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TECHNICAL MEMORANDUM

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file 752.13
dated 9-4-69*

DIAGNOSTIC STUDIES OF HIGHWAY VISUAL COMMUNICATION SYSTEMS

HPR-2(108)

STUDY SITE NO. 9

U.S. Highway 287 - Laramie, Wyoming

TM2(108)-9

752,13 (12)

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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 open-end questionnaire techniques. Each member is asked to drive a route following the instructions of the interviewer. The route included short sections and 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

The portion of U.S. Highway 287 (Third Street) in the city of Laramie was selected as being representative of an arterial street in a small city. This section is approximately 1.8 miles in length and runs from the interchange with Interstate Highway 80 on the south end to Curtis Street or the "North Bypass" on the north edge of Laramie. The study section is wholly contained in the city of Laramie.

The field studies were conducted on this site during the week of June 16 through June 20, 1969. The weather throughout the study period was clear and mild. The diagnostic team was composed of six team members:

- A Traffic Engineer from Tennessee Highway Department
- A high school teacher
- A housewife
- A Highway Patrol Lieutenant
- A Safety Director for a trucking firm

The study section could best be described as the main street of a small town. The basic study section of just under two miles in length consisted of a two-lane and a four-lane cross section, a majority of which was curbed. There were numerous driveways and intersecting streets throughout the length of the section. The basic study section contained six signalized intersections, and both fixed-time and actuated controllers. There were no separate turning lanes; however, a leading green indication was provided at one of the signalized intersections.

The type of development along the study section varied from undeveloped to intensely developed. There was some residential development on both ends of the study section, which also passed through the central shopping area of Laramie. A strip map of this study section is shown in Figure 1.

MARKINGS--The pavement markings on this section consisted of normal lane lines. No edge lines were provided, and pavement arrows and word messages were not used. The markings that were in place were faded very badly, and lane delineation was a problem during the time of the field study.

SIGNING--The signing on this study section consisted of the modern interstate standard signing for Interstate 80 and some rather old signing for the major street intersections along the study route. The primary form of control on intersecting, non-signalized roadways was stop control. There was an abundance of parking regulation signing (both limited time parking and no parking) throughout the study section. There was no other regulatory signing of any consequence throughout the study section.

SIGNALIZATION--Five of the six signalized intersections consisted of post-mounted signal heads on both the left and the right side of the roadway. The one exception was a mast arm-mounted installation with signal heads on the mast arm and on the pole. A special left turn indication was provided at one intersection only.

③ YOU ARE AT POINT ⑤. RETURN TO U.S. 287 SOUTHBOUND AND GO WESTWARD ON WYOMING SH 130-230.

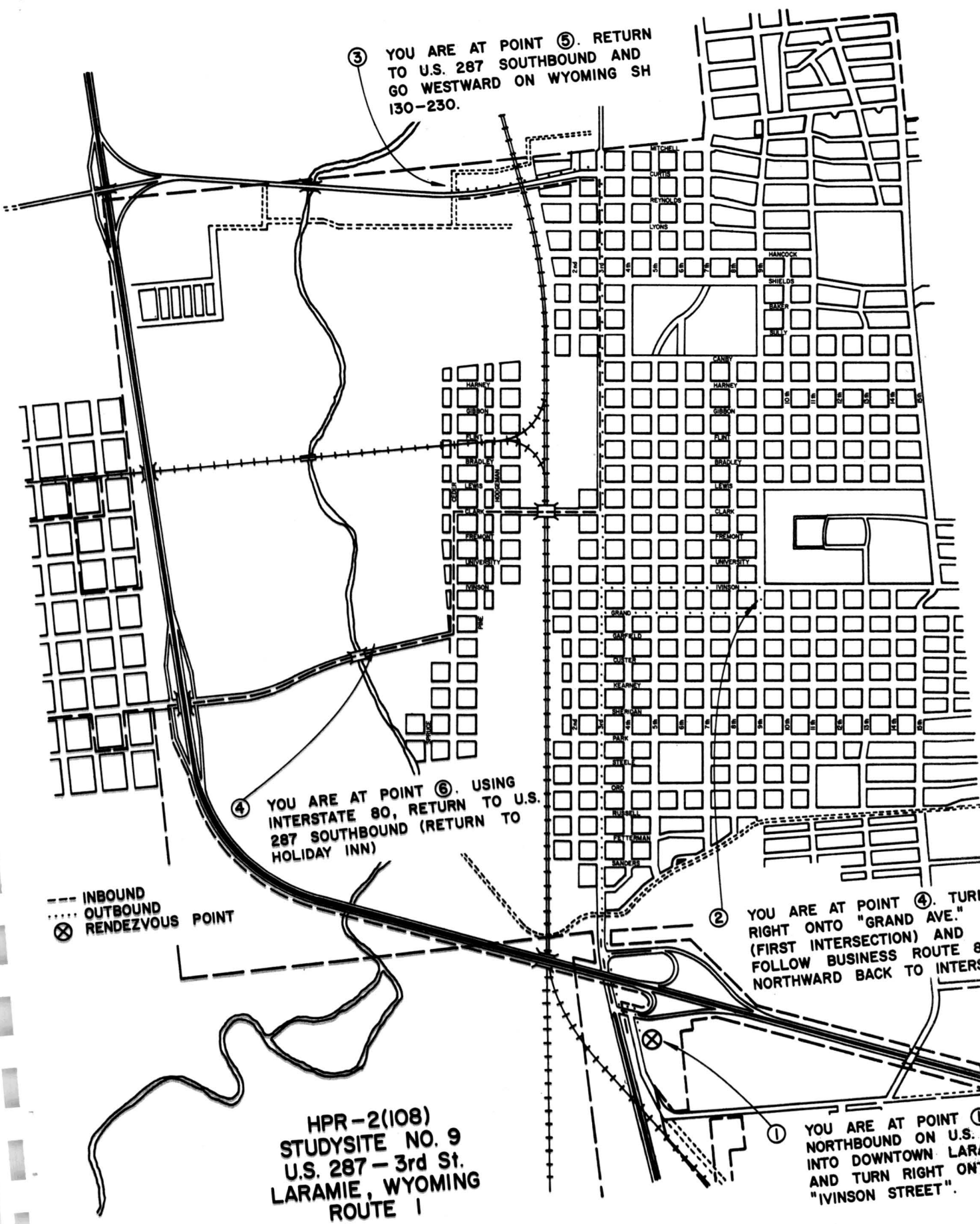
④ YOU ARE AT POINT ⑥. USING INTERSTATE 80, RETURN TO U.S. 287 SOUTHBOUND (RETURN TO HOLIDAY INN)

② YOU ARE AT POINT ④. TURN RIGHT ONTO "GRAND AVE." (FIRST INTERSECTION) AND FOLLOW BUSINESS ROUTE 80 NORTHWARD BACK TO INTERSTATE

① YOU ARE AT POINT ①. GO NORTHBOUND ON U.S. 287 INTO DOWNTOWN LARAMIE AND TURN RIGHT ONTO "IVINSON STREET".

--- INBOUND
- - - - - OUTBOUND
⊗ RENDEZVOUS POINT

HPR-2(108)
STUDYSITE NO. 9
U.S. 287 - 3rd St.
LARAMIE, WYOMING
ROUTE 1



③ YOU ARE AT POINT ③. GO SOUTHBOUND ON U.S. 287 AND TAKE U.S. 30 TOWARD CHEYENNE.

