

**Research Report
KTC-96-26**

**EVALUATION OF INCIDENT MANAGEMENT TECHNIQUES
(LEXINGTON, KENTUCKY)**

by

Kenneth R. Agent
Research Engineer

Jerry G. Pigman
Research Engineer

Nikiforos Stamatiadis
Associate Professor

and

Eugene Culton
Graduate Student

Kentucky Transportation Center
College of Engineering
University of Kentucky
Lexington, Kentucky

in cooperation with

Lexington-Fayette Urban County Government
Kentucky Transportation Cabinet
and
Federal Highway Administration

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EXECUTIVE SUMMARY

The objective of this project was to evaluate and document the various incident management techniques used by the Lexington Fayette Urban County Government (LFUCG) to alleviate the impact of incidents on highways in Fayette County. Components included in the evaluation included: 1) establishment and use of traffic diversion routes, 2) use of variable message signs, 3) use of detour signing, 4) use of arrow board signs, 5) improvement of existing incident detection and verification through enhanced computerized mapping, 6) use of linked motion detection equipment, and 7) development of a public information program. The methods used to incorporate each of these components into an incident management program were described.

The analysis of traffic diversion plans showed that congestion would be an extreme problem with many of the diversion routes; especially during peak hours. It was recommended that existing diversion routes be used only during off peak hours and alternate routes be developed for peak traffic flow periods.

1.0 INTRODUCTION

Increased traffic volumes have resulted in a higher probability for incidents and accidents on interstates and other major highways. When there is an occurrence which disrupts traffic, the adverse effects are widespread. Delays can result in significant costs to road users and are being recognized as a major inconvenience and a burden on the driving public. Delays increase vehicle emissions and have an adverse effect on air quality. Many efforts are underway to address the problems associated with congestion resulting from incidents. These include improved traffic management techniques and applications of advanced technology to collect data and provide additional information to drivers.

An Incident Management Program, using Congestion Mitigation/Air Quality (CMAQ) funds, was begun and is being implemented for the Lexington area. Funding for this CMAQ program was provided by the 1994 U.S. Congress from the Highway Trust Fund with the objective of reducing vehicle emissions and improving air quality in Kentucky's non-attainment areas. As a means of achieving this objective of reducing vehicle emissions and improving air quality, an incident management plan was developed for the Lexington area. In general, an effective incident management plan should address six major elements. The specific elements include: a) detection, b) verification, c) response, d) removal/restoration of capacity, e) traffic management, and f) information to motorists. Components of the critical elements of incident management included in the Lexington program were as follows:

- 1) Establishment and use of traffic diversions routes,
- 2) Use of variable message signs,
- 3) Use of detour signing,
- 4) Use of arrow board signs,
- 5) Improvement of existing incident detection and verification through enhanced computerized mapping,
- 6) Use of linked motion detection equipment, and
- 7) Development of a public information program.

The objective of this project was to evaluate and document the various incident management techniques used by the Lexington Fayette Urban County Government (LFUCG) to alleviate the impact of incidents on highways in Fayette County.

2.0 EVALUATION AND DOCUMENTATION

There were several components of the project. Some were independent while others were interconnected. Following is a discussion of each of the various

components of the incident management plan. The activities necessary to implement the specific component are documented. Also, when appropriate, a measure of the effectiveness is discussed. A listing of the major purchases made as part of this project is presented in Appendix A.

2.1 Incident Management Committee

As a method to assist in communication between the various agencies involved in incident management, a subcommittee was formed from the Congestion Management Committee to discuss relevant issues in this area. The subcommittee was later named the Incident Management Committee and has met since 1994 with seven meetings held in 1994, nine in 1995, and nine in 1996. Members of this committee represent a range of interests and responsibilities. The organizations within the LFUCG represented on the committee include the Division of Traffic Engineering, Division of Police, Division of Fire, Division of Planning, Division of Environmental and Emergency Management, Division of Public Information, Division of Engineering, and Division of Streets and Roads. The Kentucky Transportation Cabinet is represented by the local district office, the Division of Multimodal Programs, and the State Highway Engineer's office. Other organizations represented on the committee include the Federal Highway Administration, the local transit company (LexTran), Fayette County Public Schools, the Kentucky State Police, the University of Kentucky Transportation Center, a local towing company, the Disaster and Emergency Services area office, the American Automobile Association, and the Traffic Safety Institute from Eastern Kentucky University. A listing of the committee members and the primary subjects discussed at each of the meetings are presented in Appendix B.

Examples of incident management related topics which were presented and discussed at the subcommittee meetings include: the LFUCG incident management manual, evaluation of advanced surveying technology for accident investigation, evaluation of a reference point system, developing model procedures for incident emergency response, emerging technologies in the towing industry, computerized mapping capabilities and opportunities, and detour routing and signage. It was demonstrated by those in attendance and by the discussions held that the meetings were an effective means of achieving the objective of improving communications between the involved agencies.

2.2 Traffic Diversion Routes

This part of the incident management program involved establishing specific detour routes and determination of a method for marking the routes. Computer simulation of congestion and levels of service resulting from detouring traffic onto alternate routes was used to evaluate their feasibility.

2.2.1 Establish and Mark Traffic Diversion Routes

A major component of the program was the establishment of traffic diversion routes. This would be included as part of the "traffic management" component of incident management. In addition to establishing the diversion routes, the program addressed the problem of developing a signing plan for these routes. This is part of the "information to motorists" component of incident management.

Two major interstate highways (Interstates 64 and 75) cross Fayette County. Significant congestion can occur if an incident occurs on the interstate which requires traffic to be diverted onto the urban street system in Lexington. Traffic diversion routes were developed to use when such an incident occurred. Only alternate routes as diversions from the interstates were addressed. A separate route was selected for each possible blockage of traffic in which an interchange in Fayette County could be used to divert traffic around the blockage. Separate routes were prepared for both directions of travel. A total of 20 routes were developed. Some of the routes involved travel in an adjacent county to the nearest interchange. Engineering and enforcement representatives from local and state governments selected these routes. The routes were then reviewed and approved by the Incident Management Committee and the Kentucky Transportation Cabinet. Details of the detour plan and maps showing the alternate routes are presented in Appendix C.

Changes in traffic control from typical operation were considered along the diversion route. Twelve of the routes included at least one intersection where right of way was controlled with a traffic signal. These intersections are part of a computerized signal system such that the signal timing could be adjusted using a different timing plan when a diversion altered traffic flow patterns. Also, traffic responsive signal timing, which provides the opportunity to make timing adjustments in response to changes in traffic flow, is being investigated. It is anticipated that police officers will be used at certain intersections to control right of way. For example, traffic flow at the end of the exit ramp where traffic is exiting the interstate would require a change from typical right of way.

Routing traffic through the diversion routes is accomplished by a combination of variable message signs on the interstate and flip-down signs on the adjacent street system. LFUCG Division of Police is responsible for displaying the appropriate signs. Three variable message signs were purchased with a total cost of \$85,470. The variable message sign selected and purchased was a hybrid-type sign which combines both light emitters (LED) and fluorescent flip disks. During the day, the sign uses the power-efficient fluorescent flip disks for optimum daylight legibility. Power for the system is generated from solar panels. During low light periods, inclement weather, or at night; the sign uses light emitting diodes, mounted to each flip disk. These characteristics of the sign are intended to provide optimum legibility at increased

driving angles. Messages could be input remotely using either pre-programmed messages or messages specific to a given situation. The appropriate messages, number of signs, and location of the signs would depend on the situation. For example, if a traffic accident closed the interstate making a detour necessary, the three variable message signs could be used in a combination to warn and direct traffic. Possible messages could be "Accident Ahead" followed by "Be Prepared to Stop" and "Detour at Exit xx."

Flip-down signs were determined to be the most logical and efficient means of providing signing for the alternate route when incidents or accidents closed the primary route. Because the flip-down sign was not a standard type of hardware provided by sign companies, it was necessary to investigate possible sources to supply the signs. Significant assistance was provided by representatives of the Dayton, Ohio police and traffic engineering staffs. Dayton had been one of the first cities to use the flip-down sign and their in-house fabrication experience was valuable to the process of producing signs for Lexington. The decision was made to build the signs for Lexington with personnel from the LFUCG Division of Traffic Engineering. Sign dimensions of 48 inches by 30 inches were recommended for signs in their permanent position, which resulted in dimensions of 48 inches by 60 inches in the flipped-down position. The locations of the flip-down signs were established by state and local traffic engineering representatives. When possible, the sign replaced an existing sign. These signs displayed a typical message such as speed limit during normal operation but, when a diversion was necessary, the top of the sign was dropped down to display a detour sign. A total of 88 signs were used on the various routes. To maximize the sign visibility and allow for use of standard materials, diamond grade sheeting material was used for the word "DETOUR" while other parts of the sign were high intensity sheeting. The cost of these signs was about \$60,000. Color maps showing the location of these signs along the diversion routes were prepared using GIS computer software. Details of the flip-down detour sign fabricated by Lexington-Fayette Traffic Engineering are shown in Appendix D.

2.2.2 Evaluation of Traffic Diversion Routes

Computer simulation was used to evaluate the effect the various diversion routes would have on traffic diverted from interstates onto these routes. This section includes an analysis of the diversion routes and their feasibility for handling traffic diverted from the interstates.

2.2.2.1 Methodology

TRANSYT-7F was deemed as the most appropriate optimization software to test the possible alternatives. This software package has the ability to optimize traffic signals along urban streets and develop a series of measures of effectiveness

(MOE's) for each intersection in the network as well as for the entire network and specific routes. The optimization is a macroscopic, deterministic based algorithm, where platoons of vehicles are addressed and the final solution is dependent upon the traffic characteristics of the system (i.e. no changes in system will always produce the same solution). The major optimization outcome of the software is a set of timing plans for each intersection and an optimum cycle length for the network. Even though the software is capable of simulating existing conditions and developing optimum solutions for a given set of traffic conditions, these simulations are not fully accurate representations of the traffic conditions, due to lack of any validation data and model limitations. The basic assumption of the model is that between two given intersections modeled, there are no other entry or exit points for the vehicles, which is a very unrealistic assumption for most urban networks. However, this assumption can be used for comparative purposes and establish the relative gains among the various alternatives to be tested.

In addition to TRANSYT-7F, PASSER II-90 was utilized to develop phasing plans for the signalized intersections. The phasing sequence at signalized intersections is optimized with this software and combined with TRANSYT-7F to achieve better timing plans. Even though PASSER II-90 can develop timing plans for arterials, this feature was not used since TRANSYT-7F provides more efficient timing plans. The Highway Capacity Software was also utilized for developing saturation flows for each intersection approach.

Among the 20 possible routes proposed by the LFUCG, six were thoroughly tested and potential solutions were developed. These routes are Routes 3 and 13 (a detour between Exit 115 to Exit 113; Routes 4 and 12 (a detour between Exit 113 to Exit 111); and Routes 6 and 10 (a detour between Exit 109 to Exit 104). These routes were selected for two reasons: 1) they involve some of the heaviest traveled streets in Lexington, and 2) they involve a large number of traffic signals. To determine the impact of the rerouted traffic on the local streets, the existing conditions need to be established and any gains in traffic measures such as reductions in delays, increase in speeds, and improved flow should be measured against the existing conditions. Therefore, the first step was to determine the operating level of the existing conditions and identify potential problem spots.

For most routes, the PM peak period was assumed as the period with the heaviest demand and this period was simulated for the existing conditions as well as for all alternatives tested. For Routes 4 and 12, three different periods were used (the AM, Noon, and PM peaks). The use of similar time periods for the other routes was not feasible due to lack of data. All optimizations assume a one-hour period of these conditions and MOE's presented here are for the entire hour-long period.

2.2.2.2 Existing Conditions

To simulate the existing conditions, various data were provided by the LFUCG, and visual observations of the area were performed.

Due to lack of traffic counts for some areas, the following assumptions were made for the traffic volumes currently using these sections of the roadway:

1. Traffic counts for the entire network were balanced assuming a net gain or loss of no vehicles, i.e. all vehicles entering or exiting the network should be accountable.
2. For the rerouted traffic, hourly counts provided by the Kentucky Transportation Cabinet were used for three different peak periods: AM peak 1,900 vehicles per hour (vph), Noon peak 2,000 vph, and PM peak 2,200 vph.

For the operational characteristics of the roadway, lane widths were determined and percent of heavy vehicles was assumed to be 4 percent. Based on the given signal data, there is some coordination among the existing signals, but each major arterial follows its own coordination. The absence of a common coordination for each proposed route can be a cause for problems through the route. The percent of trucks traveling on the interstate during the peak traffic hour was assumed to be 10 percent. An effort was made to keep the cycle lengths as low as possible, since long cycles will lead to unnecessary delays. Therefore, a maximum cycle length of 150 seconds was used.

Based on these assumptions, the existing conditions were simulated. The next step involved the addition of the rerouted traffic to each route. To simulate the environment of a bi-directional closure of the freeway, rerouted traffic for both directions was also simulated. The results for the simulations for each route are presented in the following.

2.2.2.3 Routes 4 and 12

This route system will divert the southbound I-75 traffic onto Broadway to New Circle Road to Winchester Road with the northbound I-75 traffic reversing this route. Based on existing traffic conditions, the current geometry of these roadways, and new coordination of all signals along the route, the rerouted traffic will overburden these arterials. The only time period that this system or routes will not pose significant problems is the AM period, where smaller traffic volumes are currently on these roadways. However, during any other time period of the day significant problems should be expected. The simulation of these conditions indicate that there will be no flow, i.e. the congested conditions will simply be transposed from the freeway to these streets.

The first analysis examined the impact of the bi-directional freeway closure, with Routes 4 and 12 used simultaneously. Based on the output obtained, there are two major areas where most of the problems will occur. First, the interchange between New Circle Road and Winchester Road is not capable on handling the additional traffic from Route 4. The existing loop ramp is not adequately designed to allow use by heavy vehicles and thus, will cause long delays and long queues which would extend beyond the interchange and completely stop traffic along New Circle Road. Second, the intersection of New Circle Road and Broadway requires modifications to allow the left-turning (Route 4) or right-turning (Route 12) vehicles to go through the intersection. The use of more than one turning lane is deemed appropriate here to accommodate the additional traffic. These modifications are essential to allow these routes to accommodate the expected additional traffic. The proposed layout of the two areas is shown in Figures 1 and 2.

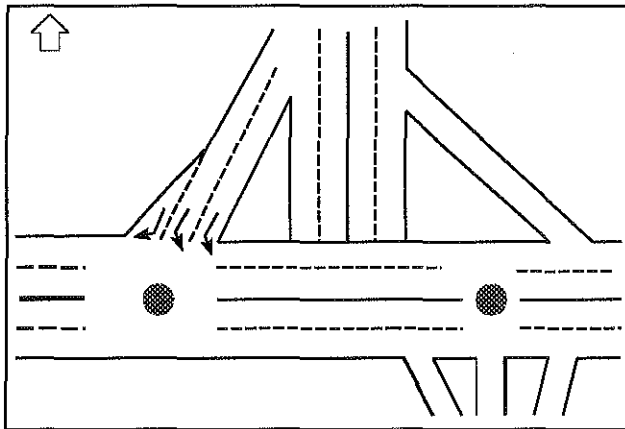


Figure 1. New Circle-Winchester interchange

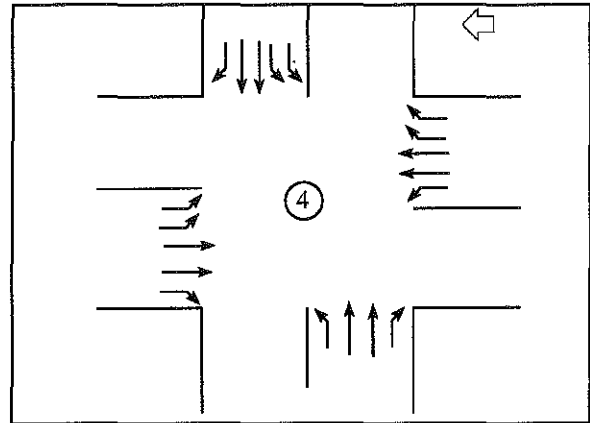


Figure 2. New Circle-Broadway intersection

Even though the interchange is shown with two left-turn lanes (Figure 1), the use of one lane can be utilized but delays will still be a problem. Two new signals are needed with this design to allow traffic to move effectively. Assuming that these two geometric changes are implemented, traffic can move at slow speeds (approximately 5 to 7 mph), delays are reduced, and some flow can be achieved. To further enhance the flow along these routes, the intersections with the interstate ramps should be modified to allow for dual turning lanes for accommodating the traffic from and onto the interstate. Implementing these changes, the traffic can move at slightly higher speeds (approximately 8 to 10 mph) and the delays are further reduced.

The analysis of each route separately indicated that similar solutions are required, even though travel speeds would increase in this scenario. Therefore, use of Route 4 in the AM peak with the recommended changes will have travel speeds of approximately 15 mph, in the Noon peak approximately 12 mph, and in the PM

peak approximately 10 mph. Similarly, vehicles on Route 12 will travel at speeds of 17 mph during the AM peak, at 13 mph during the Noon peak, and at 10 mph during the PM peak.

2.2.2.4 Routes 3 and 13

This route system will divert the southbound I-75 traffic onto Newtown Pike to New Circle Road to Broadway with the northbound I-75 traffic routed onto the same set of roads except in the reverse order of routing. Based on the existing traffic conditions, the current geometry of these roadways, and new coordination of all signals along the route, the rerouted traffic will cause significant traffic problems along these arterials. The only time period simulated for these routes was the PM peak period due to lack of additional traffic data. The simulation of these conditions indicates that there will be no flow, i.e. the congested conditions will simply be transposed from the freeway to these streets.

The first analysis examined the impact of the bi-directional freeway closure (Routes 3 and 13 used simultaneously). Based on the output obtained, most of the problems will occur around the Newtown Pike and New Circle Road interchange. The left turn to be completed for Route 3 from westbound Newtown Pike onto New Circle Road will experience significant delays unless a traffic signal is installed. Moreover, the use of a second left-turning lane is essential to prohibit extending the turning traffic queues beyond Nandino Drive. The merging of the turning traffic with New Circle traffic is another area where problems will arise. To avoid potential problems at the merging area, the inside lane of New Circle should be closed to allow for the merging of the diverted traffic. Finally, the ramp from New Circle to Newtown (used in Route 13) should provide two right-turning lanes to accommodate the increased traffic. Gains could also be realized with the addition of a second right-turn lane at the intersection of Broadway and New Circle. These modifications are necessary to allow the routes to accommodate expected additional traffic. The proposed layout of these two areas is shown in Figures 3 and 4.

