Road on Georgetown Road on the northern end of the project. On the southern end, the route travels along New Circle Road from Woodhill Drive to Richmond Road. The route does not have stops on New Circle Road but does have stops on both Woodhill Drive and Palumbo Drive at Codell Drive.

5.6.2. Brown Route #2 (Newtown Road – Tates Creek Road) – This route travels along New Circle Road from Newtown Pike to Boardwalk and the North Park Wal-Mart with a stop at the Wal-Mart.

5.6.3. Blue Route #3 (Russell Cave Road – Nicholasville Road) – This route travels along New Circle Road from Russell Cave Road to Broadway. This route does stop on New Circle Road at the Housing Authority.

5.6.4. Purple Route #4 (New Circle Road – N. Limestone Road – Versailles Road) – This route travels along New Circle Road between N. Limestone and Eastland Drive. This route stops along N. Limestone at the K-Mart. This route services the Super Kroger's at Bryan Station Road and also contains a stop along New Circle Road at Eastland Drive.

5.6.5. Yellow Route #5 (Eastland Shopping Center – Harrodsburg Road.) – This route travels along New Circle Road between Eastland Drive and Creative Drive. This route services Sam's Warehouse on New Circle Road and Eastland Shopping Center on Eastland Drive and the U.S. Post Office and the AFDC offices on Creative Drive.

5.6.6. Green Route #6 (Leestown Rd. – Richmond Rd.) – This route crosses under New Circle Road at Richmond Road.

5.6.7. Pink Route #7 (Hamburg Pavilion – Winchester Rd. – Transit Center) – This route travels parallel to New Circle Road along Fortune Dr. between Winchester Rd. and Liberty Road. This route crosses New Circle Road at Liberty Road.

Any improvements to New Circle Road should consider the bus routes located on the corridor. Bus pull-offs should be constructed at major stop locations, such as the Housing Authority near Russell Cave Road. With the growing traffic congestion on New Circle Road and in Lexington, mass transit,

as well as other types of multi-modal transportation, will play a more vital role in the transportation system of the city.

5.7 Major Bridge Structures

There are six major bridge structures that cross over New Circle Road within the project corridor. There is also a railroad overpass located on Broadway approximately 500 feet south of the New Circle Road/Broadway intersection that may be affected by improvements to New Circle Road. New Circle Road also travels over Richmond Road at the eastern termini of the project. The structures and their current vertical clearance are shown in the table below:

Structure	Vertical Clearance	Horizontal Clearance
KY4 / Georgetown Road	14'9"	@ 53'
KY 4 / Newtown Pike	15'10"	@ 56'
KY 4 / IBM Overpass	15' 1"	@ 50'
KY 4 / RR Overpass @ Broadway	13' 7"	@ 38'
N. Broadway / RR Overpass	13' 2"	@ 44'
KY 4 / Winchester Road	16' 5" +	@ 70'
KY 4 / RR Overpass @ Liberty Rd.	15' 1"	@ 38'

The minimum vertical clearance for urban arterials is 16.5 feet. Based on this, all of the bridges that cross over New Circle Road, except for Winchester Road, will need to be raised. The existing horizontal clearance will also be impacted with the widening of New Circle Road. The speed limit from Georgetown Road to Boardwalk is 55 mph. This restricts the use of a curb and gutter section and requires 12 foot shoulders on the roadway. With the proposed six lane typical section, the minimum width of the roadway on each side of the centerline is 58 feet. An eight lane typical requires a width of 70 feet. These widths do not include any lateral clear zone or additional widening for guardrail. The widening would end east of the Georgetown Road Bridge with the scope of this study. However, the proposed reconstruction of the Georgetown Road Interchange may require the reconstruction of the existing bridge. With replacing the existing highway bridges, careful consideration to maintenance of traffic will need to be given. Phase construction of any replacement bridges should allow adequate width for the maintenance of traffic requirements.

The railroad overpass bridges on the project will also have to be replaced with any improvements to New Circle Road. The span lengths must be increased in addition to raising the railroad grade to provide adequate vertical clearance. All of the railroad bridges cross New Circle Road and Broadway

at a moderate to severe skew angle. When considering the proposed six lanes with a bike lane typical and a 30 degree skew angle, a bridge will need to span approximately 70 feet. With a Welded Steel Plate Girder with Ballast Trough structure, a 70 foot span will require a beam depth of approximately 4.67' (4' 8"). Allowing approximately 3 feet for the ballast trough, ties, and rails the entire bridge structure will need to be approximately 7' 8" in depth. To obtain the 16' 6" minimum vertical clearance, the minimum distance between the pavement of the highway to the top of the rails will need to be 24' 2". With the eight lane typical section and increased span length, the bridge structure depth will increase to 8' 4", resulting in grade to top of the rail distance of approximately 24' 10".

The amount that the railroad grade must be raised is calculated in the table below:

Structure	# Lanes	Skew Angle (degrees)	Existing Clearance	Existing Highway to Rail Depth	Proposed Clearance + Structure	Required Railroad Raising
NC@ Broadway	6 + Bike	30	13' 7"	19' 11"	24' 2"	4' 3"
NC@ Broadway	8	30	13' 7"	19' 11"	24' 10"	4'11"
NC@ Liberty	6 + Bike	25	15' 1"	21' 9"	23' 11"	2' 2"
NC@ Liberty	8	25	15' 1"	21' 9"	24' 8"	2' 11"
Broadway	3	50	13' 2"	21' 5"	24'10"	3' 5"

The proposed structure depth could be reduced from what is shown by using a thru-girder bridge. This would reduce the depth of the bridge structure by approximately 2 feet. The use of a thru-girder bridge, however, is not standard practice of the railroads and would likely not be approved. Another option to minimize the railroad grade modification is lowering the grade on the roadway. However, the existing drainage problems at all of the crossings make this option undesirable. The most feasible option at this time seems to be raising the grade of the railroad.

Maintenance of traffic must be addressed while the railroad bridges are being replaced. All railroad grades must be raised, by varying amounts, to meet current vertical clearance standards. To maintain rail traffic and allow for the rise in the railroad grades the new railroad bridges will be constructed parallel to the existing bridges. To save the expense and inconvenience of going through the transition twice, it is recommended that the new track become the permanent track.

For the crossing near Young Drive, W.T. Young Storage is located directly to the south of the railroad. Due to the location of the W.T. Young Storage buildings, the new bridge and track would be placed to the north of the existing bridge. Raising the vertical alignment of the railroad may

require the use of retaining walls between the old and new tracks. The railroad grade adjacent to New Circle Road is relatively flat and should accommodate raising the grade in the range of 2 to 3 feet. After construction of the new bridge, the old bridge will be removed, but the old tracks will need to remain as a siding to serve the existing loading docks along the south side.

The CSX crossing over New Circle near Broadway is complicated with the railroad being in a horizontal curve and the adjacent CSX crossing over Broadway being within approximately 600 feet. The railroad bridge must be raised at the New Circle Road crossing between 4'3" and 4'11", depending on the final alternative, with increased span lengths. Alternate 3 is the only alternate that requires replacement of the railroad bridge over Broadway, however, this project should address raising the bridge, regardless of alternate, to provide adequate vertical clearance. Due to the existing 50 degree skew, placing a five-lane curb and gutter section with a sidewalk would require a span of approximately 125 feet. Due to the long bridge span, it is recommended that a median be placed on existing Broadway in order to allow for a pier in the middle of the roadway. This would allow the maximum span to be reduced to approximately 80 feet.

Even though there are residents located directly to the south of the railroad near the Broadway crossing, the new bridge and track should be located on that side, and may require acquisition of 1 or 2 homes. In order to avoid these houses, the track would have to be shifted to the inside of the existing railroad curve. This would decrease the curve radius making the railroad curve sharper, which is undesirable. It would also impact the Shell gas and food mart at the corner of Broadway and New Circle Road. There is a double 6'x5' box culvert beneath the railroad embankment just to the northeast of New Circle Road. This box culvert will have to be lengthened to extend under both the new track and the new Broadway location. The main impact east of New Circle Road is the reduction in size of the Old Don Jacobs used car center. After construction of the new bridge, the old track and bridges will be removed.

Table Of Associated Railroad Structure Costs

Location	Estimated Permanent Structure Cost	Estimated Track Modification Cost	Total Railroad Structure Cost
NC@ Broadway	$550,000	$150,000	$700,000
NC@ Liberty	$550,000	$150,000	$700,000
Broadway	$600,000	$150,000	$750,000

5.8 Drainage Effects

5.8.1 Flood Prone Areas

Several flood prone areas exist throughout the New Circle Road N.E. corridor that will need to be carefully examined with the roadway expansion. The most notable areas of concern are listed below.

New Circle Road Between Boardwalk and Newtown Pike

Several members of the public commented at the public meetings that flooding occurs at the point were a tributary of Cane Run crosses New Circle Road in front of Lexmark. Many people have said that there have been instances where New Circle Road has been under water in this area. The culvert under New Circle Road for the Cane Run tributary needs to be examined to determine the proper sizing to maintain adequate freeboard between the roadway and the headwater of the required design rainfall event.

Cane Run Between Russell Cave Road and Newtown Pike

Cane Run, which runs parallel to and north of New Circle Road between Russell Cave Road and Newtown Pike, is suspected to currently cause flooding downstream. The additional runoff from the New Circle Road N.E. expansion would worsen the situation. Measures need to be taken not to increase the peak flows within Cane Run.

New Circle Road @ Broadway (Under CSX Railroad Bridge)



Flooding is a common occurrence at this location. The piping system and cross drain under New Circle Road need to be examined to determine if capacity problems exist. This low area receives all of the drainage of New Circle Road from the high point near Meadow Lane, which is nearly one mile away. Significant storm water detention will be needed along New Circle Road from the vicinity of Meadow Lane down to the CSX Railroad Bridge to reduce the flooding in this area.

North Side of New Circle Road Between Bryan Station Road and Old Paris Pike

Consideration needs to be given to an existing sinkhole in this area and how the expansion of New Circle Road will effect the local groundwater issues. In addition, consideration needs to be given to the floodplains in this area and how construction will effect them.

New Circle Road @ Floyd Drive

The capacity of an existing culvert under New Circle Road near Floyd Drive needs to be studied as part of the roadway expansion. Downstream flooding to homes is known to occur in this area.

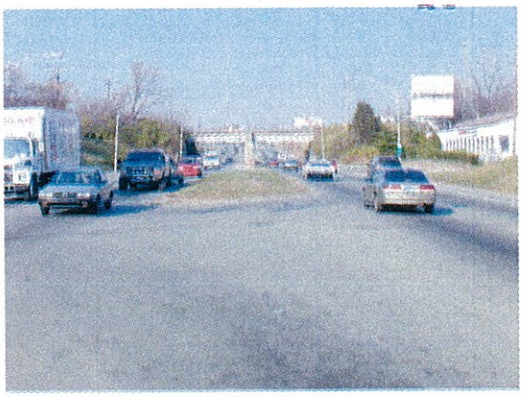
New Circle Road @ Yates Elementary School

Consideration needs to be given to flooding problems caused by drainage beneath and from New Circle Road at Yates Elementary School.

New Circle Road @ Liberty Road

The storm water piping system at the intersection of New Circle Road and Liberty Road needs to be evaluated to determine if capacity problems exist.

New Circle Road @ CSX Bridge (Between Liberty Road & Palumbo Drive)



Flooding is also known to occur in this location along New Circle Road beneath the CSX railroad bridge. The storm water piping system is inadequate to handle heavy rainfall amounts.

New Circle Road @ Woodhill Drive

The capacity of an existing culvert under New Circle Road south of Woodhill Drive needs to be studied as part of the roadway expansion.

Correspondence was received from Darryl Bennett of L.F.U.C.G.'s Division of Engineering regarding storm water drainage issues. In addition to discussing the aforementioned flood prone areas, he had the following general guidelines to be followed for storm water design:

- Design and construct improved pipe and culvert systems where examination and calculations show them to be inadequate.
- Install storm water devices that will attenuate increased peak flow due to additional impervious area.
- Discuss drainage issues with neighborhood organizations and interested property owners prior to planning and design.
- Complete design and construction of the roadway improvements in such a manner that flooding of structures and surrounding areas will neither be caused nor worsened.

5.8.2 Detention Basin Relocations

There are only a handful of locations throughout the New Circle Road N.E. corridor where the roadway expansion and improvements will interfere with existing storm water detention basins. Below is a discussion of these areas:

Wendy's Restaurant @ Corner of New Circle Road & Boardwalk

A detention basin is located in front of Wendy's Restaurant. Alternate 3 will interfere with this detention basin. Underground detention can be used beneath the proposed roadway to equal the outlet control condition that are existing.

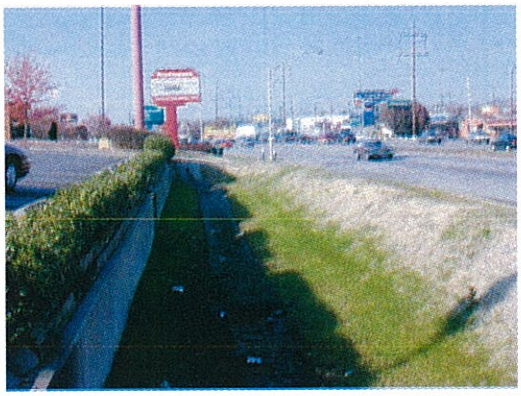
Blue Grass Auto Source @ Corner of New Circle Road & Colesbury Circle

Another detention basin is located adjacent to Bluegrass Auto Source. Alternate 3 may slightly interfere with this detention basin. Surface detention would be able to be maintained by slightly reshaping the existing detention basin.

Vacant Lot in Front of North Park Marketplace

There is also a small detention basin located at the front of a vacant lot at the front of North Park Market Place next to Krystal's Restaurant. Alternate 3 may slightly effect this basin. Surface detention should be able to be maintained after the roadway improvements are made.

Shoney's Restaurant (Now Closed) Between Russell Cave Rd. & Broadway



The berm to the right of this detention basin could be slightly impacted by Alternates 2 & 3. The existing volume of this detention basin will remain unchanged with grading changes to the berm.

North Broadway Auto Sales (Paris Pike / U.S.68/27)

The tie-in to Paris Pike, north of New Circle Road (Alternate 3) will impact an existing detention basin in front of North Broadway Auto Sales. This basin will have to be re-constructed as either surface or underground detention if Alternate 3 is constructed.

Auto Zone @ Corner of New Circle Road & Liberty Road



This small detention basin will be affected by Alternate 2 or 3. It will be difficult to maintain the existing basin volume with surface detention. Underground detention would be a good application with this situation in the event that Alternate 2 or 3 is constructed.

Woodhill Circle Plaza Between Palumbo Drive and Woodhill Drive



This detention basin will be impacted by Alternate 3. Some surface detention will be able to remain intact with Alternate 3, but a portion of the displaced volume will have to be accounted for with underground detention.

Overall, there will be little impact to existing detention basins with construction improvements along the corridor of New Circle Road N.E. mainly because there are very few detention basins to begin with. All three of the alternates will result in a much better storm sewer system than what is now existing because the roadside ditches present along a major portion of New Circle Road N.E. will be replaced by a curb and gutter roadway with a storm sewer system. The inadequacies of the current ditch and culvert system actually aid in detaining storm water. Therefore, the proposed detention facilities will take into account the widening of the roadway plus the faster times of concentration due to the improved curb, gutter, and storm sewer system. These facilities will be designed so that

flooding will neither be caused nor worsened in areas downstream of the New Circle Road N.E. construction improvements. A number of these detention facilities will most likely be underground due to the unavailability of additional right of way for surface detention basins.

5.9 Additional Considerations

Any features of the alternates (roundabouts, turn lanes, signalized intersections, etc.) may need to be reevaluated further as the project progresses into the design phase. Additionally, due to the age of the development area, many structures that are not historically significant now, may become so by the time the project is constructed. These may have to be reevaluated as the project progresses due to changes in demographics along the project corridor.

6.0 SUGGESTED CONSTRUCTION PROJECTS AND SEQUENCING

Due to the near 100 million dollar combined cost of the improvements, construction will have to be sequenced. Twelve decision sections of the study area have been combined into six suggested construction projects costing between 8 and 25 million dollars each. Each of these construction projects can be built and used as stand alone improvements without any of the other projects being built. This allows the complete improvement to be built in pieces, as funding is available.

The construction project sequence is listed below:

Winchester Road to Liberty Road	$8,500,000
Liberty Road to Woodhill Drive	$11,500,000
North Limestone to Winchester Road	$15,300,000
North Broadway/Paris Pike	$24,100,000
Boardwalk to Russell Cave Road	$21,100,000
Newtown Pike interchange	$15,600,000 (This project may be accelerated to coincide with proposed Newtown Pike improvements)
Total	$96,100,000

Project 1, Winchester to Liberty Road: There are no changes proposed for the Winchester Road Interchange. The existing six lane New Circle Road section with curb and gutter and a closed median that exists between Pridemore Court/Jingle Bell Lane and Trade Center Drive will be extended to Liberty Road. Only right turns into and out of the side streets will be permitted at Pridemore Court/Jingle Bell Lane, Family Circle, and Christian Road. Left turn movements will be accommodated via mid-block U-turn Lanes or at signalized intersections. The Trade Center Drive intersection will not be changed.

Project 2, Liberty Road to Woodhill: New Circle Road will be widened to eight lanes with curb and gutter and closed median from Liberty Road to Woodhill Drive. Roundabouts are to be placed on Liberty Road on either side of New Circle Road in a "bowtie" configuration at the intersection of Christian Road and another at Creative Drive. The New Circle Road intersections of Christian Road and Creative Drive will permit only right turns in and out. Only thru and right turn movements will be permitted at the intersection of New Circle Road and Liberty Road. Motorists wishing to turn left onto Liberty Road from either direction will exit New Circle Road via a right turn on the Christian

Road or Creative Drive loops, then make another right turn onto Liberty Road and cross New Circle Road as a thru movement. The existing signalized intersection configurations at Young Drive and Palumbo Drive will remain unchanged with the exception of a three lane median allowing a full left turn lane into Young Drive and dual left-turn lanes from southbound New Circle Road to Palumbo Drive. Dual left turns will also be added from Palumbo to southbound New Circle Road. This will continue to be an at-grade traffic signal controlled intersection. An additional left-turn lane from southbound New Circle Road to Woodhill Drive and a thru/left-turn lane from Woodhill Drive to southbound New Circle Road will be added to the existing configuration. All existing movements and turn lanes will be retained.

Project 3, North Limestone to Winchester Road: The existing six lane New Circle Road section with curb and gutter and a closed median that exists between Industry Road/Sunshine Lane and Eastland Drive will be extended back past North Limestone. Traffic signals will remain at North Limestone/Old Paris Pike, Bryan Avenue/Bryan Station Road, Industry Road/Sunshine Lane, and Eastland Drive. Dual left-turn lanes would be added from eastbound New Circle Road onto Bryan Station Road and from eastbound New Circle Road onto Eastland Drive. Only right turns will be permitted into and out of Meadow Lane and Floyd Drive with left turns being accommodated via mid-block U-turn lanes. A mid-block U-turn or a controllable median opening would allow left turns out of the fire station.

Project 4, Paris Pike/Broadway: N. Broadway will be realigned to the east of the CSX railroad, bridging over New Circle Road and passing over or under the railroad to tie back into existing Paris Pike. The remaining stubs of N. Broadway and Paris Pike will connect to the relocated road with T-intersections on each side of New Circle Road. The T-intersections will be signalized with dual left turn lanes, dual through lanes, and single right turn lanes. There will be no signal nor cross traffic on New Circle Road and the two stub ends of N. Broadway and Paris Pike at New Circle Road will have dual right-turn lanes entering and exiting New Circle.

Project 5, Boardwalk/Colesbury Circle to Russell Cave Road: The median will be closed at Boardwalk/Colesbury Circle permitting only right turns into and out of these side streets. Left turns will be accommodated via mid-block U-turn lanes along New Circle Road to either side of the intersection. A Single Point Urban Interchange will be constructed at Russell Cave Road.

Project 6, Newtown Pike Interchange: A Single Point Urban Interchange will replace the existing interchange. This project may be accelerated to coincide with other Newtown Pike improvements.

Georgetown Road Interchange: Replacing the existing interchange with a Single Point Urban Interchange should be considered as a separate project.

Richmond Road Interchange: Replacing the existing interchange with a Single Point Urban Interchange should be considered as a separate project.

EXHIBIT 1

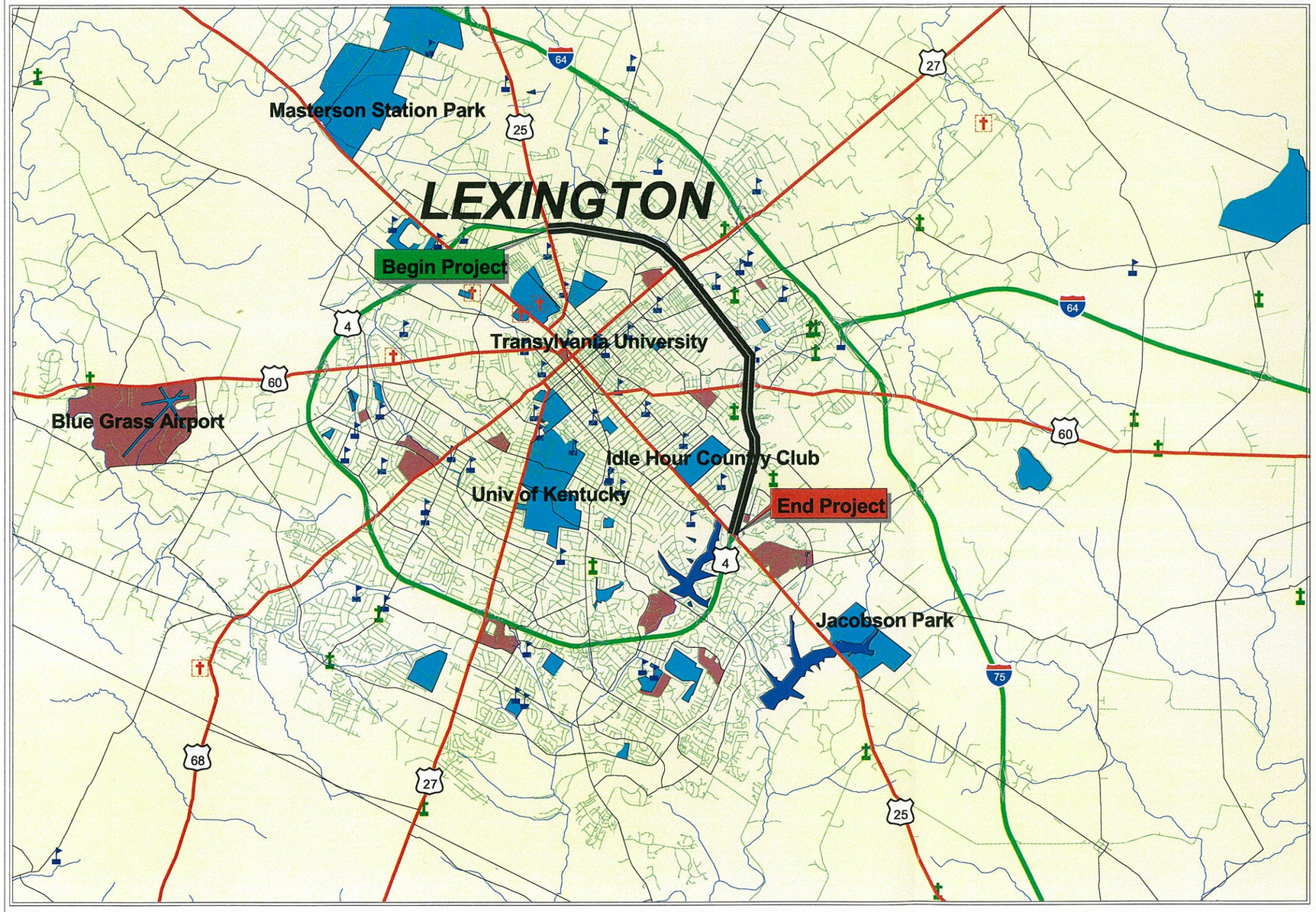
PROJECT LOCATION MAP

Palmer ENGINEERING

AMERICAN

NEW CIRCLE ROAD--KY 4

Georgetown Road to Richmond Road



5 0 5 10 Miles

PROJECT VICINITY MAP

Legend

Road

- Primary road w/limited access
- Primary road
- Secondary/connecting road
- Access ramp
- Water
- Street
- River
- School
- Cemetery
- Church
- Public Facilities
- Landmark

N W E S

Palmer ENGINEERING

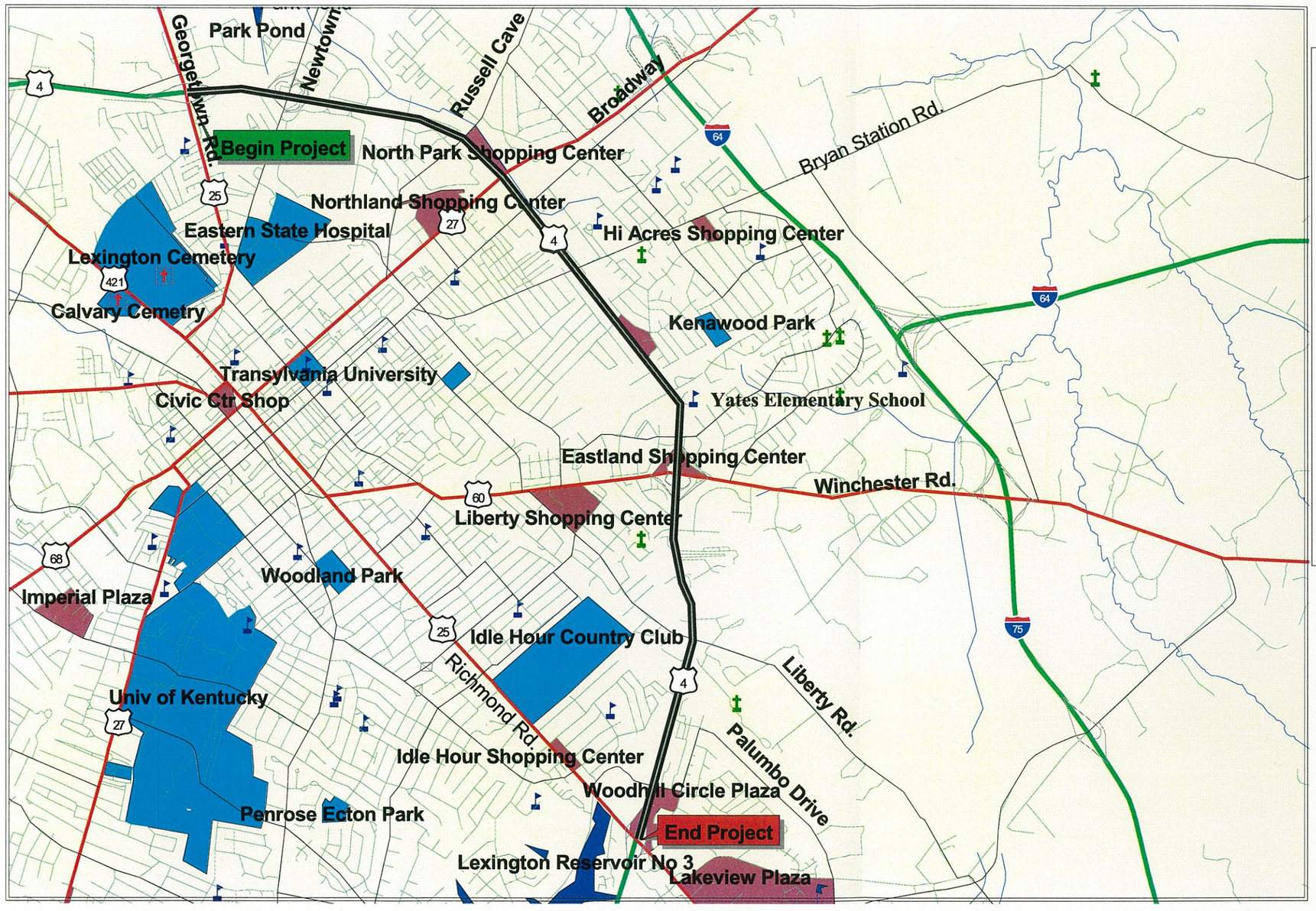
AMERICAN

Fayette County



NEW CIRCLE ROAD--KY 4

Georgetown Road to Richmond Road



2 0 2 4 Miles

PROJECT CORRIDOR MAP

Legend

Road

- Primary road w/limited access
- Primary road
- Secondary/connecting road
- Access ramp
- Water
- Street
- River
- School
- Cemetery
- Church
- Shopping Center
- Landmark

N W E S

Palmer ENGINEERING

AMERICAN

Fayette County



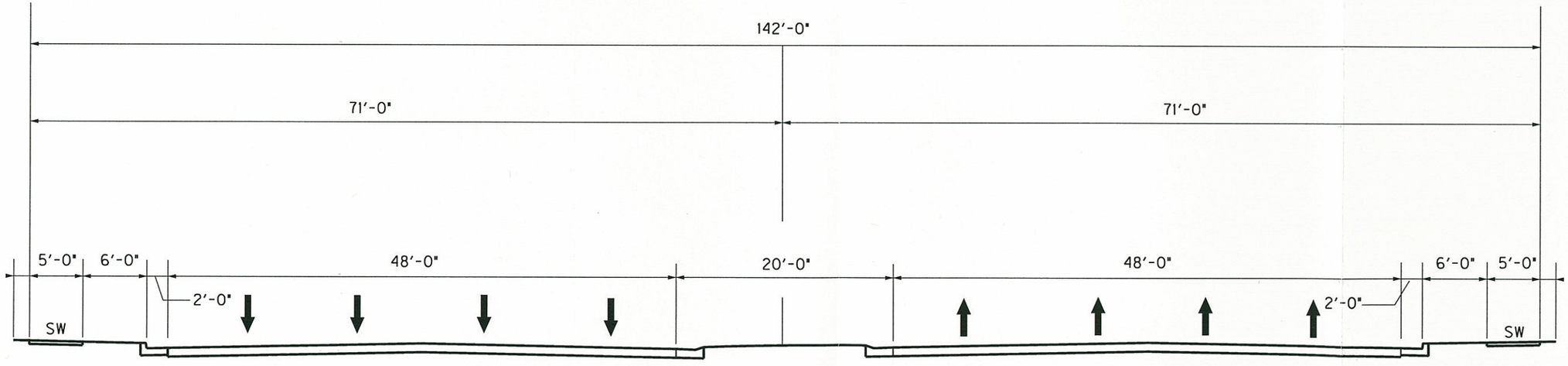
EXHIBIT 2

TYPICAL SECTIONS

Palmer ENGINEERING

AMERICAN

COUNTY OF	FISCAL YEAR	SHEET NO.	TOTAL SHEETS

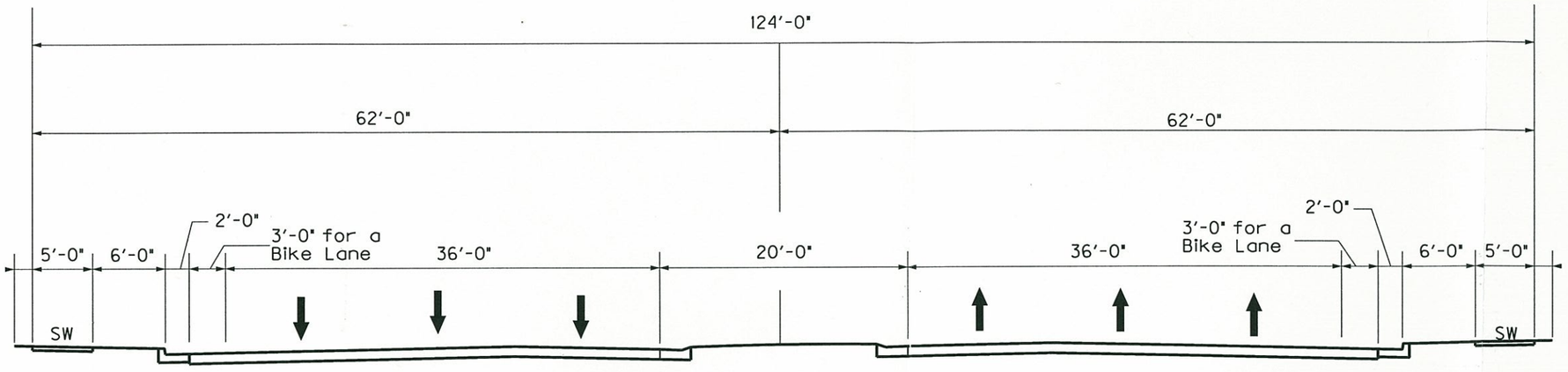


8 - LANE SECTION

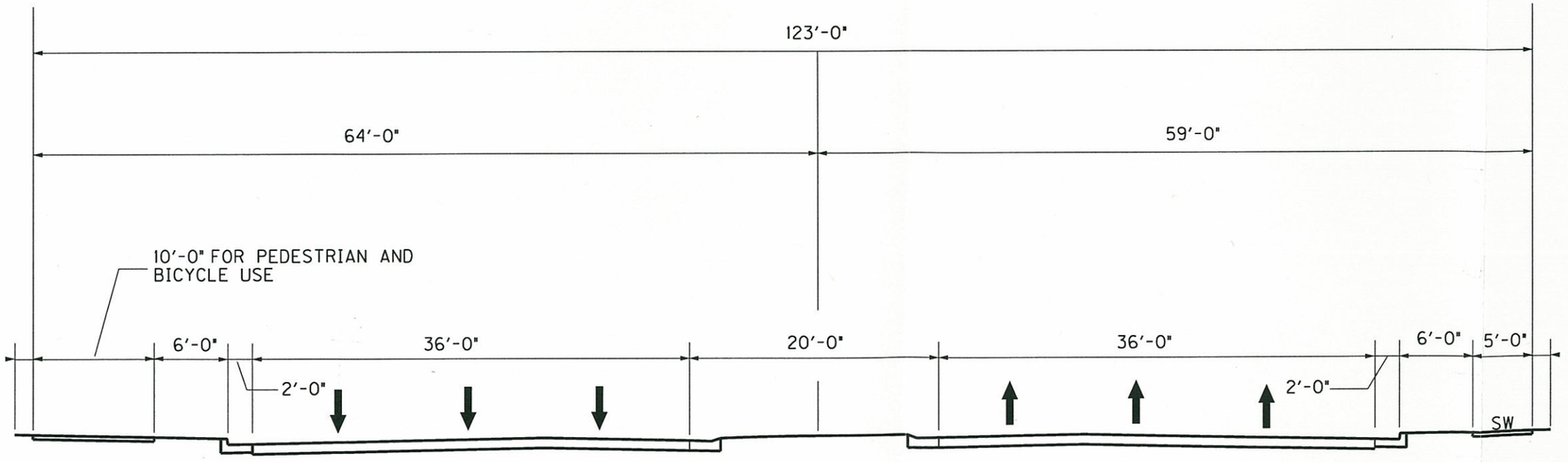
TYPICAL SECTIONS
NEW CIRCLE ROAD

TYPICAL DGN 04/17/2002

COUNTY OF	FISCAL YEAR	SHEET NO.	TOTAL SHEETS



6 - LANE SECTION WITH A THREE FOOT BIKE LANE



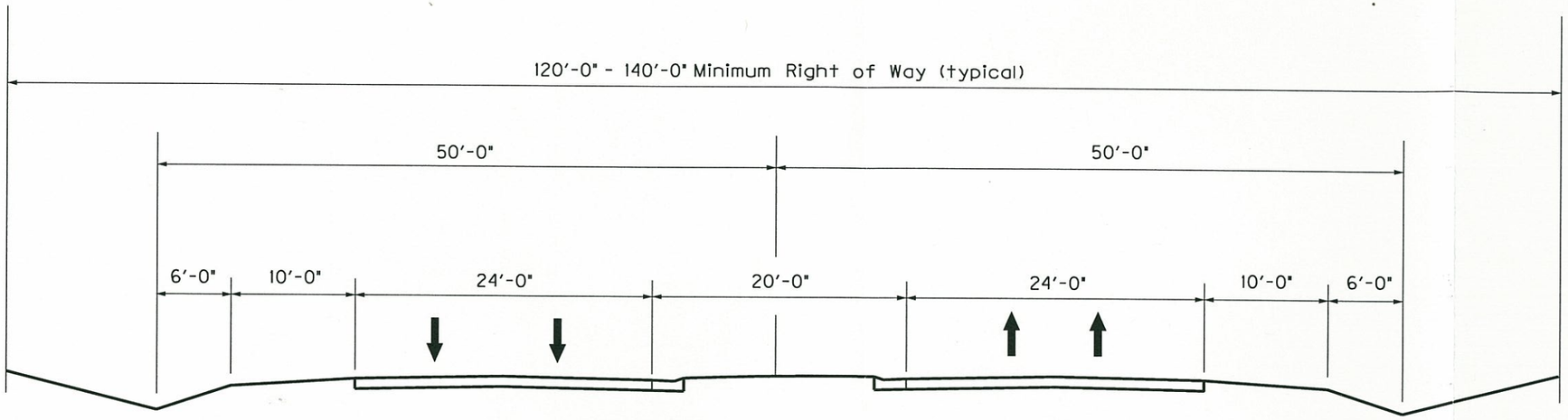
6 - LANE SECTION WITH A TWO-WAY, DUAL ACCESS BIKE LANE

TYPICAL SECTIONS
NEW CIRCLE ROAD

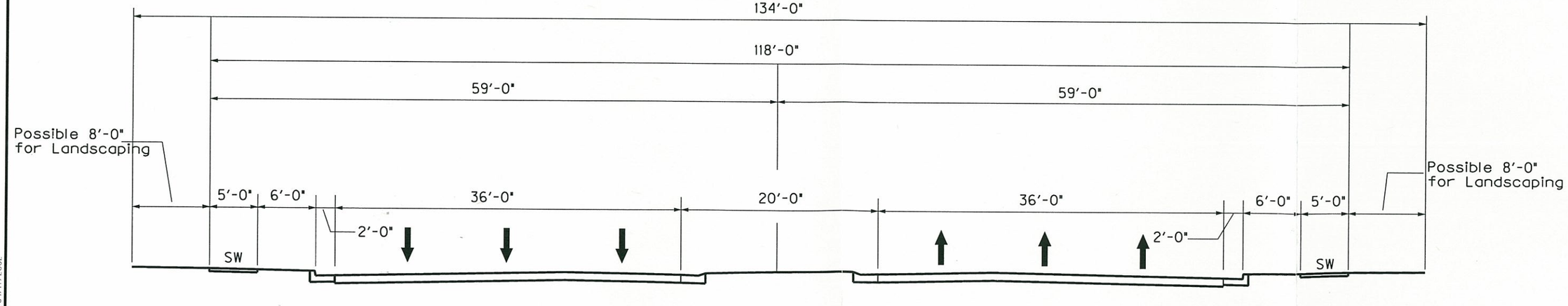
04/17/2002

TYPICAL.DGN

COUNTY OF	FISCAL YEAR	SHEET NO.	TOTAL SHEETS



4 - LANE SECTION



6 - LANE SECTION

TYPICAL SECTIONS
NEW CIRCLE ROAD

TYPICAL.DGN 04/17/2002

EXHIBIT 3

INTERSECTION TURNING MOVEMENTS

Palmer ENGINEERING

AMERICAN

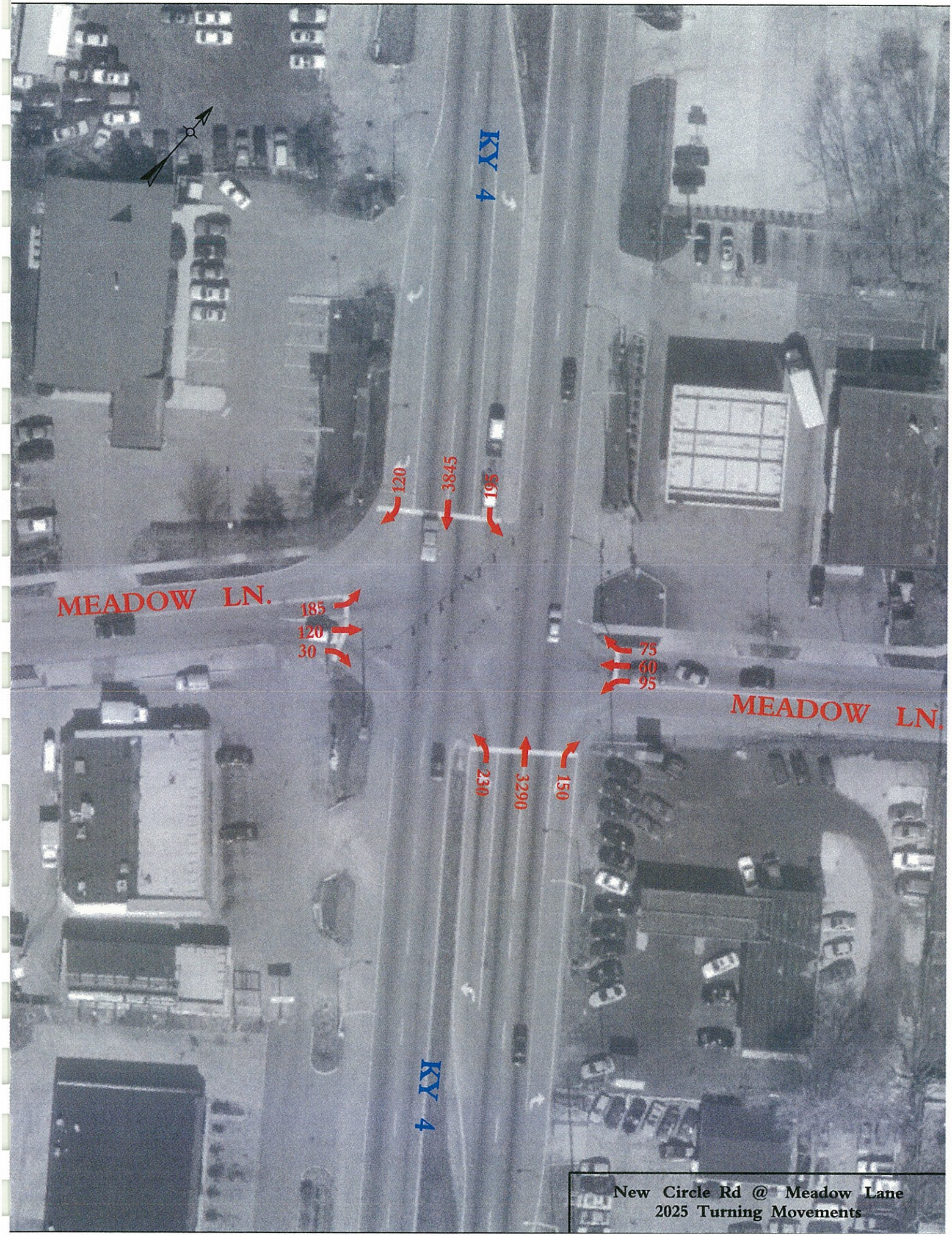
New Circle Road @ Boardwalk\Colesbury
2025 Turning Movements
KY 4
NEW CIRCLE RD.
BOARDWALK
COLESBURY CIRCLE
30
2790
50
170
30
835
165
30
30
170
3530
370

New Circle Road @ Russell Cave Road
2025 Turning Movements
KY 4
NEW CIRCLE RD.
RUSSELL CAVE RD.
RUSSELL CAVE RD.
390
2100
810
540
555
390
370
950
400
630
2990
60

New Circle Road @ North Broadway
2025 Turning Movements

New Circle Rd @ North Limestone St.\
Old Paris Road
2025 Turning Movements
KY 4
NEW CIRCLE RD.
LIMESTONE ST.
OLD PARIS RD.
230
3040
330
500
475
280
300
205
110
300
3240
140

New Circle Rd @ Bryan Station
2025 Turning Movements
KY 4
NEW CIRCLE RD.
BRYAN AVE.
BRYAN STATION
460
2890
200
250
100
420
500
110
290
470
3410
350


KY 4
120
3845
195
MEADOW LN.
185
120
30
75
60
95
MEADOW LN.
230
3290
150
KY 4
New Circle Rd @ Meadow Lane
2025 Turning Movements

New Circle Rd @ Floyd Drive
2025 Turning Movements
NEW CIRCLE RD.
KY 4
FLOYD DR.
GREEN'S
LINCOLN\
MERCURY
3435
215
3550
40
235
190

New Circle Rd @ Industry Road\
Sunshine Lane
2025 Turning Movements
KY 4
NEW CIRCLE RD.
INDUSTRY RD.
SUNSHINE LN.
30
370
150
200
70
230
80
840
200
50
50
120

New Circle Rd @ Eastland Drive
2025 Turning Movements
KY 4
NEW CIRCLE RD.
EASTLAND DR.
EASTLAND DR.
540
2920
220
230
165
280
330
155
350
485
3420
245

New Circle Rd @ Pridemore Road\
Jingle Bell Lane
2025 Turning Movements
NEW CIRCLE RD.
KY 4
JINGLE BELL LN.
PRIDEMORE CT.
200
5
150
150
3520
50
60
5
50
100
2900
40

New Circle Rd @ Trade Center Drive\
Mall Outlet
2025 Turning Movements
KY 4
NEW CIRCLE RD.
TRADE CENTER DRIVE
Mall Outlet
345
2725
20
300
10
270
15
20
15
355
345
20

New Circle Rd @ Family Circle \
Solid Platinum
2025 Turning Movements
NEW CIRCLE RD.
KY 4
FAMILY CIRCLE
SOLID PLATINUM
10
2875
105
200
145
15
10
15
10
3500
120

New Circle Rd @ Christian Drive
2025 Turning Movements

New Circle Rd @ Liberty Road
2025 Turning Movements
LIBERTY RD.
LIBERTY RD.
NEW CIRCLE RD.
KY 4
200
280
495
500
2410
300
380
400
445
280
2980
400

New Circle Rd @ Creative Drive
2025 Turning Movements
NEW CIRCLE RD.
KY 4
CREATIVE DR.
3170
170
3900
20
40
170

New Circle Rd @ Young Drive
2025 Turning Movements

New Circle Rd @ Palumbo Drive\
Quantrell Cadillac
2025 Turning Movements
NEW CIRCLE RD.
KY 4
PALUMBO DR.
QUANTRELL CADILLAC
530
15
350
540
3260
10
410
2430
20
30
15
30

New Circle Rd @ Woodhill Drive
2025 Turning Movements
KY 4
NEW CIRCLE RD.
WOODHILL DR.
WOODHILL DRIVE
870
2340
100
120
90
70
1095
50
450
425
3165
50

