MAUMELLE / OAK GROVE I-40 INTERCHANGE FEASIBILITY STUDY

Prepared by
Planning and Research Division
Arkansas State Highway and Transportation Department

ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT

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December 17, 1996

The Honorable Judith Baldwin
Mayor of Maumelle
550 Edgewood Drive
Maumelle, Arkansas 72113

Dear Mayor Baldwin:

Enclosed is a copy of the *Maumelle/Oak Grove I-40 Interchange Feasibility Study*. The study examined the existing transportation network and examined several alternatives for a new location route connecting Maumelle to Oak Grove via an interchange on I-40 at the now closed Morgan rest area.

If you have any questions, please contact Richard Mills in our Planning and Research Division at (501) 569-2063.

Sincerely,

Thomas L. Harrell
Planning and Research Engineer

TLH:RWM:md

Enclosure

cc: Commissioner L.W. "Bill" Clark
Director
Deputy Director and Chief Engineer
Assistant Chief Engineer for Planning

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November 1996

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Planning and Research Division
Arkansas State Highway and Transportation Department
in cooperation with the
Federal Highway Administration

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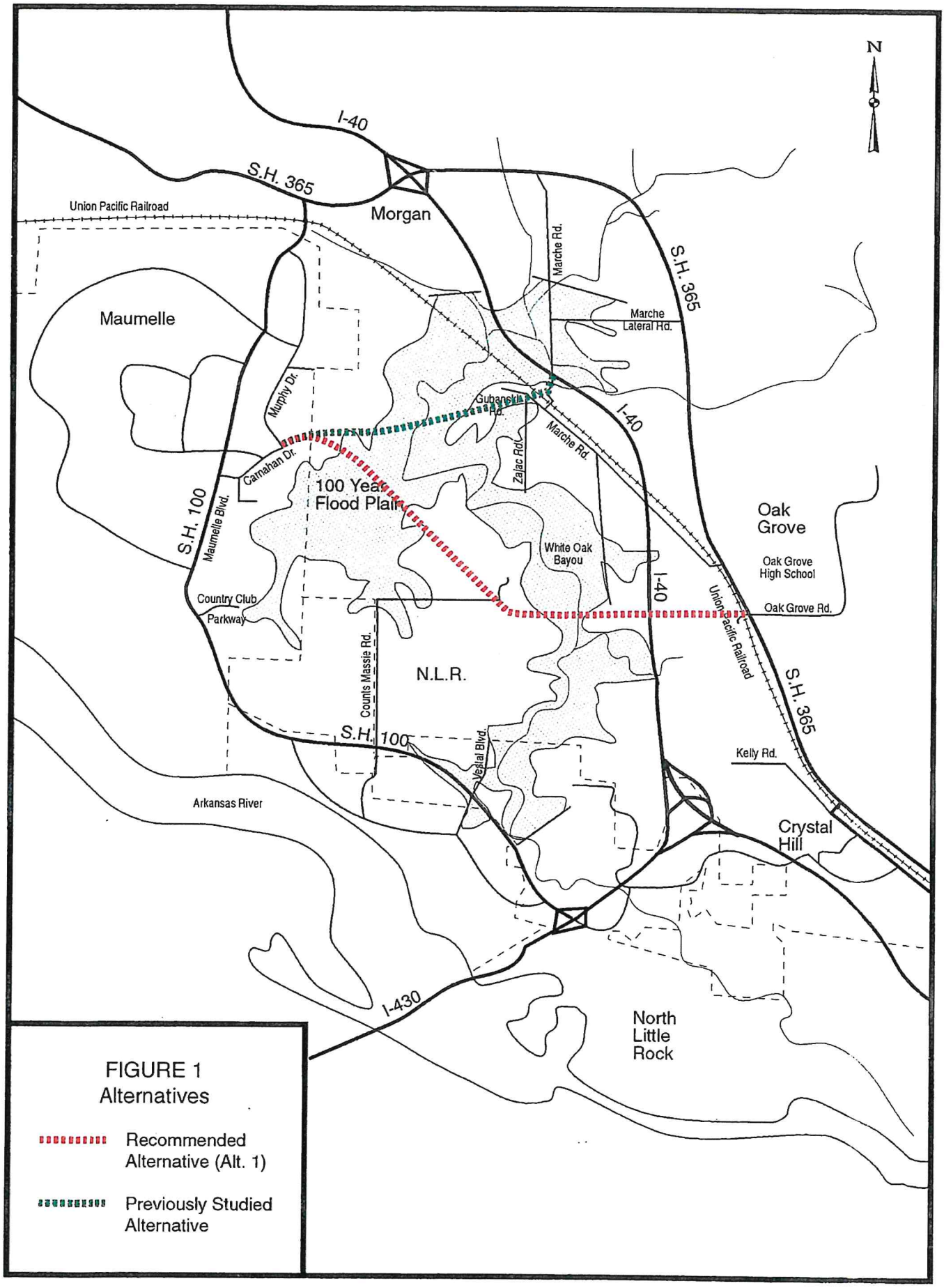
EXECUTIVE SUMMARY

On September 25, 1991, by Minute Order 91-473, the Marche Interchange Feasibility Study was adopted by the Arkansas Highway Commission. The study evaluated proposals extending Carnahan Drive in the city of Maumelle to the Marche Road overpass at I-40 and converting the existing grade separation to an interchange. The study found that a proposed roadway extension to I-40 and interchange construction was needed (Figure 1). It recommended that a change in access to I-40 be pursued and that all involved jurisdictions take actions necessary to preserve right-of-way. Because of local concerns regarding community disruption and possible impacts on White Oak Bayou, this project has not been implemented.

