



Soil and Materials Engineers, Inc.

USING FWD DATA IN PAVEMENT REHABILITATION OF MUNICIPAL/COUNTY ASPHALT ROADWAYS

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Overview of Presentation

- **Falling Weight Deflectometer (FWD).**
- **AASHTO Pavement Design Procedure.**
- **Results obtained from FWD testing.**
- **Examples of results from FWD data analysis.**
- **Verification of results from FWD testing.**
- **Using data obtained from FWD testing to select rehabilitation strategies.**



FALLING WEIGHT DEFLECTOMETER (FWD)



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Falling Weight Deflectometer



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Falling Weight Deflectometer



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Falling Weight Deflectometer



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Falling Weight Deflectometer



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Falling Weight Deflectometer



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PAVEMENT DESIGN USING AASHTO PROCEDURE



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AASHTO (1993) PROCEDURE

- **Inputs:**
 - **Traffic (ESALs).**
 - **Subgrade Modulus.**
 - **Initial Serviceability.**
 - **Final Serviceability.**
 - **Reliability, Overall Deviation.**
- **Output**
 - **Required Structural Number (SN) of Pavement.**

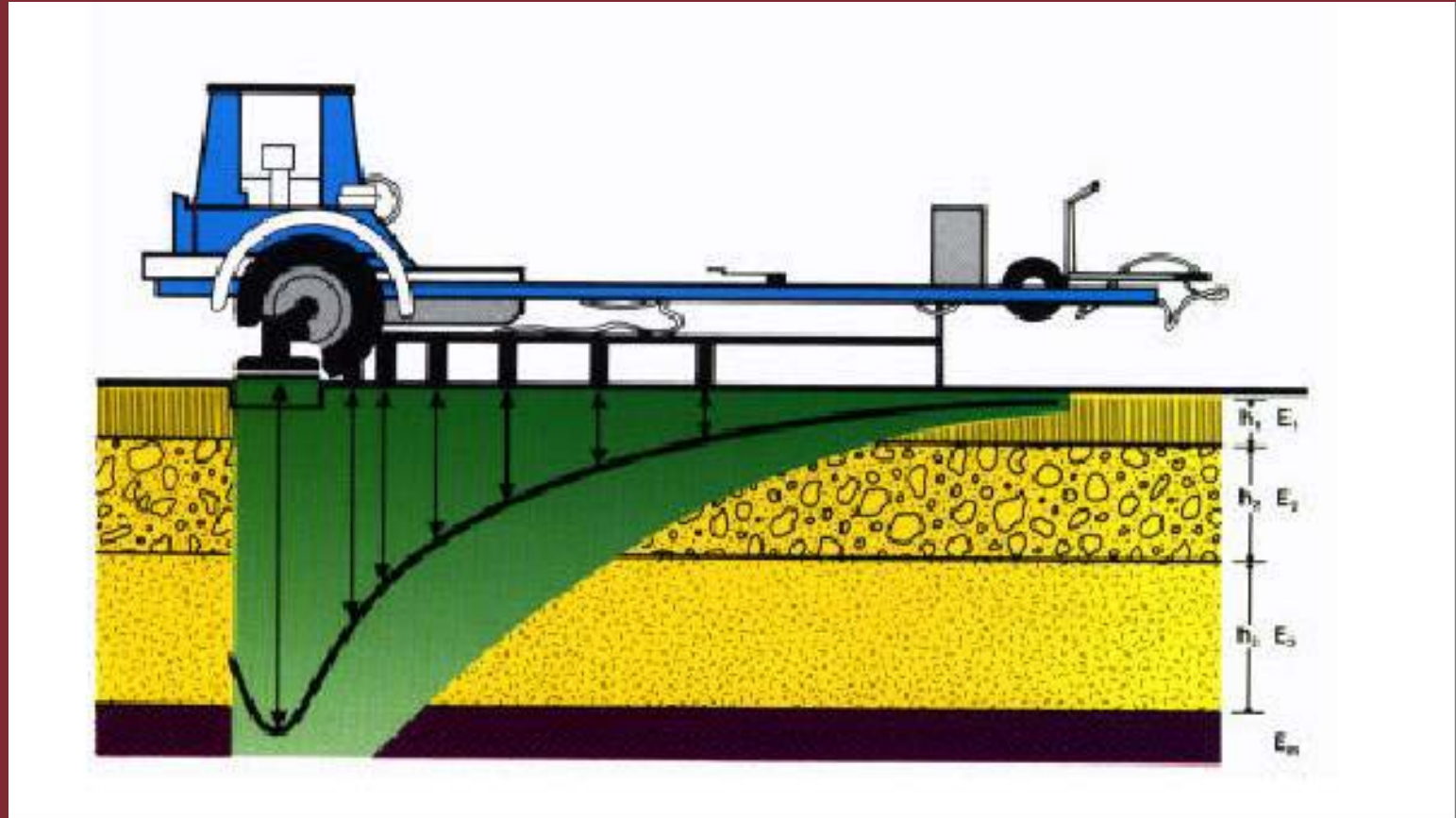


OUTPUT FROM FWD TESTING



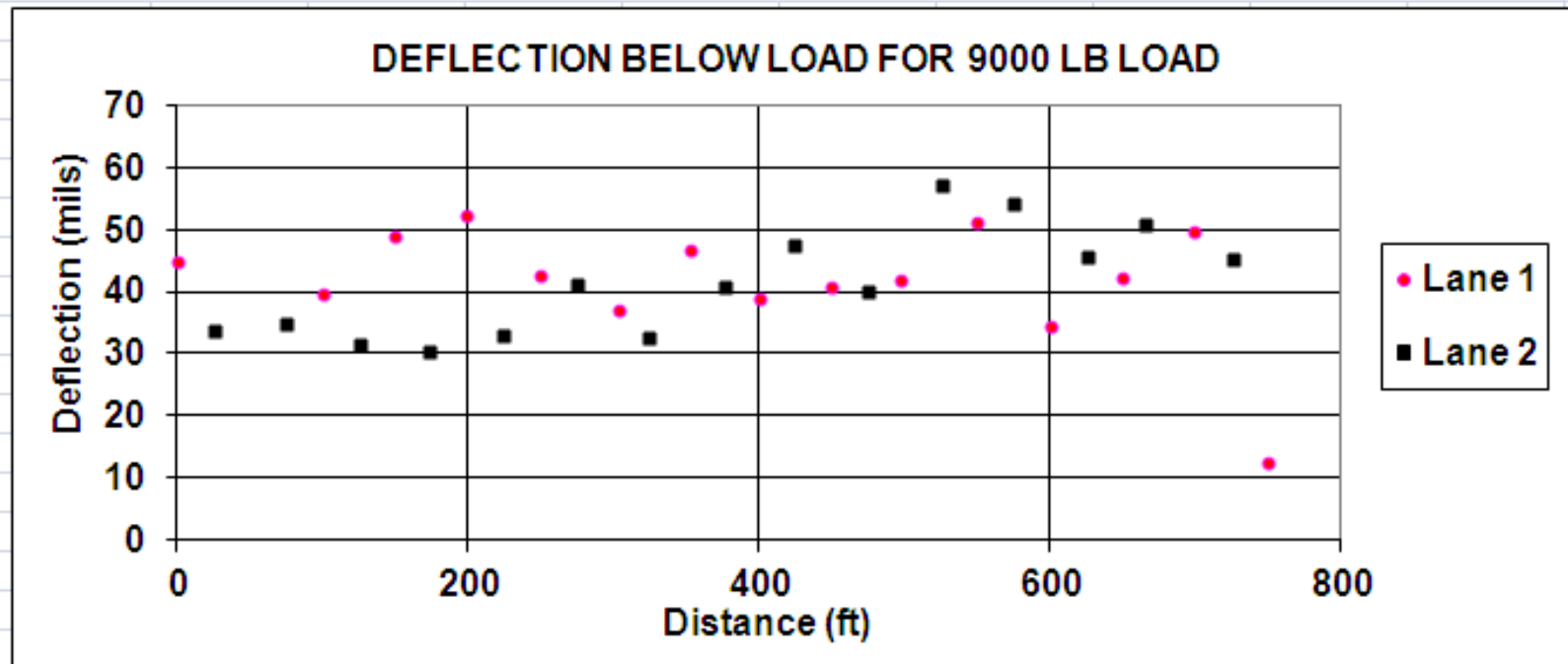
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Deflection Basin Recorded at a Test Location

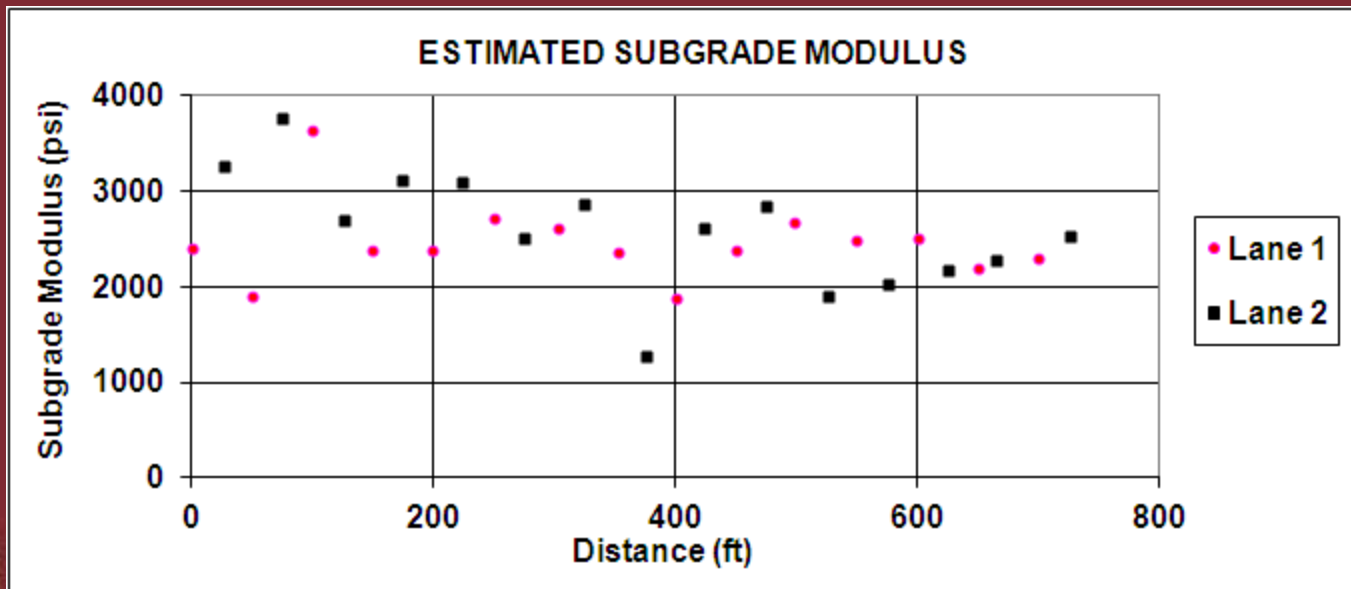
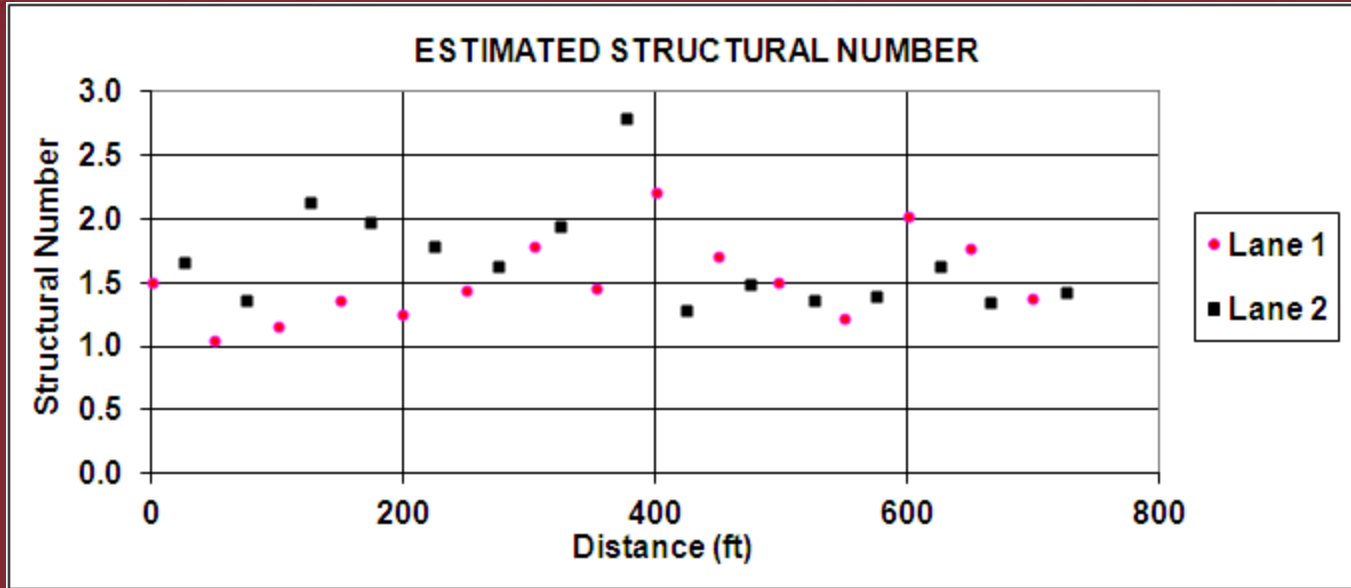