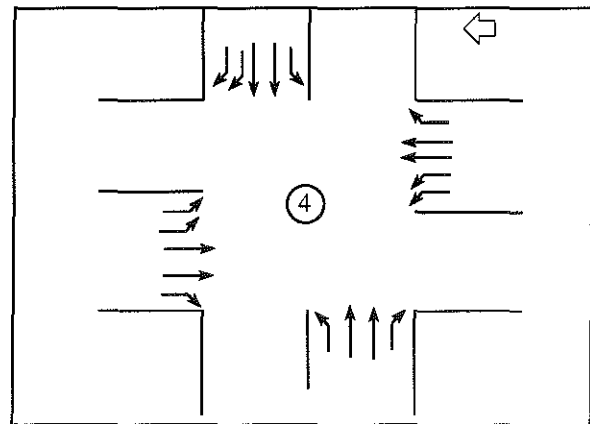


Figure 4. New Circle-Broadway intersection

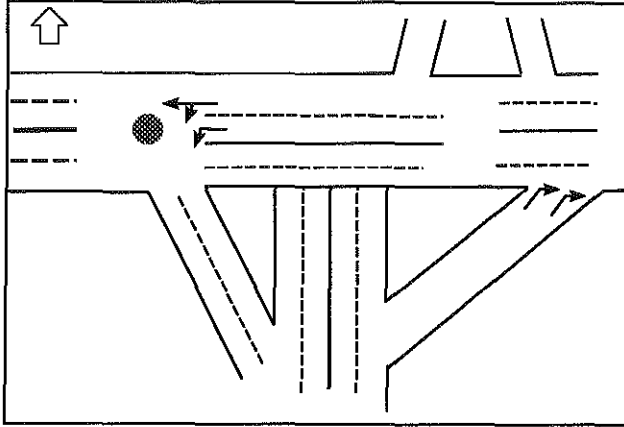


Figure 3. New Circle-Newtown interchange

After implementing these two changes, there was some movement along these routes, but the flow was very low. This problem is mainly attributed to the left turns from Newtown onto New Circle. To further enhance the flow along these routes, the intersections with the freeway ramps should be modified to allow for dual turning lanes to accommodate the traffic from and to the interstate. Implementation of these changes could result in traffic moving at slightly higher speeds (approximately 6 to 8

mph) and further reduce delays.

The analysis of each route separately indicated that similar solutions are required, even though travel speeds would increase in this scenario. Therefore, use of Route 3 in the PM peak with the recommended changes would result in travel speeds of approximately 4 mph, while Route 13 would exhibit higher speeds (about 8 mph).

2.2.2.5 Routes 6 and 10

This route system will divert southbound I-75 traffic onto Man O'War Boulevard to Richmond Road to Athens-Boonesboro Road and the northbound I-75 traffic onto the reverse routing. Based on existing traffic conditions, the current geometry of these roadways, and new coordination of all signals along the route, the rerouted traffic will cause minor traffic problems along these arterials. The only time period simulated for these routes was the PM peak period due to lack of additional traffic data. The simulation of these conditions also indicates that there will be some flow at low speeds with no modifications along this route.

The first analysis examined the impact of the bi-directional freeway closure with Routes 6 and 10 used simultaneously. Based on the output obtained, most of the problems will occur around the Man O'War Boulevard and Richmond Road intersection. The right turn to be completed for Route 10 from westbound Richmond Road onto Man O'War will experience significant delays unless a second right-turn lane is used. The next problem area along this route is the Athens-Boonesboro Road, which is currently a two-lane two-way roadway. This road can accommodate an additional 2,000 vph total in both directions. Therefore, bi-directional usage of this route may not be feasible under the existing conditions.

After implementing the modification of the Richmond and Man O'War intersection, increased flows and smaller delays were observed. To further enhance the flow along these routes, the intersections with the freeway ramps should be modified to allow for dual turning lanes to accommodate traffic from and onto the interstate. If these changes could be implemented, the traffic could move at higher speeds (approximately 10 mph) and the delays would be further reduced.

The analysis of each route separately indicated that similar solutions are required, even though travel speeds would increase in this scenario. Therefore, use of Route 6 in PM peak with the recommended changes will have travel speeds of approximately 12 mph, while Route 10 will exhibit lower speeds (about 10 mph).

2.2.2.6 Diversion Route Summary and Recommendations

Based on analyses of the traffic diversion plan, there is a need for significant geometric changes in order for these routes to accommodate the expected rerouted traffic. The interchanges of New Circle Road with Newtown Pike and Winchester Road need to be modified to allow for the increased traffic to flow. Moreover, the intersection of New Circle Road with Broadway needs to be modified to allow for dual right- and left-turns to be completed for the respective routes. To assist the flow from and onto the interstate, dual turning lanes are required. In addition to these geometric changes, left-turns made from all cross streets along the routes should have permitted phasing to provide a maximum green time for the rerouted traffic.

The analyses shown here indicate that after implementation of these changes, problems would still be present with these routes. Even though it is expected that rerouted traffic will cause an increase in the existing traffic congestion, the extent of these delays is expected to be extremely high. The only time period when traffic congestion problems are expected to be minimal is during the off peak hours. In order to better accommodate congestion anticipated as a result of diverting traffic from the interstate, the following policies are recommended:

- 1) Use the existing proposed routes during the low peak periods, preferably between 10:00 pm to 6:00 am; and
- 2) Develop and use a new alternate route during the higher traffic times of the day.

A new detour route is proposed to avoid the currently congested north area of Lexington. It is proposed for use irrespective of the freeway closure location. Following is a description of the proposed new detour route. Southbound traffic on I-75 would exit at Newtown Pike and be routed to the north side of New Circle Road--the limited access section. The traffic would exit at Alumni Road and turn

left at Man O'War. At Richmond Road, the traffic can either continue along Man O'War or to Athens-Boonesboro Road, dependent upon the location of the freeway closure. Similarly, northbound traffic on I-75 will use the reverse routing and it could exit at either Athens-Boonesboro Road or Man O'War. Based on the analysis performed here, this proposed route will utilize the existing routes 6 and 10, which were the most promising routes among those evaluated. It is believed that this new route will allow for smoother flows, higher speeds, and lower overall delays. Even though the new route is significantly longer than the existing routes, this is a preferred solution due to the use of the limited access section of New Circle Road.

An issue that has not been addressed here is the use of more than one route at the same time or the use of different routes by different types of vehicles. For example, Route 4 can be used to reroute automobiles while at the same time Route 3 can be used to reroute heavy vehicles. Moreover, the extent of the freeway closure will play a significant role in determining which routes will be used. However, by rerouting traffic to the proposed new alternate route, it is expected that the problem will be addressed earlier, traffic will flow more efficiently, and long queues along the freeway will be avoided.

The plans of the Kentucky Transportation Cabinet regarding future geometry improvements along these routes will address some of the geometric changes proposed here. The New Circle Road interchange with Winchester Road will be redesigned as a single point interchange controlled by one traffic signal and plans are being considered for the improvements required along Athens-Boonesboro Road. Therefore, any new designs should take into consideration the requirements of the routes proposed as part of the traffic diversion plan to allow for more efficient travel of current and rerouted traffic.

2.3 Incident Detection, Verification, and Response

The first components of incident management include detecting and verifying that an incident has occurred. Rapid detection is necessary to minimize the period of time in which there is a reduction in the capacity of the roadway. Proper verification is required to reduce the time to activate an appropriate response and direct the response to the scene. This includes providing information to the appropriate agencies where a response can be initiated and determining the precise location and nature of the incident. After an incident has been detected and verified, the next step is the activation of the appropriate agencies for the necessary response. Following are descriptions of methods used to detect and verify incidents.

2.3.1 Video Camera Surveillance

A basic component of the detection and verification system is the video surveillance system provided throughout Fayette County. There are over 30 color surveillance video cameras currently in service and, when completed, there will be 37 cameras monitoring traffic on arterials and interstates. The cameras will provide full coverage of the two interstates as well as the two major bypass routes (New Circle Road and Man O' War Boulevard). In addition to providing real-time information to the Traffic Management Center, video is supplied to the Kentucky Department of Highway District 7 Office and the LFUCG Police and Fire dispatch centers. Appropriate communication links are necessary to insure that proper response is provided for incidents and accidents. This system of video camera monitoring has proven to be an effective system of detection and verification.

2.3.2 MOBILIZER Software

Another method used in this program to assist in the rapid detection of incidents involved the use of additional computer equipment and software which allowed linking motion detection with the Traffic Management Center. The vehicle detection software is a wide area fusion system called MOBILIZER. Motion detection equipment recognizes vehicle motion from multiple sensors using proprietary tracking technology to obtain dynamic wide area traffic information such as flow densities and speeds to assess traffic operations. Output from the equipment will provide additional information about the flow of traffic at the Clays Ferry Bridge to be used for alerting the appropriate agencies concerning congestion, incidents, or accidents at that location. To date, this software has not been fully implemented.

2.3.3 Reference Markers

Another method of determining the precise location of an incident is the use of additional reference signs/markers on the interstate system. Standard milepoint signs are placed at one-mile intervals to identify locations on most roadways. Reference signs have been placed at 0.1-mile intervals on the interstate system in northern Kentucky and the Cincinnati area. In the Louisville area, reference markers have been proposed for use at 0.2-mile intervals to assess the benefits of less frequently spaced signs. A similar system in Fayette County, with reference signs placed at 0.2-mile, has been approved.

2.3.4 Roadway Weather Information System

Related to detection of events which affect traffic flow and increase the potential for incidents and accidents is the gathering of accurate weather information.

Roadway Weather Information Systems (RWIS) have been installed at two locations in Fayette County to provide real-time weather and pavement conditions. The locations are at the Clays Ferry Bridge and the southern interchange of I-64 and I-75. The system used for gathering data consists of surface sensors, subsurface temperature probes, visibility sensors, precipitation sensors, wind speed/direction sensors, and a remote processing unit. The sensor installed in the pavement provides data on the temperature of the pavement, moisture present on the pavement, and the condition of the moisture on the pavement (wet, snow, ice, frost). Information collected by these devices is transmitted remotely to the Kentucky Transportation Cabinet's Division of Maintenance in Frankfort, where the data are evaluated for use in directing maintenance operations related to adverse weather. Software to access the central processing unit located in Frankfort has been provided to the LFUCG Division of Traffic Engineering. Accessibility to the weather system data will allow advance notice of weather conditions which may result in increased potential for incidents and accidents. These data should enable optimization of personnel, equipment, and chemicals for use when snow and ice conditions exist.

2.3.5 Computerized Mapping

Computerized mapping is being used by the LFUCG Division of Traffic Engineering to provide graphics for representations of real-time volumes, speeds and levels of service through the signal system link with system loop detectors and green extender loops to a work station in the Traffic Management Center. Other specialty mapping includes accident locations, road blockages/closures, signal malfunctions, weather-related emergencies, highway construction, special event routing, and incident diversion routing. These graphics are incorporated into the two-hour program shown on Government Television Channel 3 each weekday morning from 6:30 am to 8:30 am. The benefit of this information is to allow highway users to make route and time-related decisions before traveling on Lexington's streets.

2.4 Removal/Restoration of Capacity

An objective of incident management is to decrease the amount of time required to remove obstacles from the roadway and restore the roadway capacity to its pre-incident condition. A method the LFUCG Division of Police use to assist in this objective is advanced surveying equipment by the investigating police for the on-scene documentation of accidents. It has been found that the use of this equipment has reduced the time necessary to collect the appropriate measurements to properly document the accident scene. This application of surveying equipment has not only allowed the scene to be cleared in a shorter amount of time and decrease motorists

delay; but has also improved the safety of investigators, decreased fuel waste, pollutant emissions, congestion and secondary accidents.

2.5 Public Information Program

The public information and education component represents a combined effort of several divisions within the LFUCG to provide incident site traffic conditions to motorists. Most of the efforts are handled by the Divisions of Public Information, Traffic Engineering, and Police. The information is directed toward the local news media (including radio, television, and print media) as well as the general public.

The objective of the public information program is to gather important traffic information and then provide this information to the public in a timely manner. Traffic information is gathered from many sources. These include the video surveillance cameras, the computerized traffic signal control system, local and state police dispatch, local fire dispatch, and local and state highway agencies. A computerized weather monitoring program allows for warning of upcoming weather conditions. Typically, police, fire, and environmental and emergency management personnel notify the Divisions of Traffic Engineering and Public Information of significant incidents that affect traffic flow.

The largest program in the public information area is the Traffic Information Network (TIN) which is operated by LFUCG Division of Traffic Engineering. One aspect of the TIN involves providing information to the public through the local news media about traffic flow during peak traffic times. The standard operating hours are from 6 to 9 am and 4 to 6 pm. However, the TIN operates for extended periods of time during emergency situations. Traffic information is sent every 20 minutes by FAX to three television stations, 16 radio stations, and one newspaper with a total coverage of about 45 counties in Central Kentucky. A cellular telephone provider in central Kentucky (Cellular One), allows toll-free calls to *311 (TIN Hotline) for customers to obtain traffic information. The Traffic Management Center also has a web site (<http://lfucg.com/trafficw/trafinfo.htm>) on the Internet providing traffic information to the public.

A Traffic Hotline is maintained for motorists to access current traffic information. During peak traffic times, motorists access the latest TIN update. During non-peak traffic times, motorists obtain updates about such items as lane blockages and construction activities via cellular phone.

Traffic information is also provided to the public through cable television. During the morning drive time, a government TV3 program entitled "Lexington in Motion" provides current information to cable watchers. Viewers can observe road conditions at various locations in the county through use of 30 traffic cameras

located at major intersections as well as at two interstate locations. A continuous audio feed of traffic information is provided to TV3 when the electronic bulletin board is in operation. This program has included the purchase of additional equipment which has provided improved graphics incorporated into the traffic information programs shown on Channel 3. This has allowed for representations of real-time volumes, speeds, and levels-of-service to be provided through the signal system link with system loop detectors and green extender loops to the Traffic Management Center. Other specialty mapping added includes identifying accident locations, road blockages or closures, signal malfunctions, weather related emergencies, construction, special event routing, and incident diversion routing.

Arrangements have been made to insure that information is provided to motorists during all hours. Information would be provided by the TIN during its hours of operation or by personnel from Traffic Engineering or Public Information during other time periods.

The Divisions of Public Information and Traffic Engineering have produced numerous traffic information videos that have been shown on TV3 and other outlets. The videos have included topics related to incident management such as Electronic Investigation of Accidents, Work Zone Signage, 20 Minute Traffic Ticker, the Traffic Information Network, and Emergency Vehicles in Traffic. Also, related brochures are disseminated through Public Information and at various locations.

The use of the variable message signs and arrow boards is also part of the objective of improving information to motorists. These portable signs are used by the Division of Police to provide directions to motorists when incidents occur. They have also been used in conjunction with events such as University of Kentucky football games and parades. In addition, the variable message signs have been used to display information related to the red-light running campaign underway in Lexington and to provide messages related to safety belt usage and speed. The arrow boards have been used at incidents and at some events such as parades. To date, the three variable message signs have been used a total of 8,477 hours on 575 days. Most of the use (386 days) has involved the use of the signs to display information (primarily related to the red light running campaign). Use at events has included six University of Kentucky football games, two parades, and two basketball tournaments. All of the signs were used at an incident at a construction zone on an interstate where the interstate was closed for several hours. They have also been used on local streets where the road was closed due to storm damage.

Another type of motorist information involves highway advisory radio (HAR). Two HAR sites are in place on Interstate 75 as part of the Clays Ferry reconstruction project. These HAR locations have been used when appropriate to notify motorists of conditions on Interstate 75. The use of a mobile HAR which

could be moved to a specific incident location was investigated. However, such a system has not been purchased to date.

3.0 SUMMARY

The components of the incident management techniques implemented in Lexington which were part of the evaluation and documentation included the following: 1) establishment and use of traffic diversion routes, 2) application of variable message signs, 3) use of flip-down signs for detour routing, 4) use of arrow board signs for detour routing, 5) improvement of existing incident detection and verification through computerized mapping, 6) use of motion detection equipment for monitoring areas susceptible to frequent congestion, 7) use of reference markers for incident location, 8) integration of weather information system into the traffic management process, and 9) establishment of a public information program for traffic and incident management. In addition, an Incident Management Committee was formed to assist in the communication process between various agencies involved with incident management. The committee has met over twenty times in the three-year period since its inception, and has become a major link in the communication process for traffic and incident management.

A significant effort was devoted to the evaluation and analyses of traffic diversion plans. It was determined that congestion would be an extreme problem with many of the diversion routes; especially during the peak hours of traffic flow. In order to better accommodate the diverted traffic, it was recommended that the existing diversion routes be used only during off peak periods and that new alternate routes be developed for peak traffic flow periods. A new diversion route was recommended which relied primarily on the controlled access sections of New Circle Road rather than the unlimited access controlled section of New Circle on the north side of Lexington.

An important part of the incident management system was the public information and education component. Through the efforts of the Divisions of Public Information, Traffic Engineering, and Police; incident site traffic conditions are provided to motorists. This is accomplished by directing the information to local news media through the Traffic Information Network and to the public through the Traffic Hot Line.

An Incident Management Manual was prepared by the LFUCG Division of Traffic Engineering. This manual details the responsibilities and policies for dealing with incidents in Fayette County. For example, information is given concerning when and how to set up a detour route or how to respond to a hazardous material incident. Emergency phone numbers are given for various agencies.

APPENDIX A

**LIST OF MAJOR PURCHASES
FOR INCIDENT MANAGEMENT**



Lexington Fayette Urban County Government
Division Of Traffic Engineering

200 East Main Street Lexington, Kentucky 40507 (606)258-3487 Fax (606)258-3479

REPORT FOR GRANT EXPENDITURES

TO: Jerry Pigman
Research Engineer

FROM: Steven W. Cummins, E.I.T. ^{SWC}
Traffic Engineer

DATE: November 25, 1996

INCIDENT MANAGEMENT EXPENDITURES: The following is description of the activities surrounding the accounts associated with the Incident Management Grant:

Acct. # 759-491-361-750: Athletic Die Co. (\$1,038.50) for Dies relating to the Flip-Down Sign

Acct. # 759-491-361-914: Computer equipment, cell phone connections, locks and immobilizers (\$1842.50) for the CMS.

Notebook computers from Lexington Computer Store (\$4,718.00) for remote control of the CMSs.

Trafcon 25S Flashing Arrowboards (2) from Eastern Metal of Elmira, Inc. (\$10,900.00) for lane closures.

Changeable Message Signs (3) from Addco, Inc. (\$85,470.00).

Acct. # 759-491-361-410: Premium Door Service (\$7,500.00) for installation of the Flip-Down Signs. *(Note: Payment to be billed as work is completed)

Acct. #759-491-361-510: Unistrut Indianapolis (\$16,217.00) for square posts and all necessary mounting hardware.

3M Corporation - TCM (\$20,604.59) for the roll goods associated with the Flip-Down Sign fabrication

Furrow Building Material (\$106.80) for assembly and mounting parts for the Flip-Down Signs

Moore Industrial Hardware (\$2,428.80) - same as above

Furrows Building Material (\$219.80) for alumiglass telescopic poles

Vulcan Signs (\$4,101.60) for aluminum blanks for Flip-Down Signs

Brown Supply Co. (\$647.70) for various hardware related to Flip-Down Sign fabrication

Neille-LaVielle Supply Co. (\$370.80) - same as above

Contract Machining and Mfg. (\$1,591.20) for Flip-Down Sign striker plates, number blanks and reinforcing angle iron

Vulcan Signs (5,166.15) for reduced shield faces for Flip-Down Signs

Electronic Business Machines (\$428.80) for color toner cartridges relating to printing of the color Detour Route Maps

Cardinal Office Supplies (\$184.00) for notebook folders to hold the Detour Route Maps.

The accounts totals are as follows:

Acct. # 759-491-361-750:	\$ 1,038.50
Acct. # 759-491-361-914:	\$ 102,930.50
Acct. # 759-491-361-410:	\$ 7,500.00
Acct. # 759-491-361-510:	\$ 52,067.24.

There are other purchase about to be awarded in Acct. # 759-490-361-914 concerning additional computer equipment and in the Acct. # 759-490-361-510 relating to overhead street name signs along the detour routes, (this is primarily going to be a roll good, aluminum blanks and mounting brackets purchase - approx. \$12,000.00).

