HUMAN FACTORS REQUIREMENTS FOR REAL-TIME MOTORIST INFORMATION DISPLAYS

VOL. 8 ANALYSIS OF DRIVER REQUIREMENTS FOR INTRACITY TRIPS

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16. Abstract

The primary objective of this report is to document a systems analysis conducted to determine driver information requirements for intracity trips in freeway corridors when incidents occur on the freeway. The analysis begins with the pre-trip planning a driver goes through; the decisions which he makes during his trip; and the decisions he makes at his destination.

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PREFACE

This document is part of a seventeen-volume report entitled, Human Factors Requirements For Real-Time Motorist Information Displays. Titles of all volumes are shown below.

Volume	FHWA-RD Number	Title
1	78-5	Design Guide
2	78-6	State of the Art: Messages and Displays in Freeway Corridors
3	78-7	Summary of Systems in the United States
4	78-8	Bibliography and Selected Annotations: Visual Systems
5	78-9	Bibliography and Selected Annotations: Audio Systems
6	78-10	Questionnaire Survey of Motorist Route Selection Criteria
7	78-11	Analysis of Driver Requirements for Intercity Trips
8	78-12	Analysis of Driver Requirements for Intracity Trips
9	78-13	A Study of Physical Design Requirements for Motorist Information Matrix Signs
10	78-14	Human Factors Evaluation of Traffic State Descriptor Variables
11	78-15	Human Factors Evaluation of Route Diversion and Guidance Variables
12	78-16	Supplement to Traffic State Descriptors and Route Diversion and Guidance Studies
13	78-17	Human Factors Evaluation of Audio and Mixed Modal Variables
14	78-18	Point Diversion for Special Events Field Studies
15	78-19	Freeway Incident Management Field Studies
16	78-20	Feasibility of Audio Signing Techniques
17	78-21	Driver Response to Diversionary Information

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TABLE OF CONTENTS

I. INTRODUCTION

The purpose of this document is to develop an analysis of tasks, decisions, and updates an urban driver must go through in proceeding on an intracity trip from one point to another. Since drivers respond differently to different situations, an attempt is made to broaden these tasks and decisions such that they apply to a general driving situation. The analysis begins with the pre-trip planning a driver goes through; the decisions which he makes during his trip; and the decisions he makes at his destination should his destination be more than a point (shopping center, airport, etc.). The analysis is particularly influenced by on-site experience in day to day operation on the Dallas North Central Expressway Corridor.

After some effort had been expended in developing these criteria, it was decided that less emphasis should be placed on pre-trip planning; however, it is necessary and desirable to present that background data, since it was a project activity and directly related to the trip itself. The following sections detail the analysis which was performed, the refinement of the findings within this analysis, and a summary statement.

II. DEVELOPMENT OF DATA BASE

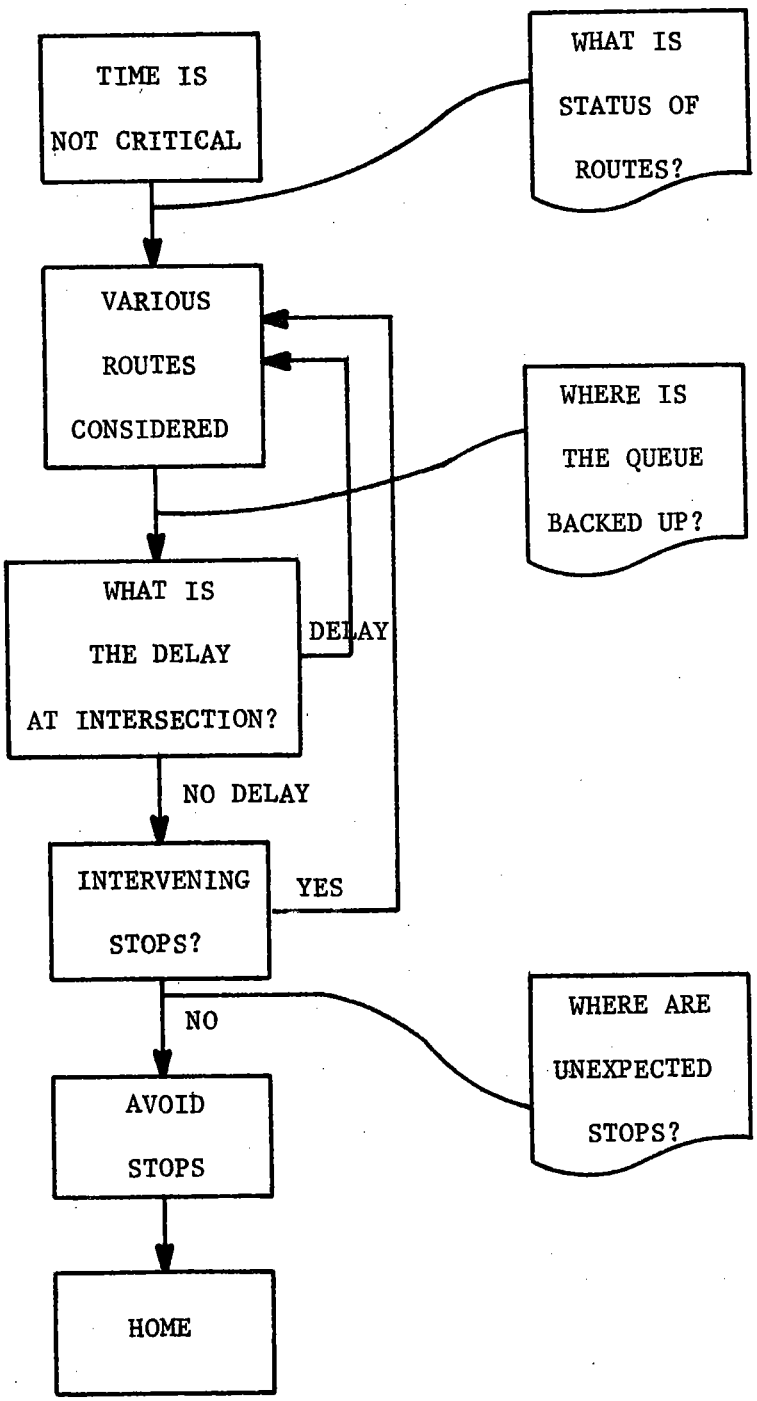
Recognizing that trip task decisions will be reached in different manners by various drivers, an approach was developed to involve as many drivers as feasible within staff and time limitations to monologue typical trips. The technique was to provide a tape recorder in the vehicle, with the driver instructed to make comments on every situation during his driving task where a decision was required. He was to comment on the specific decision he made; what prompted him to make that decision in lieu of another; and what further information he would like to have had. Drivers were instructed to be as free as possible in their analysis without being restricted as to what was "possible or not possible" to have in the way of information. Typical transcriptions from these studies are included in the appendix. The transcriptions are rough and unedited, just as the driver respondents dictated them.

