TECHNICAL MEMORANDUM

Diagnostic Studies of Highway Visual Communication Systems

HPR - 2(108)

STUDY SITE NO. 7

U.S. Highway 80-82, Southern Bypass, Montgomery, Alabama

TM 2 (108)-7

INTRODUCTION

The "Diagnostic Studies of Highway Visual Communication Systems" research project has been designed to: (1) review the current practices in visual communications with the automobile driver using a multi-discipline team approach; (2) identify the deficiencies in these practices; and (3) recommend changes in the existing standards. Pilot studies were conducted in three states (Arkansas, California, and Maryland) in order to develop the diagnostic study techniques and to acquaint the members of the Project Policy Committee with these procedures. This memorandum is a detailed report on the results of the diagnostic team review of sites within these states. The opinions expressed are those of the diagnostic team and not the recommendations of the research staff. The results of pilot studies and the improvements recommended by the staff will be combined as an interim report to be published in the near future.

DESCRIPTION OF STUDY PROCEDURES

The diagnostic evaluation of the study site was conducted using both the driver interview and the open-end questionnaire techniques. Each member is asked to drive a route following the instructions of the interviewer. The route included short sections on adjacent facilities as illustrated in Figure 1. The driver was asked to comment on the roadway section as he drove, and these comments were recorded. The interviewer asked questions only as necessary to keep the conversation productive. At the conclusion of each driving phase (night and day), the subject was asked to complete a questionnaire. The interviews and the comments on the questionnaire are the basis of the material presented in this memorandum.

STUDY SITE CHARACTERISTICS

GENERAL CHARACTERISTICS

Study Site No. 7 is a portion of the Southern Bypass in the city of Montgomery, Alabama. The study site begins on a part approximately one-quarter mile west of Mobile Highway intersection and runs eastward to approximately one-half mile east of the U.S. 231 (Troy Highway) intersection. A portion of the study section is the city of Montgomery. The major segment is in Montgomery County.

The field studies on this site were conducted during the week of April 28 to May 2, 1969. The weather throughout the study period was clear and mild. The diagnostic team was composed of eight team members.

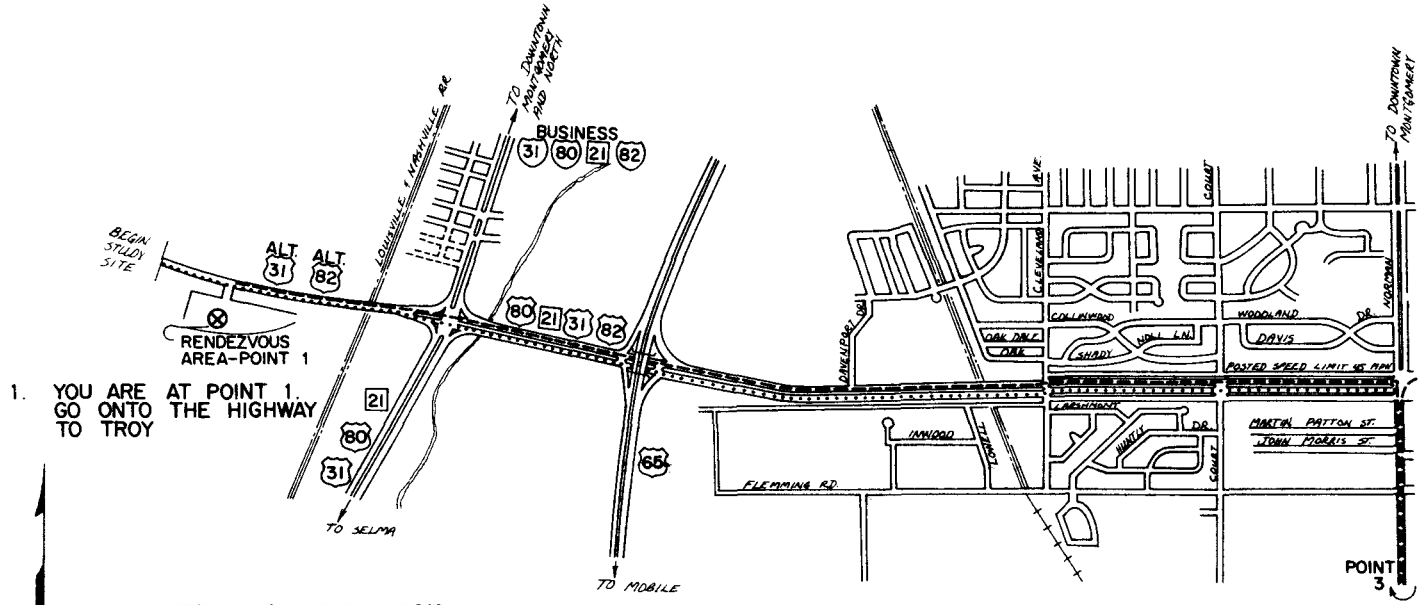
An operations engineer from Wyoming Highway Department
A maintenance foreman from Alabama Highway Department
A maintenance crewman from Alabama Highway Department
A traffic officer from the City of Montgomery
A state trooper from Alabama Highway Patrol
A professional bus driver from Selma, Alabama
A traffic engineer from Alabama Highway Department
An assistant research development engineer from Alabama Highway Department

The study section could best be classified as s suburban arterial street with the general characteristics of an expressway. The basic study section was seven miles long and consisted of a basic four-lane divided cross section with two frontage roads along part of the total length. The study section included eight signalized intersections. The most common type of control for the signalized intersections was the volume-density control system. There was one grade separation structure separating the study section from Interstate 65 southbound toward Mobile. Signalized intersections had left turn bays and separate turn phases. In most cases free right turn lanes were also provided. There were very few openings through the separator between the main lanes and the frontage roads except at the intersections. There were, however, several openings through the median for U-turning maneuvers and for access to property along sections with and without the frontage roads.

The type of development along this study section varied from undeveloped to intensely developed. There is some residential development particularly on the frontage roads and rather large shopping areas that would generally be classified as a major suburban strip commercial development. A strip map of the study section indicating the study routes is presented in figures 1 and 2.

TRAFFIC CONTROL CHARACTERISTICS

MARKINGS--The pavement markings for this section of roadway consisted of normal lane lines. No edge lines were provided, except at the major intersections and in a few cases to channel traffic around a specific obstruction. Word messages were used very sparingly. Pavement arrows were, however, commonly included to direct traffic into the proper turn lanes.



1. YOU ARE AT POINT 1.
GO ONTO THE HIGHWAY
TO TROY

NOTE: AN OIL COMPANY ROAD MAP WAS AVAILABLE TO THE DRIVER AT ALL TIMES.

