

OFFICE MEMORANDUM



MICHIGAN
STATE HIGHWAY DEPARTMENT

June 21, 1965

To: E. A. Finney, Director
Research Laboratory Division

From: F. J. Bashore

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Subject: Failures of Two-Component, Cold-Pour Joint Sealant in New Pavement Construction. Research Project 62 G-116. Research Report No. R-525.

This report summarizes two separate inspections of two-component joint sealant installations made by Gene Sigsby and the writer, in accord with your recent request. R. L. Greenman had reported that problems were occurring in Districts 8, 9, and 10 on new pavement projects sealed last year with cold-pour sealants.

Inspection of May 27, 1965 (District 9)

M 63201B, C1 (Southbound Wide Track Dr., from W. Huron St. 1/2-mile south, in Pontiac). This project was inspected with Oliver Smith, Project Engineer, and Lyle Lipp, Asst. District Road Engineer. It was constructed with 99-ft slabs, and the joint seal used was a hand-mix material (Type 2 or 3) installed in November 1964. All expansion joints were poured about 2-in. deep, more than flush with the pavement surface. There was severe loss of adhesion and lifting (Fig. 1). In most cases the seal was out of the joint or could be lifted out. Contraction joints in this area were in good condition, without extrusion of material above the surface, and adhesion was satisfactory.

USS 63201D, C5 (Westbound Orchard Lake Dr., between northbound and southbound Wide Track Dr.). This project adjoins the previous one, was sealed at the same time, and includes two expansion joints and seven contraction joints. The sealant in both expansion joints was about 50-percent gone (Fig. 2). It had been poured to proper depth, but was too high above pavement. Two of the contraction joints were in poor condition; one had failed because the compressible filler had not been fully inserted into the joint, leaving little or no concrete face for the sealant to adhere to (Fig. 2). The other, which also appeared to have been filled more than flush, had been damaged by traffic and/or snow removal equipment.

F 50013A, C1 (Relocated M 53 from 22 Mile Rd. to about 1/2-mile north of 23 Mile Rd., near Utica). The third area inspected was relocated M 53 and the structure carrying M 59 over relocated M 53 (S06 of 50011F). New M 53 was under construction using 99-ft slab lengths. The joints had been sealed in some areas late last year using Type 1 two-component joint seal (fast setting, machine applied). The expansion joints on M 59 adjacent to the structure were sealed in 1964. In all joints the sealant

was either loose or in certain areas totally removed by traffic. Subsequently, George Pingel, Senior Inspector, stated that the same situation prevailed at the expansion joints adjacent to the structure carrying 23 Mile Rd. over relocated M 53 (S01 of 50013A). We stopped at the field office on 22 Mile Rd. and discussed the problem with John Bramer, Project Engineer and Mr. Pingel, who both seemed to have a good understanding of the problem. Mr. Pingel and another inspector showed us one section of relocated M 53 not yet open to traffic (22 Mile Rd. to about 1/2-mile north of 23 Mile Rd.) which was sealed under their supervision. Here all transverse contraction joints were in good condition (Fig. 3). They pointed out that joints must be well sandblasted, well cleaned, and as dry as possible to obtain good adhesion of the two-component sealant to concrete. They have tried to keep the sealant level below the pavement surface, although some joints are still too full. Since this type of material, once cured, does not smear and level out when forced out of the joint as temperature rises, they felt it should be initially filled to a level similar to that specified for the placement of neoprene preformed material. They also showed us another area about 1-mile long not yet open to traffic (northbound relocated M 53 north of 23 Mile Rd.) but completed earlier this year and sealed full depth. The seals have been forced out as much as 1 in. and more (Fig. 3). This area is to be resealed, according to Bramer, since no inspector was present during sealing, which was done improperly.

Inspection of June 8, 1965 (Districts 8 and 10)

Mob of 82211C, C21 (M 85, about one block north of Pennsylvania Rd.). This project includes only two contraction and six expansion joints and was completed in 1963 using variable slab lengths. With few exceptions, the cold pour material was kept low in the joints. At a few spots where the material was high, damage by snow plows and traffic was evident. With these few exceptions, the general condition of the sealant was good (Fig. 4).

CS 82-60, C3 (Eureka Rd. from US 24 to I 75). This project (99-ft slabs) was sealed this spring with two-component cold pour. The sealant level reportedly was high when initially poured, causing rapid failure of the expansion joints in recent hot weather. These joints have subsequently been resealed with hot-pour material without removing all the cold pour (Fig. 5). The contraction joints are still in good condition although the material rising above the pavement surface is being removed by traffic (Fig. 5). Examination of one contraction joint showed that the compressible filler was placed too low in the joint, so that the correct shape factor of seal could not be obtained and too large a volume of sealant was available for extrusion.