Several different types of trips such as work, shopping, recreation, school, and business were considered. Since it is not practical to provide information to drivers specifically for trips by type, several general considerations for trips (which may or may not apply to one of the specific trip types) were developed. These considerations are as follows:

1. fixed destination/flexible destination
2. time criteria/time non-critical
3. route fixed/route variable
4. information presented/information gleaned
5. weather
6. safety
7. intervening stops
8. distance to destination

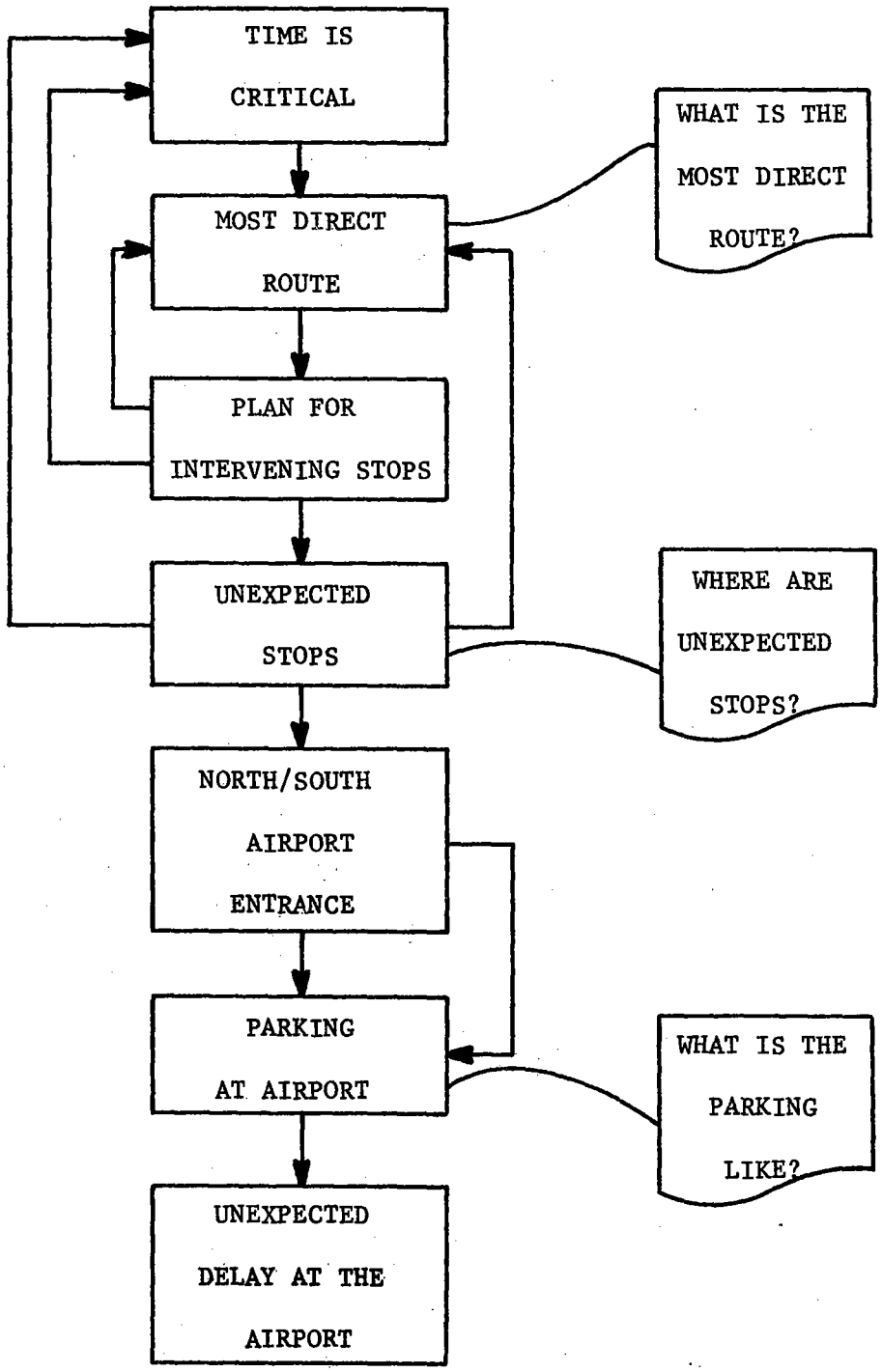
Figures 1 through 5 are examples of trip activity flow diagrams for specific type trips. Each diagram was developed during an actual trip made in Dallas. As each trip was being made, the driver noted points where he wanted information that was not available. These information points are shown on the right side of each diagram.

For the work to home and shopping trips time was not critical. This is an important consideration and is discussed in other sections of this report. The work to airport, home to school, and home to work trips started with the constraint that time is critical.