APPENDIX B

INCIDENT MANAGEMENT COMMITTEE MEMBERS

AND MEETING AGENDAS

INCIDENT MANAGEMENT SUBCOMMITTEE MEMBERS

November 1996

Lexington-Fayette Urban Co. Govt.
Division of Police
150 East Main Street
Lexington, Kentucky 40507
Assistant Chief Billy Burton
Lt. Billy Thompson
Officer Debbie Wagner
Bea Dobbs
606/258-3666
FAX 258-3574

Lexington-Fayette Urban Co. Govt.
Division of Fire - Communications
219 East Third Street
Lexington, Kentucky 40508
Capt. John Patterson
606/254-1120 or 231-5644
FAX 255-4302

Lexington-Fayette Urban Co. Govt.
Division of Fire - Station #1
219 East 3rd Street
Lexington, KY 40508
Major David Mattingly
606/231-5641 or 254-1120
FAX 231-6136

Lexington-Fayette Urban Co. Govt.
Division of Planning
200 East Main Street - 10th Floor
Lexington, Kentucky 40507
Bob Kennedy
Marc Guindon
606/258-3160
FAX 258-3163

Lexington-Fayette Urban Co. Govt.
Division of Traffic Engineering
200 East Main Street - Rm. 720
Lexington, Kentucky 40507
Ron Herrington, Chairman
Andy Terwilleger
Mark Washing
Clif Eaton
Jim Woods
Brian Dennis
Steve Cummins
606/258-3480
FAX 258-3479

Lexington-Fayette Urban Co. Govt.
DEEM
121 N. Martin Luther King Blvd.
Lexington, Kentucky 40507
Dion LeMieux
Tom Webb
606/258-3784
FAX 252-8689

Lexington-Fayette Urban Co. Govt.
Division of Public Information
200 East Main Street - First Floor
Lexington, KY 40507
Darlene Easterwood
606/258-3010
FAX 258-3250

Lexington-Fayette Urban Co. Govt.
Division of Engineering
200 East Main Street - 8th Floor
Lexington, KY 40507
Dave Uckotter
606/258-3410
FAX 258-3458

Lexington-Fayette Urban Co. Govt.
Division of Computer Services
200 East Main Street - 7th Floor
Lexington, Kentucky 40507
David Lucas
258-3386
FAX 258-3399

Lexington-Fayette Urban Co. Govt.
Division of Streets and Roads
1555 Old Frankfort Pike
Lexington, KY 40504
Leo McMillen
606/258-3450
FAX 253-1014

Kentucky Transportation Center
Civil Engineering / Transportation
Center Building
University of Kentucky
Lexington, KY 40506-0281
Jerry Pigman
Ken Agent
606/257-4521
FAX 257-1815

Kentucky Transportation Cabinet
District Highway Office No. 7
P.O. Box 11127
Lexington, KY 40512-1127
Wayne Mosley
Willie Whittamore, Jr.
Larry McMurray
606/246-2355
FAX 246-2354
James Ballinger, Resident
Engineer
c/o Construction Division
623-7410

Kentucky Transportation Cabinet
Division of Multimodal Programs
3rd Floor, New State Office Bldg.
125 Holmes Street
Frankfort, Kentucky 40622
Charles Schaub
502/564-7433
FAX 502/ 564-4422

Kentucky Transportation Cabinet
501 High Street, State Office
Building
10th Floor, Room 1005
Frankfort, KY 40622
David E. Smith
502/564-3730
FAX 502/564-4809

Kentucky Transportation Cabinet
Dept. of Highways
Division of Traffic
501 High St., Room 105
Frankfort, KY 40622
Simon Cornett
Larry Irish
502/564-3020

Federal Highway Administration
U.S. Dept. of Transportation
Kentucky Division Office
330 West Broadway
Frankfort, KY 40601
Glenn Jilek 6727
Katherine Hainer
Terry Chism
502/223-6720
FAX 502/223-6735

INCIDENT MANAGEMENT SUBCOMMITTEE MEMBERS

November 1996

Fayette County Public Schools
701 East Main Street
Lexington, KY 40502
John Kiser
606/281-0392
FAX 281-0349

City of Winchester
P.O. Box 40
Winchester, KY 40392
Ed Burtner, City Manager
606/744-2821

LexTran
109 West Loudon Ave.
Lexington, KY 40508
Steve Rowland
Ron McElhose
606/255-7756
FAX 233-9446

Bluegrass ADD
699 Perimeter Drive
Lexington, KY 40517
Bruce Duncan
269-8021
FAX 269-7919

Kentucky State Police Post #7
699 Eastern Bypass
Richmond, KY 40475
Cpt. Charles Bowman,
Commander
606/623-2404
FAX 502/564-3538

Bluegrass Airport
4000 Versailles Road
Lexington, KY 40510
John Slone
254-9336

Scott County Judge Executive
P.O. Box 973
Georgetown, KY 40324
Hon. George Lusby
502/863-7850

Bluegrass Towing
1001 Manchester Street
Lexington, KY 40508
Jim Herron
606-233-9711
FAX 252-7789

Woodford County Judge Executive
103 South Main Street, Room 200
Versailles, KY 40383
Hon. Frank Watts
873-4139

DES Area 13 Office
P. O. Box 4288
Lexington, KY 40544-4288
Logan Wiler
606-254-2532
FAX 246-2338

Robert McCool
Vehicle Injury Prevention Specialist
Kentucky Injury Prevention
and Research Center
333 Waller Ave., Suite 202
Lexington, KY 40504-2915
257-6741

AAA Blue Grass Kentucky
155 N. M.L. King Blvd.
Lexington, KY 40507
Stephanie Hutcherson
233-1111
FAX 281-1410

David Moses
Kentucky Transportation Cabinet
Division of Operations
State Office Bldg., Room 705
501 High Street
Frankfort, KY 40622
502/564-4556
FAX 502/564-6640

Traffic Safety Institute
253 Stratton Building
Eastern Kentucky University
Richmond, KY 40475
Ray Ochs, Coordinator
606/622-2236
FAX 606/622-6548

Incident Management Committee Meeting Agendas

January 11, 1994	<ol style="list-style-type: none"> 1. Incident Management Manual, draft 2. Incident Management Options 	<p>Susan Oatman Cheryl Lowrance</p>
February 8, 1994	<ol style="list-style-type: none"> 1. Safety Management System Requirements video - Partners for Safety 2. Kentucky accident statistics 3. Lexington in Motion video series 	<p>Jerry Pigman</p> <p>Ken Agent Marianne Blodgett</p>
March 8, 1994	<ol style="list-style-type: none"> 1. Fayette County accident statistics 2. Incident Management Team video 	<p>Debbie Wagner Grant Zammit</p>
May 10, 1994	<ol style="list-style-type: none"> 1. Incident communications 2. Clays Ferry Bridge reconstruction update Changeable message signing 3. Incident management goals & objectives 	<p>Capt. John Patterson Wayne Mosley</p> <p>Ron Herrington</p>
July 12, 1994	<ol style="list-style-type: none"> 1. Emergency Operations Plan 2. Clays Ferry Bridge reconstruction update Video surveillance, changeable message signs, Highway Advisory Radio 	<p>Pat Dugger Ron Herrington</p>
October 11, 1994	<ol style="list-style-type: none"> 1. Evaluation of advanced surveying technology for accident investigation 2. Video - Lexington Safety / Congestion Management Systems 3. Clays Ferry Bridge reconstruction 	<p>Ken Agent</p> <p>Ron Herrington</p> <p>Wayne Mosley</p>
December 13, 1994	<ol style="list-style-type: none"> 1. Fayette County Schools children's safety 2. Evaluation of accidents/incident emergency response Evaluation of reference point system Proposed fog & ice equipment at Clays Ferry Bridge 3. Video - Lexington Safety / Congestion Management systems 	<p>John Kiser Jerry Pigman</p> <p>Ron Herrington</p>
February 14, 1995	<ol style="list-style-type: none"> 1. Developing model procedures for accident/incident emergency response 2. Proposed fog and ice detection at Clays Ferry, status report 	<p>Jerry Pigman, Ken Agent</p> <p>Ron Herrington</p>
March 16, 1995	<ol style="list-style-type: none"> 1. Proposed fog and ice detection at Clay's Ferry, status report 2. 1994 Annual Traffic Report 	<p>Ron Herrington</p> <p>Debbie Wagner</p>

Incident Management Committee Meeting Agendas

April 11, 1995	<ol style="list-style-type: none"> 1. Proposed fog and ice detection at Clays Ferry, status report 2. Electronic accident investigation equipment - video 	<p>Ron Herrington</p> <p>John Smoot</p>
May 9, 1995	<ol style="list-style-type: none"> 1. Current towing practices in Lexington emerging technologies of towing industry 2. Computerized mapping capabilities and opportunities 3. Fayette County Schools Safety Committee recommendations 	<p>James Herron</p> <p>David Lucas</p> <p>John Kiser</p>
July 11, 1995	<ol style="list-style-type: none"> 1. Detour routing (Interstates 64 & 75 2. Detour signage 3. Changeable message signage status 	<p>Lt. Bill Thompson</p> <p>Ron Herrington</p> <p>Ron Herrington</p> <p>Jerry Pigman</p> <p>Andy Terwilleger</p> <p>A. Terwilleger/S. Cummins</p>
September 12, 1995	<ol style="list-style-type: none"> 1. Red light running grant 2. Detour routes (I-64 and I-75) 3. Changeable message sign & arrowboard status 	<p>Sgt. David Leddy</p> <p>David Lucas</p> <p>Andy Terwilleger</p>
October 10, 1995	<ol style="list-style-type: none"> 1. Blue Grass AAA Traffic Safety Programs 2. Construction projects/techniques Work Zone Safety, Fayette County 3. Detour Routes (I-64 and I-75) 	<p>Kathy Gross</p> <p>Wayne Mosley</p> <p>David Lucas</p>
November 14, 1995	<ol style="list-style-type: none"> 1. Graduated driver licensing 2. Fayette County interstate detour routes 3. Traffic Information Network - additional services 4. Video surveillance sites update 5. Changeable message signs update 	<p>Ray Ochs</p> <p>David Lucas</p> <p>Clif Eaton</p> <p>Mark Washing</p> <p>Steve Cummins</p>
December 12, 1995	<ol style="list-style-type: none"> 1. Incident Management efforts and programs in other cities around the region 2. Enhanced colorgraphics and fire routing 	<p>Gerry Dupree</p> <p>George Hardin</p>
February 13, 1996	<ol style="list-style-type: none"> 1. Statewide Incident Management efforts 2. Graduated licensing update 	<p>David Smith</p> <p>Ray Ochs</p>
March 12, 1996	<ol style="list-style-type: none"> 1. Clay's Ferry crane incident debriefing 	<p>several agencies</p>
April 9, 1996	<ol style="list-style-type: none"> 1. Red light running 2. Changeable message sign use report 3. Status of "flip-down" detour signs 	<p>Debbie Wagner</p> <p>Lt. Bill Thompson</p> <p>A. Terwilleger/S. Cummins</p>

Incident Management Committee Meeting Agendas

May 14, 1996	<ol style="list-style-type: none"> 1. Red Light Running Project, status report 2. Fayette Co. 1996 construction, state projects 3. Fayette Co. 1996 construction, local projects 4. Detour Route Signage, update 	<p>D. Wagner N. Stroop A. Heard A. Terwilliger/S. Cummins</p>
August 13, 1996	<ol style="list-style-type: none"> 1. Incident Emergency Response 2. Flip-Down Signs / Detour Routing 	<p>J. Pigman/K. Agent A. Terwilliger</p>
September 10, 1996	<ol style="list-style-type: none"> 1. 1995 Traffic Incident Summary 2. Crash Related Injuries in Fayette Co. 3. Status Update, Clays Ferry Bridge Reconstruction 	<p>B. Dobbs R. McCool J. Ballinger</p>
October 8, 1996	<ol style="list-style-type: none"> 1. SCAN Systems Weather Stations 2. Fire & EMS Summary 3. Analysis & prioritization of traffic signals 	<p>C. Jones J. Patterson J. Woods</p>
November 12, 1996	<ol style="list-style-type: none"> 1. Interstate Reference Markers 2. Siren Activated Signal Pre-emption 3. Traffic Information Series 4. Video Surveillance Sites Update 	<p>J. Pigman K. Agent M. Washing R. Herrington B. Dennis</p>
December 10, 1996	<ol style="list-style-type: none"> 1. Bluegrass AAA Traffic Safety Programs 2. Nicholasville Road Changeout - demo 3. E-911 Signage Update 	<p>Lilla Mason M. Washing D. Lucas</p>

APPENDIX C

DETOUR PLAN AND MAPS

FOR FAYETTE COUNTY

DETOUR ROUTES

INTERSTATES 64/75

FAYETTE COUNTY

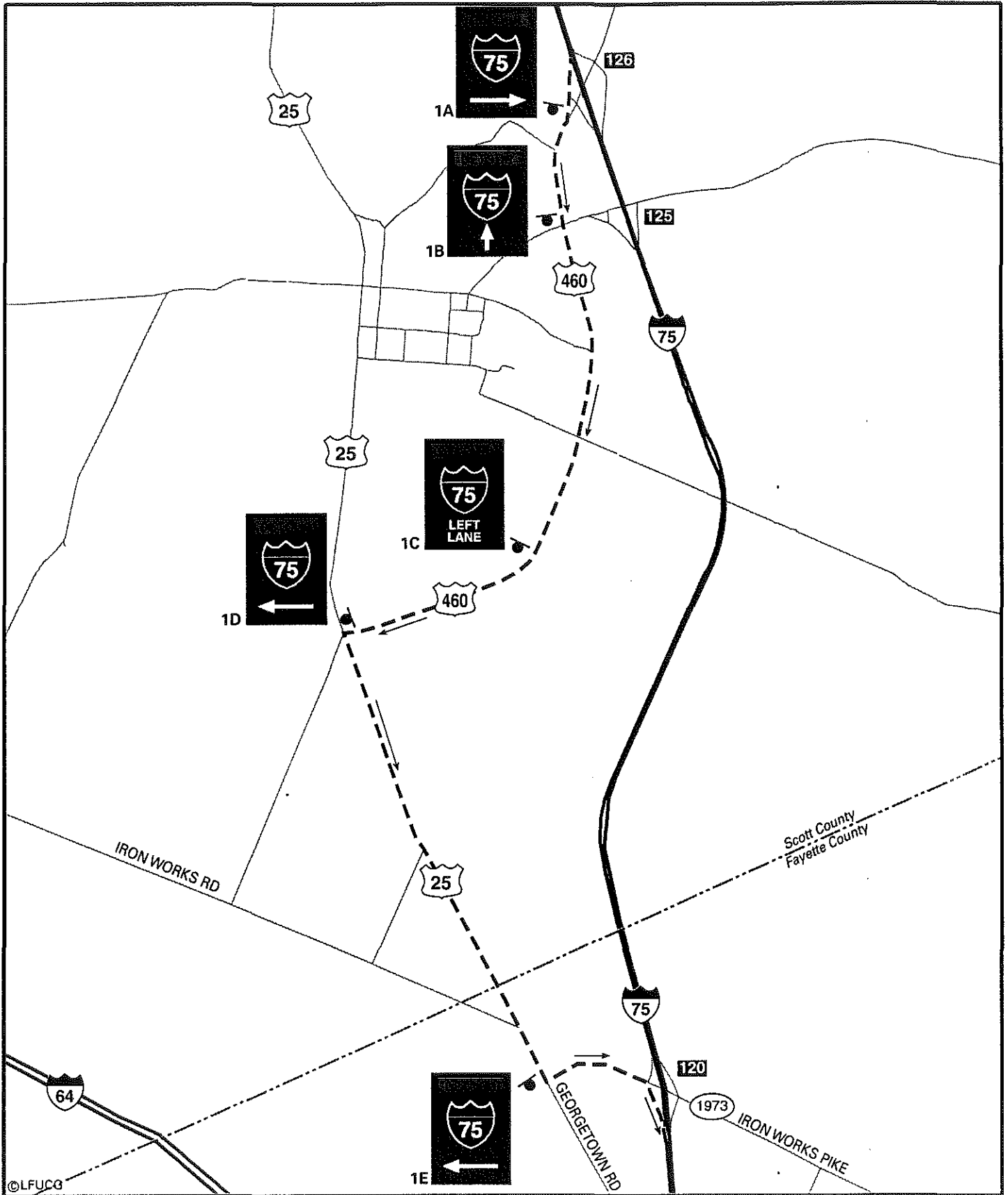
December, 1996

The Lexington-Fayette Urban County Government began an Incident Management Committee in January, 1994 to address the impact of congestion-causing accidents, and to better coordinate appropriate agency response efforts within the community. Over the past few years, the most severe impacts have resulted from incidents occurring on the two interstate highways in Fayette County.

When incidents occurred on either Interstate 64 or 75, it often became necessary to divert traffic around the incident onto other roadways for as much as 3 to 4 hours per incident. Without a planned and coordinated effort, some of the diverted traffic made wrong turns, and generally added to traffic congestion around the city. This was especially evident during peak commuting periods.

To combat the confusion caused during this time of traffic diversion, the Committee identified and analyzed 22 alternative routes to address possible incident situations on interstates. The detour routes are presented in this notebook to provide assistance to responding agencies who work to guide motorists around such incidents. Various "flip-down" signs have been installed, and their locations identified on these maps to assist the LFUCG Division of Police in their efforts. The maps specifically show what color and message the "flipped-down" sign should display. In addition, a specific route number and letter code identify the sequence for the signs along the route. Routes 8 and 20, identified earlier in the process, have been rejected as possible detours, and are not included in this notebook.

Because many of the pre-determined detour routes are along urban arterials, which are heavily signalized, special timing plans have been developed to assist traffic flow. The decision to initiate a detour route will be made by the Division of Police. The Division of Traffic Engineering and the Traffic Information Network will work closely with them to manage traffic around the incident.