EXHIBIT 4

BUILD ALTERNATE 1

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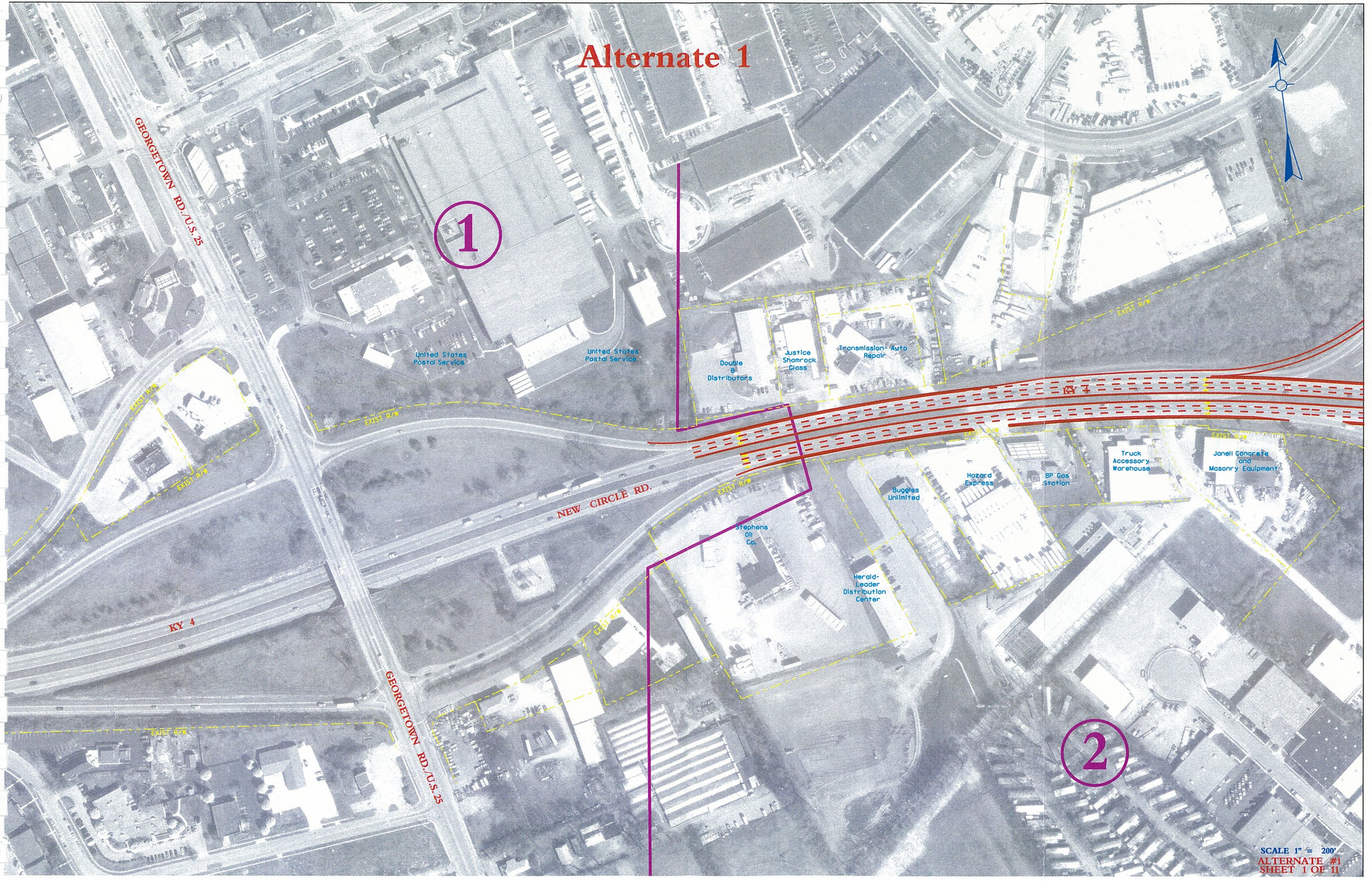
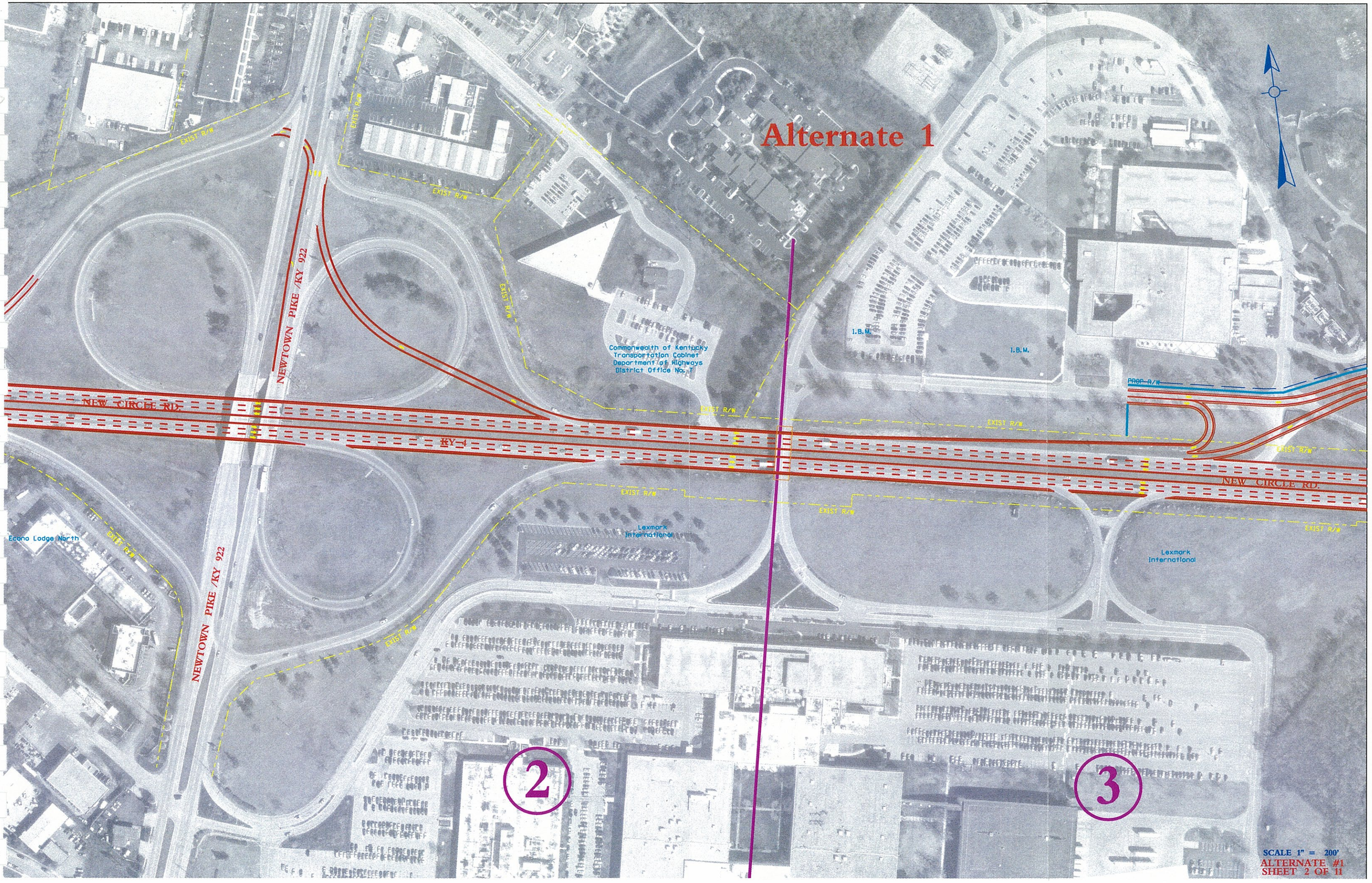
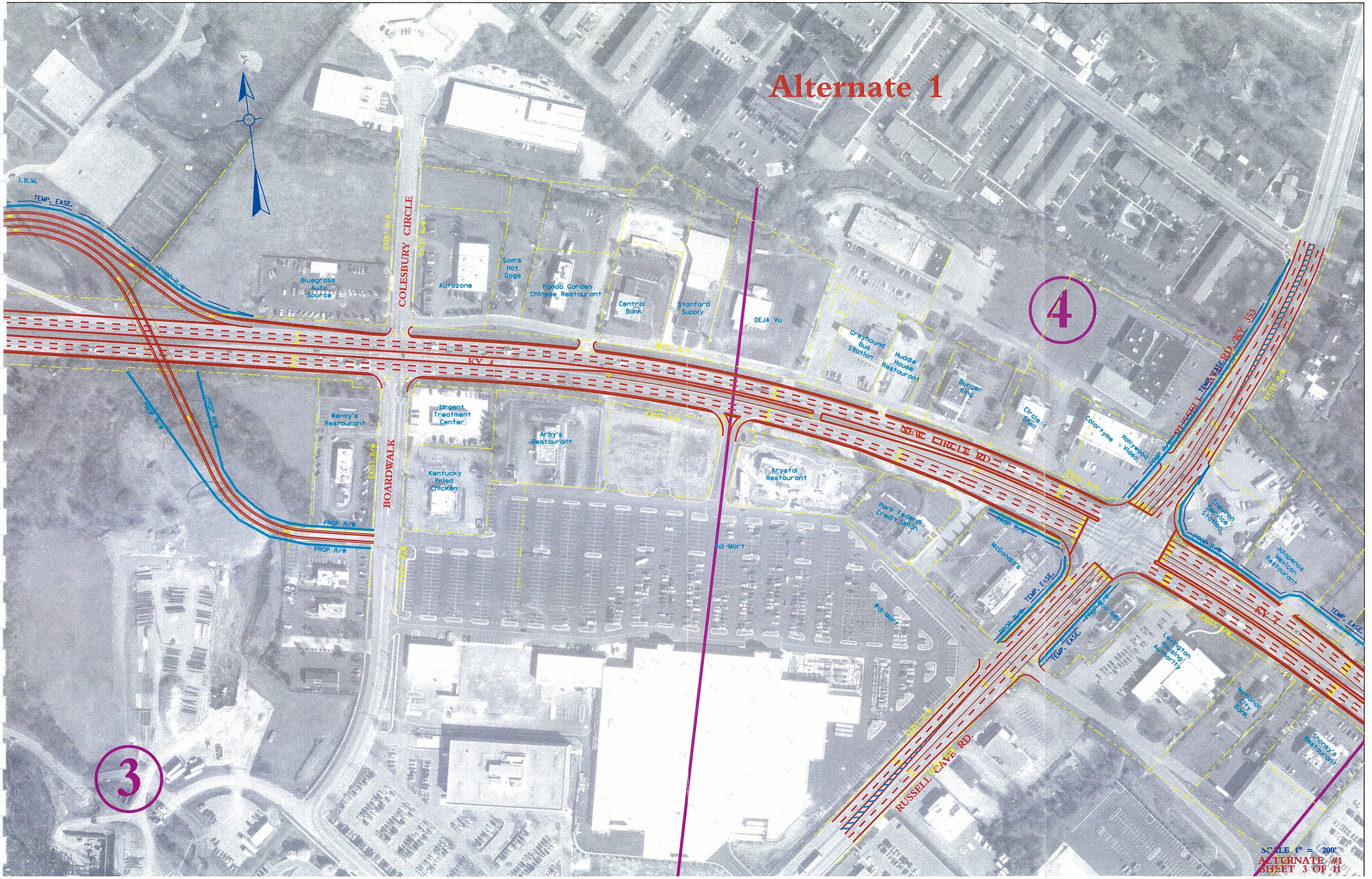
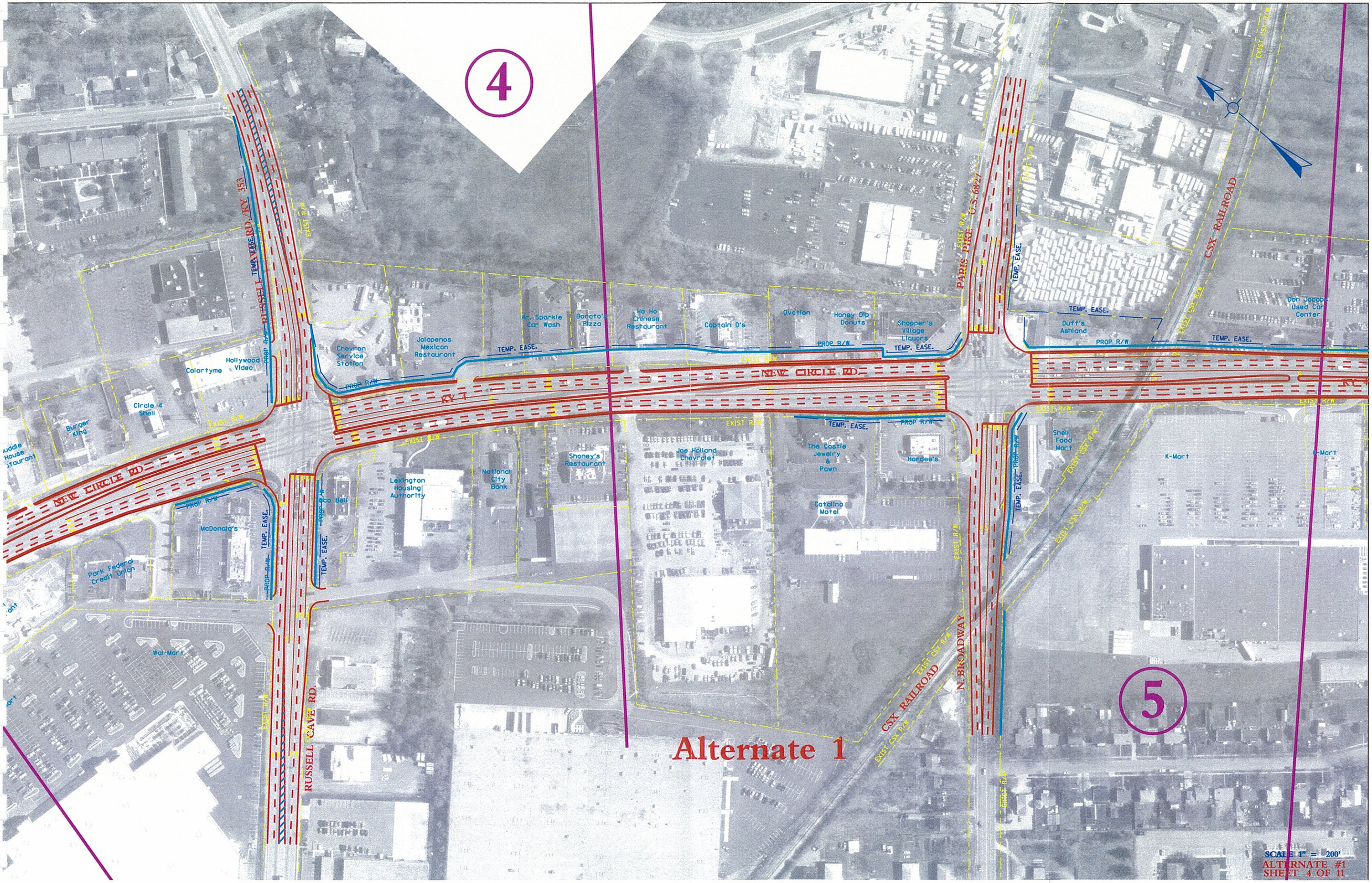
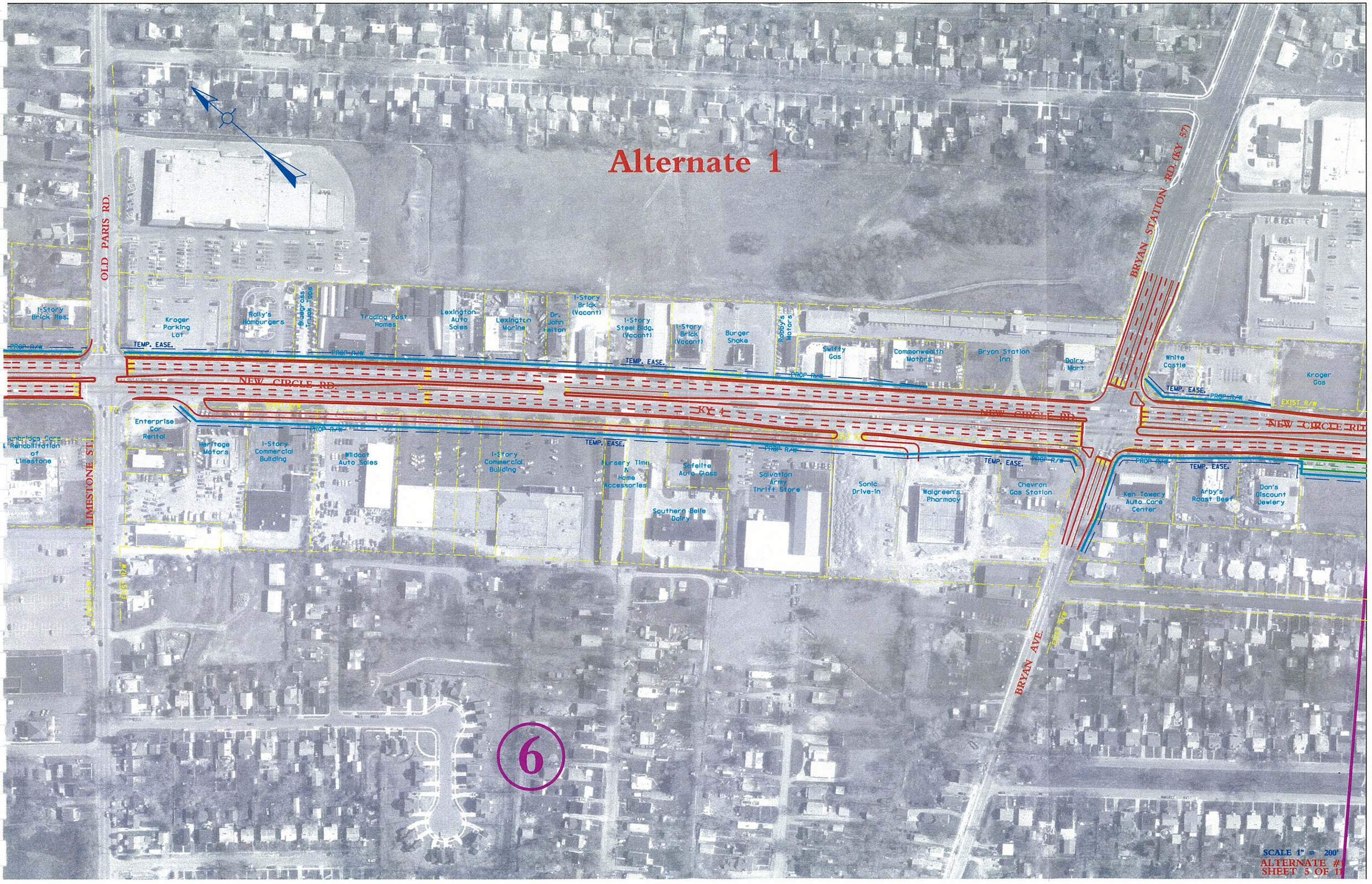
AMERICAN


Alternate 1
GEORGETOWN RD./U.S.25
1
United States Postal Service
United States Postal Service
Double B Distributors
Justice Shamrock Glass
Transmission- Auto Repair
EXIST R/W
KY 4
NEW CIRCLE RD.
Truck Accessory Warehouse
Janell Concrete and Masonry Equipment
Buggies Unlimited
Hazard Express
BP Gas Station
Stephens Oil Co.
Herald-Leader Distribution Center
KY 4
GEORGETOWN RD./U.S.25
2
SCALE 1" = 200'
ALTERNATE #1
SHEET 1 OF 11

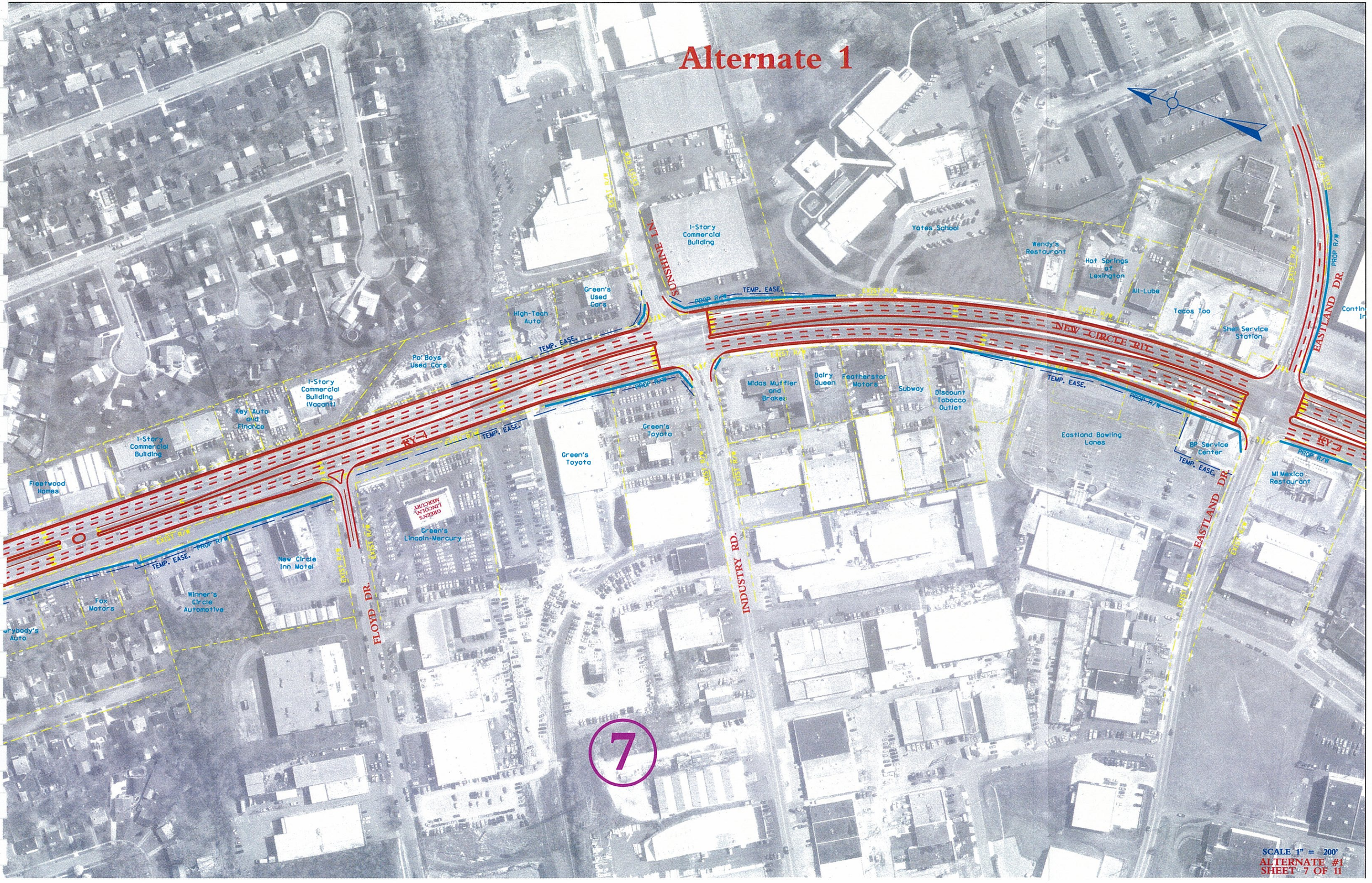

Alternate 1
NEWTOWN PIKE /KY 922
NEW CIRCLE RD.
KY-4
EXIST R/W
PROP R/W
Commonwealth of Kentucky
Transportation Cabinet
Department of Highways
District Office No. 7
I.B.M.
Lexmark
International
Econo Lodge North
2
3
SCALE 1" = 200'
ALTERNATE #1
SHEET 2 OF 11

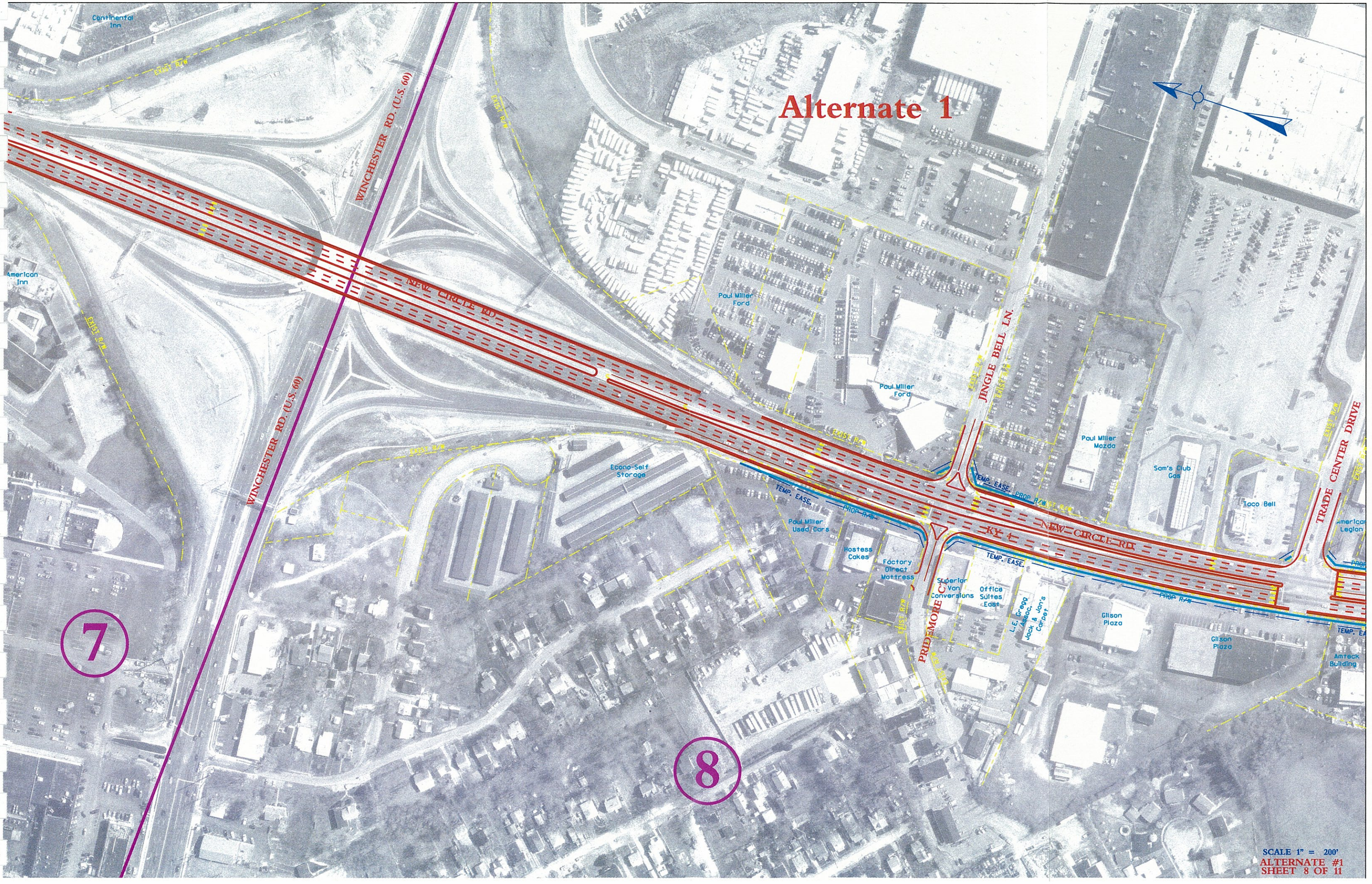

Alternate 1
I.B.M.
TEMP. EASE.
PROP R/W
EXIST R/W
COLESBURY CIRCLE
Bluegrass Auto Source
Autozone
Sam's Hot Dogs
Panda Garden Chinese Restaurant
Central Bank
Stanford Supply
DEJA Vu
Greyhound Bus Station
Huddle House Restaurant
Burger King
Circle K
Color-tyme
Hollywood Video
KY 4
NEW CIRCLE RD.
RUSSELL CAVE RD. TEMP. REVERSED KY 353
Wendy's Restaurant
Urgent Treatment Center
Arby's Restaurant
Kentucky Fried Chicken
BOARDWALK
Krystal Restaurant
Park Federal Credit Union
Wal-Mart
McDonald's
Chevron Service Station
Jalapenos Mexican Restaurant
Lexington Housing Authority
National City Bank
Shoney's Restaurant
RUSSELL CAVE RD.
4
3
SCALE 1" = 200'
ALTERNATE #1
SHEET 3 OF 11

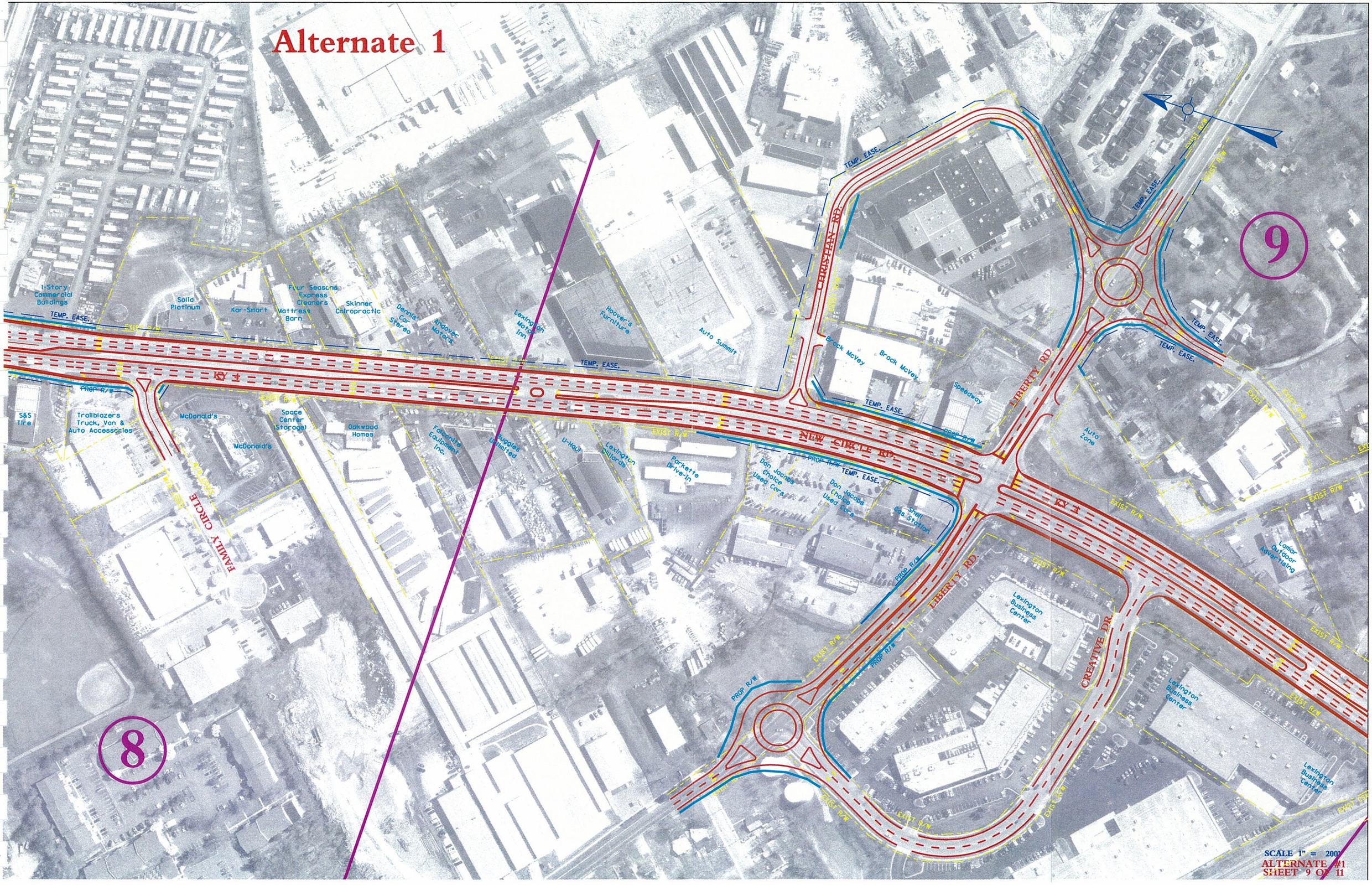

4
5
Alternate 1
NEW CIRCLE RD.
KY 4
RUSSELL CAVE RD.
RUSSELL RD. / KY 353
PARIS PIKE U.S. 6827
N. BROADWAY
CSX RAILROAD
TEMP. EASE.
PROP R/W
EXIST R/W
EXIST CSX R/W
Wr. Sparkle Car Wash
Donato's Pizza
Ho Ho Chinese Restaurant
Captain D's
Ovation
Honey Dip Donuts
Shopper's Village Liquors
Duff's Ashland
Don Jacobs Used Car Center
Chevron Service Station
Jalapenos Mexican Restaurant
Hollywood Video
Colortyme
Circle 4 Shell
Burger King
Lexington Housing Authority
National City Bank
Shoney's Restaurant
Joe Holland Chevrolet
The Castle Jewelry & Pawn
Hardee's
Catalina Motel
Shell Food Mart
K-Mart
McDonald's
Park Federal Credit Union
Wal-Mart
SCALE 1" = 200'
ALTERNATE #1
SHEET 4 OF 11

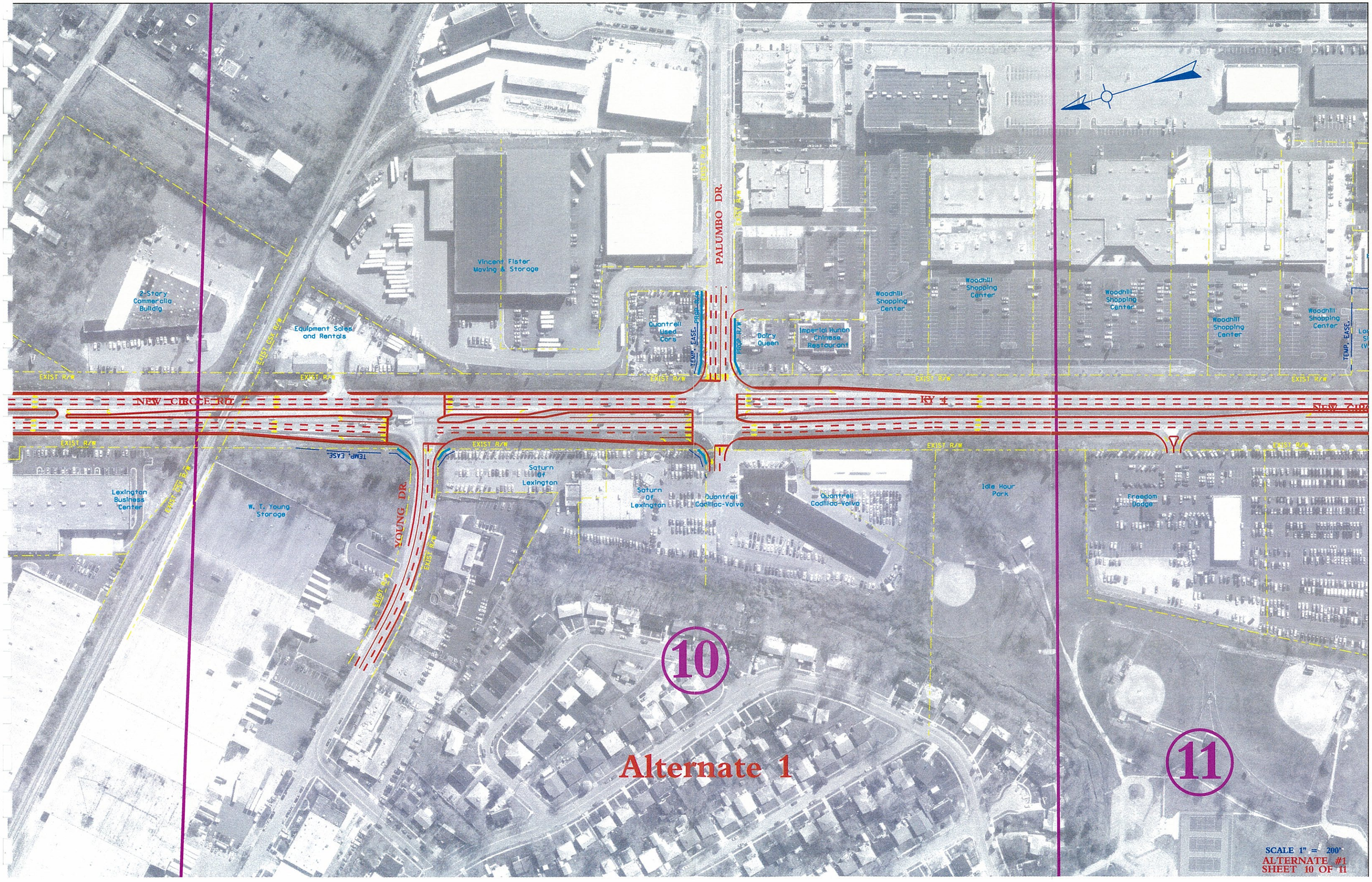

Alternate 1
OLD PARIS RD.
BRYAN STATION RD. (KY 57)
NEW CIRCLE RD.
LIMESTONE ST.
BRYAN AVE.
1-Story Brick Res.
Kroger Parking Lot
Rally's Hamburgers
Bluegrass Truck Tops
Trading Post Homes
Lexington Auto Sales
Lexington Marina
Dr. John Felton
1-Story Brick (Vacant)
1-Story Steel Bldg. (Vacant)
1-Story Brick (Vacant)
Burger Shake
Robby's Motors
Swifty Gas
Commonwealth Motors
Bryan Station Inn
Dairy Mart
White Castle
Kroger Gas
Enterprise Car Rental
Heritage Motors
1-Story Commercial Building
Wildcat Auto Sales
1-Story Commercial Building
Nursery Timm & Home Accessories
Safelite Auto Glass
Salvation Army Thrift Store
Southern Belle Dairy
Sonic Drive-In
Walgreen's Pharmacy
Chevron Gas Station
Ken Towery Auto Care Center
Arby's Roast Beef
Dan's Discount Jewlery
TEMP. EASE.
PROP R/W
EXIST R/W
6
SCALE 1" = 200'
ALTERNATE #1
SHEET 5 OF 11


Alternate 1
BRYAN STATION RD. (KY. 57)
NEW CIRCLE RD.
KY-4
MEADOW LN.
Dairy Mart
White Castle
Kroger Gas
Long John Silver's
Gilkey Window Co.
Spa Gallery
Quality Auto Sales
Autohouse Used Cars
Lexington-Fayette Urban County Fire Station
Self-Service Car Wash
Speedway
Lexington Auto Store
Circle 4 Discount Auto Sales
Shields Auto Sales & Service
1-Story Commercial Building
2-Story Commercial Building
1-Story Commercial Building
Fleetwood Homes
Ken Towery Auto Care Center
Arby's Roast Beef
Dan's Discount Jewlery
Carpet One
Metro Motors
Pizza Hut
1-Story Conc. Blk. Commercial Building
Atlas Auto Sales
Bluegrass Medical Associates
PDQ Market
1-Story Commercial Building
1-Story Commercial Building
1-Story Commercial Building
Everybody's Auto
TEMP. EASE.
PROP R/W
EXIST R/W
7
SCALE 1" = 200'
ALTERNATE #1
SHEET 6 OF 11


Alternate 1
SUNSHINE LN.
NEW CIRCLE RD.
EASTLAND DR.
FLOYD DR.
INDUSTRY RD.
KY 4
1-Story Commercial Building
Yates School
Wendy's Restaurant
Hot Springs at Lexington
All-Lube
Taco's Too
Shell Service Station
Green's Used Cars
High-Tech Auto
Po' Boys Used Cars
1-Story Commercial Building (Vacant)
Key Auto and Finance
1-Story Commercial Building
Fleetwood Homes
Green's Toyota
Green's Lincoln-Mercury
New Circle Inn Motel
Fox Motors
Winner's Circle Automotive
Midas Muffler and Brakes
Dairy Queen
Featherston Motors
Subway
Discount Tobacco Outlet
Eastland Bowling Lanes
BP Service Center
Mi Mexico Restaurant
TEMP. EASE.
PROP R/W
EAST R/W
7
SCALE 1" = 200'
ALTERNATE #1
SHEET 7 OF 11


Alternate 1
Continental Inn
American Inn
WINCHESTER RD. (U.S. 60)
NEW CIRCLE RD.
JINGLE BELL LN.
TRADE CENTER DRIVE
PRIDEMORE CT.
Paul Miller Ford
Paul Miller Mazda
Paul Miller Used Cars
Econo-Self Storage
Hostess Cakes
Factory Direct Mattress
Superior Van Conversions
Office Suites East
L.E. Gregg Assoc. Jack & Jon's Carpet
Sam's Club Gas
Taco Bell
American Legion
Glison Plaza
Amtrack Building
TEMP. EASE.
PROP R/W
EXIST R/W
7
8
SCALE 1" = 200'
ALTERNATE #1
SHEET 8 OF 11


Alternate 1
8
9
NEW CIRCLE RD.
LIBERTY RD.
CHRISTIAN RD.
FAMILY CIRCLE
CREATIVE DR.
TEMP. EASE.
PROP R/W
EXIST R/W
1-Story Commercial Buildings
Solid Platinum
Kar-Smart
Four Seasons Express Cleaners
Mattress Barn
Skinner Chiropractic
Dennis Car Stereo
Andover Motors
Lexington Motor Inn
Hoover's Furniture
Auto Summit
Brock McVey
Speedway
Auto Zone
Lamar Outdoor Advertising
S&S Tire
Trailblazers Truck, Van & Auto Accessories
McDonald's
Space Center (Storage)
Oakwood Homes
Fabcentre Equipment Inc.
Bugeles Unlimited
U-Haul
Lexington Billiards
Parkette Drive-In
Don Jacobs Choice Used Cars
Shell Gas Station
Lexington Business Center
SCALE 1" = 200'
ALTERNATE #1
SHEET 9 OF 11


PALUMBO DR.
NEW CIRCLE RD.
KY ±
YOUNG DR.
Vincent Fister Moving & Storage
2-Story Commercial Buildig
Equipment Sales and Rentals
Quantrell Used Cars
Dairy Queen
Imperial Hunan Chinese Restaurant
Woodhill Shopping Center
Lexington Business Center
W. T. Young Storage
Saturn Of Lexington
Quantrell Cadillac-Volvo
Idle Hour Park
Freedom Dodge
EXIST R/W
TEMP. EASE.
PROP. R/W
10
11
Alternate 1
SCALE 1" = 200'
ALTERNATE #1
SHEET 10 OF 11

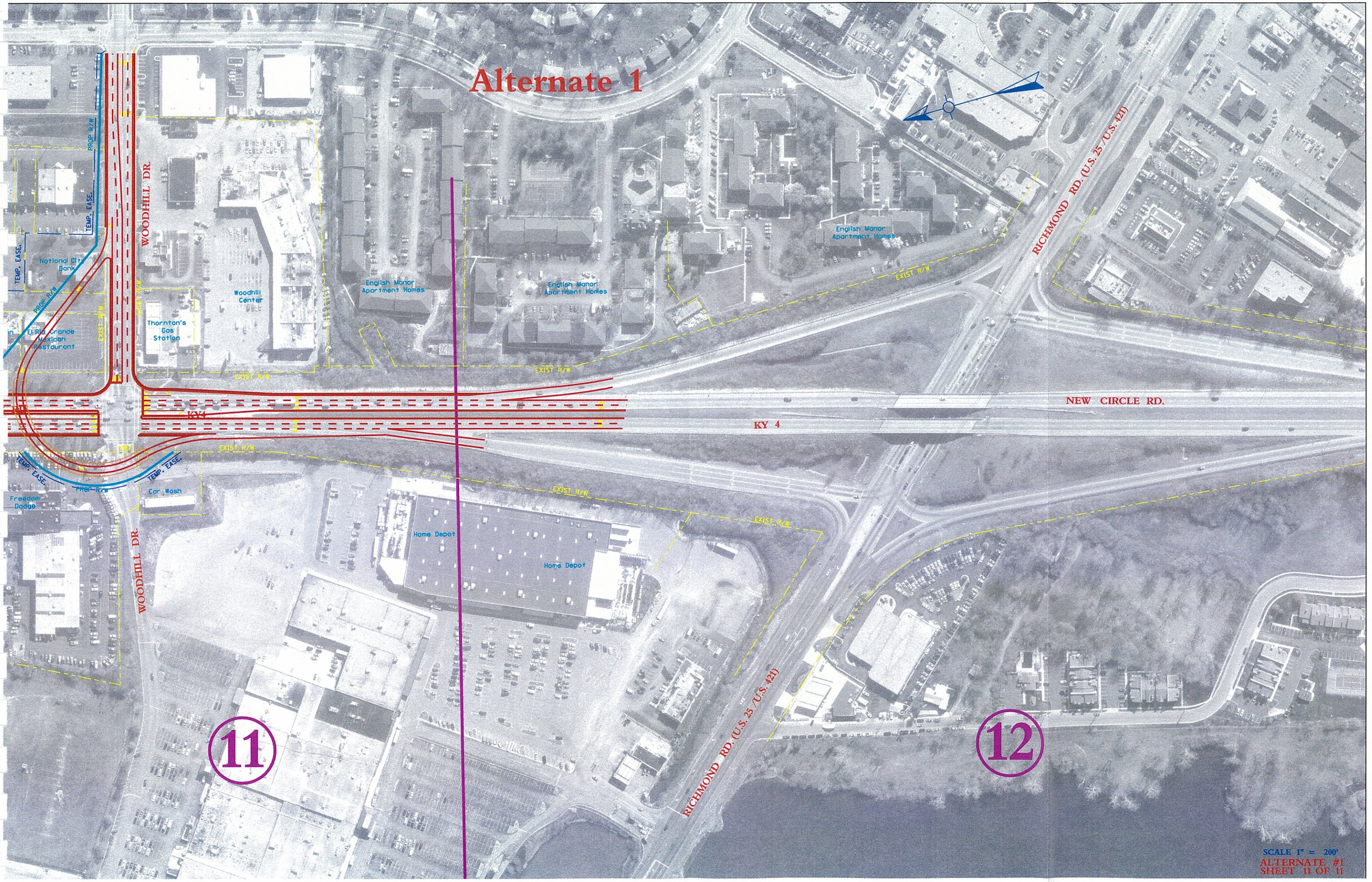
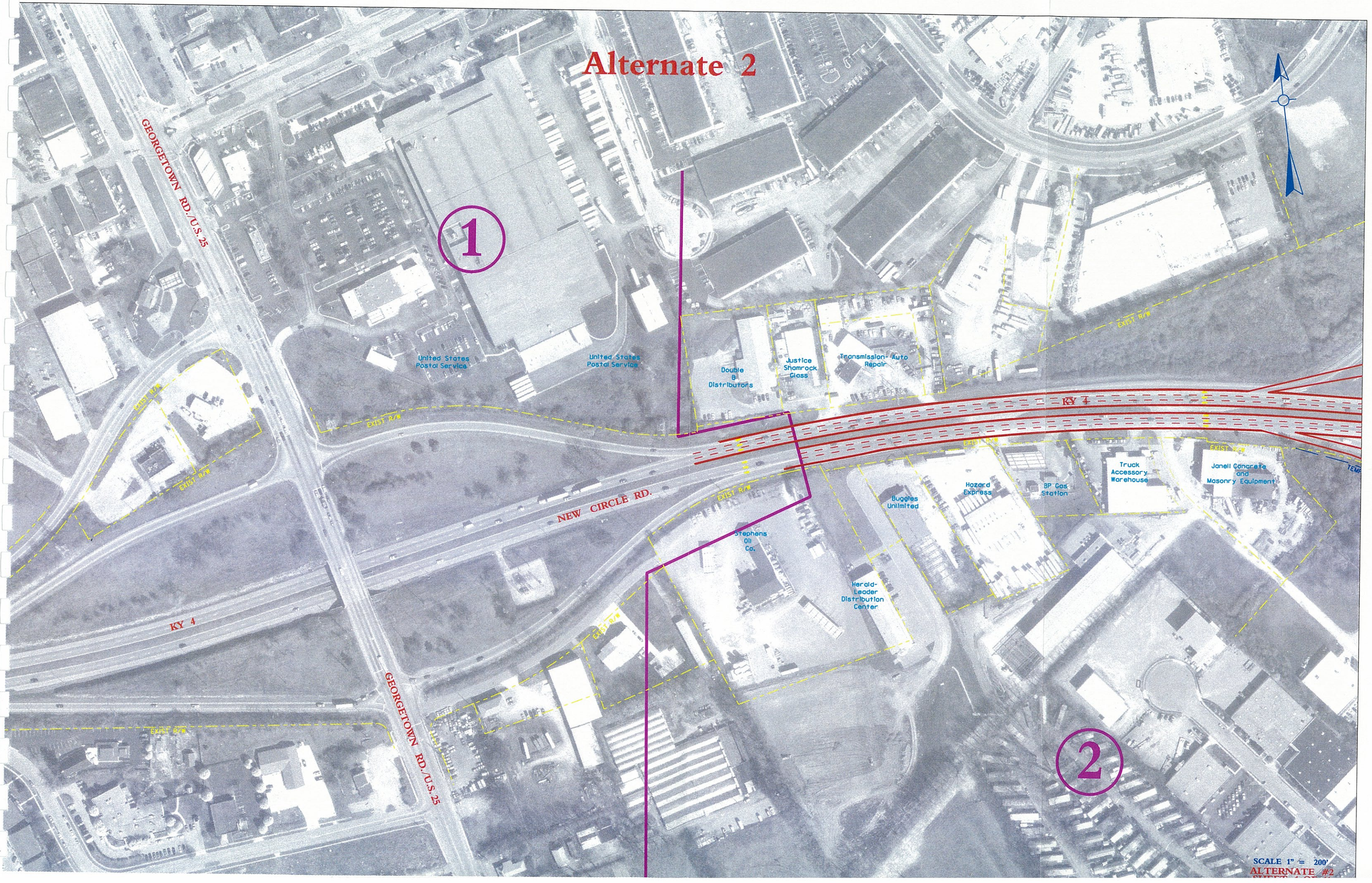
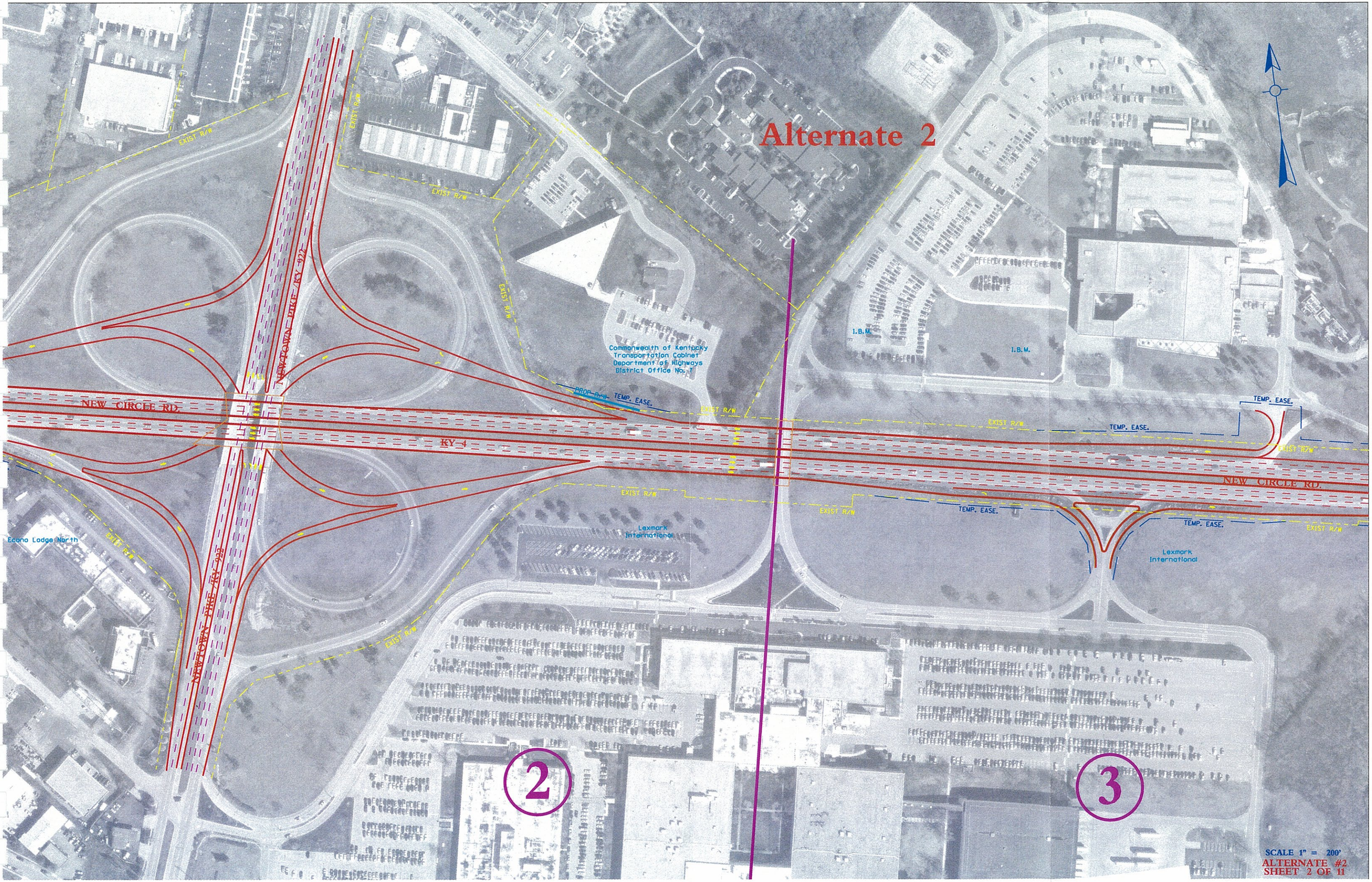
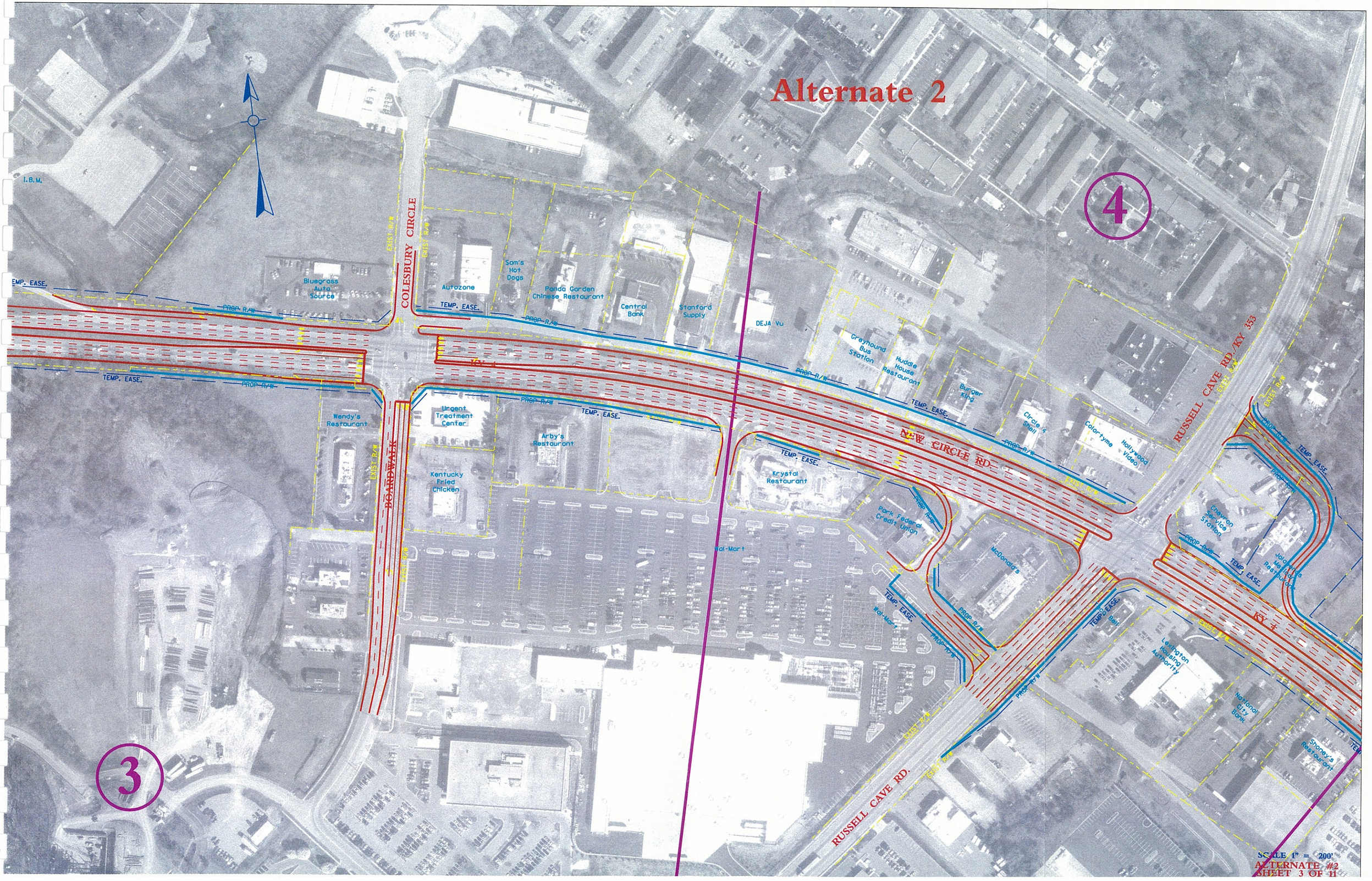