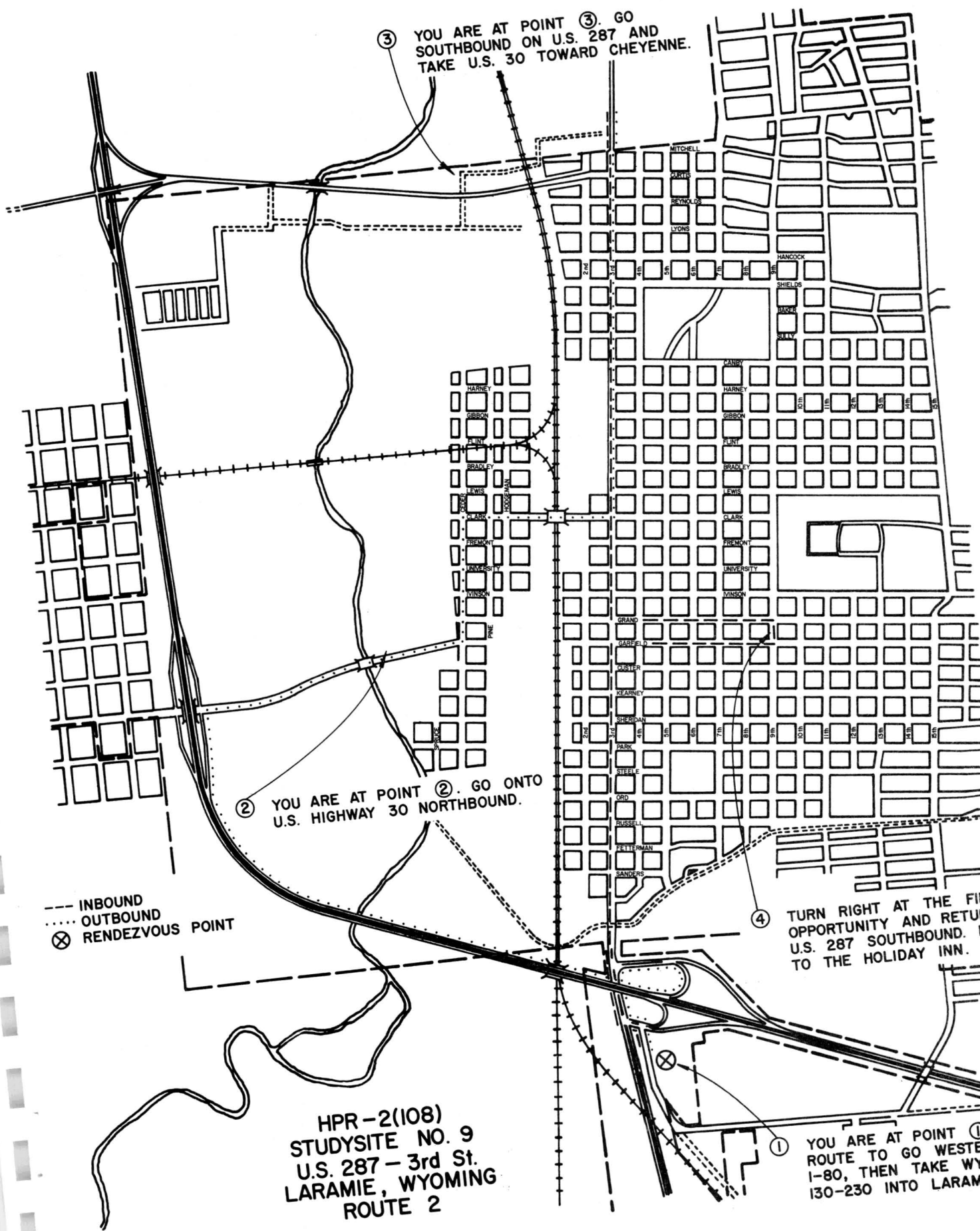
② YOU ARE AT POINT ②. GO ONTO U.S. HIGHWAY 30 NORTHBOUND.

④ TURN RIGHT AT THE FIRST OPPORTUNITY AND RETURN TO U.S. 287 SOUTHBOUND. RETURN TO THE HOLIDAY INN.

① YOU ARE AT POINT ①. PLEASE ROUTE TO GO WESTBOUND I-80, THEN TAKE WYOMING 130-230 INTO LARAMIE.

HPR-2(108)
STUDYSITE NO. 9
U.S. 287 - 3rd St.
LARAMIE, WYOMING
ROUTE 2

--- INBOUND
..... OUTBOUND
⊗ RENDEZVOUS POINT



DIRECTIONAL SIGNING--The directional signing throughout the study section was exclusively on the right side. There was one unique directional sign consisting of a neon "U.S. 30" message with an arrow pointing in the appropriate direction.

TRAFFIC CHARACTERISTICS--The traffic volumes in the study section were very light during the time of the study. However, it was noted that with the large enrollment at the University of Wyoming during the winter months the traffic volume would be considerably heavier. The posted speed throughout the study section was 30 mph. The running speed was generally in the range of 25 to 30 mph.

DIAGNOSTIC TEAM REVIEW

STUDY SITE 9; U.S. HIGHWAY 287; LARAMIE, WYOMING

GENERAL COMMENTS OF THE TEAM

The general consensus of the team was that for the posted speed of 30 mph on Third Street (U.S. Highway 287), there was not a problem with the proximity of objects, although several fixed objects might be considered hazardous. There was also a feeling that the lack of control of curb openings could be a problem, but because of the relatively low volume of traffic on the facility, they are not a major problem at this time. The most general comment regarding geometric design was the width of structures on the connecting routes to the study section itself, particularly on Interstate 80 and on Wyoming State Routes 130 and 230.

SUGGESTED DESIGN IMPROVEMENTS

The primary point of concern with regard to geometric design of the study section dealt with the lack of specific turn lanes at certain critical intersections. A particular concern was the intersection of Third Street and Clark Street where a leading left turn phase was provided but without a protected left turn lane. There was also a general feeling that the area near the north end of the study section which was uncurbed was somewhat of a problem but it was felt by a majority of the team that the problem did not warrant the cost of curbing the entire section.

SIGNALIZATION

The signalization in the study section was generally considered to be a little less than adequate for the needs. The post-mounted signal heads were difficult for the team members to locate, and there was a tendency for these heads to be lost in the commercial lighting. Also, the mast arm-mounted signals at Third and Clark Streets tended to blend in with commercial signing adjacent to the roadway. The team did conclude, however, that the mast arm-mounted signal heads were superior to the post-mounted signals on the left and right. It was suggested that these be installed during routine maintenance in the future.

SIGNING

It was the consensus of opinion of the team that the two signs being utilized for right turn on red and for prohibited right turn on red were so similar that it is difficult to distinguish between them. It was suggested that the right turn on red sign permitting the movement should be black on white, and the prohibited right turn on red sign should be red on white. It was the feeling of the team that red would quickly identify the prohibited turn.

The sign "END BUSINESS 80" needs to be supplemented by an additional sign with the message "INTERSTATE 80 TRAFFIC FOLLOW U.S. 230" sign would tend to be misleading to anyone following that route and expecting to get back to

Interstate 80. It was also suggested that the signing provided for the major intersecting roadways in the study section was adequate; however, supplementary signing at the intersection to direct or to confirm that the proper decision has been made would be desirable. This would be in addition to the existing advance directional signing rather than in place of it.

It was the general feeling of the team members that destination signing when not accompanied by highway route numbers was somewhat undesirable. They felt that a directional sign such as "RAWLINS" with an arrow to the right should have an additional plate indicating the highway number to be followed.

ILLUMINATION

The only major problem with the illumination was the inconsistencies in the level of illumination throughout the study section. The basic mounting height for the illuminaires was 30 feet, and the spacing ranged from approximately 100 feet staggering to 300 feet on one side only. The team felt that there was no substantial glare problem created by the luminaires, but the inconsistencies in the level of illumination made it a little more difficult to drive than in sections that were lighted more uniformly.

DELINEATION

The primary problem in defining the roadway lanes was due to the lack of visibility of the lane lines. Throughout the study section, there was some doubt in the team members' minds regarding the number of lanes available to them. It was suggested that the centerline and lane lines be repainted to make them more visible. In addition, throughout the north end of the study section (the uncurbed section), the edge line should be used to identify the edge of the traveled-way.

COMMENTS ON CONNECTING ROADWAYS WHICH WERE A PART OF THE BASIC DRIVING RUNS

Many of these dealt with the width of the roadway or the width of the structures involved. On Wyoming State Highway 130-230, there was a very narrow bridge which did not have channelization, guardrail treatment, delineation, or any positive identification of the very narrow structure. The bridges on Interstate 80 were also noted as being relatively narrow and without guardrail treatment on rather high fills. It was also noted by the members of the diagnostic team that the pedestrian signal on Cedar and Ivinson could be confusing as it appears to be a normal signalized intersection. Thus, traffic entering from the "STOP" sign on both the left and the right could appear to a driver approaching the intersection to have run the red light and might startle him or greatly increase the probability of an intersection collision. It was suggested by some of the team members that some method should be devised to identify this as a pedestrian signal.

LIST OF APPENDICES

APPENDIX "A" - DESCRIPTION OF STUDY PROCEDURE

APPENDIX "B" - SUMMARY OF DIAGNOSTIC QUESTIONNAIRE

APPENDIX "C" - SUMMARY OF TECHNICAL 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 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 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 9; U.S. Highway 287; Laramie, Wyoming

The following is a detailed presentation of the comments made by the diagnostic team members on the diagnostic questionnaires, concerning daylight conditions.