Deflection Below Load

Adams: Junction to Farmer



Estimated SN and Subgrade Modulus

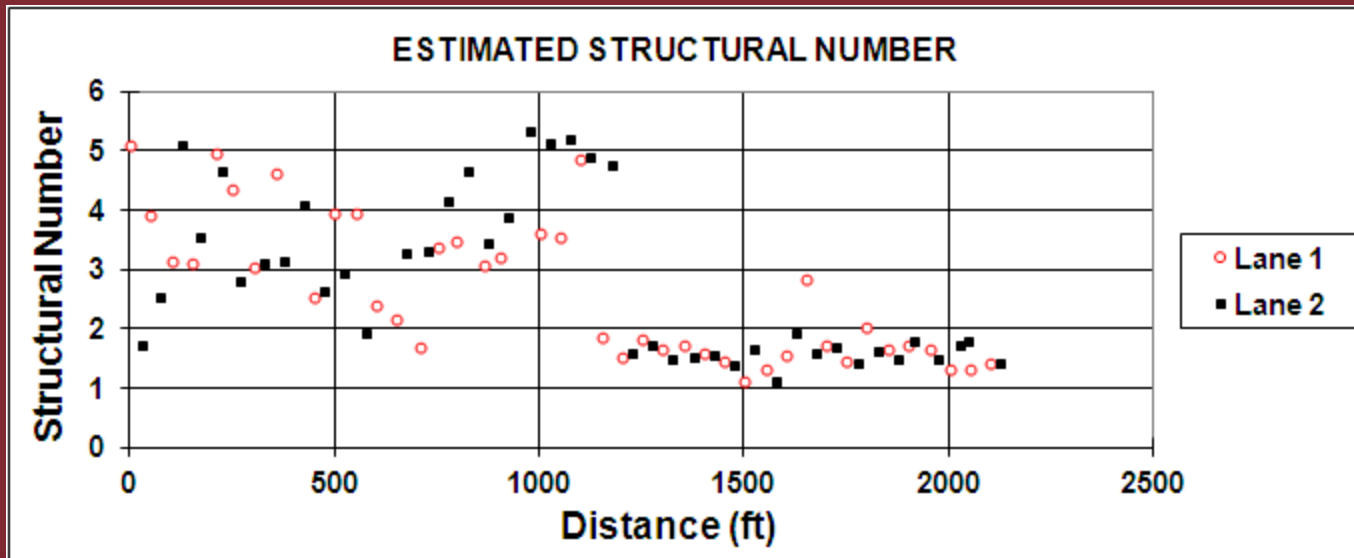
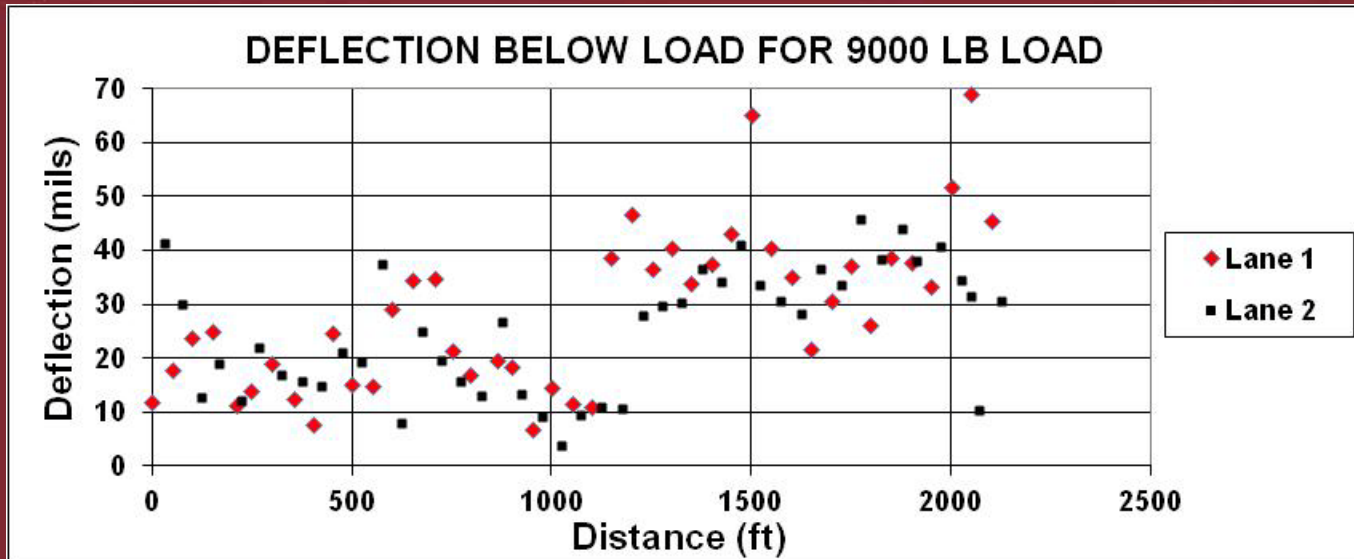


