

State of Illinois
DEPARTMENT OF PUBLIC WORKS AND BUILDINGS
Division of Highways
Bureau of Research and Development

EVALUATION OF SA-1 (STABILIZING AGENT-1) IN THE RECONSTRUCTION
OF A TOWNSHIP ROAD BY ADAMS COUNTY

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SUMMARY

SA-1 is a new product being offered by Central Chemical Company, Fresno, California, as a soil stabilizing agent and as an additive for use in reconstructing old asphalt pavements.

According to G. L. Schneider, developer of SA-1 and owner of Central Chemical Company, SA-1 is a liquid chemical that, when diluted with water and added to soil, produces better compaction properties through the removal of various chemical compounds which inhibit compaction and limit stability.

Also according to Mr. Schneider, the application of SA-1 solution to an old asphalt pavement will result in the temporary emulsification of the existing asphalt, enabling the existing asphalt and aggregate to be remixed and recompacted in place for use as a bituminous stabilized base.

This report is concerned with a field trial of SA-1 (Stabilizing Agent-1) which has been proposed as an additive to facilitate the reconstruction of old asphalt pavements for use as bituminous stabilized bases. The Adams County road, which was reconstructed with SA-1 in accordance with procedures recommended by Mr. Schneider, has not performed well in service, and offers no encouragement to further use of SA-1 in this type of construction.

GENERAL PROCEDURE

According to the producer, the procedure for reconstructing asphalt surfaces is briefly as follows: The surface is scarified with a road grader and

the SA-1 and water mixture is sprayed onto the scarified material. The usual amount of SA-1 (1 part SA-1 to 1,000 parts water) used is 1 gallon per mile for every foot of surface width. The scarified mixture is bladed into a windrow. This windrow is then bladed back and forth across the road to thoroughly mix the material and to further break down the asphaltic surface. Sometimes it is necessary to use a pulvimixer to completely break down the scarified material. This is especially true when the weather is cool or where the asphaltic surface being reconstructed is of a higher type. After the material is broken down, it is respread and compacted. At the announced price of \$25 per gallon and the above application rate, the cost of the SA-1 treatment is approximately \$0.043 per square yard - material only.

TRIAL INSTALLATION

A trial application of SA-1 in reconstructing an asphalt road was made in Adams County on August 2 and 3, 1966 by county forces. Mr. Schneider was present to provide technical advice. A half-mile section about two miles east of Quincy in Ellington Township was treated. Figure 1 shows the exact location of this section. The surface of this township road was a built-up layer of four seal coats using MC-5 asphalt and 3/8-inch rounded gravel. The layer of built-up seal coat was about 1 1/2 inches thick.

The work began at about 8:30 a.m. on August 2, a clear warm day with a high temperature in the low eighties. Scarification of the surface was done with two graders. A grader scarifying the surface and the scarified surface are shown in Figures 2 and 3. Application of SA-1 solution to the freshly scarified surface was started at about 9:00 a.m. In total, 12 gallons of SA-1 in 12,000 gallons of water were sprayed on the half mile of scarified material, a heavier application than previously recommended. The township road treated is about 18 feet wide,

which would require only 9 gallons of SA-1 for the half-mile section at the standard rate of application. (It is claimed that overapplication does not hinder the action of the chemical.) The scarified material, SA-1, and water mixture was bladed into a windrow as shown in Figures 4 and 5. Another 4,000 gallons of water were then added and the windrow was allowed to sit over the noon hour. (The additional 4,000 gallons of water were applied upon Mr. Schneider's recommendation.) After noon the windrow was bladed back and forth across the road to mechanically break down the larger particles of scarified material. This was done until about 3:30 p.m. when it was decided that the breakdown of the scarified material had stopped. The softening and breakdown of the scarified material are shown in Figures 6, 7, and 8. When the material in the windrow was spread on the road, there were still many large particles of scarified material that did not break down as shown in Figure 9. No compaction equipment was available that day, but a steel wheel roller and a pneumatic tire roller were brought to the job on the following morning. At that time an attempt was made to compact the treated material. Also, more water was added to aid in compaction. Three or four passes were made with each of the compactors, but the treated material was still quite loose after compaction as shown in Figures 10 and 11.

RESULTS

On August 30, 1966, an inspection was made of the treated section. The surface of the section was rough and uneven due to the many particles of scarified material that had not broken down during treatment. The material had hardened and felt solid when struck with a hammer. Some of the treated material was beginning to ravel out of the surface. The raveling and surface roughness are shown in Figures 12, 13, 14, and 15.

A second inspection was made of the treated section on October 25, 1966. The SA-1 treated material had been covered with a seal coat, which had improved the appearance and riding quality of the road. However, there were still some rough spots and uneven ridges on the surface. The SA-1 treated material still felt solid when struck with a hammer. The appearance of the seal coated road is shown in Figures 16, 17, 18, and 19.

Again on February 14, 1967, an inspection was made of the SA-1 treated section at which time the surfacing was found to be deteriorating severely in the form of raveling along the edges of the road. The main reason for this raveling seemed to be the poor continuity of the treated layer. The particles of material that were not broken down during treatment have little bond to each other and, consequently, are subject to being shoved around with subsequent cracking and raveling under the action of traffic. Also, the layer of treated material had no bond to the underlying subgrade. Large areas of surfacing could easily be lifted by hand. The condition of the road surface at this time is shown in Figures 20, 21, 22, 23, 24, and 25.