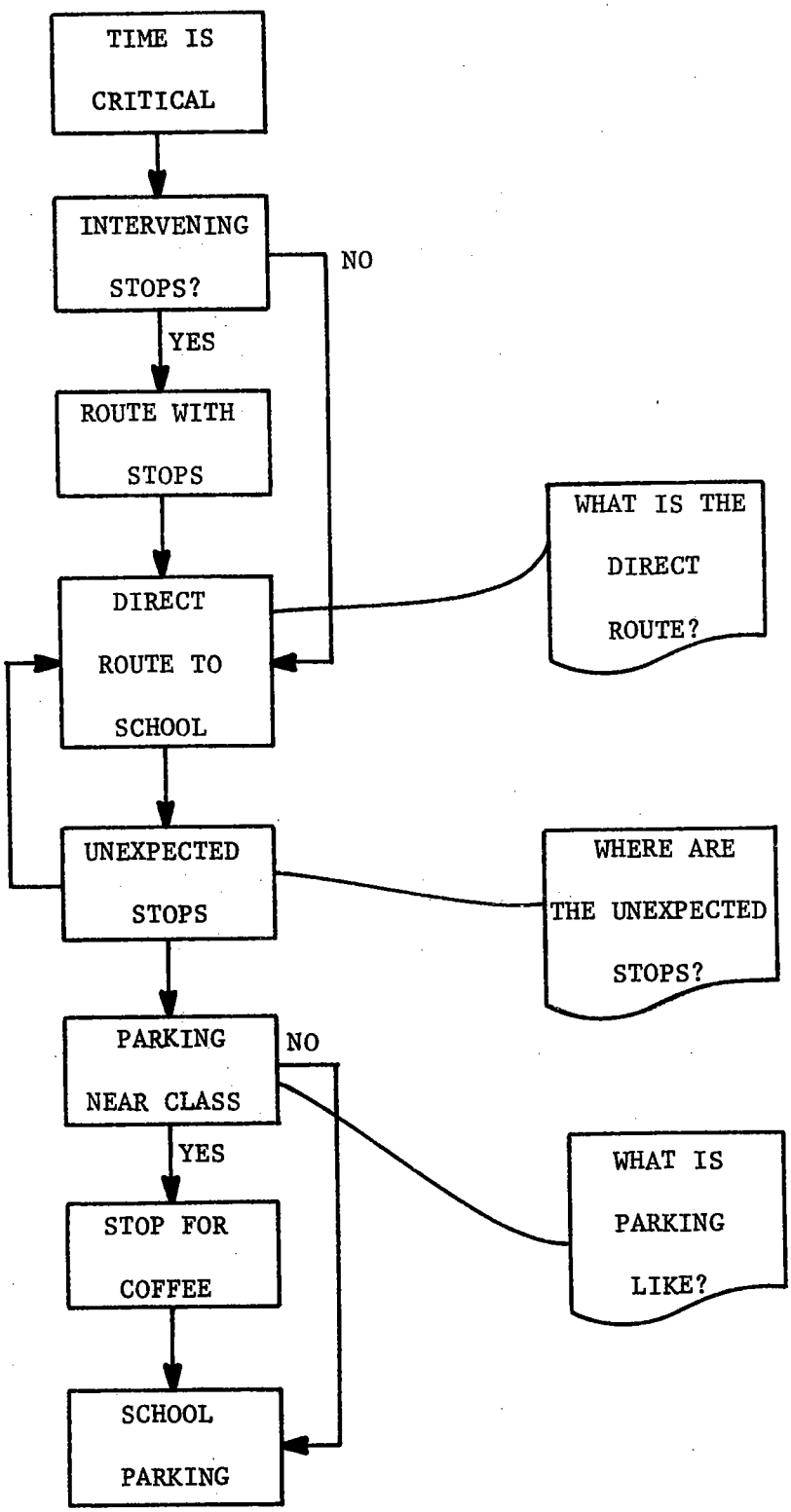
WORK TO HOME FLOW CHART

FIGURE 1



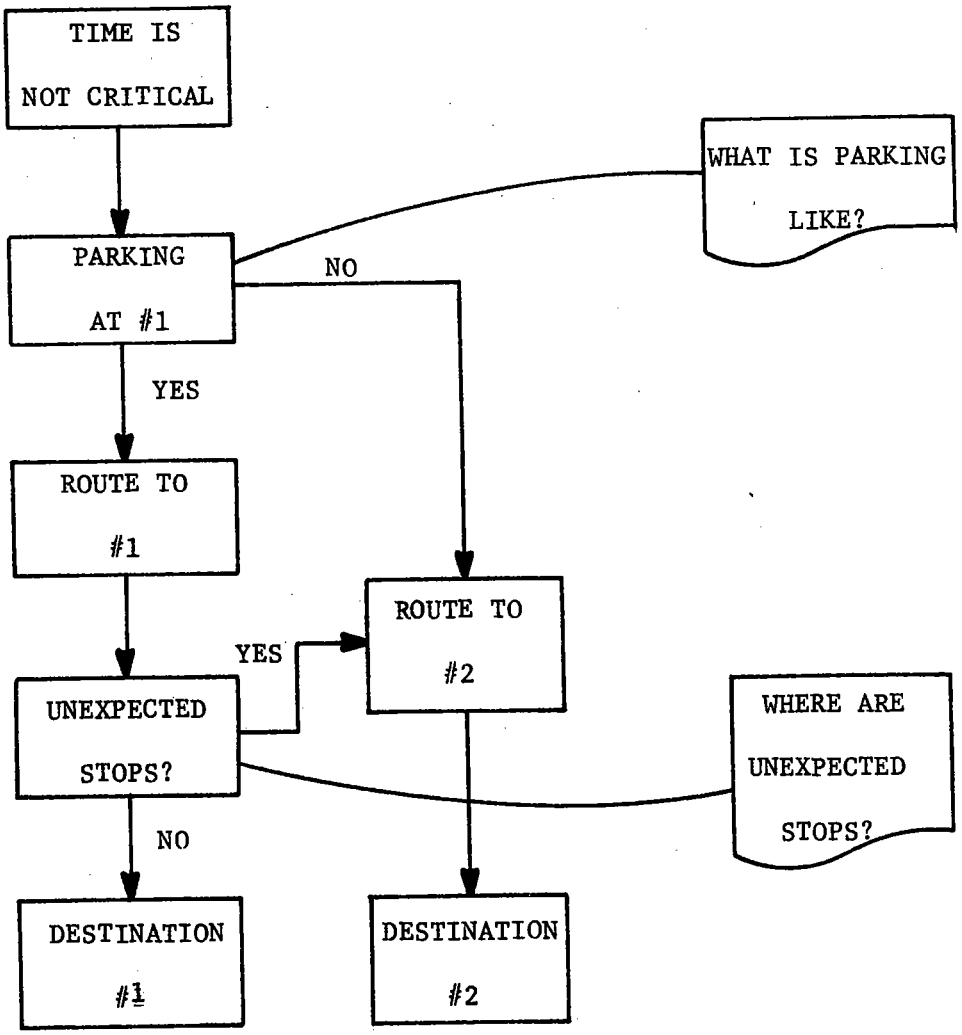
WORK TO AIRPORT FLOW CHART

FIGURE 2



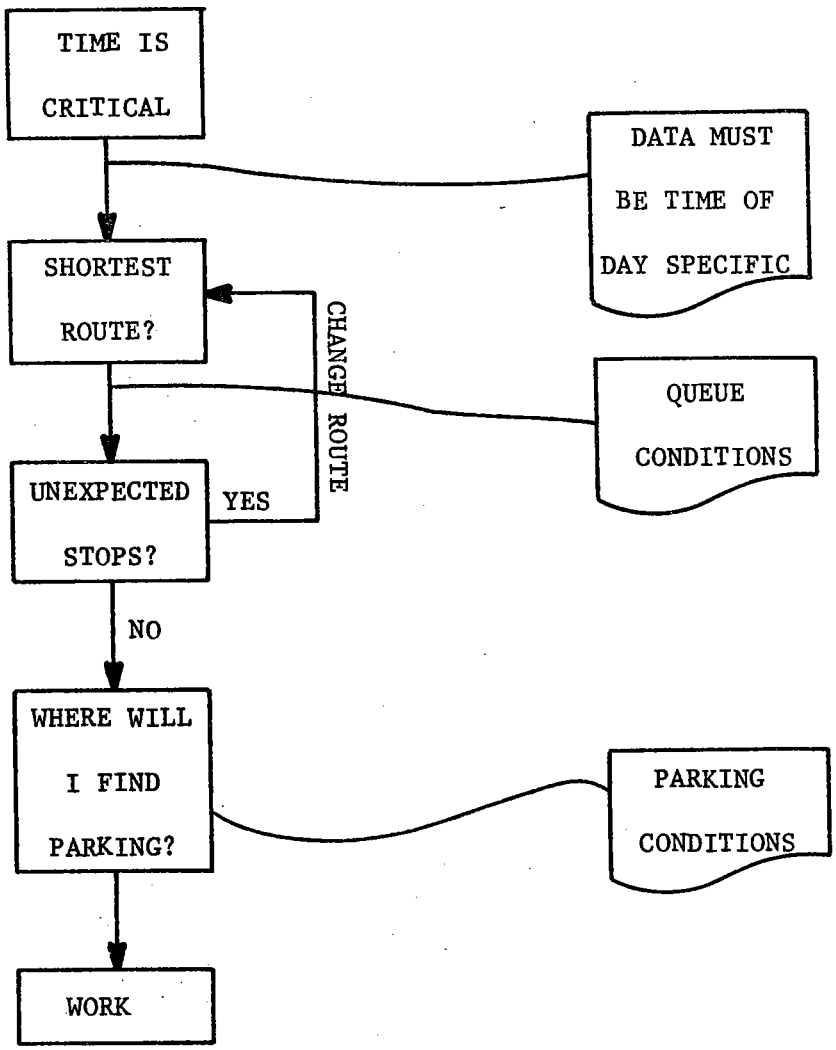
HOME TO SCHOOL FLOW CHART

FIGURE 3



SHOPPING FLOW CHART

FIGURE 4



HOME TO WORK FLOW CHART

FIGURE 5

III. TRIP DECISION SPHERES

The three spheres within which trip decisions are made are as follows:

1. Pre-trip planning at the source of the trip

2. Decisions during the trip itself between the source and the destination (or sink)

3. Decisions made at the sink periphery where the sink is a major traffic attraction such as shopping center, airport, university campus, and the specific destination within that sink.

Based on these three spheres where decisions must be made and the various trip activity flow charts, a series of trip characteristic profiles and the information bit desired for each profile was developed. This information is presented in Tables 1, 2 and 3, with Table 1 presenting pre-trip planning at source, Table 2 presenting source to sink planning, and Table 3 presenting profile for tasks between the sink periphery and the point destination. In developing these profiles, it became apparent that many of the decisions were the same for any trip type with only their importance varying from trip purpose to trip purpose.