EXAMPLES OF RESULTS FROM FWD DATA ANALYSIS

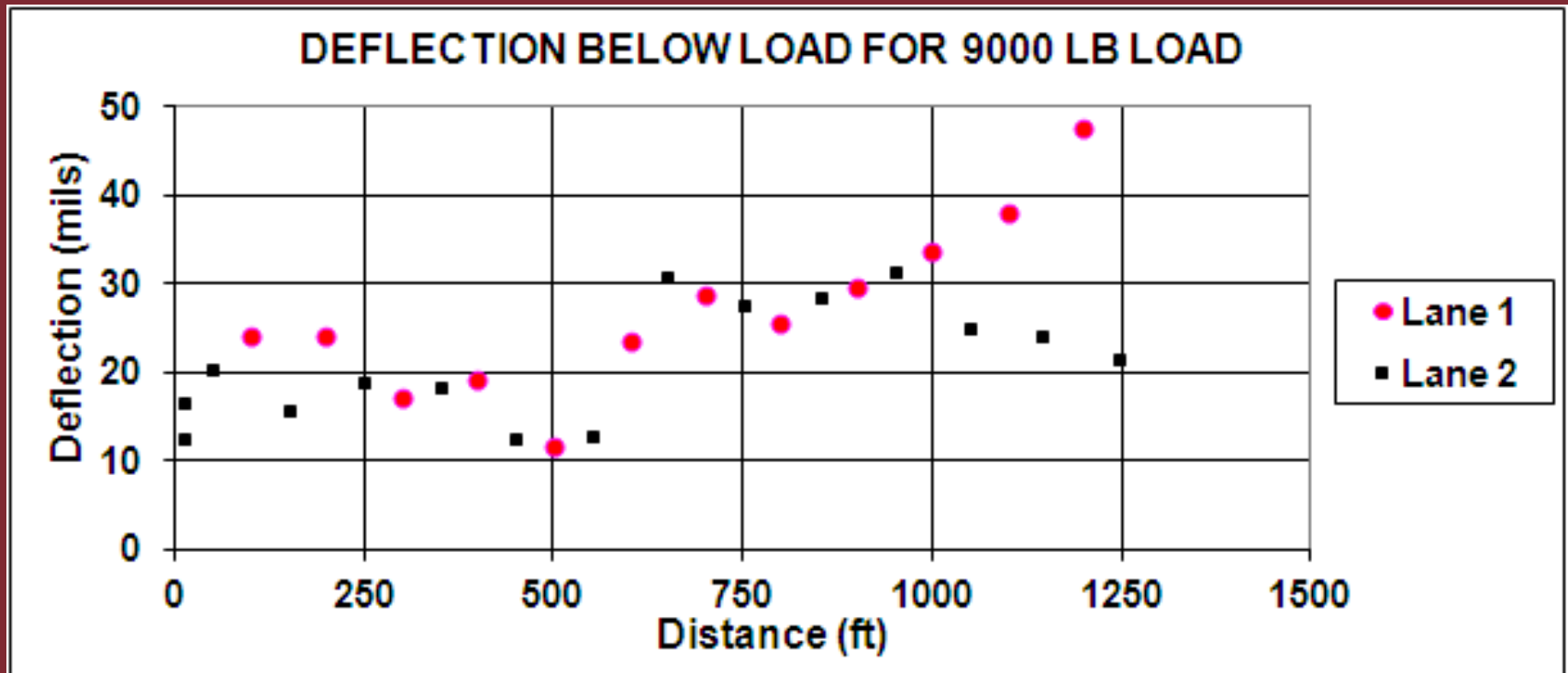


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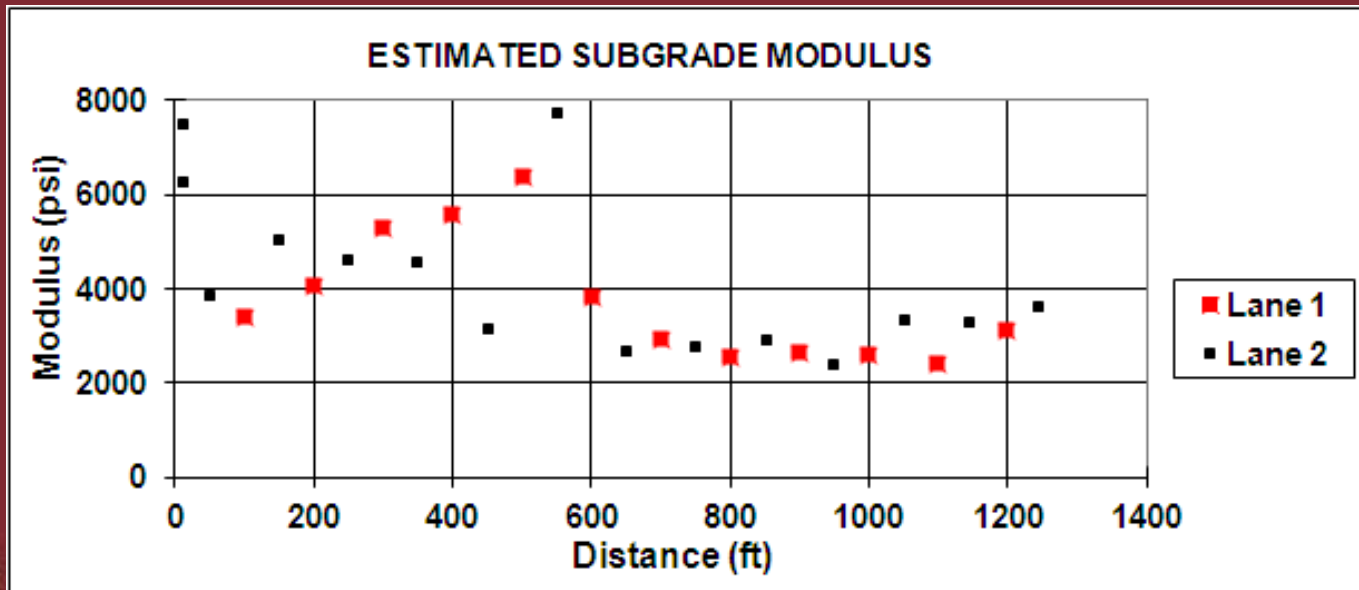
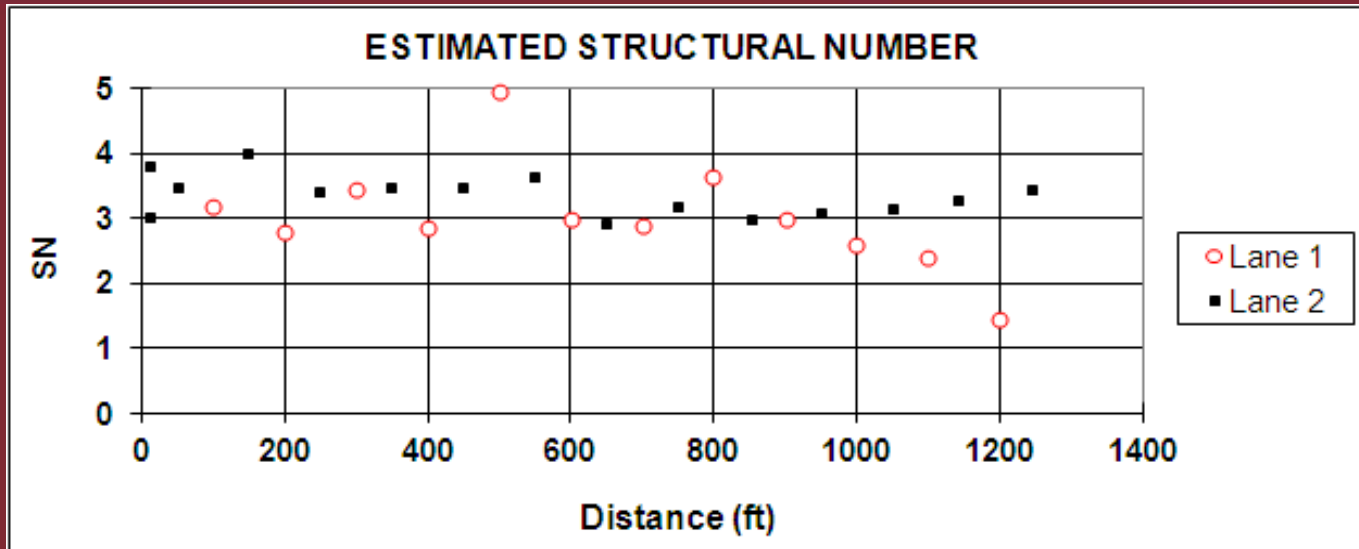
Detect Differences in Pavement Structure