..... OUTBOUND
--- INBOUND

3. YOU ARE AT POINT 3.
GO ON U.S. HIGHWAY 31
ALTERNATE NORTHBOUND

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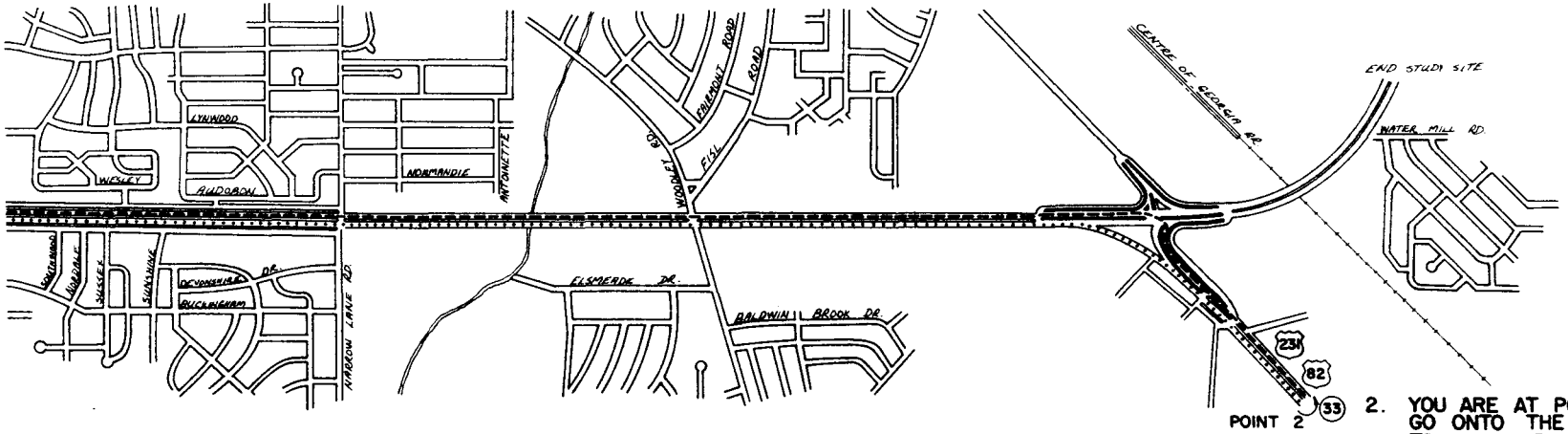
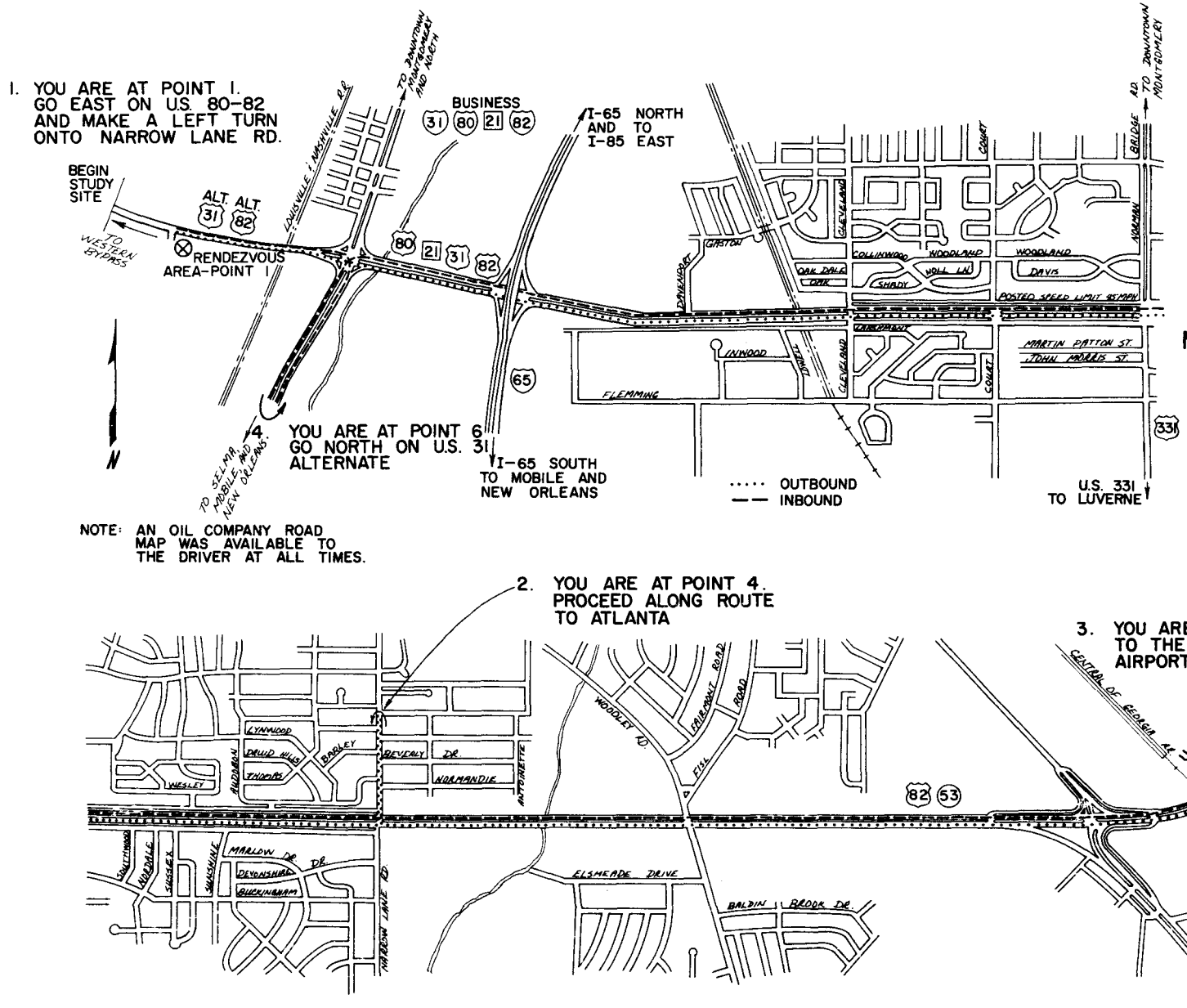
MONTGOMERY, ALABAMA
ROUTE NO. 1



2. YOU ARE AT POINT 2.
GO ONTO THE HIGHWAY
TO LUVERNE



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STUDY SITE NO. 7
U.S. 80-82 SOUTHERN BYPASS
MONTGOMERY, ALABAMA
ROUTE NO. 2

SIGNING -- The unsignalized intersection approaches to the Southern Bypass, were generally controlled by "STOP" signs. In a few instances local drivers from major parking facilities, such as hospitals, were not controlled by any type of regulatory signing. The free right turn lanes at the signalized intersections were controlled by a regulatory sign, black letters on a white background with one letter in red with the message "STOP ON RED, TURN WHEN CLEAR." At the intersection of Mobile Highway and Southern Bypass, the turn lanes were controlled by "YIELD" signs. The study section was relatively free of regulatory signing, with the exception of posted speed limits at frequent intervals.

The directional signing was generally mounted on the right side of the roadway and consisted of both destinations and route numbers. On one of the approachs to the Southern Bypass, ten route markers and their supplementary directional arrows were combined into a single cluster. Also, the similarity of route numbers was a considerable problem. U.S. Highway 30, and U.S. Highway 30 Business, U.S. 80, and U.S. 80 Business, U.S. 231, U.S. 331, Alabama 21, and Alabama 21 Business all are signed on the Southern Bypass. Advance street name signs are provided for the major signalized intersections. These advanced plates carry a message "X STREET NEXT EXIT."

The approaches to the signalized intersections have advance warnings several hundred feet in advance of the intersection. The standard warning sign "SIGNS AHEAD" was used with the supplementary plate over the warning sign that had black letters on the yellow background with the word "INTERSECTION." When the approach to the signalized intersection was not visible to the driver, supplementary flashers were added to the warning sign installation in order to draw greater attention to the warning device.

SIGNALIZATION -- The study section contained seven signalized intersections which were predominantly volume-density controlled with span wire mounted signal heads. The green arrows were used for both the through movements and the left turn movements. The arrows and the amber ball had an eight inch lense while the red ball had an eight or twelve inch lense depending upon the particular intersection involved. Two signal heads were used per approach with one additional signal head controlling the left turn maneuver where special left turn lanes were provided.

ILLUMINATION -- The Southern Bypass does not have fixed overhead lighting but is provided with safety lighting at the signalized intersections. A lighting project has been approved for this study section, and it is expected to be continuously illuminated in the very near future.

TRAFFIC CHARACTERISTICS

The traffic volume on the Southern Bypass is estimated to be 30,000 vehicles per day. The design volume for this facility is 10,000 vehicles per day. In addition, the percentage of heavy trucks using the facility is very high. During the study period, there were approximately 12% heavy trucks using the Southern Bypass.

The posted speed throughout the study section is 45 mph. The running speed was very close to that 45 mph value with the eighty-fifth percentile speed between 50 to 55 mph. There did appear to be a problem of slower moving vehicles occupying the left hand lanes.

ACCIDENT CHARACTERISTICS

The intersections of Mobile Highway with the Southern Bypass and Norman Bridge Road with the Southern Bypass contibuted about 51% of all the accidents during the previous three year record. The predominant type of accident was the rear-end collision, but the right-angle collision created by violation of the red signal was also a prevalant cause. The apparent accident rate for this study section was 10.6 accidents per million vehicle miles (mvm), and the apparent fatality rate is 0.21 deaths per mvm.

SUMMARY OF THE DIAGNOSTIC TEAM REVIEW

Study Site 7; U.S. Highway 80-82; Montgomery, Alabama

The diagnostic team, in general, stated that the study section was relatively easy to drive, that there were no major conflicting flows of any consequence, and that the facilities were generally of a high type. The complexity of the signalized intersections due to the use of two-way frontage roads on both sides did present a few problems but not of a severe nature, probably due to the relatively low volumes using them.