The middle column - trip characteristic profile - in Tables 1, 2 and 3, presents a series of decisions which are largely based on the information developed from the tape recorded record of typical trips as described previous. A logical flow of decisions from the first decision dealing with driver familiarity would be down to the information regarding intracity destinations and intercity destinations. The order of the trip characteristic profiles is not important as this will be a function of the individual driver and his trip purpose. In fact, some of these characteristic profiles may be reinserted in the column as the trip proceeds.

Pre-trip -- The trip characteristic profile information is presented as a question a driver might consciously, or unconsciously, pose as he plans his trip. The left column presents what might be the information bit desired for yes response. The right column presents the information bit which might be desired if there is no response to that question. Also presented under the information bit desired is a code suggesting how this information might be provided to the driver. The code is as follows:

DI - driver information which might be provided by a dial-in type system

TABLE 1

PRE-TRIP PLANNING EXERCISE AT SOURCE

INFORMATION BIT DESIRED YES RESPONSE	TRIP CHARACTERISTIC PROFILE	INFORMATION BIT DESIRED NO RESPONSE
DETAILED INFORMATION BELOW	AM I FAMILIAR WITH AREA?	WHAT ROUTE SHOULD I TAKE? DI
NO MESSAGE	*AM I WITHIN MY "TIME CRITICAL FRAME"?	IS A FASTER ROUTE AVAILABLE? HOW CAN I GET TO A FASTER ROUTE? DI
WHAT ARE CONDITIONS ON MY COMMITTED ROUTE? DI CR	*AM I FIRMLY COMMITTED TO A PARTICULAR ROUTE?	WHAT ALTERNATE ROUTES ARE AVAILABLE AND RECOMMENDED? WHAT ARE KNOWN CONDITIONS ON THAT ROUTE? DI
WHAT ARE WEATHER CONDITIONS? DI CR	*WILL WEATHER AFFECT MY TRIP PLAN?	NO MESSAGE
WHAT ARE ADVANTAGES? WHAT MODES AVAILABLE? DI	WILL I CONSIDER MODE CHANGE?	NO MESSAGE
WHAT SPECIAL ADVANCE SINK OPERATION & CIRCULATION DATA SO I NEED? (PARKING AVAILABILITY, TURN PROHIBITIONS, ONE-WAYS, INTERNAL TRANSIT MODES) DI	IS MY DESTINATION WITHIN A MAJOR SINK? (AIRPORT, CBD, FAIRGROUND, OFFICE COMPLEX, STADIUM)	NO MESSAGE
WHAT ARE CONDITIONS AT MINOR SINK? (PARKING, SPECIFIC ENTRANCES, TRAFFIC RESTRICTIONS) DI	IS MY DESTINATION A MINOR SINK? (OFFICE BUILDING, SHOPPING CENTER, SCHOOL)	NO MESSAGE
WHAT SPECIAL POINT SINK INFORMATION DO I NEED? (HOURS OF OPERATION, SERVICE OFFERED) DI	IS MY DESTINATION A "POINT" SINK? (HOME, SHOP, STORE, BANK, THEATRE, SERVICE STATION)	NO MESSAGE
NO MESSAGE	WILL MY INTRA CITY DESTINATION BE INTERMEDIATE TO AN INTER-CITY LINK?	WILL SUFFICIENT INFORMATION BE AVAILABLE AT INTER/ INTRA CITY MODE? DI

*** Recurring consideration during planning**

TABLE 2

TRIP EXERCISE FROM SOURCE TO SINK

INFORMATION BIT DESIRED YES RESPONSE	TRIP CHARACTERISTIC PROFILE	INFORMATION BIT DESIRED NO RESPONSE
NONE	AM I FAMILIAR WITH AREA?	AM I STILL ON ROUTE? WHAT AND WHERE ARE MAJOR "LANDMARKS"? WHAT TRAFFIC CONTROLS WILL AFFECT MY TRIP? SS
NO MESSAGE	*AM I WITHIN MY "TIME CRITICAL FRAME"?	HOW CAN I GET TO A FASTER ROUTE? (GUIDE TO MAJOR LANDMARK) RR VS
ARE DELAYS OCCURRING AS EXPECTED? (QUEUES, STOPPAGES, SPEED ZONES) DS	DO RECURRENT DELAYS (CONGESTION, RR XINGS, SCHOOL ZONES) AFFECT MY TRIP TASK?	NO MESSAGE (UNLIKELY)
WHAT HAS OCCURRED? WHAT IS DEGREE? WHAT CAN I DO ABOUT IT? DS VS RR CR	*DO UNEXPECTED DELAYS (ACCIDENTS, STALLS, HIGH WATER, EMERGENCY VEHICLES, MAINTENANCE ACTIVITIES) AFFECT MY TRIP?	NO MESSAGE (UNLIKELY)

* Recurring consideration during trip

TABLE 3

TRIP TASK EXERCISE SINK PERIPHERY TO SPECIFIC DESTINATION

INFORMATION BIT DESIRED YES RESPONSE	TRIP CHARACTERISTIC PROFILE	INFORMATION BIT DESIRED NO RESPONSE
AFFIRMING MESSAGE	AM I FAMILIAR WITH INTERNAL SINK OPERATION AND IT APPARENT?	WHAT STREETS, RAMPS, ENTRANCES, ETC., ARE AVAILABLE TO MY SPECIFIC DESTINATION? SS
NO MESSAGE	*AM I WITHIN MY "TIME FRAME"?	HOW DO I GET TO AN ALTERNATE ROUTE OR DESTINATION? DI SS
WHERE IS PARKING?	DO I NEED PARKING?	WHERE ARE LOADING ZONES, DROP-OFF POINTS? SS
WHERE IS MY PARKING LOT? WHY IS IT MY PARKING LOT? SS	DOES PARKING LOT I USE MAKE A DIFFERENCE?	AFFIRMING MESSAGE SS
WHERE IS ALTERNATE SPACE AVAILABLE? DS	IS MY PARKING LOT LOADED?	AFFIRMING MESSAGE SS
AFFIRMING MESSAGE SS DS	AM I FAMILIAR WITH LOT TO FINAL DESTINATION?	HOW DO I GET TO DESTINATION? DO I NEED A RIDE? WHEN WILL RIDE RUN? WILL IT BE A COST ITEM? SS DI

*** Recurring consideration during major sink internal trip**

CR - information which might be obtained from commercial radio

DS - dynamic signing, a sign with fixed message which may have a device to call attention to it such as flashing lights, or it may be a foldup sign such as the 3M varicom sign

VS - variable signing such as a rotating drum sign or a matrix sign with more flexibility than under dynamic signing

RR - limited range roadside radio where drivers could receive information from their normal car radio

SS - static signing which would be typical guide signs, either route signs or signs to specific destinations such as airports, university, shopping centers.

Trip -- The second major sphere within which decisions must be made is on the actual trip itself. Here again, a trip characteristic profile presented in the center column shows typical concerns a driver might have during a trip. The order in which these appear would be variable, and in fact, many of the characteristics would be continually evaluated and updated, particularly the question as to the critical time frame. As described, each trip characteristic profile poses a question with an information bit desired depending on the response. The key to how the information is provided is indicated by the code previously described.

Major Sink -- The third major sphere where trip decisions must be made is from the periphery of a major sink to the specific destination. If the specific destination is a point destination such as a residence address or a single office building, this particular phase is not applicable. However, if the destination is within a major sink such as an airport with its own system of roadways and signing, or an office complex where circulation through the complex and its parking area is necessary, then the driver must go through an additional decision-making process. These are given in the same manner as previously outlined with a trip characteristic profile in the center column posing certain driver concerns. Again, the specific order of these decisions may vary with the most important characteristic being driver familiarity. A response with the information bit desired is shown on the left and right of the trip characteristic profile.