DAY PHASE

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

<u>Yes</u>	<u>No</u>	<u>Comments</u>
	x	Not to my knowledge. I did not notice any.
	x	
	x	The only point was the vertical curve over U.S. 287 on Interstate 80, but it wasn't objectionable. This also occurred on the Clark St. Viaduct 130-230.
x		On Grand Ave. where they have parking on one side, and no parking on the other.
	x	On the Bypass at the west end of Interstate 80, contact is lost for a short distance, as well as on Interstate 80 at the U.S. 287 Crossover, but the signs are visible guide lines.
	x	All vertical and horizontal curves seemed OK.
x		At the overpass on State Route 130.

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

You could possibly use overhead signing down the road or possibly use delineation.

No parking on both sides.

None.

Question: How would you evaluate the importance of being able to continuously see the roadway surface while driving? (Answers: A--Of Little Importance; B--Of Some Importance; C--Relatively Important; D--Critical Problem)

(continued)

<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	<u>Comments</u>
		x		
		x		There could be damage to the road which could cause you to lose control. There might be something in the road.
		x to x		The driver should always have contact with the road.
			x	So that you can stay in the proper lane.
		x		Where vision is lost, danger cannot be seen, such as holes in the road, objects in the road, or snow on dry spots.
		x		It gives the driver on a strange road an uncomfortable feeling not to be able to see over a steep hill.
	x			This would depend upon the design speed and upon the speed limit.

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?

<u>Yes</u>	<u>No</u>	<u>Comments</u>
	x	There should be better signing at the point of turning.
x		I found them to be not very well marked on the main routes, but they were OK on the Interstate.
x		The signing is adequate; however, the marking is lacking.
	x	Grand Ave. needs repainting.
x		
x		There are no turn lanes in evidence in town.
x		Where curbs are in place.

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)? (Answers: A--Yes; B--Not to Any Appreciable Degree)

(continued)

<u>A</u>	<u>B</u>	<u>Comments</u>
x		Very poorly marked.
	x	On some of the city streets, they were not marked to specify four-lane traffic. This could be confusing. The Interstate was well marked.
	x	It would be better if the striping were in a new condition at all times.
x		To a degree where four-lane or two-lane traffic is in effect.
	x	Third Street has an area that is not marked which makes one believe it is four-lane when it is only two-lane.
x		There are no lanes in evidence in town.
x		The lanes are not marked. Even the yellow and the stripes are practically nonexistent on Third St.

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

<u>Yes</u>	<u>No</u>	<u>Comments</u>
x		
x		
	x	There is no differentiation in color or striping of stalls.
	x	Re-striping.
	x	Parking lanes are not marked in the city.
	x	No parking lanes are in evidence.
	x	The parking lanes are not marked at all.

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

<u>Yes</u>	<u>No</u>	<u>Comments</u>
x		Should be marked "DO NOT TRAVEL IN PARKING LANE."

(continued)

<u>Yes</u>	<u>No</u>	<u>Comments</u>
	x	I noticed on the approach to the Interstate, most people drove on the shoulder rather than the roads. This applied to the curved approaches.
	x	People position themselves generally in the center of the apparent roadway driveable surface.
x		On North Third St. to Grand Ave.
x		One noticed.
x		There were no lane markers in evidence. The cars drove on shoulder on the interchange ramps.
x		Because the parking lanes are not marked.

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

<u>Yes</u>	<u>No</u>	<u>Comments</u>
x		
x		
	x	
x		
x	x	Yes--on Interstate 80; on State Highway 130.
	x	
	x	

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

On S.H. 130-230 west, there is a very narrow bridge. I wasn't bothered by sign posts or telephone posts in the downtown area.

The bridge abutments on S.H. 130 are very narrow. The sign posts on S.H. 130 are on the shoulder.

(continued)

The Interstate is lacking guardrails at the bridge abutments and at steep fill slopes. Signs are located on the edge of the shoulders.

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?

<u>No. of Feet</u>	<u>Comments</u>
10	Should allow room for cars and trucks to park and still let people walk with safety.
5-10, 25	Depending upon whether it is in the city or on the Interstate: city--5 to 10 feet; highway--25 feet.
5, 30-50	It depends upon the driving speed, the amount of other friction the driver has, and the type of road section. Rural--30 to 50 feet; downtown--5 feet.
12	
10	If there is an eight foot parking area at the curb side.
30	Where possible. Two feet from the edges of the curb on Third St. is sufficient considering the 30 mph speed limit. On the through Interstate lanes, allow 30 feet, if you have the proper sight distance.

Question: Do the curves require an excessive amount of driver concentration and thus increase the hazard of other objects along the roadway?
(Answers: Yes; No; Possibly--Pos.)

<u>Yes</u>	<u>No</u>	<u>Pos.</u>	<u>Comments</u>
		x	
		x	If they are real sharp curves, but otherwise, no.
	x		
	x		
	x		

<u>Yes</u>	<u>No</u>	<u>Pos.</u>	<u>Comments</u>
	x		The curves seemed to be OK.
	x		One curve on Interstate 80 probably would, if you were traveling 75 mph.


Question: Does the development and its associated activities along the roadside distract you to any appreciable degree? (Answers: A--Yes; B--No; C--Some But Not of Concern)

<u>A</u>	<u>B</u>	<u>C</u>	<u>Comments</u>
x			A gal in a mini-skirt (pink).
		x	
	x		However, some of the business approaches are 300 or more feet in length with no access control, and call for extra caution on the driver's part.
		x	
		x	
	x		
x			Small route markers and cardinal direction markers are difficult to locate at times.

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

<u>Yes</u>	<u>No</u>	<u>Comments</u>
	x	
		I noticed there was no specific sign right at the turns on to the Interstate (i.e., Interstate 80 turning on to U.S. 287).
x	x	Some streets aren't signed, and there is no advance signing.
x		
	x	Cross street signs could be slightly larger without causing obstruction.
x		No turn lanes are provided. There is good notification of highway intersections.

(continued)

<u>Yes</u>	<u>No</u>	<u>Comments</u>
	x	The numbered routes should be used with an advance arrow of this type:  The un-numbered cross streets do not have any advance signs, and probably should in some cases.

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

Better signing and more of them.

Possibly by advance signing $\frac{1}{2}$ block before the intersection.

This is accomplished by striping.

"GRAND AVE.--500 FT." or "GRAND AVE.--2 BLOCKS AHEAD."

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?

<u>Yes</u>	<u>No</u>	<u>Comments</u>
	x	Paint the lanes more often.
		They were not marked, so it is not applicable.
x		There are only two and they seem adequate.
	x	They are not properly marked.
	x	
x		On the Interstate Highway the lane signs are OK. There are no lane signs in town.
		I don't recall any lane assignments.

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

Marking should be several hundred feet before the turn to give the driver ample time to get into the proper lane.

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

<u>Yes</u>	<u>No</u>	<u>Comments</u>
x		
		Not applicable.
	x	
x		The markings on Third St. for four-lane and two-lane traffic are very poor.
x		
x		On viaduct over railroad tracks--confusing sign.
		Does not apply.



Question: Are the turn lanes clearly identified and outlined?

<u>Yes</u>	<u>No</u>	<u>Comments</u>
	x	Better and more often paint job.
		The turn lanes are not specified in the city. On the highway it was fine.
	x	The striping was in bad condition.
	x	They should be painted.
	x	Not marked in the city area.
x		It is OK on Interstate 80. No lanes in town were evident.
	x	Left turn lanes would be very helpful on Third St.

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

Paint on the street to tell where to turn.

With an arrow or a line-type stripe.

By a painted arrow:  or 

Left turn lanes would be very helpful on Third St.

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

<u>Yes</u>	<u>No</u>	<u>Comments</u>
	x	There should be bigger signs in most areas.
x		On the Interstate, they are excellent.
x		Utilization of both routes and destination names should help most drivers.
x		
x		
x		Except where 30, 130, and 230 signs are together. Numbers this close to looking alike are confusing.
	x	Some signs indicate which direction a town is. There is no indication of this.

Question: Are the turn lanes long enough so as to eliminate the need for a substantial speed reduction in the through traffic lanes? (Answers: A--Always; B--Usually; C--On Occasion; D--Seldom)

<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	<u>Comments</u>
		x		
x				On the Interstate.
				The turn lanes are usually through plus left (dual purpose).
	x			
x				On Interstate 80--good. Thru lanes are not marked in the city.
	x			Fine on Interstate 80.
	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? (Answers: A--Yes; B--Possibly; C--Poorly Located)

<u>A</u>	<u>B</u>	<u>C</u>	<u>Comments</u>
		x	They should be located closer to the intersection.

(continued)

A B C

Comments

x

x

x

x x

On Interstate 80--good. The sign on U.S. 130 is slightly confusing by its location, which is too far past the ramp. Some signs in the city are hard to see unless you know exactly where they are. Interstate 80--east and west on Grand Ave.

x

Stop lights may be better if they were placed overhead.

x

Typical. Some locations could be improved.

