Long-Term Pavement Monitoring Program:
Summary of Alternative Development Workshop
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ABSTRACT
The purpose of the Long-Term Pavement Monitoring (LTM) Program Alternative De­
velopment Workshop, held October 15-19, 1984, and sponsored by the FHWA, was to
discuss basic issues related to implementing a national LTM program for pave­
ments. The results of this workshop are summarized. It was the consensus of the
workshop participants that there were many questions of critical importance to
financing and managing the nation's highways that could only be answered by a
continuing monitoring effort. This appears to be the only way to successfully
study the primary effects of mixed traffic and environment on the performance
of pavements. The need for flexibility in experimental design offered by a mix
of in-service highways, special design sections, and accelerated mechanical
testing was recognized. There was strong opinion that active management from a
central organization, independent of government agencies subject to political
change, would be required for the success of a long-term pavement monitoring
program. It was also expected that regional centers would be required to par­
ticipate with the state highway agencies in the collection of the data, to train
personnel, and to conduct much of the specialized field and laboratory testing
to ensure data uniformity. It was concluded that the major results from this
effort would be improved prediction and design models to more effectively manage
the nation's highway system.

The LTM workshop was held in Alexandria, Virginia, October 15-19, 1984, and the results are summarized
in this paper.

The purpose of this workshop, sponsored by FHWA,
was to discuss basic issues related to implementing
a national LTM program. These basic issues included

1. What questions related to the financing and
management of the nation's highways need to be an­
swered and can only be answered with a continuing
data monitoring effort?
2. What data need to be collected and evaluated
in order to answer these questions?
3. What is the best way to collect and evaluate
these data in order to answer a number of these
basic and important questions?

The question of the need for a long-term pavement
monitoring program had been previously answered in
the affirmative by strong consensus of the particip­
ants in the Pavement Testing Conference held in May
1984. It was the consensus opinion from that con­
fERENCE that long-term monitoring of in-service
highways and special design sections was a critical
requirement and that accelerated testing with large
mechanical testers was also necessary for special
studies.

The LTM workshop, held at the Old Colony Inn in
Alexandria, Virginia, brought together members of
the AASHTO Joint Task Force on Pavement, Pavement
Management Task Group, and representatives of FHWA,
state highway agencies (SHAs) participating in the
LTM pilot case studies, industry, AASHTO, NCHRP, the
World Bank, universities, and the private sector. To
fulfill its purpose, the workshop was divided into
four workshop groups, each representing a specific
need for long-term pavement monitoring. These work­
shop groups were

1. Group 1--national level,
2. Group 2--state level,
3. Group 3--new design methods, and
4. Group 4--rehabilitation design methods.

The workshop was divided into eight sessions.
Session 1 was the opening session, which included
presentations that provided background information
for the workshop and established workshop objectives.
Session 2 included presentations by representatives
of the eight state highway agencies participating in
the LTM pilot case studies and by the technical sup­
port contractor evaluating the data and developing
the LTM data bank for these pilot studies. This ses­
session provided the experience and insight gained from
the pilot case studies. Sessions 3-7 were generally
conducted separately by workshop group, with each
group considering the specific issues from the view­
point of the specific interests assigned to it. These
sessions addressed the following issues:

• Session 3--information needs,
• Session 4--data analysis and outputs,
• Session 5--data needs,
• Session 6--implementation issues, and
• Session 7--synthesis of findings.

Session 8 was the "close-out" session that included
Rauhut et al.

on future LTM plans by Gary Byra, Interim Director

Although there were some differences among workshop

RECOMMENDATIONS AND CONCLUSIONS OF WORKSHOP GROUPS

Although there were some differences among workshop

INFORMATION NEEDS

models. These equations must be capable of reason­

models are needed for both new pavements and reha­

The following combined information needs were ex­

1. The highest priority information need is for

DATA NEEDS

DATA ANALYSIS AND OUTPUTS

Because the priority information needs were identi­

models, the consequent highest priority

values may be expected to provide valuable information where statistical techniques are not practical.