Based on the above analysis, it can be seen that there is a broad spectrum of information bits which would be both desirable and necessary for a driver in planning, carrying out, and concluding his trip tasks. It is not within the scope of this project to analyze and test all three of these spheres of decisions as presented. It has

been decided that emphasis should be given on the second phase of the analysis which is the actual trip itself. However, the information and data which were developed for the pre-trip planning and the travel within a major sink were helpful in developing the types of information a driver needs and desires during his trip.

Effects of Trip Purpose on the Trip Task

Based on the analysis of the real-time monologue records by various trip purposes, it became evident that trip purpose for an intracity trip was not highly important relating to the tasks the driver must accomplish and the bits of information he might desire. Any trip type may include, for example, intervening stops. Route and time planning for such stops will follow the same general process, regardless of trip purpose. Unexpected delays (accidents, weather, construction, etc.) have an effect on any trip, regardless of trip purpose. The effect may be more severe on a time-critical business trip than on a loosely planned recreation trip. However, delays are not only detrimental in terms of time; they may cause additional accident hazard or force drivers onto an unfamiliar route. In summary, information bits required for trip task itself do not necessarily depend on factors which are related solely to the purpose of the trip. Information will be helpful or necessary in varying degrees depending on the trip purpose. Nevertheless, similar types of information may be required for any trip purpose.

IV. DIVERSION DECISION

Factors Affecting Diversion Decision

In examining the real-time monologues, one primary factor influenced decisions time and again: the factor of driver unfamiliarity. Intuitively it can be said that the unfamiliar driver requires more information than the familiar driver. The trip monologues made by drivers who were familiar with the study area in general further confirmed this. Typical comments were: "Since I am familiar with the area that I am in right now, I was able to go directly to another route"; "Decided to go from McCommas to Central and down Central to Lemmon, and the main reason was habit"; "The biggest problem with the downtown area is the one-way system and not being familiar with that system"; "There was a choice to turn left or right and because we did not know about the alternate route ....., we waited and turned left."

Certainly, it would not be feasible to provide information segmented for familiar drivers and information segmented for unfamiliar drivers. However, whatever information is presented may be used in a different manner by a familiar driver than for an unfamiliar driver. The familiar driver will much more readily make his own decision as to an alternate route or in fact whether he should divert. The unfamiliar driver may choose to stay with a route which is firmly fixed in his mind. If however he does divert, he will need fairly specific information as to which routes he should follow and how he should return to his original route. In summary, it will be necessary to provide specific information and guidance to all drivers in the case of diverting from a primary facility; however, the manner in which individual drivers use this information may vary depending on the driver familiarity with the area.

Probability of Diversion

During the three stages of a trip (pre-trip planning (origin), trip, and destination), the probability of a decision to divert, where a choice exists, ranges from 100 percent to 0 percent. The qualification "where a choice exists" is necessary to exclude the situation where drivers are physically forced to divert due to some extraordinary happening such as police action; a bridge being closed; or where drivers are physically restrained from diverting.

Several factors will influence the probability of an individual driver diverting, not the least of which is the familiarity of that driver as discussed above. Figure 6 shows an hypothesized representation of diversion probability. It is hypothesized that the closer

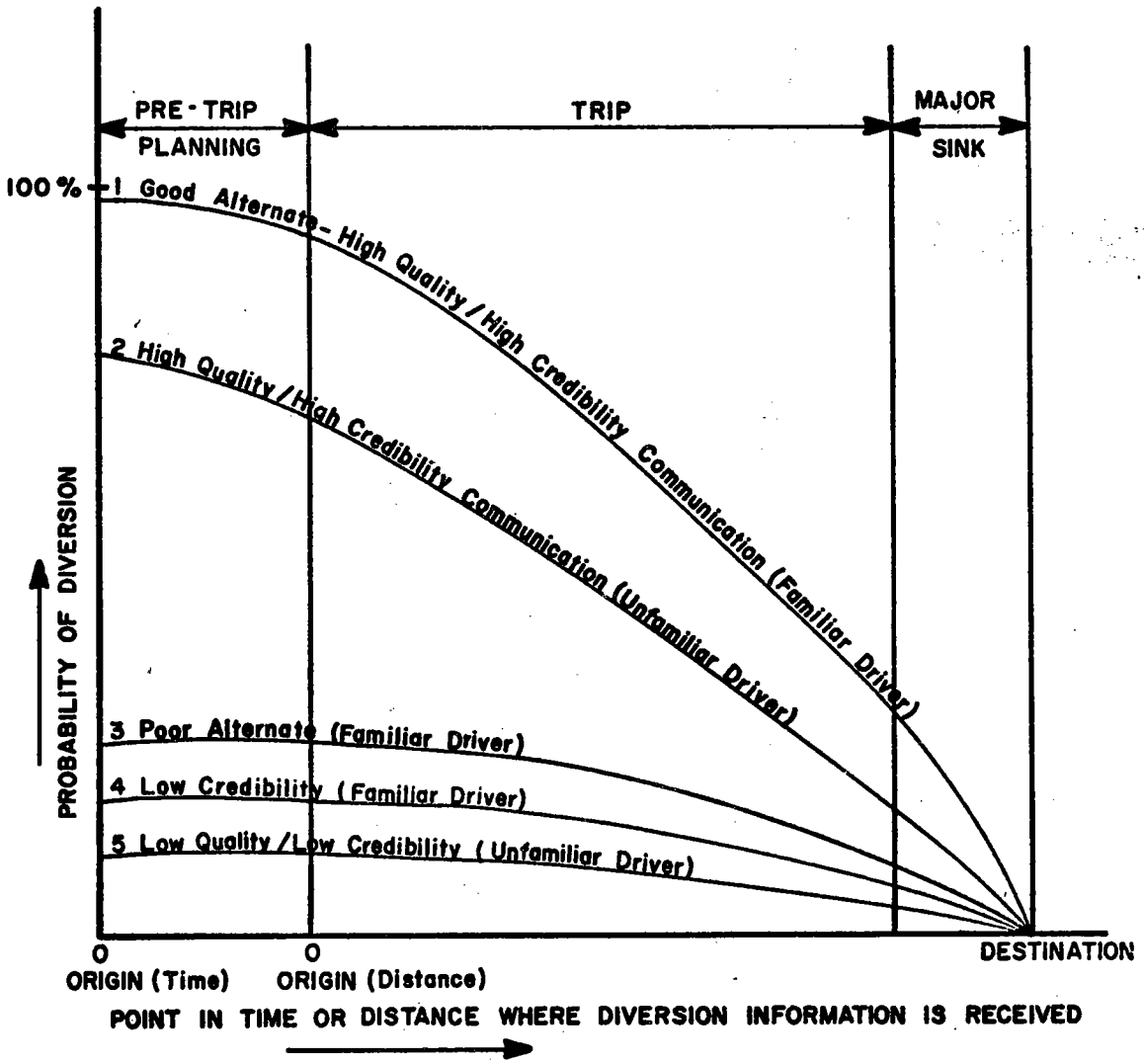


Figure 6 - Hypothesized Diversion Probability

a driver gets to his location in either time or distance, the less likely he is to divert. Several curves are presented for consideration. The exact shape of the curves is certainly subject to speculation and verification.

The top curve, (Curve 1) a condition for highest diversion probability, would represent familiar drivers who know a good alternate is available. Information is presented in a quality manner technically and the driver believes the information to be valid. In other words, conditions for diversion are ideal.

