

Pavement investigation and analysis

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Pavement rehabilitation costs a lot of money, even for minor repairs. So it makes sense to design pavement to last as long as possible and take into consideration all possible factors that impact performance or contribute to premature deterioration. That cannot be done through guesswork because factors affecting future performance cannot be determined solely by appearance or surface condition. It's the existing pavement structure and underlying soils that are key to designing long-lasting, structurally sound pavement.

The existing pavement structure and character of the underlying soils can be determined from historical records. If record drawings are accurate, you know what is supposed to be there. But was it actually constructed that way? And how are the native soils and base materials behaving compared to idealized "R-value" and gravel factors assumptions? The only way to know is to investigate.

Investigation methods

There are two investigation methods that establish the quality and strength of an existing pavement structure: deflection testing and core testing. Together, these methods provide a complete picture of

the existing pavement structure and its in-place strength.

Deflection testing is a non-destructive method that determines the overall structural capacity of existing pavement. The pavement is "bent" under a load to determine pavement deflection.

In California, California Test Method 356 (CTM 356), "Method of Test to Determine Flexible Pave-

ment coring or historical records, the measured deflections and the design traffic index.

Pavement coring measures existing pavement thicknesses to determine the depth of various pavement layers. Each layer is measured and evaluated for type (e.g. aggregate base).

After native soil samples are obtained, they are tested for R-value



Deflection and core testing, when combined, provide data that is essential for designing structurally sound, long-lasting pavement at the lowest cost.

ment Rehabilitation" is the most common approach to pavement analysis. Using this method, both the asphalt concrete layer capacity and the total overall section capacity are determined. If the structure is inadequate, the amount of overlay necessary to provide structural adequacy can be determined.

The structural analysis is based on the existing asphalt concrete layer thickness, which is provided by

at both in-place and "design" moisture content using California Test 301 (CT 301).

On existing pavement, core samples are taken about every 500 feet or less in alternating lanes. At least two locations are sampled per segment. R-value samples are normally obtained on 2500-foot intervals with at least one sample obtained for each segment.

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Pavement investigation

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Investigation results

Deflection testing and core sampling yield a wealth of information about structural section layer thicknesses, reflective cracking influences, subgrade soil characteristics, and structural support values of existing pavement. This information can be used to evaluate potential rehabilitation treatments and the "constructability" of a prospective treatment.

For example, a pulverization and resurfacing technique is very economical and effective in eliminating the existing cracking history in the pavement layer, allowing a much longer lasting, new pavement layer that is not influenced by underlying "cracked" pavement. However, because pulverizing significantly reduces support for construction equipment, the critical question before selecting this approach is whether or not the existing pavement, after pulverization, can support construction traffic, including placement of the new asphalt concrete layer.

Every rehabilitation option has constraints based on the existing structural section, existing structural support and character of the underlying soils. Proper investigation is the only way to understand the constraints.

Rehabilitation design

With the results of a pavement investigation, various pavement alternatives can be evaluated for effectiveness, such as structural adequacy, reflective cracking control, constructability, economics, longevity and geometrics.

An analysis usually provides several treatments, some of which require sufficient quantities of work to be effective, so grouping similar treatments into a "project" makes economic sense.

Pavement investigation value

Pavement rehabilitation generally is designed for at least 10 years of effective life. Many options provide 15 to 20 years with proper maintenance. Unfortunately, mistakes based on guesswork can take years off the expected life or cause cost overruns during construction

from "unanticipated" construction problems that could have been identified by an analysis. If only one more year of serviceability is gained, then the cost of the pavement investigation has paid for itself. If two years are gained, then the return is doubled. More importantly, a proper pavement investigation can provide a very cost-effective rehabilitation approach for a pavement that is identified for reconstruction.

Pavement testing is an effective tool to determine the best pavement rehabilitation approach for the future. It determines the existing pavement structure, confirms its structural adequacy, why it failed and how it will perform with various maintenance alternatives. The cost of testing, typically between three and five percent of the total rehabilitation cost, is relatively small when compared with the potential downside of relying on best guesses in pavement design. A quality pavement rehabilitation design that adds just one more year of service life more than offsets the cost of testing. Due diligence always pays off in the end.

News you can use - When it comes to timing, knowing when to bid pavement construction projects is critical. PEI recommends bidding paving projects in the winter, during contractors' slow periods. Seeking quotes in the spring and summer almost always results in higher costs. During the winter, contractors are looking ahead to fill their construction season calendar. This requires advanced planning. You need to know what next year's projects will be and have the designs underway by fall. Having an accurate multi-year pavement management plan is critical for this process. In addition to timing, accurate, clear plans and technical specifications take the guesswork out of the bidding process, which results in lower bids.



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