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

Yes No

Comments

x

I did not notice any specific warning of traffic control devices.

Not really applicable.

x

x

The situation was not apparent.

x

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

By a blinking light notification of an approaching traffic control device or sign.

The "U.S. 30" sign at Third and Grand Streets should be larger.

Question: Where hazard warnings are provided, can they easily be associated with the hazard involved? (Answers: A--Yes; B--In Some Cases; C--No)

(continued)

<u>A</u>	<u>B</u>	<u>C</u>	<u>Comments</u>
x			No hazard warnings were posted.
x			
		x	A hazard sign can be seen, but type of hazard is not clear--on bridges.
			No hazard signs were observed on the route.
x			Except for the pedestrian light on S.H. 130. This confused me into believing it was a traffic control.
	x		Some hazard boards are used on Interstate 80 which I don't understand.

Question: Are warnings provided for hazards which are obvious and for which little, if any, warning is actually required? (Answers: A--Yes; B--In a Few Cases; C--No)

<u>A</u>	<u>B</u>	<u>C</u>	<u>Comments</u>
	x		
			No hazard warnings were posted. On a bridge on S.H. 130 there should have been a warning; the street was narrow and dangerous.
x		x	"SIGNAL AHEAD"--yes; no warning on a narrow bridge on S.H. 130--230--no.
		x	
x			At the end of Interstate 80.
			None was observed.
		x	

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

<u>Yes</u>	<u>No</u>	<u>Comments</u>
	x	
	x	

(continued)

<u>Yes</u>	<u>No</u>	<u>Comments</u>
	x	
x		
	x	
	x	
	x	

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

The signal light at Cedar and Grand Ave. which is a pedestrian light.

The one-way street sign on the edge of the railroad overpass on the left side could confuse some tourist driver.

But sometimes the side-mounted signals are difficult to spot.

Question: Did you, as a driver, have difficulty in seeing the traffic lights?
(Answers: A--Yes; B--Sometimes; C--No)

<u>A</u>	<u>B</u>	<u>C</u>	<u>Comments</u>
		x	
		x	
		x	
		x	
		x	
		x	
		x	I am familiar with the light placements.
	x		I feel that overhead traffic lights are much more effective.

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

<u>Yes</u>	<u>No</u>	<u>Comments</u>
x		

(continued)

<u>Yes</u>	<u>No</u>	<u>Comments</u>
		I noticed this in only one place along the route.
x		The driver has to watch closely; however, there isn't too much trouble, at least in the daylight.
	x	
x		In the city, color signs distract the driver when watching for signals.
	x	
x		More so with side-mounted signals.

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

<u>Yes</u>	<u>No</u>	<u>Comments</u>
x		
x		
x		
x		Generally.
x		
x		
x		I did not have any noticeable difficulty negotiating street curves.

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

<u>Yes</u>	<u>No</u>	<u>Comments</u>
x		
	x	
	x	However, I am always cautious of long open drive accesses.

(continued)

<u>Yes</u>	<u>No</u>	<u>Comments</u>
x		The driveways on North Third St., some motels, and some service stations.
x		Vision is generally limited by drivers entering a street from a driveway or an alley.

x

x

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

<u>Yes</u>	<u>No</u>	<u>Comments</u>
x		
	x	
	x	Not too many commercial vehicles were present, but with the narrow lane undivided section, they would block the road ahead.
x		The directional sign on Interstate 80, when you pull onto U.S. 287 north.
x		If the commercial units are followed too closely, vision is blocked; however, a short distance back eliminates the vision problem.
	x	None observed.
x		Particularly in heavy congested traffic.

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

<u>Yes</u>	<u>No</u>	<u>Comments</u>
x		
	x	
	x	
	x	
	x	Enough but not excessive.

(continued)

<u>Yes</u>	<u>No</u>	<u>Comments</u>
	x	There is too little information on some town intersections.
	x	State and U.S. shields and arrows should be located at the intersection, as well as $\frac{1}{2}$ a block back, as they are at present.

Question: In my opinion, the roadside advertising competes with the official highway signing and signalization for the driver's attention to:
A--A Marked Degree; B--Some Degree; C--A Limited Degree; D--A Very Limited Degree, If At All.

<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	<u>Comments</u>
	x			
			x	
			x	This may be more pronounced at night.
			x	
	x			Some road signs attract so much attention that they could be missed completely.
	x			Occasionally, I do notice an advertising sign, but only when I am not looking for a highway sign.
x				In many cases it is difficult to compete with billboard-type signs, particularly when the advertising signs outnumber the highway signs to a marked degree.

SUMMARY OF THE DIAGNOSTIC QUESTIONNAIRES

Study Site 9; U.S. Highway 287; Laramie, Wyoming

The following is a detailed presentation of the comments made by the diagnostic team members on the diagnostic questionnaires, concerning nighttime conditions.

NIGHT PHASE

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

<u>Yes</u>	<u>No</u>	<u>Comments</u>
	x	Poor visibility, plus the dual lane serves as straight through or left. Islands should be formed for protected turn bays.
x		The Interstate 80 ramp from U.S. 287 to Interstate 80 should read "INTERSTATE 80 WEST." Rawlins direction signs at U.S. 287 -- "INTERSTATE 80 RAMP EAST."
	x	On the Interstate--yes; in town--no turn lanes.
	x	Lighting is poor and streets need to be re-stripped.
x		Left turn lanes would be helpful on Third Street.
	x	Need re-painting. Should be repainted more often.
x		On the Interstate, I found them adequate but not on the Laramie streets.

Question: The existing lighting provides a view of the road which is: A--About The Same As Daylight Conditions; B--Somewhat Less Than Daylight Conditions But Adequate to Discern the Various Roadway Elements; C--Adequate to Illuminate the Through Lanes and Turn Lanes But the Intersections Are Not As Visible As They Should Be; or D--Inadequate For Safe Driving.

<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	<u>Comments</u>
	x			Not good for signing; lighting is very spotty; all street signs are completely washed out. Major intersections are much better, but on route, as a whole, the lighting is spotty and marginal for safety.

(continued)

<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	<u>Comments</u>
	x			Intersections--good; between intersections--poor; on Third St.
	x			Street signs are slightly difficult to see at night.
			x	On North Third St., commercial lighting overpowers street lights and roadway signs.
	x			But the lighting could be improved.
	x			Could be improved between intersections.
	x			

Question: Does the glare from opposing headlights and/or the roadway lighting tend to obscure the driver's view of the roadway ahead? (Answers: A--Probably; B--Possible; C--Not to Any Marked Degree)

<u>A</u>	<u>B</u>	<u>C</u>	<u>Comments</u>
		x	There was no discomfort at all, when there was moderate traffic. However, the roadway lighting wasn't as effective as it was with light traffic.
x			Opposing head lights and commercial signs and lighting obscure the view in many places on Third St.
		x	On the approach to the bridge on State Highway 130, illumination is not sufficient.
	x		There is a glare from headlights on West Laramie Bridge, traveling either west or east.
	x		
	x		
		x	

Question: Does the location of the roadway signs, with respect to the street lights, make them difficult to read at a glance? (Answers: A--Yes; B--In Some Cases; C--No)

(continued)

<u>A</u>	<u>B</u>	<u>C</u>	<u>Comments</u>
x	x		All street signs and some directional route assemblies.
		x	The location of the signs is good. However, there is some confusion on Interstate 80 where the groups of signs are all together.
		x	Highway route signs and directional signs are desirable at the intersections, as well as before them. Lighting is no particular problem.
	x		Traveling west on S.H. 130-230, the sign to get on Interstate 80 is beyond the turnoff. Particularly the street name signs. Green reflectorized background would be helpful for these signs.
	x		
	x		Especially in the city area. Some were obscured by poles, trees, etc.

Question: In your opinion, would varying the color of lights at the intersections assist in identifying them? (Answers: Yes; Possibly--Pos.; No)

<u>Yes</u>	<u>Pos.</u>	<u>No</u>	<u>Comments</u>
	x		We at present use yellow bulbs for exit-ramp lighting. This offers good approach target value, but you give up 40% of the output. However, it seems to be generally understood.
x			Interstate 80 has yellow light at intersections which make exit ramps easy to locate.
x			If the color codes were made available to the public.
x			With proper public education.
	x		If it were a uniform practice.
		x	
	x		

Question: Where directional signing is provided can it be easily read and understood at a glance? (Answers: A--Yes; B--Possibly; C--Doubtful; D--No)

<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	<u>Comments</u>
x				However, there is not enough carry-through or route shields on all signs.
x				On the Interstate--good. Local signs could be improved.
x				In all cases that I can recall.
			x	A bad spot is Jackson and Cedar, driving east, as well as Clark and Cedar, traveling east.
x				The two blocks ahead information is very good.
		x		
x				Especially on the Interstate Highway

Question: Are the driving lanes clearly identified?

