

EXPERIMENTAL CONCRETE PAVEMENT RAMPS
(Progress Report)
Experimental Work Plan No. 7



MICHIGAN DEPARTMENT OF STATE HIGHWAYS

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Research Laboratory Section
Testing and Research Division
Research Project 70 F-113
Research Report No. R-925

Michigan State Highway and Transportation Commission
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Lansing, June 1974

This yearly progress report covers the performance to date of experimental ramps on two Michigan construction projects, to evaluate non-reinforced concrete pavements without load transfer devices, subjected to different traffic conditions. The experimental construction features were incorporated in two Michigan projects having considerably different projected traffic volumes. A total of eight ramps containing experimental unreinforced pavement were placed by two different contractors. Six additional ramps are used as control sections. Locations of the experimental ramps are, I 475 at the Hill Rd Interchange in Flint, and I 69 at the Ainger and Butterfield Rd Interchanges near Olivet. Details of construction, instrumentation and measurements were described in Research Report No. R-842 issued in January 1973. The FHWA requires yearly reporting on "Category 2" projects. This brief summary will serve that purpose for the subject project, since final conclusions are not drawn as yet.

Table 1 is a summary of ramp performance data to date.

The movements shown are summer-winter variations. Those shown for I 475 at Hill Rd were obtained over a temperature range of 25 F. The joint movements of the I 69 ramps were taken over a temperature range of 48 F. None of the short slab unreinforced ramps show any evidence of faulting at this time.

The average percentage of hot-poured rubber asphalt sealed joints showing some adhesion or cohesion failures is 28 percent and 27 percent for the I 69 and I 475 ramps, respectively. The amount of failure per joint is small in most cases. The percentage of joints with some seal failure, per ramp, varied from 3 to 53 percent. Both extremes were located in the I 69 ramps.

Only one of the short slab ramps contains transverse cracks at this time; whereas, all the standard pavement ramps exhibit transverse cracking. The I 69 ramps have been in service for approximately eighteen months; the I 475 ramps are scheduled to be opened to traffic in the fall of this year.

Ramp roughness measurements have been periodically performed since shortly after construction. Ramp profiles are obtained by the Department's Rapid Travel Profilometer and equivalent roughness numbers computed from the data obtained. To date, measurements show slight variations in surface roughness; however, since this is relatively new pavement and portions have not been subjected to public use, it is too early to draw meaningful conclusions. Ramp "F" of the Hill Rd Interchange was not measured on the last two dates shown in Table 1 due to the fact that it was still being used as a haul route by the contractor and portions of it were covered with sand and gravel.

All information presented in Table 1 is from initial evaluations. Performance data will continue to be collected and maintained by the Research Laboratory. Progress reports will be issued on approximately a yearly basis.

TABLE 1
SUMMARY OF RAMP DATA

| Location | Ramp Designation | Description | Average Joint Movement, in. | Average Hot-Poured Joint Seal Failures, percent ¹ | Average Joint Spalling, percent ² | Transverse Cracking, in ft | Equivalent Roughness No., in./mi | | |
|---------------------------------|------------------|--|-----------------------------|--|--|----------------------------|----------------------------------|----------|----------|
| | | | | | | | Jan. 73 | Sept. 73 | March 74 |
| I 475 Hill Rd Interchange | A | Standard Pavement | 0.083 | Preformed Seals | 1.29 | 192 | 226 | 200 | 228 |
| | B | 20 ft unreinforced slabs, skewed joints, bituminous base | 0.010 | 0.78 | 0.85 | None | 220 | 270 | 255 |
| | C | Standard Pavement | 0.051 | Preformed Seals | 1.83 | 191 | 211 | 263 | 292 |
| | D | 20 ft unreinforced slabs | 0.003 | 0.27 | 0.13 | None | 163 | 232 | 226 |
| | E | 20 ft unreinforced slabs, bituminous base | 0.020 | 0.43 | 0.05 | None | 175 | 191 | 213 |
| | F | 20 ft unreinforced slabs | 0.007 | 0.18 | 0.59 | None | 158 | --- | --- |
| I 69 Ainger Rd Interchange | A | Standard Pavement | 0.126 | Preformed Seals | 0.34 | 218 | 173 | 201 | 203 |
| | B | Standard Pavement | 0.152 | Preformed Seals | 0.54 | 188 | 205 | 230 | 213 |
| | C | Standard Pavement | 0.136 | Preformed Seals | 0.77 | 190 | 200 | 221 | 212 |
| | D | Standard Pavement | 0.117 | Preformed Seals | 0.55 | 134 | 200 | 231 | 222 |
| I 69 Butterfield Rd Interchange | A | 20 ft unreinforced slabs | 0.047 | 0.12 | 0.19 | None | 157 | 185 | 188 |
| | B | 20 ft unreinforced slabs | 0.036 | 0.09 | 0.03 | None | 168 | 183 | 181 |
| | C | 20 ft unreinforced slabs, skewed joints | 0.034 | 0.23 | 0.15 | None | 212 | 229 | 227 |
| | D | 20 ft unreinforced slabs | 0.040 | 0.27 | 0.01 | 44 | 175 | 190 | 197 |

1 Percentage computed as follows: $\frac{\Sigma \text{ Seal failure lengths}}{\text{Total length of seal}} \times 100$

2 Percentage computed as follows: $\frac{\Sigma \text{ Spall lengths}}{\text{Total length of joint face}} \times 100$
Spalls defined as per Standard Specifications, Section 4.14.18, a.