Alternate 1
WOODHILL DR.
PROP R/W
TEMP. EASE.
TEMP. EASE.
National City Bank
El Rio Grande Mexican Restaurant
Woodhill Center
Thornton's Gas Station
EXIST R/W
English Manor Apartment Homes
English Manor Apartment Homes
English Manor Apartment Homes
EXIST R/W
RICHMOND RD. (U.S. 25 / U.S. 421)
EXIST R/W
NEW CIRCLE RD.
KY 4
KY 4
EXIST R/W
TEMP. EASE.
TEMP. EASE.
PROP R/W
Car Wash
Freedom Dodge
EXIST R/W
EXIST R/W
Home Depot
Home Depot
WOODHILL DR.
RICHMOND RD. (U.S. 25 / U.S. 421)
11
12
SCALE 1" = 200'
ALTERNATE #1
SHEET 11 OF 11

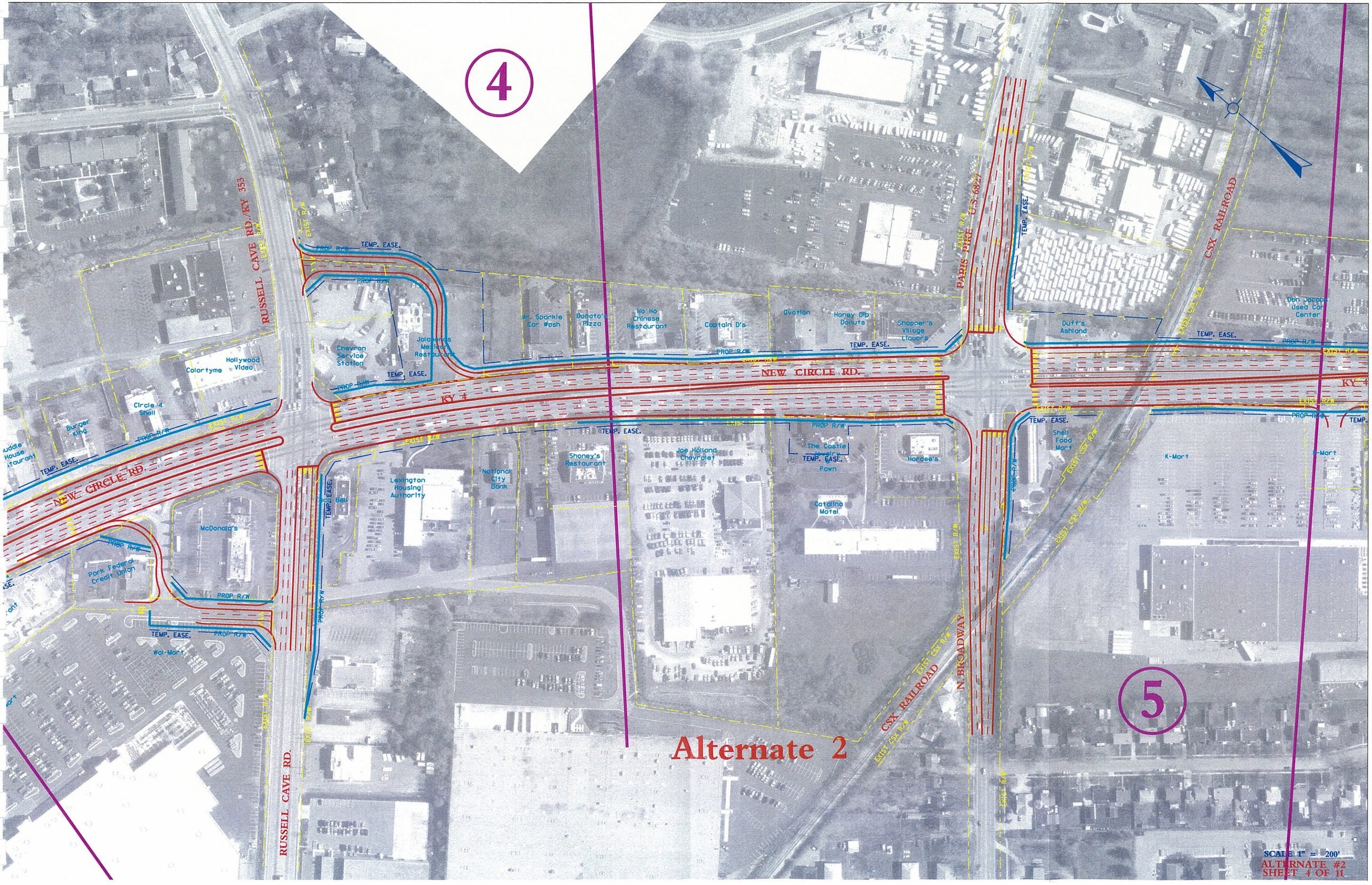
EXHIBIT 5

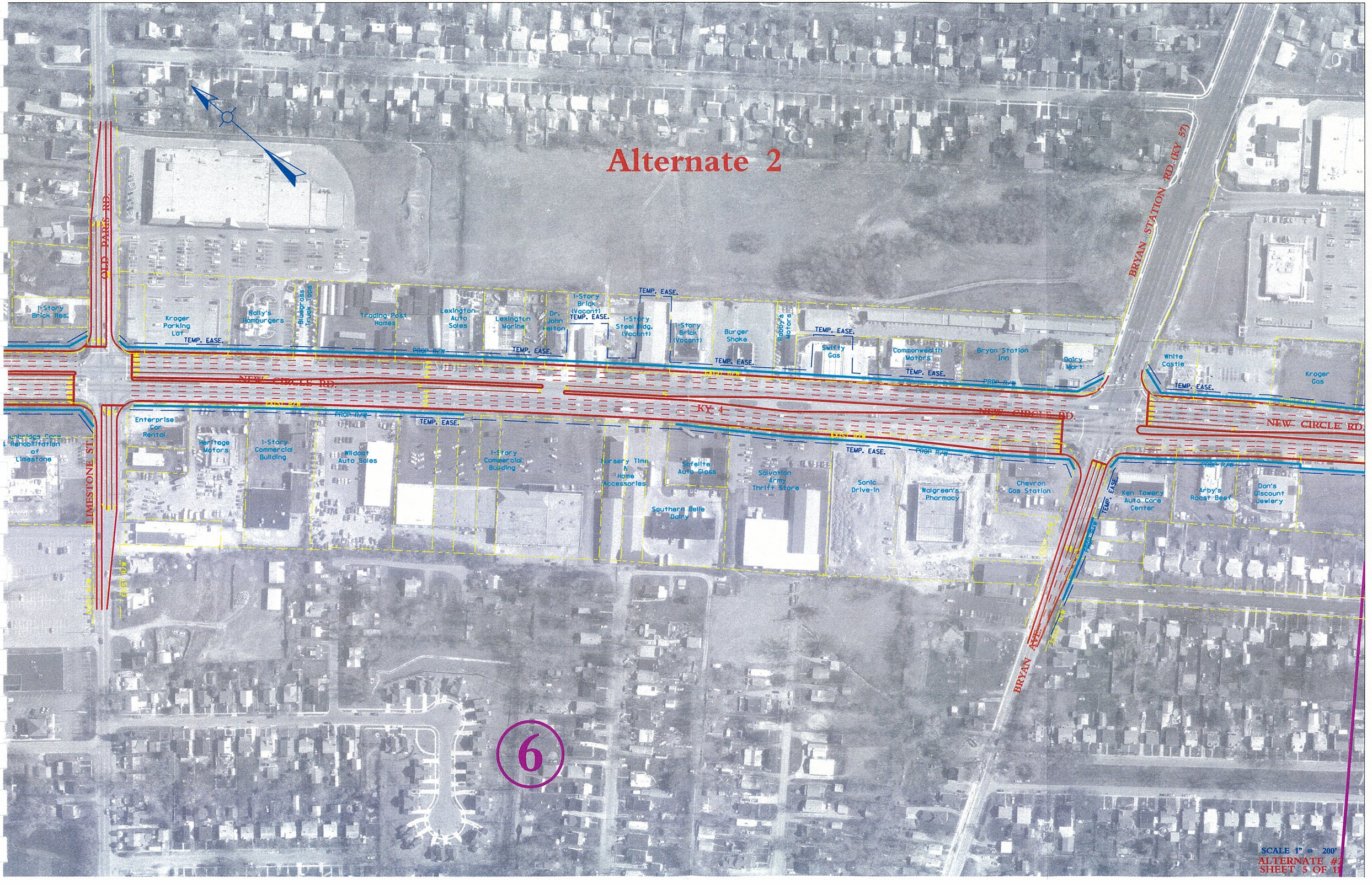
BUILD ALTERNATE 2

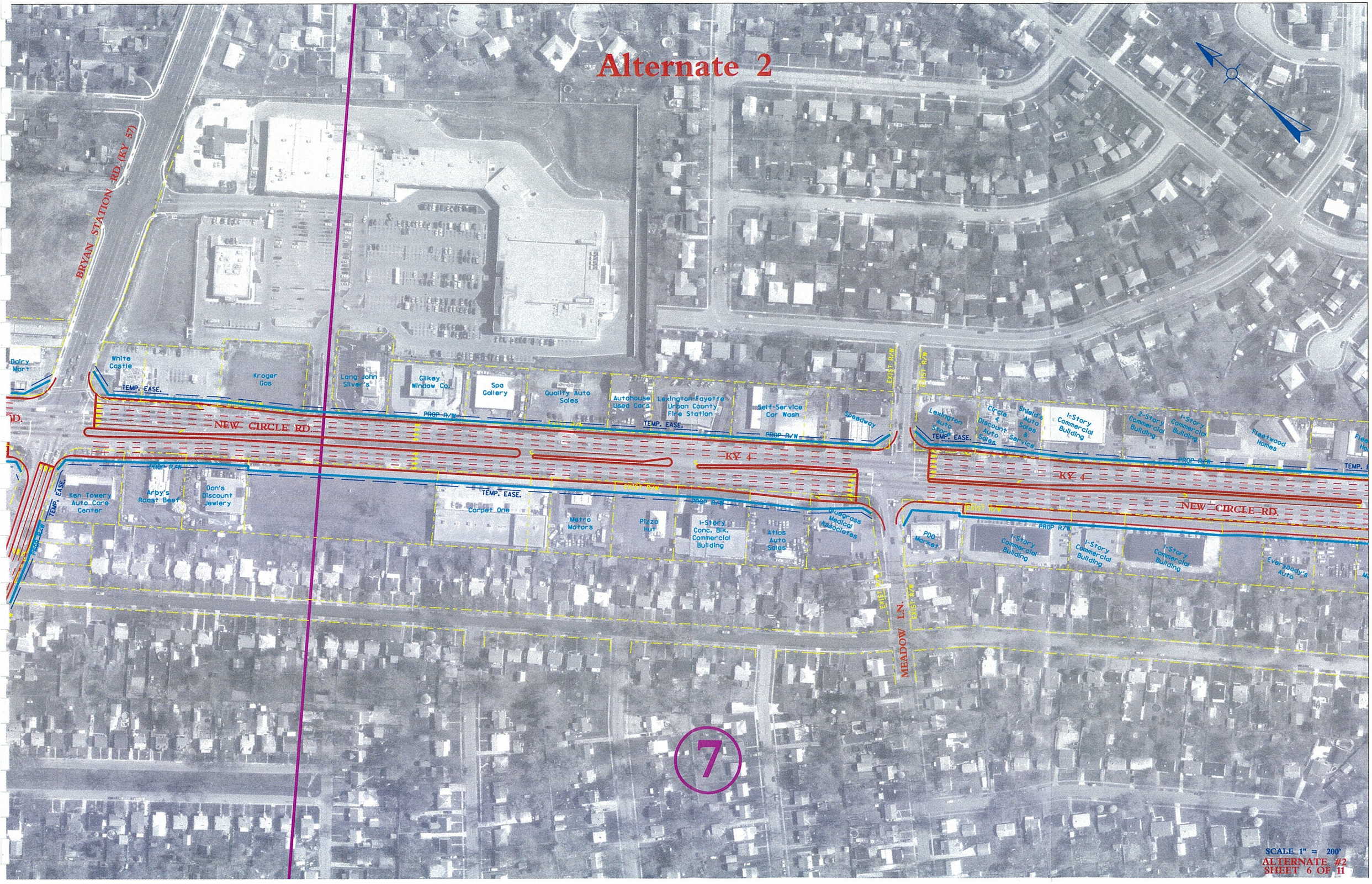

Alternate 2
1
2
GEORGETOWN RD./U.S.25
NEW CIRCLE RD.
KY 4
United States Postal Service
United States Postal Service
Double B Distributors
Justice Shamrock Class
Transmission- Auto Repair
Stephens Oil Co.
Herald-Leader Distribution Center
Buggies Unlimited
Hazard Express
BP Gas Station
Truck Accessory Warehouse
Janell Concrete and Masonry Equipment
EXIST R/W
SCALE 1" = 200'
ALTERNATE #2

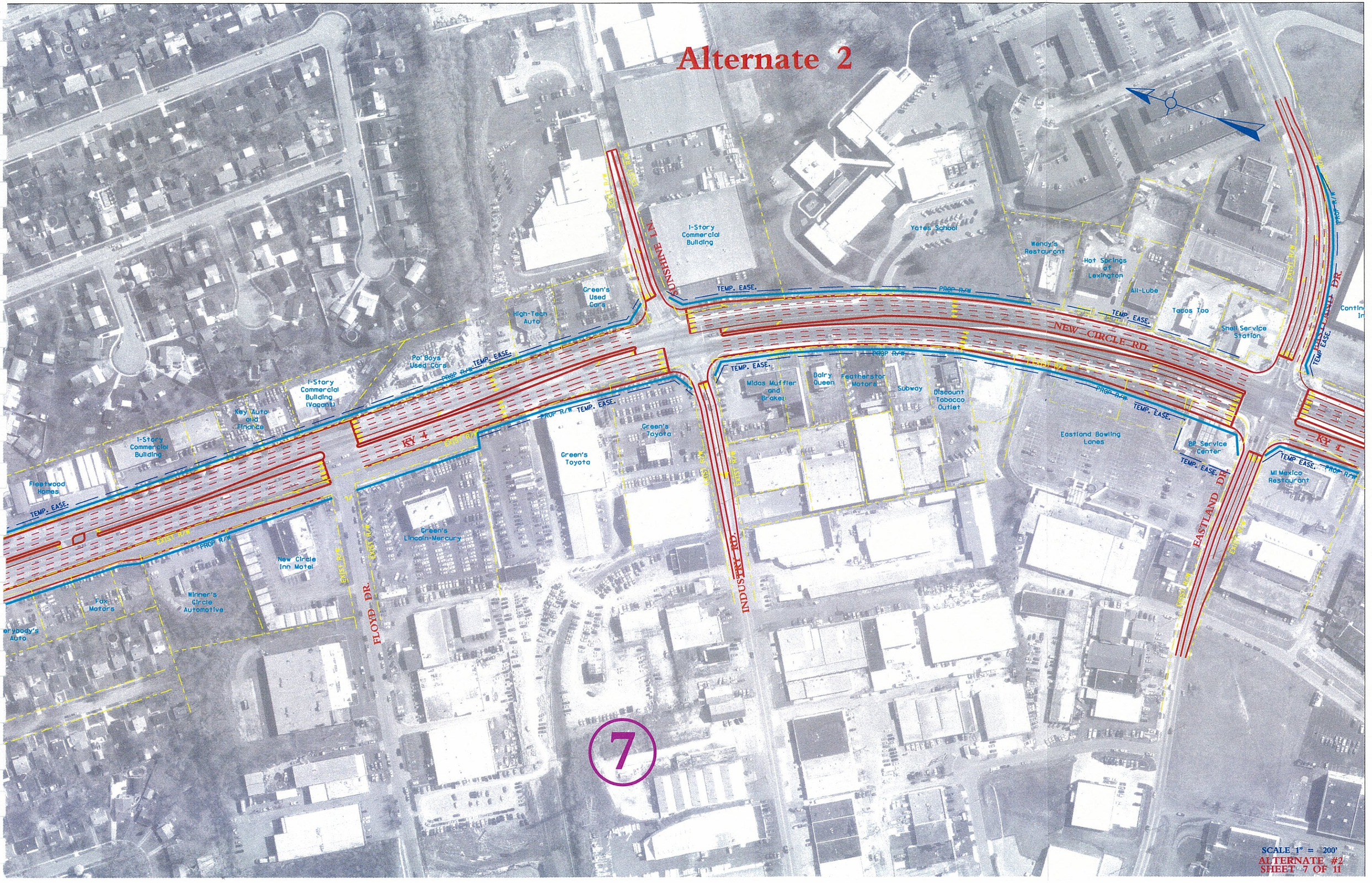

Alternate 2
NEW CIRCLE RD.
KY-4
NEWTOWN PIKE KY 922
NEWTOWN PIKE KY 922
EXIST R/W
PROP R/W
TEMP. EASE.
Commonwealth of Kentucky
Transportation Cabinet
Department of Highways
District Office No. 7
I.B.M.
I.B.M.
Lexmark
International
Lexmark
International
Econo Lodge North
2
3
SCALE 1" = 200'
ALTERNATE #2
SHEET 2 OF 11

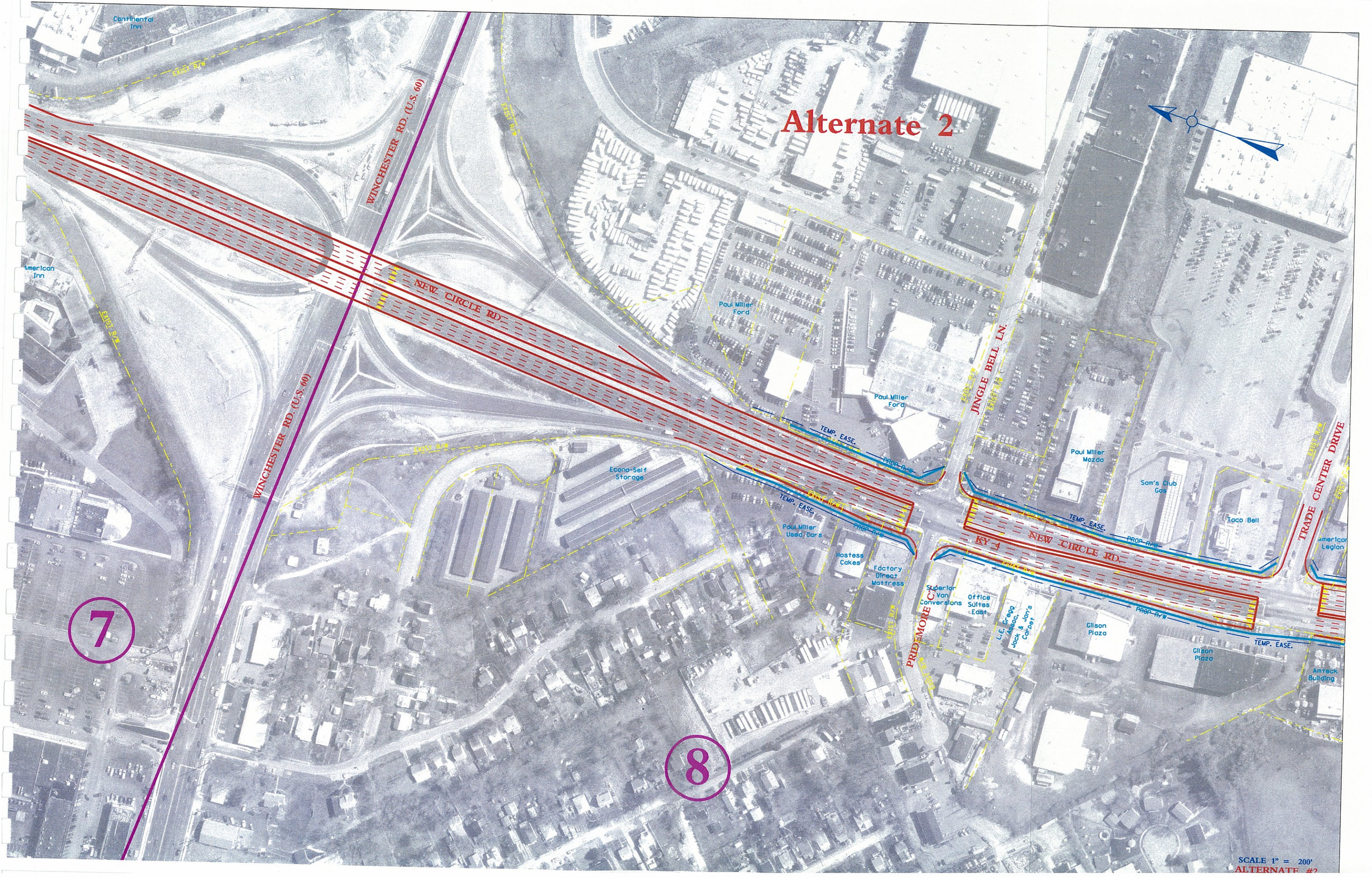

Alternate 2
I.B.M.
COLESBURY CIRCLE
EXIST. R/W
TEMP. EASE.
PROP. R/W
Bluegrass Auto Source
Autozone
Sam's Hot Dogs
Panda Garden Chinese Restaurant
Central Bank
Stanford Supply
DEJA VU
Greyhound Bus Station
Huddle House Restaurant
Burger King
Circle K Shell
Color-tyme
Hollywood Video
RUSSELL CAVE RD./KY 353
NEW CIRCLE RD.
KY 4
Wendy's Restaurant
Urgent Treatment Center
Arby's Restaurant
Kentucky Fried Chicken
BOARDWALK
Krystal Restaurant
Park Federal Credit Union
Wal-Mart
McDonald's
Chevron Service Station
Valvoline Instant Oil Change
Lexington Housing Authority
National City Bank
Shoney's Restaurant
RUSSELL CAVE RD.
4
3
SCALE 1" = 200'
ALTERNATE #2
SHEET 3 OF 11

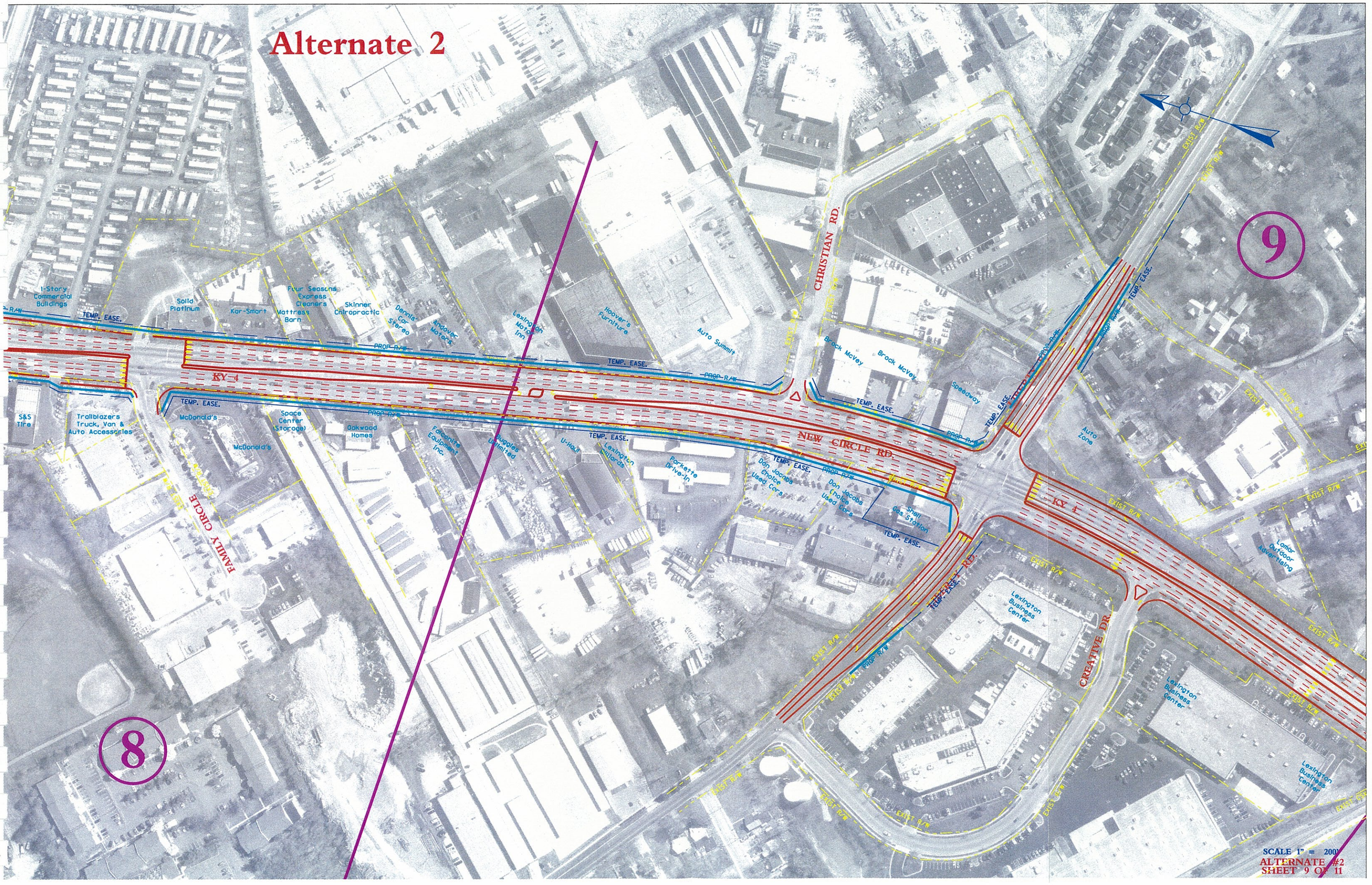

4
5
RUSSELL CAVE RD./KY 353
RUSSELL CAVE RD.
NEW CIRCLE RD.
KY 4
PARIS PIKE - U.S. 68/27
CSX RAILROAD
N. BROADWAY
EXIST. R/W
PROP. R/W
TEMP. EASE.
Chevron Service Station
Jalapenos Mexican Restaurant
Mr. Sparkle Car Wash
Donato's Pizza
Ho Ho Chinese Restaurant
Captain D's
Ovation
Honey Dip Donuts
Shopper's Village Liquors
Duff's Ashland
Don Jacobs Used Car Center
Hollywood Video
Colortyme
Circle 4 Shell
Burger King
Shoney's Restaurant
Joe Holland Chevrolet
The Castle Jewelry
Pawn
Hardee's
Shell Food Mart
K-Mart
Lexington Housing Authority
National City Bank
Catalina Motel
McDonald's
Park Federal Credit Union
Wal-Mart
Alternate 2
SCALE 1" = 200'
ALTERNATE #2
SHEET 4 OF 11

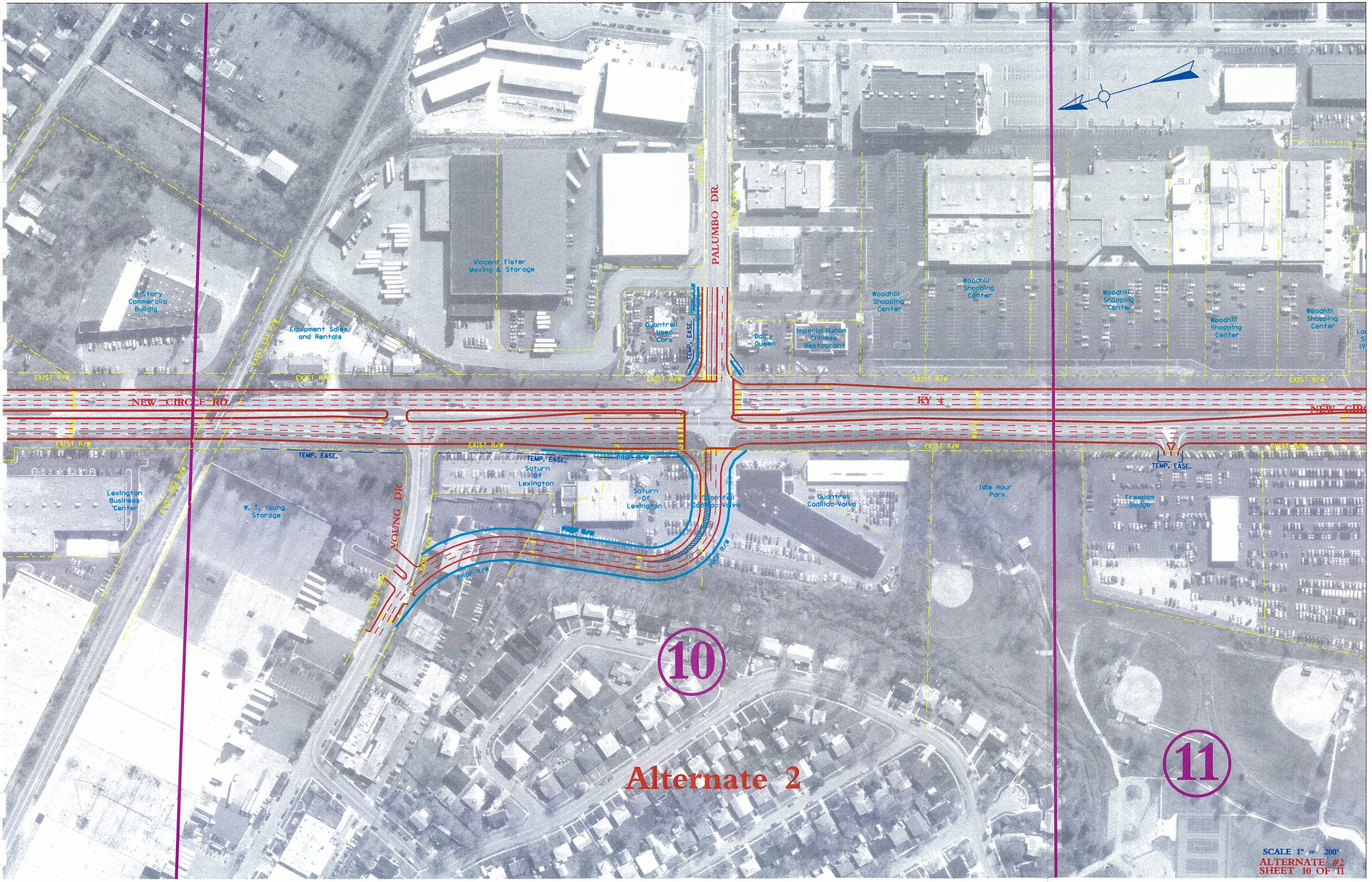

Alternate 2
OLD PARIS RD.
BRYAN STATION RD. (KY 57)
NEW CIRCLE RD.
KY 4
LIMESTONE ST.
BRYAN AVE.
1-Story Brick Res.
Kroger Parking Lot
TEMP. EASE.
Rally's Hamburgers
Bluegrass Truck Tops
Trading Post Homes
Lexington Auto Sales
Lexington Marine
Dr. John Felton
1-Story Brick (Vacant)
1-Story Steel Bldg. (Vacant)
1-Story Brick (Vacant)
Burger Shake
Robby's Motors
Swifty Gas
Commonwealth Motors
Bryan Station Inn
Dairy Mart
White Castle
Kroger Gas
PROP R/W
Enterprise Car Rental
Heritage Motors
1-Story Commercial Building
Wildcat Auto Sales
1-Story Commercial Building
Nursery Time & Home Accessories
Satellite Auto Glass
Southern Belle Dairy
Salvation Army Thrift Store
Sonic Drive-In
Walgreen's Pharmacy
Chevron Gas Station
Ken Towery Auto Care Center
Arby's Roast Beef
Dan's Discount Jewelry
6
SCALE 1" = 200'
ALTERNATE #2
SHEET 5 OF 11


Alternate 2
BRYAN STATION RD. (KY 57)
NEW CIRCLE RD.
KY 4
MEADOW LN.
Dairy Mart
White Castle
Kroger Gas
Long John Silver's
Gilkey Window Co.
Spa Gallery
Quality Auto Sales
Autohouse Used Cars
Lexington-Fayette Urban County Fire Station
Self-Service Car Wash
Speedway
Lexington Auto Sales
Circle 4 Discount Auto Sales
Shields Auto Sales & Service
1-Story Commercial Building
2-Story Commercial Building
Fleetwood Homes
Ken Towery Auto Care Center
Arby's Roast Beef
Dan's Discount Jewelry
Carpet One
Metro Motors
Pizza Hut
1-Story Conc. Blk. Commercial Building
Atlas Auto Sales
Sugar Ass Medical Associates
PDQ Market
Everybody's Auto
TEMP. EASE.
PROP R/W
EXIST R/W
7
SCALE 1" = 200'
ALTERNATE #2
SHEET 6 OF 11


Alternate 2
NEW CIRCLE RD.
EASTLAND DR.
FLOYD DR.
INDUSTRY RD.
SUNSHINE LN.
TEMP. EASE.
PROP R/W
EXIST R/W
1-Story Commercial Building
Yates School
Wendy's Restaurant
Hot Springs of Lexington
All-Lube
Tacos Too
Shell Service Station
Green's Used Cars
High-Tech Auto
Po' Boys Used Cars
1-Story Commercial Building (Vacant)
Key Auto and Finance
1-Story Commercial Building
Fleetwood Homes
Green's Toyota
Green's Lincoln-Mercury
New Circle Inn Motel
Winner's Circle Automotive
Fox Motors
Midas Muffler and Brakes
Dairy Queen
Featherston Motors
Subway
Discount Tobacco Outlet
Eastland Bowling Lanes
BP Service Center
Mi Mexico Restaurant
7
SCALE 1" = 200'
ALTERNATE #2
SHEET 7 OF 11


Alternate 2
Continental Inn
American Inn
WINCHESTER RD. (U.S. 60)
NEW CIRCLE RD.
EAST R/W
Paul Miller Ford
JINGLE BELL LN.
TEMP. EASE.
PROP. R/W
Econo-Self Storage
Paul Miller Used Cars
Hostess Cakes
Factory Direct Mattress
Paul Miller Mazda
Sam's Club Gas
Taco Bell
TRADE CENTER DRIVE
American Legion
KY 4
Superior Van Conversions
Office Suites East
L.E. Gregg Assoc.
Jack & Jon's Carpet
PRIDEMORE CT.
Gilson Plaza
Amteck Building
7
8
SCALE 1" = 200'
ALTERNATE #2


Alternate 2
CHRISTIAN RD.
NEW CIRCLE RD.
KY 4
FAMILY CIRCLE
CREATIVE DR.
EXIST R/W
PROP R/W
TEMP. EASE.
1-Story Commercial Buildings
Solid Platinum
Kar-Smart
Four Seasons Express Cleaners
Mattress Barn
Skinner Chiropractic
Dennis Car Stereo
Andover Motors
Lexington Motor Inn
Hoover's Furniture
Auto Summit
Brock McVey
Speedway
Auto Zone
S&S Tire
Trailblazers Truck, Van & Auto Accessories
McDonald's
Space Center (Storage)
Oakwood Homes
Edwards Equipment Inc.
Bugeles Unlimited
U-Haul
Lexington Billiards
Parkette Drive-In
Don Jacobs Choice Used Cars
Shell Gas Station
Lexington Business Center
Lamar Outdoor Advertising
8
9
SCALE 1" = 200'
ALTERNATE #2
SHEET 9 OF 11


NEW CIRCLE RD.
KY 4
PALUMBO DR.
YOUNG DR.
Vincent Fister Moving & Storage
2 Story Commercila Buildg
Equipment Sales and Rentals
Quantrell Used Cars
Dairy Queen
Imperial Hunan Chinese Restaurant
Woodhill Shopping Center
Lexington Business Center
W. T. Young Storage
Saturn Of Lexington
Quantrell Cadillac-Volvo
Idle Hour Park
Freedom Dodge
EXIST R/W
PROP R/W
TEMP. EASE.
10
11
Alternate 2
SCALE 1" = 200'
ALTERNATE #2
SHEET 10 OF 11

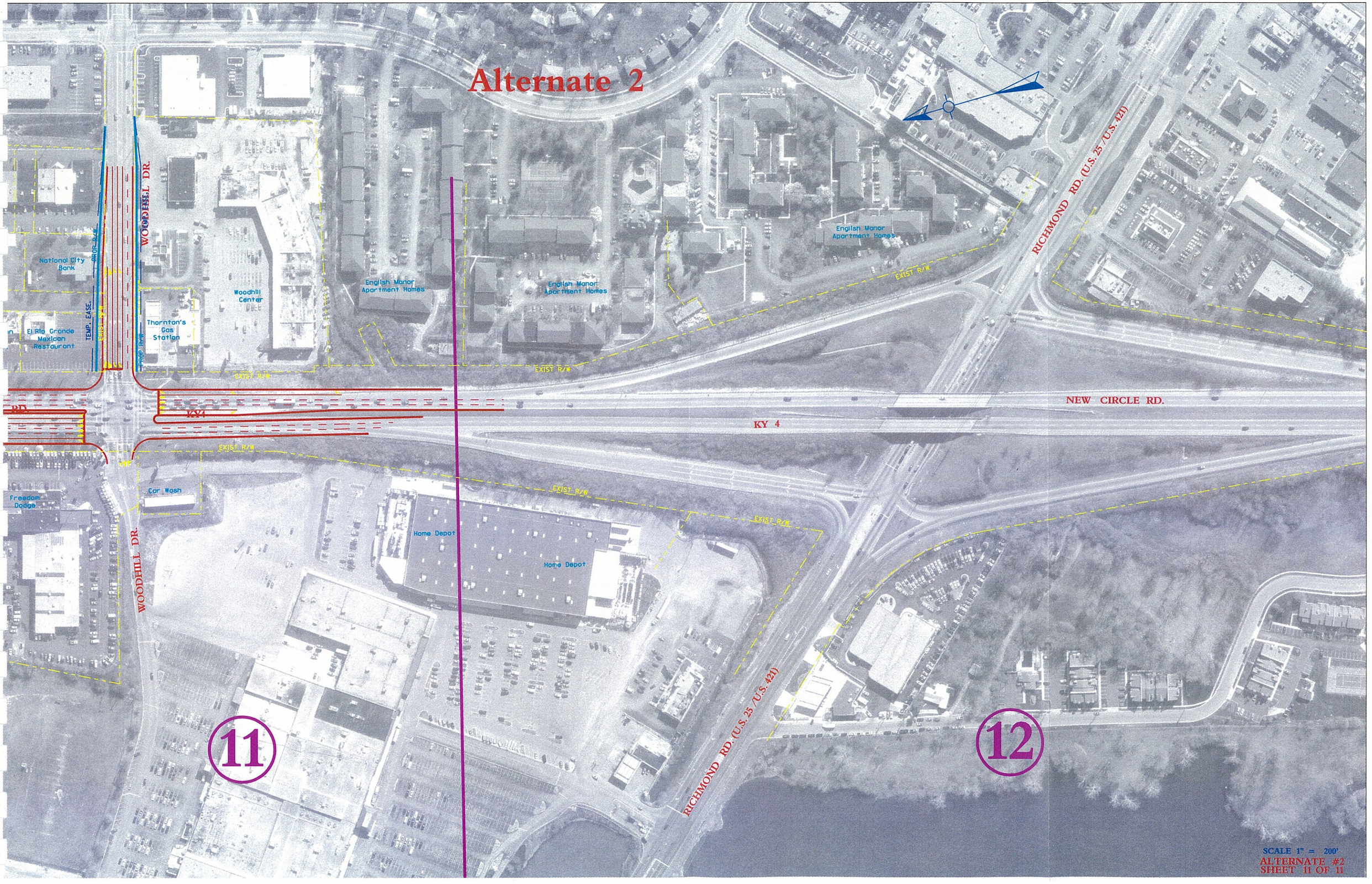
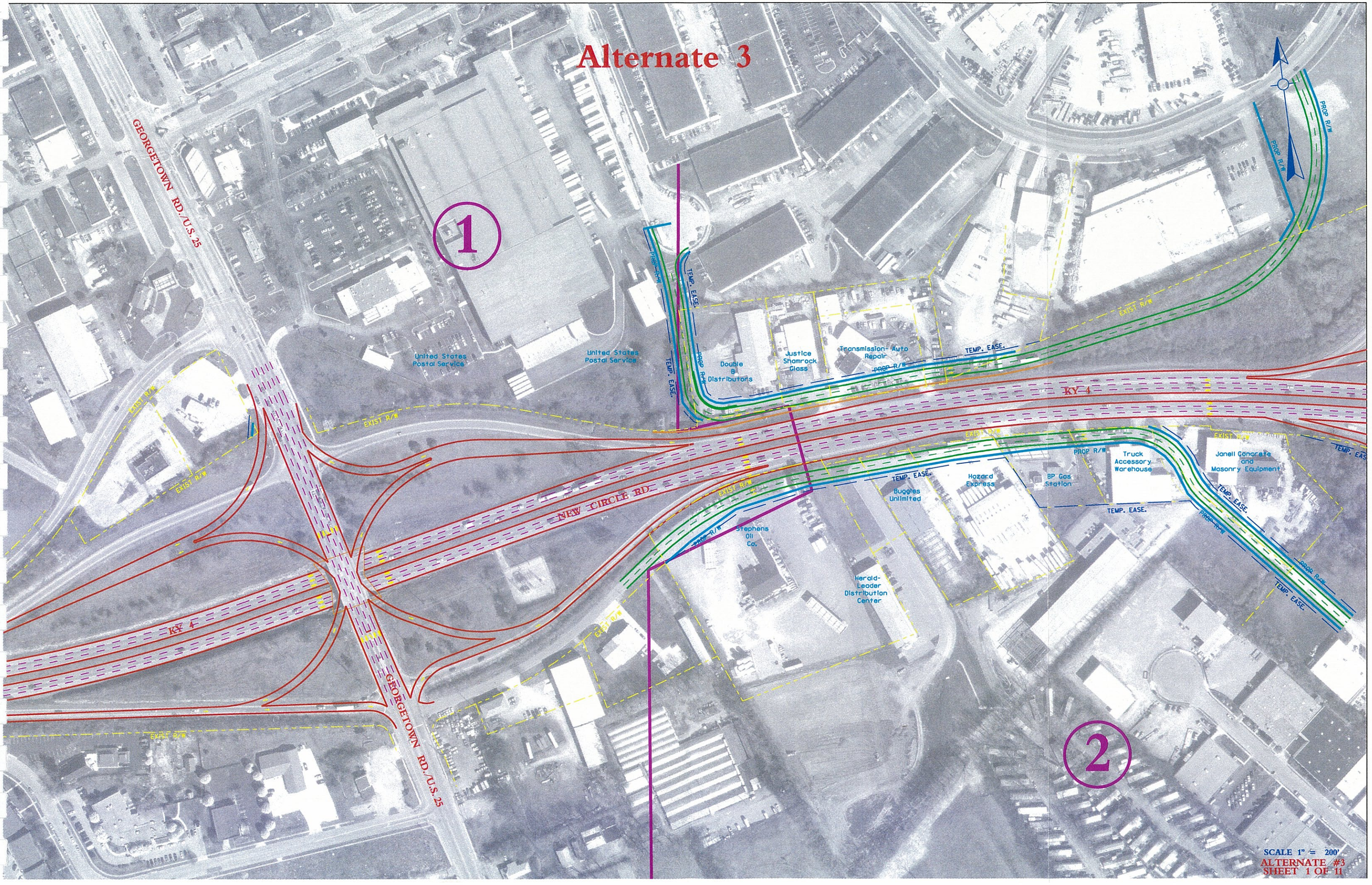

Alternate 2
WOODHILL DR.
National City Bank
TEMP. EASE.
PROP. R/W
Woodhill Center
Thornton's Gas Station
El Rio Grande Mexican Restaurant
English Manor Apartment Homes
English Manor Apartment Homes
English Manor Apartment Homes
EXIST R/W
RICHMOND RD. (U.S. 25 /U.S. 421)
NEW CIRCLE RD.
KY 4
KY4
Car Wash
Freedom Dodge
Home Depot
Home Depot
WOODHILL DR.
RICHMOND RD. (U.S. 25 /U.S. 421)
11
12
SCALE 1" = 200'
ALTERNATE #2
SHEET 11 OF 11