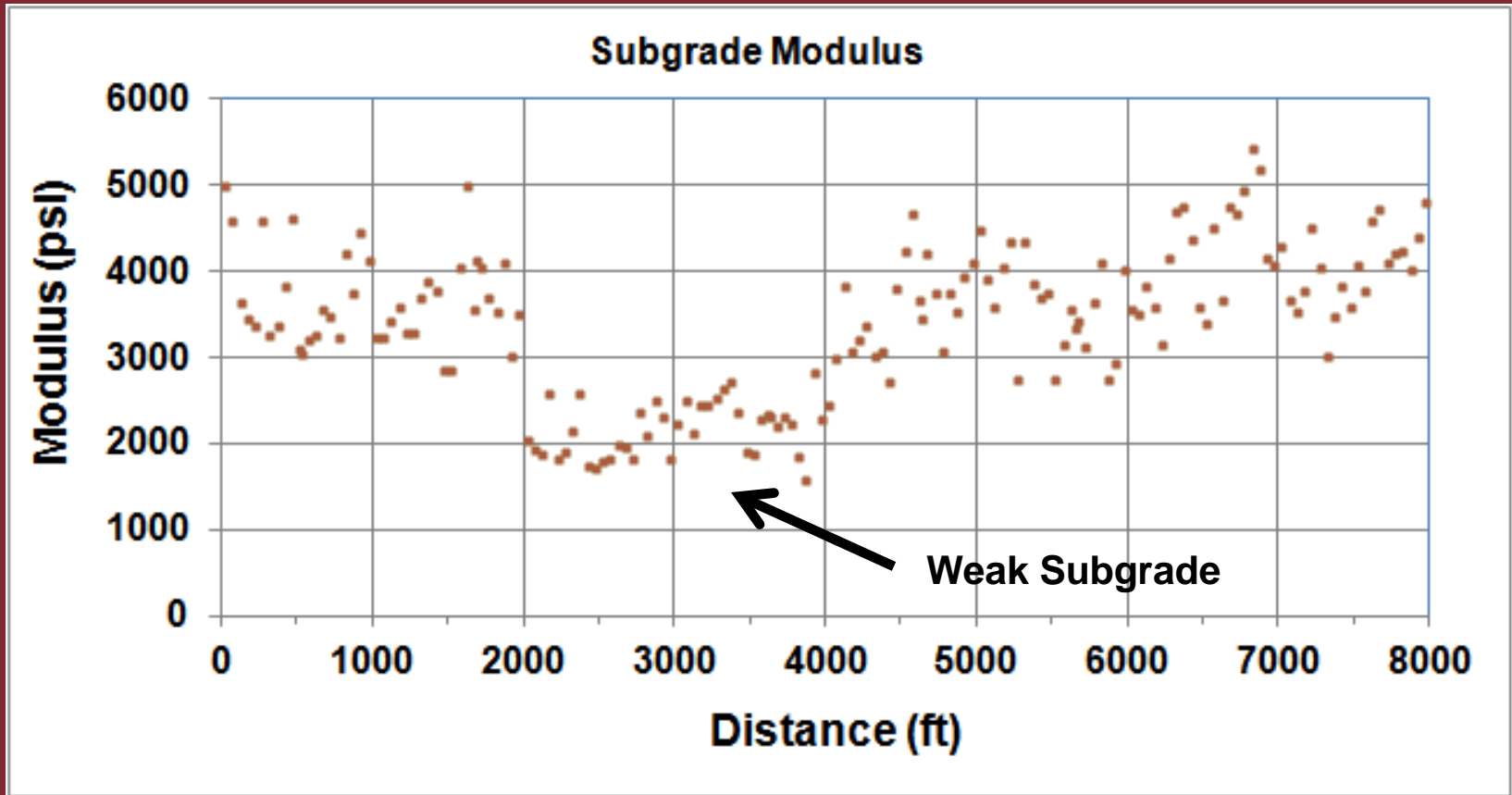
Detect Differences in Subgrade Support Conditions