On January 31, 1996, a group of community leaders appeared before the Arkansas Highway Commission and requested that a feasibility study be made of a route connecting the Maumelle and Oak Grove communities to Interstate 40 via an interchange at the now closed Morgan rest area. The route was proposed to provide a more direct route for the children in Maumelle to get to their schools in Oak Grove. Another important function cited was the diversion of heavy truck traffic generated by the Maumelle Industrial Park from State Highway (S.H.) 100 and S.H. 365. This diversion would decrease traffic congestion as well as lessen noise impacts to surrounding residential areas.

Five new alternatives were submitted by the community leaders as possible route locations and all were studied. Two alternatives extend Carnahan Drive south and east across White Oak Bayou to I-40 at the former Morgan rest area, and then extend eastward to S.H. 365 at Oak Grove Road. The other three alternatives originate at three different points along S.H. 100 further south of the S.H. 100/Carnahan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Kelly Rd.
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Crystal Hill
I-430
North Little Rock
FIGURE 1
Alternatives
Recommended Alternative (Alt. 1)
Previously Studied Alternative

INTRODUCTION

In September, 1991, the Arkansas Highway Commission adopted the Marche Interchange Feasibility Study by Minute Order 91-473. Proposals extending Carnahan Drive in Maumelle's industrial park to the Marche Road overpass at I-40 and converting the existing grade separation to an interchange were studied. A need for an extension was found to exist and it was recommended that a change in access to I-40 be pursued and that local jurisdictions take actions necessary to preserve the right-of-way and secure project funding.

In January, 1996, a group of citizens requested that the Arkansas Highway Commission study the feasibility of constructing a new road to connect the City of Maumelle to the Oak Grove community. The road would extend across White Oak Bayou and include an interchange on I-40 at the site of the now closed Morgan rest area.

The delegation, which also included representatives from Maumelle and North Little Rock, suggested that the study consider several proposed alternatives that were not evaluated in the Marche study. The group stated that the proposed road and new access to I-40 were needed in order to improve the transportation of school children from Maumelle to school in Oak Grove. Most of the children from Maumelle attend Oak Grove schools and they are forced to travel indirect routes that pass through the congested Morgan Interchange or Crystal Hill on a daily basis. Better accessibility to Maumelle's expanding industrial areas is also needed. As the residential areas along S.H. 100 (Maumelle Boulevard) continue to develop, the effects of heavy truck traffic will become increasingly intrusive. The continued growth of residential areas as well as

STUDY AREA

The proposed facility would impact an area of northwest Pulaski County north of the Arkansas River and west of I-430 and the Crystal Hill community (Figure 2). Contained within the eastern part of this area along S.H. 365 are the communities of Oak Grove and Crystal Hill. The city of Maumelle and a portion of the city of North Little Rock along Maumelle Boulevard (S.H. 100) are located in the western part of the study area. The middle of the study area encompasses a largely rural, undeveloped area which has I-40, White Oak Bayou, and the Union Pacific's main east/west rail line passing through it.

The Oak Grove/Crystal Hill area is an unincorporated area of middle to low-income housing on large lots in a semi-rural setting. Light industrial operations and warehousing are scattered along S.H. 365. The lack of city sewer in the area has limited growth to a slow pace with individual lot development being the primary form of growth. However, two areas of fairly concentrated development are Oak Grove Road near the Oak Grove Junior/Senior High Schools, and the vicinity of the Crystal Hill Road interchange with I-40. Population growth in the area has been average at best.

In contrast, the portion of the study area west of I-40 and north of I-430 contains the city of Maumelle, which is one of the faster growing areas of the State. Starting in the early 1970s, it was one of the New Towns supported by grants and loans from the U.S. Department of Housing and Urban Development (H.U.D.). Maumelle has grown from approximately 1,421 residents in 1980 to an estimated 1996 population in excess of 7,800. Growth in new housing starts has been very good, with over 400 units being built in the last three years alone.