Suggested Design Improvement--The diagnostic team concluded that the turn lanes, both the right turn lanes and the left turn lanes, were too short and needed to be extended. In the case of the right turn lane, a barrier curb was used in several cases to prevent direct access to the turn lane from some distance upstream. It was suggested that this curb be rebuilt to provide for a longer right turn lane and thus eliminate the problem at or near the intersection proper. The left turn lanes were also deemed to be too short, and the entry to the turn bay was too short for a natural maneuver. The use of dual turns was suggested for several of the signalized intersections to take greater advantage of the available green time at the signal. Regarding the grade, which in two instances was severe due to the overpass structures at railroads, it was concluded that very little could be done at this time with the grade problem. The use of the warning signs "SIGNALS AHEAD" with the flashing amber beacon seemed to be satisfactory for alerting the driver to the fact that a signal exists, that he can not see due to the grades themselves. There was some concern on the part of the drivers while traversing this section of roadway for the lack of adequate sight distance or the possible lack of adequate sight distance on the very sharp vertical curves.

The lane drop or roadway narrowing at the west end of the study section produced a general consensus that a more positive right-of-way assignment in the merging area should be provided. It was suggested that a combination of signing and markings would be best suited for this job. An edge line tapered into the bridge structure and a sign either on the left or right as deemed desirable by traffic engineering study such as "MERGE RIGHT" or "MERGE LEFT," should be provided to give a more positive direction to the merging maneuver that is required.

The narrow bridges at the railroad overpass structure were a problem in both cases, and it was suggested that an edge line should be carried not only to, but also across the bridge structure in order to delineate the edge of the traveled-way for the driver. It was also suggested that hazard boards be placed at the end of bridges in order to more clearly identify the bridge rail for the driver in wet, rainy weather or in foggy conditions.

It was suggested that the locations of the signal poles and power poles along this facility did constitute a substantial hazard and that these poles might be relocated some distance from the traveled-way and still provide equally efficient operation. If it were not feasible to relocate the poles,

it was suggested that reflective material (either the coat-it type spray material or an adhesive strip) be added to all of the signal poles and power poles immediately adjacent to the traveled-way.

The frequency of median openings along the study section was of considerable concern to all of the diagnostic team members. It was suggested that the number of openings be reduced to a minimum and that the provision be made to minimize the number of U-turnings made at these points.

The use of slip ramps to and from the main lanes to the service roads was suggested as being very useful in eliminating congestion in and around the intersections. It was pointed out by several team members that this would have to be associated with the change in operation from two-way to one-way frontage road operation. It was suggested that this should be done, if it was deemed feasible by the State Traffic Engineer.

It was a general consensus of the diagnostic team that guardrails should be provided on railroad overpass structures where very severe drops exist on the right edge of the roadway at this time. These guardrail installations should be integrated with the bridge rail to provide a positive deterrent to a vehicle leaving the roadway on these high fills.

Signing--With regard to the advanced warning of hazards in this study section, the diagnostic team concluded that the warning signs for signalized intersections ahead were unnecessary in many cases. It was suggested that all the advance warning signs be reevaluated and appropriate action be taken for their removal, if they did not, in fact, fulfill a real need. The team also suggested hazard markers be placed at the piers at the interchange with Interstate Highway 65 and at the bridge rails at the two overpass structures. It was also the consensus of opinion that the warning sign for the paint test section was unnecessary and that the average driver would not be startled by transverse paint lines of various colors on the pavement.

With regard to the directional signing, many of the team members noted the overlapping of route numbers on this section of roadway and the use of the business route shields. It was generally the consensus of opinion that the business route shields of varying colors were of limited value to the driver and that a simple directional sign to "DOWNTOWN" Montgomery would probably have been more appropriate and less confusing. The law enforcement representatives on the diagnostic team were strongly in favor of overhead signing at the major intersections. It was their belief that right side signing was not sufficient for a facility with a 45 mph operating speed and a high percentage of trucks. The possible use of pavement markings as an alternate to overhead signs installations was considered by the team, and it was recommended that overhead sign installation be used in advance of major intersections, in order to give the driver adequate warning with respect to turning maneuvers and lane assignments.

The advance street name signing system was reasonably good but suffered from two rather severe limitations. One was the truck blockage problem associated with the large number of trucks using this facility, and the other was the lack of information at the intersection proper. It was suggested that the advanced street name signs be placed both at the left and right (i.e., both the right side and the median side) in advance of each major intersection to overcome (or at least minimize) the truck blockage problem. It was also suggested that a street name plate be added at the intersection. This plate could probably be relatively small, say a seven or eight-inch letter height and should probably be mounted on the right far side of each approach. There was also a general feeling that the advance street name plates could stand to be a somewhat larger size (four-inch letters are currently in use).

There was considerable discussion of the need for signing for special facilities, in this particular case, the signing to a major hospital. The general consensus of the diagnostic team was that a sign should be placed immediately opposite the emergency entrance to the hospital on the major street. It was not, however, suggested that routes to the hospital be trailblazed, unless it had previously been established that twenty-four hour emergency service would be available throughout the year.

Pavement Markings--The team recommended the use of edge lines throughout the study section to improve the delineation between the main lanes and the shoulder and also to identify the turning roadways. It was also suggested that the turn arrows in use on these facilities were somewhat abbreviated and therefore, very difficult to interpret. The shaft of the arrow should be extended somewhat and should be placed parallel to the lane line. It was also the general consensus of the team that word messages were of very limited value and were difficult to enforce. They might be acceptable as supplementary device for other signing, but in general application, they should be limited.

Delineation--Several members of the diagnostic team felt that some delineation to the approaches to the bridges on the railroad overpasses was necessary. However, they felt that the edge line might be sufficient, especially if a hazard board is used at the bridge end proper. They suggested that if the edge line did not appear to satisfactorily solve the problem or if a real problem still existed, a tapered delineator system into the bridge rail would be appropriate.

More positive delineation of the median openings was considered desirable and should be accomplished by the use of post-mounted delineators, probably with a thirty-six inch mounted height mounted in a U-shape around the nose of the dividing island of the median.

The bridge piers at the interchange with Interstate 65 constitute a substantial hazard and should be protected by guardrails. The guardrail

should have the reflectorized tabs in order to positively identify its location and to guide the traffic through the opening under the bridge structure. The proximity of the ditch in the separator between the main lanes and the frontage facility and the fire plug located in that separator were not considered to be substantial hazards primarily due to the rather wide approximately eight-foot shoulder which is provided on the right. It was the opinion of the diagnostic team that an edge line to positively delineate the shoulder from the thru lanes would be sufficient.

Illumination--The diagnostic team's evaluation of the illumination of this section of roadway deemed it to be inadequate for the posted speed of 45 mph at night. The existing illumination was primarily of the sport type at the major signalized intersections. The glare from roadside development and the glare from opposing traffic on the frontage facility and the opposing lanes made it very difficult to identify the roadway ahead. It was suggested that continuous illumination would be very useful to this section of roadway in assisting the driver, in identifying critical points, and in maintaining his view of the road ahead.

Slow Moving Traffic--The police officers on the diagnostic team noted that there was a considerable amount of very slow moving traffic in the left hand lane which resulted in a large number of lane changes passing on the suggestion that a minimum speed of some type be posted, such that it would be possible to cite anyone moving excessively slow in the left lane. After considerable discussion, it was recommended by the diagnostic team that the regulatory sign "SLOWER TRAFFIC KEEP RIGHT" would be appropriate for this installation and would permit enforcement of an unusually slow speed in the left hand lane. It was recommended by the team that this type of signing be installed as soon as it was practical to do so.

APPENDICES

APPENDIX "A" -DESCRIPTION OF STUDY PROCEDURES

APPENDIX "B" -SUMMARY OF THE DIAGNOSTIC QUESTIONNAIRES

APPENDIX "C" -SUMMARY OF DRIVER INTERVIEWS

APPENDIX "A"

DESCRIPTION OF THE STUDY PROCEDURES

The diagnostic evaluation of a study is conducted in four separate phases:

a. Preliminary session
b. Day driving phase
c. Night driving phase
d. Diagnostic team review

The preliminary session is designed to introduce the interdiscipline team to the objectives of the study and to explain the study procedures. The diagnostic questionnaire is presented to the team and discussed with them. The explanation of the questionnaire concentrates on the fact that it is not designed to obtain a particular response from them, but rather it is designed to direct their thinking into a particular area and thus elicit comments which the individual might care to make.

