

CHAPTER H

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SUMMARY AND RECOMMENDATIONS



Although all project studies are progressing well, under the programs developed by the main study groups, the November 1978 termination date has brought into focus areas where inadequate time has placed some serious constraints on the scope of the project. It seems clear, then, that substantial benefits would be realized if the project could be extended. Such an extension is warranted by the many delays and unforeseen events that have effectively shortened the actual study period.

## 1 STATUS OF THE STUDIES

All three main study groups have refined their field procedures, and a comprehensive data-collection program is well underway.

### *a Road User Costs Survey*

The User Costs Surveys Group has developed procedures that are generating vehicle operating-cost data from a wide variety of survey participants who are becoming increasingly cooperative. An average of over 6,000 vehicle/months of data, covering different items of user costs, are in hand and ready to be processed. Detailed inventory information, covering roadway characteristics on over 12,000 km of user survey routes, has been developed by two survey vehicles that have been operating continuously since the beginning of 1977.

All of the inventory data are validated on computer files, but only 20 percent of operating-cost data have passed preliminary processing, and even less have been completely validated for analysis. Inadequate computer support, together with delay in consolidating summaries of the data have seriously hampered the processing operation. Modified procedures directed toward collecting monthly summaries of user data are presently being implemented. These procedures will permit better validation-screening in the field and will reduce the volume of information to be processed.

High priority has been placed on processing all existing data and on establishing the exact disposition of participants in a new, quantified version of the user surveys design factorial. In the future, highest priority will be given to filling identified gaps in this factorial, and efforts will concentrate on developing information on those

items that have the most impact on user costs.

*b Road User Costs and Traffic Experiments*

This Group has identified 13 necessary and nine desired experiments that they plan to conduct in developing a deterministic model to predict speeds and fuel consumption. This includes nine required speed studies with a nine-man crew, which are 44% complete, and four required fuel studies with a 19-man crew, which are 74% complete. Preliminary equations developed from the fuel data are presented in this report, and final relationships will be established in the near future, as each of the experiments is completed.

It was necessary to expand the driver-behavior experiments following the implementation by the government of a policy of strict enforcement of speed limits, in November 1976. This had a major impact on driver speeds, and therefore complicated our data analysis requirements. Lack of programming support has slowed the data flow and delayed the analysis effort. Missing was programming to generate summary reports which would permit field data screening to locate discrepancies and errors.

A conceptual framework has been developed for a deterministic model to predict time and fuel consumption, while different traffic-simulation programs are being examined for use in explaining traffic-composition effects on speed.

A tight schedule has been established to finish the required traffic experiments. The fuel crews expected to complete their studies early in 1978 will then be diverted to help with the traffic-behavior experiments. However, within this time frame it will not be possible to complete the proposed satellite studies that are estimated to require three months.

*c Pavement and Maintenance Studies*

This Group has established 86 paved sections, having completed at least one cycle of roughness, deflection and condition survey measures on every section. The measurement program is running smoothly. Material characterization on 21 sections is complete, and a material consultant is currently conducting test on another 30 sections. Another contract has been signed for 20 more sections, and the consultant is presently starting the work.

Axle-loading data have been collected on over a third of the sections, and this program will continue. Traffic-classification information has been developed for a limited number of test sections. However, considerable assistance is expected in the future from DNER/DER agencies, so no problems are expected in this area.

The methodology for the unpaved roads was refined on six sections, while the more time-dependent paved sections were being established. The major work program on unpaved roads has been started and a number of sections have now been established.

Because of the large volume of laboratory work, the pavement studies will have to rely on the pledged cooperation from DER-DF to handle this work.

A work schedule has been developed and the necessary resources have been established to complete the objectives of the pavement studies before November 1978. Nevertheless, there is considerable concern that, for the paved sections, the period of observation will be too short to produce meaningful results, particularly for the maintenance studies, whose monitoring period will last only about nine months.

## 2 RECOMMENDATIONS

The period of the project, relating specifically to work in Brazil, was originally conceived to last 42 months. Two to three months were spent on recruiting the international staff, and nearly half a year was dedicated to getting the Brazilian technical staff together. Additional time was consumed by the pilot tests, calibration of the equipment and establishment of computer facilities. It is estimated, therefore, that a study of the scope originally envisioned will require 12 additional months.

Well trained field teams in all areas of the research are now productively generating information. It has required from 12 to 24 months to realize this level of implementation, so every month added to the field efforts at this point is extremely cost effective.

A work program has been designed to keep the entire team together through November 1978, which is the end of the current budget period for the international staff. Current plans call for the Brazi-

lian staff to carry the project forward to February 1979.

It is recommended that the project be extended for a year, in terms of participation by the international staff, and for nine months, in terms of the Brazilian staff, with the last six months being reserved for the analysis and final report.

Such an extension would also add to the data-collection phase and reduce overlap between producing final relationships and incorporating them into a computer model. The extension of the data-collection period would especially benefit the user surveys area, where recently-identified participants are critical in filling the survey factorial. The pavement studies area would also benefit from the extension of the observation period for alternative levels of maintenance response. In addition, it would also permit the completion of all the user cost and traffic experiment satellite studies.

Regardless of what happens related to recommended project extensions, the research team will need continued access to suitable computer facilities to finish the project.