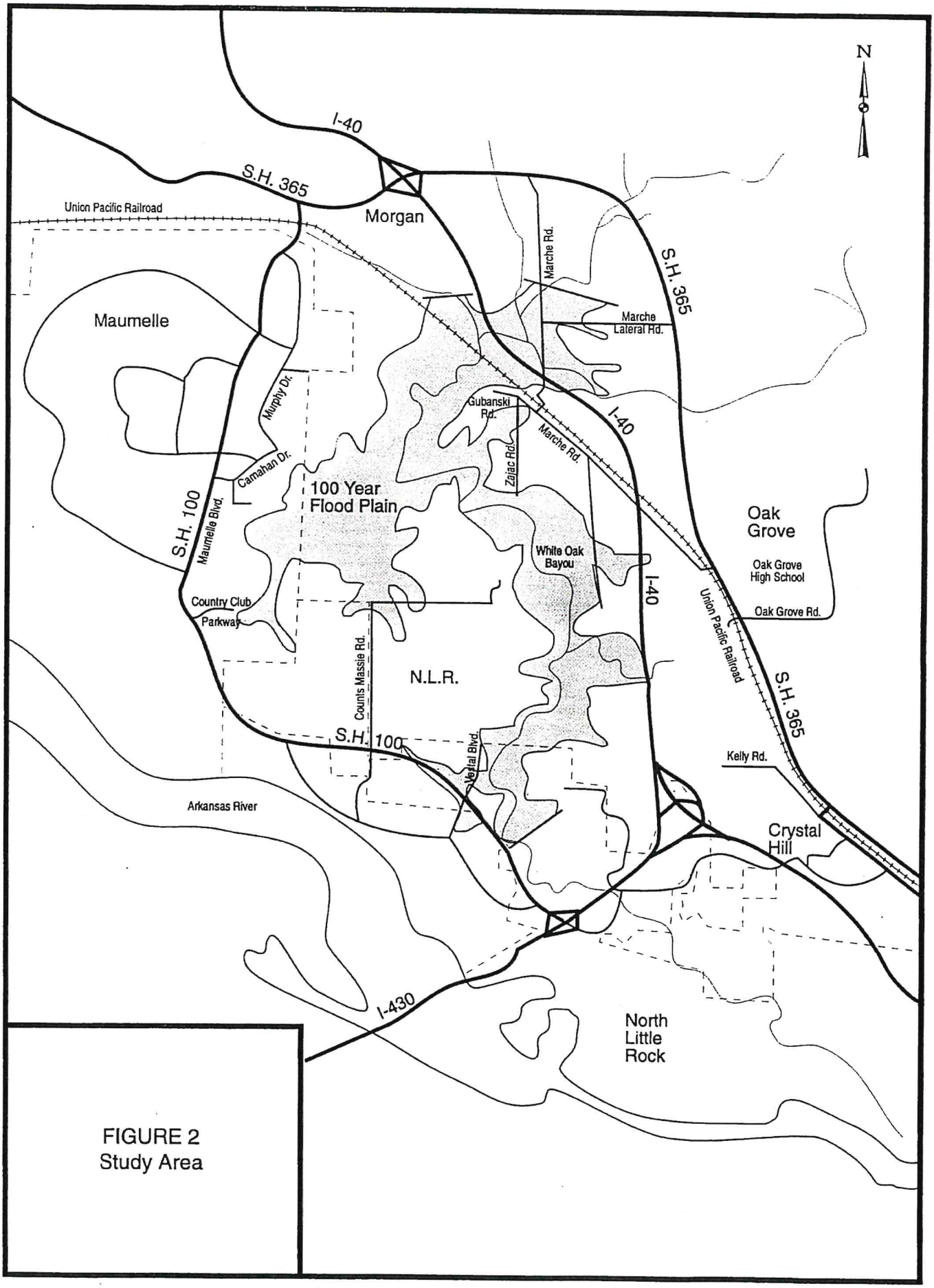


FIGURE 2
Study Area

The area along Maumelle Boulevard that lies between Maumelle's city limits and I-430 is within the city limits of North Little Rock. This area is developing at a moderate pace, with warehousing/commercial development predominating. Traffic counts have increased on Maumelle Boulevard due to growth in the city of Maumelle.

The area between Maumelle Boulevard and I-40 is largely undeveloped and growing slowly. Much of the area is part of the White Oak Bayou floodplain which seriously limits the development potential of a large area east of Maumelle. To the west of the I-40/Union Pacific Railroad overpass lies the community of Marche.

AREA TRANSPORTATION SYSTEM

The study area is served by four major highway routes: I-40, I-430, S.H. 365, and S.H. 100 (Maumelle Boulevard). I-40 is a four lane freeway which passes across the area from southeast to northwest providing a direct connection to North Little Rock and points east, including downtown Little Rock via I-30. I-40 to the northwest is a major cross-country route in addition to providing access to Conway, a rapidly growing city about 15 miles away with a population in excess of 35,000.

I-430 is a six lane freeway which approaches from the south across the Arkansas River and terminates at I-40 near the Crystal Hill community. It provides a direct connection to the fast growing northwestern part of Little Rock, points south, and another route to downtown Little Rock via I-630.

State Highway 365 roughly parallels I-40 on the east, curving to the west at the northern extremity of the study area where it crosses over I-40 at the Morgan Interchange. The highway has two twelve foot lanes and four foot shoulders east of the interchange. West of the interchange, which is the northern entrance to Maumelle, the highway has two eleven foot lanes with four foot shoulders. The section of S.H. 365 that lies between the Morgan Interchange at I-40 and S.H. 100 into Maumelle is scheduled to be widened to 4 and 5 lanes.

State Highway 100 (Maumelle Boulevard) loops around the western edge of the study area, paralleling the Arkansas River and passing northward through Maumelle, from an interchange with I-430 north to S.H. 365 just west of the I-40 / Morgan Interchange. Maumelle Boulevard has four lanes and a median with access in Maumelle limited to significant street intersections. Outside of Maumelle, the median

EXISTING CONDITIONS

Highway Conditions

Highway characteristics in the study area range from two lane rural highways without any traffic control other than stop or yield signs to highways with traffic volumes growing to levels requiring multiple lanes and intersection signalization. Although the routes under discussion are classified as urban routes, they are still making the transition to urban facilities while current levels of development and traffic volumes cause the routes to operate more like rural highways.

The concept of levels of service is commonly accepted as a qualitative measure of the restrictive effects of increased volume within a traffic stream. A level of service definition generally describes these conditions in terms of such factors as speed and travel time, freedom to maneuver, traffic interruptions, comfort and convenience, and safety. Six levels of service (LOS) are defined ranging from LOS A down to LOS F. LOS A represents free flow conditions where individual users are unaffected by the presence of others in the traffic stream. Traffic flow in LOS B is stable, but other users in the traffic stream are noticeable. At LOS C, maneuverability begins to be significantly affected by other vehicles. Level of service D represents dense but stable flow where speed and maneuverability are severely restricted. Traffic volumes approach peak capacity for given operating conditions at LOS E; speeds are low, but uniform, and operations at this level are unstable. Minor interruptions in the traffic stream will cause breakdown in the flow and deterioration to LOS F, which is characterized by traffic volumes exceeding the capacity of the roadway and the unstable stop-and-go traffic stream. LOS D is generally used as a minimum acceptable level of service.