The day phase of the on-site review begins on the afternoon of the first day of the study. The diagnostic team members are transported to the rendezvous point at one end of the study section. Two cars are used in the driver interviews and, upon arrival at the study site, the number one drivers begin their driving runs with the other team members remaining in a car stationed at the rendezvous point. The driver is given instructions well in advance of the required maneuver, and his comments regarding the communication systems provided are recorded on a portable tape recorder. The comments are tied to the roadway through reference markers located at the roadside. The marker numbers are read and recorded on tape as each is passed. After completion of the driving run, the team member moves to an observer position, and the second driver begins his driving run. A different route is driven by the second driver. Errors made during the driving phase are corrected as soon as it is practical to do so. When both the driver and the observer runs are completed, the team member is asked to complete the diagnostic questionnaire on the daylight phase. The process is repeated until all team members have served as a driver and as an observer.

The night phase is conducted in the same manner as the day phase and is held on the evening of the first day of the study.

The morning of the second day of the study is devoted to a team review of the study site. Problem areas are identified, and suggestions regarding possible solutions are discussed. The team is not asked for a consensus of opinion on the improvements which should be made on the study site. Rather, all ideas are explored regardless of how many or how few of the team members might support them.

The comments made on the diagnostic questionnaire and the summaries of the driver interviews are the basis of the Technical Memorandum on the study site, which is the formal report of the opinions expressed by the team.

APPENDIX "B"

SUMMARY OF THE DIAGNOSTIC QUESTIONNAIRES

Study Site 7; U.S. Highway 80-82; Montgomery, Alabama

The following is a detailed presentation of the comments made by the diagnostic team members on the diagnostic questionnaire.

DAY PHASE

Question: Did you, as a driver, lose visual contact with the roadway at a distance less than your desired distance at any point along the vehicle's projected travel path?

Yes	No	Comments
	x	The thru lanes are properly situated and in most cases properly marked.
	x	
	x	
	x	As far as roadway visibility is concerned, I had no difficulty. The only thing was that some of the side roads, because of the relative flatness, were hard to see until only a short distance away.
x		When going over a steep bridge, you lose visual contact of the road.
x		At Cleveland Avenue railroad overpass.
	x	Going over the overhead bridge; needs a bigger warning sign (Cleveland Avenue).
	x	Had no awareness of any loss in surface visibility.

What treatment, if any, would you recommend to improve this situation?

Maybe paint or repaint the arrows in the thru and turn lanes.

Better side road warnings.

Have separate bridges.

I don't know of any.

				A bigger sign before crossing over this bridge would help or a caution light with warning signs (flashing amber).
				Do not feel that any treatment is necessary.

Question: How would you evaluate the importance of being able to continuously see the roadway surface while driving?

☐ of little importance ☐ of some importance

☐ relatively important ☐ critical problem

LI	OSI	RI.	CP	Comments
		x		I feel that it is important, because this particular course is so congested.
		x		Depending upon location, speed, etc.
		x		It is most important to ascertain your travel path at all times to enable the driver to make proper decisions.
			x	
			x	
		x		So you wouldn't drop off on the shoulder and lose control or drop far enough back behind so you can see all signals.
		x		In past experience, have been uneasy about the surface visibility particularly where there is a steep vertical curve and a sharp horizontal curve together.

Question: Do you, as a driver, feel that the turn lanes are obvious in time for a reasonably alert driver to make a smooth, natural maneuver into them?

Yes	No	Comments
	x	But in some places, yes. There should be more and plainer advance warnings.
	x	The turn lanes are not long enough; this coupled with no or inadequate warning presents a problem.
	x	Considerable improvements need to be made in developing left turn bays, and adequate markings should be applied.

Yes	No	Comments
		On some intersections not enough warning is given to warn motorists as to what the next exit is to enable them to get into proper lane for a turn.
	x	On the Bypass, some of the turning lanes are not long enough.
x		But not at Woodley and Narrow Lane Roads.
	x	Some of the turn lanes have too short a notice before you approach them.
x		Provided vehicle is in lane adjacent to turn lane. Turn lane appears too short.

Question: Does the driver appear to have difficulty in maintaining the vehicle within the marked lane (i.e., does he tend to move over into adjacent lanes)?

Yes	No	Comments
	x	There is ample room as far as width is concerned.
	x	Road surface conditions cause some wandering. Edge lines would help.
	x	
	x	
	x	When the striping is not bright enough, I judge by the edge of the pavement.
	x	
x		Some of the left turn lane arrows are too short and not big enough. You have to get just about on top of them to tell what they are. Too much curve in tail of arrow.
	x	Did not notice any difficulty of this kind.

Question: Are the through lanes clearly identifiable from the parking lane?

Yes	No	Comments
x		The only improvement I can see is to paint a good visible centerline.

Yes	No	Comments
x		In most cases due to contrast. Edge lines would be better.
	x	Edge lines should be applied.
x		
x		Most are not paved.
	x	Not enough.
	x	I think it would be better to have overhead signs showing the through lanes.
x		No parking lanes on roadway driven.

Question: Does there appear to be a substantial number of vehicles driving partially in the parking lane?

Yes	No	Comments
x		Some, in order to get around other cars.
	x	None observed.
	x	
	x	
	x	
	x	
x		Better marked lanes would help a lot.
	x	Did not notice vehicles driving on shoulder.

Question: Are the roadside hazards (bridge abutments, piers, guardrails, sign post, etc.) removed a sufficient distance from the through lanes to insure reasonable safety?

Yes	No	Comments
	x	In one certain place on the course, they are not visible, and you are traveling up a hill (Cleveland Ave. and Bypass going west).
	x	
	x	Bridge ends, piers, post, signal poles, etc.,

Yes	No	Comments
		Should be removed as far as possible. Where unable to, more should be marked appropriately.
x		
	x	Too many metal posts holding up wires for traffic lights are too close to through lanes.
	x	
	x	Do not have enough hazard warning signs for a sufficient distance to warn the driver.
x		Was not aware of any feeling of being crowded.

If "No," are the hazards visible for a sufficient distance to prevent the driver's being startled by it?

Yes	No	Comments
x		
	x	
	x	
	x	

Question: What do you feel is a minimum safe distance from the outside edge of the through lane or from the curb to an obstruction?

Number of Feet	Comments
6	Because overhang from trucks and other maintenance equipment won't damage them or vice versa.
30	For this area and speeds.
15	This is natually determined by adjacent land use, geometrics, etc.
10	
12	I think it should be at least the width of one lane.
6	I think six feet distance from the curb is a safe distance.

Number of Feet	Comments
3	This depends on vehicle speed traffic and width of approach pavement. The above distance would apply to bridge abutments. Other obstructions should be further out.

Question: Do the curves require an excessive amount of driver concentration and thus increase the hazard of other objects along the roadway?

Yes	No	Possibly	Comments
	x		There are no curves on this course.
			Not applicable.
	x		
	x		
	x		
x			More warning signs to let the driver know that the curve is dangerous.
	x		Had no difficulty with the curves.

Question: Does the development and its associated activities along the roadside distract you to any appreciable degree?

Yes	No	Some	Comments
		x	Not to any degree.
x			The many approaches with entering traffic.
x			Commercial development and advertising are distracting.
		x	Along this stretch of roadway most business is on a service road.
		x	It doesn't bother me, because I concentrate on my driving.
		x	
	x		To a certain extent.
	x		Do not notice this unless attention is called or specifically looking.

Question: Is there sufficient advance notification of cross streets to permit proper utilization of the turn lanes provided?

Yes	No	Comments
	x	There are notifications, but they should be made bigger and plain.
	x	No advance street names for some streets; also, to the airport.
	x	Overhead signs or post-mounted signs on both sides should be applied.
	x	When on the inside lane, the view may be obscured by large vehicles or other traffic.
	x	Signs should be bigger and farther back from intersection. Should be lighted at night.
	x	Some of the cross streets have no markings, and they are stuck over on the right. The left lane can't see them at all.
	x	Not in heavy traffic, and it is necessary to switch lanes prior to reaching turn lanes. Signs are small and not visible from inside lane in heavy traffic.

If "Yes," how is it accomplished; if "No," how could it best be accomplished?

By advance signing and/or overhead signs depending upon location, etc.

Bigger signs (overhead).

By overhead signs.

You could accomplish this by putting up larger signs, and overhead would be great.

Perhaps more visible signs (overhead)? Suggest an advance sign telling next major intersection soon after an intersection.

Question: Where lane assignments are indicated (i.e., a requirement of being in a certain lane to perform a certain maneuver), are the assignments clear and easily understood?

Yes	No	Comments
	x	The painted arrows should be kept painted and more tail on the arrow.

Yes	No	Comments
	x	By arrow markings and signal indications only.
	x	Many lanes are not properly marked with arrows and legends.
x		
	x	
	x	Not enough warning ahead before it's time to make the lane change. Also bigger and better turn arrows on pavement.
	x	Lane assignments not indicated.