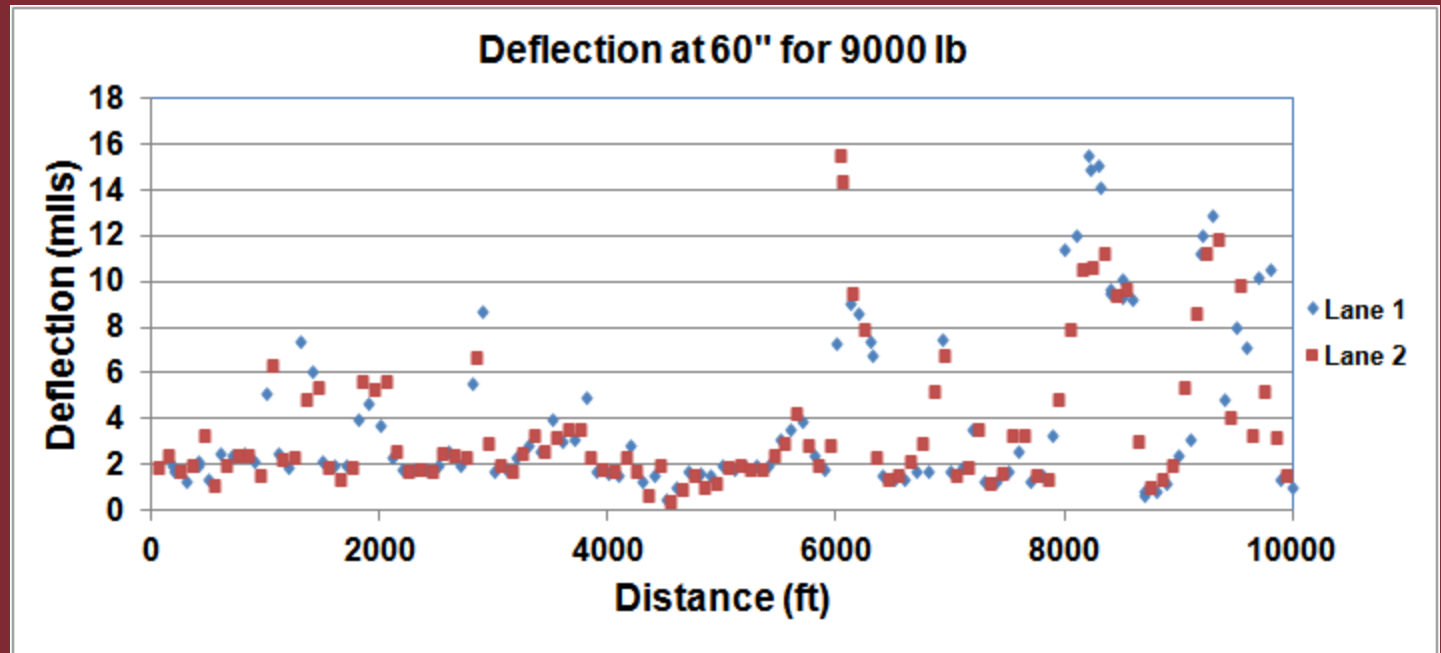
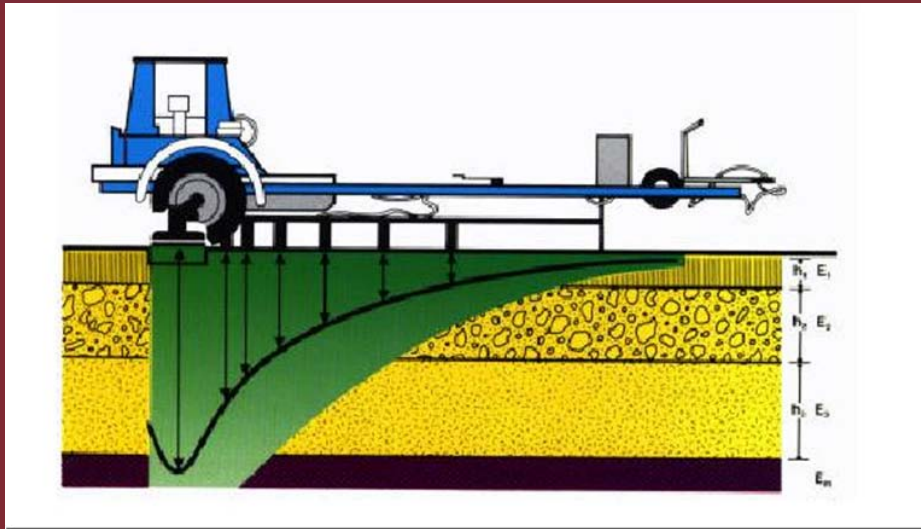
Detect Differences in Subgrade Support Conditions