This session dealt with what general and specific types and elements of data should be collected to provide an adequate data bank to satisfy the important information needs. Each workshop group reviewed the data needs in terms of the specific interest (or viewpoint) that it was assigned. Two of the four workshop groups offered specific lists of data items to be collected. The other two made recommendations in broader terms.

It appeared to be the consensus opinion that a number of data items now identified for collection in the current data collection guide could be eliminated without detriment to the data base, but that these would be difficult to identify until the experimental plan was developed. It was also thought that other data items needed to be added, especially those related to evaluating rehabilitation techniques and predicting performance after these techniques have been applied.

Other principal recommendations and conclusions for data needs were as follows:

1. Uniform and standardized data collection is absolutely essential.

2. Inventory data in general are one-time data and not costly, so data items of special rather than general usefulness may be included. However, it is important to limit the monitoring data to those data items of significance to the dependent variables to be studied.

3. For state-level needs, it was concluded that inventory data could best be collected from as-built drawings. However, the members of the workshops for design of new pavements and rehabilitation design thought that it was critically important that layer thicknesses be established by coring and boring and that material properties be based on uniform testing methods applied to cores and samples.

4. Accurate traffic data are extremely important and should be collected at least quarterly for sufficient periods to ensure that representative samples are obtained. Weigh-in-motion equipment should be used for measuring axle load distribution and auto­
matic vehicle classifiers for classification. Traffic should be test-site specific rather than interpolated from other locations.

5. Maintenance data are very important and must be collected in a uniform manner from all states.

6. Measurements of distress, roughness, deflections, skid resistance, and so forth that indicate performance are of primary importance, but measurements could be less frequent than the annual ones now planned. This could allow more test sections for the funds available and result in increased statistical adequacy.

7. Environmental data should be collected on a monthly basis by a central agency such as the National Weather Service instead of by individual SHAs.

IMPLEMENTATION ISSUES

It was the consensus opinion that strong, active management from a central organization, independent of government agencies subject to political change, would be required for the success of a long-term pavement monitoring program. It was also expected that regional centers would be required and that the regional staffs should participate with the SHAs in the collection of the data, to ensure their uniformity, and in training SHA personnel. It was also believed that the central organization would need to conduct much of the specialized field and laboratory testing, probably using regionally deployed equipment, to ensure its uniformity.

The support for the LTM effort was essentially unanimous, with all SHAs participating in the pilot studies wishing to continue and perhaps expand their activities. It was thought that a core group of full-time staff should be established as soon as possible to initiate organizational and experimental planning.

Dedicated, long-term funding will be required for this program, and the level of funding now proposed may need to be supplemented by state HP&R funds. There was general concern that overall state research programs might suffer as a result of LTM funding requirements.

The workshop participants agreed that the data storage facilities should be centrally located on a dedicated computer, but that the data should be accessible by SHAs and all interested parties. Data security would be critically important, with no data changes allowed other than by the central staff.

It was agreed that experiment design to optimize results for the funding available was of paramount importance. In view of the almost limitless possibilities for studies and data collection to accommodate special interests, it will be necessary to carefully select dependent variables for study and to distribute them among in-service highways, special design sections, and mechanical testing to optimize results. SHAs should be encouraged to select design sections for monitoring in newly constructed or rehabilitated pavements because such sections offer better control of the variables than do pavements that have been in service for some time. Appropriate fractional factorials and subexperiments must be considered to provide the output required within practical funding constraints.

The number of the test sections to be implemented was discussed. It was recognized that increasing the number of test sections increases reliability of the results and offers the possibility of more studies, but it was expected that some 1,000 to 2,000 in-service highway sections and 500 design sections would be a reasonable goal.

SUMMARY

It was the consensus of the workshop participants that there were many questions of critical importance to financing and managing the nation's highways that could only be answered by a continuing pavement monitoring effort. This appears to be the only way to successfully study the primary effects of mixed traffic and environment on the performance of pavements. The need for the flexibility in experiment design offered by a mix of in-service highways, special design sections, and accelerated mechanical testing was recognized.

There was general concern expressed that the momentum of FHWA LTM initiatives might be lost during the transitional period for establishing dedicated funding and an organization to manage the program. Appropriate measures to expedite the formation of a core organization and maintain momentum were urged.

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