E. A. Finney

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F 81121A, C2 (M 153 from M 14 to Ford Rd.). This project consists of about 1-1/2 miles of divided highway constructed with 71 ft 2 in. slabs. All expansion joints are hot pour and contraction joints cold pour (Type 1). Contraction joints on the east-bound section were poured full 2-in. depth while those on the westbound were poured over a jute filler with polyethylene tape as bond breaker. Those poured full depth were expelled from 1/8 to 1/4 in. above the pavement surface, but those poured over filler had not noticeably risen (Fig. 6).

OFFICE OF TESTING AND RESEARCH

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Figure 1. Typical expansion joints on Wide Track Dr., filled too deep (2-in.) with sealant extruding from joint so that traffic pulls it free from groove. Joint faces at right possibly not adequately cleaned (Project M 63201B, C1).

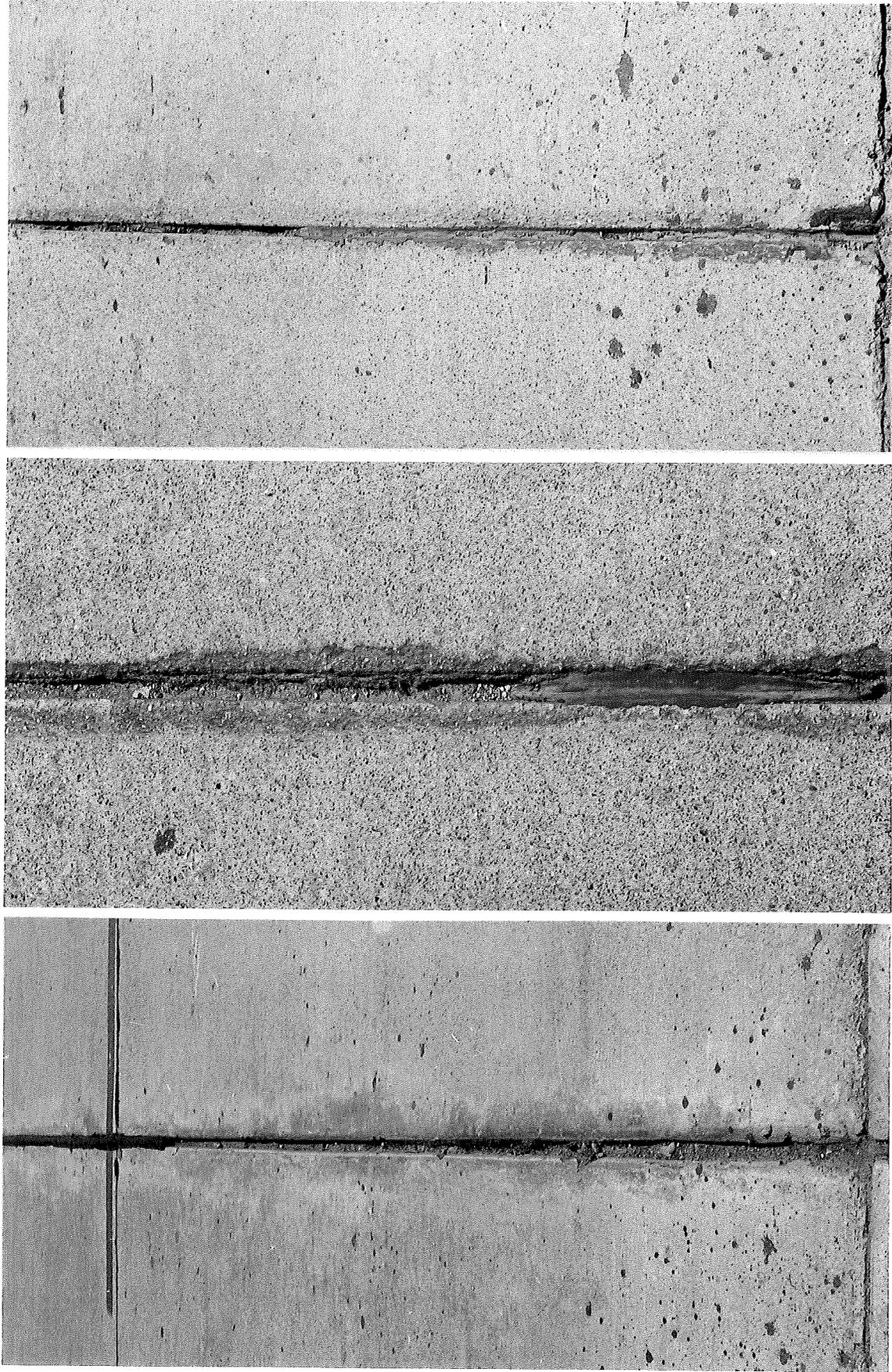


Figure 2. On Orchard Lake Rd., expansion joint (left) with most sealant gone, contraction joint (center) with some sealant missing and compressible filler too high along one side of groove, and second contraction joint (right) with sealant missing and indications of sealing too high above surface (Project USS 63201D, C5).