<u>Yes</u>	<u>No</u>	<u>Comments</u>
	x	Markings show up better at night than at day due to reflectivity, but they are in poor shape in at least 60% of the study area.
	x	The lanes are very poorly marked in Laramie on all streets.
	x	No lanes are indicated in most cases in town.
	x	The striping is lousy.
	x	Very poor.
	x	They need repainting.
		In Laramie, they were practically nonexistent, but on the highway, I found them clearly marked.

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

(continued)

<u>A</u>	<u>B</u>	<u>C</u>	<u>Comments</u>
		x	Glare doesn't bother me personally; however, it may bother another average driver or an older person.
	x		
		x	
	x		Being familiar with the route, not totally depending upon road signs, I was not bothered by glare.
	x		Depending upon the type of sign and location.
x			
	x		I feel that part of this problem is because of the fact that I wear contact lenses.

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

<u>Yes</u>	<u>No</u>	<u>Comments</u>
x		Two blocks usually for major route intersections.
x		
x		OK on the Interstate and in the city.
	x	On Interstate 80--good. With parking being in some areas on Grand Ave. and not being allowed in other areas, there needs to be proper notification.
x		
x		In most cases.
x		

Question: Do the turn lanes tend to trap the driver (i.e., is there a tendency for a driver to become trapped in a turning lane)?

<u>Yes</u>	<u>No</u>	<u>Comments</u>
	x	Due to the fact they are dual purpose lanes, one cannot be trapped.

(continued)

<u>Yes</u>	<u>No</u>	<u>Comments</u>
	x	On Interstate 80--good. State Highway 130-230 has lane markers for right turns that could confuse many drivers who do not want to make this right turn.
	x	There are no turn lanes in the city.
x		
	x	
x		At some places.
	x	

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

<u>Yes</u>	<u>No</u>	<u>Comments</u>
	x	They have no reflectivity and are badly washed out by the street lighting.
	x	Street signs are small and are not lighted for easy reading.
	x	It is difficult to read street signs, with poor locations being they cause more than poor illumination.
	x	Some are hidden behind tree limbs or other signs.
	x	They are too small and should be reflectorized.
x		In most cases.
	x	Some need new paint; some need to be placed at different places.

Question: In my opinion, the sight distance to the right-of-way control devices ("STOP" signs, "YIELD" signs, signals, etc.) with the existing lighting are:

<input type="checkbox"/> Adequate	<input type="checkbox"/> Questionable
<input type="checkbox"/> Inadequate	<input type="checkbox"/> Critical

(continued)

<u>A</u>	<u>I</u>	<u>Q</u>	<u>C</u>	<u>Comments</u>
x				
x				Interstate 80--good.
x				"STOP" signs are often too far back. The car must be pulled up through the pedestrian walk to observe the traffic.
		x		Traveling south on Third St., the overhanging traffic light at Third and Clark is obscured with the Texaco sign right behind it.
x				
x				At most intersections.
x				

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

<u>Yes</u>	<u>No</u>	<u>Comments</u>
x		Especially bridge flashboards.
x	x	Interstate 80 ends at Laramie and is well marked to exit return to U.S. 30 west. Hazard signs on edge of overpasses are only on one side. Exit speeds should be posted before the exits are entered.
x		The only incident in mind is the end of Interstate 80 west where lanes are merged effectively by signs.
	x	The hazard signs on bridges on Interstate 80 are inadequate. Also, the hazard signs on the turnoff ramps don't let me know what the hazard is.
	x	Some hazard boards are used on Interstate 80 which I don't understand.
	x	Need warning signs on bridges and better markings, such as bright yellow paint on the edge of bridges.
x		

Question: Do commercial signs and lights along the street detract to a marked degree from the effectiveness of traffic control devices (signs, signals, etc.)? (Answers: Yes; Possibly--Pos.; No)

<u>Yes</u>	<u>No</u>	<u>Pos.</u>	<u>Comments</u>
x			Quite a few of the businesses were closed, or it would have been a lot worse.
x			Third St. has many colored lights that detract the driver from seeing the signal lights as clearly as he should see them.
		x	To a very small extent. On Third St. lights may detract from the route signs, etc.
x			Third and Clark is a bad spot. Grand and Third should be marked with a larger sign for U.S. 30.
x			In some cases the signs are very difficult to see.
	x		

APPENDIX "C"

SUMMARY OF DRIVER INTERVIEWS

Study Site No. 9; U.S. Highway 287; Laramie, Wyoming

GEOMETRIC DESIGN

DAY PHASE

These bridges don't have tapered end guardrails (referring to the bridges on Interstate 80).

You need a guardrail on the approach to these bridges (on Interstate 80).

There is no protection for the bridge rails at this point (on Interstate 80).

The steep grades on the viaduct overpass structure are very dangerous in the winter. We need a guardrail on the approach to this bridge (driver is referring to the bridge over the railroad on the North Bypass).

There is no guardrail on these bridges, and there should be (referring to bridges on Interstate 80).

There is no edge line marking and no shoulder in this area (the driver is referring to the State Route 130).

Comment: The wide approaches into the businesses are probably undesirable, but they don't really bother me.

The curve openings to the businesses at this point are a little but troublesome, especially with a vehicle coming out at an angle such as this one is.

The parking in the right lane is not particularly undesirable (the driver is referring to the parking on the south end of the study section).

NIGHT PHASE

That road-tapering situation is bad, especially if there is a car right beside you (the driver is referring to the taper for the parking in front of the courthouse between Fifth and Sixth Sts. on Grand Ave.).

The left turn lane would be an improvement for the Clark St. intersection. This narrow bridge is a real traffic hazard; we need the full treatment on the approaches (the driver is referring to the narrow bridge on State Route 130 west of the city of Laramie).

There is no guardrail on the bridges in this area (the driver is referring in particular to the overpass structure on the railroad on the North Bypass or Curtis St. just west of the study section).

This is a critical curve for the 70 mph posted speed (the driver is referring to the horizontal curve to the left just south of the State Highway 130 interchange on Interstate 80).

This bridge is particularly dangerous (the driver is referring to the narrow bridge on State Route 130 west of the city of Laramie).

The gore area on the westbound exit ramp to State Route 130 is particularly well identified. The narrow bridge on State Route 130 is very hazardous; the curve is very difficult to see in this area (the driver is referring to the curve on the bridge on State Route 130 or Clark St. approaching the U.S. 278 study section).

DAY PHASE

This bridge really is disturbing, particularly the way you seem to be coming right at the rail (the driver is referring to the narrow bridge on State Route 130 west of Cedar St.)

The wide business openings in this area do not concern me at all (comment refers to the lack of curb control in the northern end of the study section).

Comment: The power poles are a hazard especially when you are trying to turn into a business (the driver is referring to the power poles that are not protected by the curbing or any protective device between Lions and Hancock near the north end of the study section).

The geometry of that island is particularly good (the driver is referring to the dividing island for the ramp going north onto U.S. 287 and turning to the right to go west on Interstate 80).

This is a real tight four-lane section (referring to the area around Sheradon on Third St.).

The parking in the right hand lane is certainly bothersome to me. The parking in front of the courthouse causes the width of the road to have to be narrowed at that point. This has always been troublesome for us (the driver is referring to the westbound direction on Grand Ave. between Fifth and Sixth St.s).

The wide open drives don't bother me in this area, but they certainly are excessive (the driver is referring to the uncontrolled curb openings near the north end of the study section).

There is no acceleration lane on the ramp (the driver is referring to the State Highway 130 entrance ramp to Interstate 80 eastbound).

NIGHT PHASE

The curb going to the bridge end is dangerous at that point (the driver is referring to the bridge over the flood control channel just to the north of the interchange with Interstate 80).

There needs to be a guardrail on these bridges over the railroad (the driver is referring to the bridges on the North Bypass and Curtis St.)

That narrow bridge is certainly dangerous (the driver is referring to the narrow bridge on State Route 130 west of the city of Laramie).

There is no acceleration lane on this ramp (the driver is referring to State Highway 130 ramp onto Interstate 80 east).

The bridge entreatment on the Interstate is insufficient.

These intersections without any type of control are certainly bothersome to me (the driver is referring to the intersections on Garfield St. to the east of the study section).

SIGNALIZATION

DAY PHASE

An isolated left turn signal could be used here (the driver is referring to the southbound approach to Clark St. on U.S. 287).