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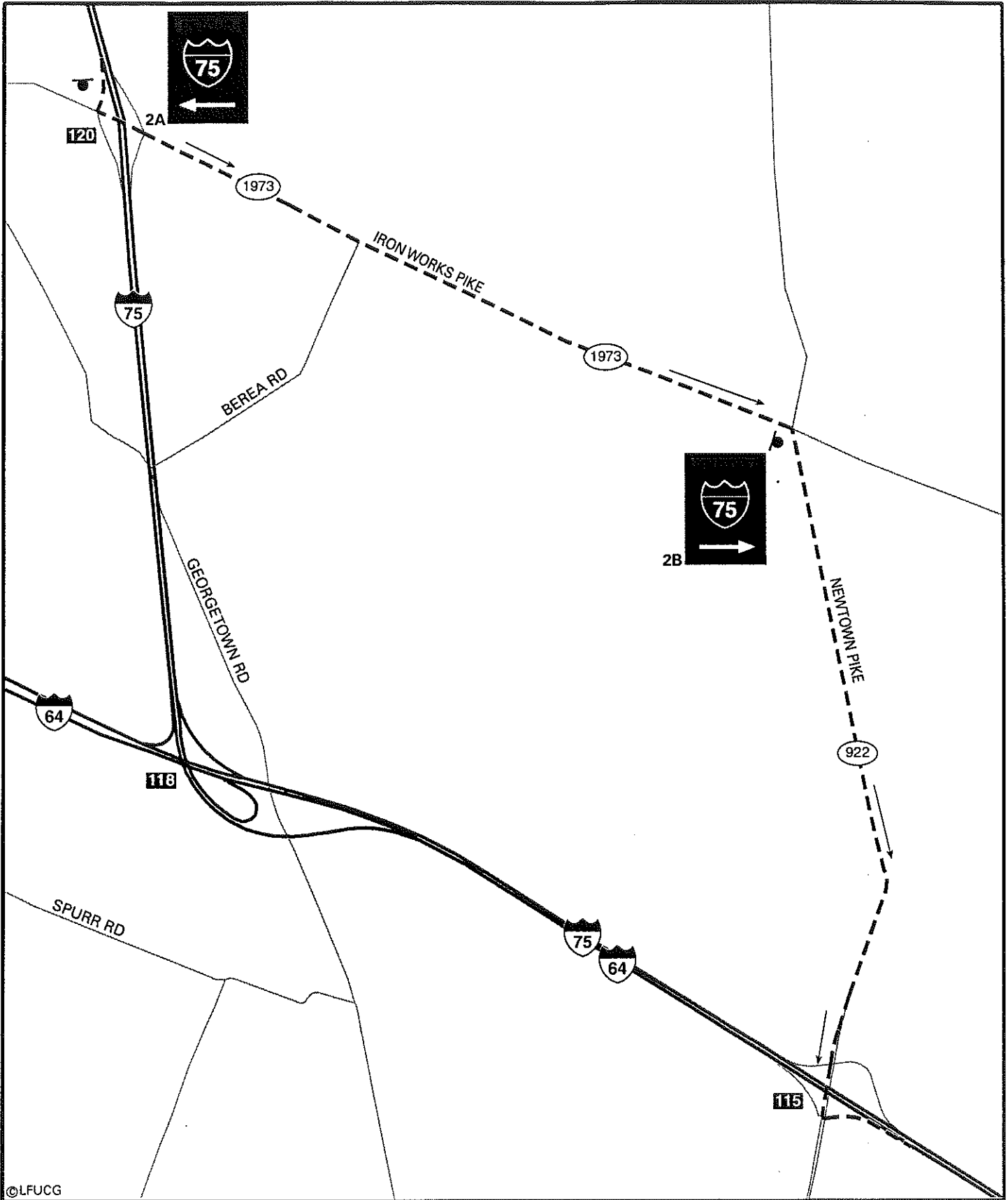
8/1/96



ROUTE 1

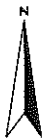
Southbound I 75

- Detour Sign
- Detour Route
- Interstate
- Other Roads
- County Line
- Exit Number
- Sign Number










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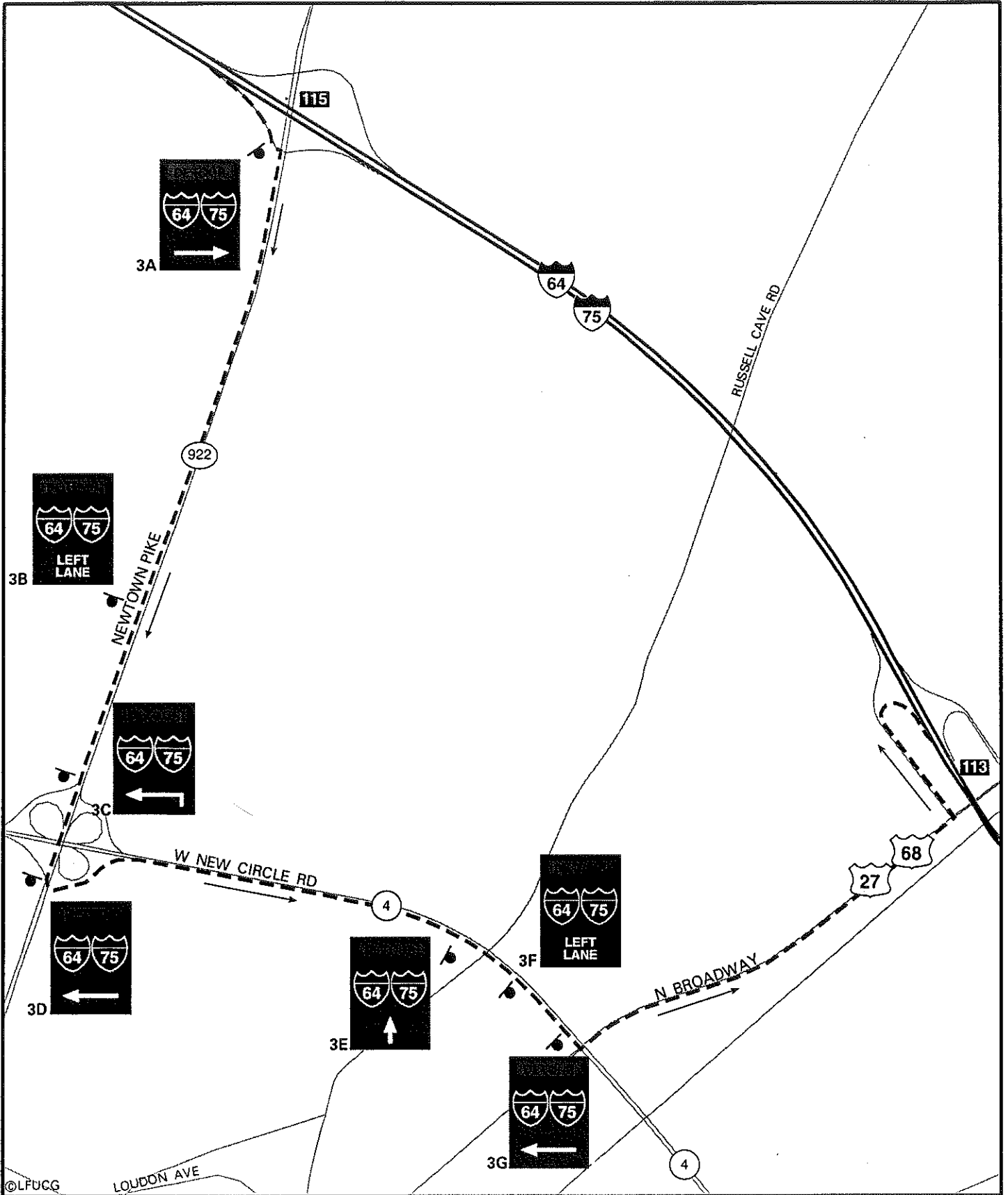
8/1/96



ROUTE 2

Southbound I 75

-  Detour Sign
-  Detour Route
-  Interstate
-  Other Roads
-  County Line
-  Exit Number
-  Sign Number



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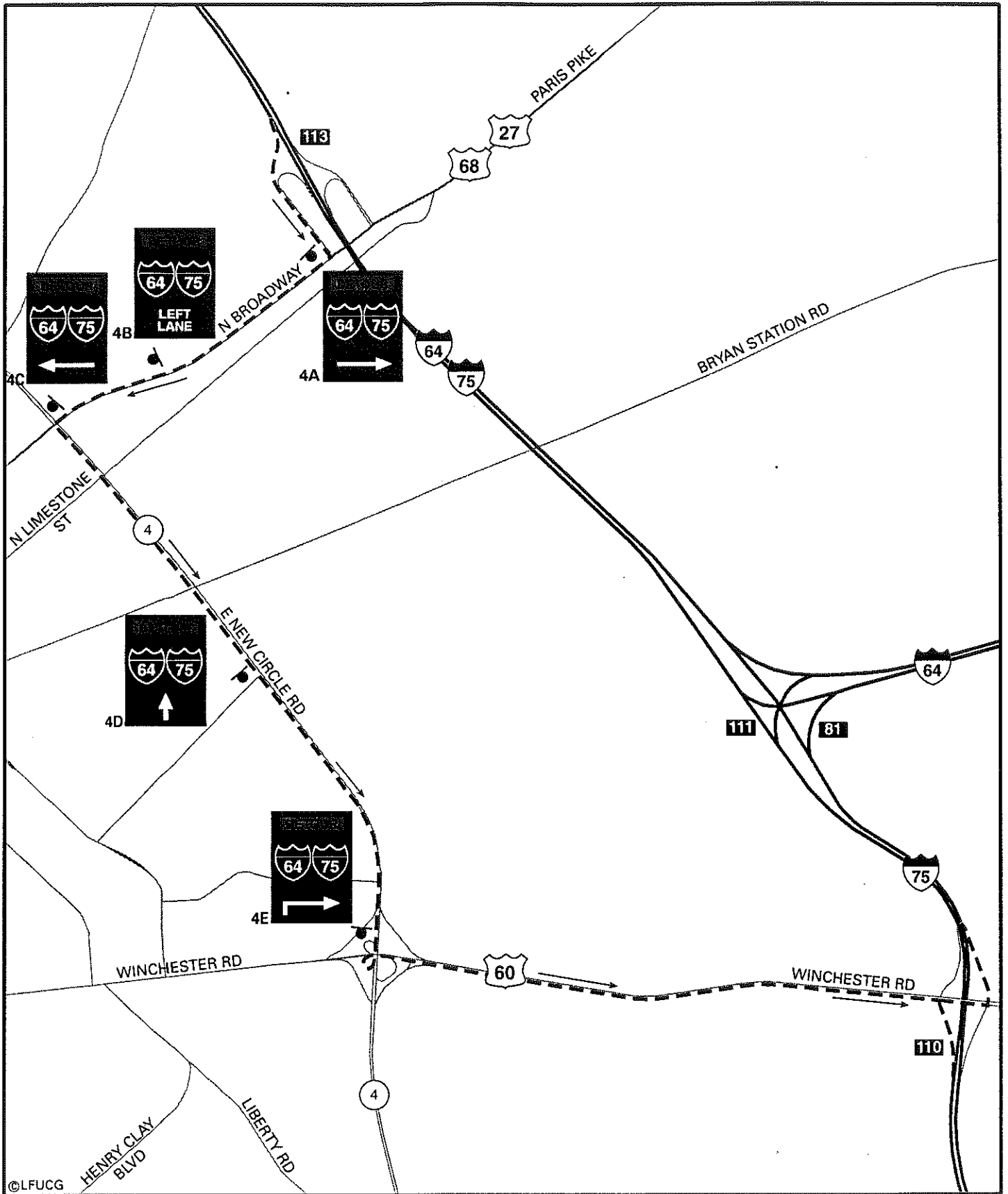
8/1/96



ROUTE 3

Southbound I 75 & Eastbound I 64

- Detour Sign
- Detour Route
- Interstate
- Other Roads
- County Line
- Exit Number
- Sign Number



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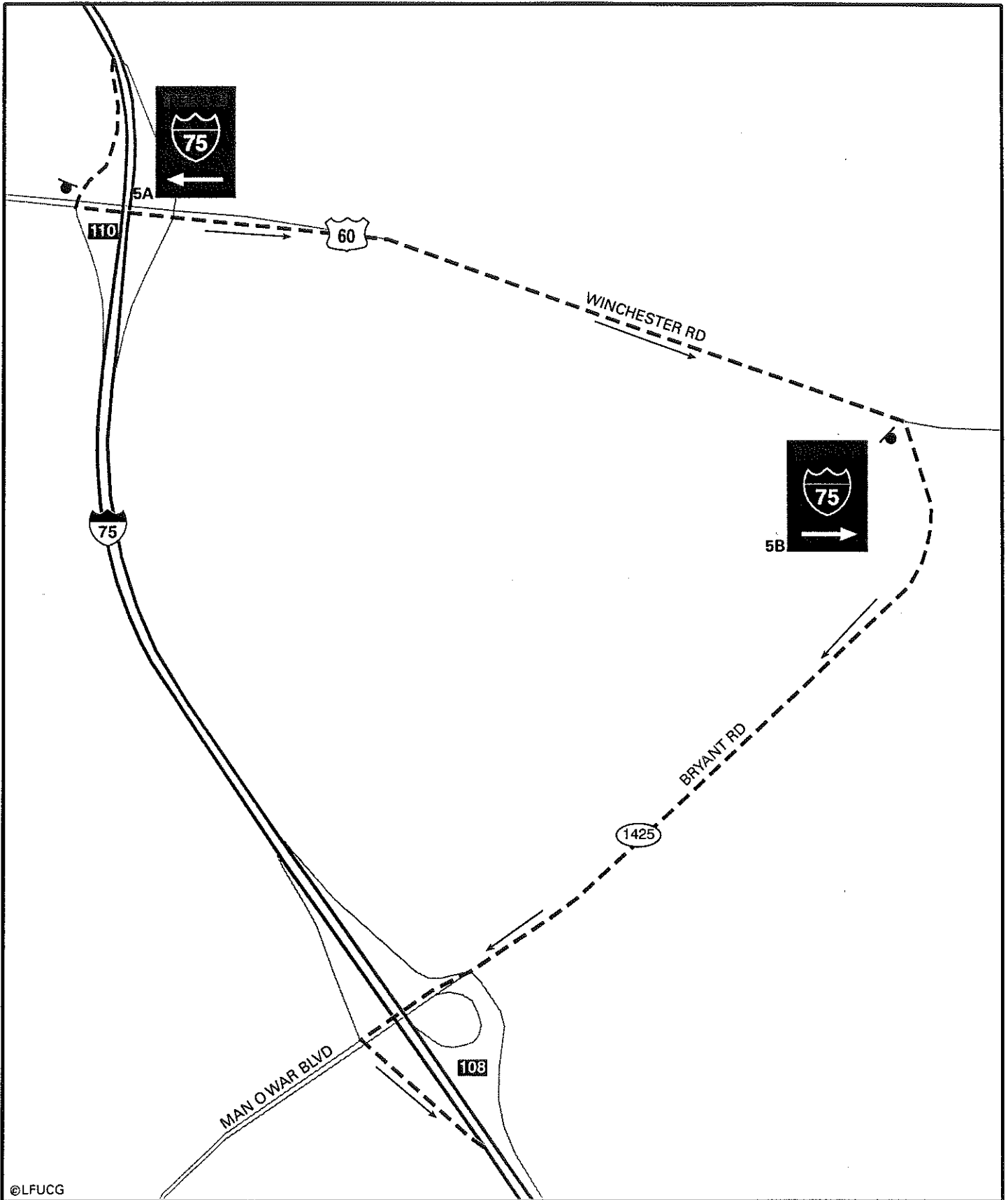
8/1/96



ROUTE 4

Southbound I 75 & Eastbound I 64

- Detour Sign
- Detour Route
- Interstate
- Other Roads
- County Line
- Exit Number
- Sign Number










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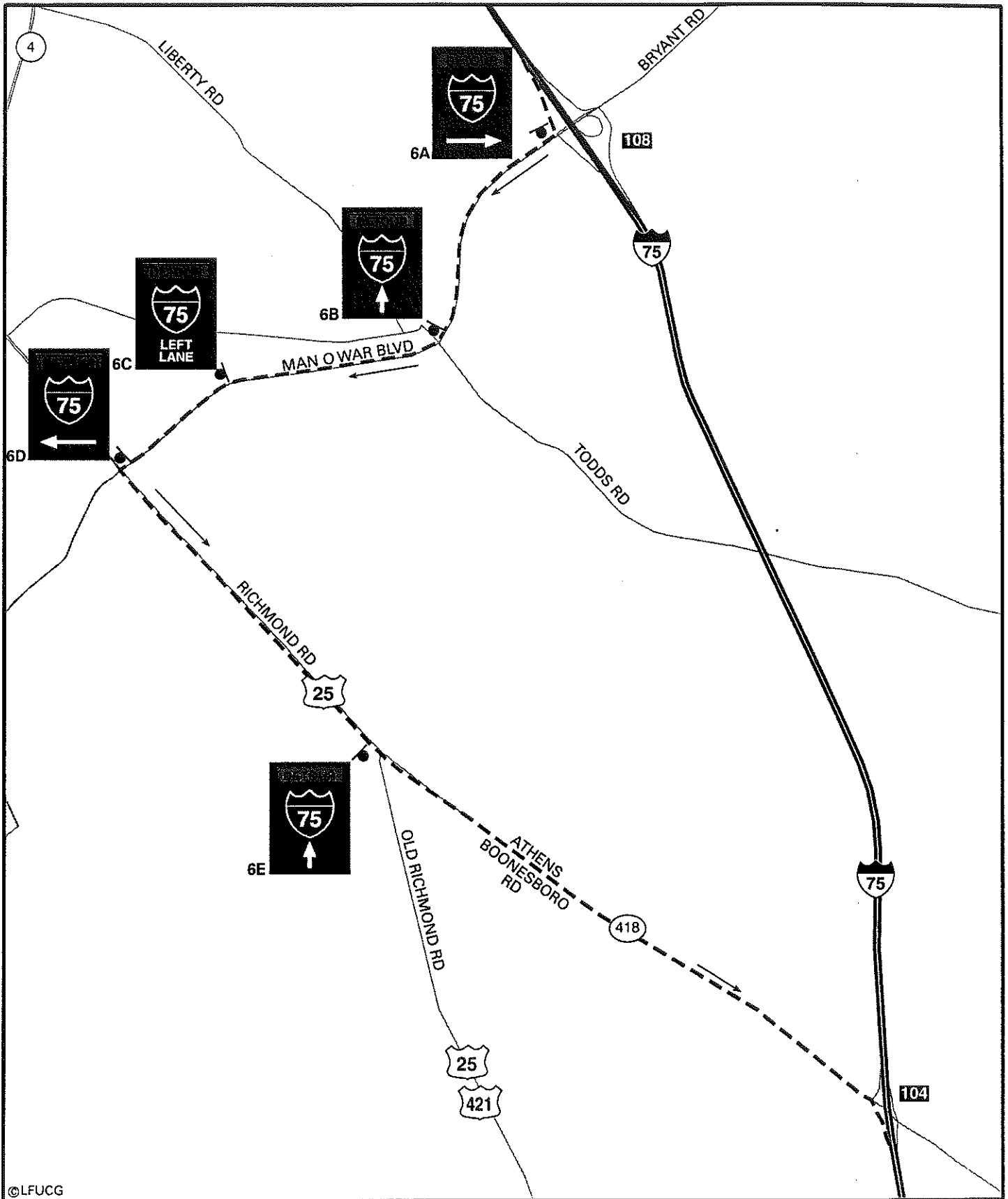
8/1/96



ROUTE 5

Southbound I 75

-  Detour Sign
-  Detour Route
-  Interstate
-  Other Roads
-  County Line
-  Exit Number
-  Sign Number