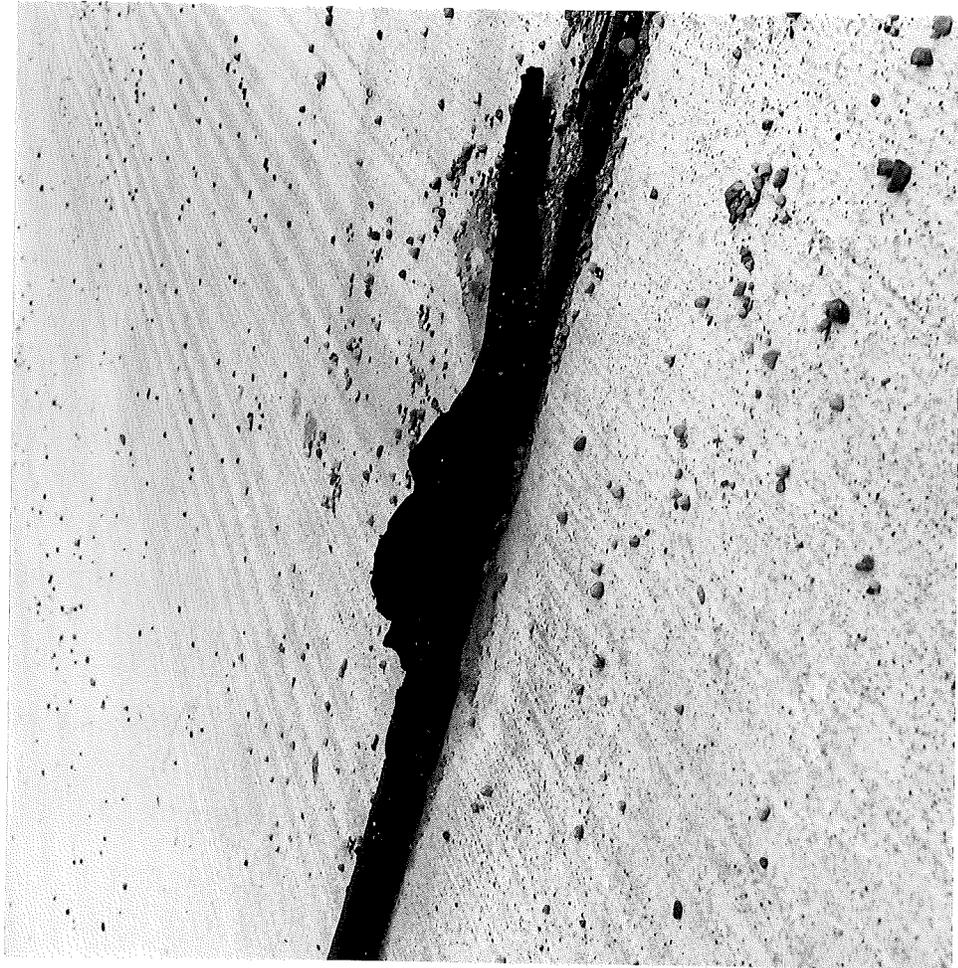
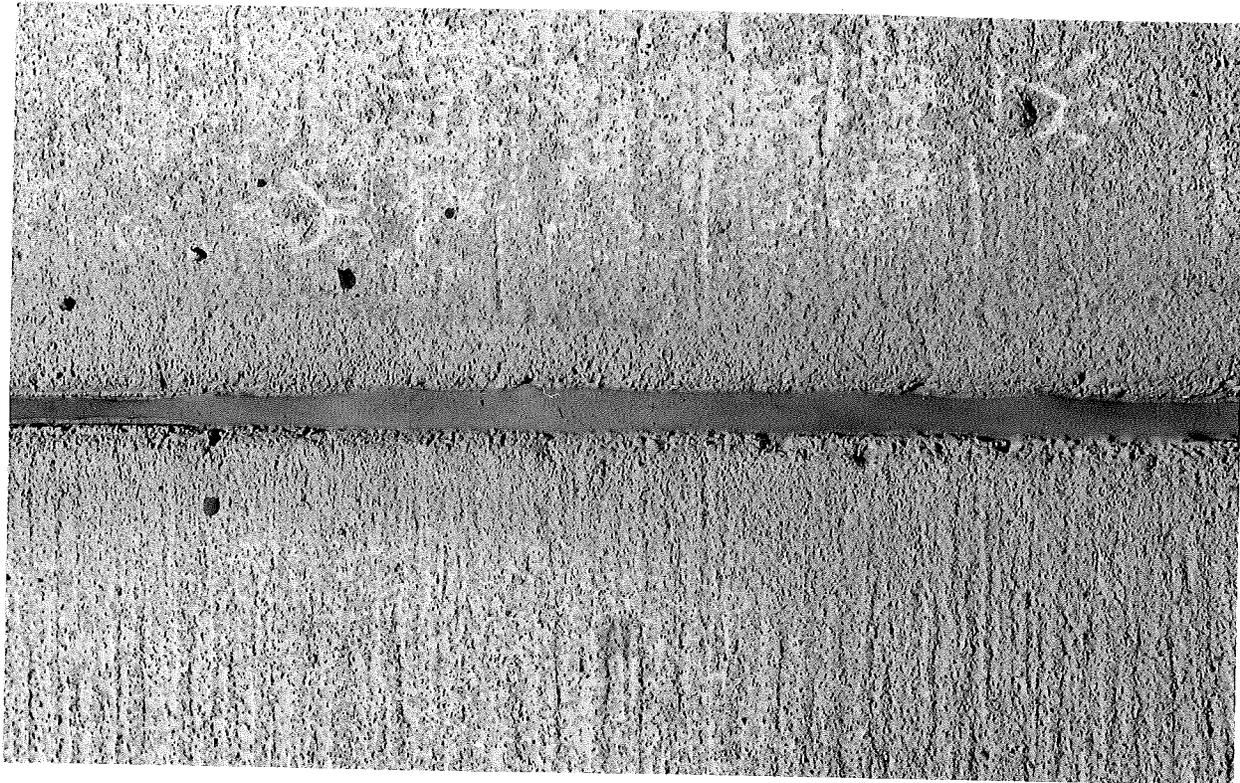