If "No," please indicate the source of the confusion.

Arrows are not plain enough.

Not enough markings.

Too many motorists make turns from wrong lane indicating confusion.

Like the sign to Dannelly Field. It's stuck right at the light where you are supposed to turn left, and you don't have enough warning before you see the sign.

Intersection of U.S. 31 and 80 (Mobile Highway), double turning lanes not marked.

Question: Do the existing lane assignments result in unnecessary lane changes (i.e., indicate a change to another lane when both lanes continue in the desired direction)?

Yes	No	Comments
	x	
		Not applicable.
	x	
	x	
	x	
	x	No problem of this nature.

Question: Are the turn lanes clearly identified and outlined?

Yes	No	Comments
	x	They would be, if they were kept painted.
	x	Pavement markings faint.
	x	Not enough lane markings.
x		
	x	Some are not painted and aren't long enough.
	x	
	x	The turn arrows have too much curve in the handle and are not big enough.
	x	Paint stripes dim in some cases. Where a frontage road is present, a driver turning onto Bypass may be confused by turn lane marked for frontage road.

If "Yes," how are they marked; if "No," how should they be marked?

No comment.

Adequate pavement markings.

Mostly be street arrows.

They should be painted to indicate where they are.

Painted arrows on pavement. Arrows to be kept painted regularly. Only should be in left turn lanes.

With bigger arrows, with straight arms, and with bigger warning signs before you get too close to your turn lanes.

Perhaps contrasting curb to lead into turn lane with good paint striping. Perhaps turn lanes of contrasting color.

Question: Are the directional sign messages clear and concise so as to minimize the possibility of driver confusion?

Yes	No	Comments
x		In most cases.

Yes	No	Comments
	x	Too many routes, arrows, etc., per assembly.
	x	Not enough informational signs; too many route designations and improperly placed.
x		
	x	Some are too bunched up and aren't big enough.
	x	
	x	The overhead signs are much better and more noticeable.
x		Had no problems of this nature.

Question: Are the turn lanes long enough so as to eliminate the need for a substantial speed reduction in the through traffic lanes?

Always	Usually	On Occasion	Seldom	Comments
			x	Appear short.
			x	Most of the turn lanes are too short for the amount of traffic.
		x		Some are and some are not.
				No comment.
		x		
	x			
			x	
			x	

Question: Are the right-of-way control devices (i.e., "STOP" signs, "YIELD" signs, and signals) located in positions where they are readily apparent to a reasonably alert driver?

Yes	Possibly	Poorly Located	Comments
x			I feel they are placed properly.
x			Arrow indications dim, back plates would help; also, arrow indications could be 12".
x			Signs and markings need to be upgraded.

Yes	Possibly	Poorly Located	Comments
x			Most are pretty well noticeable.
x			In the area I traveled they are, but not everywhere.
		x	Most of them are located on right side of road, and the traffic in left lane can't see them. They should be where both lanes can see them.
x			Had no problem in this regard.

Question: Is there sufficient advance warning of traffic control devices which are not readily apparent?

Yes	No	Comments
x		Had no problem with this.
	x	Needs more warning signal or signs when you are coming up over a hill and can't see what's over the hill.
	x	
x		
x		
x		Excessively.
x		But advance warning signs are not big enough.

If "No," how could this best be accomplished?

Bigger signs or flashing amber lights in advance of an intersection.

No comment.

More and bigger warning signs. Should be lighted at night. I think large, lighted overhead signs are more efficient.

By bigger and more warning signals or signs.

Question: Where hazard warnings are provided, can they easily be associated with the hazard involved?

Yes	No	In Some Cases	Comments
			The specific hazard noticed was the narrowing of U.S. 31 from four to two lanes abruptly.
x			
x			
x			
		x	Flashers too far in advance of signals.
x			
			On this course.

Question: Are warnings provided for hazards which are obvious and for which little, if any, warning is actually required?

Yes	No	In a Few Cases	Comments
x			
x			Signalized intersections.
		x	More reflective paint should be applied for nighttime use.
	x		
x			
		x	
			Did not notice any of this.

Question: In your opinion, is there a question as to which traffic stream a "STOP" sign, "YIELD" sign, or signal applies?

Yes	No	Comments
	x	
	x	
	x	Not in the particular area we went over, but in some other areas there is.

Yes	No	Comments
	x	
	x	
	x	
	x	

If "Yes," which device, and where is it located?

Question: Did you, as a driver, have difficulty in seeing the traffic lights?

Yes	No	Sometimes	Comments
		x	Depending mostly on direction of travel and sun.
	x		Traffic lights seems to be OK for me.
		x	Because of bright sunlight. I think all traffic lights should be bigger.
x			The one with just the arrows is difficult to see .8 inch lens).
	x		
		x	Signals need to be upgraded.
		x	When facing the sun.
	x		In my case, no. I am familiar with the area, but to out-of-state people, there could be a problem.

Question: Do commercial signs along the roadway make traffic signals or signs difficult to see?

Yes	No	Comments
	x	No problems.
	x	
	x	
	x	
	x	Not in this particular area.

Yes	No	Comments
	x	They do not make it difficult for me to see.
	x	Had no problem with this.

Question: Do the curb radii at the intersections permit smooth turns from the right into the right lane of the cross street?

Yes	No	Comments
		All turns made on test run were left.
x		They seem to be OK to me.
	x	Due to curbs being in way, no long left turn lane is available at one or two places (Court St. for one).
x		They are out in the open and shouldn't be hard to judge from not hitting them.
x		
	x	Many times radii are too short and should be improved to provide a better turning radius.
x		Median should be bullet-nosed.
x		There is ample room for such turns on this course.

Question: Do the driveways create an uncomfortable feeling while driving this section?

Yes	No	Comments
	x	
x		
x		Median crossovers are spaced too close together.
	x	There are very few driveways entering this roadway.
x		At two or three congested areas, it is dangerous.

Yes	No	Comments
x		A certain extent. I believe if driveways were marked, it would be better.
	x	Had no problem with this.

Question: Do commercial trucks block the view of the roadway ahead to a noticeable degree?

Yes	No	Comments
x		Particularly at traffic signals. Have no idea of traffic signal indication or situation ahead.
x		When following a big truck, you do not have the view of what's ahead, as you would if the truck weren't there.
	x	
x		It makes it hard to see the traffic signals.
	x	
x		The roadway should be widened to three lanes each direction.
x		
x		

Question: Does there appear to be an excessive amount of official informational signing along this section of roadway?

Yes	No	Comments
	x	None that I observed.
	x	Not to an objectable degree.
x		Many obsolete and nonconforming signs should be removed.
	x	
	x	
	x	
	x	

SUMMARY OF DIAGNOSTIC QUESTIONNAIRE

Study Site 7; US 80-82; Montgomery, Alabama

The following is a detailed presentation of the comments made by the diagnostic team members on the diagnostic questionnaire.

NIGHT PHASE

Question: Are the turn lanes obvious to a reasonably alert driver so that a smooth, natural maneuver to the turn lanes is possible?

Yes	No	Comments
x		
x		Sometimes it is difficult to tell where the turn lane begins.
x		But not at every intersection.
	x	Too short - not marked good.
	x	I do not like the double turn lane. I think the single turn lanes are much better.
	x	Additional delineation and markings needed.
	x	Not long enough.

Question: Are the through lanes easily distinguishable from the parking areas where parking is permitted?

Yes	No	Comments
x		
		Not applicable.
x		But not at every intersection, because the center lanes need painting.
x		
x		I will say they are to me.
x		
	x	Contrast is mostly lost.

Question: Are the roadside hazards visible for a sufficient distance to prevent the driver's being startled by them?

Yes	No	Comments
x		
x		However, with low light beam, the overhead structure for I-65 will sometimes startle me.
x		What there is, there is not any to amount to anything.
x		But not all.
	x	Take the overhead Railroad Bridge, it has no guardrails, and before you get to it the bridge has no kind of reflectors to let you know it is there until you are right on it.
	x	Bridge, piers, post, etc., need additional treatment.
	x	Bridge columns and abutments.

Question: Is a clear and distinct outline of the roadway ahead provided?

Yes	No	Comments
	x	Lines are dim and need painting in many places.
	x	Could be improved with edge striping.
	x	Not in every case, but a side stripe would be a big help.
	x	Needs good center and edge-of-road marking lines.
	x	Centerline markings are about faded out in places and need edge drive line markings, great help.
	x	Additional edge lines needed.
	x	Inadequate striping and no delineation; I believe striping, delineation, and spot illumination at major approaches are needed.