Detect Areas of Weak Subgrade



Detect Areas of Peat Within Roadway

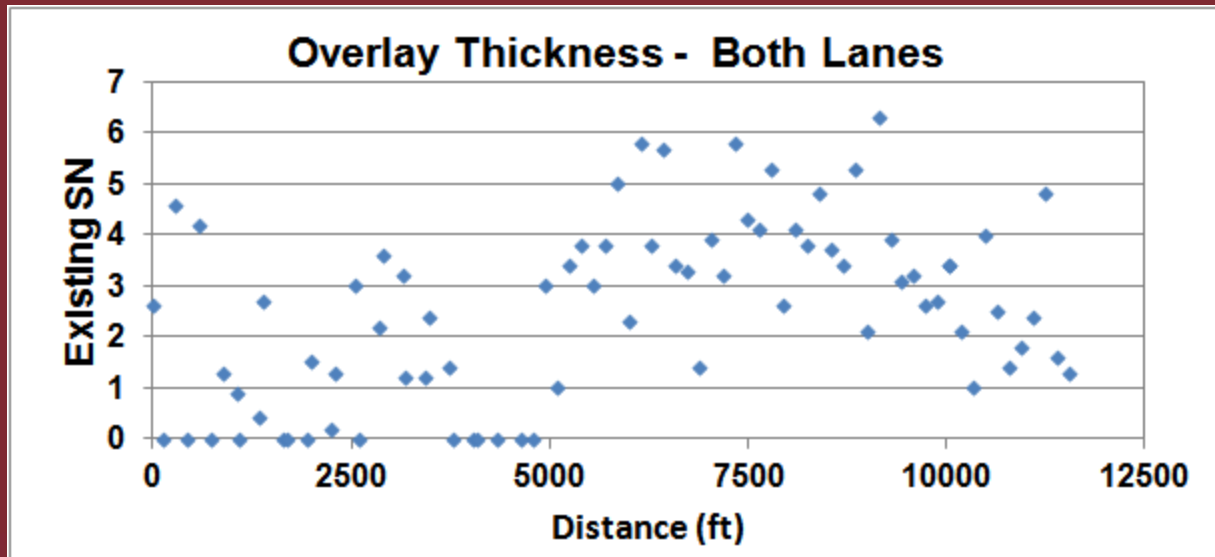
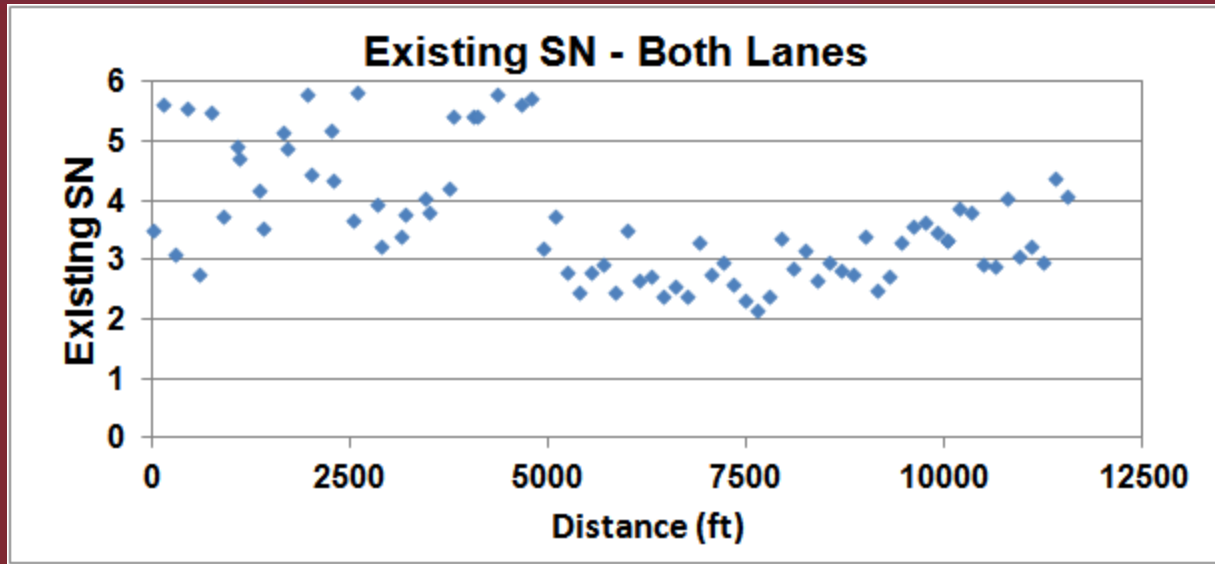