Curve 2 represents the unfamiliar driver who would be less likely to divert than the familiar driver, even under ideal conditions of a quality and credible message. Alternate routes would be unknown to him and could only be assumed from the message.

Familiar drivers who are aware that the alternate is poor are represented in Curve 3, with Curve 4 showing drivers who have reason to suspect that the message is invalid either from previous experience or from the manner in which it is presented.

Curve 5 represents the lowest probability of diversion, an unfamiliar driver who is presented with information which he either does not understand or he suspects is not correct.

A family of curves exists in among these five curves which would represent varying degrees or combination of the data. However, if the hypothesis is correct, the importance of communicating with drivers early in their trip is apparent.

V. MAXIMIZING COMMUNICATION

The preceding discussions have not been specific as to on-freeway or off-freeway communication. Overall factors affecting successful diversion in these two categories are much the same, although specific techniques and strategies will vary. Economic considerations force selective application of communication hardware. Installation of such hardware must be at locations to maximize the number of drivers contacted.

Vehicle Concentrations -- In a typical urban freeway corridor, the freeway itself may carry upwards of 50 percent of all traffic crossing a screen line on major parallel arterials. Consider the traffic data as shown in Figure 7, which is representative of the North Central Expressway Corridor. Two screen lines are shown, one along Forest and the other along Mockingbird. The total number of vehicles (two-way) crossing the screen lines on the major continuous routes is shown at the right of each route. As can be seen, the freeway in this case carries over 50 percent of the traffic. The greatest opportunity for communicating with the most drivers passing a fixed location would obviously be on the frontage road and freeway system. Primary contact should be made within the 300 or so feet or right-of-way; and, an attempt should be made to keep drivers as close to that area as possible.

Driver Needs -- Considering that primary emphasis should be on the freeway itself, what does an urban (freeway) area driver desire as he proceeds on his chosen route? Most drivers desire to travel freely at the maximum speed limit. Without adding freeway lanes this is not practical. But within the confines of desirable operation from a traffic engineer's standpoint (maximum throughput), what would a driver need or want: (1) He wants traffic to continue to move; (2) He wants his chosen route to be free for him to maneuver his vehicle (Level of Service D or greater); and (3) He wants to be informed somehow of his entry/exit points (not necessarily decision points). If it were possible to tell a driver that to get from Point A to Point B: (1) He could expect his lane to be clear of obstructions (and slow moving vehicles); (2) He could expect traffic to flow freely for maneuverability; and (3) He would be adequately informed of where he needs to make a change, a great majority of the drivers needs would be satisfied.

What does an urban driver need if the above three criteria will not be satisfied: (1) He needs to know that his chosen route is restricted (congestion, accident, stall, ice, maintenance, etc.), but not necessarily why; (2) He needs to know what to do to cope with that situation (stay on the freeway, divert to the frontage road, or divert to the arterial system); and (3) If he is diverted, he

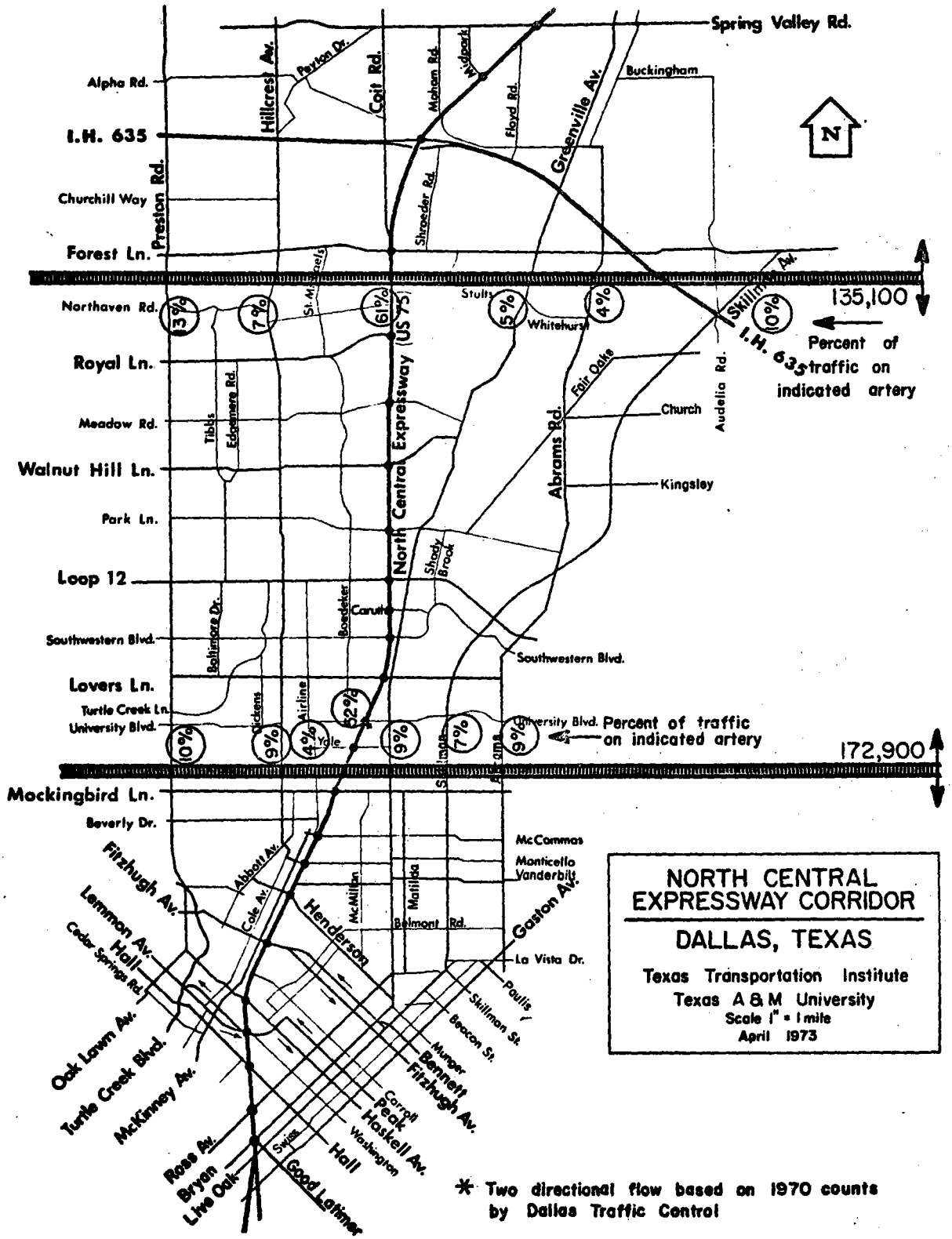


Figure 7 - Typical 24-Hour Flow at Two Screen Lines*

needs to know how to get back to his primary route or to his destination on the alternate route.

A Real-World Example -- Figure 8 shows a map of the North Central Expressway Corridor with typical frontage road routing as per the legend on the right side of the map. Due to discontinuous frontage roads, routing off the frontage road along a near arterial and back to the frontage road would be necessary at some points. This type of routing would be most applicable to the non-familiar driver as it maintains close contact with the frontage road and the freeway. A familiar driver may well choose to stay on the arterial system or the frontage road all the way to his destination. Typical sign messages and various types of signs which might be used are shown in Figure 9. Again, these signs would be primarily applicable to the unfamiliar driver but could be helpful to the familiar driver.