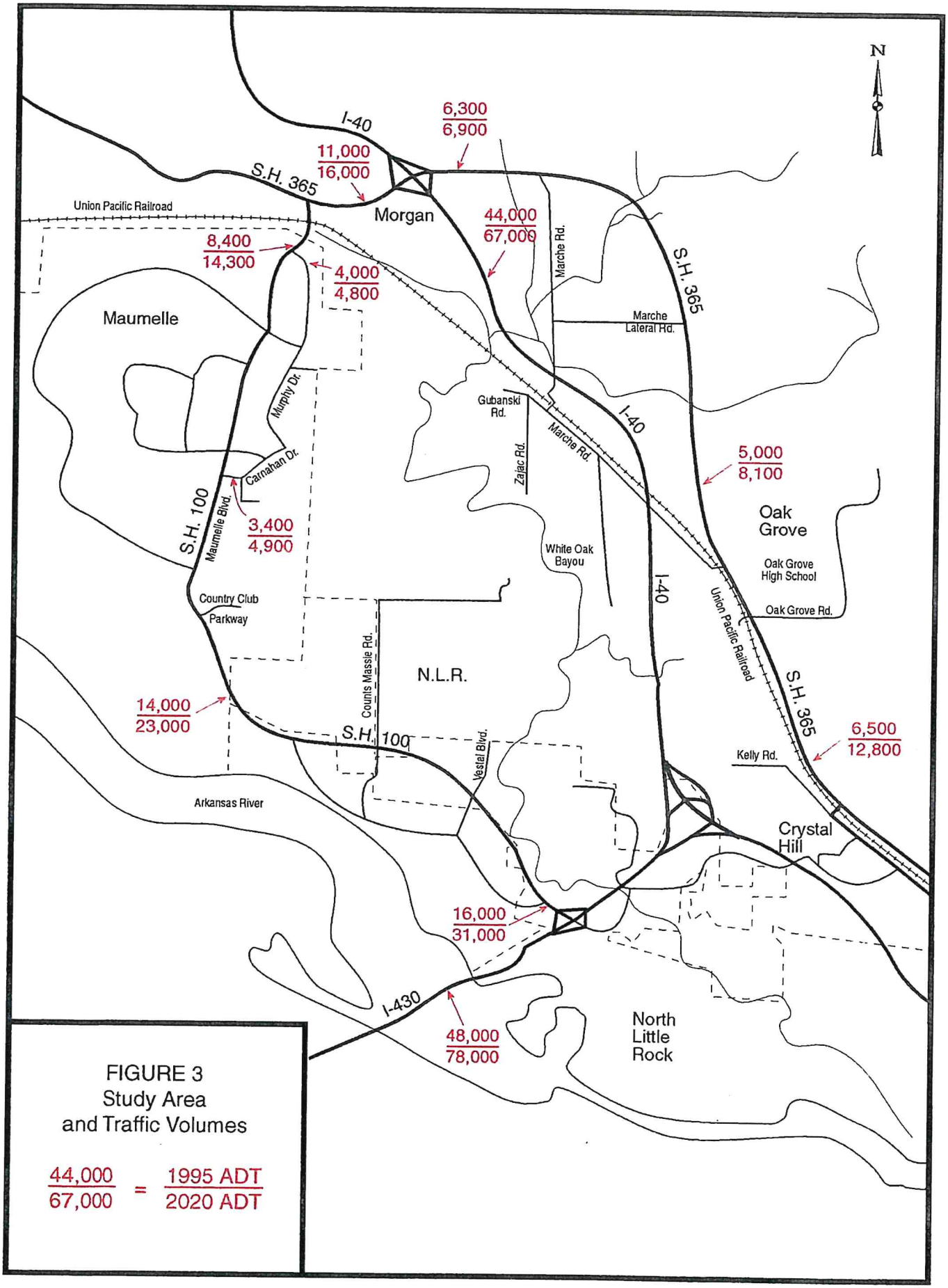


FIGURE 3
Study Area
and Traffic Volumes

$\frac{44,000}{67,000} = \frac{\text{1995 ADT}}{\text{2020 ADT}}$

Railroad Crossings

Railroad crossings are assigned hazard ratings to evaluate the need for various types of crossing warnings and protection devices. The safety devices currently in use at the various existing at-grade crossings range from signs (crossbucks) to short arm gates with flashing lights and bells. A hazard rating formula is used by the Department in order to determine which type of safety device(s) would best handle the safety requirements for a given railroad crossing. The rating is based upon four criteria: highway traffic volumes, railroad traffic volumes, accident data, and local conditions. The formula produces a hazard rating number which ranges from 1 to 125. A value of 1 is considered the least hazardous condition whereas a value of 125 is considered the most hazardous. Table 1 shows the various hazard ratings and their corresponding recommended protection device.