Determine Overlay Thickness – Haul Routes

- **Conduct FWD testing.**
- **Determine SN of existing pavement and subgrade modulus at each test location.**
- **Use traffic to compute required SN for 5-Year and 10-Year life.**
- **If SN (required) > SN (existing) determine overlay thickness at each test location.**
- **Average values to obtain overlay thickness.**



Overlay Thickness – 10 Year Life



VERIFICATION OF RESULTS FROM FWD DATA ANALYSIS



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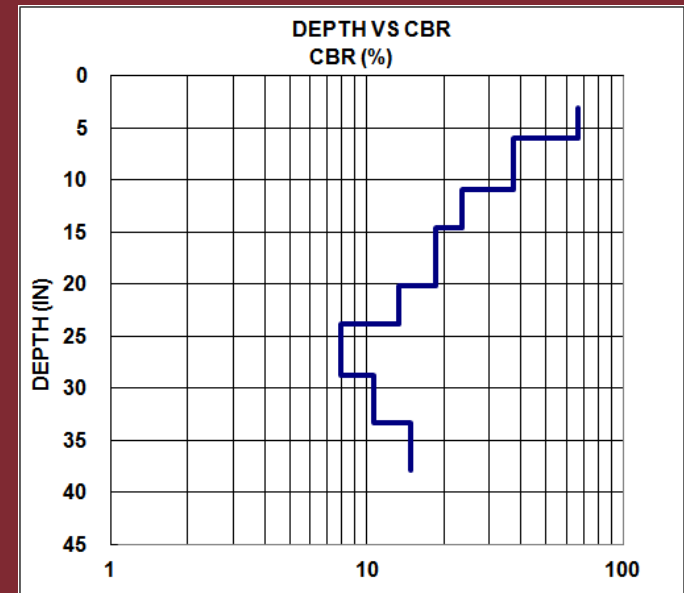
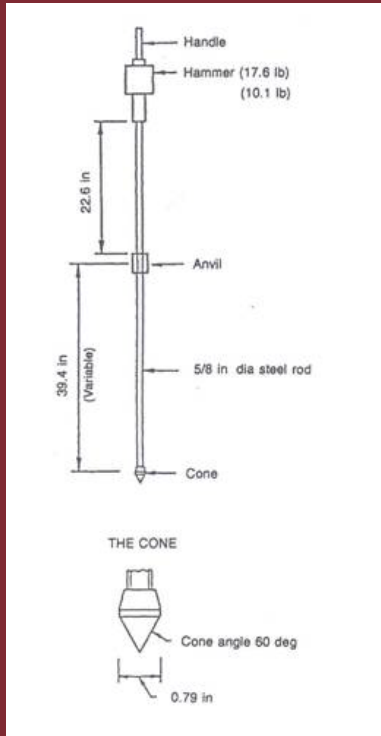
Verification of FWD Results

- Use SN and subgrade modulus values estimated from FWD data to locate core and soil probe locations.
- DCP testing to determine strength of base/subgrade to a depth of 3 to 5 ft from pavement surface.



DCP Testing

- DCP testing - use 39" or 60" rod.



USING RESULTS FROM FWD TESTING FOR PAVEMENT REHABILITATION



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Pavement Rehabilitation

- Existing SN and subgrade modulus (verified from cores/subgrade probes) and existing distress on pavement used in selecting rehabilitation strategy.
- FWD testing provides coverage of entire project. One minute to do a test. Typical test spacing of 100 to 400 ft depending on length of project.
- Existing SN and/or subgrade modulus used to determine overlay thickness/new pavement section.



Conclusions

- **FWD data can be used to estimate existing structural number and subgrade modulus at each test location.**
- **Targeted core/boring locations determined using results from FWD testing.**
- **FWD testing provides coverage of entire project . Number of cores/soil probes can be reduced.**
- **Existing pavement distress, existing SN, and subgrade modulus used in selecting rehabilitation strategy and designing overlay thickness/ pavement section.**



Questions?



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