Question: Is the light provided by the vehicle's headlights sufficient for safe operation on this facility?

Yes	No	Comments
		In some places the roadway seems dark.
x		Had no problem with this.
x		Because the surface is not too black.
x		
x		Lights OK.
	x	Street lighting needed.
	x	Approaches not delineated.

Question: Does the glare from opposing headlights obscure your view of the roadway ahead? (A--Probably; B--Possibly; C--Not to any marked degree)

A	B	C	Comments
		x	
x			This does occur at times.
		x	If opposing cars dim their headlights.
		x	
	x		If the car you are meeting does not dim its lights, the view of the roadway ahead is cut.
x			Need street lights.
		x	

Question: Is there sufficient advance notification for the turn lanes?

Yes	No	Comments
		In some places the view of intersection marks can be obscured by traffic.
x		Could be improved.
	x	They need to be long and to give advance notice more clearly.

Yes	No	Comments
	x	More warning signs and bigger turn arrows on pavement would help a lot.
	x	In some but not all.
	x	Need additional markings.
	x	

Question: Is there a tendency for a driver to become trapped in a turning lane?

Yes	No	Comments
	x	
	x	But could see how this might happen in turn to the Troy Highway.
x		Yes, because the lights for left hand turns are not timed long enough.
	x	Take " DANNELY FIELD" sign is right at the light on right side. After you finally notice the sign, you can't cross over in left turn lane.
	x	
	x	

Question: Can the street name signs on major streets be easily read at a glance?

Yes	No	Comments
	x	
x		When very near the signs and in outside lane. Could be larger and on both sides or roadway or overhead.
	x	There are not enough advance warning, and the signs are not big enough.
	x	Not at night.
	x	The streets that are marked, you can't see them until you are right on them.
	x	

Yes	No	Comments
x		Where they exist, I believe one sign each side of approach to intersection is needed.

Question: Where directional signing is provided can it be easily read and understood at a glance? (Answers: Yes, No, Possibly, Doubtful)

Yes	No	Poss.	Doubt.	Comments
x				Signs seem much more clear at night than in daylight.
		x		The number of route signs with similar numbers may make it confusing.
x				In most cases.
			x	Too many signs on one post. Not enough light to read easily.
		x		Some are faded out mighty bad, and they would be a lot better, if they were up overhead.
	x			Need overhead externally illuminated signs.
	x			Too many; some of the minor ones could be posted in advance, such as trailblazers.

Question: Are the driving lanes clearly marked?

Yes	No	Comments
x		Some of the markers need repainting.
	x	Dim striping could be renewed.
	x	They need restriping.
	x	Lines need repainting; also, arrows tend to wear and fade.
	x	Lots of the driving lanes are faded out.
	x	
	x	A centerline poor; no edge line.

Question: Does the glare from opposing headlights make it difficult to read the traffic signs? (A--Definitely; B--To some degree; C--No)

A	B	C	Comments
		x	
	x		This occurs in some instances.
	x		If you are stopped at the intersection.
	x		
	x		Certainly when the opposing car won't dim its lights and when the sign is faded a lot.
		x	
		x	

Question: Where hazard warnings are provided, can they be easily associated with the hazard involved?

Yes	No	Comments
x		
x		Had no problem with this.
x		There are no hazardous warning on this route.
x		
	x	Do not have enough hazard warning signs.
x		
x		Excessive (signalized intersection).

Question: Does the width of the lane create a noticeable degree of tension while driving this section?

Yes	No	Comments
	x	
	x	Lanes appear to be of sufficient width.
	x	They are wide enough.
	x	
	x	It's wide enough to suit me.

Yes	No	Comments
	x	
	x	

Question: While driving the right hand lane, does the parking along the curb or, where parking is prohibited, the height of the curb create a noticeable degree of tension?

Yes	Some	No	Comments
		x	
		x	
x			They seem alright to me.
	x		In a few places only.
		x	Doesn't bother me.
		x	
		x	

Question: Do commercial signs and lights for roadside businesses attract your attention?

Yes	No	Comments
x		Yes, but not to a degree that it interferes with driving.
	x	Not to any significant degree.
x		At some intersections (e.g., at Norman Bridge Rd. and Bypass).
	x	Only at a very few places.
x		Any well lighted business attracts my attention. Most noticeable - the neon lights and flashing lights.
x		Most noticeable - commercial advertising.
x		To a limited degree.

Question: In my opinion, the sight distance to right-of-way control devices ("STOP" signs, signals, etc.) is: Adequate, Questionable, Inadequate, Critical.

A	Q	I	C	Comments
x				
x				Sometimes it is startling to top a vertical curve and see a traffic signal at bottom and have no idea when lights will change.
	x			At some intersections. In my opinion overhead advance warning directions would help at every intersection on the Southern Bypass.
x				
x				I would say they are to me.
x				
x				

APPENDIX "C"

SUMMARY OF DRIVER INTERVIEWS

Study Site 7; U.S. Highway 80-82; Montgomery, Alabama

GEOMETRIC DESIGN

DAY PHASE

Those dual left turn lanes are sure good; they keep traffic from backing up during the rush hour.

I think they should cut out some of those median openings and thereby cut out a lot of this congestion.

These right turn lanes are real short. I'll bet they're not more than 75' long (Court St. intersection).

Some of these curbs are too close to the edge of the roadway, especially on the corner at Mobile Highway intersection.

The crown at this road is relatively sharp, but it doesn't bother me in driving.

I think for the volume of traffic, this road handles it fairly well.

This is a particularly dangerous area with no shoulder. Some people have run off of it, but I think it is a delineation problem rather than a question of geometrics (this is the eastbound approach to Cleveland Ave.).

I think these poles are too close to the edge of the roadway. I don't like this at all (Cleveland Ave. intersection).

NIGHT PHASE

This really bothers me here. This overpass and you don't know what is on the other side of it (eastbound approach to the Cleveland Ave. intersection).

DAY PHASE

NIGHT PHASE

I don't think the left turn lane for this particular intersection is long enough (Narrow Lane Road intersection). I think one lane would be enough, although there's room for two, but one would be enough if it were longer.

This is a pretty badly congested area with the sharpening complex here and the turning bays are not long enough at all (Woolco shopping area).

I think this area around here really needs a service road (just to the east of the Interstate 85 interchange).

This extra left turn lane has been real good; I really like it (this is Mobile Road intersection). Of course, there are a lot of people who are afraid to make a left turn beside another vehicle.

I think something should be done here about vehicles piling up and blocking traffic while waiting to make a turn (Court St. intersection).

I think the best answer to the problem of this intersection (Norman Bridge Road intersection) is a great separation with a Bypass being elevated.

ILLUMINATION AND GLARE

Illumination at this intersection is not too bad (Mobile Highway intersection).

The Woodley Road intersection is lit real well, but the median and shoulder lack contrast. The road, grass, and asphalt all look alike.

I don't think there's a need for continuous fixed illumination, although some spot illumination would be desirable.

DAY PHASE

NIGHT PHASE

The left turn slot of the intersection in general is real dark (comments related to Narrow Lane Road intersection).

There's too much conflict of light--commercial lighting on both sides of of the roadway and headlights from the opposing lanes and from the frontage road.

The small overhead lights at the intersections make the median openings very difficult to see.

Street lighting will definitely be an asset here with the conflict of roadside development (eastbound approach to the Norman Bridge Road intersection).

I think they need some illumination right in front of the hospital. I think that lighting all along this section is relatively poor.

I think this commercial lighting does have a distracting effect to a certain degree (just before Interstate 65 interchange westbound).

It seems awfully dark here. Perhaps some edge line would help you see the road better (this comment was made about half way between the Mobile Road intersection and the Interstate 65 interchange westbound).

I think in an area such as this where there is spot illumination at the intersections, you can't help but be alert to the fact that there is an intersection (approaching Norman Bridge Road).

It seems to me that I am driving beyond my headlights. By seeing the traffic ahead I can tell pretty well whether the road is clear. But I definitely recommend continuous illumination for this section of roadway (Narrow Lane Road

DAY PHASE

NIGHT PHASE

advance informational signs at the approximate location at this comment).

SIGNING

DAY PHASE

It wouldn't hurt if that sign were about three times bigger than it is ("SIGNAL AHEAD" mounted on a mast arm eastbound approach to Mobile Highway).