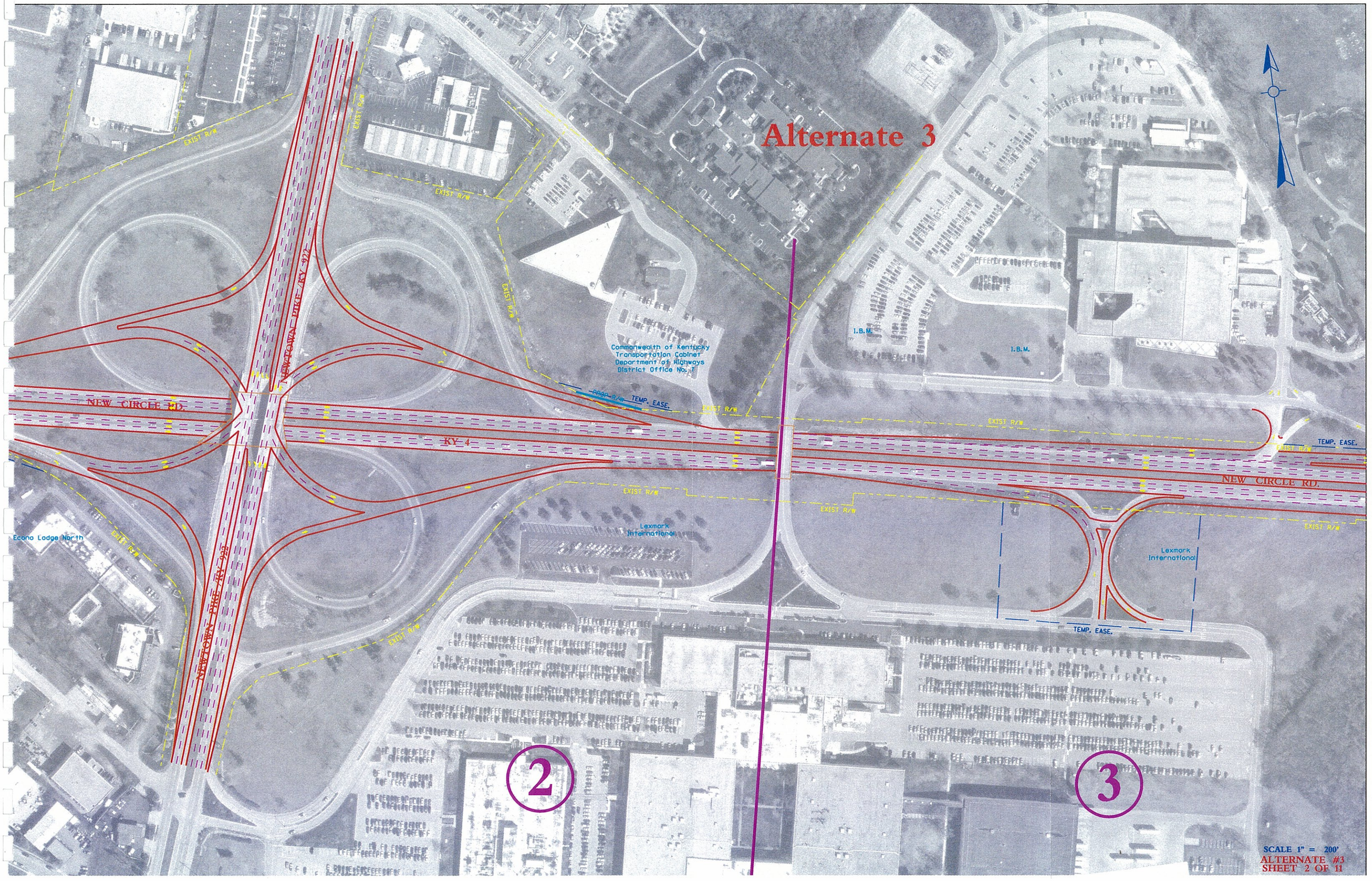
EXHIBIT 6

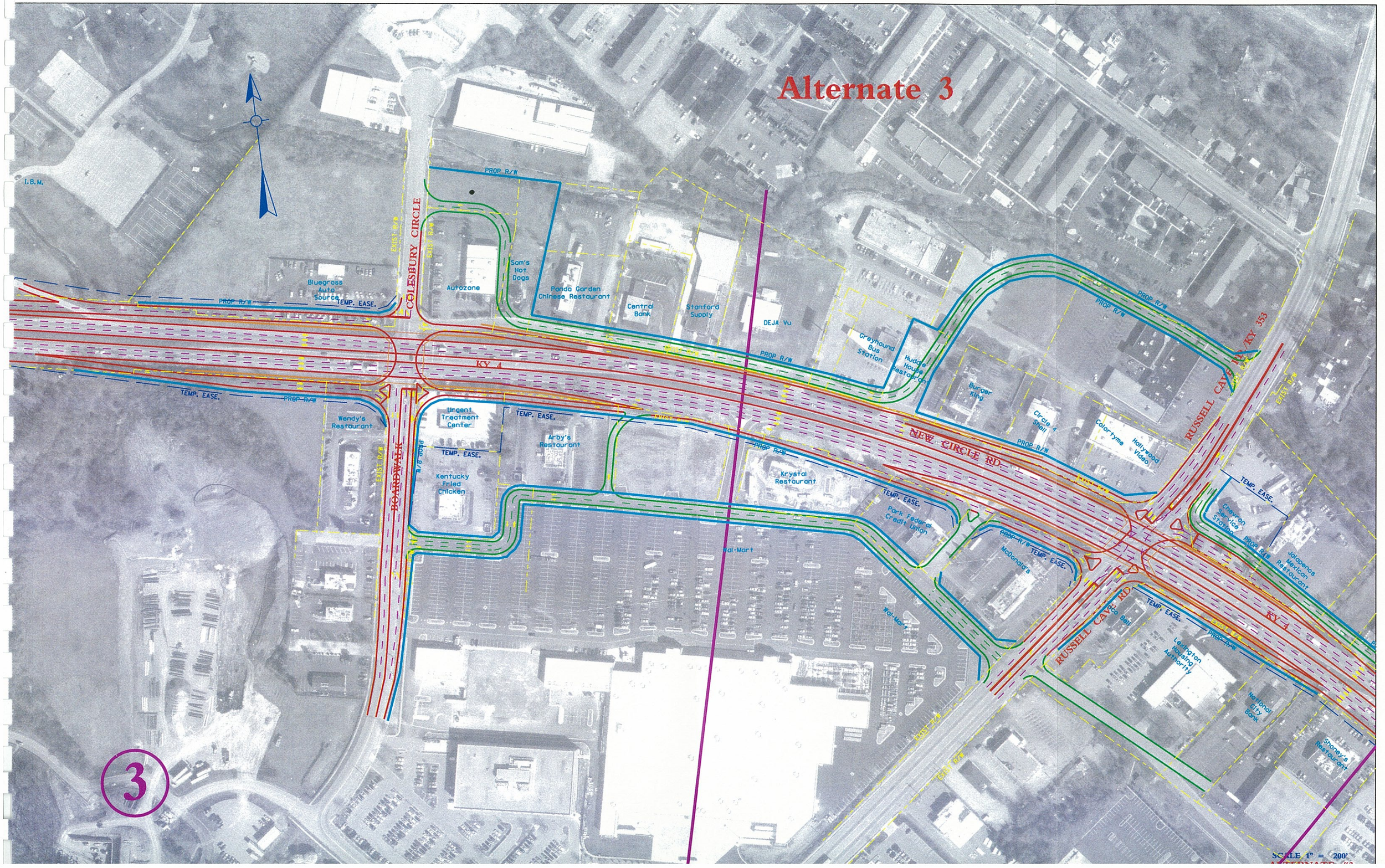
BUILD ALTERNATE 3

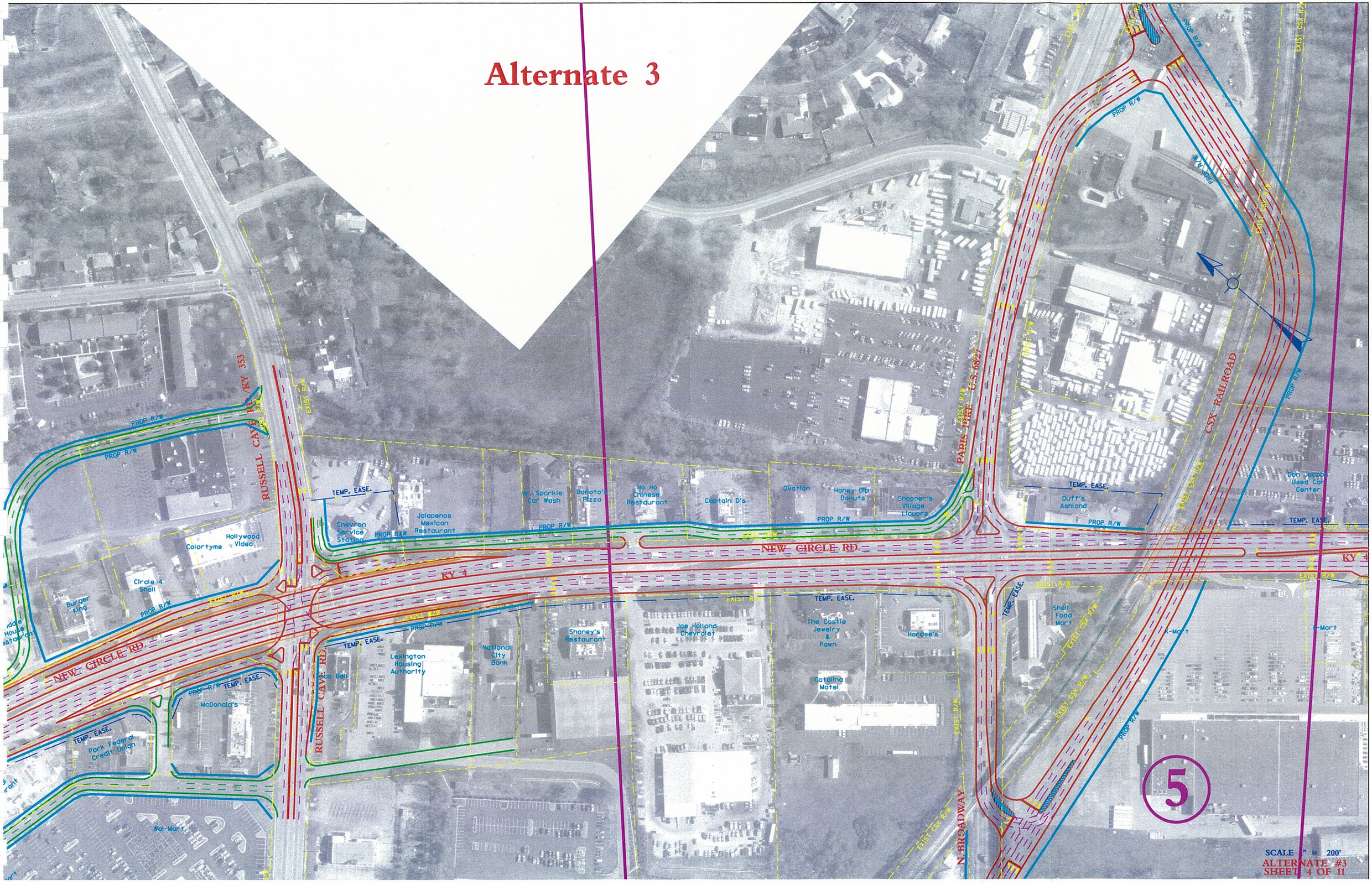
Palmer ENGINEERING

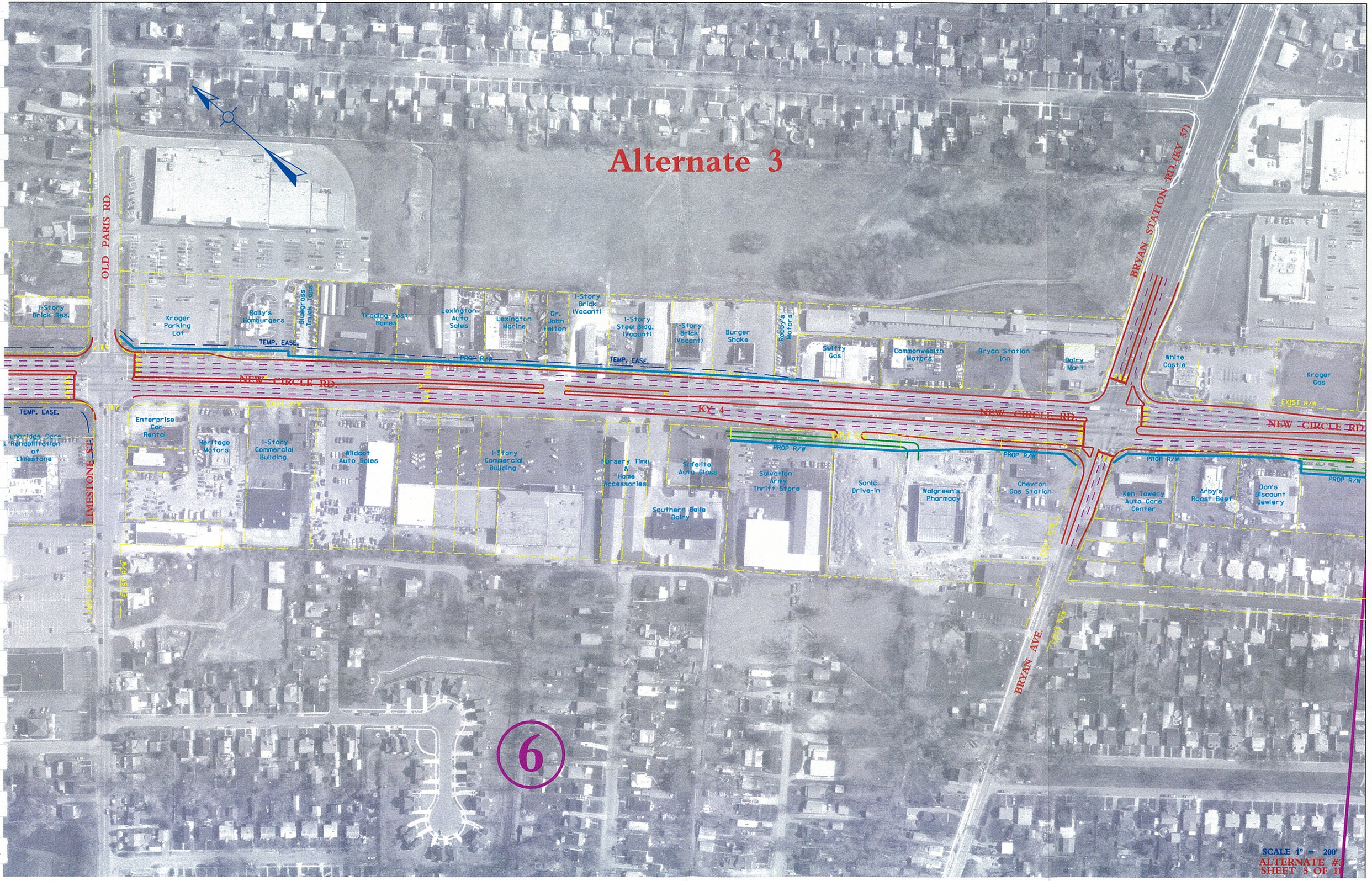
AMERICAN


Alternate 3
1
2
GEORGETOWN RD./U.S.25
NEW CIRCLE RD.
KY 4
EXIST R/W
PROP R/W
TEMP. EASE.
United States Postal Service
United States Postal Service
Double B Distributors
Justice Shamrock Glass
Transmission- Auto Repair
Buggies Unlimited
Hazard Express
BP Gas Station
Truck Accessory Warehouse
Janell Concrete and Masonry Equipment
Stephens Oil Co.
Herald-Leader Distribution Center
SCALE 1" = 200'
ALTERNATE #3
SHEET 1 OF 11

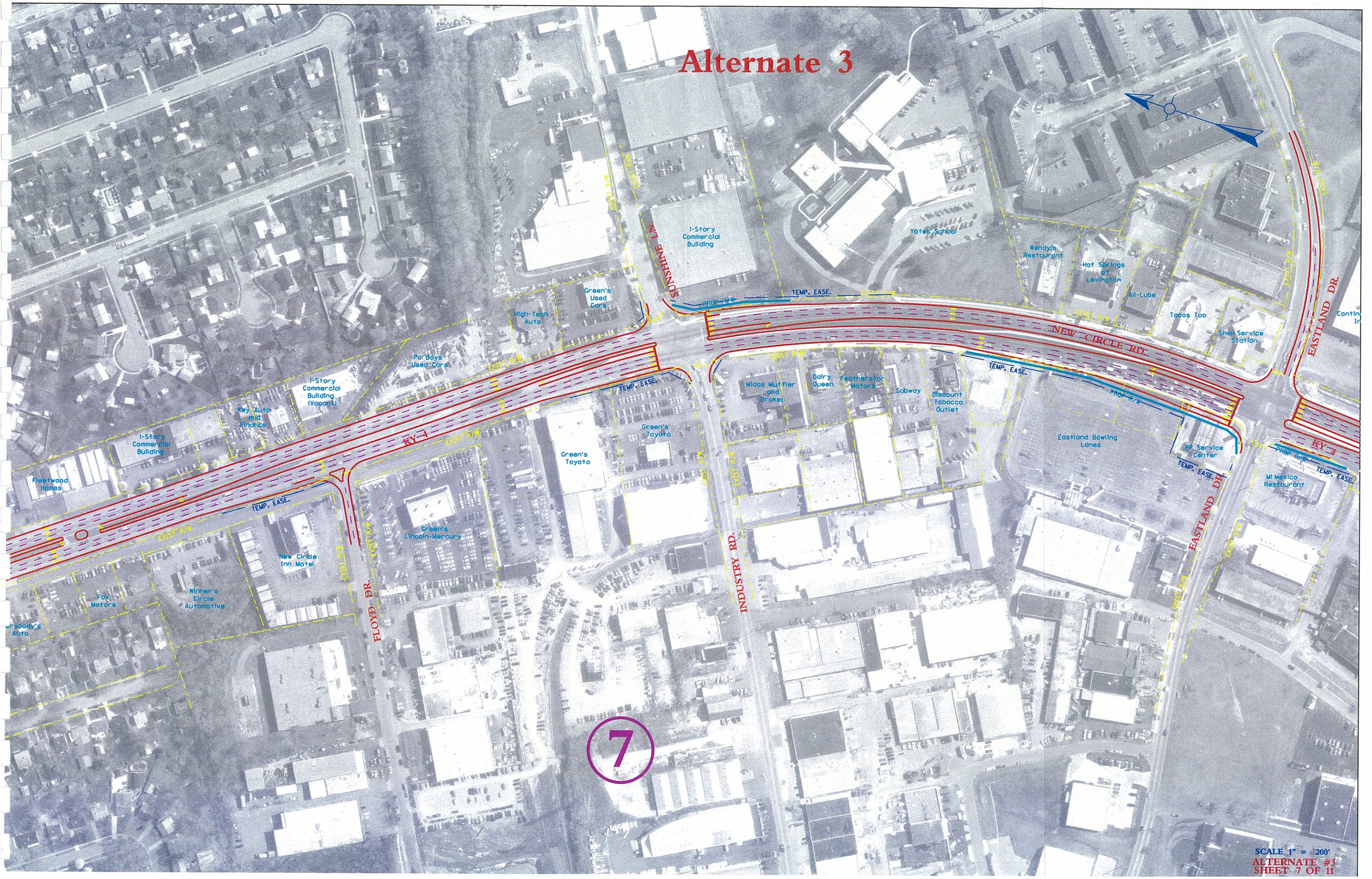

Alternate 3
NEW CIRCLE RD.
KY 4
NEWTOWN PIKE (KY 922)
EXIST R/W
PROP R/W
TEMP. EASE.
Commonwealth of Kentucky
Transportation Cabinet
Department of Highways
District Office No. 7
I.B.M.
Lexmark
International
Econo Lodge North
2
3
SCALE 1" = 200'
ALTERNATE #3
SHEET 2 OF 11

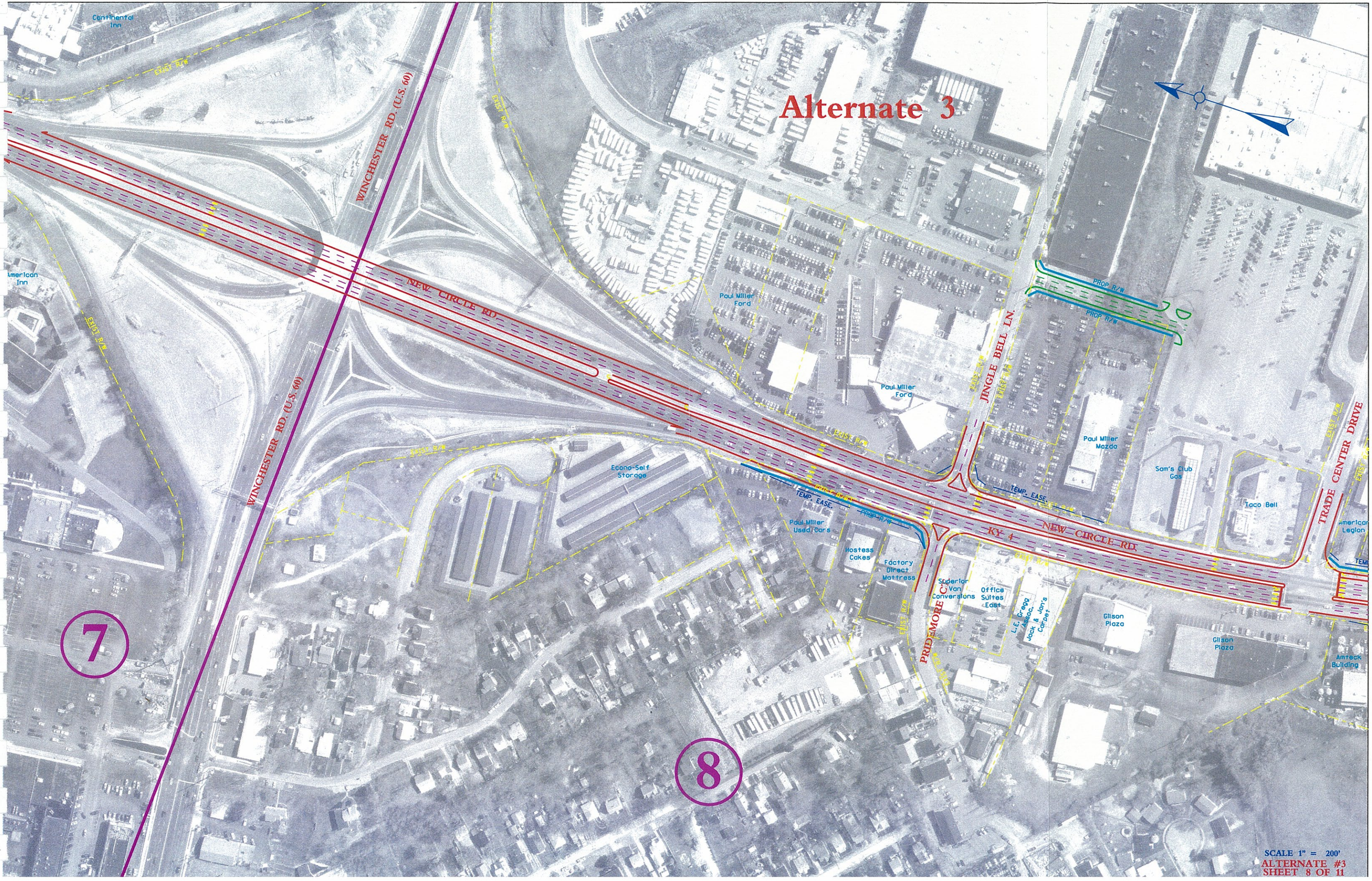

Alternate 3
I.B.M.
COLESBURY CIRCLE
BOARDWALK
KY 4
NEW CIRCLE RD.
RUSSELL CAVE RD./KY 353
PROP R/W
EXIST R/W
TEMP. EASE.
Bluegrass Auto Source
Autozone
Sam's Hot Dogs
Panda Garden Chinese Restaurant
Central Bank
Stanford Supply
DEJA Vu
Greyhound Bus Station
Huddle House Restaurant
Burger King
Circle 4 Shell
Colortyme
Hollywood Video
Wendy's Restaurant
Urgent Treatment Center
Arby's Restaurant
Kentucky Fried Chicken
Krystal Restaurant
Park Federal Credit Union
McDonald's
Chevron Service Station
Jalapenos Mexican Restaurant
Lexington Housing Authority
National City Bank
Shoney's Restaurant
Wal-Mart
3
SCALE 1" = 200'

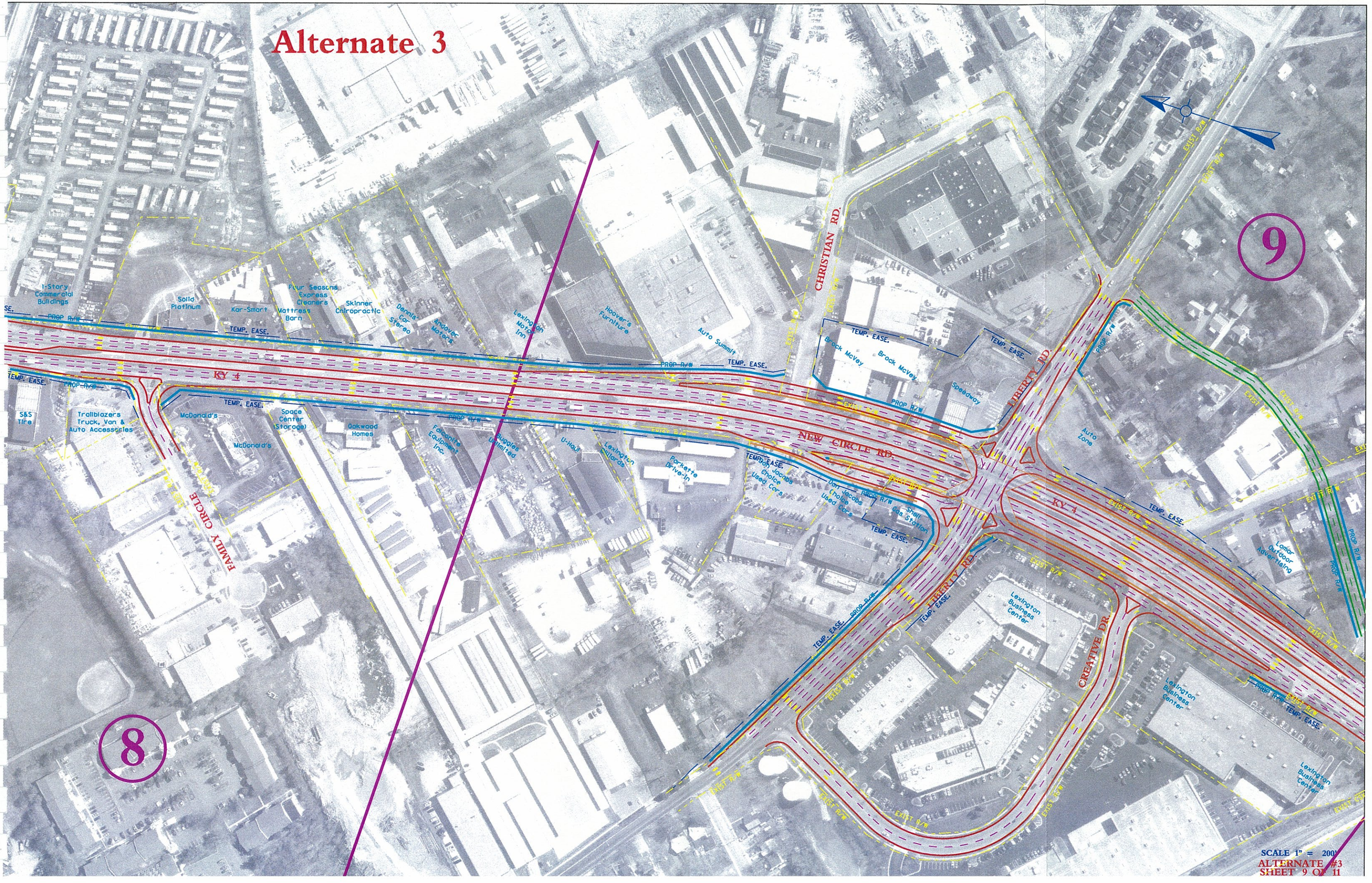

Alternate 3
NEW CIRCLE RD.
KY 4
RUSSELL CAVE RD.
KY 353
PARIS PIKE U.S. 68/27
CSX RAILROAD
N. BROADWAY
PROP R/W
EXIST R/W
TEMP. EASE.
Chevron Service Station
Jalapenos Mexican Restaurant
W. Sparkle Car Wash
Donato's Pizza
Ho Ho Chinese Restaurant
Captain D's
Ovation
Honey Dip Donuts
Shopper's Village Liquors
Duff's Ashland
Don Jacobs Used Car Center
Hollywood Video
Colortyme
Circle K Shell
Burger King
Shoney's Restaurant
Joe Holland Chevrolet
The Castle Jewelry & Pawn
Hardee's
Catalina Motel
Lexington Housing Authority
National City Bank
McDonald's
Park Federal Credit Union
Wal-Mart
Shell Food Mart
K-Mart
5
SCALE 1" = 200'
ALTERNATE #3
SHEET 4 OF 11


Alternate 3
OLD PARIS RD.
BRYAN STATION RD. (KY 57)
NEW CIRCLE RD.
KY 4
LIMESTONE ST.
BRYAN AVE.
1-Story Brick Res.
Kroger Parking Lot
Rally's Hamburgers
Bluegrass Truck Tops
Trading Post Homes
Lexington Auto Sales
Lexington Marine
Dr. John Felton
1-Story Brick (Vacant)
1-Story Steel Bldg. (Vacant)
1-Story Brick (Vacant)
Burger Shake
Bobby's Motors
Swifty Gas
Commonwealth Motors
Bryan Station Inn
Dairy Mart
White Castle
Kroger Gas
TEMP. EASE.
PROP R/W
EXIST R/W
Enterprise Car Rental
Heritage Motors
1-Story Commercial Building
Wildcat Auto Sales
1-Story Commercial Building
Nursery Time & Home Accessories
Satellite Auto Glass
Southern Belle Dairy
Salvation Army Thrift Store
Sonic Drive-In
Walgreen's Pharmacy
Chevron Gas Station
Ken Towery Auto Care Center
Arby's Roast Beef
Dan's Discount Jewelry
6
SCALE 1" = 200'
ALTERNATE #3
SHEET 5 OF 11


Alternate 3
BRYAN STATION RD. (KY 57)
NEW CIRCLE RD.
KY 4
MEADOW LN.
Dairy Mart
White Castle
Kroger Gas
Long John Silver's
Glikey Window Co.
Spa Gallery
Quality Auto Sales
Autohouse Used Cars
Lexington-Fayette Urban County Fire Station
Self-Service Car Wash
Speedway
Lexington Auto Store
Circle A Discount Auto Sales & Service
Shields Auto Sales & Service
1-Story Commercial Building
2-Story Commercial Building
Fleetwood Homes
Ken Towery Auto Care Center
Arby's Roast Beef
Dan's Discount Jewelery
Carpet One
Metro Motors
Pizza Hut
1-Story Conc. Blk. Commercial Building
Atlas Auto Sales
Bluegrass Medical Associates
PDQ Market
Everybody's Auto
EXIST R/W
PROP R/W
TEMP. EASE.
7
SCALE 1" = 200'
ALTERNATE #3
SHEET 6 OF 11


Alternate 3
7
SUNSHINE LN.
NEW CIRCLE RD.
EASTLAND DR.
KY 4
FLOYD DR.
INDUSTRY RD.
TEMP. EASE.
PROP R/W
EXIST R/W
I-Story Commercial Building
Yates School
Wendy's Restaurant
Hot Springs of Lexington
All-Lube
Tacos Too
Shell Service Station
Green's Used Cars
High-Tech Auto
Po' Boys Used Cars
I-Story Commercial Building (Vacant)
Key Auto and Finance
I-Story Commercial Building
Fleetwood Homes
Midas Muffler and Brakes
Dairy Queen
Featherstor Motors
Subway
Discount Tobacco Outlet
Green's Toyota
Green's Toyota
Eastland Bowling Lanes
BP Service Center
Mi Mexico Restaurant
Green's Lincoln-Mercury
New Circle Inn Motel
Winner's Circle Automotive
Fox Motors
SCALE 1" = 200'
ALTERNATE #3
SHEET 7 OF 11


Alternate 3
Continental Inn
EXIST R/W
WINCHESTER RD. (U.S. 60)
NEW CIRCLE RD.
American Inn
Paul Miller Ford
JINGLE BELL LN.
PROP R/W
Econo-Self Storage
TEMP. EASE.
Paul Miller Mazda
Sam's Club Gas
Taco Bell
TRADE CENTER DRIVE
KY 4
Paul Miller Used Cars
Hostess Cakes
Factory Direct Mattress
Superior Van Conversions
Office Suites East
L.E. Gregg Assoc.
Jack & Jan's Carpet
PRIDEMORE CT.
Glison Plaza
Amtrack Building
American Legion
7
8
SCALE 1" = 200'
ALTERNATE #3
SHEET 8 OF 11



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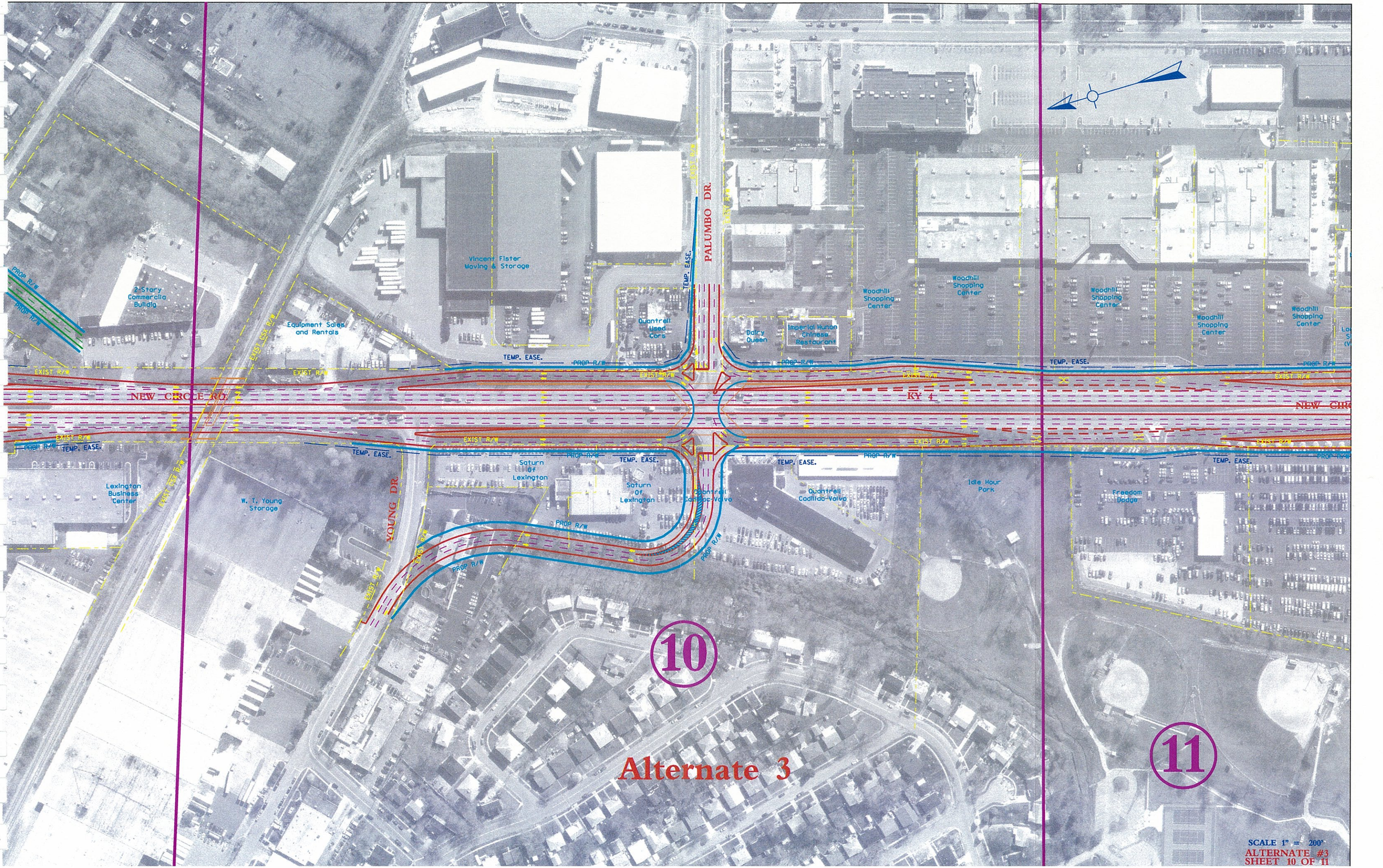
PALUMBO DR.
NEW CIRCLE RD.
KY 4
YOUNG DR.
Vincent Fister Moving & Storage
3-Story Commercial Building
Equipment Sales and Rentals
Quantrell Used Cars
Dairy Queen
Imperial Hunan Chinese Restaurant
Woodhill Shopping Center
Lexington Business Center
W. T. Young Storage
Saturn of Lexington
Quantrell Cadillac-Volvo
Idle Hour Park
Freedom Dodge
TEMP. EASE.
PROP R/W
EXIST R/W
10
11
Alternate 3
SCALE 1" = 200'
ALTERNATE #3
SHEET 10 OF 11

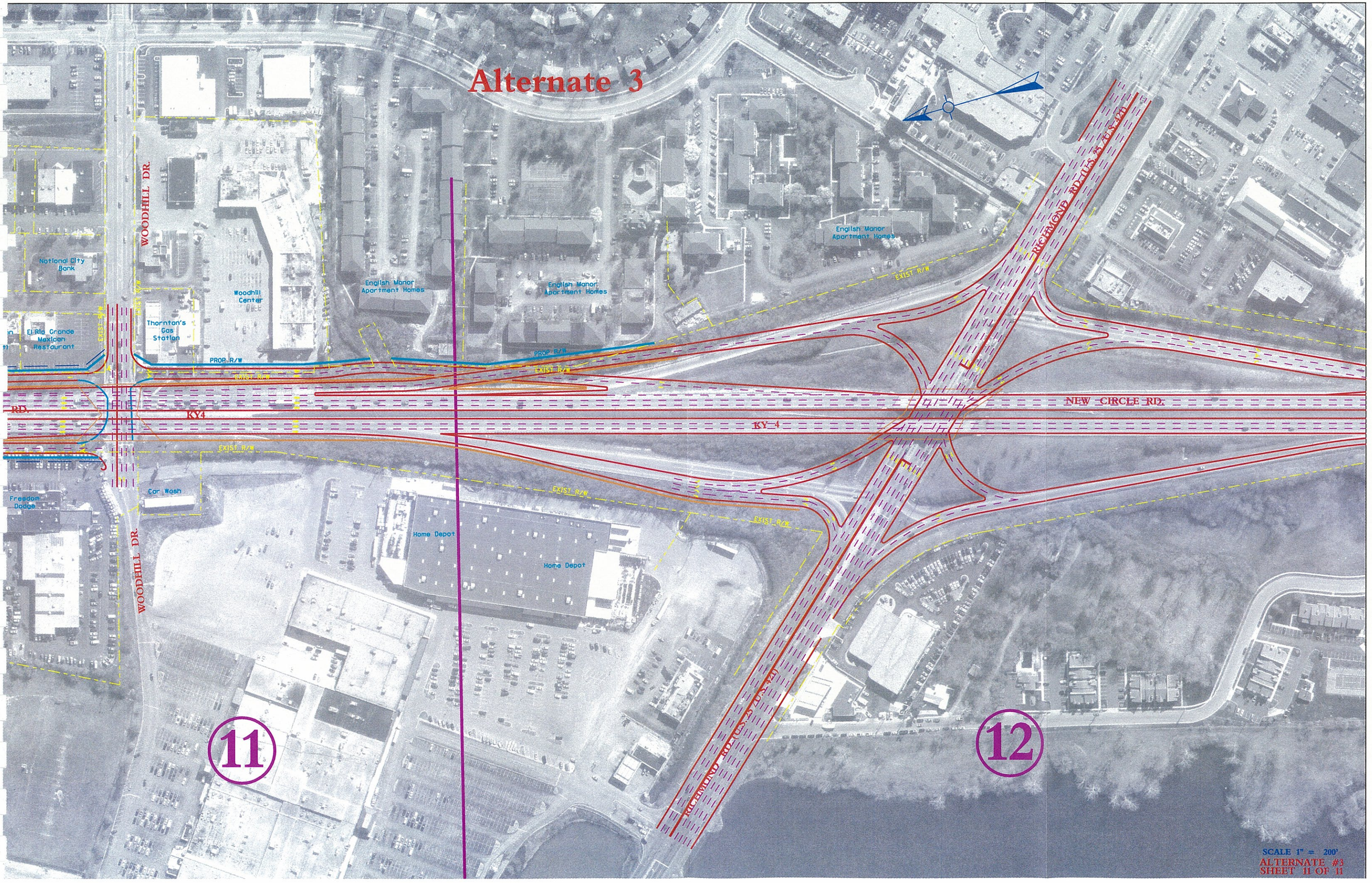
Alternate 3
WOODHILL DR.
National City Bank
El Rio Grande Mexican Restaurant
Thornton's Gas Station
Woodhill Center
English Manor Apartment Homes
English Manor Apartment Homes
English Manor Apartment Homes
EXIST R/W
PROP R/W
EXIST R/W
PROP R/W
EXIST R/W
RICHMOND RD (US 25 & KY 627)
NEW CIRCLE RD.
KY4
KY-4
EXIST R/W
Car Wash
Freedom Dodge
EXIST R/W
EXIST R/W
Home Depot
Home Depot
WOODHILL DR.
RICHMOND RD (US 25 & KY 627)
11
12
SCALE 1" = 200'
ALTERNATE #3
SHEET 11 OF 11

EXHIBIT 7

BUILD ALTERNATE 4

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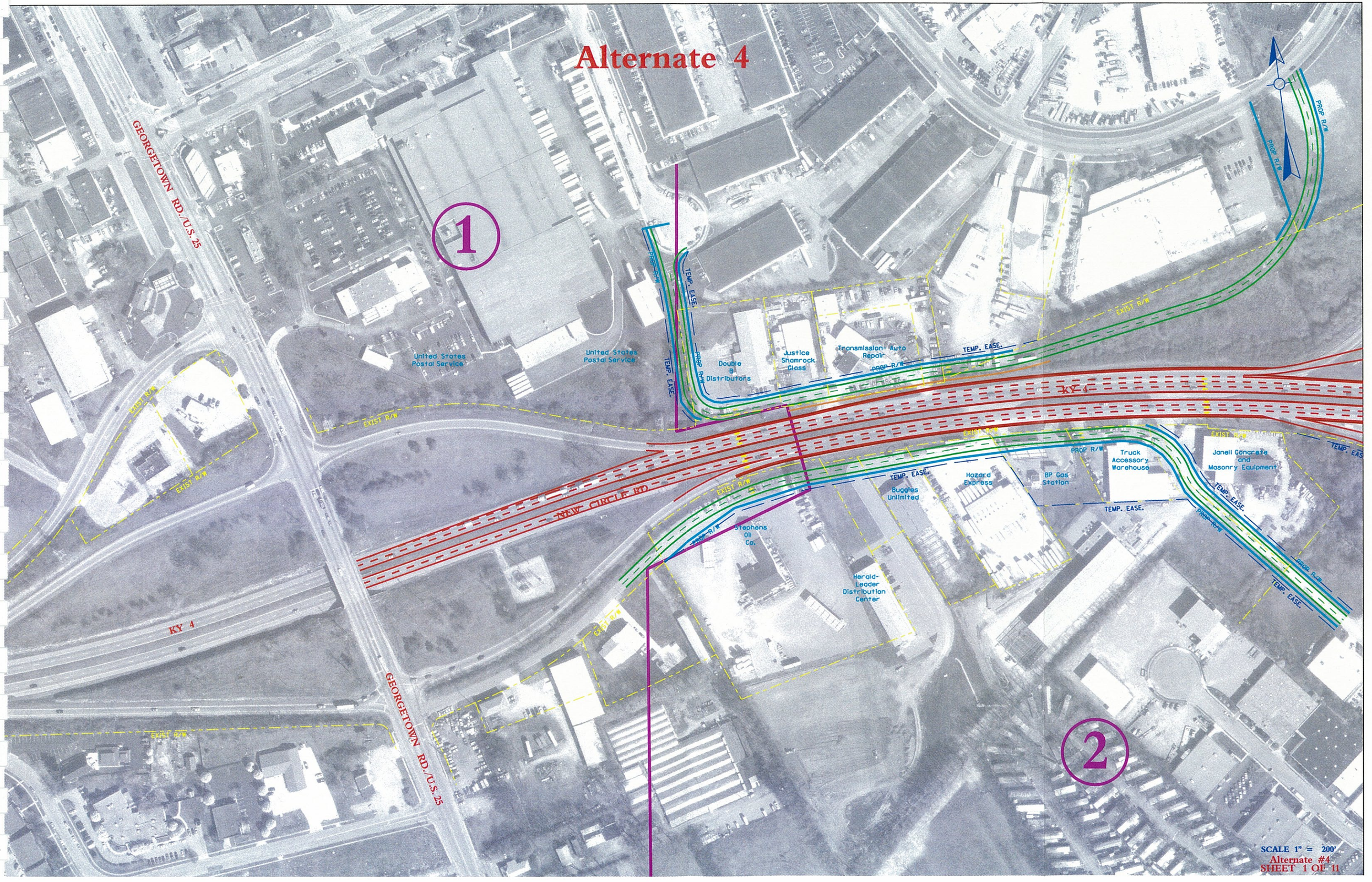
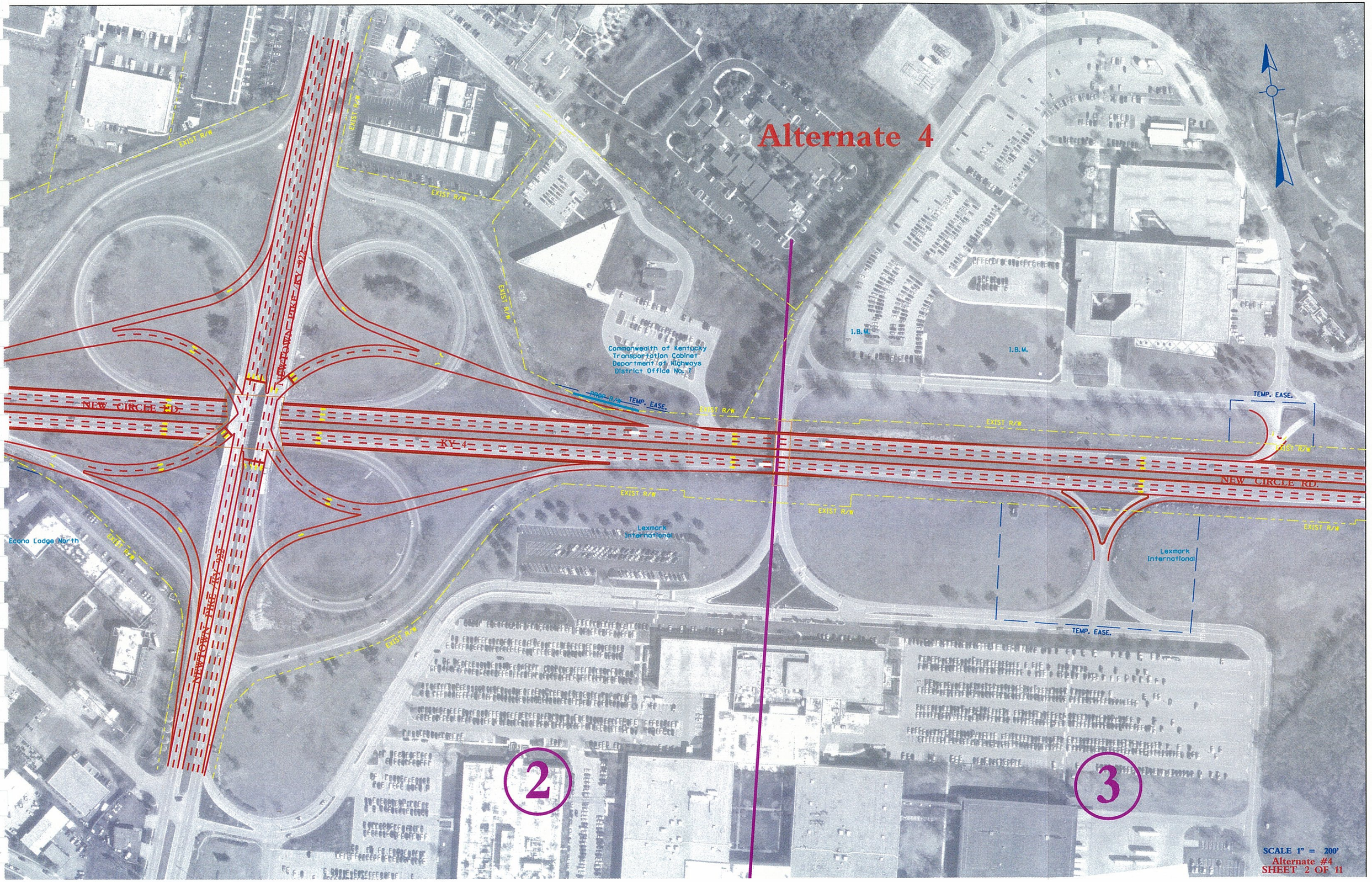
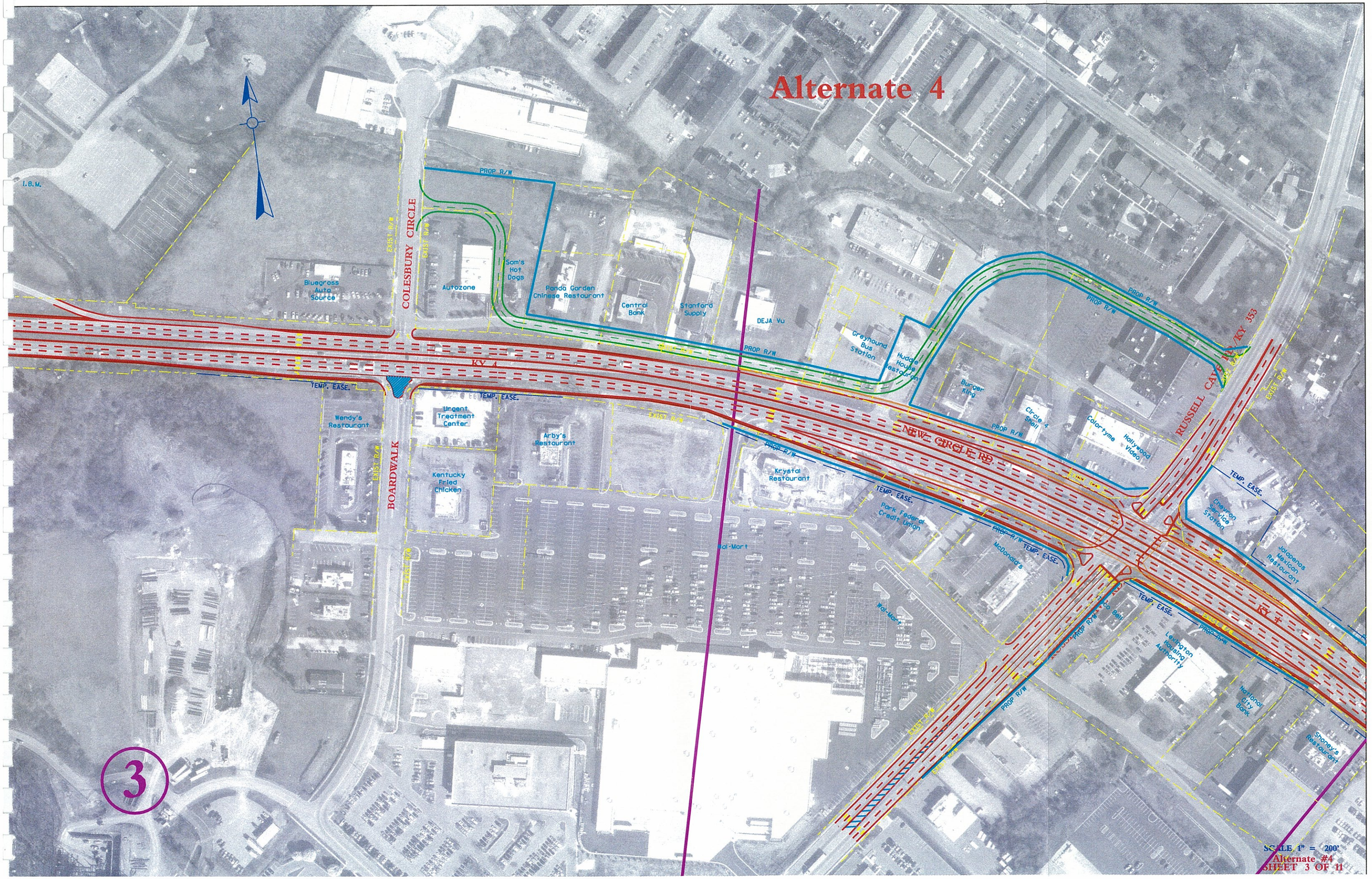

Alternate 4
GEORGETOWN RD./U.S.25
1
2
United States Postal Service
United States Postal Service
Double B Distributors
Justice Shamrock Glass
Transmission- Auto Repair
Stephens Oil Co.
Herald-Leader Distribution Center
Buggies Unlimited
Hazard Express
BP Gas Station
Truck Accessory Warehouse
Janell Concrete and Masonry Equipment
NEW CIRCLE RD
KY 4
EXIST R/W
PROP R/W
TEMP. EASE.
SCALE 1" = 200'
Alternate #4
SHEET 1 OF 11

