STATEMENT OF NEED:

ODOT Central Office Administrators have noticed disproportionate funding needs are consistently found in the same Districts. The apparent need for more money in a given district can be attributed to many factors such as differences in pavement performance due to materials, environment, or loading; differences in pavement condition thresholds by which rehabilitation candidates are chosen; inequities in the pavement allocation formula which unfairly funds certain pavements over others; or a differences in past funding and project development practices which created a district network with less peaks and valleys of predicted conditions. In reality the difference in budget requirements from one district to another is likely a combination of all of the aforementioned.

A research study was conducted to identify the causes of pavement performance differences between districts.

RESEARCH OBJECTIVES:

1. To investigate the cause(s) of the perceived pavement performance differences between districts
2. To develop a database to keep track of pavement performance, traffic loading, environment, design, construction record, and maintenance practices, for the Interstate and 4-lane divided highway systems.
3. To analyze the performance trend on selected districts and provide recommendations on how to normalize pavement performance among districts.
4. To provide recommendations on additional data requirements, software, and analysis tools needed to serve the needs of the department in addressing pavement performance related query in the future.

RESEARCH TASKS:

1. Data collection
2. Pavement performance database development
3. Performance analysis and evaluation
4. Recommendations formulation
5. Final report preparation, review, and revision
RESEARCH DELIVERABLES:
1. Final report
2. Database containing roadway inventory, project histories, pavement conditions, and traffic volume information for all the priority, urban, and general systems highways.
3. Survival curves for various pavement groups

RESEARCH RECOMMENDATIONS:
- To “normalize” pavement performance within the state, it is necessary to improve the performance trend in Districts 3, 4, and 12, since their performances are lower than the statewide average. Performance in District 3 is much lower than the average. Therefore, improving the performance of pavements in District 3 will have the most impact towards “normalizing” statewide performance.
- The current statewide funding allocation formula likely has already considered traffic loading and mileage of pavement in each District as a factor. Other factors which affect pavement performance such as percentage of each pavement type, aggregate quality, and snowfall amount also vary quite significantly among districts. Therefore, future funding allocation formula should also consider these factors or a certain degree of performance differences have to be accepted.
- Increasing funding to the Districts with poor performance may help to normalize pavement conditions, but may not entirely address the performance differences because some districts are inherently disadvantaged by their geographic or geological locations and existing pavement types.
- Material quality is the most likely factor that can be improved upon to make an impact on pavement performance.
- It is recommended composite pavements on the priority system be replaced with new flexible pavements through reconstruction.
- Constructing overlays before pavements have severely deteriorated and building thicker overlays on composite pavements, pavements with high traffic loadings, and pavements in high snowfall areas, may help improve pavement performance.
- Part of the pavement performance variation among Districts can be attributed to differences in decision making or policy at the District level in regard to rehabilitation timing and activity.
- Further study is needed to determine the optimal multiyear rehabilitation strategy and timing.
- Further study is needed to develop methods to incorporate ride quality as part of an overall condition measure

PROJECT PANEL COMMENTS:
The purpose of the research study was to determine the perceived performance differences among ODOT Districts. The study concentrated on such performance attributes as, traffic loadings, climate, materials, treatment type, and treatment timing, just to name a few. To conduct this research a comprehensive pavement information database was developed to aid in the research. The database includes tables that can easily be related to one another. The tables include: construction history, maintenance history, project cost, road inventory, pavement condition, traffic, climate, and several performance tables to make it easy to track performance of each project over time. Results of the study concluded the following:
- Pavement performance is influenced by pavement type, traffic loading, climate, material quality, and decision making
- Asphalt overlays, pavement condition prior to the overlay, treatment timing and overlay thickness affects the overall performance of the pavement
- The median survival time to next treatment for new rigid pavements is nearly 16 years and for new flexible the median survival time is 12 years
- The median survival time for asphalt overlays is 8 years
• Overlays on flexible pavement perform better and last longer than overlays on composite pavements
• Durability of aggregate affects overlay performance

In conclusion the research showed there are, in some cases, significant differences in pavement performance between the Districts. The research highlighted the differences and offers some feasible strategies for remedying the problems causing the differences.

IMPLEMENTATION STEPS & TIME FRAME:

• The pavement management information system (PMIS) is in place.
• OPE is updating the database on an ongoing basis.
• Reporting capabilities of the database has been used to provide information to executive management.
• Decisions trees have been developed to help the department maintain consistency among the Districts decisions on pavement assets.

EXPECTED BENEFITS:

The following are items we have implemented and the affect it has had on the Departments core business of managing pavements:

• ODOT is able to track the performance of various projects or types of projects and now has the capability of quantifying benefit, or cost effectiveness of implementing various strategies which will help us in the future to identify the appropriate remedy for our pavement projects
• The department is in the process instituting a strategic initiative that will define the department’s pavement management process. The results of this study such as material, timing of treatments, etc. will be used to help frame this initiative and implement this process
• ODOT has developed a set of decision trees that will be used in the future to help the department maintain consistency among the Districts decisions on pavement assets these decisions trees were developed from the PMIS
• The PMIS will be used to develop ODOT’s forecasting tools, and help improve the materials specifications implemented in the future

EXPECTED RISKS, OBSTACLES, & STRATEGIES TO OVERCOME THEM:

None

OTHER ODOT OFFICES AFFECTED BY THE CHANGE:

ODOT Districts
Systems Analysis Planning
Materials Management

PROGRESS REPORTING & TIME FRAME:

The PMIS will be the source of data for several research projects which have been initiated to improve ODOT pavement management process.

A research contract was initiated with Ohio Northern University on July 26, 2004 to investigate the use of ride quality as part of an overall pavement condition measure.

A research contract was initiated with the University of Toledo on November 1, 2003 to develop pavement performance equations.
TECHNOLOGY TRANSFER METHODS TO BE USED:
1. The Final Report of the research has been distributed to 49 state transportation departments, different FHWA offices, selected national libraries, and others.
2. Database containing roadway inventory, project histories, pavement conditions, and traffic volume information for all the priority, urban, and general systems highways.

IMPLEMENTATION COST & SOURCE OF FUNDING:
A $10,084 research contract was initiated with Ohio Northern University to investigate the use of ride quality as part of an overall pavement condition measure.

A $193,638 research contract was initiated with the University of Toledo to develop pavement performance equations.

Approved By:

Office Administrator:
Signature: David Humphrey Office: OPE Date: 9/23/2005

Division Deputy Director:
Signature: Howard Wood) Division: Planning Date: 10/11/2005