I think an out-of-town driver would be completely lost, if he were looking for a particular street name, because they are just not marked other than that advance sign.

I think this advance sign needs to be an overhead ("WOODLEY ROAD NEXT EXIT" advance informational sign).

I can understand what those signs mean (the green business route shields).

If you miss the advance street sign, you just would not know what intersection this is (Narrow Lane Road intersection).

I didn't even notice "SIGNALS AHEAD" (mast arm mounted on the eastbound approach to the Mobile Highway intersection).

I think there should be a "KEEP RIGHT" sign in that media (northbound approach on Narrow Lane Road to U.S. 80).

I believe that this intersection is one of the best marked on this stretch of roadway (U.S. Highway 231 southbound).

That sign was pretty hard to read: "WOODLEY ROAD NEXT EXIT"

That overhead sign was good but could have been bigger ("SIGNALS AHEAD " white/black overhead sign in advance of Woodley Road).

NIGHT PHASE

"SIGNAL AHEAD" sign completely out at night ("SIGNAL AHEAD" on the mast arm at the railroad bridge in the west approach) (eastbound to Mobile Highway).

"SIGNAL AHEAD" sign is very weak (eastbound approach to Davenport St.).

The "JUNCTION WITH U.S. 331" sign stands out real good. Speed limit signs need some reflectors. I can't see them (Norman Bridge Road eastbound).

If I were going only to use the advance street signs, I would put it in the median.

On U.S. 231 south the cardinal letters in the arrownead are real indistinct, and I would prefer regular cardinal direction.

That sign means very little to me (the driver is referring to the "BUSINESS ROUTE" informational sign).

They don't take advantage of the median for advance signing at all.

"SIGNAL AHEAD" overhead sign is real good (Woodley Road on the westbound approach).

The advance intersection signs show up good at night - a lot better than in the day time.

The "FOUR LANES END" sign doesn't reflect at all, and then the action sneaks up on you before you know it (just west of Mobile Highway intersection at the railroad overpass structure).

DAY PHASE

There are three trucks up there, and that is where all your information is. Also that "JUNCTION BUSINESS ROUTE" sign is completely dead ("NORMAN BRIDGE ROAD NEXT EXIT").

I think that the "DANNELLY FIELD" sign should be enough ahead of the intersection to be able to make the turn (Mobile Highway intersection right side edge).

If a truck were in the way of the advance street signs, it would be completely blocked off.

I don't think people ever use any of those signs in a cluster. They just use the ones that they need (comment made approaching Narrow Lane Road).

In a flat intersection like this one, you can't see very much of it for the signs involved (Woodley Road intersection).

"What do you think of the cardinal directions on the arrowhead?"

I don't really like it. It's not really too clear.

"What does the "BUSINESS ROUTE"informational sign mean?"

It means it is the downtown section actually, or at least that's what it means to me.

That sign was quite dim ("JUNCTION WITH BUSINESS ROUTE" before Norman Bridge Road intersection).

I think they definitely need a street sign on these streets large enough to be seen in advance (Davenport St. intersection).

NIGHT PHASE

This sign should be a diamond with an advisory speed (the truck entrance advisory speed sign placed just beyond the railroad bridge west of the study section).

I think the advance street name signs should be at least bigger and should be utilized on both sides of the road to be effective.

I think the street signs should be overhead or on the left anyway.

That sign would be advisory to me, and the intersection board is substandard.

These aiport signs are hard to read; I guess they are real old and their reflectiveness is about gone.

I don't feel that there is any need for these "BUSINESS ROUTE GREEN" signs.

Those clusters at the end of the intersection could possibly be eliminated by pulling the directional route markers in advance to the intersection.

I think overhead signing would be of real value especially with lane designation (Mobile Highway intersection westbound).

I think there needs to be some sort of signing as to how to get up to this hospital emergency entrance (Baptist Memorial).

They don't give you enough advance warning as to which street you are coming upon or what highway. When they do, it is only about 50 yards or so, and then it's too late.

In my opinion, I would say about 100 yards ahead of every intersection. An overhead sign with all pertinent information on it would really help this Bypass, like arrows telling you which lane to

DAY PHASE

I think they need some sort of advance warning telling you of the busy intersection (Mobile Highway intersection with the Southern Bypass) ahead.

I think there needs to be some kind of sign that let's you know what streets are crossing the Bypass (Davenport St. intersection).

That one is on both sides; that's good (the "JUNCTION WITH 331").

I just happened to know where Narrow Lane Road was, but there was still no indication other than advance street sign. I think I would have a hard time finding it, if I didn't know where it was.

There aren't any markings to tell you how to get to the hospital. I guess we'll just have to guess how to get into it.

I think they need an overhead sign here with the lane designated with arrows (approach to Toodley Road intersection).

"Would you like to have an overhead sign here?"

Yes sir, I would like to have an overhead sign at every intersection on this Bypass (Woodley Road intersection).

"What do you think of the little letters on the arrows?" (referring to the cardinal directional letters on the directional arrows) I don't believe they're of any value.

I don't believe that there are any "DANNELLY FIELD" signs, until you get up to that next intersection.

I think they need all these signs on both the left and right.

NIGHT PHASE

to use to go where.

I think they need a sign here saying "KEEP RIGHT" on this median (on Narrow Lane Road approaching U.S. 80 southbound).

I can't see the directional signs very good tonight, but that interstate sign is real good (U.S. 231 intersection westbound).

A stranger would have to be on top of "DANNELLY FIELD" signs before he could tell what they meant.

I would really prefer warning signs to pavement markings. I think that signs are a lot more effective (comment made at the Troy Highway intersection).

The "DANNELLY FIELD" sign was really bad there (westbound approach to Court St. intersection).

I really like that warning sign, especially with the flashing beacon (westbound approach to Davenport intersection).

That directional sign to the airport is real bad. That sign should be a little further back (Mobile Highway intersection westbound approach).

I think that it would be better to find out who has the right-of-way on this squeezed down situation (the narrowing just prior to the railroad overpass at the west end of the study section).

I would strongly recommend the use of overhead signing to prepare you for the street, and a marker at the intersection to confirm the name.

I don't really see any use in the signal signs. Now they might be justifiable where you can't see ahead of you, but in a series such as this,

DAY PHASE

Now they have got street markers out, but you sure couldn't see it without searching for it (Court Street intersection).

"How did you know there are two lanes for a left turn? It isn't marked?"

"I came by here when they were building it."

I don't think they could read that many signs at one time.

I don't think that warning signs for this paint test section are really necessary. I don't think it would startle anybody without it.

I don't think that the similarity of route numbers is confusing. Of course, I have lived here for some time and that may be why.

I feel that there could be more advanced warning of the streets. Signs larger and easier to see, for example. Also, maybe, placed on both sides of the road (left and right).

I think an overhead sign with an arrow telling you which lane to get in would be most valuable (i.e., Court St. with a down arrow).

I think most people would know that the green sheild is a business route.

I think that the advance street name signs should be at least 300-500' from the intersection just so you would have time to make the necessary maneuvers.

I like the idea of the warning signs for littering. There is a lot of littering, and I think that this might help a little bit.

I think that the "SIGNAL AHEAD" warning signs. Far enough back but not big enough to be seen day or night (approach to Narrow Lane Road)

NIGHT PHASE

I think they are unnecessary (Court St. intersection).

I believe this intersection is well marked anyway we have gone through it (Troy Highway).

DAY PHASE

NIGHT PHASE

I think that it wouldn't hurt to put up some sort of directional sign to the hospital.

I like the idea of the "DANNELLY FIELD" signs. That is a pretty busy place, and I think that the signs are a good idea.

I would prefer the numbered signs as opposed to purely directional signs. It has been my experience that the tourist will follow highway numbers, and the local people usually know where they are going anyway.

A "YEILD" sign would be easier to enforce than the "STOP WHEN RED" sign. Because there can be no doubt, if he doesn't yield, as there most always will be a wreck.

I think if they are going to use directional signs, they should be larger and easier to read.

I think there should be some method of identifying who has the right-of-way here on the squeezed down section (just west of the Mobile Highway intersection to the narrowing of the overpass section to the railroad).

I think that sign could be reworked, so it could be improved and easier to read Mobile Highway intersection).

I think that the legend on the advance street name sign should be larger and easier to read.

I missed the turn to U.S. 331, but it was not the fault of the sign. I was just concentrating on talking instead of where I was going.

I think that sign is too complex, but it is hard to avoid ("MOBILE HIGHWAY INTERSECTION--WESTBOUND").