The overhead signals are particularly effective for me (the driver is referring to the mast arm-mounted signal heads).

The flashing ambers are good, particularly to draw attention. The pedestrian signal for the crosswalk is confusing. It appears to be a signal for the intersection itself.

NIGHT PHASE

That is a hard signal light to see (the driver is referring to the mast arm-mounted signals over the roadway at Clark St.).

That pedestrian light is bad (the driver is referring to the pedestrian signal at the intersection of Cedar St. and Grand Ave.).

The pedestrian signal is confusing to a driver (the driver is referring to the pedestrian signal at the intersection of Cedar St. and Grand Ave.).

I think the intersection of Third and Russell should have a signal. That signal blends into the background (the driver is referring to the mast arm-mounted signal at Clark St. from the southbound approach).

That signal for the crosswalk sure is confusing; it looks just like an intersection signal (the driver is referring to the pedestrian signal at the intersection of Cedar St. and Grand Ave.).

The pedestrian signal light is certainly confusing; I thought it was an intersection signal (the driver is referring to the pedestrian signal at the intersection of Cedar St. and Grand Ave.).

SIGNING

DAY PHASE

The signing and my sense of direction don't coincide at this intersection (the driver is referring to the approach to Third St. on Grand Ave. where the "BUSINESS 80 WEST" sign is supplemented by a double-headed arrow pointing both north and south).

NIGHT PHASE

There is no indication of the change from four-lane to two lane after the light. A sign might be useful for that purpose (the driver is referring to the northbound approach to the signalized intersection at Custer).

DAY PHASE

Business 80 ends too soon; they should have extended it a little further up the roadway (the driver is referring to the "END BUSINESS 80" sign just short of Curtis St. on the north end of the study section).

There is no signing at the actual turn in order to take you to the Interstate 80; an overhead sign might be more effective at this point.

That "STATE ROUTE 130" sign is really in bad shape (the driver is referring to the State Route 130 shield just west of Clark St. going westbound).

The sign preceding the turn is too far beyond the rim. The advance markings are excellent, but there is no signing at the turn itself (the driver is referring to the 90 degree left turn from Clark St. onto Cedar St.).

I think there should be a confirmation sign for Interstate 80 west after you make the turn onto the ramp.

At the beginning of the turn there is no indication on Interstate 80 of the west movement. The advance signs say west on on Interstate 80, but the sign at the actual turn reads "RAWLINS."

The approach to that ramp was certainly well signed (the driver is referring to the advance signing for the State Highway 130-230 exit ramp going west on Interstate 80).

State Highway 130 is also very well marked. The confirmatory markers are very useful. There are no highway shields at the actual turn (the driver is referring to the terminal of the ramp from Interstate 80 west to State Highway 130).

There is a sign behind a tree (the driver is referring to the speed limit sign on Cedar St. northbound).

NIGHT PHASE

The street name sign is placed directly behind the light (the driver is referring to the street name sign for Ivinson St. going northbound on Third St.).

There is no indication of changing from two lanes back to four lanes; an edge stripe and/or sign might be useful in this regard.

There is no indication of where you should turn to get to Interstate 80 west at the north end of the study section).

There needs to be trailblazers to show Interstate 80's signing at the ramp to Interstate 80 westbound coming northbound on U.S. 287).

That sign is behind the tree (the driver is referring to a "YIELD" sign on Cedar St. approaching Clark St.)

The "two-arrows-down" sign is confusing to me (the driver is referring to the warning sign with two arrows down at 45 degrees to indicate passage of either side of an obstruction).

The dual information system is good (the driver is referring to giving both destination names and route numbers on each directional sign).

There is a need for signing at the intersection itself (the driver is referring to signing at the intersection, in addition to signing in advance of the intersection. The particular intersection involved is the Clark St. approach to Third St.).

If you're trying to follow U.S. 30 to Cheyenne, there is a need for some additional signing (the driver is referring to the approach to U.S. 30 going south on U.S. 287).

DAY PHASE

The "yield" sign is in a bad position (the driver is referring to the "Yield" sign for Clark St. on Cedar St. which is located approximately 50 ft. in advance of the intersection proper).

Routes aren't mentioned at all at the intersection (the driver is referring to the intersection of Cedar and Clark Sts. going north on Cedar).

We need a directional sign for U.S. 30 at this intersection (the driver missed the advance sign indicating the junction with U.S. Highway 30 and desired supplementary information at the intersection itself. He found the neon sign "U.S. 30" with an arrow to the right difficult to pick out of the background lighting).

There is no confirmatory marking for U.S. 30 after you make the turn either.

There is certainly a lack of speed limit signs in this area, and I don't think I've seen one today.

There is a "YIELD TO PEDESTRIANS" sign, but there is no crosswalk. The street name sign at Ivinson is partially hidden. The "NIGHT ST." sign is also hidden.

There is no sign directing you to the Business Route 80 at this stop light (the driver is referring to Clark St. going northbound).

There is no highway marker at the "STOP" sign (the driver is referring to the eastbound approach to U.S. 287 on the North Bypass or Curtis St.)

There is not sufficient signing for this intersection; we need something at the intersection itself (the driver is referring to the southbound approach to Clark St.).

NIGHT PHASE

The "U.S. 30" sign on top of the signal is too small (the driver is referring to the neon directional sign).

The railroad warning sign is a little too close to the track.

The street name sign at Ivinson washes out at night. The street name signs at this area are not reflectorized.

I can't read the street name signs at night. The Night Street signs are behind the light.

You certainly need the route numbers at the turns (the driver is referring to the approach to U.S. 287 on the North Bypass or Curtis St.)

There needs to be a supplementary directional sign at the intersection itself.

I would like to have roadway number markings at each intersection (the driver is referring to the intersection with major highways and the use of directional information at the intersection proper rather than in advance of it).

The "DO NOT ENTER" sign is on the wrong side of the frontage road (the driver is referring to the "DO NOT ENTER" sign on the left side of the overpass structure (viaduct on State Route 130)

The supplementary distance panels under the warning signs for major intersections are certainly very good.

The arrow on that sign is hidden by the luminaire pole (the driver is referring to the arrow (directional) to Rawlins on the southbound approach to the interchange with Interstate 80).

DAY PHASE

I think there should be a warning sign for this narrow bridge (the driver is referring to the narrow bridge on State Highway 130 west of the city of Laramie).

The directional sign for Interstate 80 eastbound is past the actual turn (the driver is referring to the westbound approach to the interchange with Interstate 80 and State Highway 130).

There are no highway route markers at this intersection (the driver is referring to the terminal of the off-ramp to State Highway 130 from Interstate 80 westbound).

I think there should be a sign to indicate that the business Route 80 and U.S. 30 are the same around town.

This is signed real well. "JUNCTION --TWO BLOCKS" is a very good sign. It conveys the message very effectively (the driver is referring to the supplementary plate on the junction warning sign).

The route markers are very low and down under the trees (the driver is referring to the route markers around Cedar St. northbound).

The placement of that "DO NOT ENTER" sign is bad. A driver making that turn might catch a glance of that sign and think he is going the wrong way on a one-way roadway (the driver is referring to the "DO NOT ENTER" sign which is placed on the left bridge rail on the approach to the viaduct overpass structure on Clark St. just west of the study section).

The "TWO BLOCKS" panel is very effective in conveying the information to the driver.

NIGHT PHASE

The "PED XING" signs are no problem for me. The street name signs along here are all partially hidden (the driver is referring to the street name signs generally on the south end of the study section).

There is no signing for the narrowing of the street; I think there should be.

In response to a direct question on the school warning sign during the summer, the driver responded that he did not see the warning sign.

You need the route markers at the intersections, too. The "JUNCTION TWO BLOCKS" sign is very effective.

There is no indication whether this is two or four lanes. The paint on the pavement would probably be best, but in the winter a sign should also be put up.

The combination of S.H. 130-230 and U.S. 30 on the same cluster might be confusing to an unfamiliar driver.

The confirmatory markers are very good.

The sign is too far beyond the turn (the driver is referring to the directional sign to the on-ramp to Interstate 80 east at the interchange with State Highway 130).

I think the "MERGING TRAFFIC" sign is very good (the driver is referring to the "MERGING TRAFFIC" sign used on the main lanes just in advance of a freeway on-ramp).

I think these signs are a little bit oversized, but I think they are probably very effective--more so than the standard ones.

DAY PHASE

There are no borders on these signs; I think there should be a light border around them to make them stand out in the background. These school signs are not of the fold-down type. I think that they probably should have a sign to tell the people that school is in session during the summer.

I can't even read that "UNIVERSITY OF WYOMING" sign; if they are going to put one up, they should at least make it large enough for the driver to read it.