Also in Figure 9, certain parallel facilities are designated as alternate routes, either near or far, and could be used where a major traffic blockage is expected to continue for an extended time on the freeway. Near alternates would of course be applicable and require less signing. Far alternates would probably only be applicable to the familiar driver, if at all.

Off-Freeway Contact -- The possibility of diverting drivers bound for the freeway and frontage road system suggests an extensive communication system off the freeway proper, particularly to unfamiliar drivers. What do these drivers require? Basically, the same information and service as outlined for drivers on the freeway. They want to know that the freeway would be clear of blockages, free for maneuverability, and adequately signed for change points. How and when could this information be given to the driver? Information would have to be given at decision points where major arterials cross.

Consider the map in Figure 8 and the possible decision points where major continuous routes cross. A brief perusal of the corridor map shows that there would be close to a hundred such points. Considering that there are drivers on three approaches who may need freeway information (northbound and southbound paralleling the freeway, and either east or westbound flowing to the freeway), the task becomes quite large. Obviously only major decision points could be signed. Audio signing could reduce the number of sign structures and serve all three movements.

Providing route guidance at the decision points would be complex. Perhaps only route traffic conditions should be provided except at major highways where the greater number of unfamiliar drivers would be found.

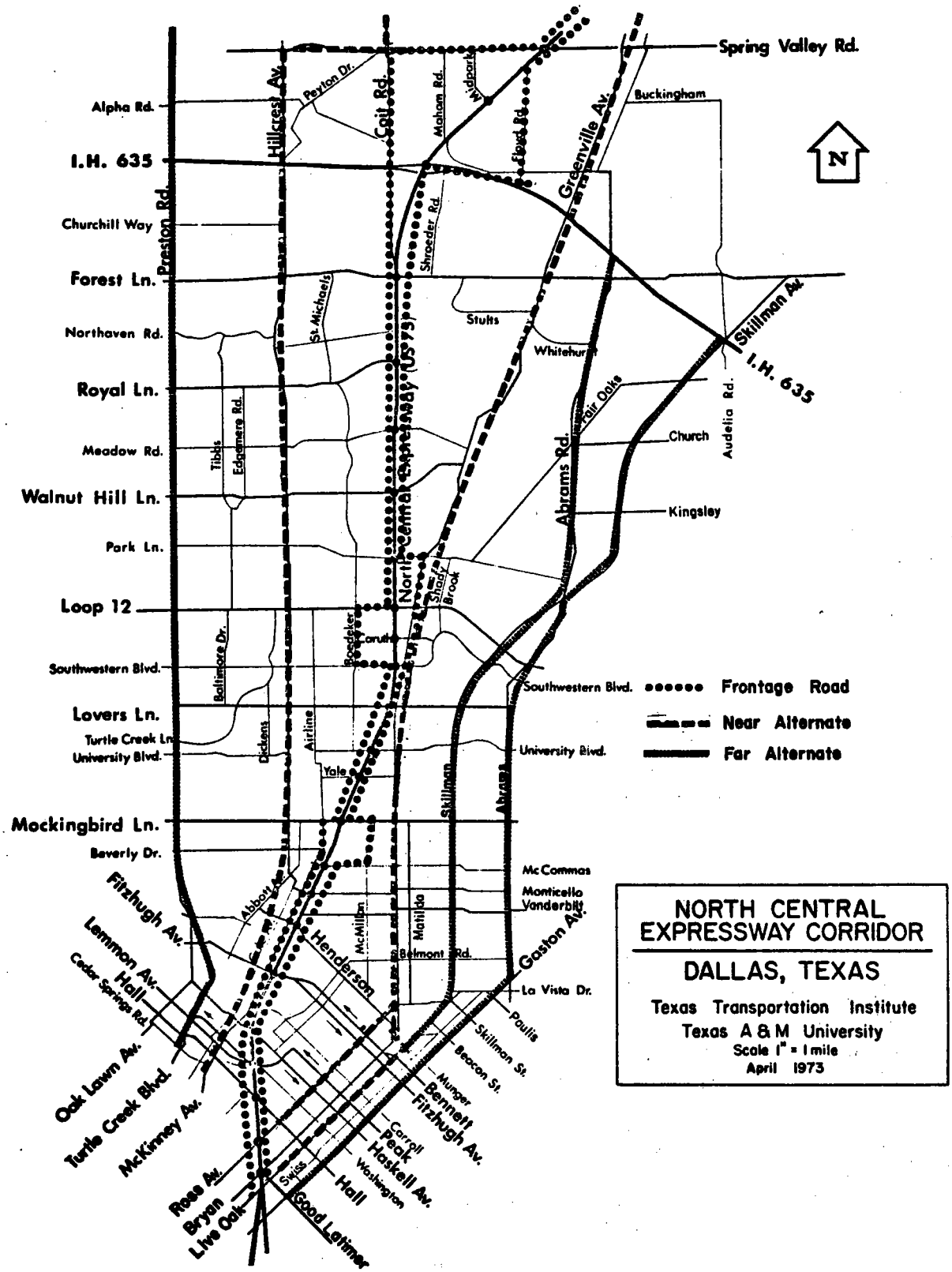


Figure 8 - Alternates to Freeway

DRUM OR BIT #1	FREEWAY CONDITIONS	OR	BLANK	OR	BLANK	OR	BLANK
DRUM OR BIT #2	OK	OR	LANE BLOCKED	OR	SLOW	OR	BLANK
DRUM OR BIT #3	STAY ON FREEWAY	OR	EXIT AT	OR	BLANK	OR	BLANK
DRUM OR BIT #4			NEXT EXIT		X STREET		Y STREET

ON-FREEWAY SIGN MESSAGES
(AUDIO, MATRIX, DRUM)

DRUM OR BIT #1	SOUTHBOUND CENTRAL	OR	BLANK	OR	BLANK	OR	BLANK
DRUM OR BIT #2	OK	OR	SLOW	OR	BLOCKED	OR	BLANK
DRUM OR BIT #3	BLANK	OR	ALTERNATE ROUTE	OR	ALTERNATE ROUTE	OR	ALTERNATE ROUTE

FRONTAGE ROAD SIGN MESSAGE
(AUDIO, MATRIX, DRUM)

SOUTHBOUND CENTRAL ALTERNATE ROUTE	OR	SOUTHBOUND CENTRAL ALTERNATE ROUTE	OR	SOUTHBOUND CENTRAL ALTERNATE ROUTE	OR	BLANK
←		→		↑ ↑ ↑		BLANK

ARTERIAL DIVERSIONARY ROUTE SIGNING
(BLANKOUT, LIGHTED, VARICOM)

Figure 9 - Typical Diversionary and Guidance Sign Formats

VI. SUMMARY

After analysis and evaluation of the trip tasks within an urban corridor, much of which has by necessity been subjective and heavily influenced by the experience in the Dallas North Central Expressway Corridor, several general summary statements were developed. These are as follows:

1. The process which a driver in an urban area goes through in planning his trip, carrying out his trip, and arriving at his destination, does not vary widely by trip purpose. The primary influencing variables in this task are the familiarity of the driver and the degree to which time is critical to his trip.

2. The driver goes through a great number of considerations, either consciously or unconsciously, during his trip task. The information bits he requires for successfully completing his trip tasks are continuously being evaluated and may be evaluated several times within the trip tasks.

3. In the urban freeway driving environment, it appears to be unfeasible to segment information for familiar or unfamiliar drivers. However, valid information either for diversion or route guidance might be used in varying ways by familiar and unfamiliar drivers, with a familiar driver making many decisions on his own as to what might be his best plan of action.