I don't think that the "PAINT TEST SECTION AHEAD" sign is needed. Perhaps if the paint test section had a tendency to confuse the driver, then it might be justified, but

DAY PHASE

NIGHT PHASE

with longitudinal lines, I think it is unnecessary.

In reference to longitudinal lines, apparently the driver meant transverse lines.

I think I would stagger the advance street name signs, so if you miss one your chances would be better to catch the next one. Also, I would put the names on the corners or perhaps on the signal ahead of the signals (comments made approaching Narrow Lane Road intersection eastbound).

I think that most people would be better advised with pavement markings than signs, but this is purely a personal opinion.

I think for out-of-town drivers, the route markers are more valuable than a destination sign.

This is my own opinion, but I would like to know where I am going and what highway I am on. I feel that "STOP ON RED" and "TURN RIGHT WHEN CLEAR" signs means someting on the same order as "YIELD."

SIGNALIZATION

DAY PHASE

NIGHT PHASE

That green ball and arrow means very little to me. I don't think I get the full message they are trying to get across (the Woodley Road intersection).

I think there should be extra long caution lights at the bottom of this hill in order to play it safe for people who might not be able to stop (eastbound approach to Cleveland Ave. intersection).

When the sun is behind those signal lights, they are really hard to see (Norman Bridge Road).

The glare from the background lighting is not very bad at this intersection (Mobile Highway intersection). I think this arrangement with arrows and a green ball is theoretically sound, but you can't see them too well (Woodley Road intersection-8" arrows).

That signal is right in the path of oncoming headlights (westbound approach to Davenport).

I think that the traffic signal should be 12" signals. I can't see that arrow at all. Mobile Road intersection westbound approach).

DAY PHASE

I think that the timing is off real bad. You have to wait too long for this light. I have noticed this for quite a few of these big ones (all comments refer to Mobile Highway intersection 80).

I think they should have 12" lenses on those signal heads (Troy Highway intersection U.S. 231).

I think the speed limit could be a little higher; then of course, the traffic volume would more accurately dictate this.

I think that this bridge definitely needs a guardrail or delineators or maybe a combination of both. It is very distrubing to me to come up on this bridge unexpectedly (Railroad Bridge between Davenport and Cleveland Ave.).

I think there needs to be a guardrail right here (on the grade approaching the railroad overpass).

NIGHT PHASE

In response to a direct question: What is your opinion of the driver response to the green arrow as opposed to green ball?

"I think that the local drivers know what to do."

Those traffic lights blend in with the commercial lights in the background (westbound approach to Davenport).

I think most drivers can distinguish between the green balls and the arrows, especially in turning situations (comment made at Narrow Lane Road).

The shoulder lacks contrast. This section really needs edge lines. There are supposed to be edge lines. They're just worn out (just east of the Mobile Highway on the Southern Bypass).

The median is awfully dark; there's no contrast at all (eastbound on the approach to Davenport).

There should be some kind of delineation on this bridge. I can't even tell that it's there at all (railroad bridge just west of the Mobile Highway intersection).

The median crossovers should all be delineated, and these bridge piers should be reflectorized or at least have guardrails (this comment is referring to the overpass structure with Interstate 65).

The signal pole bases should be reflectorized (the eastbound to Davenport).

I think there needs to be some sort of delineators at these median openings (the general area between the Baptist Memorial Hospital and the shopping center on the east).

DAY PHASE

I don't think these pavement arrows are good at all. I think they need to be longer and more distinct (U.S. 231 northbound toward the Southern Bypass).

It seems to me that this edge line is almost gone (eastbound just in advance of the Interstate 65 interchange).

NIGHT PHASE

I think the median openings need the delineators, especially at night. Also, on some of these you might think that they would connect to the frontage road, and most of them don't (left turn into the ditch possible).

This bridge is extremely hard to see at night (just west of the Mobile Highway intersection).

PAVEMENT MARKINGS

DAY PHASE

I don't think those pavement markings (arrows) are really that good or bad. I haven't really noticed them.

I believe those pavement markings should have a longer tail, and then a turn on the end instead of being so short (Mobile Highway at the Southern Bypass).

"What do you think of those arrows on the Troy Highway approaching U.S. 80 from the south?"

"I can see them real good, but they could have a longer tail."

"The lane lines are pretty dim. Do you use them or the edge of the road?"

"I use the edge of the road for guiding in all cases."

I think there is a definite need for lane markings at this intersection (Mobile Highway intersection with the Southern Bypass).

I think there is a definite need for lane lines and edge lines all along this section. They are very poor.

NIGHT PHASE

The arrows used on this intersection are very weak (Mobile Highway intersection northbound approach to Southern Bypass).

"SIGNAL AHEAD" pavement markings are real bad (westbound approach to the Woodley Road intersection).

It's real hard to tell where to stop here at night. With the frontage road configurations the way they are. Maybe some stop lines would be justified (on Narrow Lane Road approaching U.S. 80 from the north).

I think there should be edge lines all along this section and perhaps raised pavement markings (comment refers to general area Southern Bypass at the Mobile Highway intersection).

Edge lines could really stand to be improved. It rambles from solid to actually non-existent.

I think these pavement arrows are too bunched up. At 45 mph they appear to be just a round ball (U.S. 231 northbound toward U.S. 80).

For me the edge line is a lot of help. I like it a lot better than the lane line.

DAY PHASE

NIGHT PHASE

I think a lot of accidents could be prevented by wider use of edge lines.

These pavement arrows in this intersection are real bad. They just like a big ball (northbound on the Mobile Highway approaching the Southern Bypass).

These arrows need to be stretched out considerably. They are too squatty to be distinguished (U.S. 231 Troy Highway northbound toward the Southern Bypass).

I think the raised pavement markers will be a good idea all along this section of roadway.

MISCELLANEOUS COMMENTS

DAY PHASE

If you were to drive 45 in this area, you would get run over (comment refers to the area around the Baptist Memorial Hospital).

I think if you drive the speed limit around here, you would surely get run over.

That 45 mph speed limit must be a minimum speed. We were doing 50 and everyone was going by us.

I think I would rather drive on the outside lane rather than the inside lane on this bridge.

"Would you rather have a guardrail?" "No comment."

The lack of visual contact with the road does not particularly bother me, although it well might to a stranger (overpass structure just west of Mobile Highway intersection).

I think the largest portion of the accidents on this stretch are following

NIGHT PHASE

Those bridge piers really need some markings or a guardrail or something (referring to the Interstate 65 overpass structure).

Median openings are really hard to pick out. They need some type of marker or reflectors.

Driver made a left turn from the U.S. 80 westbound to Narrow Lane Road and wound up in the northbound lane inside the median. He indicated that the poor curve markings and the "KEEP RIGHT" signs were the primary causes.

Hardly anybody does 45 on this Bypass unless of course they are behind someone who is pretty slow.

I like for there to be a distinct difference between the shoulder and the road, so that if you run off it you will know it (the comment was made just in advance of the Narrow Lane Road intersection).

people who fail to yield right-of-way.

One of the real problems of this area is the slow drivers in the left lane. Possibly some signs saying "KEEP RIGHT" or a minimum speed of 30-35 would be appropriate.

This is probably the worst intersection in the city of Montgomery (referring to the Norman Bridge Road intersection with U.S. 80).

I think that the poles are located too close to the roadway (referring to the Narrow Lane Road intersection area).

Another thing that bothers me is the number of median openings, and I think that quite possibly a few of them could be eliminated.

I think that there's too much confusion on this roadway. What with all the trucks and the slow traffic and quite a bit of relatively high speed along the commercial business, etc., it's a real problem (comment refers to the area just to the east of the interchange with Interstate 65).

There is considerable doubt as to who has right-of-way here (the squeeze down area at the railroad overpass structure just west of the Mobile Highway intersection).

I believe that there is a definite need for guardrails on this overpass. This causes me a great deal of concern (railroad bridge at the west end of the study section).

A reevaluation of the overlapping of route designation is definitely needed not only here but statewide.

I like the idea of overhead sign bridges as opposed to a span wire mounted. Not only would this look better, but I think it would be safer.

DAY PHASE

NIGHT PHASE

"My general opinion of the Southern Bypass is that it could be better improved with a little cost simply by adding left turn lanes, extending left turn lanes, adding right turn lanes in lieu of traffic signal work, and adding a few sign bridges here and there. This, in addition to better markings, would work wonders as opposed to an extensive mount of work that would be great deal more costly. This would be a cheaper solution and much quicker. But I think the final solution would have to be complete separations at the intersections.