Both of the situations regarding the right turns on red should be signed (the driver is referring to both the prohibited right turn on red and the permitted right turn on red situations).

That Grand Ave. street name sign is missing (the driver is referring to the approach to Grand Ave. on Ninth St.).

That double arrow on the Business Route 80 shield is certainly confusing; I don't know which way to turn (the driver is referring to the approach signing to U.S. 287 from U.S. 30 Grand Ave. westbound).

The "TWO BLOCKS" panel is very effective. (The "END OF BUSINESS 80" sign is confusing, if you're attempting to follow Business Route 80 back to Interstate 80).

I think the "SIGNALS AHEAD" warning sign is very useful. The "MERGING TRAFFIC" warning sign is a good sign (the driver is referring to the use of the "MERGING TRAFFIC" sign just in advance of the on-ramp for interstate-type facilities).

The use of an arrow is questionable on the exit sign just past the railroad track (the driver is referring to the advance sign to the exit ramp to U.S. 287 from Interstate 80 eastbound).

NIGHT PHASE

The curbs on this bridge are real difficult to find (the driver is referring to the definition of the roadway section on the viaduct structure on Clark St. just west of the study section).

Some signing is needed at the intersection (the driver is referring to the eastbound approach to U.S. 287 on Clark St.).

The "TWO BLOCKS" supplementary sign is very good. The street name signs all along here are difficult to read (on Grand Ave. going east on Third St.).

The "FORT COLLINS" sign is hidden behind a light pole (the driver is referring to the southbound approach to the junction with Interstate 80 at the south end of the study section).

I can't read the Interstate sign on the right (the driver is referring to the directional sign to Interstate 80 east on the far right edge of the pavement just south of the interchange structure with Interstate 80).

The overhead clearance doesn't show up at all. If I were in the truck, I certainly be interested in that.

The street name signs in general are very difficult to pick out. The "IVINSON ST." sign is lost in a cluster of signs at the intersection (that's on Third St. northbound to Ivinson).

The "JUNCTION WITH U.S. 80--TWO BLOCKS" is excellent.

The sign to Business 80 with the double-headed arrow pointing both left and right is confusing.

There is no signing at the intersection itself to Business 80 (the driver is referring to the westbound approach to the intersection of Grand Ave. and Third St.).

DAY PHASE

I think Interstate signing to the hospital would be helpful. That "YIELD" sign could be a little clearer (the driver is referring to the "YIELD" sign in advance of the Clark St. intersection with Cedar St. where State Highway 130 makes a sharp turn to the right).

The supplementary plate to the junction sign for State Highway 130-230 is very good. However, I believe that the use of heat would be more useful than using the term "TWO BLOCKS." A shaft on the arrow before the left turn would also be an improvement.

That "PED XING" warning sign does not convey the message to me.

I think the business route markers are useful. The sign on the side should be higher (the driver is referring to the U.S. 287 junction with Interstate 80 sign just south of Interstate 80).

The "PED XING" is not a good sign. The speed limit sign is too high and in the trees (the driver is referring to the speed limit sign on Third St. at Ord St.).

The "BUSINESS 80" sign is hard to find and "WEST" is confusing with the double arrow.

The "U.S. 30" sign is too small to be effective (the driver is referring to the neon sign over the signal heads).

The sign cluster S.H. 130-230 and U.S. 30 west is confusing (the driver is referring to the cluster on the westbound approach to Third St. on Grand Ave.).

The sign directions are confusing with cardinal directions (the driver is referring to the instruction that both routes northbound and westbound turn the same direction).

NIGHT PHASE

The U.S. 30 and Interstate 80 business shields could be stacked and thus, eliminate some of these poles.

The street signs in general are very difficult to read.

The "END OF BUSINESS 80" sign is confusing.

There is no U.S. 287 marker at the point where you have to turn (the driver is referring to the eastbound approach to U.S. 287 on the North Bypass or Curtis St.).

The "DO NOT ENTER" sign is misplaced (the driver is referring to the "DO NOT ENTER" sign placed on the left side of the bridge structure for the viaduct over the railroad on Clark St.).

The over-sized signs used on the Interstate are very good.

I really don't have an opinion on the value of the "MERGING TRAFFIC" sign, as I didn't even see it.

The confirmatory signs are very useful on the Interstate or on any other highway.

The "DO NOT ENTER" sign on the left is confusing (the driver is referring to the "DO NOT ENTER" sign placed on the left side of the bridge structure to the viaduct over the railroad on Clark St.).

There certainly needs to be some signing at the intersection itself (the driver is referring to the eastbound approach at Third St. on Clark St.).

The "TWO BLOCKS" panel below the junction sign is very good.

DAY PHASE

The "END BUSINESS 80" is confusing. Someone who is attempting to follow Interstate 80 west would probably take the direction indicated for Interstate 80 east.

The "TWO BLOCKS" advance supplementary plate is very good. The arrows on those signs are a little bit too small (the driver is referring to the directional signing at the intersection of Clark and Third Sts.).

The airport sign is also too small. The "DO NOT ENTER" sign is confusing where it is placed (the driver is referring to the "DO NOT ENTER" sign placed on the left side of the bridge structure on Clark St. over the railroad).

The "INTERSTATE 80 EAST" sign is too far past the actual turn (the driver is referring to the directional sign at the on-ramp to Interstate 80 and State Highway 130-230).

The exit sign as you come up the hill is confusing. It might give the impression of an exit in advance of the structure rather than beyond it (the driver is referring to the advance signing for the U.S. 287 exit from Interstate 80 eastbound).

NIGHT PHASE

The arrow to Fort Collins is hidden behind the light pole (the driver is referring to the directional sign on Interstate 80 east, the southbound approach to Interstate 80 on Third St.).

ILLUMINATION AND GLARE

DAY PHASE

NIGHT PHASE

This lighting is not too good; the spacing is too large (the driver is referring to the luminaires near the south end of the study section which are 400-watt luminaires at 30 ft. space at approximately 300 ft. centers).

The glare is real bad from that used car lot on the right (the comment was made between Custer St. and Grand Ave. on Third St. going northbound).

The lighting is too far apart in this area (the driver is referring to the illumination system north of Clark St. on Third St. or U.S. Highway 287).

The commercial lighting is too close to the street in this area (comment is made at approximately Harney St. going north on U.S. 287).

There is insufficient lighting in this area, and it is complicated by that string of commercial lights (this comment is made between Biggin and Flint Sts. on Third St. going southbound).

The lights are placed so far apart that they are not very effective (the driver is referring to the 400-watt luminaires which are 30 ft. high and spaced approximately 300 ft. apart).

The lighting is rather spotty in this area, and it isn't very effective.

I think the lighting is very good in this area (the driver is referring to the lighting just south of Clark St. on U.S. 287 or Third St.)

The lighting is spotty here (the driver is referring to the area near the north end of the study section).

DAY PHASE

NIGHT PHASE

There is no appreciable glare problem from these luminaires (this comment refers to the lighting system used between Grand Ave. and Ivinson St. on Third St.).

There is no particular glare from the luminaires (this comment refers to the staggered system used in the downtown area of Laramie).

The flashing lights on the roadside are real distracting to me (the driver is referring to the commercial lighting in the downtown area).

The illumination is spotty in this area, and the glare is somewhat of a problem (the driver is referring to the illumination system on the south end of the study section between Russell and Steele Sts.).

The illumination could certainly be improved (the driver is referring to the general illumination system at the south end of the study section).

PAVEMENT MARKINGS

DAY PHASE

NIGHT PHASE

All the pavement markings are badly worn, except the crosswalk which has been recently repainted. It certainly makes it stand out.

We certainly need some lane lines in this four-lane section (the driver is referring to the four-lane section at the south end of the study site).

There is no yellow striping in this section, and you don't know when you can pass and when you can't (the driver is referring to State Highway 130 between Interstate 80 and Cedar St.).

This is a four-lane road, but it is not marked (the driver is referring to the four-lane section near the end of the south end of the study section).

There is no indication of the change from four-lane to two-lane after the light (the driver is referring to the transition from four to two lanes, and he feels that both signing and marking would be desirable).

The road tapering is very bad at that point (the driver is referring to the transition for parking in front of the court house on Grand Ave.).

DAY PHASE

The shoulder line is worn off at this point (the driver is referring to the inside edge line on the tight loop ramp coming onto Interstate 80 westbound from U.S. 287).

There are no lane markings on this street, even though it is wider than the one we just came off of (the driver is referring to Third St. in the north end of the study site).

The lane lines are missing (the driver is referring to the section near the north end of the study site which has paved shoulders and tow-lane operation).

