

## HR-522 ASPHALT CEMENT CONTAINING AC-13

February, 1988

### Project Concept

The first step of the rehabilitation project involved removing the old asphalt cement concrete from the old PC concrete base. This was followed by base repair work. The longitudinal joints were covered with an engineering fabric prior to overlaying the base. The resurfacing of the old PC concrete base was then completed using two (1 1/2" thick) lifts of recycled asphalt cement concrete for all of the project except the special AC-13 research areas. Virgin aggregate asphalt cement concrete containing AC-13 was placed in both the 1 1/2" thick binder and 1 1/2" thick surface lifts at five locations previously described in this report.

### Conclusion

The conclusions that have been reached from this study of AC-13 performance on this project may not necessarily apply to all types of construction where AC-13 might be used. They are:

1. Penetration and absolute viscosity test results obtained for the polymerized AC-13 asphalt cement conformed well with the project specification limits.
2. AC recovered the daily plant mixed project control sample test results show aging characteristics consistent with test results obtained from artificially aged AC-13 using the thin film oven test method.
3. Test results from surface lift cores taken from the roadway surface show a hardening or aging of the recovered AC-13 each year of the study. The hardening appears to have accelerated during the third year of the study in this project. The measured properties of the recovered AC-13 were penetration, absolute viscosity, and ductility.

The higher absolute viscosity (34,994 poise) in the recovered AC-13 after three years of service does not appear to be detrimental in the pavement performance. The test data from the binder lift cores is included in Appendixes C-1 and C-2 of this report, however a portion of the test results appear to be suspect. It appears that the location of the mix containing the AC-13 may have been improperly located on the binder lift.

4. AC-13 did not stop all rutting from occurring. Rutting has increased each year for three years, however the amount of rutting appears to be stabilizing at an average depth of less than 1/4 inch. The first year of the study the average rut depth of 0.08 inch was likely due in part to consolidation of the pavement under traffic.
5. The paving mix using AC-13 appears to be effective in controlling shoving and lateral movement of the pavement surface on this project.
6. The polymer modified asphalt cement was not effective in controlling transverse joint reflection cracks from occurring on this project. Approximately 70% reflected through the first year. This estimate was based on joint spacing in the portland cement concrete base as no pre-construction joint survey was made.
7. Based on results of this project study there is little evidence to support that AC-13 is effective in reducing the rate of longitudinal joint crack reflection in the pavement. Longitudinal joints in the portland cement concrete base that were not coincidental with the traffic lane lines on the pavement surface were covered with engineering fabric prior to resurfacing. During the first year after resurfacing cracking occurred over approximately 40% of the total length of the longitudinal joints. This increased to approximately 70% by the end of three years. There were few random cracks in the pavement areas containing AC-13 asphalt cement. No attempt was made to evaluate AC-13 effectiveness in controlling random cracking.
8. Mix containing AC-13 shows no signs of raveling after three years. The pavement appears to be performing well. Recommendation The Iowa Department of Transportation aggregate gradation specification and crushed aggregate particle requirement have been modified for heavy service pavements since this study was developed. The use of the recently developed polymerized asphalt cement specifications (P.A.C. series) should be evaluated using the new mix standards to see if polymerized asphalt cement provide increased resistance to rutting when compared to the standard heavy service mix design currently being specified.