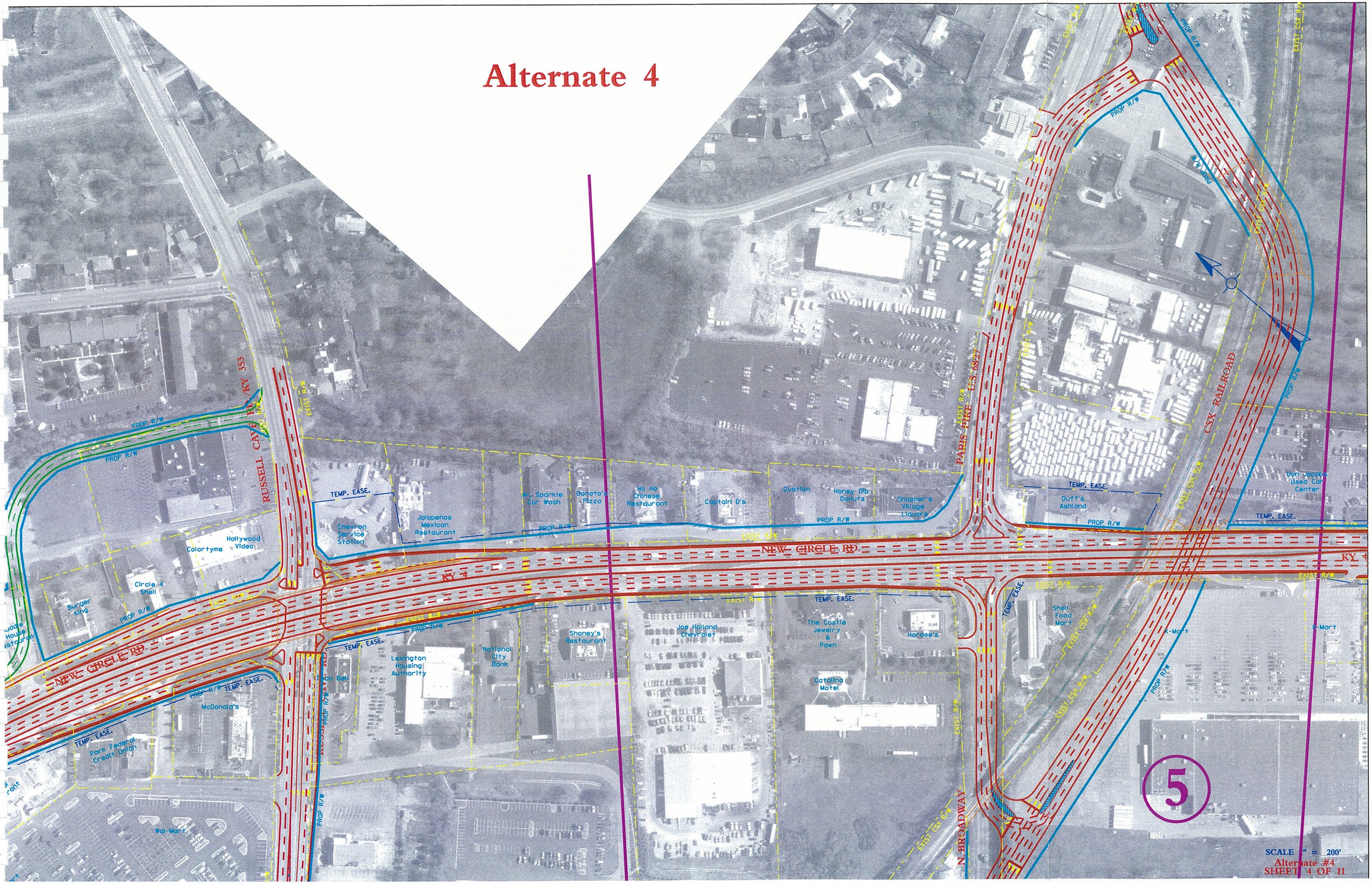

Alternate 4
NEW CIRCLE RD.
KY 4
NEWTOWN PIKE KY 922
EXIST R/W
PROP R/W
TEMP. EASE.
Commonwealth of Kentucky
Transportation Cabinet
Department of Highways
District Office No. 7
I.B.M.
Lexmark
International
Econo Lodge North
2
3
SCALE 1" = 200'
Alternate #4
SHEET 2 OF 11

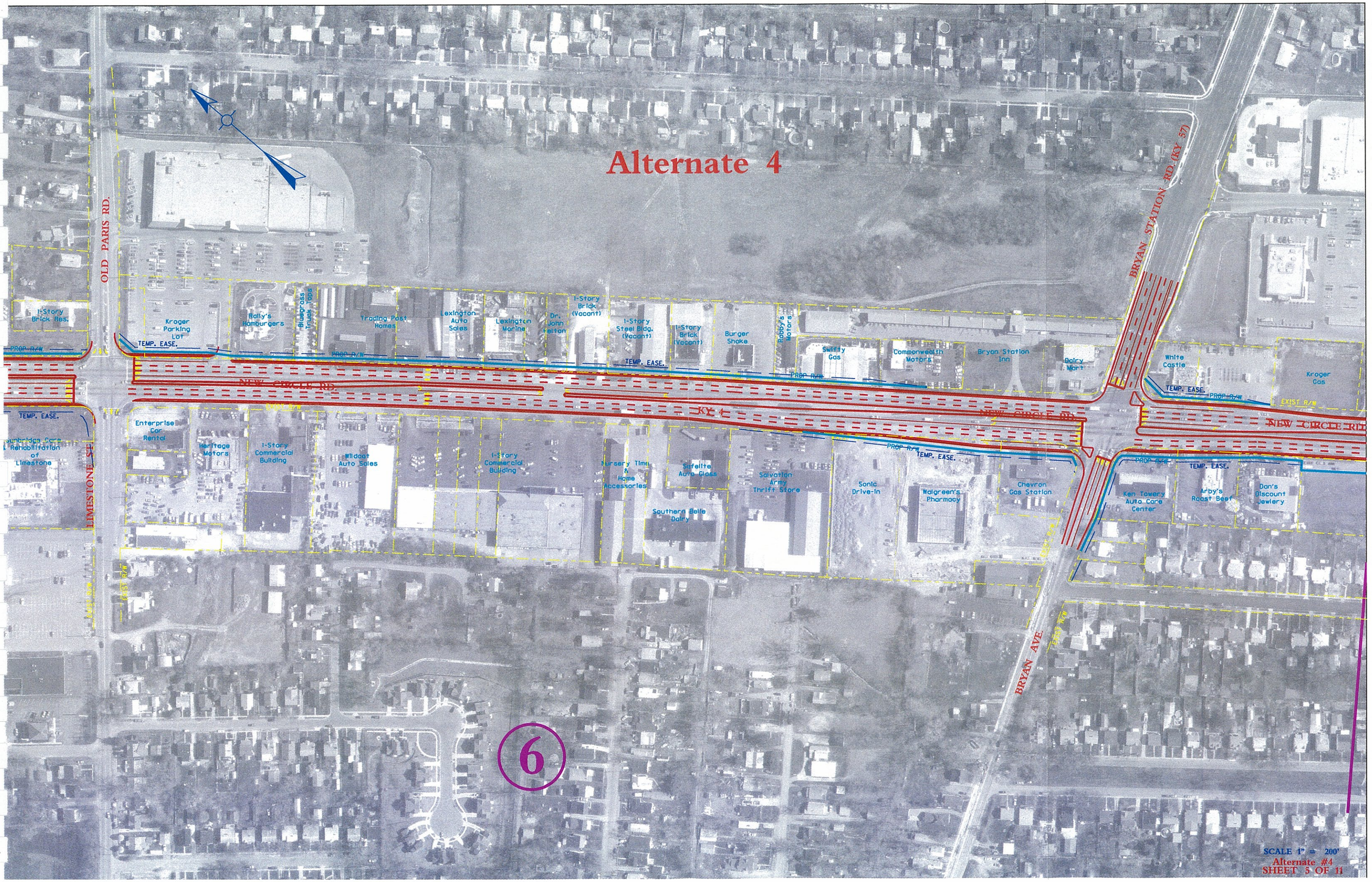


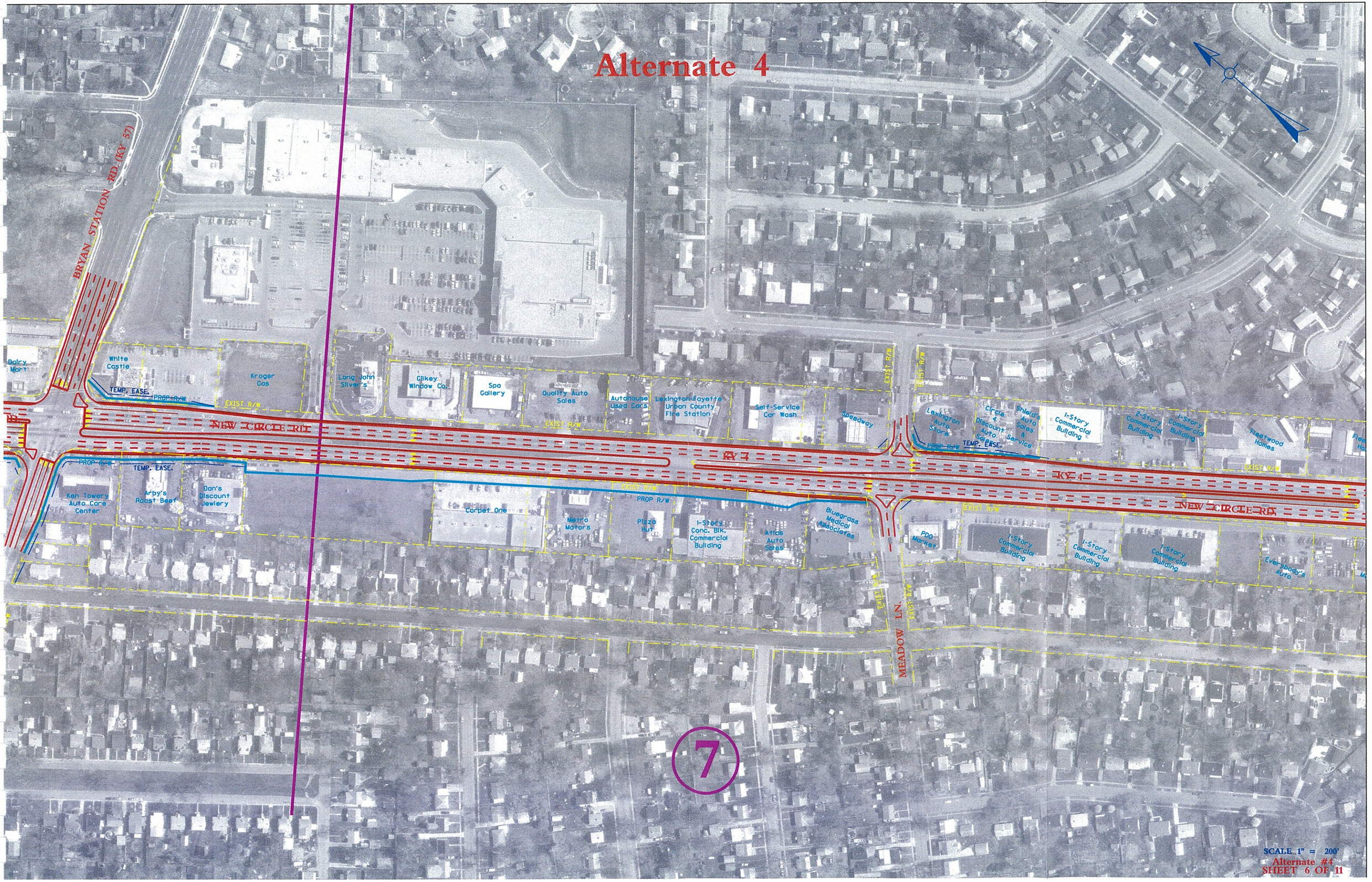
SCALE 1" = 200'

Alternate #4
SHEET 3 OF 11

Alternate 4


NEW CIRCLE RD.
KY 4
RUSSELL CAVE RD./KY 353
PARIS PIKE U.S. 68/27
CSX RAILROAD
N. BROADWAY
PROP R/W
EXIST R/W
EXIST CSX R/W
TEMP. EASE.
Chevron Service Station
Jalapenos Mexican Restaurant
Mr. Sparkle Car Wash
Donato's Pizza
Ho Ho Chinese Restaurant
Captain D's
Ovation
Honey Dip Donuts
Shopper's Village Liquors
Duff's Ashland
Don Jacobs Used Car Center
Hollywood Video
Colortyme
Circle 4 Shell
Burger King
McDonald's
Park Federal Credit Union
Taco Bell
Lexington Housing Authority
National City Bank
Shoney's Restaurant
Joe Holland Chevrolet
The Castle Jewelry & Pawn
Hardee's
Catalina Motel
Shell Food Mart
K-Mart
Wal-Mart
5
SCALE 1" = 200'
Alternate #4
SHEET 4 OF 11


Alternate 4
OLD PARIS RD.
LIMESTONE ST.
BRYAN STATION RD. (KY 57)
NEW CIRCLE RD.
KY 4
BRYAN AVE.
1-Story Brick Res.
Kroger Parking Lot
TEMP. EASE.
PROP R/W
Rally's Hamburgers
Bluegrass Truck Sales
Trading Post Homes
Lexington Auto Sales
Lexington Marine
Dr. John Felton
1-Story Brick (Vacant)
1-Story Steel Bldg. (Vacant)
1-Story Brick (Vacant)
Burger Shake
Robby's Motors
Swifty Gas
Commonwealth Motors
Bryan Station Inn
Dairy Mart
White Castle
Kroger Gas
EXIST R/W
Enterprise Car Rental
Heritage Motors
1-Story Commercial Building
Wildcat Auto Sales
1-Story Commercial Building
Nursery Time & Home Accessories
Satellite Auto Glass
Southern Belle Dairy
Salvation Army Thrift Store
Sonic Drive-In
Walgreen's Pharmacy
Chevron Gas Station
Ken Towery Auto Care Center
Arby's Roast Beef
Dan's Discount Jewelry
6
SCALE 1" = 200'
Alternate #4
SHEET 5 OF 11



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Alternate #4
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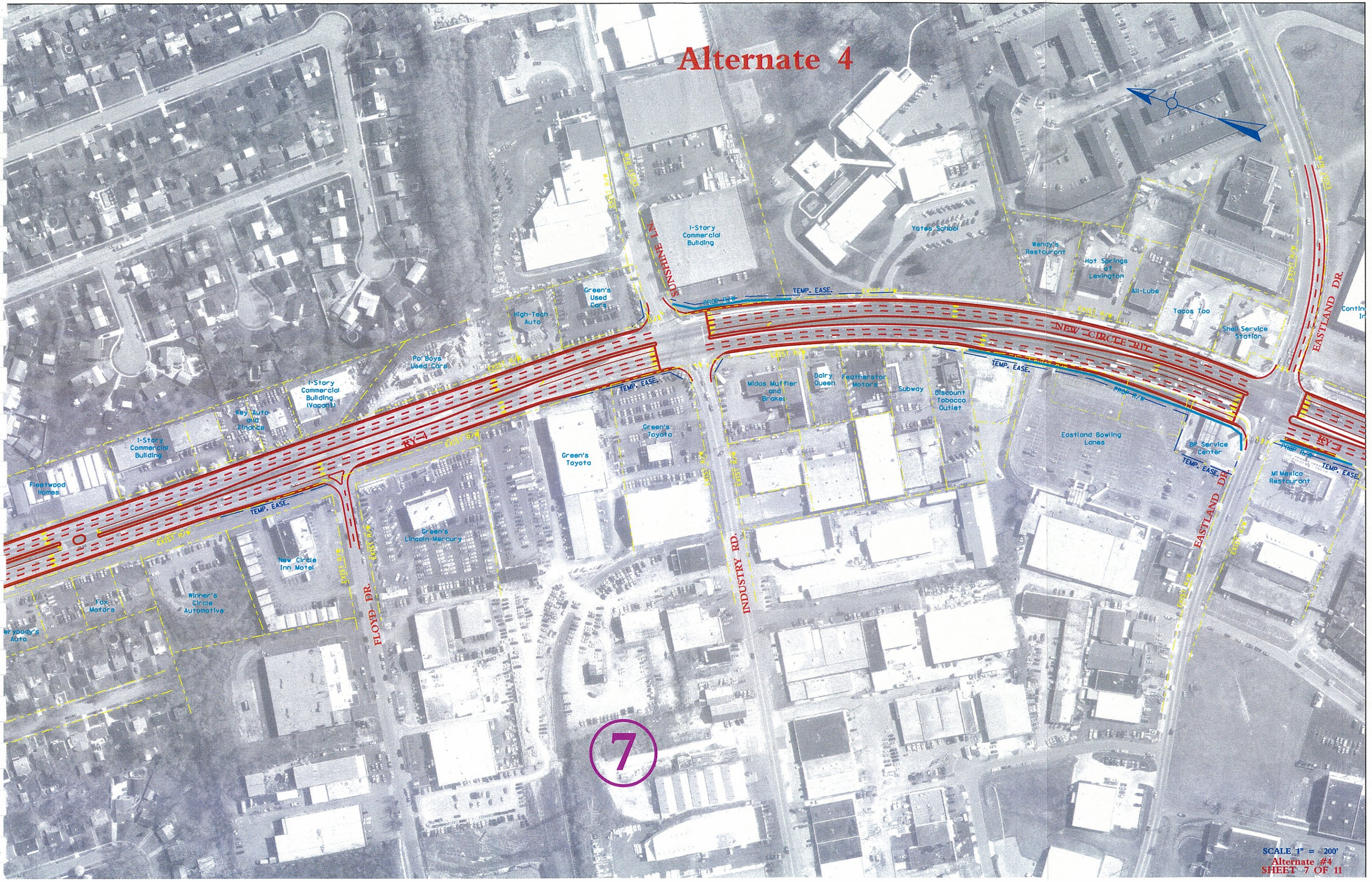

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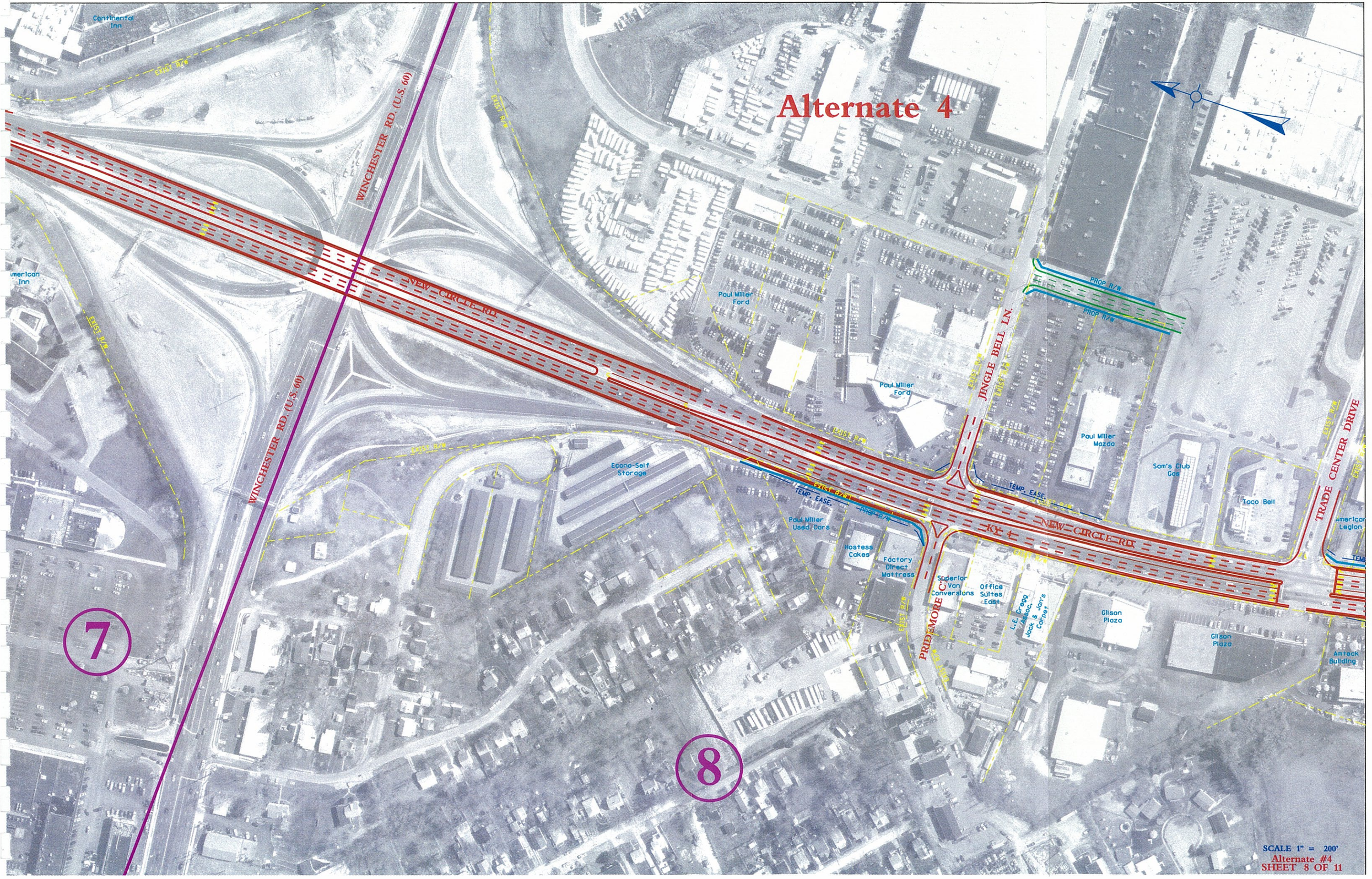
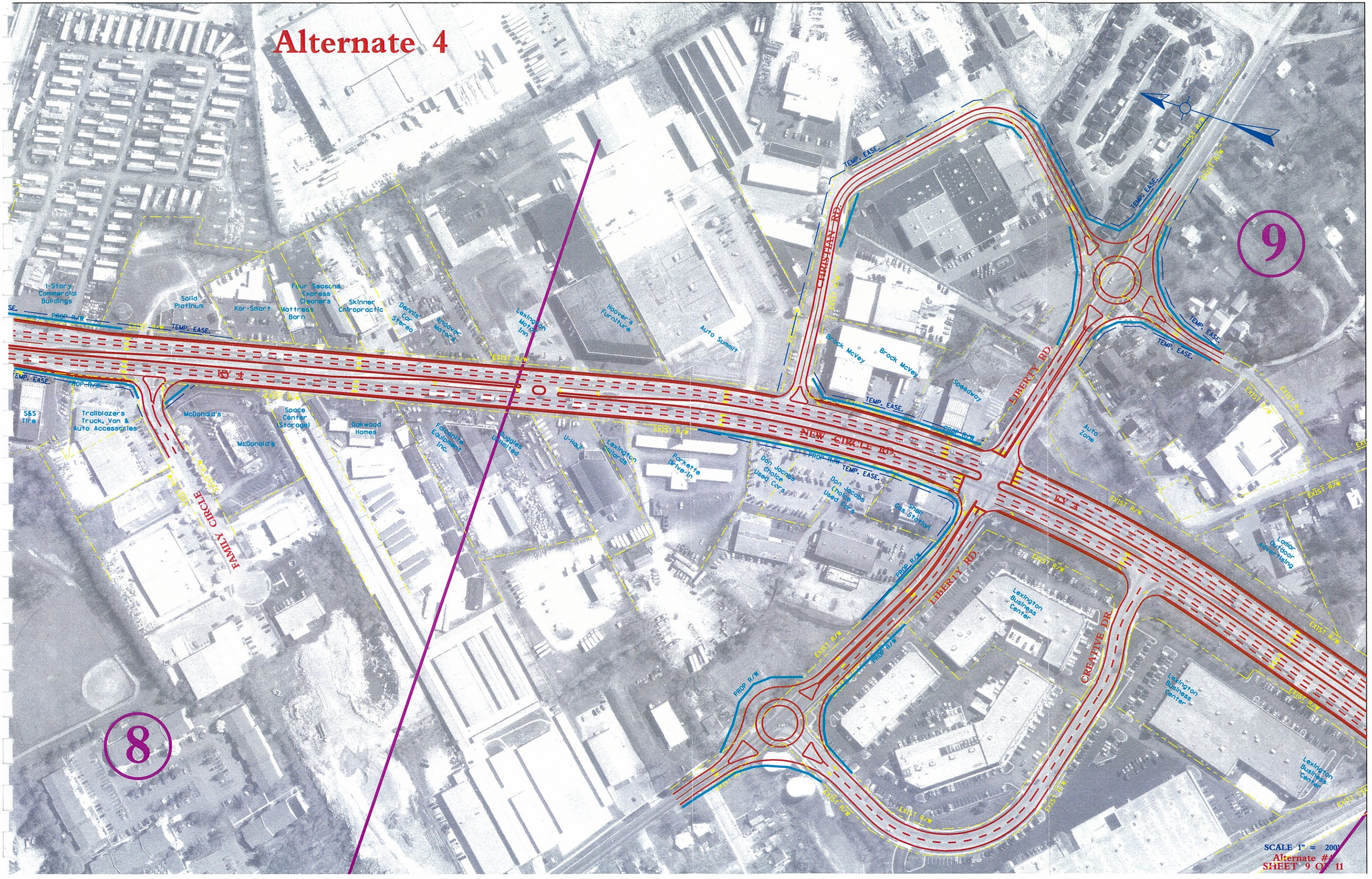
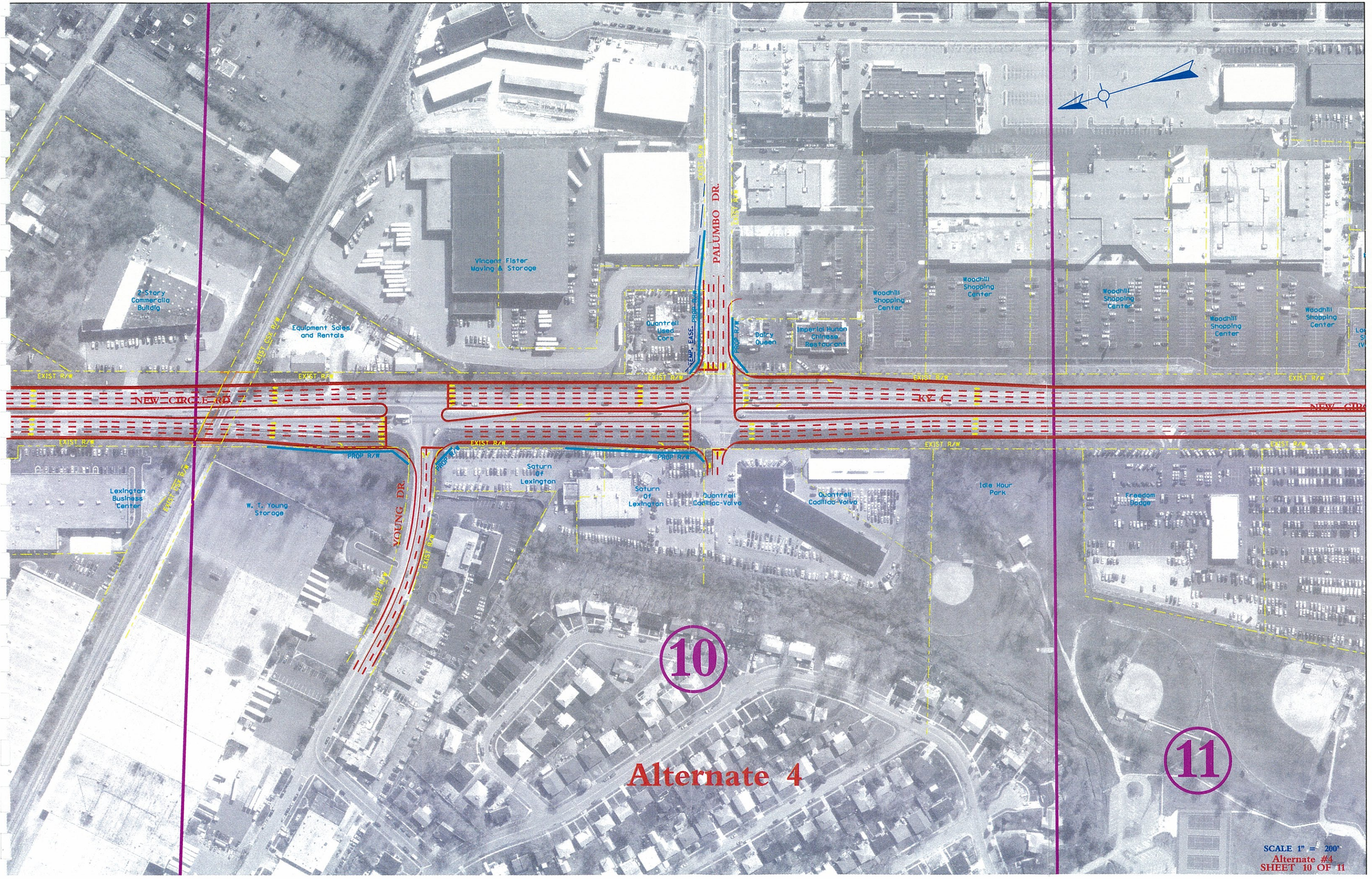
Alternate #4
SHEET 7 OF 11


Alternate 4
Continental Inn
American Inn
WINCHESTER RD. (U.S. 60)
NEW CIRCLE RD.
EXIST R/W
Paul Miller Ford
Paul Miller Ford
JINGLE BELL LN.
PROP R/W
Paul Miller Mazda
Sam's Club Gas
Taco Bell
TRADE CENTER DRIVE
American Legion
Econo-Self Storage
TEMP. EASE
Paul Miller Used Cars
Hostess Cakes
Factory Direct Mattress
Superior Van Conversions
Office Suites East
L.E. Gregg Assoc. Jack & Jan's Carpet
Gilson Plaza
Gilson Plaza
Amteck Building
PRIDEMORE CT.
KY 4
7
8
SCALE 1" = 200'
Alternate #4
SHEET 8 OF 11


Alternate 4
9
8
NEW CIRCLE RD.
LIBERTY RD.
CHRISTIAN RD.
FAMILY CIRCLE
CREATIVE DR.
EXIST R/W
PROP R/W
TEMP. EASE.
1-Story Commercial Buildings
Solid Platinum
Kar-Smart
Four Seasons Express Cleaners
Mattress Barn
Skinner Chiropractic
Dennis Car Stereo
Andover Motors
Lexington Motor Inn
Hoover's Furniture
Auto Summit
Brock McVey
Speedway
Auto Zone
S&S Tire
Trailblazers Truck, Van & Auto Accessories
McDonald's
Space Center (Storage)
Oakwood Homes
Fabricators Equipment Inc.
Bugles Unlimited
U-Haul
Lexington Mufflers
Parkette Drive-In
Don Jacobs Choice Used Cars
Shell Gas Station
Lamar Outdoor Advertising
Lexington Business Center
SCALE 1" = 200'
Alternate #4
SHEET 9 OF 11


PALUMBO DR.
NEW CIRCLE RD.
YOUNG DR.
Vincent Fister Moving & Storage
2-Story Commercial Buildg
Equipment Sales and Rentals
Quantrell Used Cars
Dairy Queen
Imperial Hunan Chinese Restaurant
Woodhill Shopping Center
Lexington Business Center
W. T. Young Storage
Saturn of Lexington
Quantrell Cadillac-Volvo
Idle Hour Park
Freedom Dodge
EXIST R/W
PROP R/W
TEMP. EASE.
10
11
Alternate 4
SCALE 1" = 200'
Alternate #4
SHEET 10 OF 11

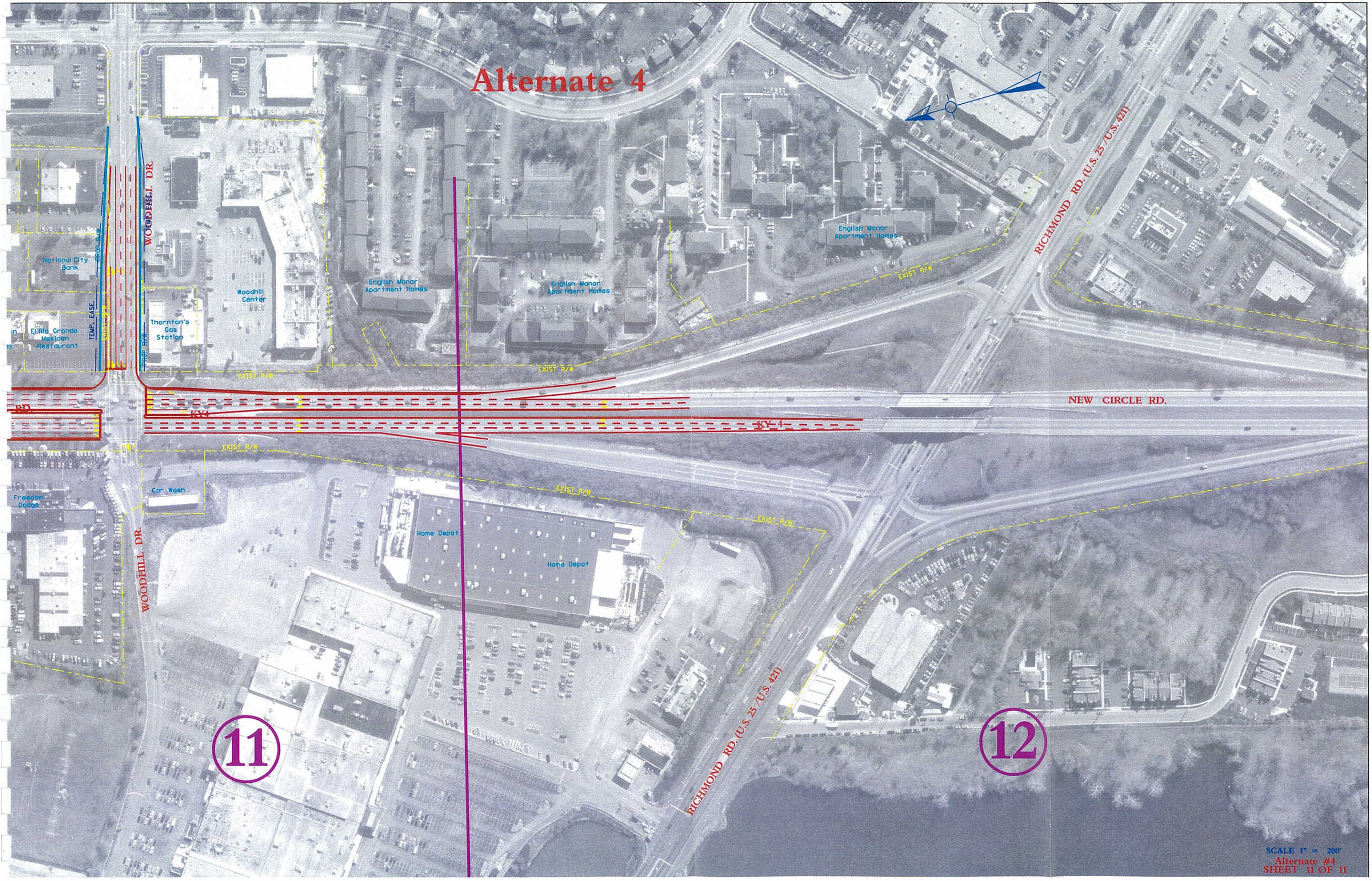

Alternate 4
WOODHILL DR.
National City Bank
El Rio Grande Mexican Restaurant
TEMP. EASE.
PROP. R/W
Woodhill Center
Thornton's Gas Station
English Manor Apartment Homes
English Manor Apartment Homes
English Manor Apartment Homes
EXIST R/W
RICHMOND RD. (U.S. 25 /U.S. 421)
NEW CIRCLE RD.
KY-4
Car Wash
Freedom Dodge
Home Depot
Home Depot
WOODHILL DR.
RICHMOND RD. (U.S. 25 /U.S. 421)
11
12
SCALE 1" = 200'
Alternate #4
SHEET 11 OF 11

EXHIBIT 8

EXISTING AND PROPOSED ILLUSTRATIONS

Alternates #1& 4

Existing



Proposed



New Circle Road @ CSX Railroad Bridge

Looking toward North Limestone/Old Paris Pike

Alternates #1& 4

Existing



Proposed



New Circle Road near Bryan Station

Looking toward North Limestone/Old Paris Pike

Alternate #1

Existing



Proposed



New Circle Road @ CSX Railroad Bridge

Looking toward Broadway

Alternate #1

Existing



Proposed



New Circle Road @ Railroad Bridge

Looking toward Young Drive

Alternate #2

Existing



Proposed



New Circle Road @ Railroad Bridge

Looking toward Young Drive

Alternates #2 & 4

Existing



Proposed



New Circle Road @ Newtown Pike

Looking toward Lexmark Bridge

Alternate #3

Existing



Proposed



New Circle Road @ Railroad Bridge

Looking toward Young Drive

PLANNING STUDY ADDENDUM

Signalized Portion of New Circle Road

KENTUCKY TRANSPORTATION CABINET

LEXINGTON FAYETTE URBAN COUNTY GOVERNMENT 1775 KENTUCKY



March 2006

Palmer ENGINEERING

AMERICAN

Signalized Portion of New Circle Road, Planning Study Addendum

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1.0 PROJECT DESCRIPTION

1.1 Purpose and Need

The purpose of this report is to propose a design for increasing safety, mobility, and system continuity in order to support continued and sustainable economic development within the northeast portion of New Circle Road. Mobility on the existing roadway is limited by congestion caused by high traffic volumes, business entrances, and conflicting weaves. Traffic volumes along New Circle Road have steadily increased over the years due to development on the north side of Lexington and providing a connection between Interstate 75 and Bluegrass Parkway.

More specifically, the Phase I design for this segment of New Circle Road addresses proposed improvements from west of Georgetown Road to Boardwalk. The original planning study proposed improving New Circle Road in segments by dividing the road into twelve decision sections and six construction projects. Decision sections 1, 2, and 3 are addressed in this planning study addendum.

1.2 Existing Conditions

New Circle Road (KY 4) and Newtown Pike (KY 922) are part of the National Truck Network, Defense Highway Network, National Highway System, and State Primary System. These roads are specifically designated for use by trucks with increased dimensions (8.5'Wx13.5'H, 28'L trailers, 53'L semi-trailers) and are important to the nation's economy, defense, and mobility. Georgetown Road (US 25) is considered a secondary road. Two of the four interchanges in the New Circle northeast corridor are located at Georgetown Road (US 25) and at Newtown Pike (KY 922). The intersection of Boardwalk/Colesbury Circle is currently signalized. Businesses line both sides of New Circle Road for the length of the Project and many have direct access to New Circle Road.

1.3 Previous Studies

The Lexington-Fayette Urban County Government initiated a 1987 study to recommend a solution for New Circle Road Northeast but none of the recommendations were approved for implementation. In 1999, a study of the 14 mile fully controlled access portion of New Circle Road was completed for the Kentucky Transportation Cabinet. The study highlighted an eight and a ten-lane alternative. The eight-lane alternative was recommended at a cost of $218 million, but no funds have been committed to that portion of New Circle Road as of this date. That study did not include recommendations for New Circle Northeast other than improvements for the interchanges at Georgetown and Richmond

Roads. In August 1999, the Kentucky Transportation Center at the University Of Kentucky College Of Engineering completed Research Report KTC-99-55, *Conversion of New Circle Road to a Limited Access Facility.* The study compared the addition of one lane in each direction with the use of median U-turn and restricted left turn strategies at selected intersections. The innovative research report was presented to the Lexington Metropolitan Planning Organization and is considered to have been the impetus for the development of the April 2002 planning study.

The Kentucky Transportation Cabinet (KTC) and the Lexington Area Metropolitan Planning Organization placed renewed emphasis on finding a solution to the New Circle Northeast corridor problem. Adequate resources were committed to the New Circle Road Northeast Planning Study beginning with the project authorization on December 1, 1999.

The firms of Palmer Engineering and American Engineering were contracted to conduct the study. The product of this effort was the *Planning Study, Signalized Portion of New Circle Road, April 2002.* This planning study addendum addresses the first segment of the corridor to be advanced to Phase I design and environmental analysis.

1.4 Planning Study Recommendations

The planning study proposed closing the median at Boardwalk/Colesbury Circle permitting only right turns into and out of these side streets. Left turns would be accommodated via mid-block U-turns lanes along New Circle Road to either side of the intersection. New Single Point Urban Interchanges were to replace the existing interchanges at Newtown Pike and Georgetown Road although the Georgetown Road interchange was to be considered as a separate project. The study also proposed relocating business access points along New Circle to frontage roads that connect to the existing system.

2.0 DISCUSSION OF ALTERNATIVES

At the Preliminary Design Conference for the Phase I design of the Newtown Pike Interchange, the Project Team discussed the need to improve the weave distances between Georgetown Road and Newtown Pike. Concerns were raised about developing a design solely for Newtown Pike without considering the affects on Georgetown Road operations. Based on these concerns, the Project Team elected to perform a Phase IA Planning Study Addendum to address this situation prior to moving to Phase IB and environmental analysis. The consultants were instructed to analyze options that utilized Collector-Distributor Roads and Service Roads between the interchanges due to the close spacing.

A Preliminary Scheme Review Meeting for this planning study addendum was held on July 13, 2005 at the District 7 Office in Lexington, Kentucky. A brief project overview was given describing the planning study that was completed in 2002 and decisions that have been made as a result of the Pre-Design Conference. Two primary issues focused upon a choice between constructing collector-distributor roads or service roads between the Georgetown Road Interchange and the Newtown Pike Interchange. Meeting attendees favored constructing 6-lanes rather than 4-lanes along New Circle Road, or at least acquiring adequate space to ultimately widen to 6-lanes. Another design issue that was discussed was that a raised curb could be used in the median with a barrier wall between New Circle Road and the service roads. An additional consideration concerning the median treatment related to the proposed use of cable guardrail that is being considered for use in the controlled access portion of New Circle Road.

During the meeting, four alternatives were presented to the group. Alternative 1 would utilize service roads and funnel all traffic through traffic signals. Alternative 2 would provide slip ramps for a portion of the traffic entering and leaving New Circle Road and the 3rd alternative would eliminate weaving between Georgetown Road and Newtown Pike through the use of additional bridges to braid the ramps. Alternative 4 would provide C-D Roads that would begin west of Georgetown Road and merge east of Newtown Pike. The Slip Ramp alternative could involve phased construction if necessary. The C-D Road alternative would have a higher cost than the other alternatives and Lexmark would be impacted by the Right-of-Way. In addition, this alternative would be much more difficult to construct in phases due to the lengths of the ramps. The project team felt that the size of this alternative might be much larger than funding would allow.

The Project Team consensus was that traffic simulations should be developed for the slip ramp alternative to see where potential problems are likely to occur. Based upon this simulation, a second alternative was to be developed. These two alternatives are to be compared to the original study alternative that only reconstructs the Newtown Pike Interchange. The selected alternative will need to be constructed in phases due to the lack of funding. In addition, the group noted that there were no Public Meetings planned for this phase of the project. Phase 1B will include additional public involvement.

2.1 Alternatives

The following alternatives are based upon a combination of recommendations from the Planning Study and the most recent thinking by members of the Interdisciplinary Team.

2.1.0 Build Alternative 4

Alternative 4 is a combination of three original alternatives considered during the planning study and represents the preferences of the focus group. For Phase I Design, New Circle Road is to be widened to 6 lanes east of Georgetown Road to Boardwalk. The following is a listing of the features of this alternative:

Georgetown Road: The existing Georgetown Road Interchange configuration will remain without improvement. Segment improvements between Georgetown Road and Newtown Pike would consist of a frontage road immediately to the south of New Circle Road, running from the point where Finney Drive currently terminates to a point where it would connect with the current terminus of Adcolor Drive. The provision of this frontage road would replace the commercial access points that will be lost as a result of driveway closings when New Circle Road is widened to 6 lanes. North of New Circle Road, a similar arrangement is proposed by providing a frontage road from a connection at the Primrose Court cul-de-sac, running along New Circle Road and back north to intersect with Nandino Boulevard.

Newtown Pike: A Single Point Urban Interchange (SPUI) will replace the existing interchange.

Boardwalk/Colesbury Circle: The access to Lexmark will remain right in-right out just as it is today and the bridge connecting the Lexmark campuses will be replaced. The median will remain open at Boardwalk/Colesbury Circle during this phase but is planned to be closed in future widening phases. The signal at Boardwalk/Colesbury Circle will remain as it currently exists with a third thru eastbound lane, this lane being dropped at the entrance to North Park Shopping Center.

2.1.1 Build Alternative 5: Original SPUI Alternative With Ramp Modifications Alternative

Alternative 5 includes improvements to the existing Georgetown Road interchange ramps, a complete redesign of the Newtown Pike Interchange, and widening New Circle Road to 6 lanes.

Georgetown Road: Georgetown Road Interchange off ramps will be widened to accommodate forecasted traffic volumes. The eastbound and westbound off ramps from New Circle Road on to Georgetown Road will be widened to two lanes which will accommodate dual left turn lanes and an exclusive right turn lane at Georgetown Road. An additional lane will be added to New Circle Road to facilitate weaving between Georgetown Road and Newtown Pike.

Newtown Pike: The primary feature of this alternative is that the Newtown Pike interchange is to be replaced with a single point urban interchange. The on and off ramps will provide dual entry to and from New Circle Road. Frontage roads will be required to provide access to the businesses between Georgetown Road and Newtown Pike that will lose access as a result of the widening. The frontage road immediately to the south of New Circle Road will be constructed from Finney Drive to Adcolor Drive. A frontage road to the north of New Circle Road will be constructed from the Double B Distributors driveway and connect to Nandino Boulevard.

Boardwalk/Colesbury Circle: The access to Lexmark will remain right in-right out just as it is today. This alternative will require the replacement of the bridge connecting the Lexmark campuses due to the additional New Circle Road lanes that will be added during this phase. The median will remain open at Boardwalk/Colesbury Circle during this phase but is planned to be closed as a result of future widening phases.

2.1.2 Build Alternative 6: Service Roads with Slip Ramps Alternative

Alternative 6 includes improvements to the Georgetown Road ramps and provides service roads between Georgetown Road and Newtown Pike. The service roads are designed to eliminate weaving

between the interchanges and include slip ramps to provide greater access. New Circle Road is to be widened to 6 lanes or at a minimum, right-of-way to accommodate 6 lanes is to be acquired until such time that the road can be widened to 6 lanes.

Georgetown Road: The Georgetown Road Interchange off ramps will be modified to accommodate the widening of New Circle Road and realigned to tie to the service roads. Vehicles traveling to/from Georgetown Road will access the service road and travel thru signals at Newtown Pike. The service road slip ramps will provide access to/from Newtown Pike.

Newtown Pike: This alternative removes direct access to New Circle Road from adjacent businesses and provides access via service roads and slip ramps north and south of New Circle Road. This design allows the Georgetown Road and the Newtown Pike interchanges to work in concert such that motorists wishing to travel west on New Circle Road may exit Newtown Pike at the service road ramp and continue to either the adjacent businesses or continue west via a slip ramp in order to merge onto New Circle Road. In the opposite direction motorists traveling east on New Circle Road may access the service road via a slip ramp that becomes the on-ramp to the Newtown Pike interchange. The Newtown Pike Interchange will be changed from a partial cloverleaf to a diamond interchange with the exception that the northbound Newtown Pike to westbound New Circle loop ramp will remain.

Boardwalk/Colesbury Circle: The access to Lexmark will remain right in-right out just as it is today. This alternative will require the replacement of the bridge connecting the Lexmark campuses. The median will remain open at Boardwalk/Colesbury Circle during this phase but is planned to be closed in future widening phases. The existing lane configuration and signal will remain as it presently.

2.2 Typical Section

The typical sections for New Circle Road include a 4-lane rural section, 6-lane with curb and gutter, 6-lane with curb and gutter and service roads, and 8-lane with curb and gutter. The 4-lane rural section, located between the Georgetown Road Ramps, has twelve foot outside shoulders, 20 foot raised median, and right of way that varies from 120 to 140 feet. The 6-lane curb and gutter section, located between Georgetown Road and Lexmark, has ten foot shoulders, 20 foot raised median, and right of way width of 132 feet. The 6-lane curb and gutter section with service roads, between the interchanges, has a 20 foot raised median and 14 foot outside shoulders with barrier

walls separating the service roads from New Circle Road. The service road has a 4 foot inside shoulder and curb and gutter on the outside. The right of way width for this section including the service road is 218 feet. The 8-lane curb and gutter section, between Lexmark and Boardwalk/Colesbury Circle, has ten foot shoulders, 20 foot raised median, and a right of way width of 156 feet. The Kentucky Transportation Cabinet is currently considering cable guardrail for the controlled access portion of New Circle Road, which could be implemented on any of these typical sections.

2.3 Maintenance of Traffic

2.3.0 Maintenance of Traffic for Alternative 4

While constructing the at-grade portions of Alternative 4, traffic will be maintained without additional right of way. Drainage work will be completed first, along with any frontage roads and outside curb and gutter. The next phase will construct the outside lanes and any intersection widening that is proposed. After shifting traffic to the outer two lanes on each side of New Circle Road, the median improvements will be constructed.

The bridge for the single point urban interchange at Newtown Pike will be constructed in two halves. Left turn fillets will be constructed at the Newtown Pike end of three right turn ramps that currently don't have them. Traffic will temporarily be rerouted from the three loops onto the right turn ramps. Newtown traffic will be maintained with one lane each direction over one of the existing bridges while half of the new bridge is built. Then traffic will be maintained with one lane each direction over the newly constructed side of the new bridge while the remaining side is constructed along with the portions of the new ramps inside of the old right turn ramps. Lastly the ends of the new ramps will be tied into New Circle Road under traffic.

The Lexmark Bridge will be closed while it is replaced. New Circle Road traffic will be maintained on the existing road and stopped only for setting beams and moving equipment.

2.3.1 Maintenance of Traffic for Alternative 5

While constructing the at-grade portions of Alternative 5 traffic will be maintained without additional right of way. Drainage work will be completed first, along with any frontage roads and outside curb and gutter. Next, the outside lanes will be constructed and intersection will be widened. After shifting

traffic to the outer two lanes on each side of New Circle Road, median improvements will be constructed.

The bridge for the single point urban interchange at Newtown Pike will be constructed in two halves. Left turn fillets will be constructed at the Newtown Pike end of the three right turn ramps that currently don't have them. Traffic will temporarily be rerouted from the three loops onto the right turn ramps. Newtown traffic will be maintained with one lane in each direction over one of the existing bridges while half of the new bridge is built. Then traffic will be maintained with one lane each direction over the newly constructed side of the new bridge while the remaining side is constructed along with the portions of the new ramps inside of the old right turn ramps. Lastly the ends of the new ramps will be tied into New Circle Road under traffic.

The Lexmark Bridge will be closed while it is replaced. New Circle Road traffic will be maintained on the existing road and stopped only for setting beams and moving equipment.

2.3.2 Maintenance of Traffic for Alternative 6

While constructing the at-grade portions of Alternative 6, traffic will be maintained without additional right of way. Drainage work will be completed first, along with service roads between Newtown Pike and Georgetown Road along with the outside curb and gutter. Next, the construction of outside lanes, slip ramps, and any required intersection widening will be completed. After shifting traffic to the outer two lanes on each side of New Circle Road, median improvements will be constructed.

The bridge for the diamond interchange at Newtown Pike will be constructed in two halves. The loop ramp traffic will remain on the loops during construction and the right turn ramps will require lane shifts. Newtown Pike traffic will be maintained with one lane in each direction over one of the existing bridges while half of the new bridge is built. Then traffic will be maintained with one lane in each direction over the newly constructed side of the new bridge while the remaining side is constructed. Lastly the ends of the new ramps will be tied into New Circle Road under traffic.

The Lexmark Bridge will be closed while it is replaced. New Circle Road traffic will be maintained on the existing road and stopped only for setting beams and moving equipment.

2.4 Cost Estimate Summaries

Signalized Portion of New Circle Road
Alternative 4 Cost Summary

Section #	Description	Length (mi.)	Construction Cost
1	Georgetown Road Interchange	-	$ -
2	Newtown Pike Interchange	0.63	$ 13,000,000
3	Boardwalk/Colesbury	0.61	$ 5,200,000
	Right of Way		$ 3,000,000
	Utilities		$ 5,000,000
	Totals		**$ 26,200,000**

Note: Construction Cost Estimate for Alternate 4 has been updated since 2002 Planning Study and R/W Estimate based on Preliminary Property/Business Values.