TABLE 2

RAILROAD CROSSING PROTECTION CRITERIA

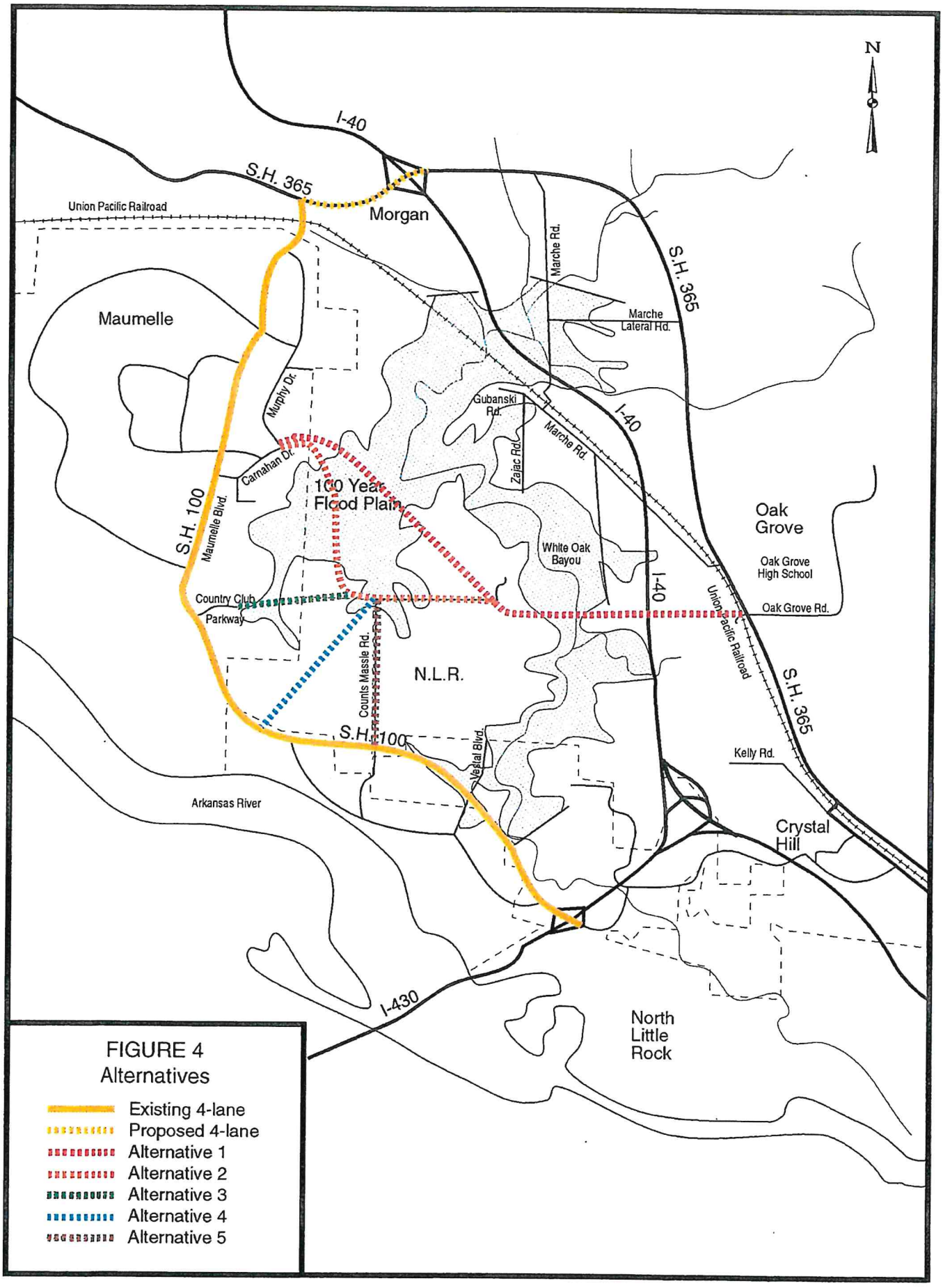
Hazard Rating	Recommended Protection Device
1 through 10	Signs - Plain or Reflectorized
11 through 25	Flashing Lights or Bells - Short Arm Gates for Double Tracks
26 through 50	Grade Separation Where Feasible, Otherwise Short Arm Gates
51 through 125	Grade Separation if Possible, Otherwise the Most Feasible Treatmen

There are four at-grade railroad crossings of the Union Pacific Railroad with through roads in the study area: S.H. 100 at Maumelle's northern entrance, Marche Road at Marche, Marche Road at Oak Grove, and Kelly Road in the Crystal Hill area. In addition, there is an at-grade crossing at Oak Grove Road which is at the location

DESCRIPTION OF ALTERNATIVES

As previously noted, the Marche Interchange Feasibility Study which was completed in 1991 established the need for a direct connection from Maumelle to I-40. The study recommended the extension of Carnahan Drive to Marche Road, improvements to Marche Road and Marche Lateral Road and the construction of interchange ramps at the Marche Road overpass over I-40. However, because of local concerns regarding community disruption and possible impacts on White Oak Bayou, this project has not been pursued. With the closing of the Morgan rest area, five additional alternatives have been identified which would provide a direct connection between Maumelle and Oak Grove (Figure 4). Each new roadway alternative will consist of two 12-foot lanes with 8-foot shoulders as well as various amounts of bridge work. For evaluation purposes, total route length for each alternative is measured from the junction of Carnahan and Murphy to S.H. 365 in Oak Grove.

The 1.7 mi. (2.7 km.) section of new location from the end of Counts-Massie Road, across I-40 and the Union Pacific Railroad to its terminus near S.H. 365 is common to all alternatives. All alternatives assume an at-grade crossing will remain at the current location at Oak Grove Road in Oak Grove. If the facility were open today, estimated traffic would create a calculated hazard rating of 57.6 which warrants a "grade separation if possible, otherwise the most feasible treatment". Because of the close proximity of S.H. 365 with its adjacent commercial establishments and residences, a grade separation at this crossing would seriously disrupt the Oak Grove area and is not included in any of the alternatives. Because of the relatively short distance (approximately 200 feet) between the crossing and S.H. 365, it is likely that a pre-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Arkansas River
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FIGURE 4
Alternatives
Existing 4-lane
Proposed 4-lane
Alternative 1
Alternative 2
Alternative 3
Alternative 4
Alternative 5

Alternative 5 begins at the S.H. 100 / Counts Massie intersection and follows Counts Massie Road to its end, about 2 mi. (3.2 km.) and then follows the alignment common to all alternatives to its end at S.H. 365 in Oak Grove. The entire length of this alternative from Carnahan to Oak Grove is approximately 6.5 mi. (10.4 km.).

The existing 2.7 mi. (4.3 km.) route from the Maumelle Industrial Park to the Morgan Interchange is the shortest for trucks traveling to the north or west. Most trucks originating in the industrial park will continue using the route. However, the route requires trucks to cross the Union Pacific rail line at an at-grade crossing and negotiate through substantial automobile traffic which is developing along the commercial strip on S.H. 365.

Alternative 1 provides the most direct route from Carnahan Drive in Maumelle's Industrial Park to I-40. It is approximately 2.9 mi. (4.6 km.) from Carnahan to I-40 via this alternative. It is approximately 3.5 mi. (5.6 km.) via Alternative 2, the only other alternative originating from the Maumelle Industrial Park, from Carnahan to I-40.. Alternative 1 provides a shorter route for trucks traveling to the east although this route adds about 3.8 mi. (6.0 km.) to the trip for vehicles headed to the northwest. All other alternatives add even more distance to the route taken by vehicles traveling to the northwest. Alternatives 3, 4, and 5 do not connect to the Maumelle Industrial Park, therefore requiring trucks to continue driving along commercial and residential areas along S.H. 100.