Figure 3. Contrasting conditions on relocated M 53 pavement not yet open to traffic. At left, typical good contraction joint with sealant below pavement surface and evidence of good sandblasting. At right, expansion joint with sealant poured too high and torn by construction traffic (Project F 50013A, C1).

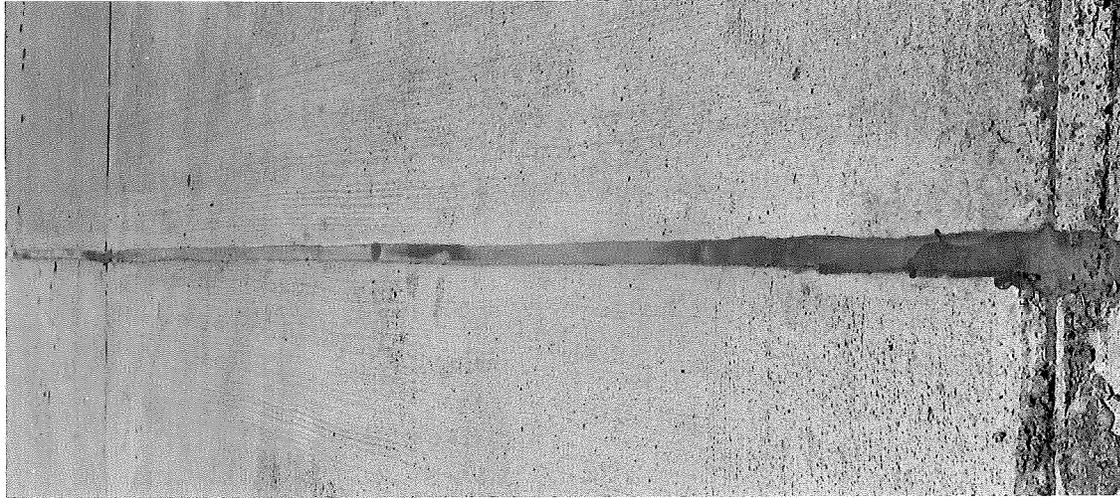


Figure 4. Properly sealed M 85 expansion joint, with sealant below pavement surface (Project Mob 82211C, C21).