4. It is hypothesized that the probability that a driver will divert from a chosen route decreases as he gets closer to his destination.

5. In a typical urban corridor, the freeway facility will carry the greatest number of vehicles and would, therefore, offer a greater possibility for maximizing the number of motorists with which communication can be made.

6. In carrying out a trip task, the urban freeway driver requires that three general criteria be met: (1) He wants traffic to continue to move; (2) He wants his chosen route to be free for maneuverability; and (3) He wants to be informed of his route change points.

7. Contact with drivers approaching the freeway from the arterial system is more complex, due to the numerous decision (or change) points in a typical urban freeway corridor. Traffic condition information should be provided without advising alternate routes except at major highway intersections, where the higher percentage of unfamiliar drivers would be encountered.

APPENDIX

TYPICAL TRIP MONOLOGUES

This will be a shopping trip. Time is critical because I want to be back to the office by a certain time. The destination is also critical because I have done some pre-trip planning and decided there is one place that I want to go for sure. If they do not have what I am looking for I'll go some other place. I have one intervening stop which is the bank, and it is considerably out of the way from the shopping destination. I would like to know the shortest route without stops between here and the bank, and then between the bank and the shopping destination. I do not know that so I will go a major route which includes a familiar route that I am fairly certain there will be no trouble with. I am not familiar with the route between the bank and the shopping location all the way, and it will include a major portion of the route being a freeway. I would like to know the conditions on that freeway. I do not want to know them right now, since it will be sometime before I get there so I would like to know them after I get through at the bank. Weather is not a factor. I would use some information I heard on the radio - there was an accident on the freeway. I could find some way to get around it. In other words, I would change my route. I will not change my destination at least until I've checked at that location to see if they have what I am looking for.

I am going to have to have another intervening stop. I have just noticed that the car has to be filled up with gas, and since we only have one credit card for Gulf gas, I've got to find a Gulf station.

Since this trip is taking place after 10:00 a.m. when most shops are open, there is not a great deal to worry about congestion. The big question is where is some very unusual situation such as a signal light malfunctioning or an accident that blocks the entire roadway, a fire that's blocking an area of town, flood waters - something that would be totally unexpected and kind of a major event, which occurs to me would not be very hard to identify and communicate to the drivers since it's kind of an on-off situation.

At a possible route changing point, I remember that the route I decided to take from the bank to shopping was sometimes under construction part of the route. I have decided to go ahead and chance it, but I would like to know if that construction is blocking - I'm going to have to have a detour.

As I think about it, it just doesn't seem logical to spend alot of time and money trying to convey information to the motorists during the off-peak, or I should say specifically during the off-peak. If the sign is there for the peak operation, it could be operated some during the off-peak. For the most part, unusual events just do not occur during the off-peak to the extent that it would justify the costs involved in putting up signs for off-peak operation. It is also a matter of what people expect. It's

not too hard to tolerate an unusual occurrence, because it is unusual and if it is something that happens at times, people aren't going to get too distraught about a bridge going out, or waters flooding, major accidents, because during the off-peak the pressure is not on to get some place at a specific time. It's a more leisure atmosphere during the off-peak. There is also no need for diversion during the off-peak. Roadways, freeways, arterials are not congested - they are not overloaded - so there is no point from that standpoint of diverting someone to another alternate route. Nothing particularly would be gained. I have just encountered a roadblock that will greatly effect my route. I'm going to have to go way out of the way. I'm not even sure why the road was blocked. If I had known this, I could have planned ahead and avoided the unnecessary detour. Since I am familiar with the area that I am in right now, I was able to go directly to another route and not actually go any at all out of the way. Somebody unfamiliar that was trying to use the route that I was on would have been greatly delayed and aggravated because as the situation is, it was practically impossible to get back to the freeway which I was trying to get to when I was detoured with the roadblock. I have noticed that my anxiety level is much higher on a two lane freeway than it is on a three or four lane freeway. I know that if there is an incident, regardless of where it is major or minor, it is going to block the freeway, or significantly effect my travel time. While I was on LBJ, I didn't worry about it so much because I knew even an accident that blocks one or two lanes I could still fairly easily get by. It's much more beneficial to tell motorists about incidents on a two lane freeway than it would be on a four lane freeway.

This will be an office to airport trip. Flight 953 leaving at 12:15 p.m. from Love Field to Houston.

The weather is rainy, cold, and will definitely effect our trip. The time right now is 11:30, so we have 45 minutes to get from the office to the gate at the airport.

One of the first considerations was we need to find our luggage and get that together, and then go make a stop between here and the airport to cash a check. Decided to go down the freeway, south from the building to McCommas, and get off at McCommas so that we can stop at a 7-Eleven and cash a check before we get to the airport.

Out of the parking lot there was a choice of turning left or right, and because we did not know about the alternate route behind the building and able to turn right, we waited and turned left to go directly over to the freeway, but there was an alternate route if we had been advised about it.

With an airport trip the time is very critical, and of course, the destination is critical and we will not change our destination. We have to be there at a very specific time so considerations such as shortest routes are the obvious. Decided to go from McCommas to Central and down Central to Lemmon, and the main reason was habit.

I have started thinking about where I am going to find parking at the airport, because I am so rushed for time, that I would like to know in advance the best place to go to a parking place.

After getting on Lemmon the trip's fairly routine. There are some parallel streets along Lemmon that could be used as alternate routes if there was some major problem on Lemmon.

At the airport we have decided to use the long-term parking. Since Love Field is not used very much now, it's pretty assured that there will be some space available. Even though it's raining, we'll be able to find a parking spot underneath the canopy.

This will be a recreation trip. This will take place during the off-peak about 2:00 in the afternoon.

There is no specific destination. I do have to stop by and get some gasoline, and then I plan to go to downtown - through the downtown area - make one stop possibly, and then back out to home.

After stopping for gas, there is little or no reason to take one route or the other, since we have no specific destination except to go into the downtown area. Just out of force of habit I took the freeway. For variety I've gotten off the freeway and will take a route through a residental area. I would like to know if some construction is going on, or if for any reason streets are blocked, but otherwise I don't really care.

In the downtown area, the main consideration is just finding a route where it's not totally blocked. All during the day it's congested - traffic is slow - queues backed up from each signal - so there's not really anything to be gained by looking for a route that doesn't have any cars, because they all do.

The biggest problem with the downtown area is the one way street system and not being familiar with that one way street system. If there was some way we could convey in broad general terms about the way that one way street system works, it seems that would be of benefit to the unfamiliar driver.

For a true recreation or social trip without any specific destination, there is really very little specific information to be given to the driver because it just doesn't effect his trip one way or the other. I would like to know if something unusual is occurring, but it really wouldn't do one thing. I would easily change my route if I was told that one route was blocked, but otherwise I don't know that there is a great deal of benefit to be gained.

I have decided to go to a location where I will need to park, and I think that is one of the biggest problems with the downtown area - off-peak or peak - is finding a parking place. Again, I am not familiar with the parking. It would be beneficial if I could find out beforehand where to go to park - exactly how much it is going to cost - where the entrance to the parking lot is.

It seems like one of the major contributions we could make in the downtown area would be signs for people that are leaving the area - giving the status of various major freeways leaving and going out from the downtown area. The downtown area is a concentration of people. The vast majority are not going to stay down here. They are going to leave so we want to be able to get information to a concentrated spot relating to the routes they might take in leaving the CBD. This could either be a good application for a telephone dial-in

system, or low-power radio. A low-power radio that just covers specifically the downtown area, giving current status of freeway conditions, of major arterial conditions leaving the downtown area, seems to me would be a good test of low-power radio.