For trucks wishing to travel south on I-430, Alternative 1 would cause an approximately 0.4 mi. (0.6 km.) increase in driving distance as opposed to the original route that travels down Maumelle Boulevard. Though a more direct route, trucks traveling down Maumelle boulevard will encounter increased congestion as commercial

FUTURE AREA ROAD NETWORK

The Central Arkansas Regional Transportation Study's (CARTS) Metro 2020 Metropolitan Transportation Plan was adopted in 1995. There are several proposed roadways in the area which will change traffic patterns and affect the demand for an interchange at the Morgan rest area (Figure 5)

There are two planned projects which will significantly affect this area. The North Belt Freeway will extend I-430 to the northeast across S.H. 365 just west of the Kelly Road crossing of the Union Pacific Railroad. An interchange at that location would provide accessibility to the interstate system for the Oak Grove area which now has poor freeway access. Also, the widening of S.H. 365 from S.H. 100 to I-40 to four lanes with a continuous left turn lane should significantly improve access to the interstate system for Maumelle residents.

The Maumelle and North Little Rock Master Street Plans have several proposed connections between the Marche area and Maumelle Boulevard to the south. Two of the more significant connections would be minor arterial routes joining Zajac Road to a new Vestal Boulevard at the southern part of the study area and an east/west route connecting Country Club Parkway via Counts Massie Road to Short Marche Road. The small east/west section of road connecting I-40 near the Morgan rest area and S.H. 365 is shown on the Maumelle Master Street Plan but not on the North Little Rock Master Street Plan. These routes are not identified in the financially constrained CARTS Metro 2020 Metropolitan Transportation Plan as funded projects.

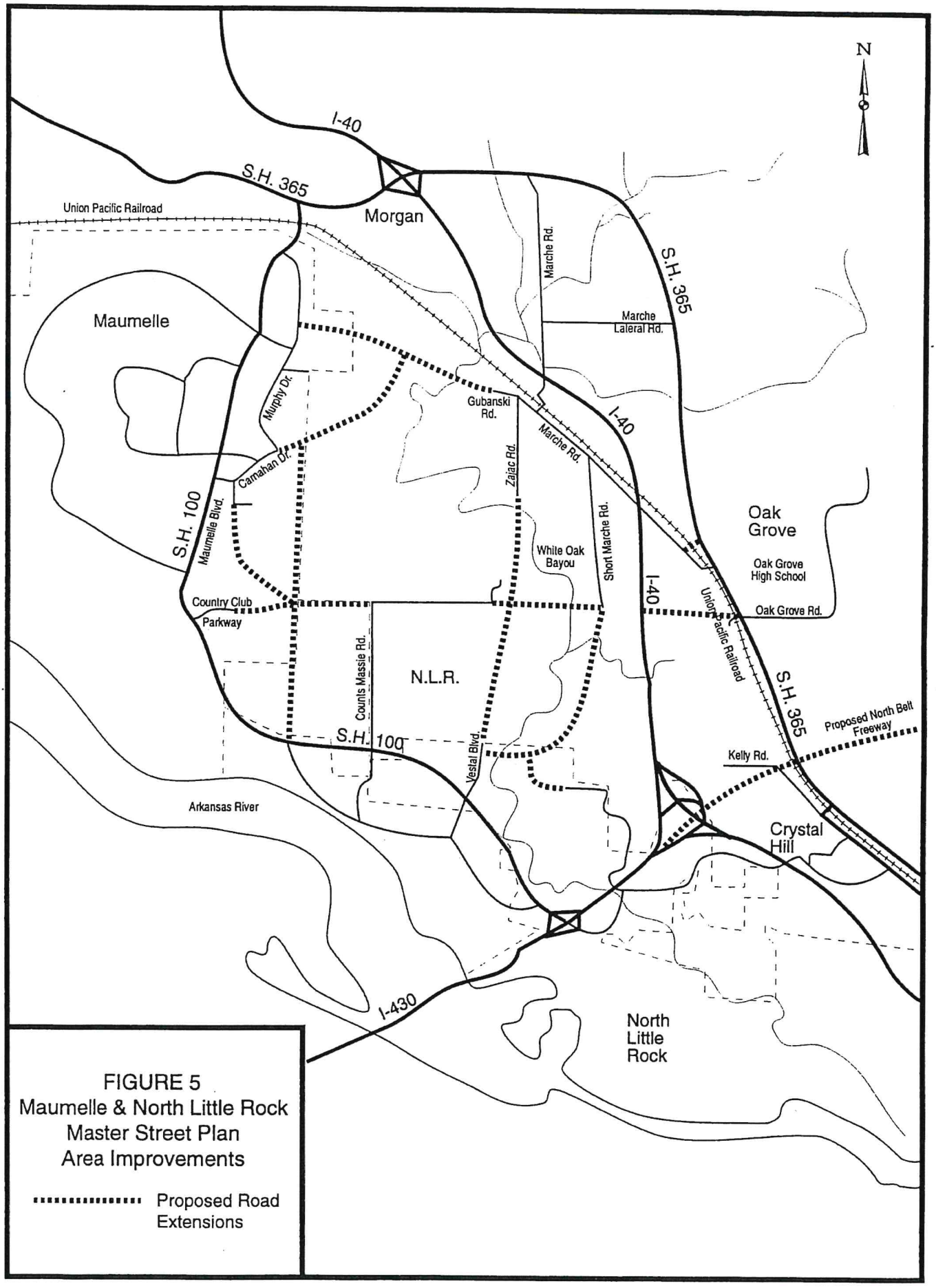

FIGURE 5
Maumelle & North Little Rock
Master Street Plan
Area Improvements

Proposed Road Extensions

ENVIRONMENTAL CONSIDERATIONS

All alternative routes will have some wetland impact ranging from 1,500 to 3,800 linear feet of encroachment. A review of early maps showed that the Corbin Cemetery lies very near the route common to all alternatives just west of White Oak Bayou. A field check revealed that the abandoned cemetery is situated on an upland ridge that protrudes out into the White Oak Bayou. The upland edges bordering the White Oak bottoms appear to have the greatest potential for containing archeological sites. Because all alternatives share the same route crossing White Oak Bayou and the adjacent uplands, none would appear to be more favorable than the others in terms of archeological impacts.

