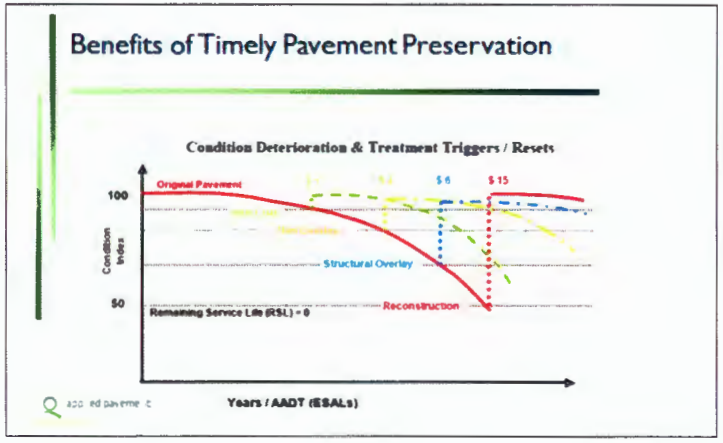
other factors such as adjacent projects, natural disasters or funding that would prompt a different treatment than the software recommends.

The data collected is imported into the pavement management system where highways are broken down into quarter-mile sections – more than 36,000 of them! The new information is combined with previously gathered information, construction and maintenance history of each section to produce a structural description.

Based upon the structural description, six pavement distress types and severity are imported into the system. The program then produces what is called a performance curve, see below, which is also adjusted for age and traffic volume.



Taking all of this data, comparing it to current projects and available funding, staff create an "efficiency frontier". The efficiency frontier shows the highest incremental benefit cost alternative for that section.

The end result is a comprehensive plan that manages treatment plans for all of road miles under the state's control within fiscal constraints. The resulting projects come together to create the Statewide Transportation Improvement Plan (STIP).

SOUTH DAKOTA DEPARTMENT OF TRANSPORTATION

Pavement Condition Monitoring Vehicle "Spider Van"

Falling Weight Deflectometer FWD

SDDOT USES ADVANCED TECHNOLOGY TO HELP MANAGE ITS HIGHWAY SYSTEM

The South Dakota Department of Transportation uses sophisticated equipment to collect data on the condition of the State Highway System. One vehicle is known as a pavement condition monitoring vehicle and has been nicknamed the "spider van". The other vehicle is a falling weight deflectometer (FWD).

"Spider Van"

Sensors mounted on the rear bumper and roof of the vehicle are used for collecting pavement condition data. Data collected with the "spider van" includes; pavement smoothness, rutting in the wheel paths, vertical movement of concrete slabs (faulting), and crack detection.

High-resolution digital cameras mounted on the vehicle capture a windshield view of the road and right-of-way. The images allow staff to view road segments at their workstation saving time and travel expenses.

The "spider van" also has the capability to automatically detect pavement cracking. High speed cameras (grayscale image) and laser scan technology (elevation) are used in combination with other technology to determine crack presence and width.

FWD

The FWD has been widely used in pavement engineering to evaluate pavement structural condition. The FWD plays a crucial role in selecting optimum pavement maintenance and rehabilitation strategies.

The FWD is designed to determine the strength of the pavement structure. The test vehicle drops a load of 9,000 pounds on the pavement to simulate one wheel of a legally loaded semi-truck axle. The movement (deflection) caused by the load is recorded by geophone sensors located on the test vehicle. The deflection is used to determine the present condition of all layers of the pavement. This information is used to evaluate the types and timing of rehabilitation that may be applied to a pavement to extend its service life.

FWD data is currently collected on Portland Cement Concrete Restoration Projects and Asphalt Concrete projects programmed for reconstruction or resurfacing in the next 3 years, thin asphalt highways that may require load limit restrictions in the spring and fall, airport projects, and network level testing.

Accurate Data Key to Managing Pavements

Information collected from test equipment is used in the Department's Pavement Management System to predict the future condition of every highway segment and identify the type and timing of treatments that will most efficiently manage its condition.

The system analyzes millions of possible combinations of feasible treatments to determine the cost and benefit of each alternative. The alternative with the highest benefit-to-cost comparison is usually selected. Staff also consider