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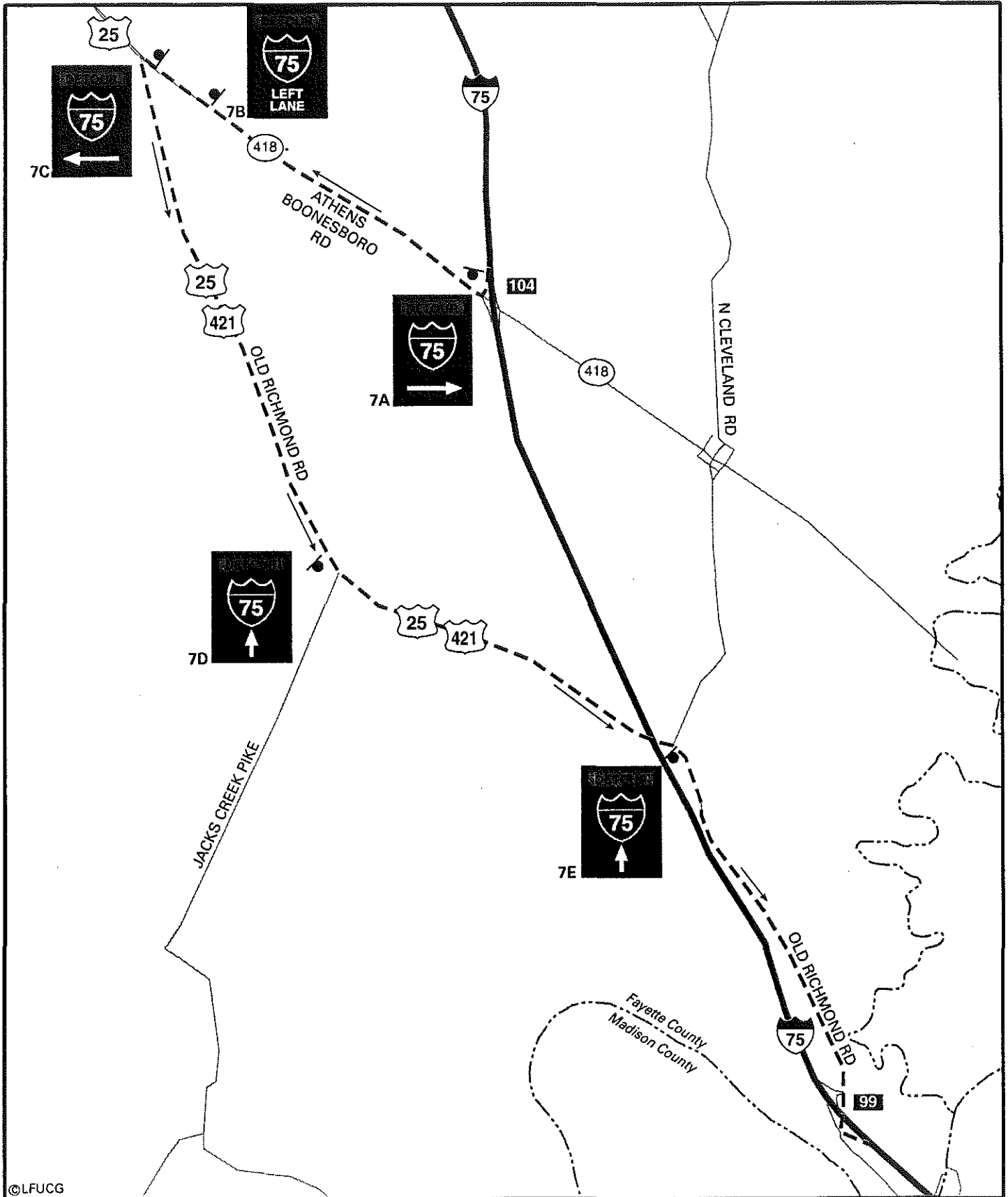
8/1/96



ROUTE 6

Southbound I 75

-  Detour Sign
-  Detour Route
-  Interstate
-  Other Roads
-  County Line
-  Exit Number
-  Sign Number



© LFUCG

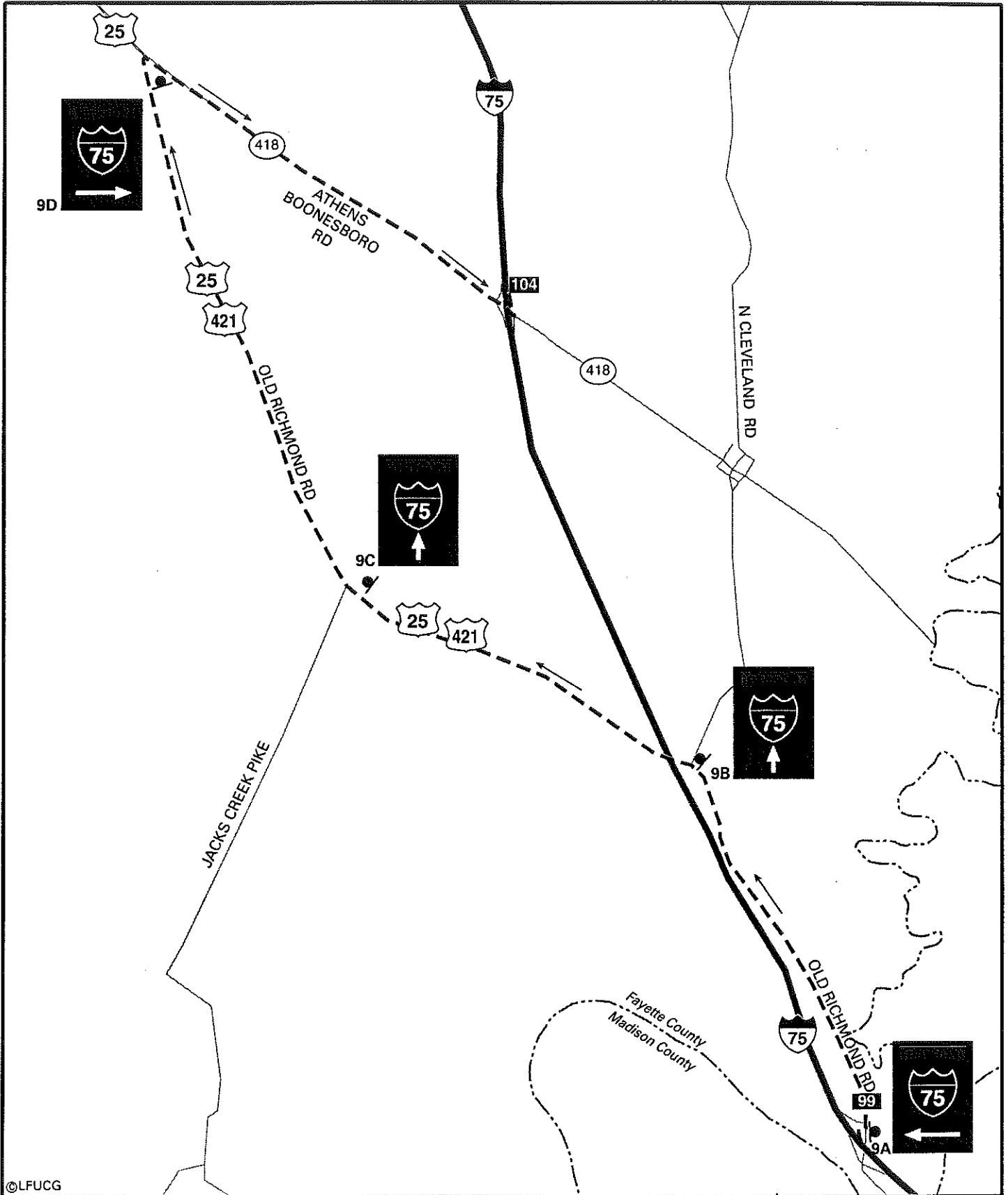
8/1/96



ROUTE 7

Southbound I 75

- Detour Sign
- Detour Route
- Interstate
- Other Roads
- County Line
- Exit Number
- Sign Number



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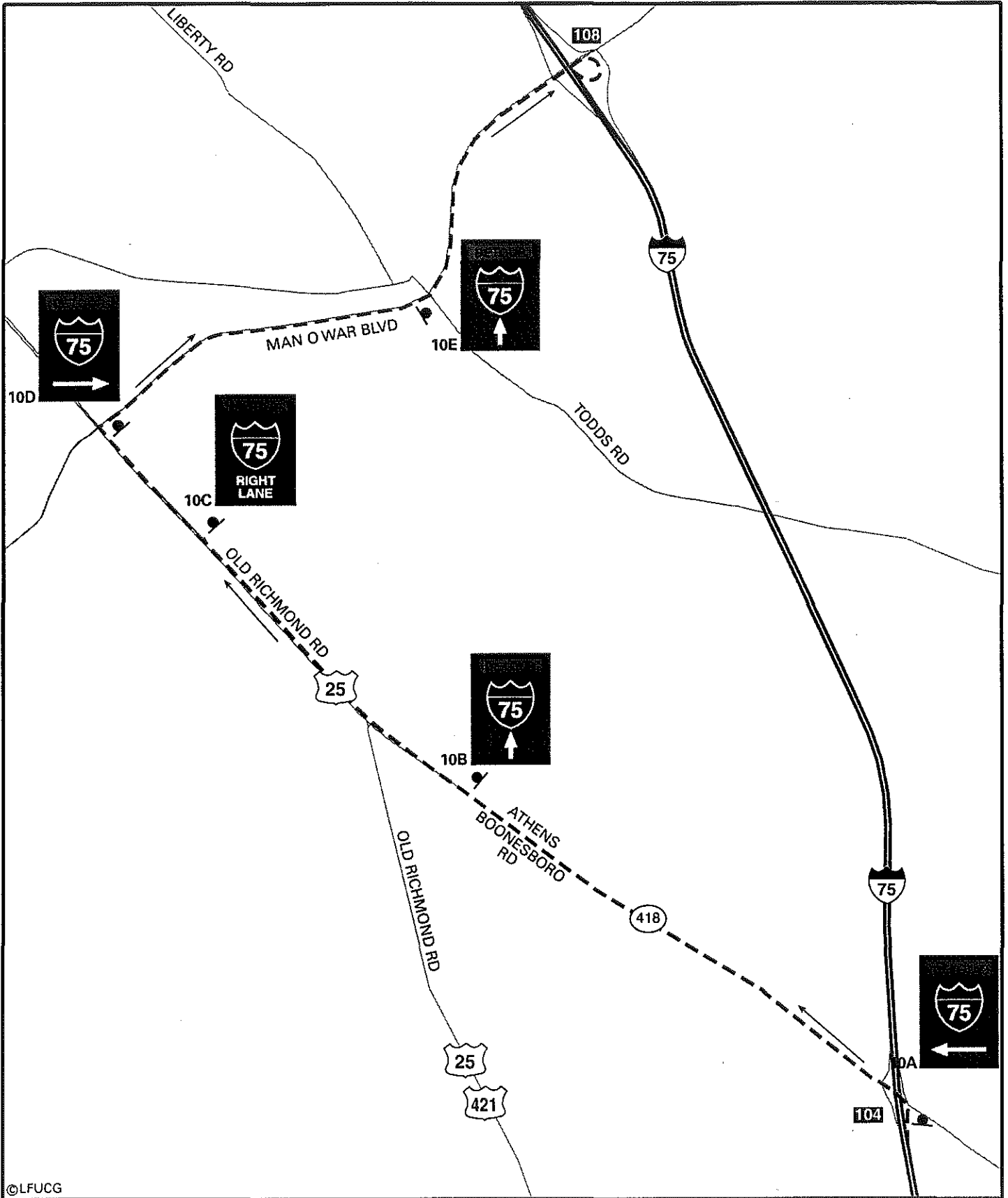
8/1/96



ROUTE 9

Northbound I 75

- Detour Sign
- Detour Route
- Interstate
- Other Roads
- County Line
- Exit Number
- Sign Number










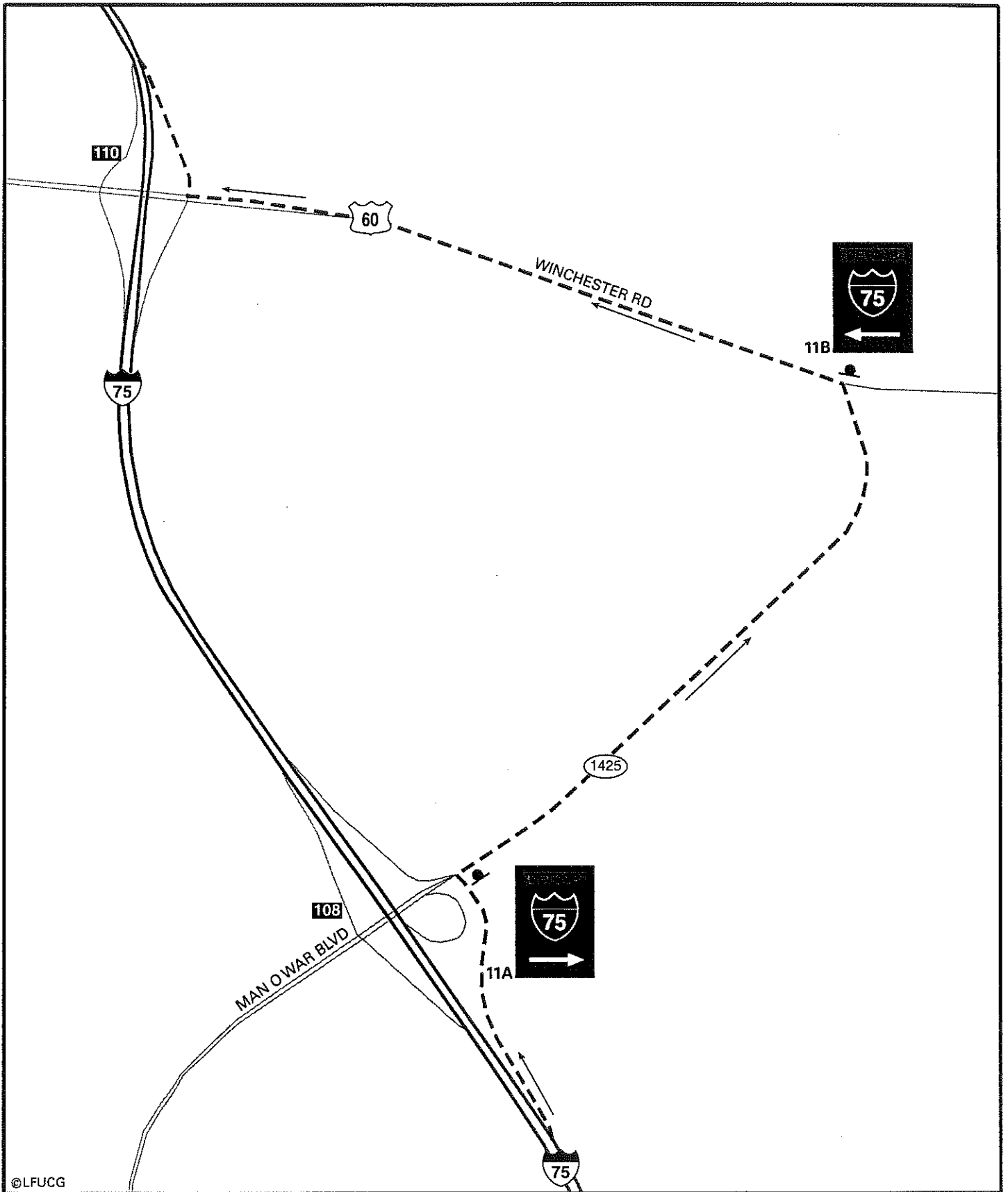
8/1/96



ROUTE 10

Northbound I 75

-  Detour Sign
-  Detour Route
-  Interstate
-  Other Roads
-  County Line
-  Exit Number
-  Sign Number










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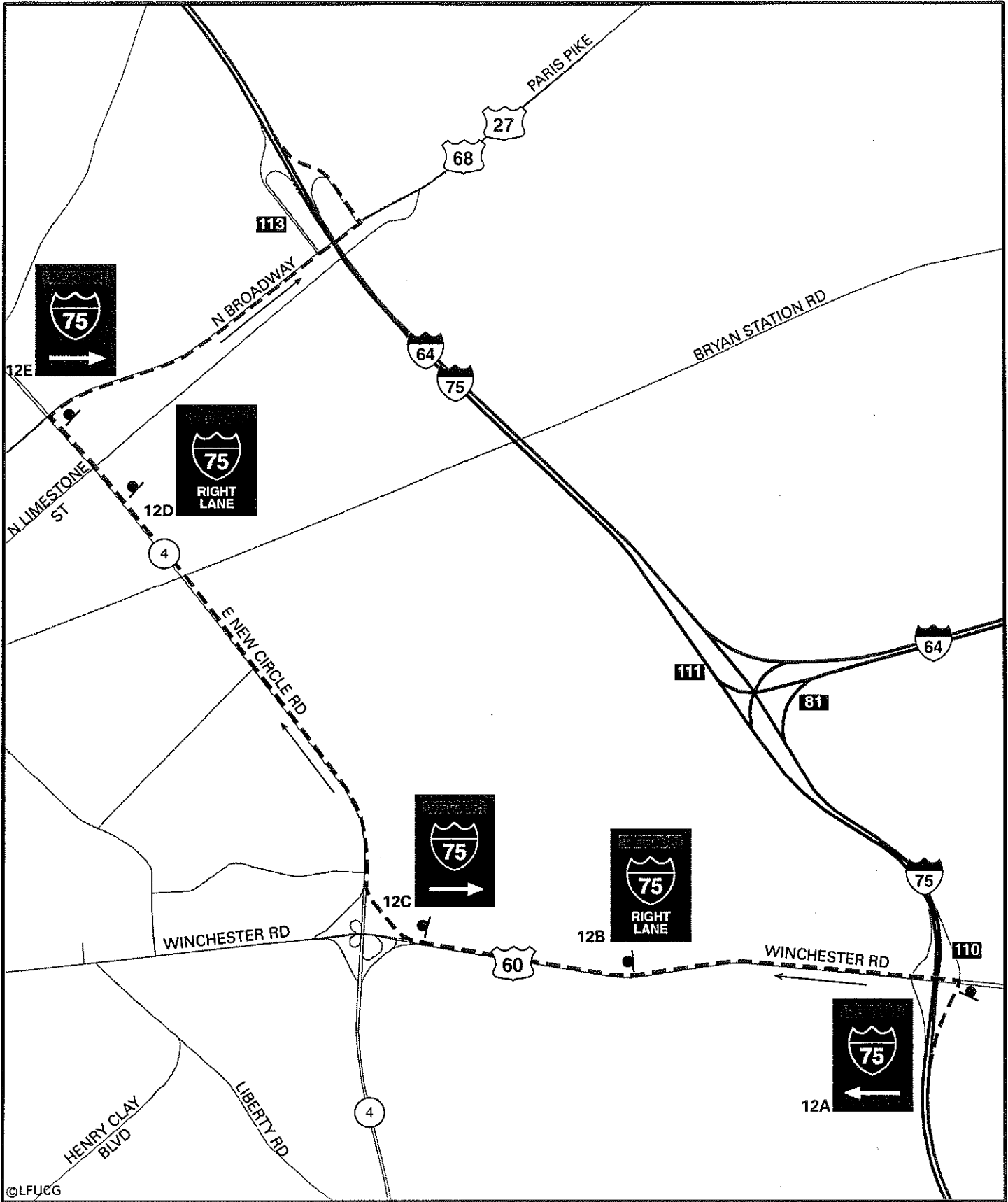
8/1/96



ROUTE 11

Northbound I 75

-  Detour Sign
-  Detour Route
-  Interstate
-  Other Roads
-  County Line
-  Exit Number
-  Sign Number