The route with the least wetland impact is Alternative 3 (1,500 ft.). This alternative, however, is the alternative with the greatest noise impacts. Highway traffic, including trucks, would be routed into a residential development. This residential development, the Country Club of Arkansas, is expanding at a considerable rate, increasing the number of receptors that would be affected. The extent of impacts, including noise, social disruption, and safety considerations, as well as the incompatibility of truck traffic and residential streets, eliminates Alternative 3 from further consideration.

Alternatives 4 and 5 have the next lowest amounts of impacted wetland at 1,750 and 1,600 linear feet respectively. Both alternatives utilize existing roadway (Counts Massie Road) in their alignments. These two alternatives would decrease existing noise impacts much less than Alternatives 1 and 2 because they require trucks to travel past residential areas on S.H. 100.

TRAFFIC FORECAST

One important factor in the evaluation of proposed alternatives is the ability of the chosen route to provide adequate service for future traffic needs, especially heavy truck traffic. Currently, approximately 800 trucks per day travel along routes in Maumelle. Continued expansion of the Maumelle Industrial Park will further increase congestion pressures on existing access routes. Future traffic in the study area has been analyzed using the CARTS 2020 traffic forecast model utilizing population and employment forecasts developed by Metroplan. Table 3 lists traffic forecasts for selected road segments with the proposed alternatives, as well as the previously studied Marche alternative, in place.

TABLE 3

2020 TRAFFIC FORECASTS

Road Segment	No-Build	Alt. 1	Alt. 2	Alt. 4	Alt. 5	Marche Alt.
S.H. 365: W. of I-40	16,100	13,900	15,100	16,300	16,400	15,000
S.H. 365: E. of Oak Grove	12,800	13,500	13,300	12,000	11,800	14,500
S.H. 100: S. of S.H. 365	14,400	12,400	13,600	14,600	14,700	13,500
S.H. 100: W. of I-430	31,000	24,300	26,400	29,600	30,000	27,200
North Belt: S. of S.H. 365	38,000	32,500	32,300	38,000	38,400	31,200
I-40: S. of S.H. 365	67,100	66,100	66,700	69,200	69,200	68,200
Proposed Rd.: W. O. Bayou	--------	9,100	5,700	800	350	4,200
Proposed Rd.: East of I-40	--------	8,100	7,400	6,800	6,500	---------

A route across White Oak Bayou to a new interchange would provide an optional route for traffic in the area and would help keep traffic volumes on existing routes in the study area from reaching unacceptable levels. Unless a new location route is

COST ESTIMATES

The estimated cost of the various alternatives is listed below in Table 4. These costs include $4 million for the construction of an interchange on I-40 at the Morgan rest area as well as $250,000 for the cost of improving the at-grade railroad crossing in Oak Grove (The cost estimate for the 1991 Marche study has been updated to reflect current construction costs).

TABLE 4

MAUMELLE / OAK GROVE I-40 INTERCHANGE
COST ESTIMATES

Alternatives	Construction	Right-of-Way	Relocation	Utilities	Total
Marche Alt.	$8,406,000	$1,320,000	$ 248,000	$ 319,000	$10,293,000
Alt. 1	$9,953,000	$ 510,000	$ 0	$ 394,000	$10,857,000
Alt. 2	$10,314,000	$ 540,000	$ 0	$ 289,000	$11,143,000
Alt. 4	$9,754,000	$ 525,000	$ 0	$ 287,000	$10,566,000
Alt. 5	$9,754,000	$ 825,000	$ 77,000	$1,250,000	$11,906,000

COMPARISON OF ALTERNATIVES

A comparison of alternatives must focus on the relative practicality of the alternatives as routes for heavy trucks and other vehicles traveling to I-40 from Maumelle's developing industrial area to the west as well as the Oak Grove community to the east. The efficiency of each alternative in transporting children between Maumelle and schools in Oak Grove must also be examined

Alternative 3 would have routed truck traffic into a residential development. The extent of noise impacts, social disruption and safety considerations, as well as the incompatibility of truck traffic on residential streets eliminated this alternative from consideration.

Alternatives 4 and 5 would require trucks to continue using S.H. 100 because neither alternative connects directly to the Maumelle Industrial Park. These two proposed routes also do not give trucks a direct connection to I-40 and would cause truck traffic to continue passing residential areas on S.H. 100. It was also determined that neither alternative would significantly reduce traffic stresses on neighboring routes in the study area and would have minimal use as through routes. These two alternatives would not provide a significant improvement in the transportation of children to schools in Oak Grove. Due to their inability to effectively alleviate the traffic problems in the study area, Alternatives 4 and 5 were removed from consideration as viable remedies for the stated problem.