Signalized Portion of New Circle Road
Alternative 5 Cost Summary

Section #	Description	Length (mi.)	Construction Cost
1	Georgetown Road Interchange	0.75	$ 5,000,000
2	Newtown Pike Interchange	0.63	$ 13,400,000
3	Boardwalk/Colesbury	0.61	$ 5,400,000
	Right of Way		$ 3,900,000
	Utilities		$ 5,000,000
	Totals		**$ 32,700,000**

Note: R/W Estimate based on Preliminary Property/Business Values.

Signalized Portion of New Circle Road
Alternative 6 Cost Summary

Section #	Description	Length (mi.)	Construction Cost
1	Georgetown Road Interchange	0.75	$ 7,900,000
2	Newtown Pike Interchange	0.63	$ 11,900,000
3	Boardwalk/Colesbury	0.61	$ 5,400,000
	Right of Way		$ 3,400,000
	Utilities		$ 5,000,000
	Totals		**$ 33,600,000**

Note: R/W Estimate based on Preliminary Property/Business Values.

Decision Section 1 – Georgetown Road Interchange

	No-Build	Alternate 4	Alternate 5	Alternate 6
Right of Way Cost ($ million)	$ 0	$ 0	$ 0.3	$ 0.2
Utility Relocation Cost ($ million)	$ 0	-	-	-
Construction Cost ($ million)	$ 0	$ 0	$ 5.0	$ 7.9
Total Cost ($ million)	$ 0	$ 0	$ 5.3	$ 8.1
EB New Circle Road Exit Ramp Delay (sec/veh)	97	91.8	27.1	94.9
WB New Circle Road Exit Ramp Delay (sec/veh)	70.4	77.2	22.9	29.6
Georgetown Road Outbound Delay (sec/veh)	59.9	68.8	48.8	61.6
Georgetown Road Inbound Delay (sec/veh)	199.7	207.2	207.4	171.3
Business Relocations	0	0	0	0

Decision Section 2 – Newtown Pike Interchange

	No-Build	Alternate 4	Alternate 5	Alternate 6
Right of Way Cost ($ million)	$ 0	$ 3.0	$ 3.6	$ 3.2
Utility Relocation Cost ($ million)	$ 0	-	-	-
Construction Cost ($ million)	$ 0	$ 13.0	$ 13.4	$ 11.9
Total Cost ($ million)	$ 0	$ 16.0	$ 17.0	$ 15.1
EB New Circle Road Exit Ramp Delay (sec/veh)	33	54.1	52.1	90.1
WB New Circle Road Exit Ramp Delay (sec/veh)	168	27.8	30.1	50.9
Newtown Pike Outbound Delay (sec/veh)	14.4	54.9	51.3	149.2
Newtown Pike Inbound Delay (sec/veh)	202.8	43.0	29.3	30.5
Business Relocations	0	2	2	3

Decision Section 3 – Boardwalk/Colesbury

	No-Build	Alternate 4	Alternate 5	Alternate 6
Right of Way Cost ($ million)	$ 0	$ 0	$ 0	$ 0
Utility Relocation Cost ($ million)	$ 0	-	-	-
Construction Cost ($ million)	$ 0	$ 5.2	$ 5.4	$ 5.4
Total Cost ($ million)	$ 0	$ 5.2	$ 5.4	$ 5.4
SB New Circle Road Delay (sec/veh)	299	-	-	-
NB New Circle Road Delay (sec/veh)	28	-	-	-
Boardwalk/Colesbury Total Delay (sec/veh)	369	-	-	-
Business Relocations	0	0	0	0

2.5 Study Recommendation

To increase safety, mobility, and system continuity several alternatives where compared before deciding to recommend Alternative 5. This alternative proposes ramp improvements to the Georgetown Road Interchange, a new Single Point Urban Interchange at Newtown Pike, frontage roads, and widening New Circle Road to six lanes.

The improvements to the Georgetown Road Interchange ramps widen both off ramps to 2-lanes which provides for dual left turn lanes and an exclusive right turn lane. The westbound on-ramp acceleration lane is extended 1000 feet to provide for adequate merging and the eastbound on-ramp will form an auxiliary lane between Georgetown Road and Newtown Pike. Each of the improvements to Georgetown Road can be constructed independently of each other which allow them to be implemented as funding becomes available.

The Newtown Pike improvements propose reconstructing the existing configuration with a Single Point Urban Interchange. The SPUI will provide two-lane on and off ramps and a signal at Newtown Pike. This configuration will eliminate the weaving movement along Newtown Pike and New Circle Road that is created by the existing loop ramps.

The proposed improvements to New Circle Road include widening to six lanes and eliminating the business access points that are currently located between Georgetown Road and Newtown Pike. The existing access points are proposed to be relocated to frontage roads that connect to Georgetown Road and Newtown Pike.

Detailed plan sheets for the recommended alternative can be found in Exhibit 6 of this report.

3.0 TRAFFIC ANALYSIS

The evaluation of current and proposed traffic conditions along New Circle Road and at its interchanges with Newtown Pike and Georgetown Road employed the use of multiple analysis tools. A regional travel demand model, TransCAD, was used to replicate existing ("base year") travel demands for the study area and to predict future travel demands. A traffic simulation model, TransModler, was then used to simulate existing and anticipated future operational conditions associated with the current facilities and alternatives under consideration. The project study area traffic model network is shown in **Figure 1**.

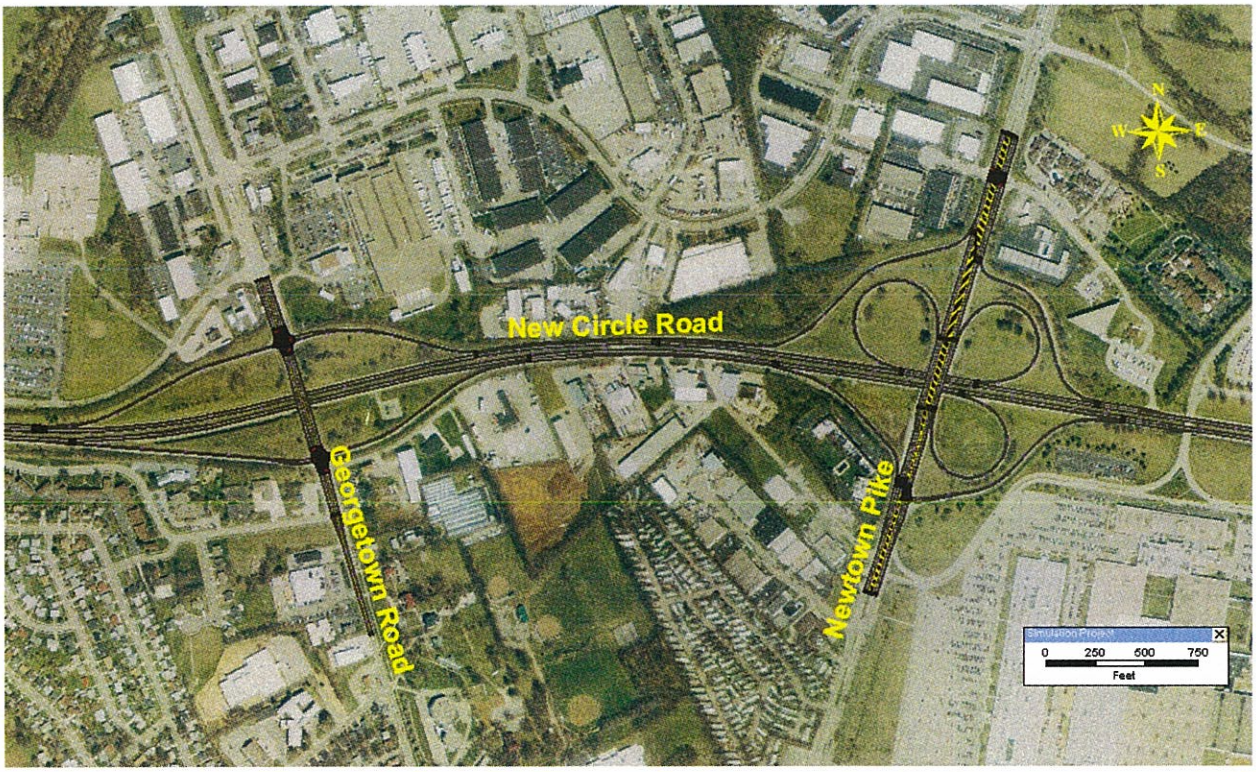


Figure 1: New Circle Road Traffic Model Network

3.1 DATA COLLECTION

In order to develop the base year model, data was collected from a number of sources. The study area model network was extracted from the Lexington Metropolitan Planning Organization (MPO) TransCAD Travel Demand Forecasting Model. Traffic signal timing plans were obtained from Lexington-Fayette Urban County Government Division of Traffic Engineering. Current and historical daily traffic counts were obtained from the Kentucky Transportation Cabinet, and additional peak-hour traffic count data were collected in the field to verify interchange ramp volumes.

Heavy truck data was also collected to simulate the impact of heavy trucks on the interchanges. According to the KYTC Highway Information System (HIS), traffic on New Circle Road and Newtown Pike currently consists of approximately 11% trucks. Traffic counts indicated that significant truck percentages are found on the ramp from southbound Newtown Pike to westbound New Circle Road (approximately 13%) and the ramp from eastbound New Circle Road to northbound Newtown Pike (approximately 12.5%).

3.2 GROWTH RATES/TRAFFIC PROJECTIONS

PM Peak Hour traffic forecasts were developed for a 2030 Design Year by developing growth factors and applying those to the base year traffic counts. Growth factors were extracted from the LFUCG Travel Demand Forecasting Model and are derived from future land use, socioeconomic data, and other factors. The MPO model assumes New Circle is widened to six lanes, Newtown Pike is widened to six lanes (between New Circle Road and I-75), and Citation Boulevard is completed to Leestown Pike. The resulting growth rates and P.M. peak hour traffic volumes are shown in **Table 1** and **Figure 2**, respectively.

Facility and Location	2005 Volume (VPH)	2030 Volume (VPH)	Total Growth (2005-2030)	Annual growth
New Circle Road, Westbound				
East of Newtown Pk	1,780	2,780	56.2%	1.8%
Between Newtown and Georgetown	2,615	3,770	44.2%	1.5%
West of Georgetown Rd	2,845	4,550	59.9%	1.9%
New Circle Road, Eastbound				
West of Georgetown Rd	2,765	3,785	36.9%	1.3%
Between Georgetown and Newtown	2,315	3,485	50.5%	1.6%
East of Newtown Pk	1,945	3,120	60.4%	1.9%
Newtown Pike				
North of New Circle	3,625	5,380	48.4%	1.6%
South of New Circle	2,445	3,970	62.4%	2.0%
Georgetown Road				
North of New Circle	2,750	3,720	35.3%	1.2%
South of New Circle	1,240	2,025	63.3%	2.0%

Table 1: Existing and Future Traffic Volumes and Growth Rates

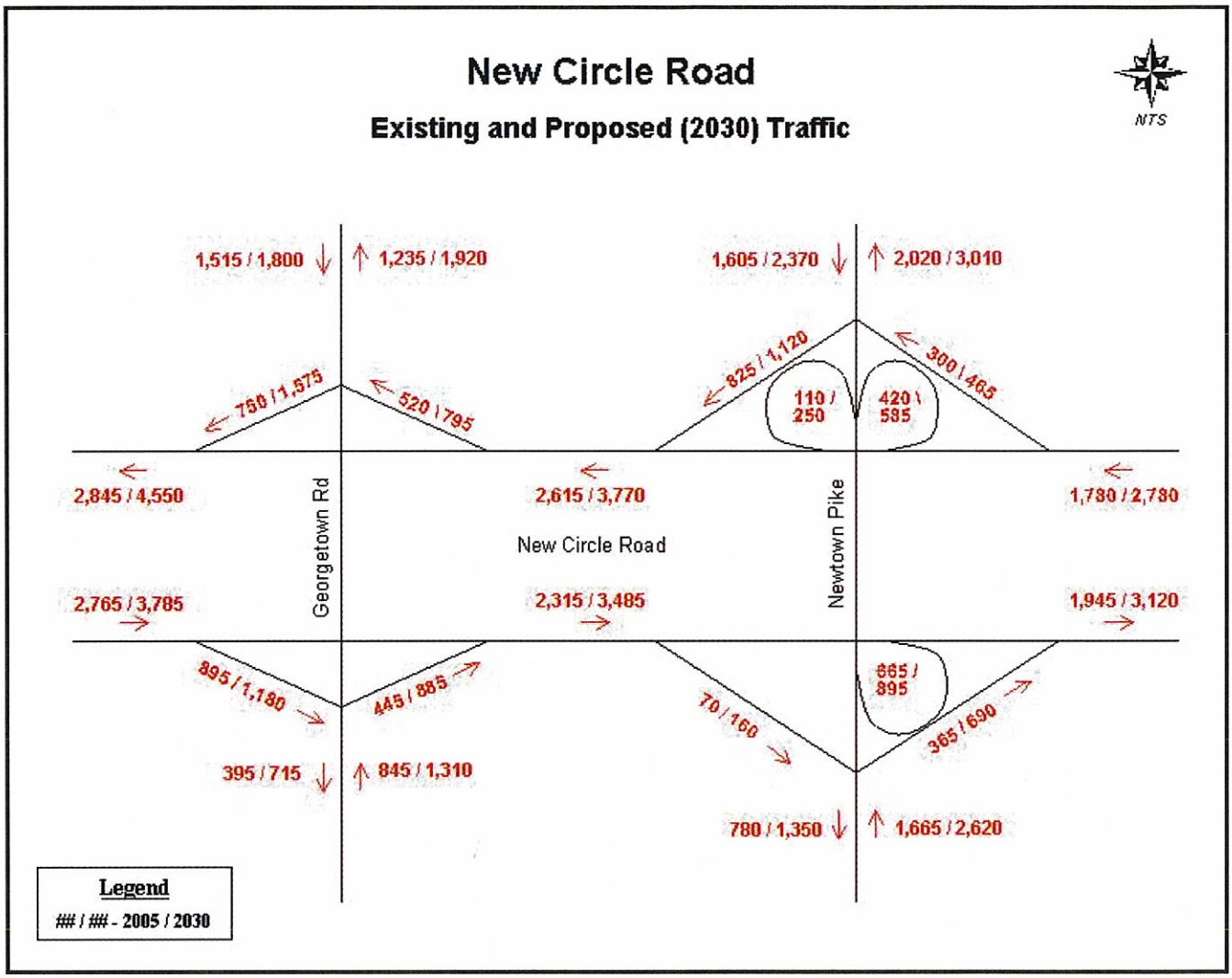


Figure 2: Existing (2005) and Future Year (2030) Traffic Volumes

3.3 ALTERNATIVES

Three alternatives were evaluated and compared to the No-Build Scenario, where no improvements (other than modifications to signal timings) were incorporated into the network. These alternatives are as follows:

- Alternative 4 - Single Point Urban Interchange (SPUI) at Newtown Pike
- Alternative 5 - Single Point Urban Interchange (SPUI) at Newtown Pike with Ramp Improvements at Georgetown Road
- Alternative 6 - Service Road Alternative with Slip Ramps

Alternative 4, referred to as the Single Point Urban Interchange (SPUI) at Newtown Pike, includes the construction of a new interchange at Newtown Pike and no modifications to the interchange at Georgetown Road. This alternative, which requires one new traffic signal on Newtown Pike, is shown in **Figure 3**.

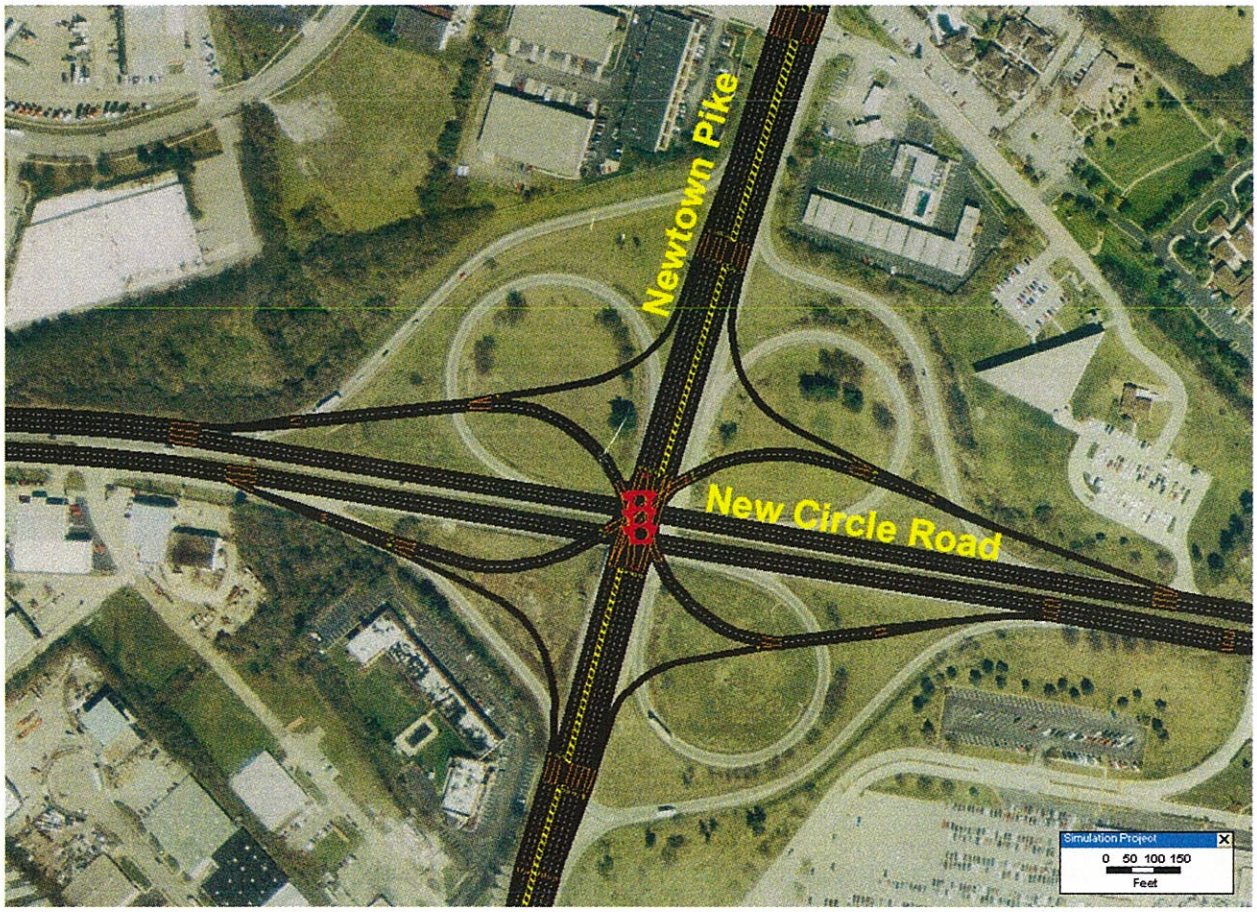


Figure 3: Single Point Urban Interchange (SPUI) at Newtown Pike

Alternative 5, shown in **Figure 4**, was developed based on the SPUI at Newtown Pike and also includes ramp modifications at Georgetown Road to accommodate the anticipated increase in weaving movements at those locations. Both exit ramps are widened to two lanes in this alternative. In addition, the eastbound and westbound New Circle exit ramps to Newtown Pike are widened to two lanes. Referred to as the Newtown SPUI with Ramp Improvements, this alternative requires a single new traffic signal at Newtown Pike.

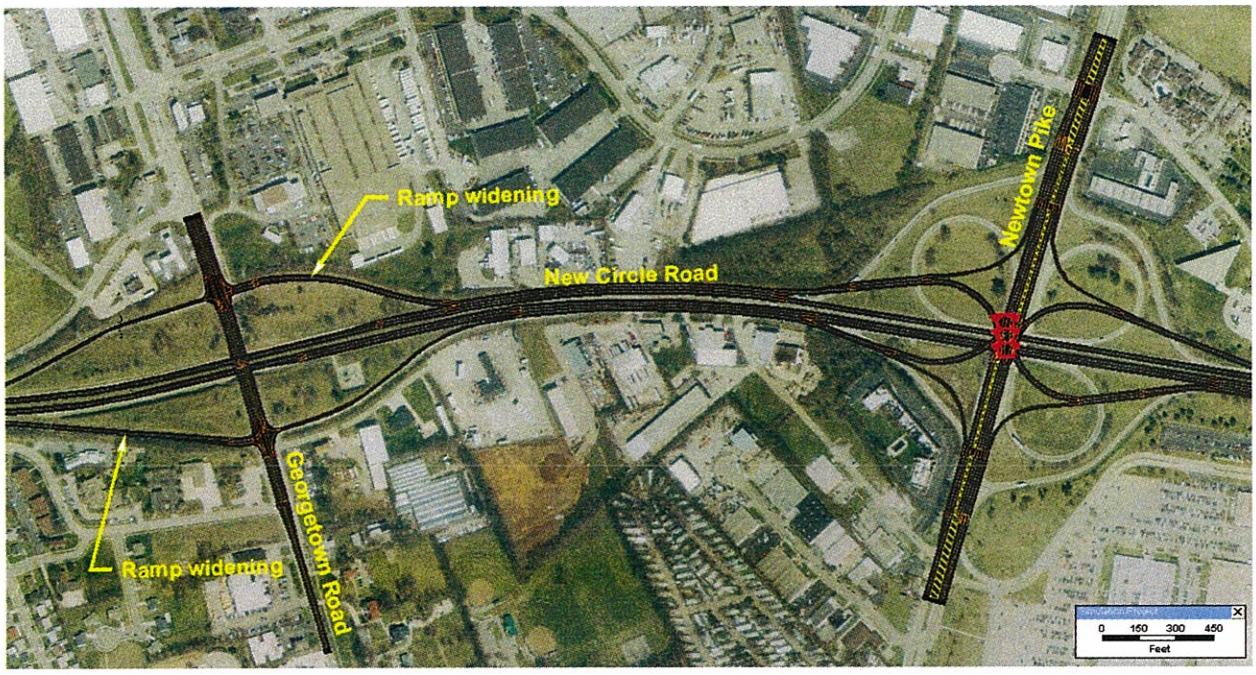


Figure 4: Single Point Urban Interchange (SPUI) at Newtown Pike with Ramp Improvements

Alternative 6, referred to as the Service Road Alternative includes the construction of a service road system that removes local access from New Circle Road to Newtown Pike and Georgetown Road and relocates it to parallel facilities. Motorists traveling westbound on New Circle Road destined for either Newtown Pike or Georgetown Road would exit New Circle east of Newtown Pike. Traffic destined to Georgetown Road would travel across Newtown Pike and travel along the service road; similarly, eastbound New Circle Road traffic destined for Newtown Pike would exit New Circle just east of Georgetown Road and enter onto the service road. Slip ramps are provided along the service roads for traffic entering and exiting Newtown Pike. A single loop ramp remains for traffic traveling northbound on Newtown Pike destined for westbound New Circle Road; Newtown Pike traffic traveling to Georgetown Road would utilize the service road. This alternative, shown in **Figure 5**, requires two new traffic signals at the service road intersections with Newtown Pike.

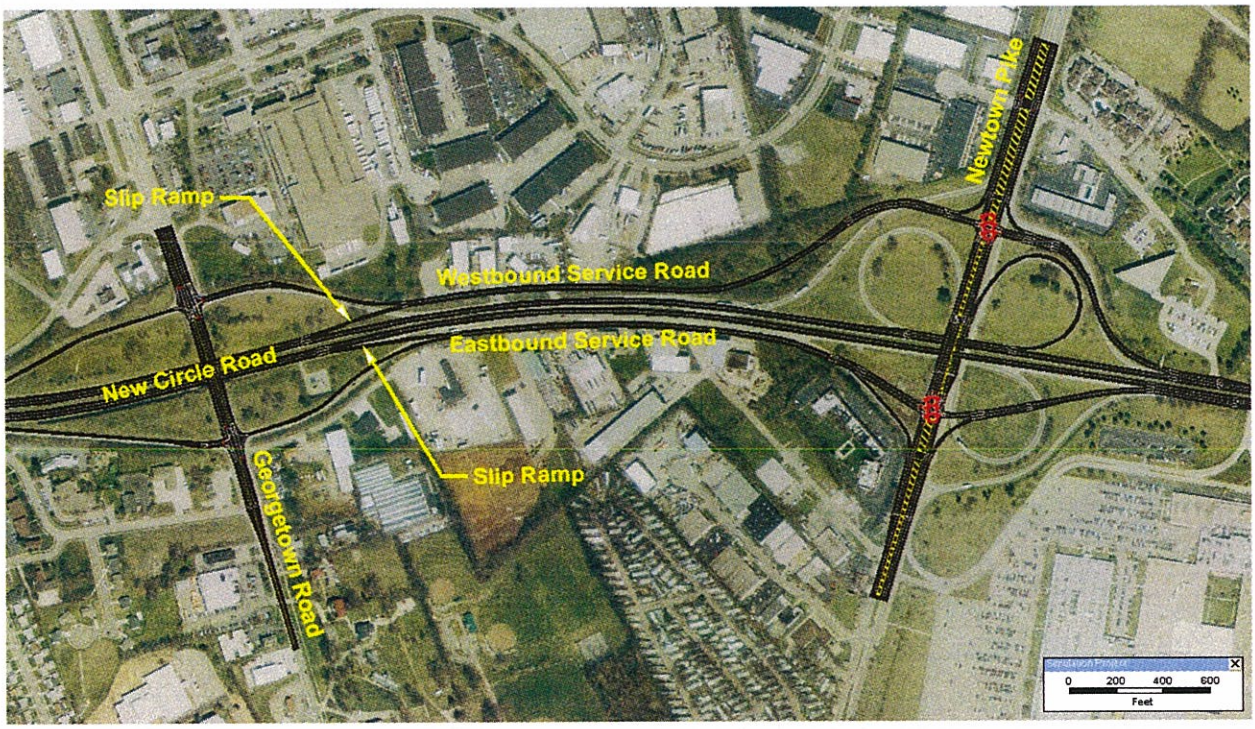


Figure 5: Service Road Alternative with Slip Ramps

3.4 TRAFFIC SIMULATION RESULTS

A traffic model was developed to simulate typical weekday P.M. peak hour traffic conditions for the current (base) year. The PM Peak was determined to be the critical peak time at this location during the original planning study. This model was calibrated to the point where it accurately reflected known traffic conditions such as volume throughput, queue length, etc. Year 2030 simulation models were developed to replicate each of the alternatives under study and to simulate anticipated future traffic conditions. **Table 2** presents the simulated travel times for the alternatives.

Travel Times (in seconds)	Existing	No-Build	Alternative 4 Newtown SPUI	Alternative 5 Newtown SPUI with Ramp Improvements	Alternative 6 Service Road Alternate with Slip Ramps
New Circle Road					
Westbound (1.71 miles)	127.0	137.0	133.4	133.5	126.4
Eastbound (1.66 miles)	125.6	494.5	289.4	123.7	125.7
Newtown Pike					
Northbound (0.44 miles)	48.6	53.5	92.0	85.0	202.6
Southbound (0.44 miles)	73.4	542.9	99.2	83.0	120.6

Table 2: Simulation Travel Times (PM Peak)

The travel times along New Circle Road decreased for each of the proposed models. The primary difference in the eastbound travel time is the Georgetown Road exit ramp. Vehicles back up onto New Circle Road causing delays. The Service Road Alternative (Alt. 6) and the Newtown SPUI with ramp modifications alternative (Alt. 5) both make improvements to the Georgetown ramp to alleviate congestion.

On Newtown Pike, the no build alternative experiences heavy delay on the southbound movement due to the right turn onto the westbound entrance ramp and the left turn onto the eastbound entrance ramp. Due to the increase in northbound Newtown Pike traffic, vehicles are not able to make a left turn without a traffic signal. With the build alternatives, the difference in the travel times for the two SPUI alternatives can be attributed to developing an acceleration lane on the ramp to westbound New

Circle Road for vehicles entering the ramp from southbound Newtown Pike with Alternative 5; Alternative 4 controls this high-volume movement with a yield sign. Alternative 6 contains two signals and also puts Georgetown Road traffic at the Newtown ramp intersection, increasing travel time.

Table 3 presents the average intersection delays for signalized intersections in the model networks. These delay values, in seconds per vehicle (sec/veh), represent weighted averages for delay for all approaches. These values are based on the difference between free-flow travel time and actual travel time; as such, the delay values presented in **Table 3** do not directly correlate to control delay and cannot be utilized to determine LOS. Traffic signal timings and approximate Levels of Service (LOS) were developed using the SYCNHRO Traffic Signal Coordination Software. LOS provides a relative indication of the quality of traffic flow along a facility or through an intersection; values range from A-F with LOS A indicating near free-flow conditions and LOS F indicating severe congestion. LOS D is considered acceptable for the Design Year in an urban area.

Intersection Delay* (sec/vehicle)	Existing	No-Build	Alternate 4 Newtown SPUI	Alternative 5 Newtown SPUI with Ramp Improvements	Alternative 6 Service Road Alternate with Slip Ramps
Newtown Pike					
Northern Intersection	--	--	--	--	19.3 (35.3)
Southern Intersection	--	--	--	--	101.3 (90.1)
SPUI	--	--	55.3	52.2	--
Georgetown Road					
Northern Intersection	24.9	142.2 (34.2)	134.1 (33.0)	82.1 (24.2)	124.5 (27.3)
Southern Intersection	46.2	57.4 (91.0)	57.2 (91.5)	27.9 (27.8)	55.1 (88.7)

*Note: (Ramp delays are in parentheses.)

Table 3: Simulation Intersection Delays

Newtown Pike does not have any signal-controlled intersections at the ramp terminus in either the existing or No-Build scenarios; therefore, delay values are not included for those locations. Alternative 6 has two signalized intersections- one to the north for the westbound service road and one to the south for the eastbound service road. The northern signalized intersection will be located approximately 550 feet from the upstream signal at Newtown Court. These locations experience significant delays and lengthy queues. In particular, the northbound and eastbound approaches at the southern intersection experience considerable congestion, with the overall average delay at approximately 101.3 sec/veh. The eastbound ramp approach experiences an average delay of approximately 90.1 sec/veh, and the northbound Newtown approach experiences delay of approximately 120 sec/veh. At the northern intersection, signal-controlled turning movements are somewhat lighter, with the exception of the northbound through movement.

Georgetown Road experiences significant delay under all alternatives, with the exception of Alternative 5. The northern intersection is most congested on its southbound approach, but the westbound New Circle Road exit ramp also sees delay. The eastbound New Circle Road exit ramp is the most congested approach at the southern intersection. The ramp improvements called for in Alternative 5, which would make both exit ramps two lanes wide, significantly reduce the delay associated with those movements. With the no build alternative and alternative 4 and 6, no improvements are made to the eastbound exit ramp. Without improvements, the maximum queue on the ramp exceeds the existing ramp length of approximately 1,200 feet, causing delay and safety concerns on New Circle Road itself. Due to the backup onto New Circle Road, the intersection and ramp delay shown in **Table 3** for the southern intersection of Georgetown Road will be worse than the simulation indicates. With the widening of the ramp as proposed in alternative 5, the maximum queue is approximately 500 feet and easily contained on the ramp.

Figure 6 shows the LOS from SYNCHRO and the proposed intersection volumes with Alternative 6. Alternative 6 will not be capable of adequately serving traffic demand in 2030. By placing Georgetown Road ramp traffic on a service road, the southbound intersection will need to accommodate an additional 610 through vehicles during the PM peak. With over 2,000 northbound through vehicles, adequate green time cannot be given to both movements to service the travel demand. The southern intersection, serving the eastbound service road at Newtown Pike, will operate at LOS F.

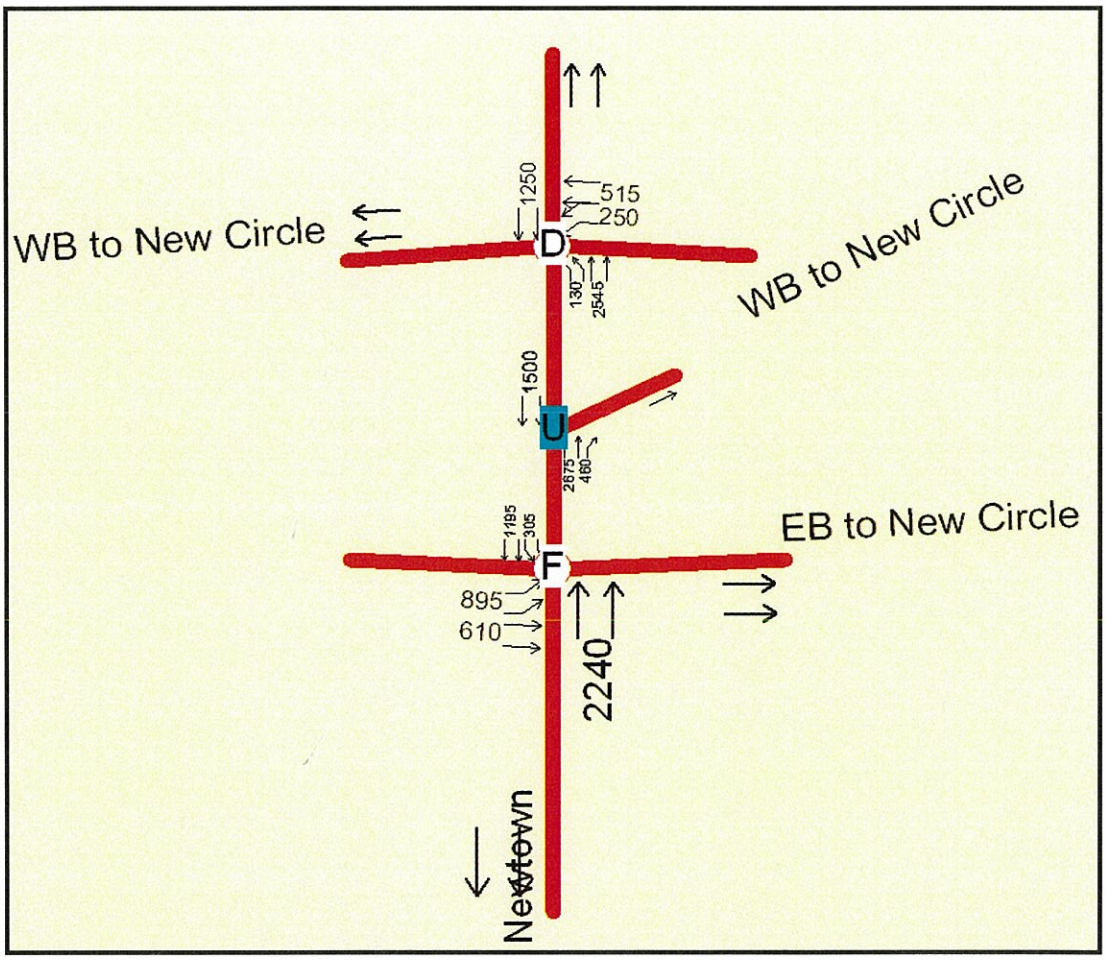


Figure 6: Newtown Pike 2030 Turning Movements and Levels of Service (LOS)
Service Road Alternative 6

Alternatives 4 and 5 do operate satisfactorily except for some backup that occurs due to merging congestion on the Newtown Pike ramp to New Circle westbound. By adding an acceleration lane for traffic entering the ramp from southbound Newtown Pike, Alternative 5 operates more efficiently and with less delay (31.0 sec/veh as opposed to 50.6 sec/veh with Alternative 4.)

The resulting 2030 turning movements and LOS values from SYNCHRO for these SPUI alternatives are shown in **Figure 7.** By combining these two intersections into a single signalized intersection and removing the Georgetown Road ramp traffic; these SPUI alternatives would be able to serve traffic at an acceptable level of service. The SPUI alternatives also move the signalized intersection approximately 500 feet further south away from the Newtown Court signal.

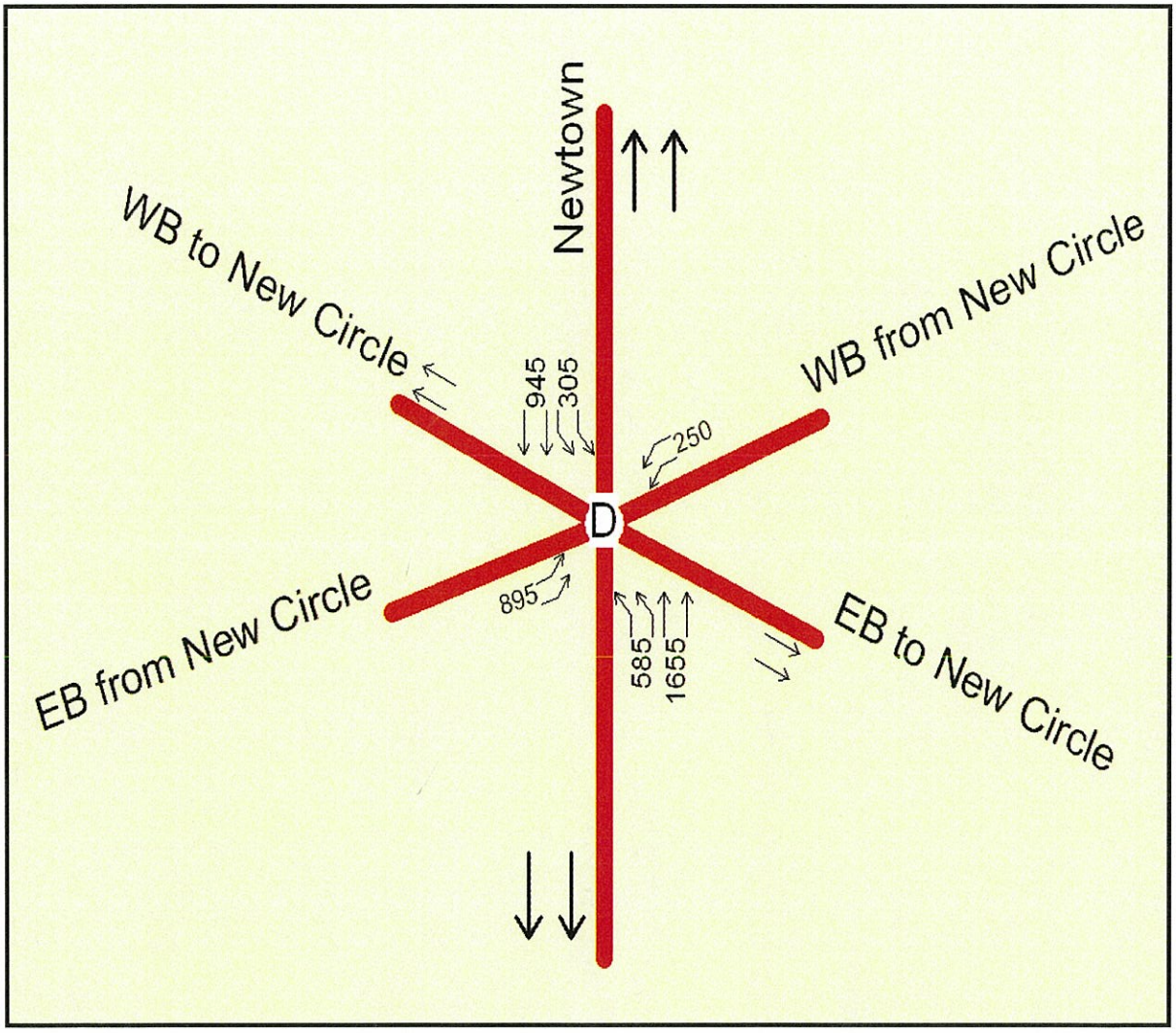


Figure 7: Newtown Pike 2030 Turning Movements and Levels of Service (LOS)
SPUI Alternative 4 & 5

At the Georgetown Road intersections with the New Circle Road exit ramps, Alternative 5 significantly decreases delay compared to the No-Build alternative due to improvements to the exit ramps, which are anticipated to be well over capacity before 2030. The northern intersection still

experiences high delay, but much of that delay could be eliminated through the construction of a right turn channel from southbound Georgetown to the entrance ramp to westbound New Circle Road. **Figure 8** illustrates the need for improvements to the Georgetown Road ramps. In their current configuration, the southern intersection (between the westbound New Circle Road exit ramp and Georgetown Road) would operate at LOS F and the northern intersection (between the eastbound New Circle Road exit ramp and Georgetown Road) would operate at LOS E. Both intersections are anticipated to experience significant growth in turning movements and will be over capacity prior to 2030.

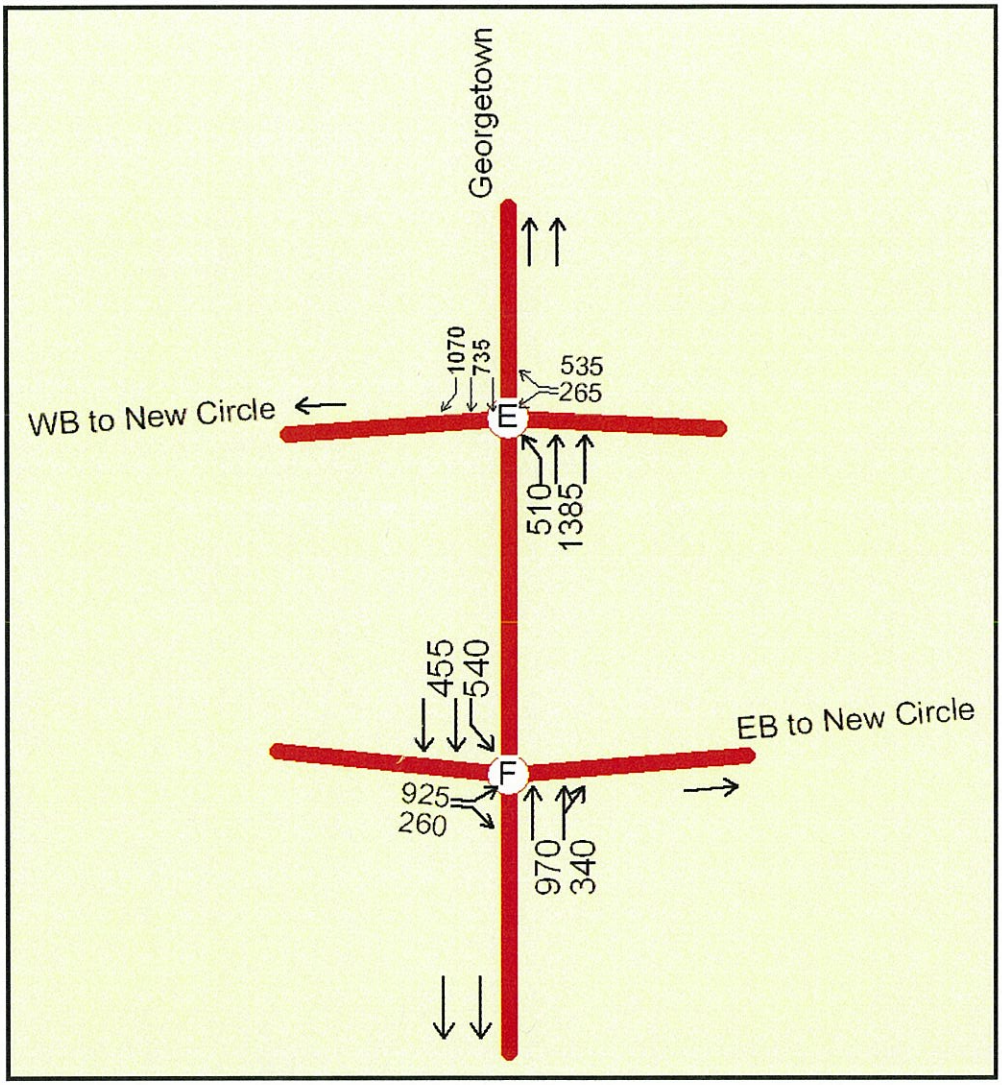


Figure 8: Georgetown Road 2030 Turning Movements and Levels of Service (LOS) No-Build Alternative

Based on this anticipated growth, improvements to the ramps accessing Georgetown Road will be necessary to maintain traffic flow on New Circle Road. The eastbound exit ramp from New Circle Road, currently a single lane ramp with minimal right-turn storage near its intersection with

Georgetown Road, was widened to two lanes in Alternative 5 with both lanes serving the high left-turn volume. Additional storage is provided for right-turning vehicles with a turning bay. Similarly, the westbound exit ramp from New Circle Road, also currently a single lane ramp, was widened to two lanes in this alternative. However, at this location the outside lane serves right-turning traffic and the left lane serves left-turning traffic; an additional left-turn bay is also provided at the intersection with Georgetown Road.

3.5 WEAVING ANALYSIS

The section along New Circle Road between Newtown Pike and Georgetown Road was analyzed to ensure weaving volumes could be adequately served with any of the alternatives. **Figure 9** depicts the current and anticipated 2030 weaving volumes on New Circle Road. Based on the traffic forecasts, New Circle Road will require no more than two lanes through the Newtown Pike interchange with additional lanes to service the weaving section between Newtown Pike and Georgetown Road. This would allow for a two-lane westbound entrance ramp from Newtown Pike. The through movements of 1,830 in the westbound direction and 1,560 in the eastbound direction are easily accommodated with two lanes.

The weaving volumes shown in **Figure 9** were analyzed using the Highway Capacity Software (HCS), version 4.1d. Both Type A, where each weaving vehicle must make one lane change in order to execute the weave, and Type B weaves, where one weaving movement must make one lane change in order to execute the weave and the other movement does not require a lane change, were considered in the analysis. Type B weaves would require the use of decision lanes (where vehicles have the option to exit or continue traveling on New Circle Road) rather than exit only lanes. The results of these analyses are shown in **Table 4**. This analysis assumed a base free-flow travel speed of 50 miles-per-hour (MPH) on New Circle.

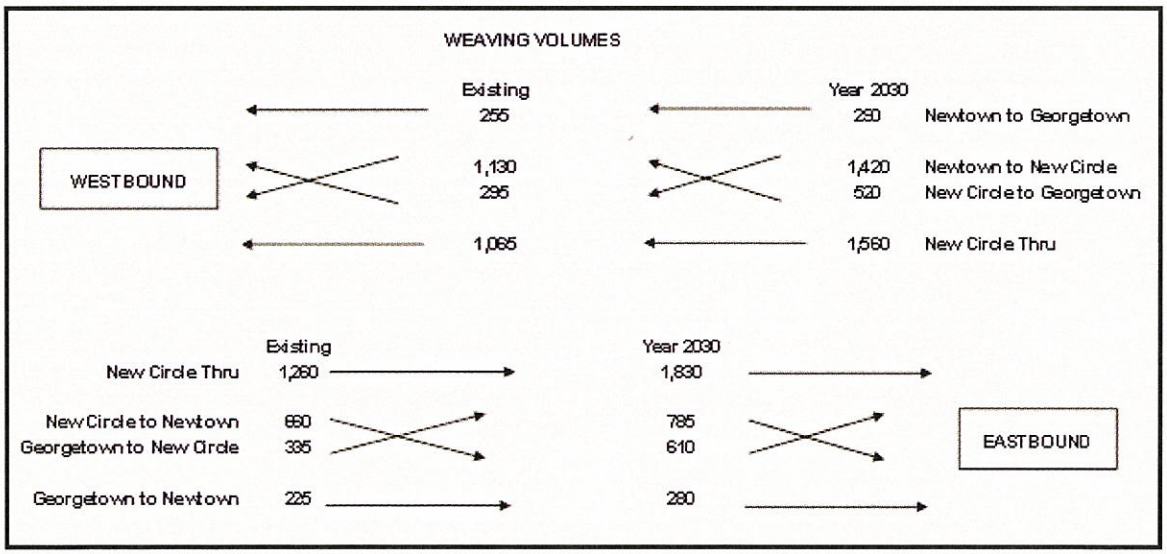


Figure 9: Existing and Year 2030 Weaving Volumes

Direction	Lanes	Performance Measure	Type A Weave	Type B Weave
New Circle Westbound	3	Segment Speed (mph)	29.81	35.54
		Segment Density (veh/mi/ln)	48.84	40.96
		LOS	F	E
New Circle Eastbound	3	Segment Speed (mph)	33.23	38.73
		Segment Density (veh/mi/ln)	40.23	34.66
		LOS	E	D
New Circle Westbound	4	Segment Speed (mph)	32.41	37.96
		Segment Density (veh/mi/ln)	33.7	28.77
		LOS	D	D
New Circle Eastbound	4	Segment Speed (mph)	35.92	41.06
		Segment Density (veh/mi/ln)	27.91	24.52
		LOS	C	C

Table 4: Weaving Analysis Results

Assuming the weaves for both directions of New Circle Road are Type A weaves with three lanes in the weaving section, the westbound direction would operate at LOS F and the eastbound would operate at LOS E. With four lanes on New Circle Road, the westbound direction would operate at LOS D and the eastbound at LOS C. Assuming both are Type B weaves with three lanes on New Circle, the westbound direction would operate at LOS E and the eastbound direction at LOS D. With four lanes on New Circle, the westbound direction would operate at LOS D and the eastbound direction at LOS C assuming a Type B weave.

Based on this analysis, westbound New Circle Road would require four lanes through the weaving section, regardless of the type of weave. Eastbound New Circle would operate at an acceptable level with a three-lane section if a Type B weave were possible and with either type of weave if the section was four lanes wide. **Figure 10** shows the types of weaves with the alternatives under consideration. As the Service Road Alternative relocates all weaving traffic to a lower speed, parallel service road, there is no weave with that alternative.