The centerline is completely worn out (this comment is made about Steele St.).

Also, there are no lane markings. It really bothers me to try to drive without lane markings; I think that is one of the more important items in driving.

The approach to this narrow bridge needs a centerline marking and some type of delineation for the narrow structure (the driver is referring to the narrow bridge on State Highway 130).

It doesn't appear that this four-lane section has ever been marked (the driver is referring to the two-lane section with paved shoulders on the north end of the study section).

Along here where parking is permitted, I think the parking lane should be marked.

There is no paint for the gore area; I think that there should be more positive treatment of that gore (the driver is referring to the gore for the ramp to Interstate 80 west from U.S. 287 northbound).

The center and edge lining is very good at this point (the driver is referring to the markings on Interstate 80).

NIGHT PHASE

There is no indication of the change from two-lane to four-lane. I think there needs to be an edge stripe (the driver is referring to the two-lane section with paved shoulders and had mistaken it for a four-lane section).

I think the road markings on this street are simply inadequate. The centerline is bad (the driver is referring to the area between Ord and Park St. near the south end of the study section).

There is no centerline here (the driver is referring to the North Bypass coming down eastbound toward U.S. 287).

Bad centerline--it simply does not show up. The edge line is good and would probably be effective in this area (the driver is referring to the two-lane with paved shoulders near the north end of the study section).

We certainly need some pavement markings in this area. An edge line would be effective, I think, on this section (the driver is referring to the two-lane with paved shoulders at the north end of the study section).

Well, I assumed that it is four-lane, although there are only two lanes marked. The center stripe is very bad (the driver is referring to the four-lane section near the south end of the study section).

There simply is not any indication whether this is two or four lanes (the comment was made between Shields and Hancock going northbound on U.S. 287).

These lane lines are generally bad (the driver is responding to a direct question about the pavement markings on Interstate 80 eastbound in the tight curve to the left just after the entry from the State Highway 130 on route).

DAY PHASE

The edge line is not too good in the daytime (the driver is referring to the edge line at the approach to the State Route 130 exit on Interstate 80 westbound).

We should have an edge line on this section (the driver is referring to the State Route 130 from Interstate 80 into Laramie which does not have paved shoulders).

There is no paint markings coming into that button channelization, it might be desirable (the driver is referring to the button channelization at the intersection of Cedar St. and State Route 130).

The striping on this bridge is good. Also, the center lane markings are good (the driver is referring to the viaduct overpass structure on Clark St. just west of the study section).

There are no street markings in this area (the driver is referring to the two-lane section with paved shoulders on the north end of the study site).

I think a stop bar would be desirable at this intersection (the driver is referring to the westbound approach to Third St. on Garfield).

There are no lane markings in this area, and the centerline isn't very good either (the driver is referring to the pavement markings on the four-lane section at the south end of the study site).

The crosswalk is not discernible. This is important because of the advance warning sign to a crosswalk (the driver is referring to the school crosswalks at Kearney and Sheridan).

Again, there are no lane markings in this area, making it difficult to drive.

NIGHT PHASE

That gore area is very clear to me (the driver is referring to gore area for the on-ramp to Interstate 80 west from U.S. 287 northbound).

Edge line on this ramp is good (the driver is referring to the on-ramp to Interstate 80 from U.S. 287).

These bridges are poorly marked and delineated (the driver is referring to the bridges on the Interstate 80 segment).

I can't tell whether this is four-lane delineated (the driver is referring to the two-lane highway section with paved shoulders near the north end of the study section).

There simply is not any indication whether this is two or four lanes (the comment was made between Shields and Hancock going northbound on U.S. 287).

These lane lines are generally bad (the driver is responding to a direct question about the pavement markings on Interstate 80 eastbound in the tight curve to the left just after the entry from the State Highway 130 on route).

That gore area is very clear to me (the driver is referring to gore area for the on-ramp to Interstate 80 west from U.S. 287 northbound).

Edge line on this ramp is good (the driver is referring to the on-ramp to Interstate 80 from U.S. 287).

These bridges are poorly marked and delineated (the driver is referring to the bridges on the Interstate 80 segment).

I can't tell whether this is four-lane or two-lane (the driver is referring to the two-lane highway section with paved shoulders near the north end of the study site).

DAY PHASE

There are no chevrons on the approach to the painted island (the driver is referring to the island for the divided roadway at the interchange of Interstate 80 going southbound).

The edge line is striped very well (the driver is referring to the edge line on the ramp to Interstate 80 west from U.S. 287).

There are no lane markings in this section.

There needs to be some edge lines tapering into this narrow bridge. The guiding end of the bridge is more important than being protected from it (the driver is referring to the narrow bridge on State Route 130 west of the city of Laramie).

Edge lines are desirable on all types of highways. The edge line is good on these ramps, it helps you guide around the tight curve (driver is referring to the ramp to Interstate 80 and Cedar St.).

Edge lines would certainly be helpful in this area (driver is referring to the two-lane section of State Highway 130 between Interstate 80 and Cedar St.).

This narrow bridge is very dangerous. You could guide right into the end of the rail (driver is referring to the narrow bridge on State Route 130 west of the city of Laramie).

I think an edge line would certainly be effective in this area (driver is referring to the two-lane section with paved shoulders near the north end of the study site).

That parking area line sure makes you change directions in a hurry (the driver is referring to the parking transition in front of the courthouse on Grand Ave.).

NIGHT PHASE

The striping isn't too good (the driver is referring to the striping on U.S. 287 in the Interstate 80 interchange area).

They need lane markings here (the driver made the comment at approximately Kearney St. going northbound).

There are no lane markings on this street (the comment was made between Grand Ave. and Ivinson St. going northbound).

The lines along here need to be repainted (the driver is referring to the pavement marking on the North Bypass or Curtis St. just west of U.S. 287).

We need a centerline stripe here (the driver is referring to the approach to the narrow bridge on State Route 130 west of the city of Laramie).

The bridge entreatment is insufficient (the driver is referring to the bridges on Interstate 80).

The right hand edge of the road is not well defined (the driver is referring to the State Route 130 section between Interstate 80 and Cedar St.).

There are no lane markings here (the driver is referring to the two-lane with paved shoulder section near the north end of the study site).

This four-lane section without pavement markings is confusing (the driver is referring to Grand Ave. east of U.S. 287).

DAY PHASE

An edge line might be helpful here (driver is referring to the two-lane section of paved shoulders on the north end of the study site).

The paved shoulders give you the impression of four lanes. The lanes are not well defined. That narrow bridge needs guide treatment (the driver is referring to the narrow bridge on State Route 130 west of the city of Laramie).

That gore area needs more treatment (the driver is referring to the gore area for the ramp to U.S. 287 from Interstate 80 eastbound).

NIGHT PHASE

DELINEATION

DAY PHASE

There should be some type of delineation of that narrow bridge (the driver is referring to the narrow bridge on State Route 130 west of the city of Laramie).

There needs to be something to guide you into that bridge (the driver is referring to the narrow bridge on State Route 130 west of the city of Laramie).

The approach to the narrow bridge is named "Dangerous;" you need some type of delineation for the edges of the bridge (the driver is referring to the narrow bridge on State Route 130 west of the city of Laramie).

The bridge ends needs guide treatment (the driver is referring to the bridges on Interstate 80).

The hazard board should be on both sides of the bridge structure (the driver is referring to the bridges on Interstate 80).

NIGHT PHASE

The hazard boards should be on both sides of the bridge (the driver is referring to the bridges on Interstate 80).

The delineators are generally good, but they are too widely spaced (the driver is referring to the post-mounted delineators on Interstate 80).

The bridges should be better marked (the driver is referring to the bridges on Interstate 80).

The gore area is clear; I don't think any further identification would be necessary (the driver is referring to the gore area for the ramp from U.S. 287 northbound to Interstate 80 westbound).

This bridge is poorly marked and delineated (the driver is referring to the bridge over the railroad just west of the U.S. 287 interchange on Interstate 80).

DAY PHASE

NIGHT PHASE

It's difficult to see the curb (the driver is referring to the curb on the right obstructure over the railroad on Clark St. approaching U.S. 287).

Why is there a hazard board at the approach to U.S. 287 from Park St.? The delineators are badly spaced on the curve (the driver is referring to the post-mounted delineators on Interstate 80).

There is a hazard board on the right but not on the left (the driver is referring to the hazard boards defining the edge of the bridge on the Interstate Highway).

The bridge entreatment is generally insufficient (the driver is referring to the bridges on the Interstate 80).

The right-hand edge of the road is not well defined. I think either an edge line or post-mounted reflectors would be effective in this area (the driver is referring to State Route 130 just east of Interstate 80).