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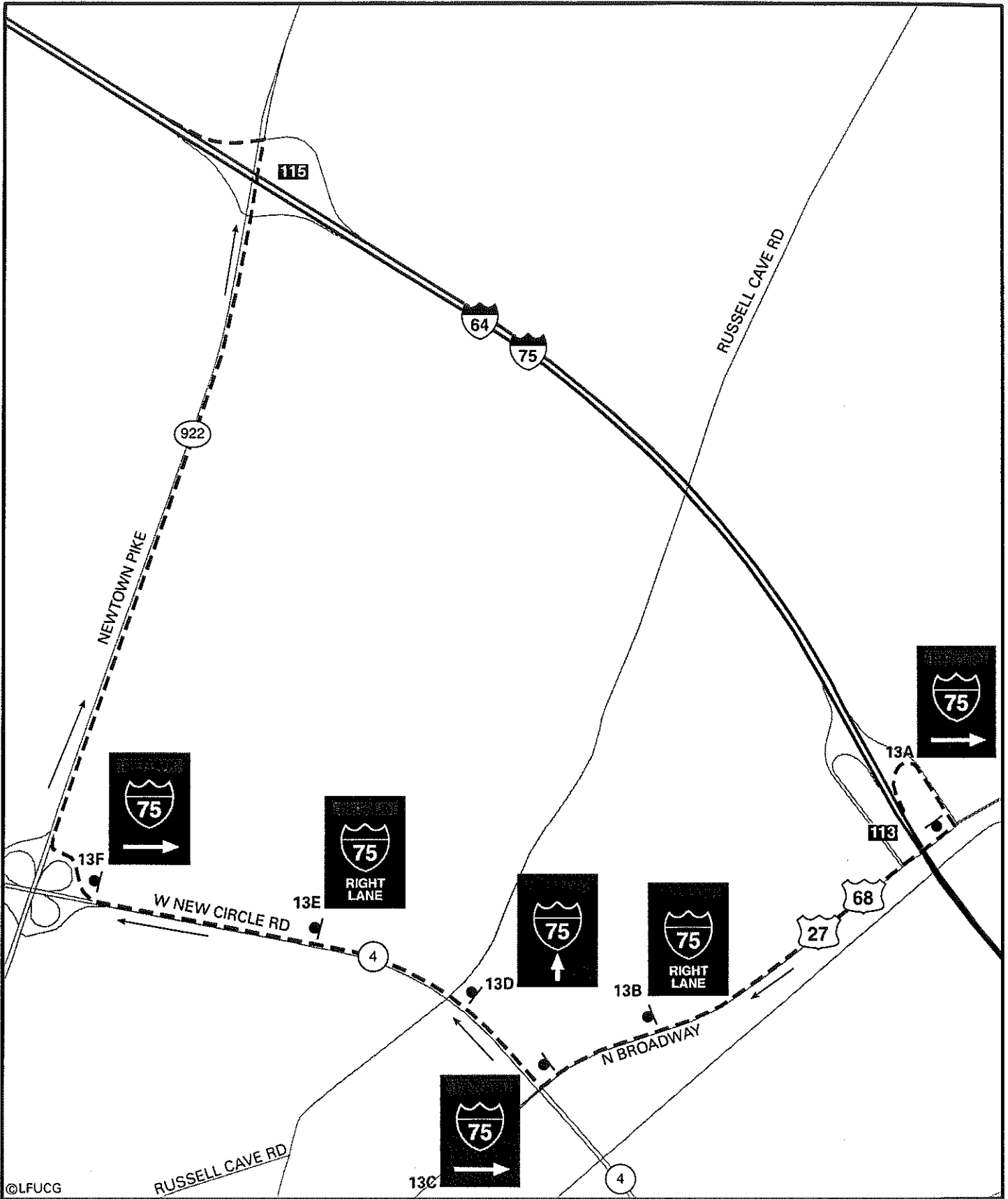
8/1/96



ROUTE 12

Northbound I 75 & Westbound I 64

- Detour Sign
- Detour Route
- Interstate
- Other Roads
- County Line
- Exit Number
- Sign Number



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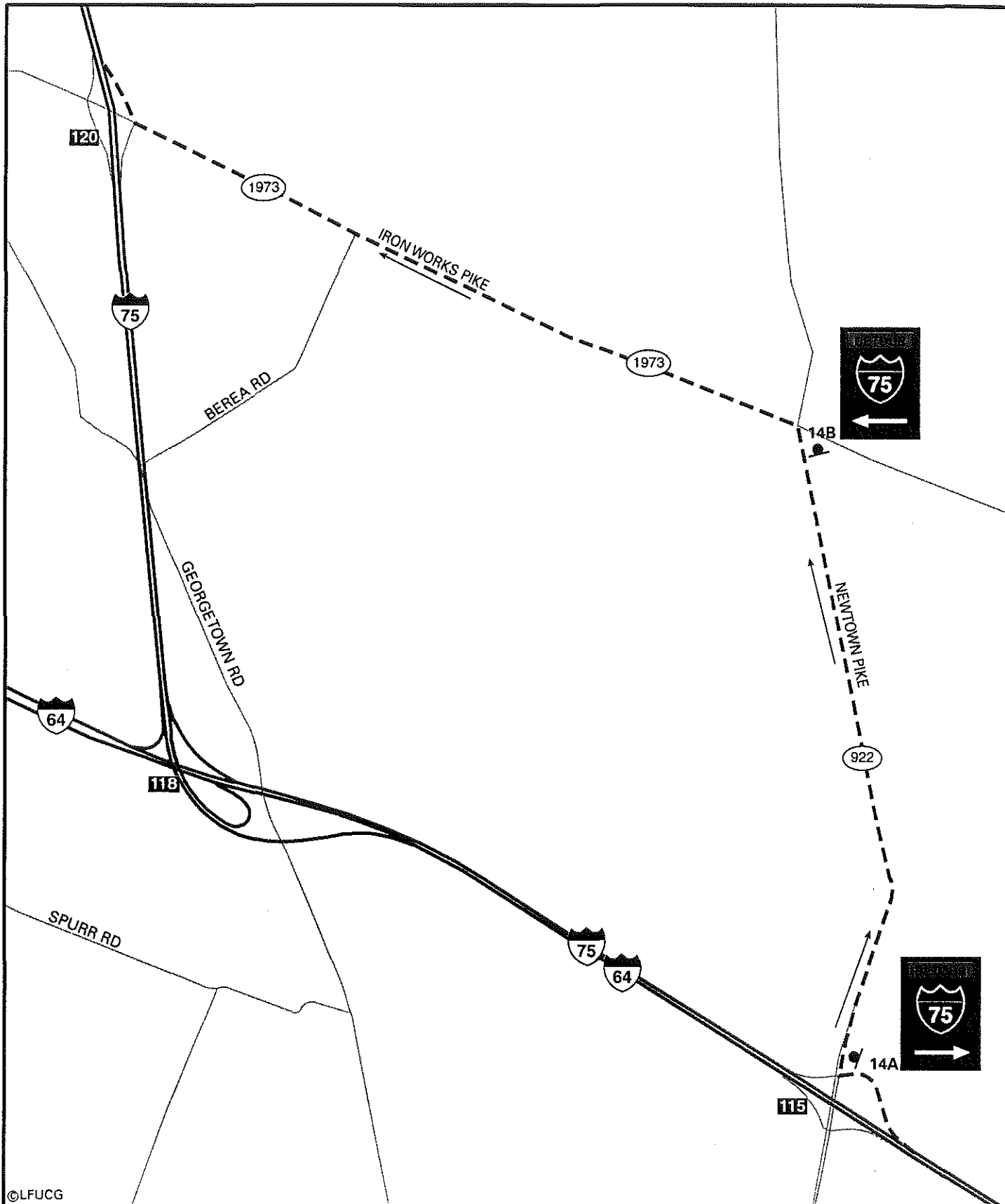
8/1/96



ROUTE 13

Northbound I 75 & Westbound I 64

- Detour Sign
- Detour Route
- Interstate
- Other Roads
- County Line
- Exit Number
- Sign Number










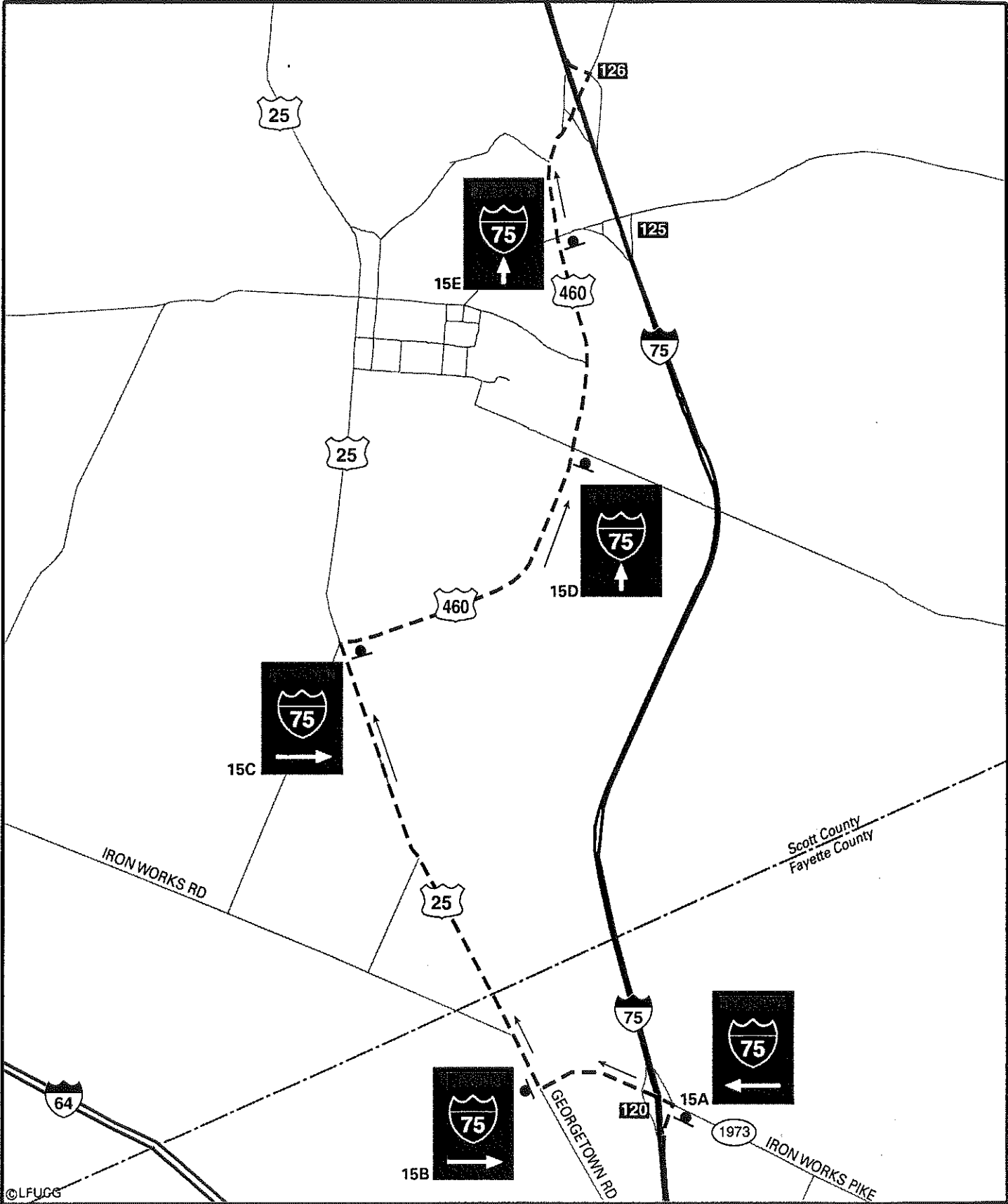
8/1/96



ROUTE 14

Northbound I 75

-  Detour Sign
-  Detour Route
-  Interstate
-  Other Roads
-  County Line
-  Exit Number
-  Sign Number










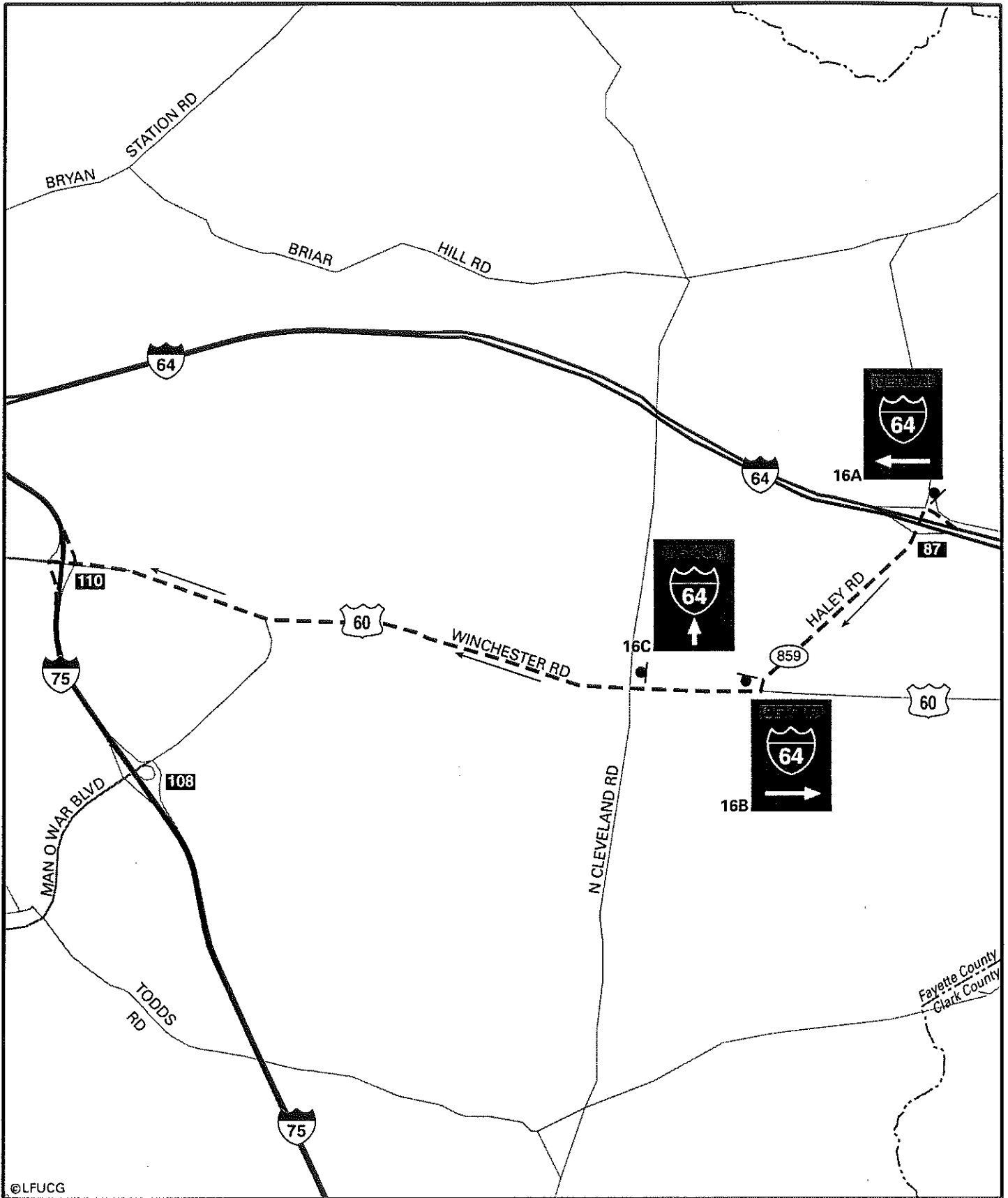
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ROUTE 15

Northbound I 75

-  Detour Sign
-  Detour Route
-  Interstate
-  Other Roads
-  County Line
-  Exit Number
-  Sign Number










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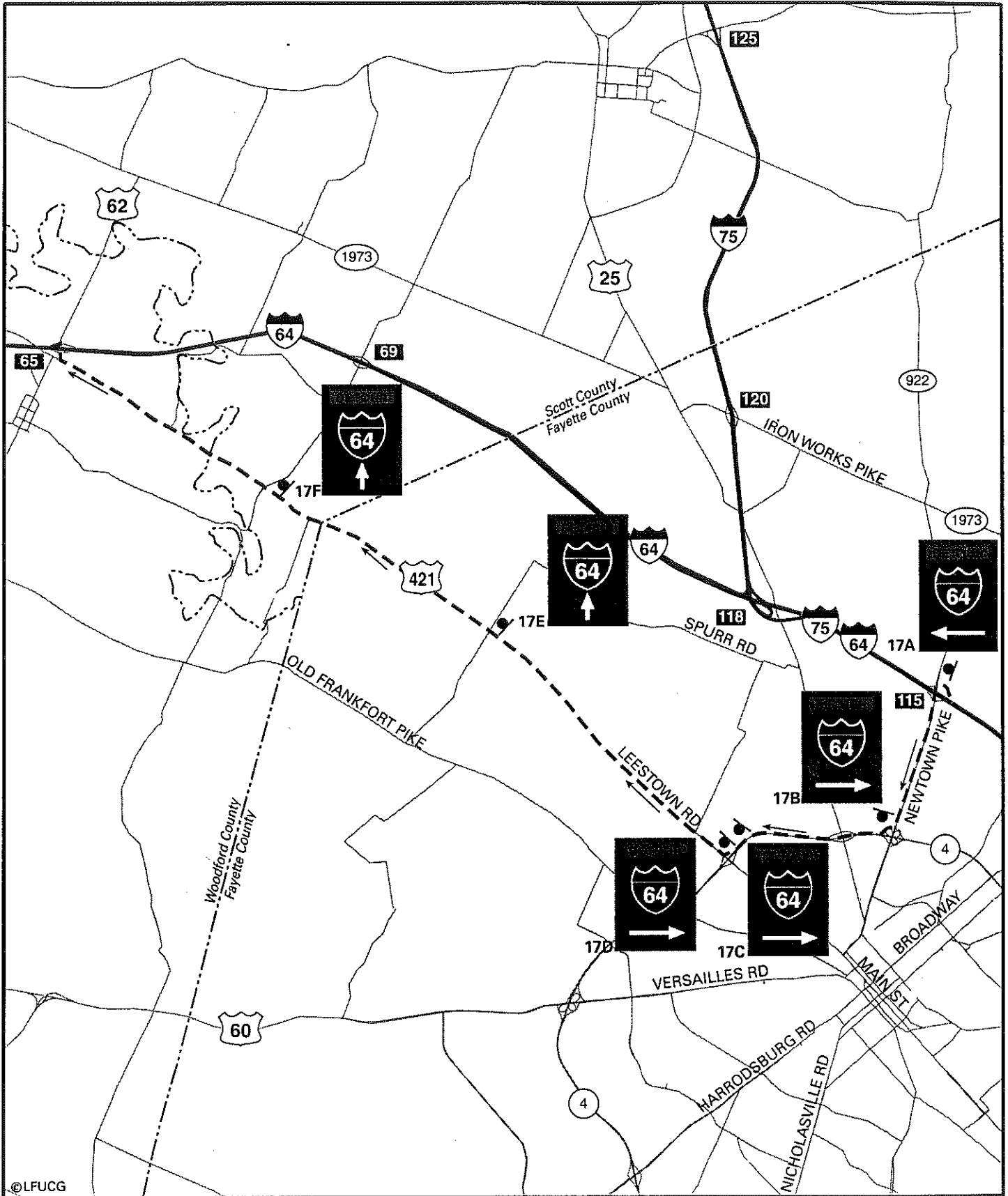
8/1/96



ROUTE 16

Westbound I 64

-  Detour Sign
-  Detour Route
-  Interstate
-  Other Roads
-  County Line
-  Exit Number
-  Sign Number