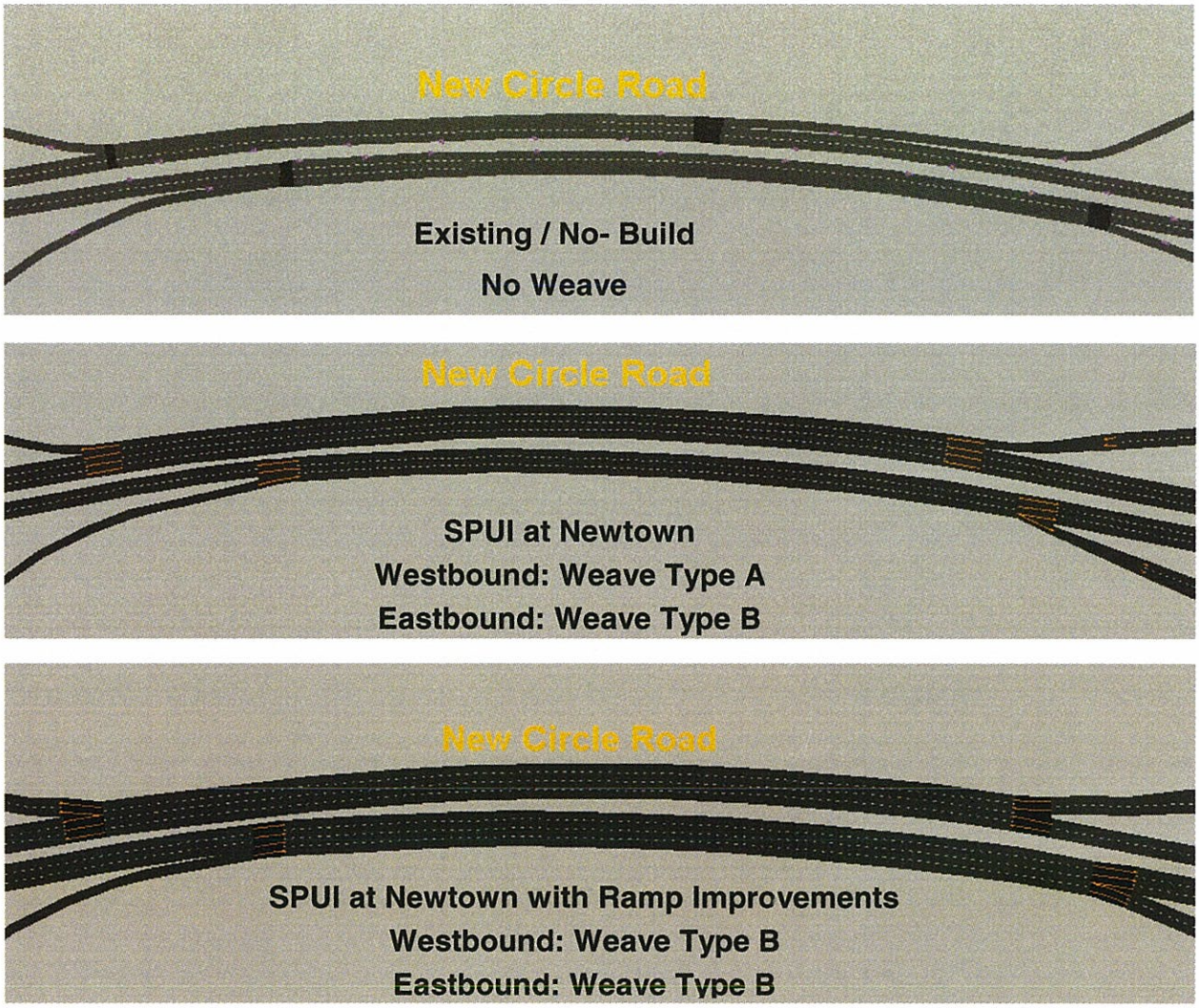


Figure 10: Weaving Types for Alternatives under Consideration

Based on these weave types, New Circle Road will operate at an acceptable level of service under the lanes configuration proposed in the SPUI with ramp improvements alternative.

3.6 CONCLUSIONS

In conclusion, the results of the traffic and traffic simulation analyses suggest the Newtown SPUI with Ramp Improvements (Alt. 5) would provide the most efficient traffic operations on New Circle Road, Newtown Pike, and Georgetown Road. The single signalized intersection on Newtown Pike combined with the ramp improvements on Georgetown Road will improve traffic flow on both facilities, as well as better serve ingress and egress from New Circle Road.

4.0 PUBLIC INVOLVMENT

4.1 Lexington Corridors Committee Meeting – August 15, 2005

Representatives for Palmer Engineering and American Consulting Engineers attended a Corridor Committee Meeting at the Lexington-Fayette Urban County Government Building on August 15, 2005. A brief history of the study process was presented as well as the alternatives shown at the Scheme Review meeting with the Project Team. Discussion and questions centered around bicycle and pedestrian facilities, the need for landscaping at the interchanges in final design, and the need to pursue additional funding for other sections of the original planning study.

5.0 ADDITIONAL INFORMATION

5.1 Enviromental Overview

This section presents a general overview of the social, economic, and environmental framework of the proposed project area. It identifies key issues, resources, and factors which represent constraints upon project location within the study corridor. The information presented is based on readily available public records and archival research supplemented with limited field reconnaissance and "windshield surveys".

5.1.1 General Characteristics of the Project Area

Topography

The proposed project is situated in Fayette County of central Kentucky. This region falls within the Inner Bluegrass Physiographic region of the state (Figure 5). This is a karst region characterized by sinkholes, underground streams, springs, and caves. The gently rolling limestone uplands of Fayette County are bordered to its south by the Kentucky River. Elevations in the county range from 549 to 1,070 feet. The elevation in the project area is approximately 960 feet (McGrain and Currens 1978).

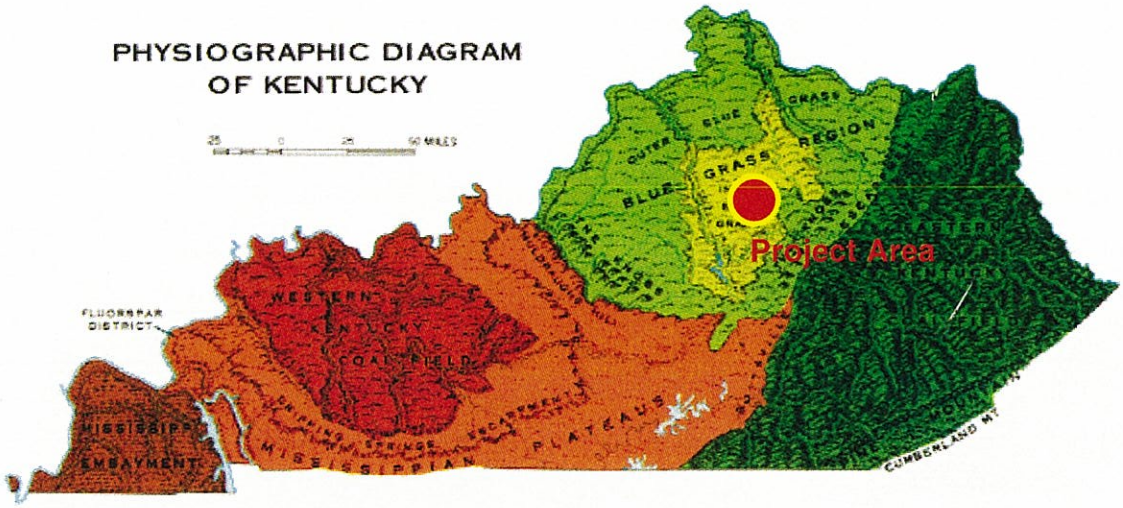


Figure 11. Physiographic Regions of Kentucky (Kentucky Geological Survey)

Population: Fayette County's population has increased over the decades since its founding and continues to increase. According to Census figures, the County's population was 174,323 in 1970, 204,165 in 1980, 225,366 in 1990, and 260,512 in 2000, making it the second largest in the state. Based on current population trends, Fayette County is expected to continue to have a high growth rate.

The project area is comprised of Census Tracts 11, 12, 37, and 38.01. Project specific demographic

data related to these Census Tracts will need to be acquired in future project phases to enable accurate comparisons of alternatives. Both Lexington and Fayette County are expected to witness growth over the next 20 years.

Ethnic Characteristics: According to the county 2003 Census, 45,914 or 17.2% of Fayette County's population were non-white, while 11,253 or 4.2% were of Hispanic origin. In the project corridor, Census Tract information concerning persons listed as white, black, Hispanic, American Indian and Alaska Native, Asian, Native Hawaiian and Other Pacific Islander, and Other race will need to be acquired in future project phases.

Labor Force: The Fayette County labor market had an estimated labor supply of 144,011 persons available for work in 2004 with a total unemployment rate of 3.2%. The labor market employment is 369,250 with a total unemployment rate of 4.1%. The labor market area includes Fayette and adjoining counties of Madison, Scott, Jessamine, Clark, Bourbon, and Woodford.

In 2004, Fayette County's rate of unemployment was 3.2% while Kentucky's rate was 5.3%. The economy in the project area is based largely on incomes which residents earn working within the County but outside the project area.

Per Capita Personal Income: Per capita personal income in Fayette County increased 19.8% from $28,582 in 1994 to $34,242 in 2003. The state had an increase of 20.6% and the U.S. had 17.1% over the same period. Within the project Census Tracts, the number of households by recorded income ranges, and the number of families below the poverty level will be identified during subsequent phases in order to assess potential project impacts relevant to environmental justice factors and community impact assessment determinants.

Agriculture: Fayette County's total agricultural cash receipts increased 38.8% between 1993 and 1998 from $209,864,000 to $291,344,000. During this period, receipts from crops decreased from 16% to 9%, while receipts from livestock increased 50%. Agriculture is an important component of the local land use and economic viability of the region. Although no farmland is currently affected by the corridor, greater detail for the NEPA process, including FPPA coordination, will be required in subsequent environmental Base Studies.

5.1.2 ENVIRONMENTAL CONSIDERATIONS

5.1.2.0 Air Quality:

The U. S. Environmental Protection Agency (EPA) has established criteria for ambient levels of common transportation related air pollutants including ozone (O_3), carbon monoxide (CO), oxides of nitrogen (NO_x), inhalable particulates (PM_{10}), and fine particulates ($PM_{2.5}$). The Kentucky Natural Resources and Environmental Protection Cabinet (KNREPC) have adopted these same air quality standards. These National Ambient Air Quality Standards (NAAQS) have been promulgated to represent the maximum allowable air pollutant levels and characterize conditions that pose no threat to human health and welfare.

Pursuant to the 1990 Clean Air Act Amendments, Fayette County is in attainment for all transportation related air pollutants (CO, NO_x, O_3, PM_{10}, and $PM_{2.5}$). Although this project is in an area that does not require transportation control measures, Fayette County is still required to demonstrate conformity pursuant to the Transportation Conformity Rule Amendments issued August 2, 2004 by the U. S. Environmental Protection Agency and the U. S. Department of Transportation. With respect to the latest conforming Transportation Improvement Program (TIP), the proposed project is located on pages UNS 1 and UNS 4 of *Fiscal Year 2004 to Fiscal Year 2007 Transportation Improvement Program*, Lexington Area Metropolitan Planning Organization, approved September 2003. Mobile source air pollution is not a problem in the project area and the existing ambient air environment is within National Ambient Air Quality Standards (NAAQS). Based on an in-house review of all available data, no air quality sensitive land uses or susceptible sites were noted. With the location of the corridor being in an attainment area and traffic volumes predicted for the design year (2022) expected to be approximately 75,000 ADT, it is anticipated that concentrations of carbon monoxide may exceed the eight-hour standard (9 ppm) regardless of the alternative alignment used.

However, a project specific air quality impact assessment will be required for this undertaking as a part of the NEPA phase project activities. This will be necessary in order to insure that the alternative selected does not adversely affect air quality programs currently in place and maintains conformity with the Transportation Improvement Program (TIP). This assessment will take into consideration the affects of local climate and topography and include a microscale dispersion analysis. Project impacts on future air quality conditions through air quality modeling will be used to

compare the relative effects of each project alternative and to determine whether or not CO emissions attributable to the project would cause or contribute to an exceedance of the NAAQS. Since the project area harbors residential and commercial land uses, representative air quality receptors will need to be identified in conjunction with the existing facility and with specific alignment alternatives and considered as a part of the assessment. Depending upon the results of the assessment, air quality impacts may be important in determining the constructability of the various alternatives and in selecting a preference from among them.

5.1.2.1 Highway Noise:

To determine the potential noise impacts attributable to construction and operation of the proposed project, each representative noise sensitive land use and/or site will need to be identified in conjunction with specific alignment alternatives and existing ambient noise levels measured. The procedure for conducting field monitoring will be based on FHWA requirements and the KTC Noise Abatement Policy. Noise levels will be measured in terms of $L_{eq,}$ which reflects the average equivalent steady state sound level which in a stated time period (usually one hour), would contain the same acoustic energy as the time-varying sound level during the same time period. For future noise level predictions, the new Federal Traffic Noise Model (FHWA TNM 2.5®) will be used for noise impact analysis.

At this time, highway noise is expected to be a major concern on this project due to a significant amount of traffic. However, most noise receptors are businesses that could be acquired for project construction. In addition, New Circle Road is classified as an urban principal arterial with no access points for businesses and roads. Given the location context of the project area, the vehicle mix, patterns and volumes and the general absence of sensitive receptors, highway noise impacts are not expected to influence project feasibility or location decisions; however, a project specific noise impact analysis will be required to verify noise impact conditions.

5.1.2.2 Social and Economic Factors:

Housing and Relocation Issues:

Residential relocations are not anticipated for this project; however, several businesses will be affected.

Community Impact Assessment and Environmental Justice Issues:

No community resources or populations are affected by this project.

Land Use:

Fayette County has a land area of 284 square miles or 181,759 acres. As of 1997, approximately 75%, or 136,319 acres, of the county are in agricultural uses. This pattern does not hold true for the proposed project study corridor where heavy buildup of commercial and residential properties exist.

Land use in the proposed project corridor is not expected to change dramatically from current uses and trends. The type of access control currently proposed for the project corridor is fully controlled. With fully controlled access, some access points will change in favor of frontage roads to accommodate existing businesses. The proposed project may contribute to some growth, but it is not expected to outstrip local economic growth plans and provisions. The project may induce new commercial development but will not result in unanticipated additional pressure on public services. Current land use patterns and trends are expected to continue for the foreseeable future.

Farmland:

Currently, no farmland is to be affected by any of the proposed alternatives; however, if any farmland is affected, the countywide scale of the land conversion is expected to be relatively insignificant since 75%, or approximately 136,000 acres, of Fayette County are available for agricultural production. Nevertheless, efforts should be made during the subsequent project phases to examine the effects of the alternatives on individual farms and further reduce land conversion impacts by design modifications wherever practicable. Coordination with the Natural Resources Conservation Service and development of FPPA farmland impact assessment evaluations will also be required.

5.1.2.3 Aquatic and Terrestrial Ecosystems:

Water Quality

A review of the "Availability of Ground Water in Bourbon, Fayette, Jessamine, and Scott Counties, Kentucky," provided information about the groundwater availability in the project area. Groundwater in this area is obtained from regions of Middle and Upper Ordovician age rocks. In the Cynthiana formation, most drilled wells are adequate for a domestic supply with a hand pump and yield more than 500 gallons per day. Water is hard or very hard and may contain salt or hydrogen

sulfide, especially at depths greater than 10 feet. In the Eden group, most drilled wells will not produce enough water for a domestic supply of 100 gallons a day.

The Kentucky Natural Resources and Environmental Protection Cabinet - Division of Water (KNREPC - KDOW) was consulted in 2001 for information on surface and groundwater. The northwest portion of this project crosses into the Royal Springs Wellhead Protection Area, beginning at the intersection of Meadow Lane and KY 4 and ending at the intersection of Georgetown Road and KY 4. Royal Springs is the municipal water supply spring for Georgetown, Kentucky.

Several springs occur along KY 4, with three occurring near the existing road. Several other springs are found within the Royal Springs groundwater basin. Certain areas of the project corridor may be hydrologically sensitive where soluble limestone is present. One area is located to the west of the existing road.

One surface stream exists within the project corridor. Cane Run flows through the northwestern portion of the project area. This portion of Cane Run is listed as an intermittent stream with a low flow. No ponds exist within the project area. KDOW will be contacted again to ensure this information is up to date.

Channel Work

Currently, KY 4 Crosses Cane Run three times east of the project area. Although it does not appear that this section of the alignment will directly impact Cane Run, channel work may be necessary at the eastern terminus. Cane Run is a blue line stream on USGS maps and will require further coordination with KDOW and USACE if more than 200 feet of the channel is altered.

Floodplain Encroachment

According to the Flood Insurance Rate Map for Lexington-Fayette County (FEMA 1992), a Zone AE and Zone A Special Flood Hazard Area occurs along the southern portion of Lexington Reservoir No. 1. This zone is outside the project area and will have no impacts. Base flood elevations of 985 feet have been determined.

Wetlands

The National Wetlands Inventory (NWI) maps for the Lexington East/West Quadrangles indicate that no wetlands occur within the project area. According to USFWS, no significant adverse impacts to wetlands are anticipated from this project.

Flora and Fauna

Information from the United States Fish and Wildlife Service (USFWS) indicates that five (5) federally listed endangered or threatened species have the potential to occur in the project area: The Indiana bat (*Myotis sodalis*), gray bat (*Myotis grisescens*), American burying beetle (*Nicrophorus americanus*), globe bladderpod (*Physaria lesquerella*), and running buffalo clover (*Trifolium stoloniferum*). Records from the Kentucky Department of Fish and Wildlife Resources (KDFWR) Information System also indicate that the federally endangered Indiana bat occurs in this area. The species forms maternity colonies and roosts with its young under the bark of trees along streams and adjacent upland areas, usually from mid-May to mid-August. The gray bat uses caves year round and is not likely to be impacted by this project. Records from the Kentucky State Nature Preserves Commission (KSNPC) also indicate that the federally endangered and KSNPC threatened running buffalo clover (*Trifolium stoloniferum*) may also occur in the project area. A search for running buffalo clover was conducted during its flowering period. No specimens were found. The globe bladderpod can be found on calcareous rocks in barrens and wooded cliffs. This habitat is very limited and dispersed in the project area and no specimens were observed. Although reintroduction efforts have taken place in Ohio, established populations of the American burying beetle are only known to exist in six states: Nebraska, Rhode Island, Oklahoma, South Dakota, Kansas, and Arkansas. As such, it is unlikely this project will have any impact on the species.

Five additional KSNPC special concern species may occur within the project area. Henslow's sparrow (*Ammodramus henslowi*) and the Savannah sparrow (*Passerculus sandwichensis*) prefer open grasslands and meadows often around scrub-shrub areas. The sedge wren (*Cistothorus platensis*) is found locally in dry cultivated grain fields and in brushy grasslands during migration. The bobolink (*Dolichonyx oryzivorus*) occurs in tall grass areas and grass fields with alfalfa and clover. The barn owl (*Tyto alba*) can occur locally in open countryside, often around human habitation. None of these species were observed during field studies conducted for this report.

Ecosystem Effects

Bridge construction or culvert placement will be necessary if streams are crossed. Construction in or near a stream can accelerate erosion and sedimentation. Aquatic species and habitats are sensitive to increased turbidity, sediment and other adverse influences on water quality (KSNPC 2001).

In karst areas, groundwater is more susceptible to contamination because surface runoff may pass directly into the ground with little or no filtration through the soil. Royal Spring Aquifer is within the project bounds. Royal Spring is used by the City of Georgetown as their primary water supply source. Sediments and surface runoff should be controlled in areas around sinkholes and caves. Sinkholes are located in the area according to KDOW's database on karst features.

Wetlands occurring along the project area have the potential to be affected by sedimentation and altered drainage patterns. Impact to a wetland's hydrology may eventually change the wetland size, classification, plant composition, and soil characteristics.

The majority of the flora and fauna inhabiting the project area occur in the few scattered undeveloped areas of mature trees and weedy vegetation. Since KY 4 is a developed corridor, there will be minimal impacts to vegetation and wildlife. The project will stay mostly within the existing right-of-way corridor; however, some disturbance to commercial land and residential lawns will likely occur. Construction of the new roadway may disturb or eliminate some plant communities and wildlife habitats. The loss of vegetation, along with noise and dust from construction activities may force some wildlife species to disperse to other areas.

Impacts to native flora and fauna may persist if construction of the roadway facilitates the spread of invasive species. Highway corridors provide opportunities for the movement of invasive species through the landscape. Invasive plants can be introduced into areas during spraying and mowing operations or through the movement of vehicles and construction equipment. The use of mulch, imported soil or gravel, and sod can also facilitate the spread of these non-native, invasive species.

Permits

Federal and state laws require the Kentucky Transportation Cabinet to obtain appropriate permits and certifications prior to construction activities that involve the waters of the US, such as rivers, lakes, streams, and wetlands. Depending on the size of any wetland impacts, either and ACE Nationwide 14 Permit, or a Section 404 Individual Permit may be required. If impacts total more than an acre, a KDOW 401 Water Quality Certification will be required. A 401 Certification will also be required if more than 200 feet of stream channel is altered. Floodplain encroachment may require coordination with FEMA and a No Rise Certification. A State Floodplain Construction Permit is necessary when construction activities are not covered under an USACE general permit.

Natural Areas

Information provided by KSNPC and KNREPC indicates that there are no registered natural areas in the project's vicinity.

4(f) and 6(f) Involvement

There are no Wild Rivers or Outstanding Resource Waters in the project area. The project area does not contain any recreational areas or wildlife and waterfowl refuges. No federal or state parks exist within the corridor. There are no outdoor recreational land and water areas or facilities established from grants-in-aid from the Land and Water Conservation Fund Act (LWCF).

Comments and Coordination

The USFWS, KDFWR, KSNPC, and KNREPC were contacted in 2000 for information concerning protected state and federal listed species, and critical habitat and monitored natural areas that may be affected by the project.

The KDOW was contacted in 2000 for water quality impacts, groundwater information, wellhead protection locations, and well and spring locations. The USACE and KDOW also provided information relating to permits. The Kentucky Geological Survey provided the topographic and NWI maps for the Lexington East/West quadrangles. FEMA provided the Flood Insurance Rate Maps for Lexington-Fayette Urban County, Kentucky.

To ensure all data remained current, these agencies were contacted for updated information prior to this report. Any new information provided by the agencies will be incorporated into a revised report.

5.1.2.4 Cultural Resources:

Historic Sites and Districts:

Utilizing data acquired from records research and archival documentation, and supplemented by a windshield survey, no sites in the project corridor met established criteria of eligibility for listing in the National Register of Historic Places. The windshield survey encompassed the area within 500 feet on either side of the existing pavement in the study corridor.

In addition, detailed examination of the corridor will be necessary in subsequent project phases to ascertain the possible existence of other, previously unidentified resources and to establish specific historic site boundaries for those resources which are determined to be eligible for the National Register.

Archaeological Sites and Districts:

Archival and records research for archaeological resources was conducted for the corridor from the files of the Office of State Archaeology and the Kentucky Heritage Council. Based on this research, there are no sites within the study corridor. Although neither prehistoric nor historic site density is expected to be high, a systematic archaeological reconnaissance survey of the preferred project alternative is recommended during the NEPA project phase.

5.1.2.5 Hazardous Wastes and Underground Storage Tanks:

An inspection of records of the State Division of Waste Management (DWM) and USEPA databases was supplemented by a preliminary screening/windshield survey of the project area to locate any sites or facilities that may harbor hazardous substances or UST's. Based on this initial level of investigation, there are 20 UST/HAZMAT sites of environmental concern in the project area. Several of the sites are service stations and other various commercial sites and businesses.

One site, Circle 4 Shell, lost approximately 17,000 gallons of gasoline via a leaking tank in July 2005, resulting in vapors in sanitary sewers, gasoline fumes in buildings, and a threat to drinking water. The tank was reportedly removed. The site is adjacent to existing highway right-of-way and this leak and any undetected or unreported leaks from this site could potentially impact the right-of-way. Therefore, this site may represent an environmental concern for the project corridor.

An Environmental Site Assessment of the project area conducted in accordance with ASTM Practice E 1527 and KYTC Guidance should be accomplished during future "NEPA" phases of the project to formally confirm UST/Hazmat findings.

5.2 Pedestrian and Bikeways

Currently, there are no designated bikeways along this section of New Circle Road. Newtown Pike south of the New Circle Road Interchange was recently repaved and a bike lane added in both directions. The Lexington Fayette Urban County Government performed a Bicycle Level of Service Study in 2001 and listed this section of Newtown Pike near the New Circle Road interchange at a Level of Service E and F. The section of New Circle Road from Newtown Pike to Boardwalk was also listed at a Level of Service E and F. New Circle Road west of Newtown Pike was not considered usable for bicycle use due to the limited access nature of the facility and therefore not evaluated.

Newtown Pike should accommodate bicycle traffic through the New Circle Road Interchange and extend the bicycle lanes that were recently added south of the interchange. A bike lane is defined as a portion of a roadway that has been designated by striping, signing and pavement markings for preferential or exclusive use of bicycles. It is anticipated that Newtown Pike will contain a paved shoulder through the New Circle Road Interchange. A portion of the paved shoulder may be utilized as a bicycle lane. With the utilization of the paved shoulder as a bicycle lane, rumble strips should not be installed where they will interfere with bicycle traffic. With the proposed interchange reconfigurations eliminating the majority of the existing free flow movements on Newtown Pike through the interchange, the safety of bicycle traffic will be greatly increased. Careful consideration will need to be given to the free flow right turn lanes onto New Circle Road. Due to the limited access nature of New Circle Road, accommodating bicycles on New Circle is not recommended. No significant pedestrian traffic is expected at the Newtown Pike and New Circle Road interchange. Pedestrians that are on Newtown Pike can utilize the paved shoulder.

5.3 Project Affect on Existing Bridge Connecting Lexmark Campus

All studied alternatives would require the replacement of the bridge connecting the Lexmark campus. The existing 105 foot long bridge is a two span structure with a pier in the median of New Circle Road. Lexmark does own property along both sides of New Circle Road and it was assumed that Lexmark will want the bridge replaced. Recent observations show that the bridge carries a small but steady volume of vehicular traffic during the day. Pedestrians were also observed utilizing the bridge. A traffic signal is located immediately north of the bridge on Lexmark property. A proposed replacement structure for the Lexmark Bridge would also need to be a two span structure approximately 181 feet long. A preliminary cost analysis indicates that the cost of this structure would be approximately $650,000.

5.4 Drainage Effects

Project Affect on Existing Storm Drainage Systems

Only two significant drainage structures are affected by the project. Both drain tributaries to Cane Run Creek and drain south to north across New Circle Road. The first drainage structure affected by the project crosses New Circle near the Janell Concrete Products office at 970 West New Circle Road. The structure is a 48" reinforced concrete pipe that drains approximately 150 acres of watershed. It has not been identified as having any flooding problems. None of the studied alternatives would have a significant effect on the volume or pathways of runoff flowing to this structure. All studied alternatives would require short extensions to the inlet and outlet of this structure.

The second drainage structure affected by the project crosses New Circle at the Lexmark campus. It is approximately 800 feet from the New Circle intersection at Boardwalk. The structure is a double 12 foot by 6 foot concrete box culvert that drains approximately 1225 acres of watershed. It has been identified as flood prone by the LFUCG. None of the studied alternatives would have a significant effect on the volume or pathways of runoff flowing to this structure. All studied alternatives would require a short extension to the inlet of this structure. The existing outlet would not be affected. A HEC-RAS flood study will be required in Phase II design that will determine if raising the grade in this area may be appropriate. If needed, a larger replacement structure could be designed at this location to alleviate flooding on the roadway.

None of the studied alternatives significantly alter the volume or pathways of runoff flowing to these two drainage structures. Unless these structures are found to be structurally inadequate, only extensions of their inlet and/or outlet will be required to construct any of the studied alternatives. However, existing drainage issues can be discussed with LFUCG to determine if this project can be coordinated with ongoing or future LFUCG projects that seek to address existing drainage problems.

5.5 Phased Construction

To solve the immediate deficiencies that exist along New Circle Road at the Georgetown Road, interchange ramps can be addressed by making ramp improvements and providing frontage roads to businesses that currently gain access via New Circle Road. A phased construction option would solve deficiencies that exist today and be compatible with ultimate construction plans. The phased construction plan would aid in minimizing delays when the ultimate construction begins by providing added ramp capacity if drivers choose to avoid construction along Newtown Pike and New Circle Road. In addition, splitting the construction into smaller phases increases funding opportunities and provides the opportunity to prioritize which phase is constructed as funds become available.

Georgetown Road Improvements

The improvements outlined to the Georgetown Road Interchange Ramps are necessary to accommodate current peak hour demands and forecasted traffic volumes. The phased improvements to the Georgetown Road Ramps are smaller parts of the ultimate plan outlined earlier in this study. The following are detailed descriptions of the separate phases of construction. The detailed plans can be found in Exhibit 8.

Phase A

Phase "A" improvements consist of adding a lane to the Eastbound New Circle Road off-ramp which will provide two lanes for the exit ramp. This will change the lane configuration along New Circle Road to an exclusive exit lane, shared thru-exit lane, and exclusive thru lane. To provide for the two off ramp lanes the exclusive exit lane will be added to New Circle Road from the ramp diverging point a total length of 1750 feet. The ramp widening will accommodate dual left turn lanes and an exclusive right turn lane at the intersection with Georgetown Road. This improvement will aid in meeting the higher traffic demand and preventing traffic from queuing onto New Circle Road, which currently occurs. It would also provide vehicles traveling Eastbound New Circle Road an alternate route to I-75/I-64 during Newtown Pike Interchange construction.

Phase B

Phase "B" improvements address the Westbound New Circle weaving problem associated with the short distance between the on-ramp from Newtown Pike and the off-ramp to Georgetown Road. This phase will lengthen the weaving distance by providing a 900' auxiliary lane between the ramps. The

additional lane will restrict access to the adjoining property owners but access would remain from New Circle during this phase. This phase widens the Westbound New Circle Road off-ramp to provide two lanes for the exit ramp. The lane configuration along New Circle Road will consist of the auxiliary lane forming the exclusive exit lane and the traveling lanes on New Circle will consist of a shared thru-exit lane, and exclusive thru lane. The forecasted traffic volumes and additional detoured traffic during ultimate construction is an additional benefit of adding a westbound auxiliary lane between Newtown Pike and Georgetown Road.

Phase C

Phase "C" improvements consist of extending the Westbound New Circle on-ramp acceleration lane 900 feet for a total length of 1050 feet. The acceleration lane extension will provide a safer merge onto New Circle Road with the increased traffic volumes. The lane will provide vehicles adequate time to reach the travel speed and more time to find a gap and merge during peak volumes on New Circle Road.

Phase D - North Frontage Road – Nandino Boulevard

Access along New Circle Road from Georgetown Road to Newtown Pike will be controlled throughout this corridor to provide for smoother traffic flow. This phase relocates access for three businesses from New Circle Road to a frontage road that is connected to Nandino Boulevard. The typical section for the frontage road includes two 12-foot travel lanes with curb and gutter. This frontage road will require the purchase of an existing business *(D&V Truck Sales and Service)* located at 968 Nandino Blvd. An alternative to constructing the north frontage road is to purchase the three businesses that currently gain access from New Circle Road.

Phase E - South Frontage Road - Finney Road

This phase relocates access points to businesses that currently have entrances along New Circle Road. Finney Road would be relocated 250 feet south along Georgetown Road (across from Lima Drive) to eliminate the impact it currently imposes on the Eastbound New Circle Road on/off ramp and Georgetown Road signal. Finney Road will remain on its existing alignment and be extended to connect to Adcolor Drive. The typical section for this frontage road includes two 12-foot travel lanes with curb and gutter. The South Frontage Road will require the purchase of two existing business tracts that are currently vacant; they are located at 990 New Circle Road and 996 New Circle Road.

Cost Estimates

Cost estimates for the different phases of construction are provided below. These estimates do not provide any improvements to New Circle Road. The improvements to Georgetown Road Interchange Ramps do not require any right-of-way acquisition. The right-of-way cost estimate for this section were based on recent business values.

New Circle Road: Georgetown Road-Newtown Pike
Phase Construction Cost Summary

Phase	Description	Construction	Utility	R\W	Total
A	EB New Circle Off-Ramp	$1,050,000	$480,000	$0	$1,530,000
B	WB New Circle Auxiliary Lane	$650,000	$0	$0	$650,000
C	WB New Circle Acceleration Lane	$370,000	$0	$0	$370,000
D*	North Frontage Road-Nandino Blvd	$1,060,000	$400,000	$2,280,000	$3,740,000
E	South Frontage Road-Finney Road	$ 990,000	$600,000	$3,690,000	$5,280,000

* Business acquisition only estimated $3,688,200

EXHIBIT 1

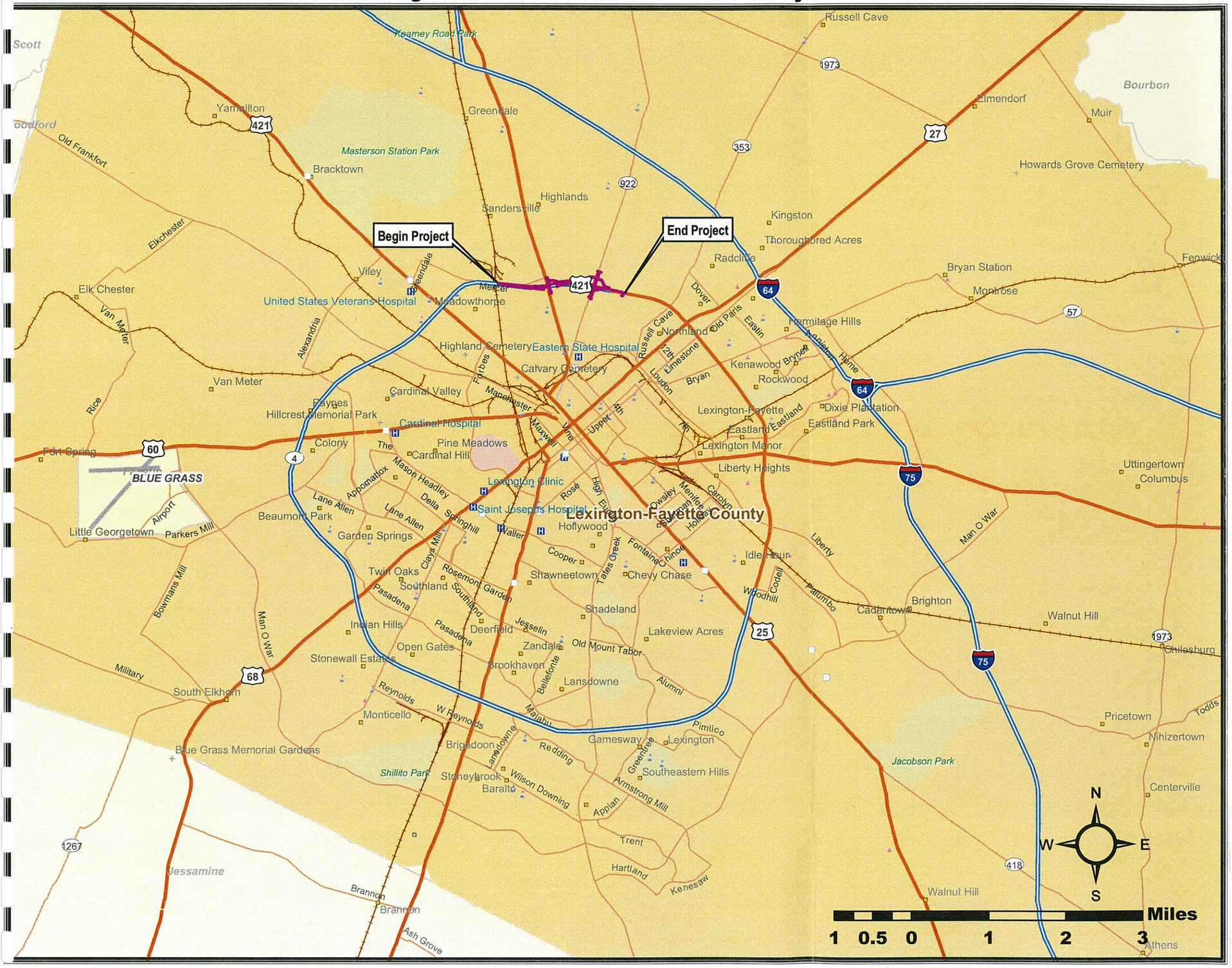
PROJECT LOCATION MAP

Palmer ENGINEERING

AMERICAN

NEW CIRCLE ROAD - KY 4

Georgetown Road to Boardwalk/Colesbury Circle



Legend

- Hospitals (AHA)
- AMTRAK Stations
- Bus Stations
- Place
- School
- Public Building
- Limited Access
- Highway
- Major Road
- Local Road
- Minor Road
- Other Road
- Ramp
- Ferry
- Pedestrian Way
- Railroads (Local)
- Runway
- Airport Area
- National Park or Forest
- State Park or Forest
- Local Park or Recreational Area

Kentucky UNBRIDLED SPIRIT

Palmer ENGINEERING

AMERICAN CONSULTING ENGINEERS

PROJECT LOCATION MAP
EXHIBIT 1

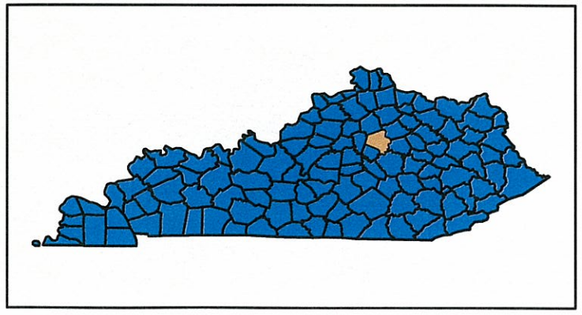


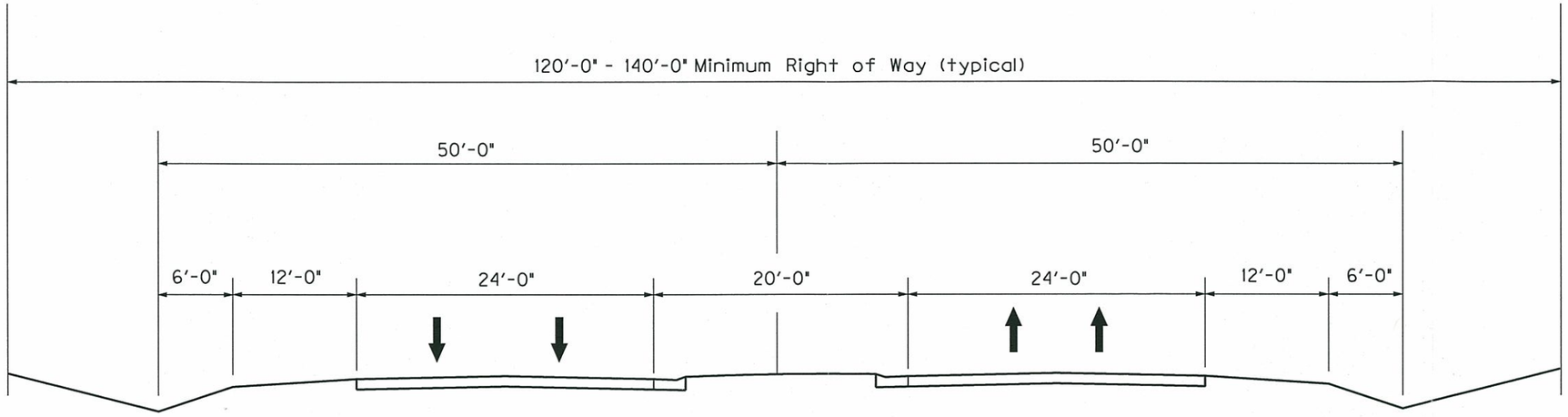
EXHIBIT 2

TYPICAL SECTIONS

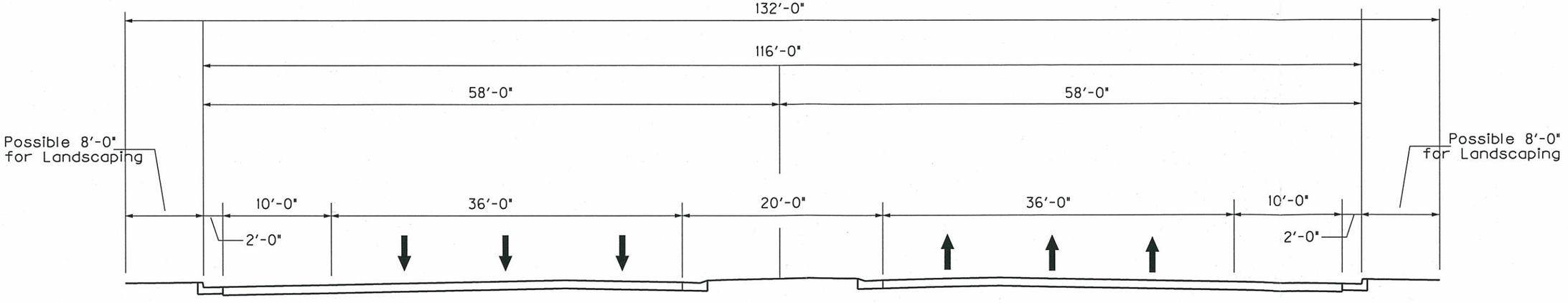
Palmer ENGINEERING

AMERICAN

COUNTY OF	FISCAL YEAR	SHEET NO.	TOTAL SHEETS



4 - LANE SECTION

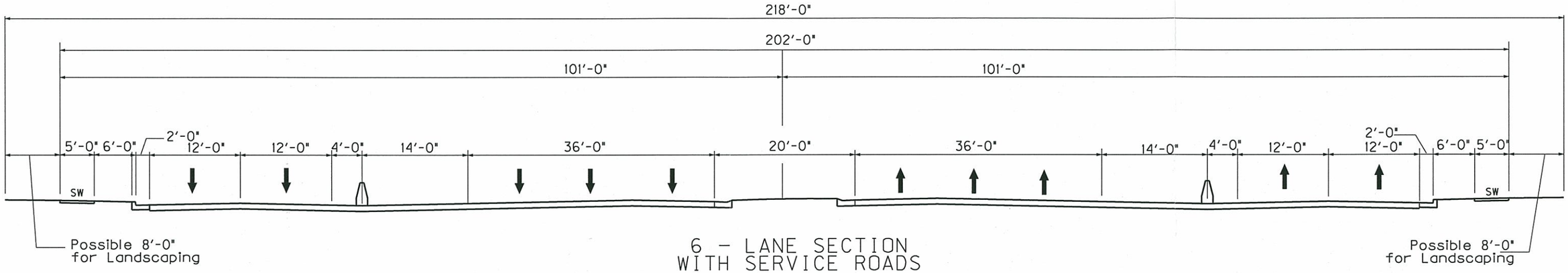


6 - LANE SECTION

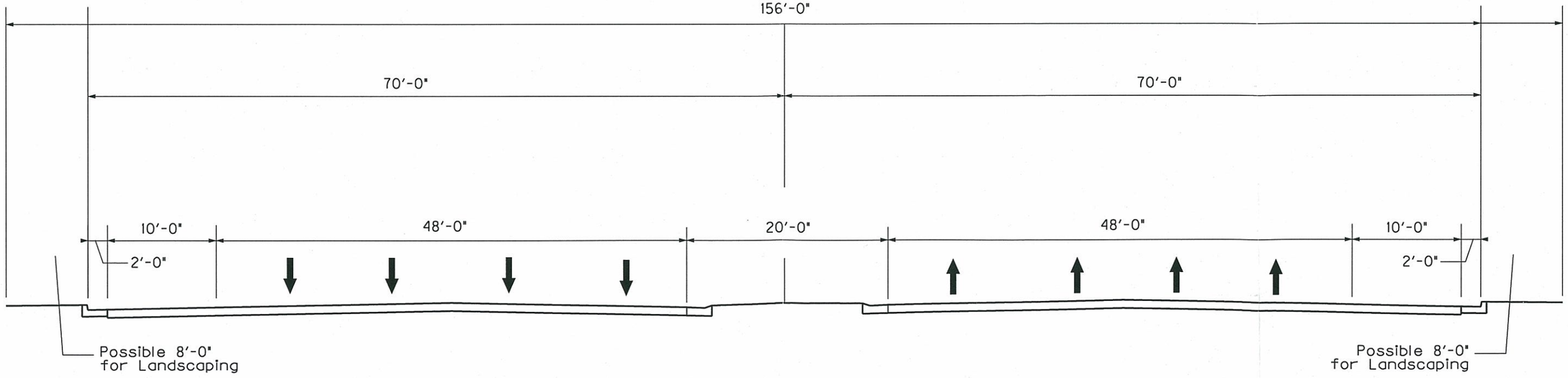
TYPICAL.DGN 2/21/2006

TYPICAL SECTIONS
NEW CIRCLE ROAD

COUNTY OF	FISCAL YEAR	SHEET NO.	TOTAL SHEETS



6 - LANE SECTION
WITH SERVICE ROADS



8 - LANE SECTION

TYPICAL SECTIONS
NEW CIRCLE ROAD

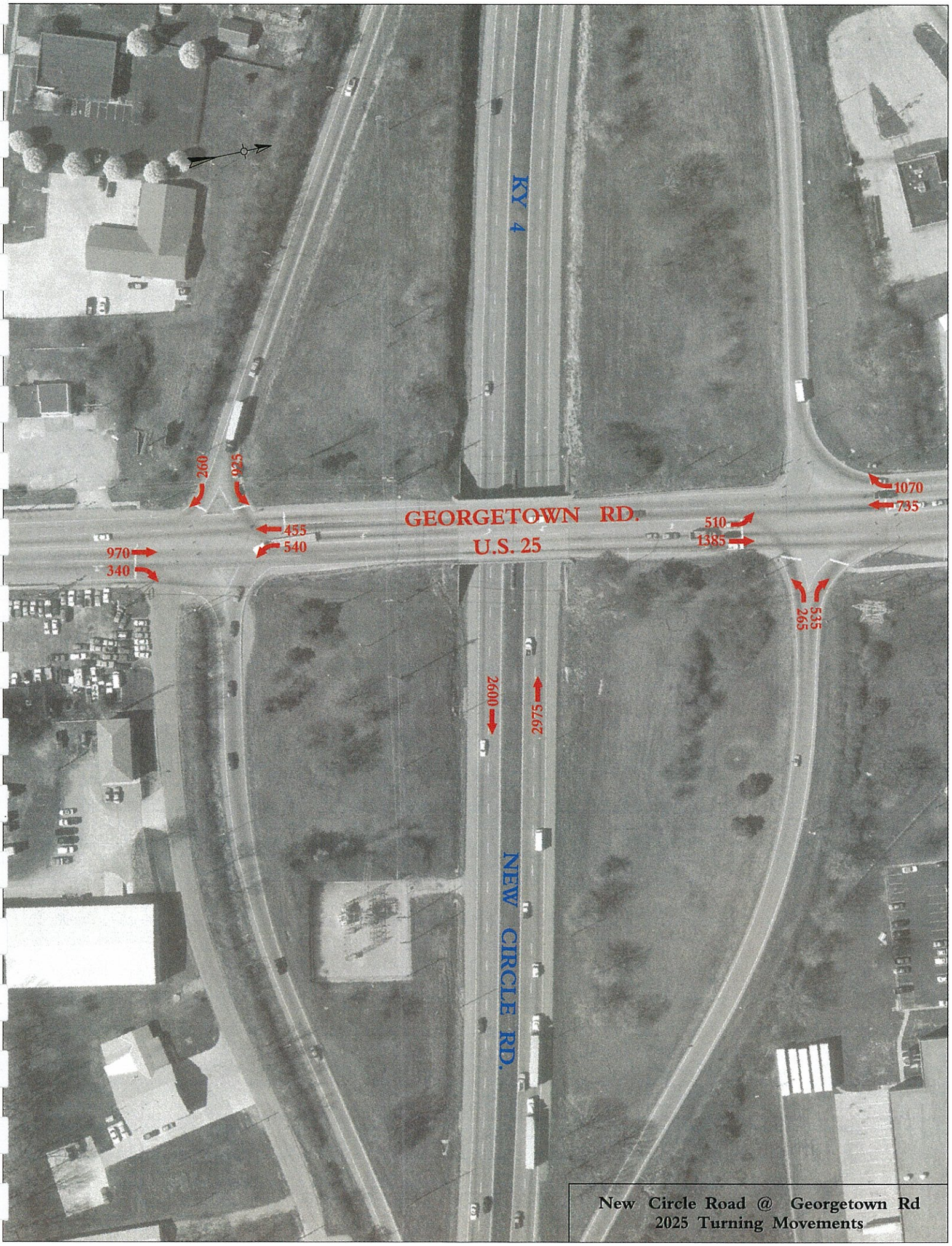
TYPICAL.DGN 2/27/2006

EXHIBIT 3

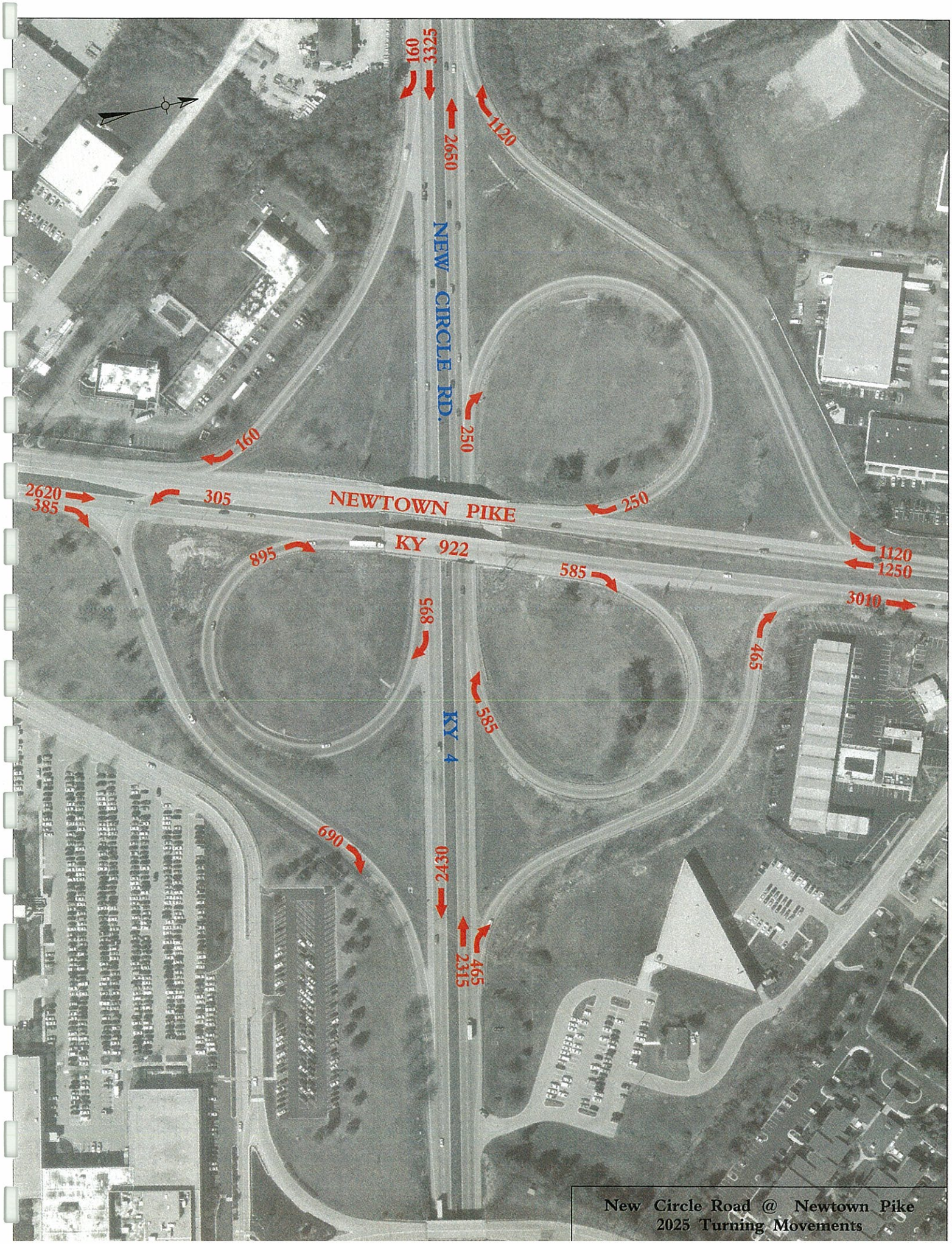
INTERSECTION TURNING MOVEMENTS

Palmer ENGINEERING

AMERICAN



New Circle Road @ Georgetown Rd
2025 Turning Movements



New Circle Road @ Newtown Pike
2025 Turning Movements

EXHIBIT 4

CORRIDOR PHOTOS



Eastbound New Circle Road East of Railroad Bridge



Eastbound New Circle Road Off Ramp @ Georgetown Road



Westbound New Circle Road @ Georgetown Road



Westbound New Circle Road On Ramp @ Georgetown Road



Westbound New Circle Road Off Ramp @ Georgetown Road



Eastbound New Circle Road @ Georgetown Road



Northbound Georgetown Road @ New Circle Road



Eastbound New Circle Road On Ramp @ Georgetown Road



Northbound Newtown Pike North of New Circle Road



Southbound Newtown Pike On and Off Ramp @ New Circle Road



Westbound New Circle Road On and Off Ramp @ Newtown Pike



Westbound New Circle Road @ Newtown Pike



Eastbound New Circle Road Off Ramp @ Newtown Pike



Southbound Newtown Pike South of New Circle Road



Eastbound New Circle Road On and Off Ramp @ Newtown Pike



Eastbound New Circle Road @ Newtown Pike



Westbound New Circle Road On and Off Ramp @ Newtown Pike



Southbound Newtown Pike North of New Circle Road



Northbound Newtown Pike North of New Circle Road



Eastbound New Circle Road @ Lexmark Bridge



Westbound New Circle Road @ Lexmark Bridge



Westbound New Circle Road West of Boardwalk Street



Eastbound New Circle Road West of Boardwalk Street



Westbound New Circle Road @ Lexmark Off Ramp, 745 New Circle Road



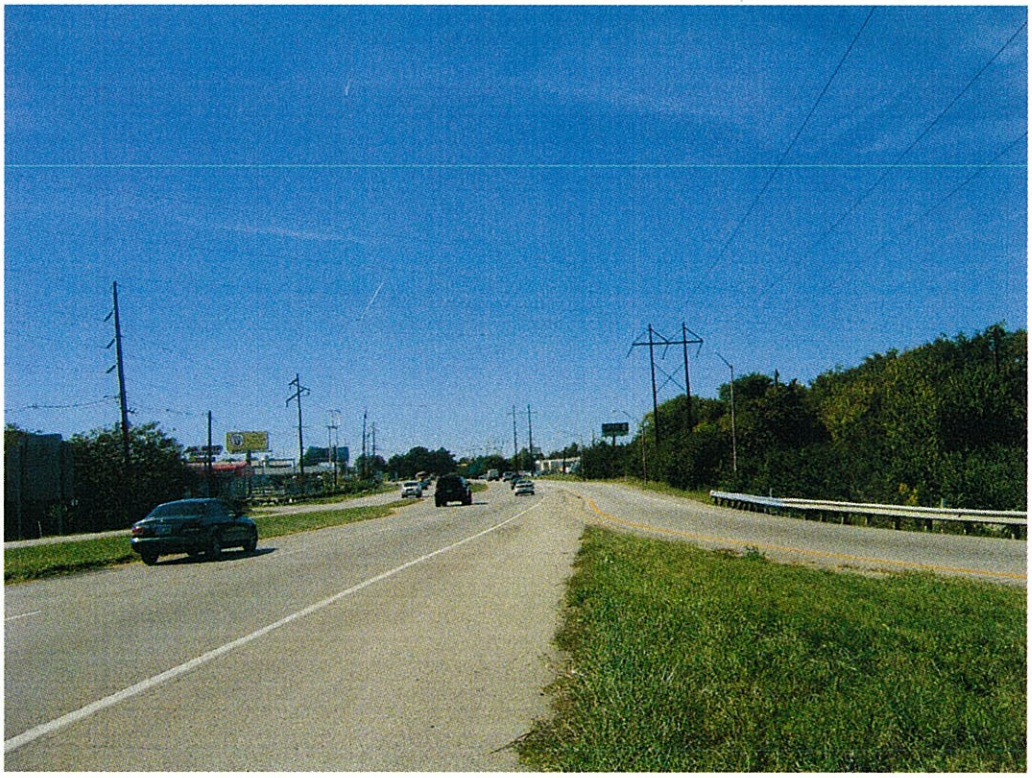
Lexmark Entrance on New Circle Road @ 740 New Circle Road



Eastbound New Circle Road @ Lexmark, 745 New Circle Road



Westbound New Circle Road @ KyDOT District 7 Office



Westbound New Circle Road @ Newtown Pike On Ramp



D&V Truck Sales and Service, 968 Nandino Blvd.