Alternatives 1 and 2 were the only alternatives determined to merit added investigation as to their ability to attain the previously stated objectives. These two alternatives have shown that they will alleviate some congestion from area roads and both provide a more direct route to I-40 for trucks and to schools in Oak Grove for

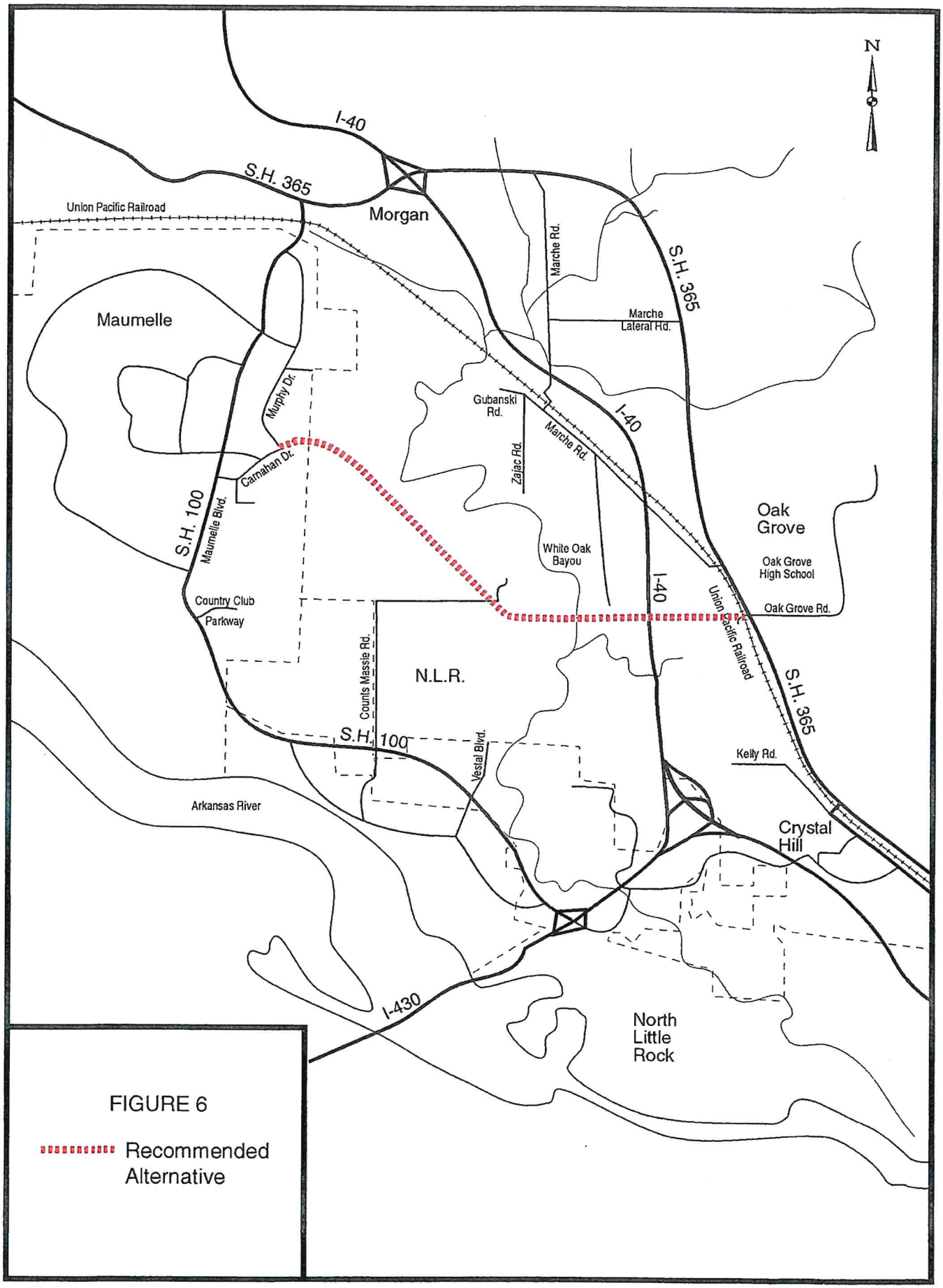
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FIGURE 6
Recommended Alternative

FEDERAL APPROVAL OF INTERSTATE ACCESS

The Federal Highway Administration (FHWA) has had some concern about allowing additional access points to the Interstate Highway System. The FHWA has stated, "It is in the national interest to maintain the Interstate System to provide the highest level of service in terms of safety and mobility. Adequate control of access is critical to providing such service. Therefore, new or revised access points to the existing Interstate System will be considered for approval only if:

1. It is demonstrated that the existing interchanges and/or local roads and streets in the corridor can neither provide the necessary access nor be improved to satisfactorily accommodate the design-year traffic demands while at the same time providing the access intended by the proposal.
2. All reasonable alternatives for design options, location, and transportation system management type improvements have been assessed and provided for if currently justified, or provisions are included for accommodating such facilities if a future need is identified.
3. The proposed access point does not have a significant adverse impact on the safety and operation of the Interstate facility based on an analysis of current and future traffic...
4. The proposed access connects to a public road only and will provide for all traffic movements...
5. The proposal considers and is consistent with local and regional land use and transportation plans...

CONCLUSIONS AND RECOMMENDATIONS

An investigation of the road network in the Maumelle/Oak Grove area indicates that existing and planned facilities can adequately address forecasted traffic. However, if forecast growth has even a moderate increase, additional access to the area will be needed. Growth and expansion of industries in the Maumelle Industrial Park has caused an increase in the amount of trucks traveling through the city. Because of the amount of traffic generated by commercial development along the approaches to Maumelle and residential development along S.H. 100 in Maumelle, a need for the removal of as much through truck traffic as possible from S.H. 100 has evolved. In addition, the forecast for total traffic has indicated that the I-430 / S.H. 100 interchange will experience significant congestion which will require upgrading the facility.

Estimates of current traffic which would use the facility indicates that there is an existing demand for the proposal. There is adequate spacing between the I-40 interchange proposed for the alternatives at the Morgan rest area and adjacent interchange ramps to meet Federal requirements. Alternative 1 is the superior route to use in order to minimize the amount of heavy truck traffic on Maumelle Boulevard (Figure 6). This route gives the most direct access to the Interstate System from the Maumelle Industrial Park. With a cost of $10.9 million, Alternative 1 is slightly less expensive than Alternative 2 and has a higher B/C ratio (2.8) than Alternative 2 (1.9). Alternative 1 affects a significantly smaller amount of wetland as well. Traffic forecasts also show that Alternative 1 would handle nearly twice the traffic that would use Alternative 2 and it would more effectively reduce the congestion problems faced by the area road network.