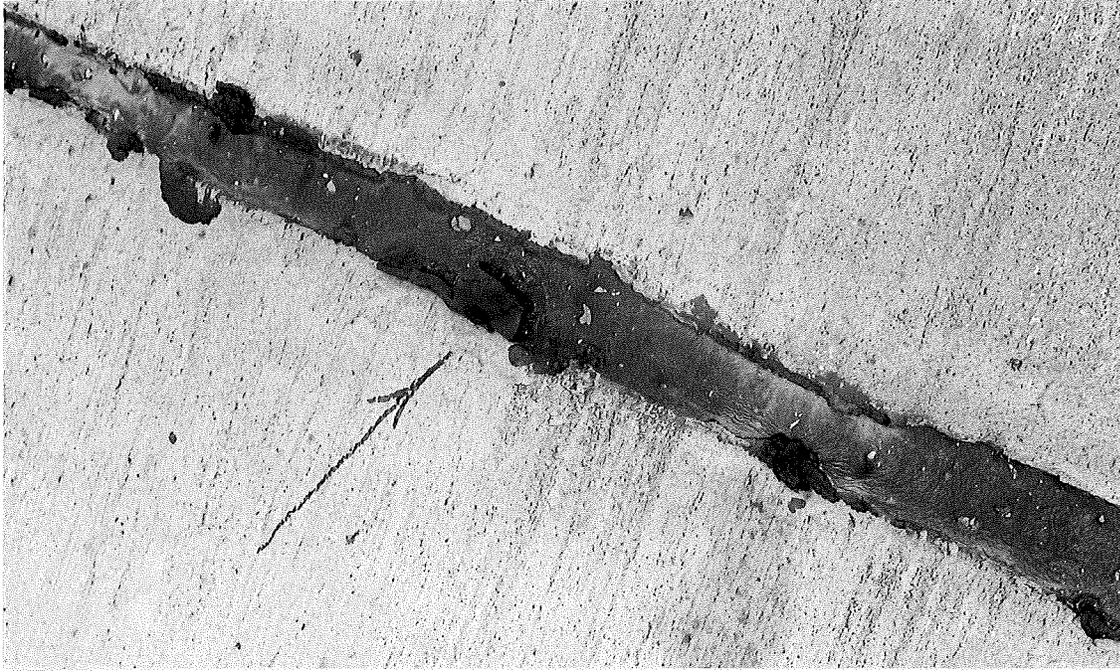
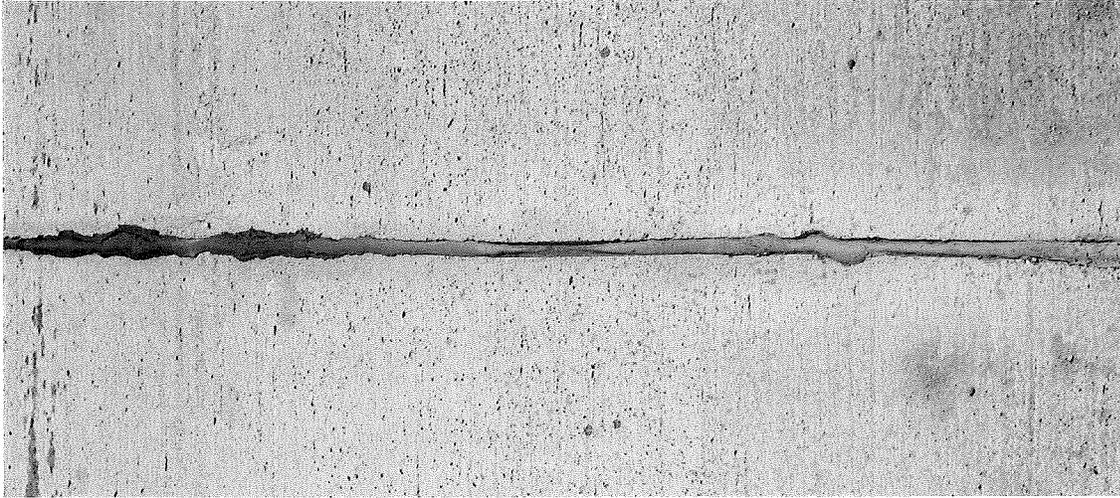


Figure 5. Original cold-pour sealant in contraction joint (left) with some extrusion on joint edge in background. Expansion joint (right) resealed with hot-pour sealant, still contains remnants of original cold-pour sealant (Project CS 82-60, C3).



Figure 6. Typical cold-pour-sealed M 153 contraction joints, with sealant poured full 2-in. depth and extruding above surface in eastbound lanes (above), and retaining good adhesion in westbound lanes (below) where poured over compressible filler (Project F 81121A, C2).