996 New Circle Road



Everybody Auto Sales, 1019 West New Circle Road



Everybody Auto Sales, 1001 West New Circle Road



Justice Shamrock Glass, 1021 New Circle Road



Camaro Central, 1004 New Circle Road



Stephens Oil Co., 1144 Finney Drive



1000 New Circle Road



990 New Circle Road



Janell Concrete and Masonry Equipment, 970 New Circle Road



Herald-Leader Distribution Center



Stephens Oil Co. and Eastbound New Circle Road On Ramp



Westbound New Circle Road Off Ramp East of Georgetown Road



Northern Right Of Way Acquisitions: 1021, 1019, 1001 New Circle Road



Southern Right Of Way Acquisitions: 1010, 1004, 1000, 996, 990 New Circle Road



Southern Right Of Way Acquisitions: 1010, 1004, 1000, 996, 990 New Circle Road



Eastbound New Circle Road On Ramp @ Georgetown Road



Southern Right Of Way Acquisitions: 990, 996, 1000, 1004, 1010 New Circle Road



Southern Right Of Way Acquisitions: 990, 996, 1000, 1004, 1010 New Circle Road



Southern Right Of Way Acquisitions: Adcolor Drive (990 and 970 New Circle Road)

EXHIBIT 5

BUILD ALTERNATE 4

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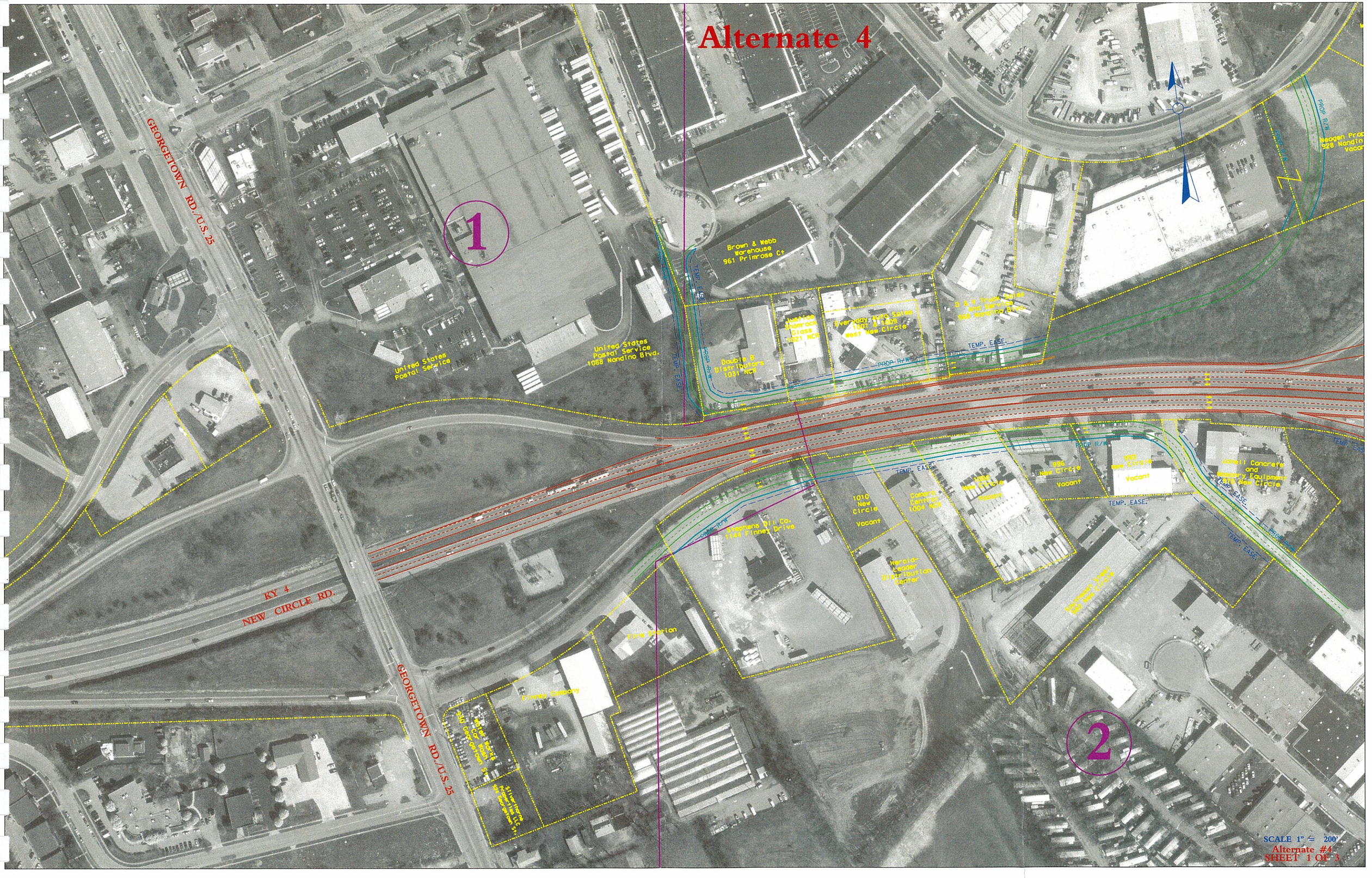
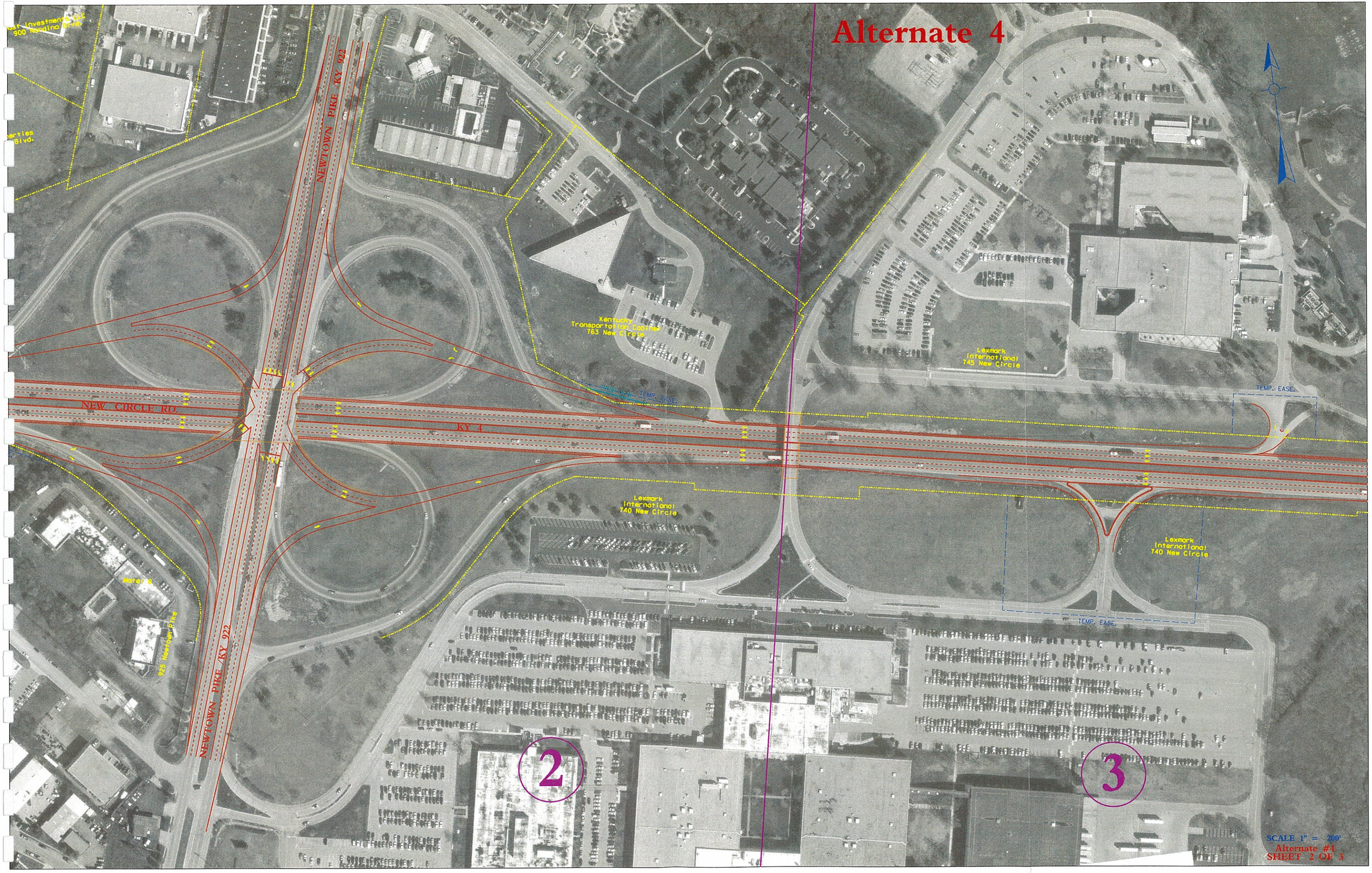

Alternate 4
1
2
GEORGETOWN RD./U.S. 25
KY 4
NEW CIRCLE RD.
United States Postal Service
United States Postal Service 1088 Nandino Blvd.
Brown & Webb Warehouse 961 Primrose Ct
Double B Distributors 1031 NCR
Stephens Oil Co. 1144 Finney Drive
1010 New Circle Vacant
Vacant
Vacant
Vacant
Vacant
Herald-Leader Distribution Center
Fire Station
Silverhorse Properties LLC 921 Georgetown St.
Glenn Company
TEMP. EASE.
PROP. R/W
SCALE 1" = 200'
Alternate #4
SHEET 1 OF 3


Alternate 4
NEWTOWN PIKE KY 922
NEW CIRCLE RD
KY 4
NEWTOWN PIKE KY 922
Kentucky Transportation Cabinet
763 New Circle
Lexmark International
745 New Circle
Lexmark International
740 New Circle
Lexmark International
740 New Circle
TEMP. EASE.
TEMP. EASE.
TEMP. EASE.
2
3
SCALE 1" = 200'
Alternate #4
SHEET 2 OF 3

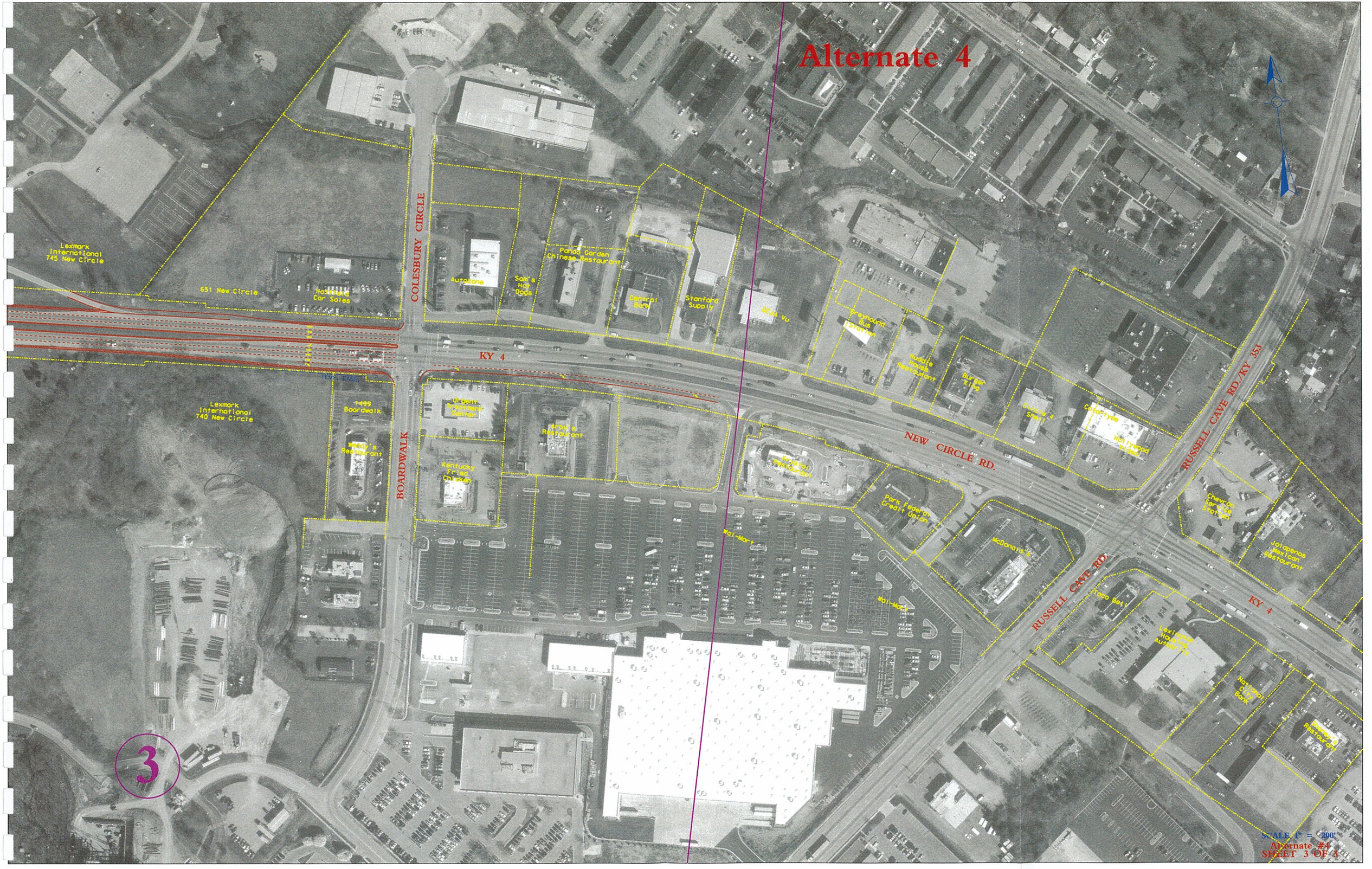

Alternate 4
Lexmark International 745 New Circle
651 New Circle
Hammond Car Sales
COLESBURY CIRCLE
Autozone
Sam's Hot Dogs
Panda Garden Chinese Restaurant
Central Bank
Stanford Supply
Greyhound Bus Station
Hudale House Restaurant
Burger King
Colortyme
Hollywood Hotel
KY 4
Lexmark International 740 New Circle
1499 Boardwalk
Urgent Treatment Center
Kentucky Fried Chicken
BOARDWALK
NEW CIRCLE RD.
Park Federal Credit Union
McDonald's
Wal-Mart
RUSSELL CAVE RD./KY 353
Chevron Service Station
Jalapenos Mexican Restaurant
RUSSELL CAVE RD.
Taco Bell
Lexington Housing Authority
Natural City Bank
Restaurant
3
SCALE 1" = 200'
Alternate #4
SHEET 3 OF 4

EXHIBIT 6

BUILD ALTERNATE 5

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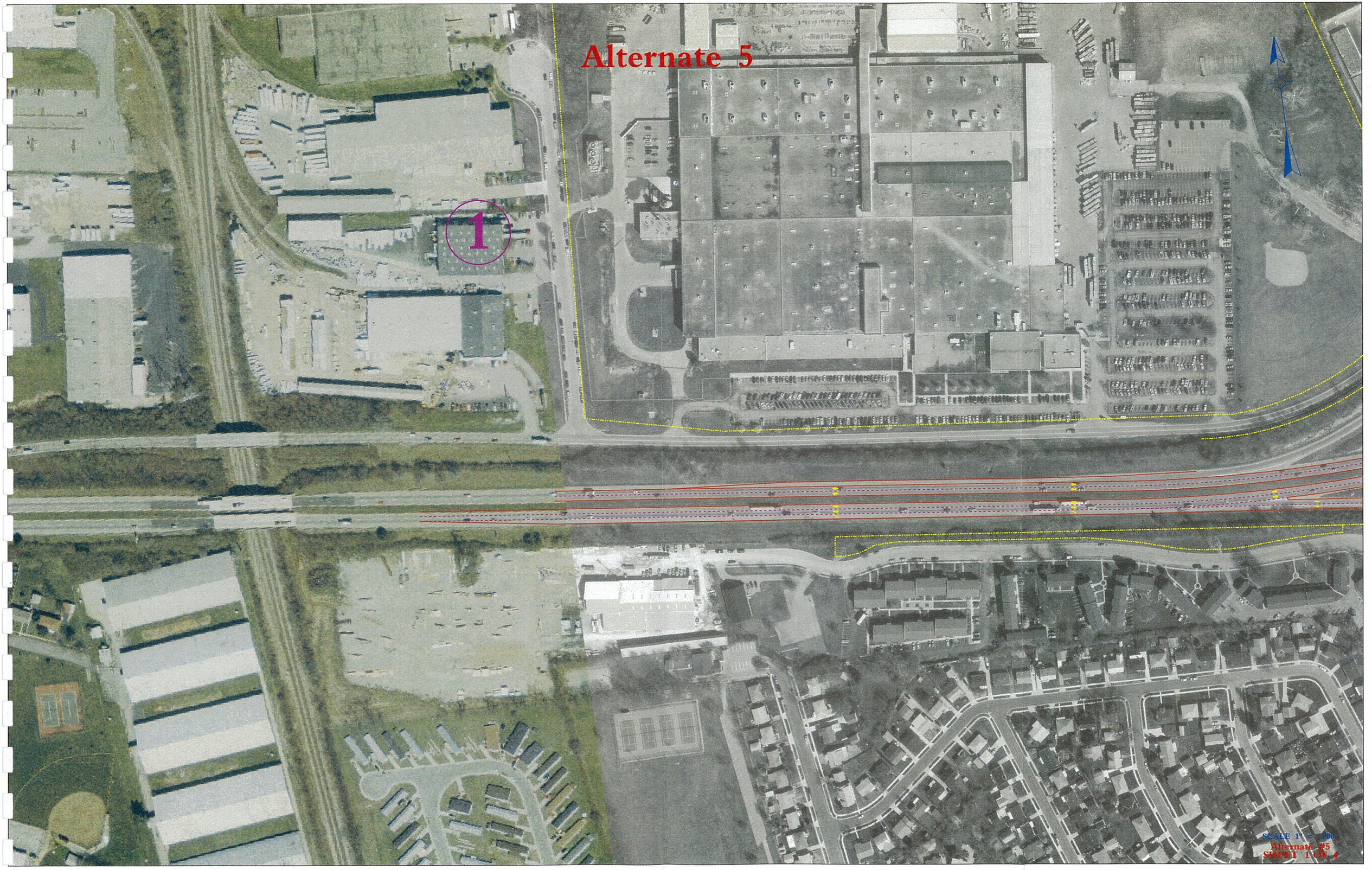
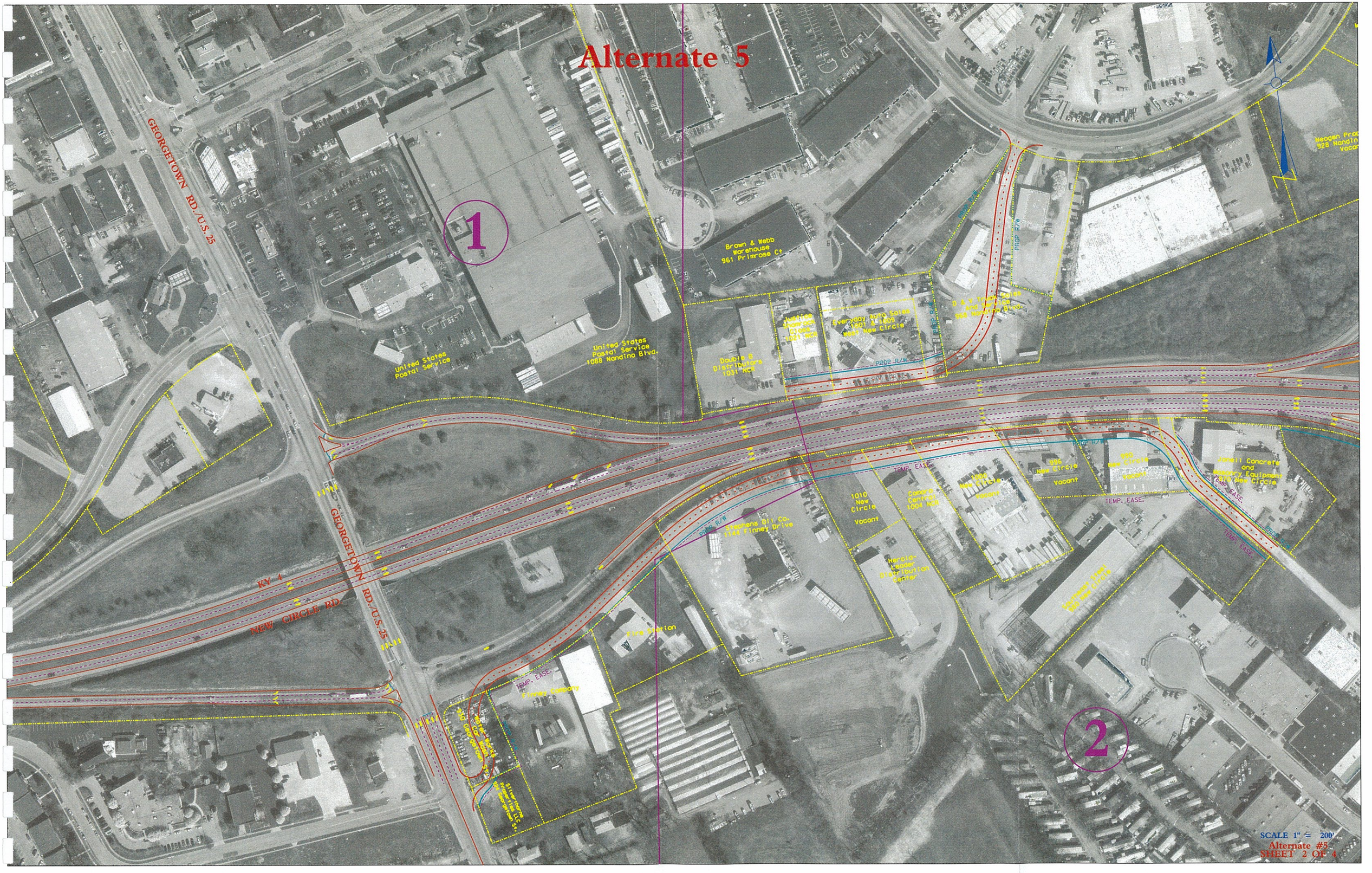
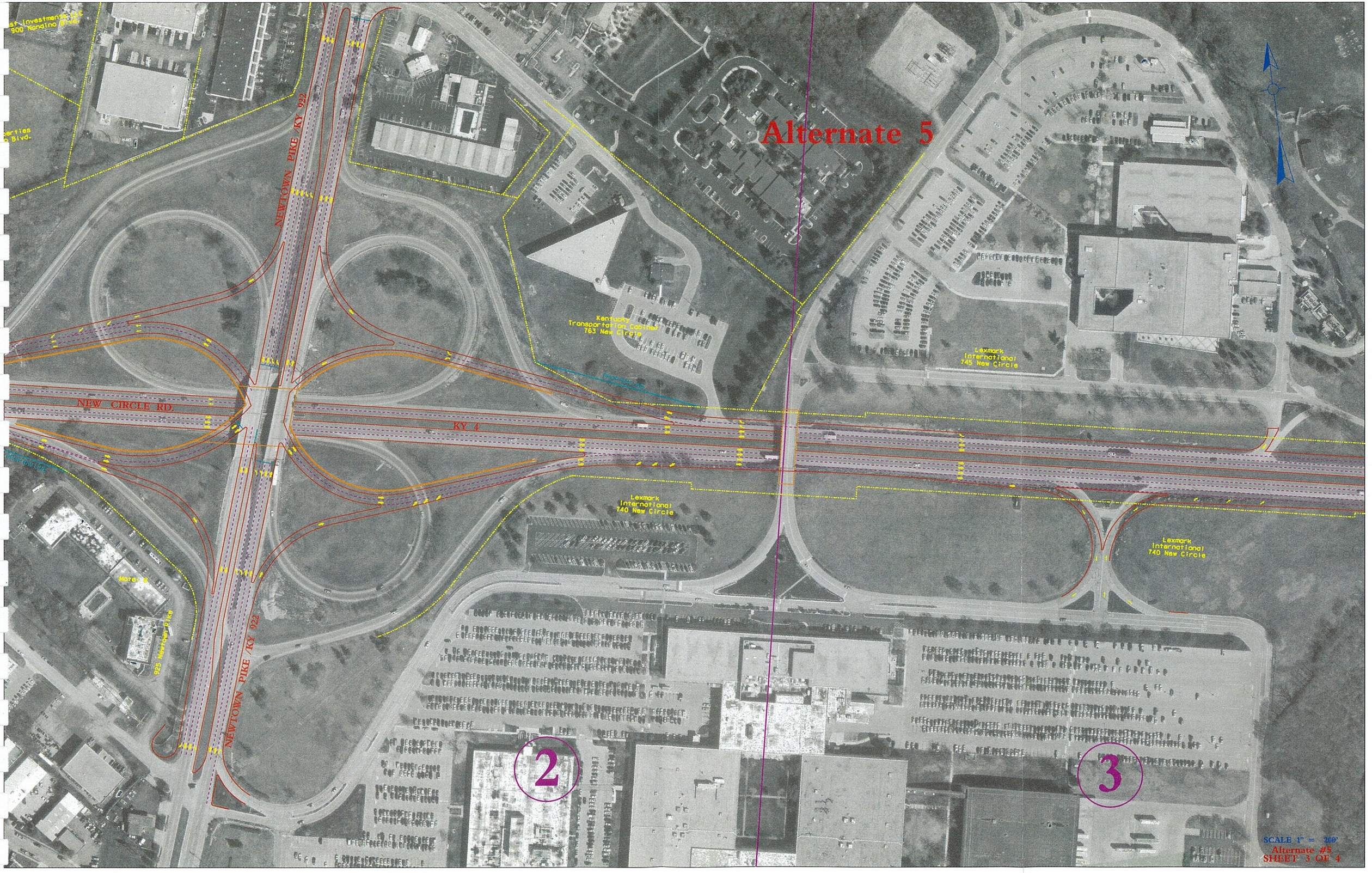

Alternate 5
1
SCALE 1" = 200'
Alternate #5
SHEET 1 OF 4


Alternate 5
1
2
GEORGETOWN RD./U.S. 25
GEORGETOWN RD./U.S. 25
KY 4
NEW CIRCLE RD
United States Postal Service
United States Postal Service 1088 Nandino Blvd.
Brown & Webb Warehouse 961 Primrose Ct
Double B Distributors 1031 NCR
Everyday Auto Sales 1401 & 1409 NCR New Circle
D & V Trucking Sales and Service 1001 Nandino Blvd.
Neogen Prop 928 Nandino Vacant
Stephens Oil Co. 1144 Finney Drive
1010 New Circle Vacant
Concrete Center 1004 NCR
Herald-Leader Distribution Center
996 New Circle Vacant
Tyrell Concrete and Masonry Equipment 1016 New Circle
Fire Station
Finney Company
TEMP. EASE.
PROP R/W
SCALE 1" = 200'
Alternate #5
SHEET 2 OF 4


Alternate 5
NEWTOWN PIKE /KY 922
NEW CIRCLE RD.
KY 4
Kentucky Transportation Cabinet 763 New Circle
Lexmark International 745 New Circle
Lexmark International 740 New Circle
Lexmark International 740 New Circle
2
3
SCALE 1" = 200'
Alternate #5
SHEET 3 OF 4


Alternate 5
Lexmark International 745 New Circle
651 New Circle
Hatfield Car Sales
COLESBURY CIRCLE
Autozone
Sam's Hot Rods
Panda Garden Chinese Restaurant
Central Bank
Stanford Supply
Re-N-Vu
Fremont Bus Station
Huddle House Restaurant
Burger King
KY 4
RUSSELL CAVE RD - KY 353
Lexmark International 740 New Circle
1499 Boardwalk
Wendy's Restaurant
Urgent Treatment Center
McDonald's Restaurant
Kentucky Fried Chicken
BOARDWALK
Wal-Mart
Park Federal Credit Union
McDonald's
Chevron Service Station
Volcanos Mexican Restaurant
RUSSELL CAVE RD
KY 4
Lexington Humane Society
National City Bank
3
SCALE 1" = 200'
Alternate #5
SHEET 4 OF 4

EXHIBIT 7

BUILD ALTERNATE 6

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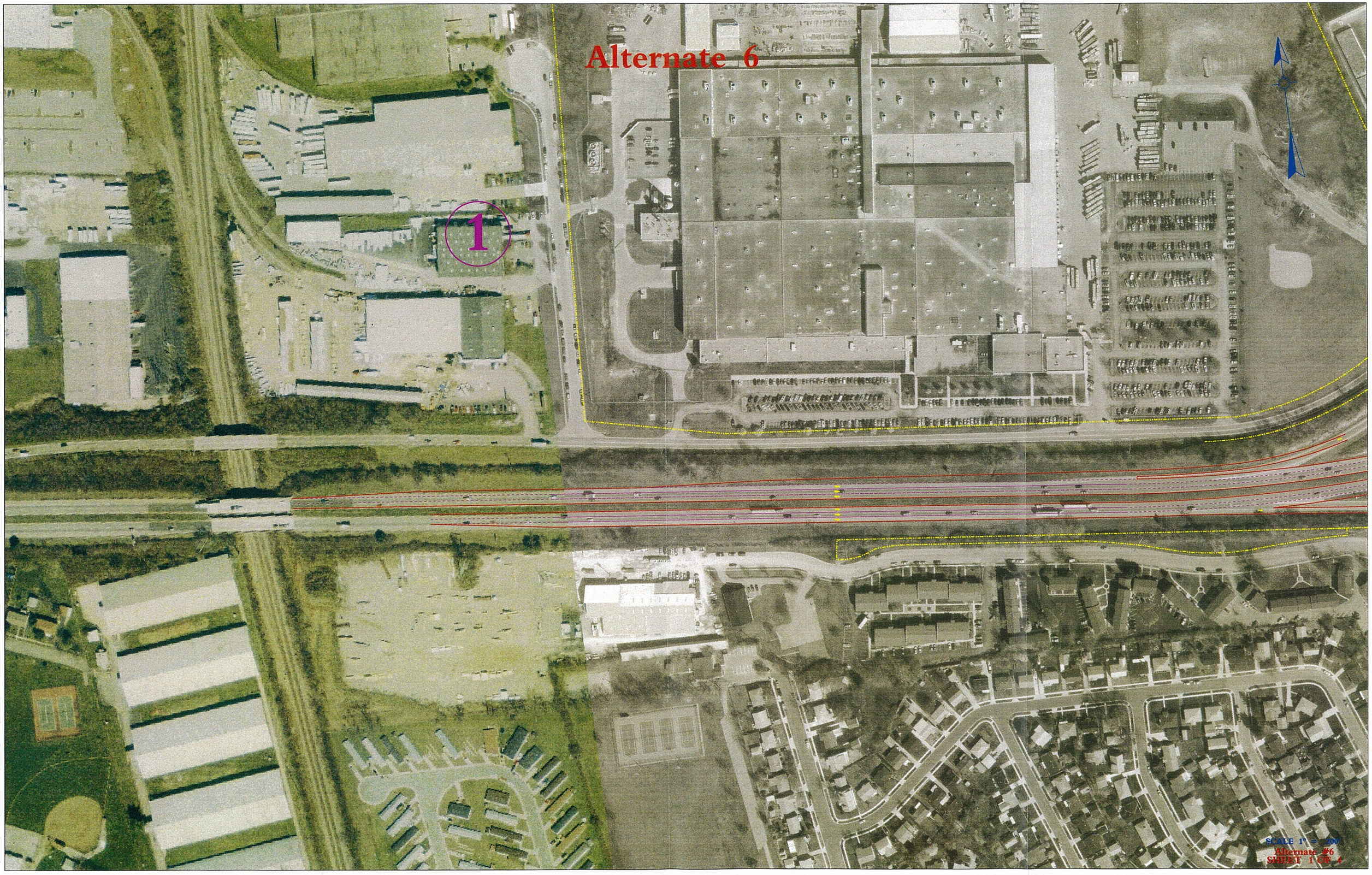
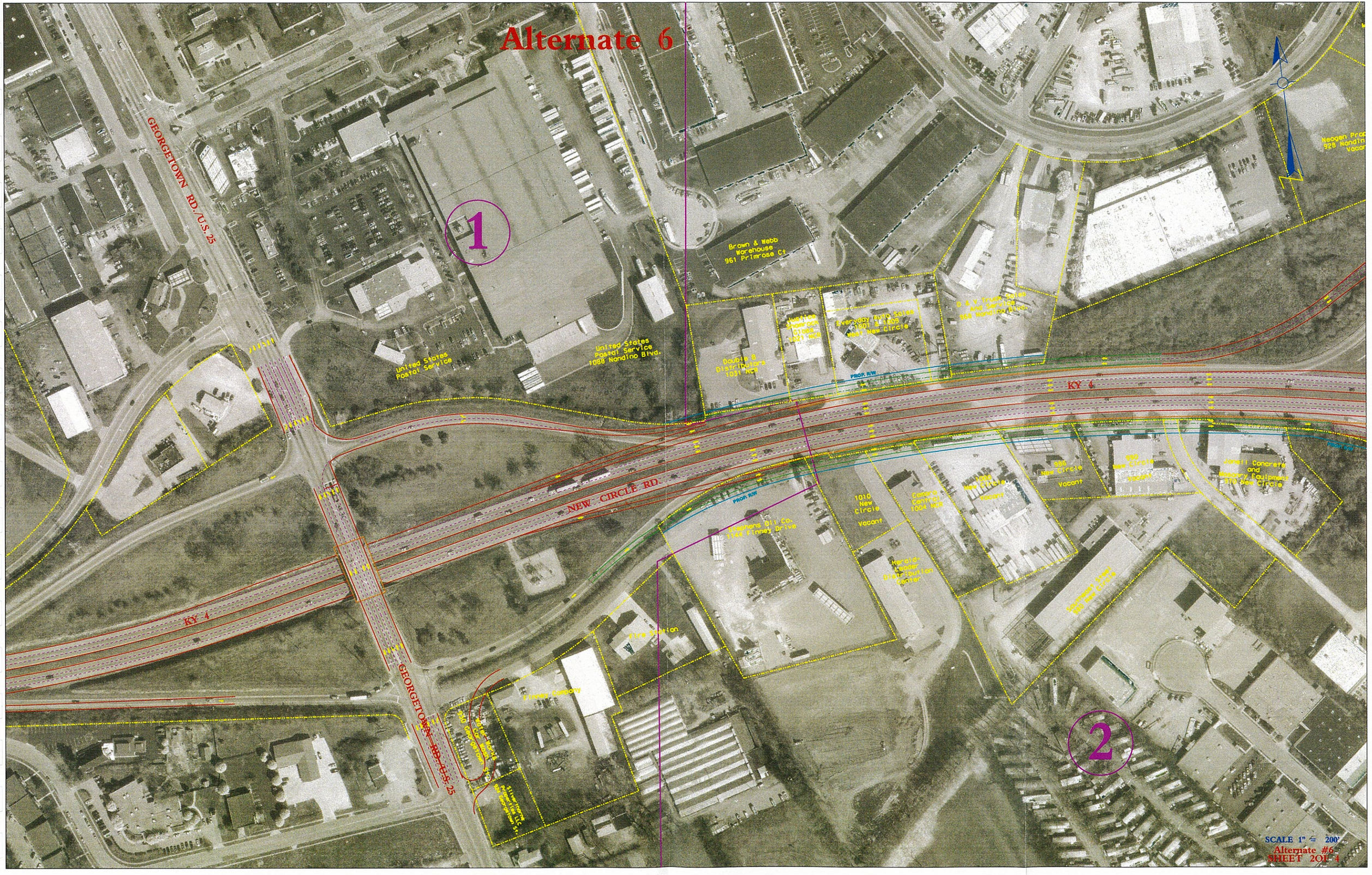
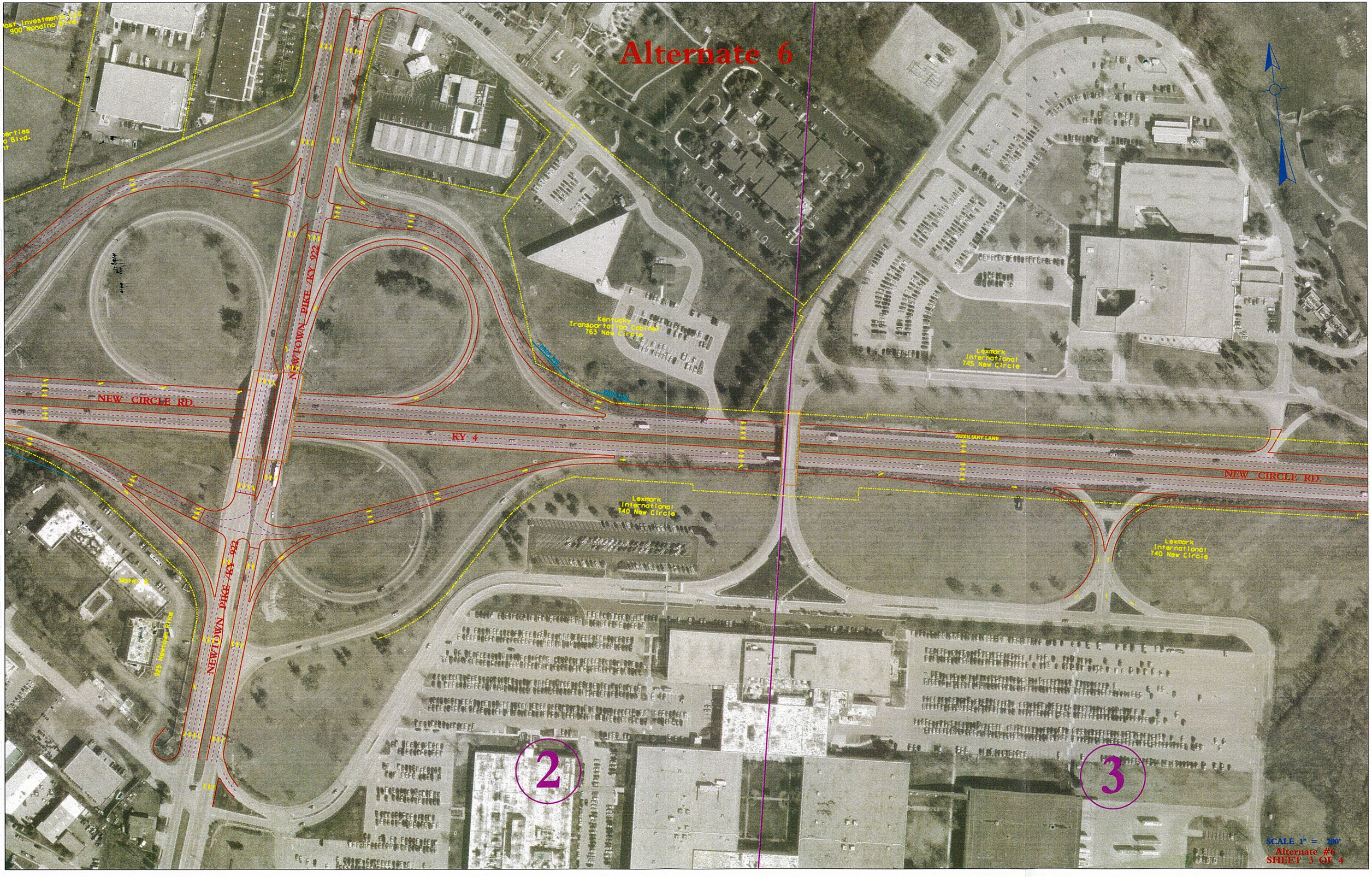

Alternate 6
1
SCALE 1" = 200'
Alternate #6
SHEET 1 OF 4


Alternate 6
GEORGETOWN RD./U.S. 25
1
2
KY 4
NEW CIRCLE RD.
United States Postal Service
United States Postal Service 1088 Nandino Blvd.
Brown & Webb Warehouse 961 Primrose Ct
Double B Distributors 1031 NCR
Everyday Pipe Sales 1001 New Circle
PROP. R/W
1010 New Circle Vacant
Vacant
Vacant
Neogen Prop 928 Nandino Vacant
Cassell Concrete and Masonry Equipment 1010 New Circle
Kerald-Leader Distribution Center
Stephens Oil Co. 1144 Finney Drive
Silver Hawk Properties LLC 1000 Georgetown St.
SCALE 1" = 200'
Alternate #6
SHEET 2OF 4


Alternate 6
NEW CIRCLE RD.
KY 4
NEWTOWN PIKE KY 922
NEWTOWN PIKE KY 922
Kentucky Transportation Cabinet 763 New Circle
Lexmark International 745 New Circle
Lexmark International 740 New Circle
Lexmark International 740 New Circle
AUXILIARY LANE
NEW CIRCLE RD.
2
3
SCALE 1" = 200'
Alternate #6
SHEET 3 OF 4


Alternate 6
Lexmark International 745 New Circle
651 New Circle
Hatfield Car Sales
COLESBURY CIRCLE
Autozone
Sam's Hot Dogs
Panda Garden Chinese Restaurant
Central Bank
Stanford Supply
AUXILIARY LANE
KY 4
Lexmark International 740 New Circle
1499 Boardwalk
BOARDWALK
Kentucky Fried Chicken
Arby's Restaurant
NEW CIRCLE RD.
Park Federal Credit Union
McDonald's
Wal-Mart
RUSSELL CAVE RD.
Jalapenos Mexican Restaurant
KY 4
3
SCALE 1" = 200'
Alternate #6
SHEET 4 OF 4

EXHIBIT 8

PHASED CONSTRUCTION SECTIONS

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GEORGETOWN ROAD
RAMP IMPROVEMENTS

SCALE 1" = 200'

KY 4 NEW CIRCLE RD

GEORGETOWN RD./U.S. 25

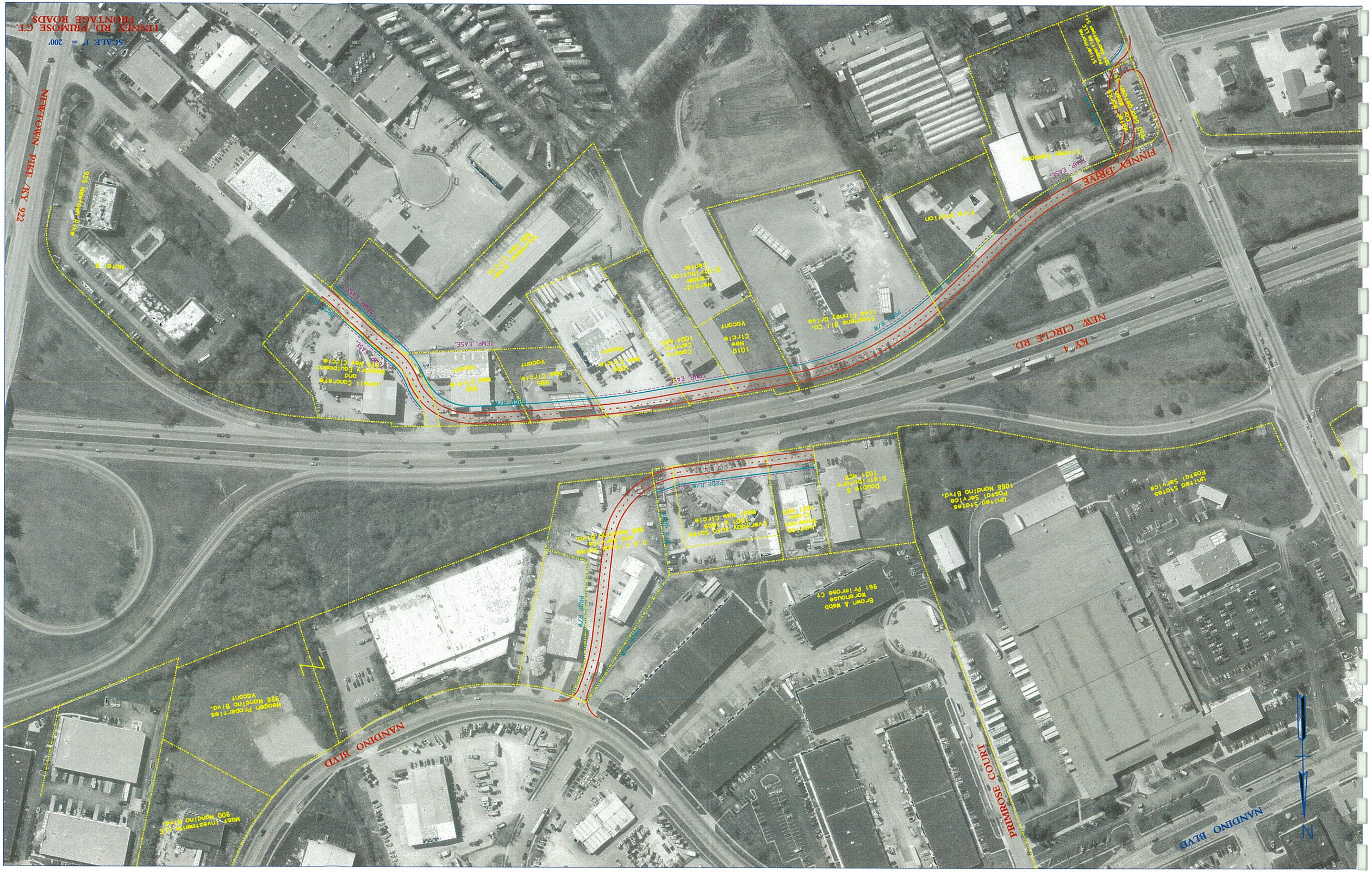
GEORGETOWN ROAD
RAMP IMPROVEMENTS

SCALE 1" = 200'

KY 4 NEW CIRCLE RD.

GEORGETOWN RD./U.S. 25

KY 922


FINNEY RD./PRIMOSE CT.
FRONTAGE ROADS
SCALE 1" = 200'
NEWTOWN PIKE/KY 922
925 Newtown Pike
Motel 8
Proposed Storm Water Detention Area
Temp. Easement
Temp. Easement
Temp. R/W
Temp. Easement
Temp. Easement
Small Concrete and Masonry Equipment Yard
Vacant
Vacant
Vacant
Temp. Easement
Temp. Easement
Horrid-Hauser Distribution Center
Vacant
1010 New Circle Rd.
Vacant
Stephens Oil Co.
11AA Finney Drive
Temp. R/W
Temp. Easement
Fire Station
Temp. Easement
Temp. Easement
Finney Company
Finney Drive
Temp. Easement
Temp. Easement
Temp. Easement