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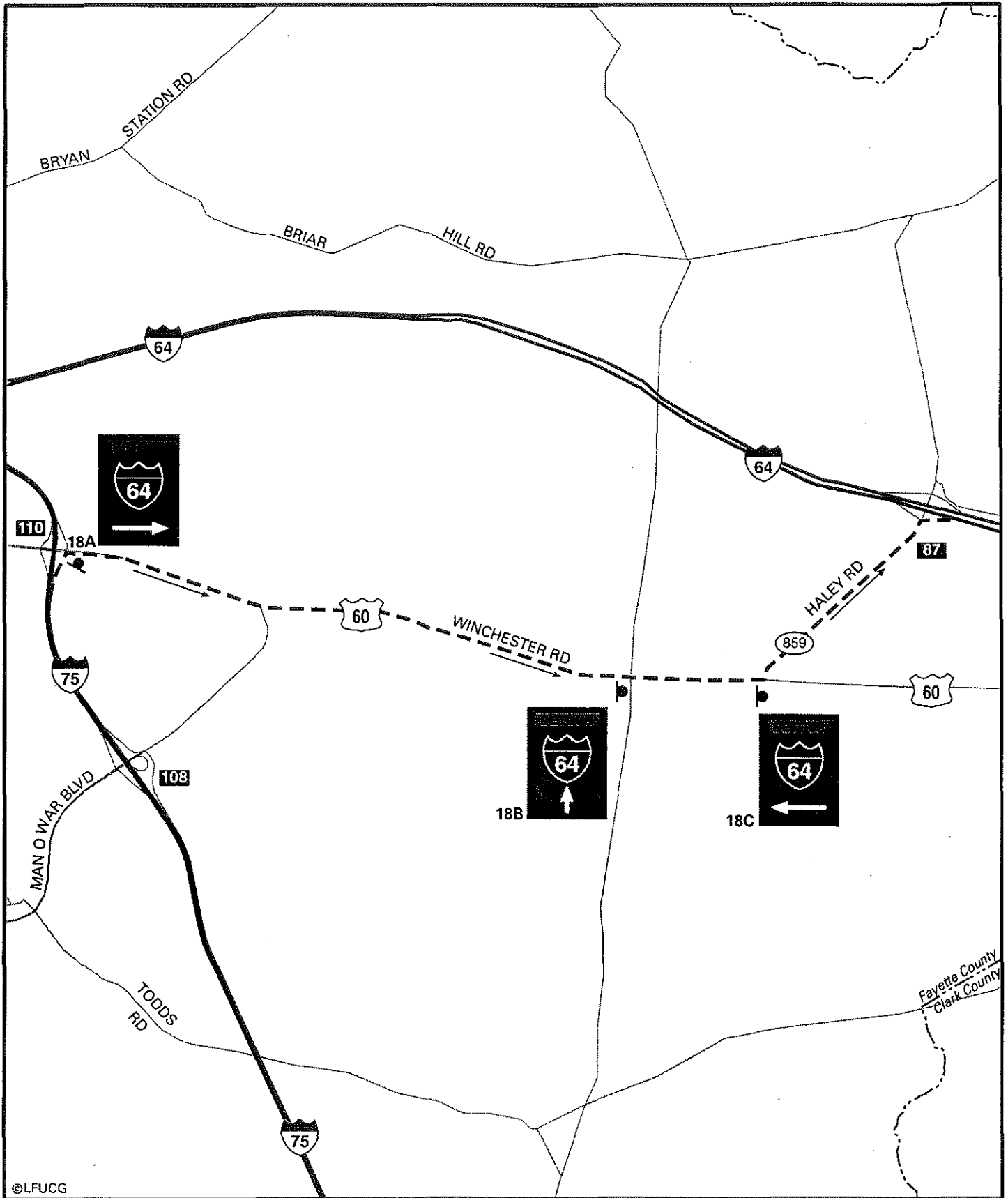
8/1/96



ROUTE 17

Westbound I 64

-  Detour Sign
-  Detour Route
-  Interstate
-  Other Roads
-  County Line
-  **115** Exit Number
-  **3B** Sign Number










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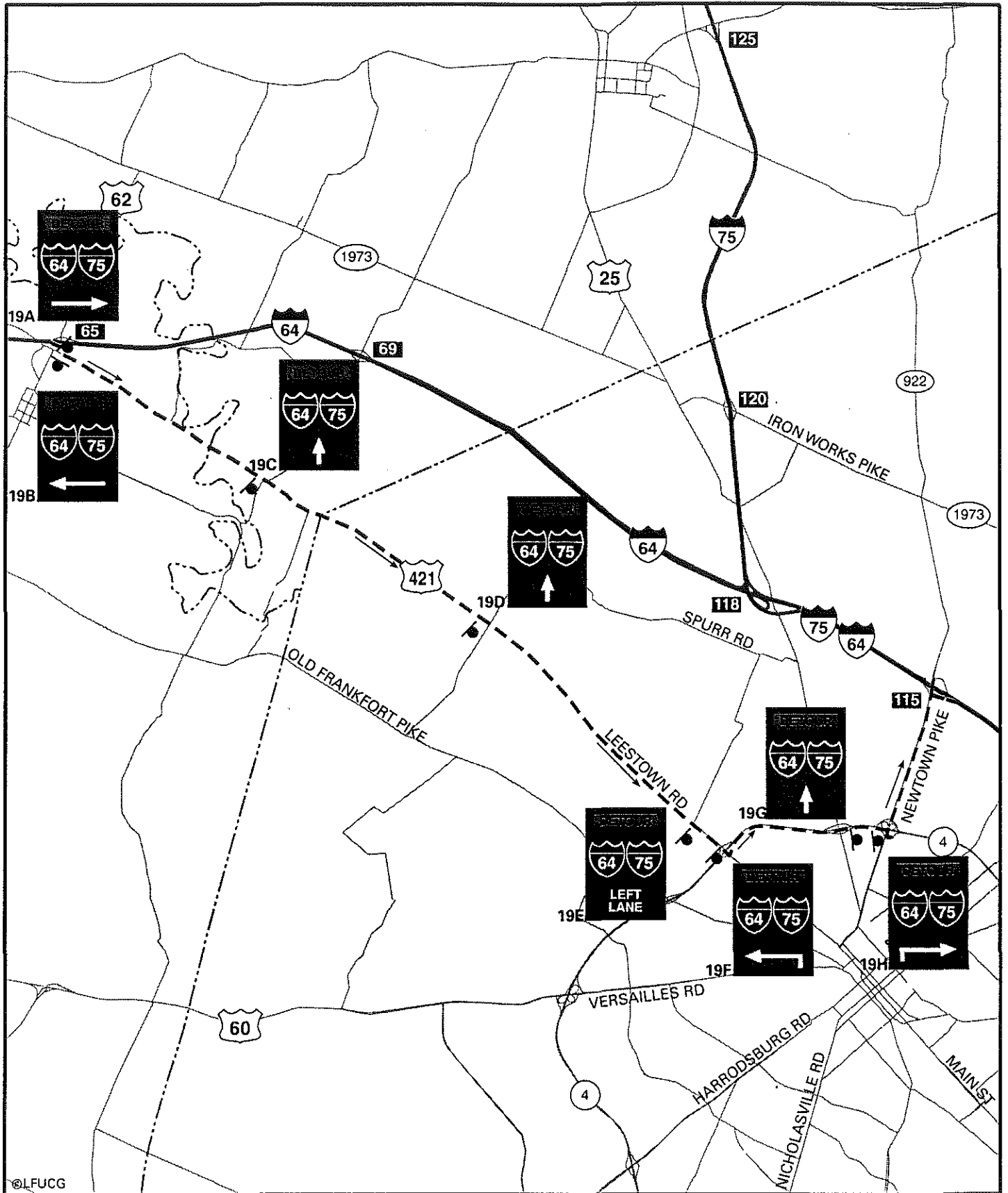
8/1/96



ROUTE 18

Eastbound I 64

-  Detour Sign
-  Detour Route
-  Interstate
-  Other Roads
-  County Line
-  Exit Number
-  Sign Number



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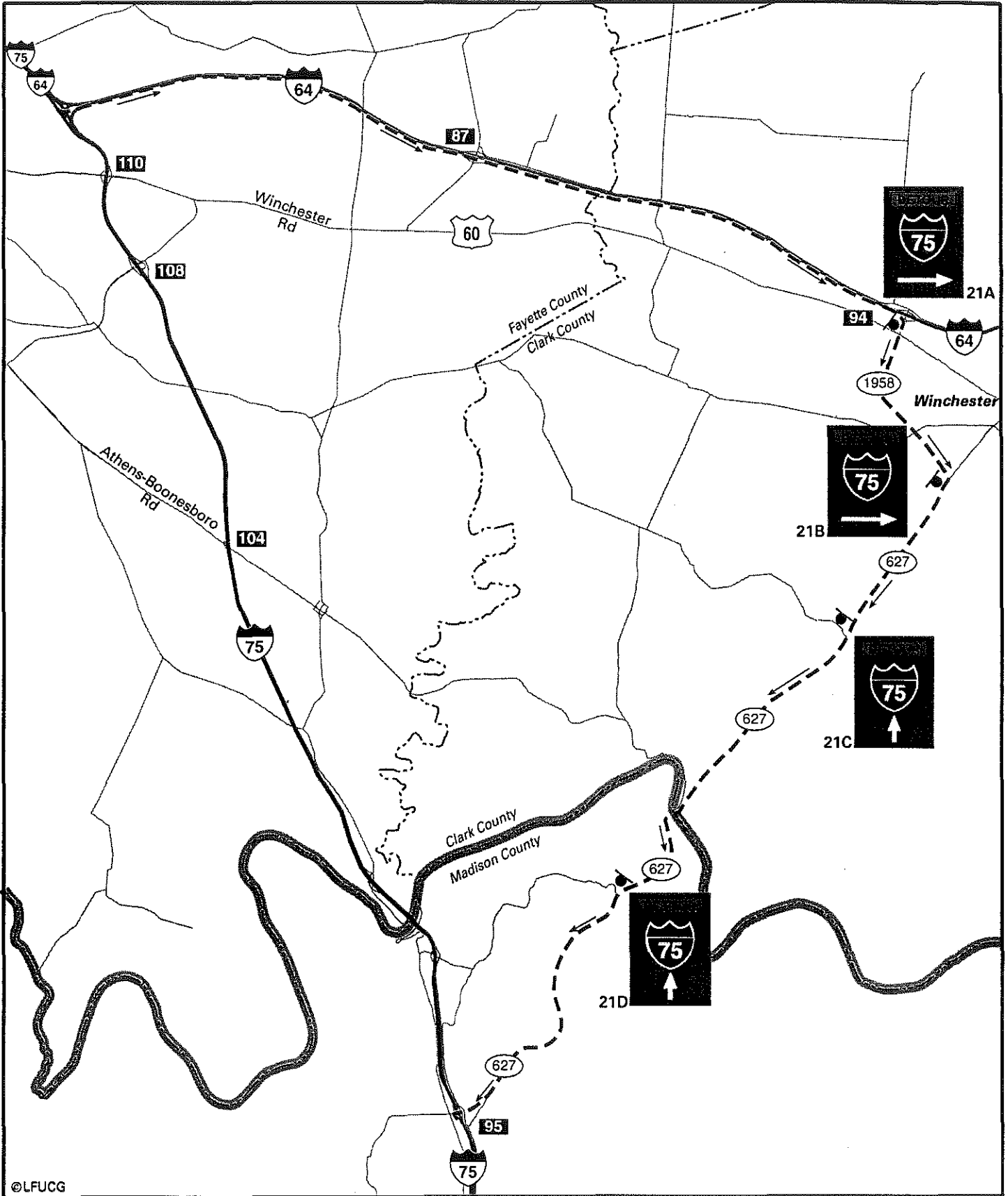
8/1/96



ROUTE 19

I 75 & Eastbound I 64

- Detour Sign
- Detour Route
- Interstate
- Other Roads
- County Line
- 115 Exit Number
- 3B Sign Number










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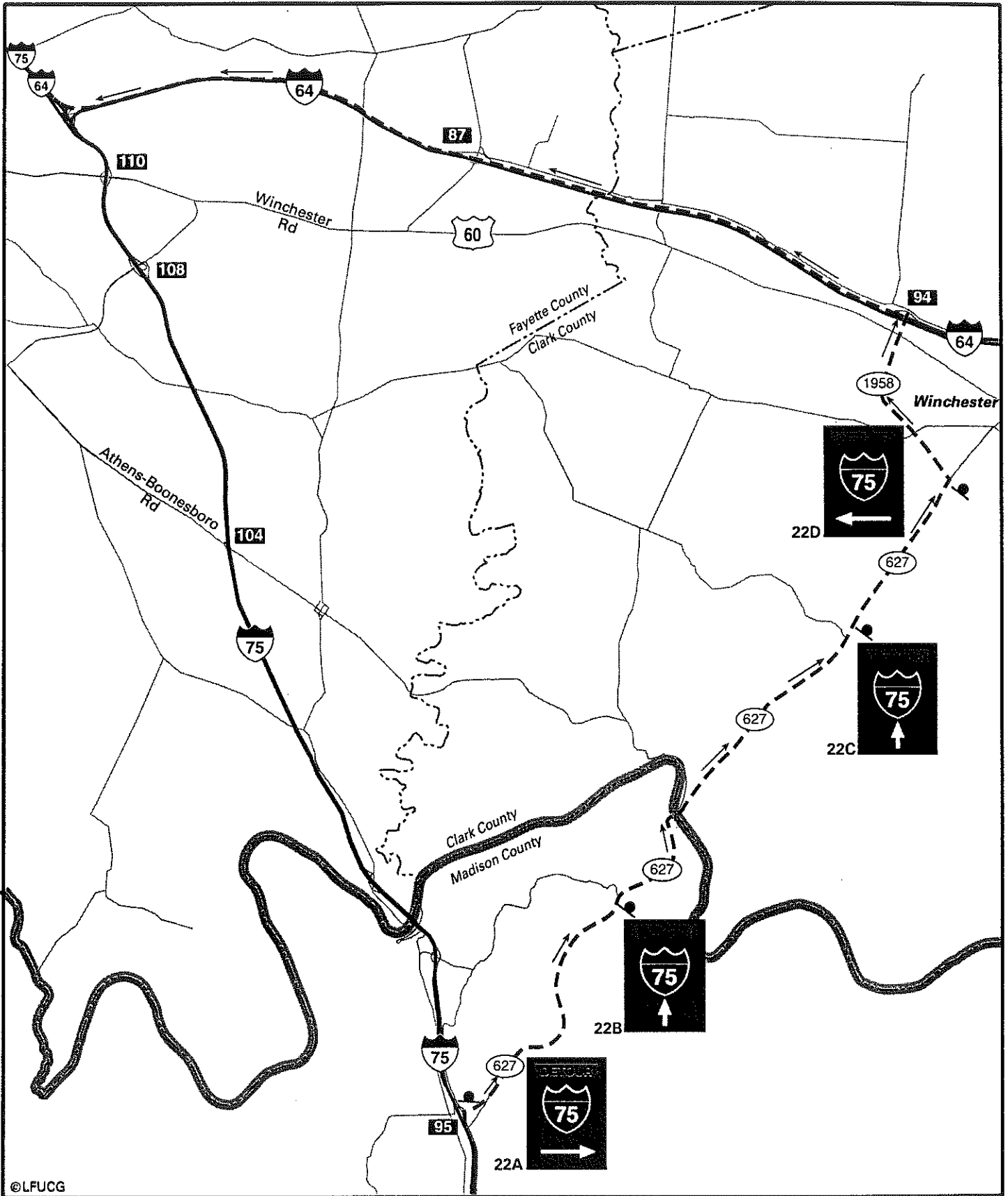
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ROUTE 21

Southbound I 75

-  Detour Sign
-  Detour Route
-  Interstate
-  Other Roads
-  County Line
-  Exit Number
-  Sign Number










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ROUTE 22

Northbound I 75

-  Detour Sign
-  Detour Route
-  Interstate
-  Other Roads
-  County Line
-  **115** Exit Number
-  **3B** Sign Number



Lexington Fayette Urban County Government
Division Of Traffic Engineering

200 East Main Street Lexington, Kentucky 40507 (606)258-3480 Fax (606)258-3479

TO: Stone Donaldson, Owner
Premium Door Service

FROM: Steven W. Cummins, E.I.T. ^{SWC}
Traffic Engineer

DATE: November 21, 1996

SUBJECT: Locations for the Flip-Down Sign Installations

The following provides a written description to the locations and on-site descriptions relating to each of the 88 Flip-Down signs along the 20 Detour Routes:

Detour Route 1: (SB I-75)

- 1A - Tourist Info.: Replaces existing sign in gore of median on off ramp.
- 1B - SB I-75 trailblazer: Replaces existing sign at intersection of US62 and US460, opposite Wendy's Restaurant.
- 1C - Buckle Up/State Law: Install 150' W along Bypass from Quality Drive in gravel median.
- 1D - Hospital: Install at intersection on Right side adjacent to existing US25 signs
- 1E - Ky Horse Park: Replaces existing sign approx. 200' N of intersection with Iron Works Road.

Detour Route 2: (SB I-75)

- 2A - Ky1973: Replaces existing sign on the Right side of exit ramp approx. 200' N of intersection.
- 2B - Ky922: Replaces existing sign at intersection.

Detour Route 3: (SB I-75 & EB I-64)

- 3A - BG Parkway: Replaces existing sign at end of off ramp.
- 3B - Car/Van Pool: Replaces existing sign approx. 1500' N of Ky4 intersection.
- 3C - Ky4 East: Replaces existing sign at Ky4 West on ramp.
- 3D - Ky4 East: Replaces existing sign at Ky4 East on ramp.
- 3E - Speed Limit 45: Replaces existing sign approx. 250' W of Russell Cave Road.
- 3F - Speed Limit 45: Replaces existing sign approx. 750' E of Russell Cave Road.
- 3G - Paris/Cynthiana: Replaces existing sign just prior to N. Broadway intersection.

Detour Route 4: (SB I-75 & EB I-64)

- 4A - Hospital: Replaces existing sign and should be located between 1st and 2nd luminaire poles W of the intersection with N. Broadway.
- 4B - Car/Van Pool: Replaces existing sign just S of Fire Station on W side of N. Broadway.
- 4C - UK: Replaces existing sign on S property corner for Bluegrass Chrysler.
- 4D - Speed Limit 45: Install opposite Ky4 from Fire Station, just W of luminaire pole #129 prior to Meadow Lane.
- 4E - I-64/I-75 Trailblazer: Replaces existing trailblazers approx. 50' W of cantilever, opposite Continental Inn.

Detour Route 5: (SB I-75)

- 5A - US60: Replaces existing sign in gore of off ramp.
- 5B - Ky1425: Replaces existing sign on E side of Winchester Road at intersection with Bryant Road.

Detour Route 6: (SB I-75)

- 6A - Hospital: Locate in the gore of the exit ramp just prior to the luminaire pole
- 6B - Speed Limit 50: Locate approx. 300' N of Todds Road intersection, prior to luminaire pole #918
- 6C - Speed Limit 45: Replaces existing sign approx. 500' N of Rio Dosa intersection, just prior to luminaire pole #119.
- 6D - Hospital: Locate in the approach median to Richmond Road, approx. 425' N of intersection and just prior to start of left turn lane. (opp. Luminaire pole #107).
- 6E - US25 and US421: Install in center, grassy median approx. 110' W of luminaire pole #223 prior to intersection with Old Richmond Road.

Detour Route 7: (SB I-75)

- 7A - ← Athens & Lexington →: Replaces existing sign approx. 150' S of Athens-Boonesboro Road along Exit Ramp 104.
- 7B - Do Not Pass School Bus, etc.: Relocates and Replaces existing sign approx. 1300' N of US25/US421 (Old Richmond Road) intersection WB side of road.
- 7C - US25/US421: Replaces existing sign approx. 50' prior to Old Richmond Road intersection. (Prior to Jacobson Park entrance)
- 7D - JCT Ky1975: Replaces existing sign opposite Richmond Road Baptist Church, N of Jacks Creek Road.
- 7E - JCT Ky1973: Replaces existing sign at intersection with Cleveland Road.

(There is no defined Detour Route 8)

Detour Route 9: (NB I-75)

- 9A - North US 25/US421: Replaces existing sign opposite end of Exit Ramp #99.
- 9B - JCT Ky1973: Replaces existing sign approx. 100' S of Cleveland Road intersection, in front of Fire Station.
- 9C - JCT Ky1975: Replaces existing sign approx. 550' S of Jacks Creek intersection.
- 9D - Ky418: Replaces existing sign approx. 200' S of Richmond Road intersection.

Detour Route 10: (NB I-75)

- 10A - Hospital: Locate along exit ramp, approx. 350' S of intersection with Athens Boonesboro Road.
- 10B - Buckle Up/State Law: Locate approx. 100' E of Walnut Hill/Chilesburg Road
- 10C - Speed Limit 45: Replaces existing sign 30' E of luminaire pole 180, opposite Glenn Infinity car dealership.
- 10D - Rupp Arena/Tourist Info: <Difficult install> Install on slope 200' E of Man O' War Blvd. intersection. (between MOW and Prosperous Place)
- 10E - Speed Limit 50: Relocates and Replaces existing sign. Locate between luminaire poles 905 and 907, approx. 300' W of Todds Road intersection @ start of right turn lane.

Detour Route 11: (NB I-75)

- 11A - Hospital: Relocates and Replaces existing sign. Locate along exit ramp approx. 350' S of Man O' War Blvd. intersection.
- 11B - ← Lexington and Winchester →: Replaces existing sign opposite Bryant Road.

Detour Route 12: (NB I-75 & WB I-64)

- 12A - ← Lexington and Winchester →: Replaces existing sign approx. 200' S of Winchester Road intersection along Exit Ramp #110.
- 12B - Reduced Speed Ahead: Replaces existing sign approx. 75' E of Wilkes Farm entrance on Right shoulder.
- 12C - Rupp Arena/Tourist Info: Locate sign in gore of New Circle Road on ramp.
- 12D - Speed Limit 45: Locate sign approx. 25' E of luminaire pole #94, just S of Lexington Marine.
- 12E - Paris/Cynthiana →: Locate adjacent to existing wooden utility pole (used for traffic signal installation), in front of Duff's Ashland Service Station.

Detour Route 13: (NB I-75 & WB I-64)

- 13A - Hospital →: Replaces existing sign approx. 300' N of intersection with N. Broadway along Exit Ramp #113.
- 13B - Thru Trucks Use NC: Locate immediately opposite Family Style Restaurant on West shoulder.
- 13C - Rupp Arena/Tourist Info: Locate on the southernmost property corner of Bluegrass Chrysler Plymouth.
- 13D - US Army Reserve Training Center ←: Replaces and relocates existing sign, approx. 20' E of luminaire pole #48 in front of Jalapenas Restaurant.
(NOTE: State to relocate existing Ky353 route marker).
- 13E - Buckle Up/State Law: Locate in front of AutoZone (auto parts shop), approx. 50' E of Colesbury Circle intersection.
- 13F - Exit 30 mph: Replaces existing sign in front of District 7 Office, just prior to ramp for NB Newtown Road.

Detour Route 14: (NB I-75)

- 14A - To BG Parkway ←: Replaces existing sign on right side at end of Exit Ramp #115, just prior to intersection with Newtown Road.
- 14B - Ky Horse Park ←: Locate approx. 200' S of intersection with Iron Works Road.

Detour Route 15: (NB I-75)

- 15A - Ky Horse Park ... →: Locate in the median opposite the intersection between Exit Ramp #120 and Iron Works Road.
- 15B - Hospital →: Locate at intersection adjacent to existing US25 and Ky1973 signs
- 15C - Hospital: Locate approx. 100' S of intersection with US460 Bypass, adjacent to SuperAmerica gas station.
- 15D - Bypass East US460: Locate approx. 225' N of intersection with Ky1962.
- 15E - To I-75/I-64 (straight ahead arrow): Replaces existing signs at US62/US460 intersection, adjacent to Swifty gas station.

Detour Route 16: (WB I-64)

- 16A - Bluegrass Station →: Replaces existing sign at end of Exit Ramp #87 at intersection with Haley Road.
- 16B - US60 ↔: Replaces existing sign approx. 50' N of intersection with Winchester Road on right shoulder.
- 16C - Ky1973 ↔: Replaces existing sign at intersection with Cleveland Road along Winchester Road.

Detour Route 17: (WB I-64)

- 17A - To BG Parkway ←: Locate sign on Left shoulder at end of Exit Ramp #115, at intersection with Newtown Road.
- 17B - Exit →: Replaces existing sign in gore of intersection with New Circle Road.
(NOTE: State to relocate Keeneland sign).
- 17C - Buckle Up/State Law: Replaces and Relocates existing sign to a point adjacent to large blue water tower on right shoulder, just prior to off ramp.
- 17D - ← Lexington/Frankfort →: Replaces existing sign approx. 250' E of intersection with Leestown Road along exit ramp.
- 17E - Ky1977 ←→: Replaces existing sign in NE corner radius of intersection with Yarnallton Road.
- 17F - JCT US62: Replaces existing sign just E of intersection with US62 along Leestown Road.

Detour Route 18: (EB I-64)

- 18A - Hospital ←: Replaces existing sign approx. 350' S of intersection with Winchester Road along Exit Ramp #110.
- 18B - Ky 1973 ←→: Replaces existing sign at intersection with Cleveland Road along Winchester Road.
- 18C - ← Avon/Landfill: Replaces existing sign opposite Haley Road along Winchester Road.

Detour Route 19: (EB I-64)

- 19A - Midway/Versailles →: Replaces existing sign approx. 250' W of Exit Ramp #65 intersectional end.
- 19B - Midway/Versailles →: Locate next to cluster of route markers, opposite STOP at intersection with Leestown Road.
- 19C - South US421: Replaces existing sign at intersection with US62.
- 19D - Ky1977 ←→: Replaces existing sign approx. 75' W of SW corner of intersection with Yarnallton Road
- 19E - Do Not Pass ... Unloading: Replace existing sign on right shoulder, approx. 50' SE of opposite Greendale Road.
- 19F - East Ky4 ←: Replaces and Relocates to beginning of guardrail
- 19G - End 40 Minimum Speed: Replaces existing sign between Georgetown Road exit gore and bridge overpass.
- 19H - Buckle Up/State Law: Locate in gore of off ramp prior to bridge and before luminaire pole.

(There is no defined Detour Route 20)

Detour Route 21: (SB I-75)

- 21A - Hospital →: Replace existing sign approx. 75' W of Ky1958 intersection along Exit Ramp #94. (NOTE: State to relocate Winchester sign).
- 21B - Buckle Up/State Law: Locate in gore left of existing US627 signs.
- 21C - Speed Limit 55: Locate just N of intersection with Ky1923, along US627.
(NOTE: install opposite Sign 22C)
- 21D - Speed Limit 55: Locate in front of 2204 Boonesboro Road (US627), near No Passing sign. (NOTE: Install opposite sign 22B).

Detour Route 22: (NB I-75)

- 22A - Buckle Up/State Law: Locate on right side of STOP at intersection with US627, at end of Exit Ramp #95.
- 22B - Speed Limit 55: Replaces existing sign just NE of Boone's Trading Post.
- 22C - Speed Limit 55: Replaces existing sign NE of intersection with Ky1923 along US627.
- 22D - Hospital ←: Replaces existing sign on SE corner of intersection with Ky1958.

Continuous communication with the District 7 Office must be maintained throughout the installation process due to the removal/replacement of certain signs along state routes. Mike Stevens should be contacted at 606/246-2355 with any question concerning a state sign.

Finally, please take the necessary efforts to avoid any and all utility lines that may be buried at or near the above-mentioned sign installation locations.

If you should have need for further information, please contact me at your earliest convenience.

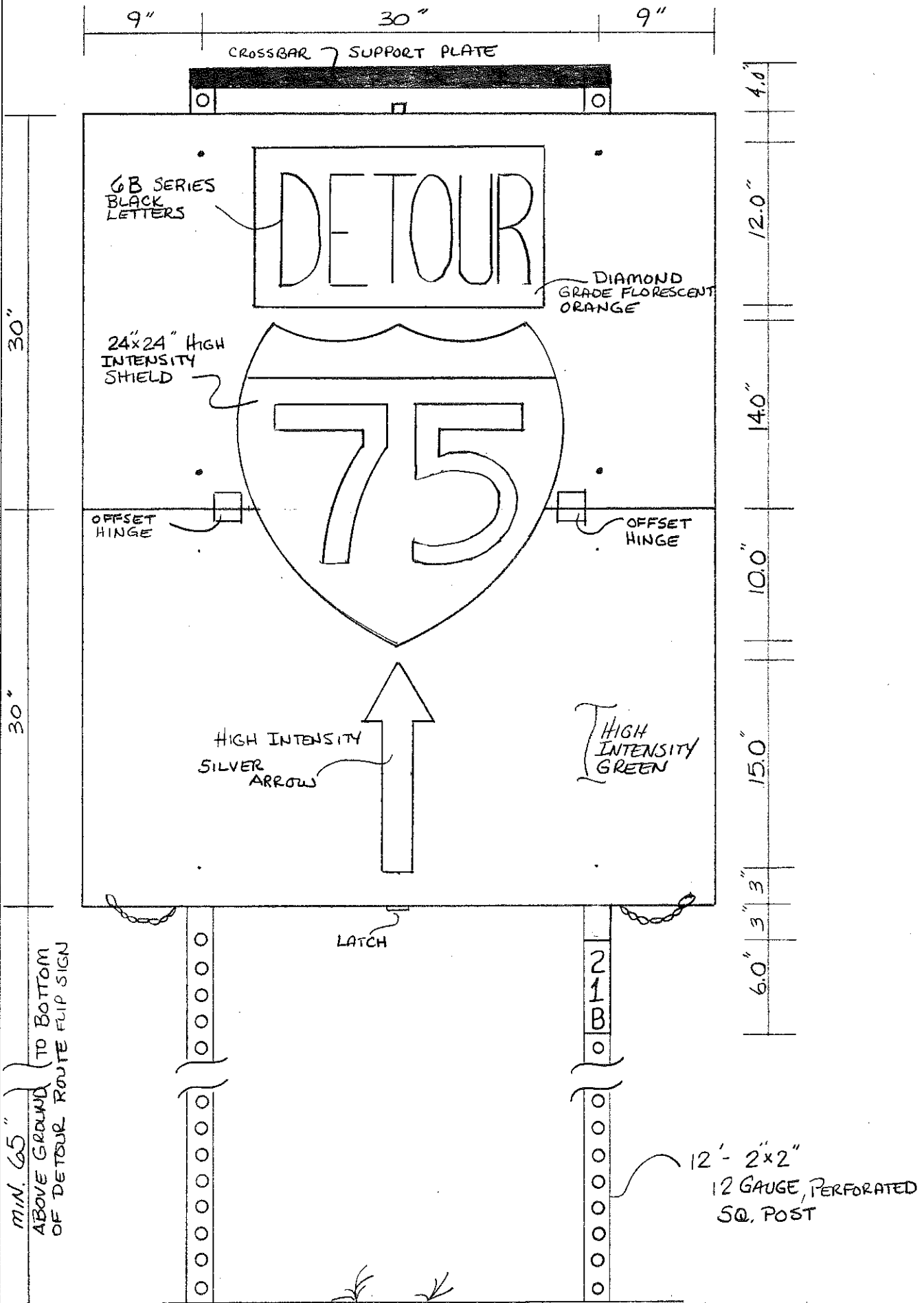
SWC/xc: Ron Herrington, P.E.
 James E. Woods, P.E.
 Andrew D. Terwilleger, P.E.
 Cecil Warner

Larry McMurray, P.E.
Mike Stevens, P.E.
Asst. Chief B. Burton

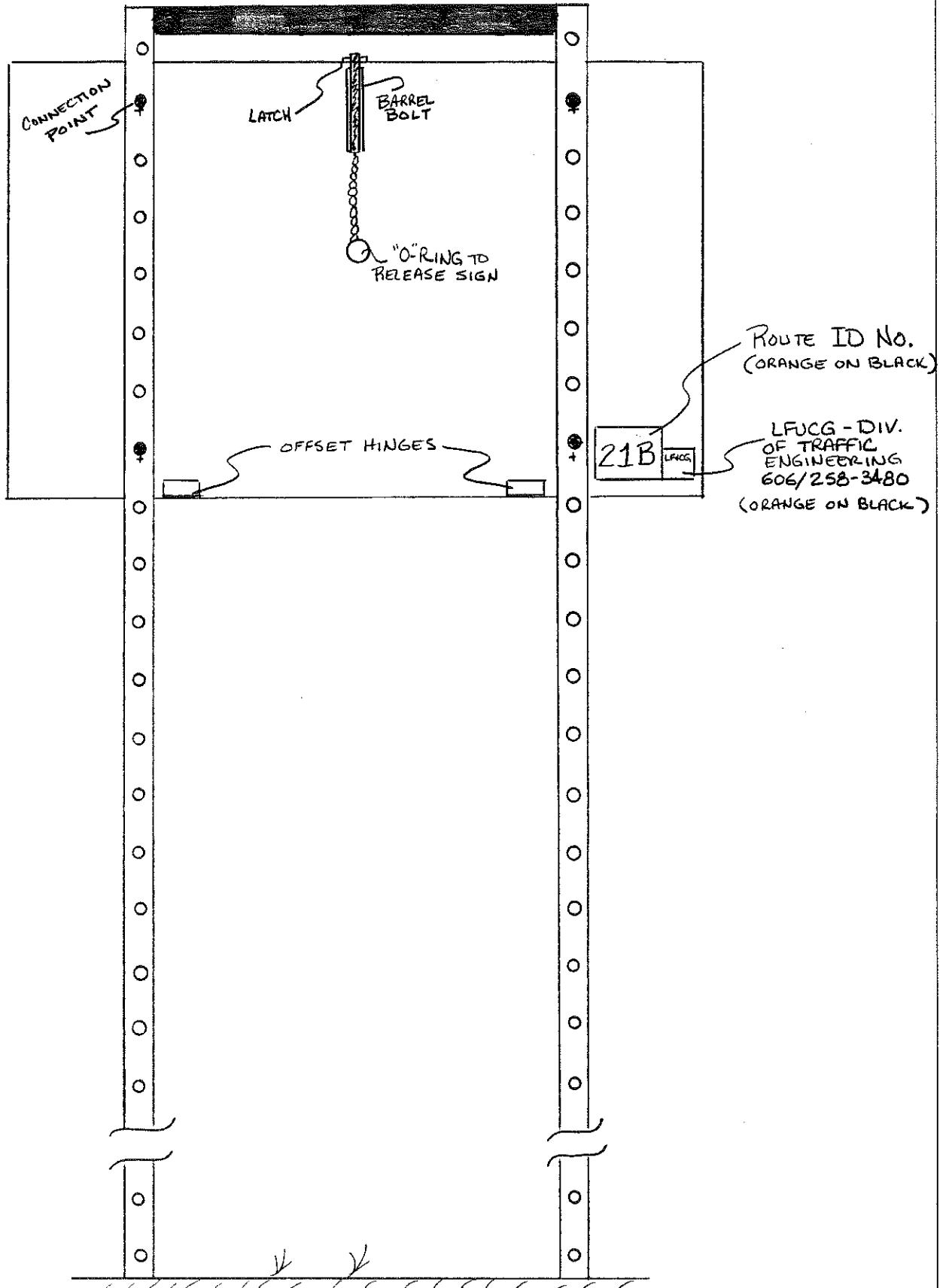
APPENDIX D

DETAILS FOR FLIP-DOWN SIGNS

50 SHEETS EYE ASER 6 SQUARE
42-381 120 SHEETS EYE ASER 6 SQUARE
42-382 200 SHEETS EYE ASER 6 SQUARE
42-392 RECYCLED WHITE 6 SQUARE
MADE IN U.S.A.



50 SHEETS EYE EASY 5 SQUARE
100 SHEETS EYE EASY 5 SQUARE
150 SHEETS EYE EASY 5 SQUARE
200 SHEETS EYE EASY 5 SQUARE
RECYCLED WHITE 5 SQUARE
Made in U.S.A.



Wind Load Moments

(70 MPH plus gusts)**

TWO-POST INSTALLATION

SIGN SIZE (W x H)"	MOUNTING HEIGHT*							
	5 Ft.	6 Ft.	7 Ft.	8 Ft.	9 Ft.	10 Ft.	11 Ft.	12 Ft.
48 x 24	11,210	13,470	15,850	18,340	20,950	23,670	26,510	29,460
48 x 30	14,160	16,830	19,610	22,520	25,530	28,660	31,900	35,260
48 x 36	17,310	20,390	23,580	26,890	30,310	33,850	37,500	41,260
48 x 48	26,960	31,240	35,630	40,150	44,780	49,510	54,370	59,340
48 x 60	35,930	41,160	46,500	51,970	57,546	63,240	69,050	74,970
60 x 30	17,340	20,510	23,810	27,220	30,750	34,380	38,130	42,000
60 x 36	21,280	24,970	28,770	32,690	36,716	40,870	45,130	49,500
72 x 36	25,250	29,550	33,960	38,490	43,140	47,890	52,760	57,750
72 x 48	35,630	41,150	46,780	52,530	58,400	64,370	70,470	76,670
84 x 42	35,100	40,710	46,450	52,310	58,270	64,350	70,540	76,854
84 x 48	41,330	47,660	54,112	60,680	67,350	74,140	81,050	88,070

Windload moments are calculated at center point of sign

ALLOWABLE LOAD

Two-1½" (12 GA) Qwik-Punch/Square-fit	20,760
Two-1½" (14 GA) Qwik-Punch	27,600
Two-1¾" (12 GA) Qwik-Punch/Square-fit	31,800
Two-2" (14 GA) Qwik-Punch.....	35,520
Two-2" (12 GA) Qwik-Punch/Square-fit	44,840
Two-2½" (14 GA) Qwik-Punch	50,040
Two-2½" (12 GA) Qwik-Punch/Square-fit.....	60,120
Two-2¾" (12 GA) Qwik-Punch/Square-fit.....	77,040

Procedure: Determine moment from table for sign size and mounting height.

Select post having an allowable load equal to or greater than required moment.

Examples: 48"x 36" sign, 9-foot mounting height — Moment = 30,310 in-lbs.

Use Two-1½" (12 GA) Qwik-Punch or Square-fit posts

84"x 42" sign, 7-foot mounting height — Moment = 46,450 in-lbs.

Use Two-2½" (14 GA) Qwik-Punch posts

* Bottom of sign
 ** For 60 MPH, multiply moment by 0.735
 For 80 MPH, multiply moment by 1.306
 For 90 MPH, multiply moment by 1.653
 For 100 MPH, multiply moment by 2.041
 (gust allowance for all wind speeds is 30%)

Your Authorized Qwik-Punch®/Square-fit® Distributor



16100 South Lathrop Avenue
 Harvey, Illinois 60426
 (708) 339-1610

Post-it® Fax Note 7671

To: <i>United</i>	Date: <i>5-1-96</i>	# of pages: <i>2</i>
Co./Dept: <i>Ey Board</i>	From: <i>Harvey</i>	
Phone #	Co: <i>X-Squared</i>	
Fax #	Phone #	
	Fax #	