A final inspection was made and a series of colored slides were taken of the SA-1 treated section on May 3, 1967. Extensive patching of the road had been done. The raveling of the pavement is continuing to spread. Areas adjacent to the already raveled areas are forming alligator type cracks.

CONCLUSIONS AND RECOMMENDATION

It is concluded that the use of SA-1 in the reconstruction of the Adams County road covered by this investigation has been unsuccessful. The primary reason for the failure appears to be the inability of the SA-1 to adequately break down the scarified material. In recompacting this partially broken down material, a layer of material of nonuniform characteristics and weak spots was formed, which

could not stand up under traffic and weather conditions.

On the basis of the results of this investigation, it is recommended that no further consideration be given to the use of SA-1 in this type of construction.

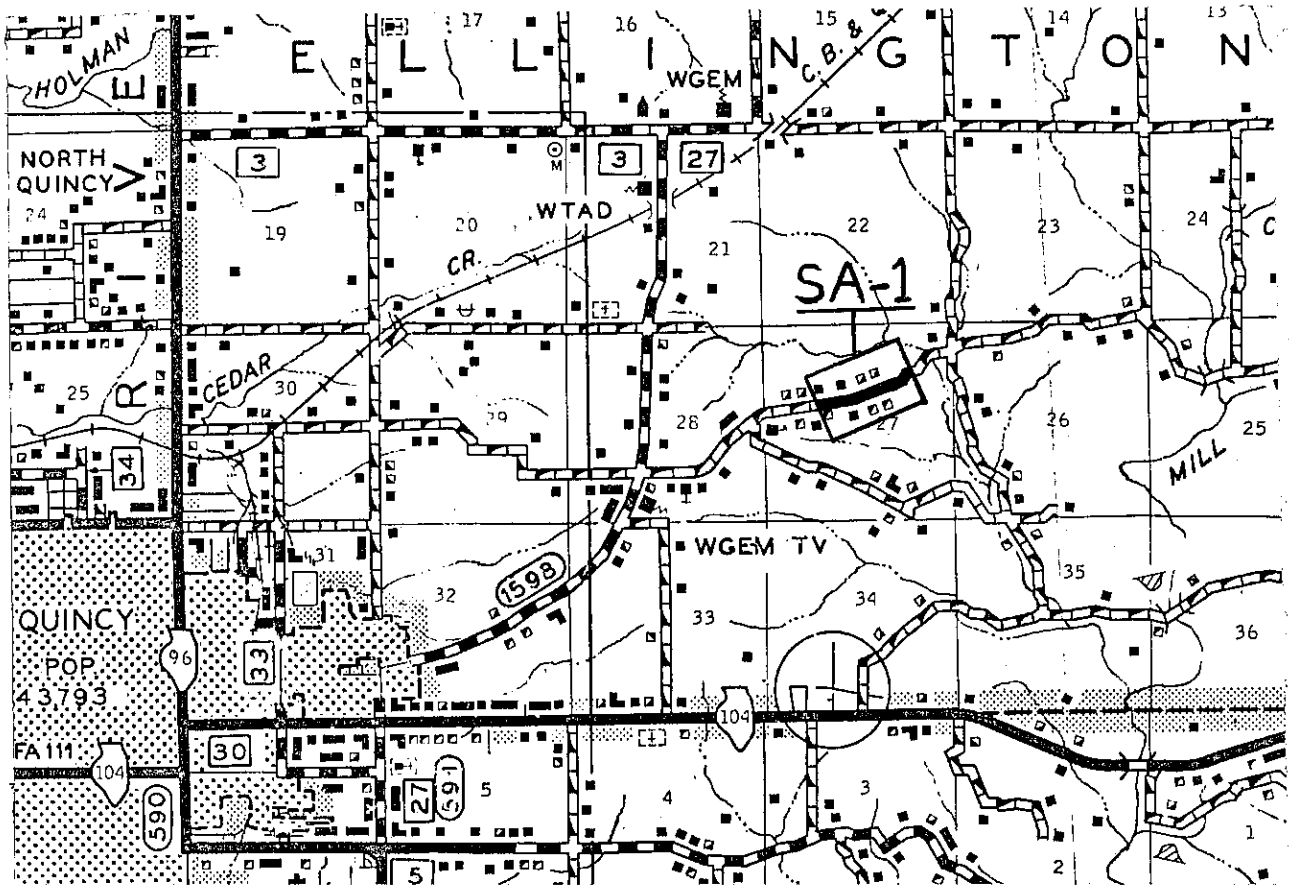


Figure 1.
Location of SA-1 trial section.

Figure 2.
The grader scarifying the surface.

Figure 3.
The scarified surface.

Figure 4.
The grader scraping the scarified
surface into a windrow.

Figure 5.
The SA-1 water and asphaltic aggre-
gate mixture in the windrow.

Figure 6.

The windrow during the mixing operation. Some softening of the asphaltic aggregate material can be noted.

Figure 7.

Figure 8.

The windrow prior to being spread onto the road.

Figure 9.

The asphaltic aggregate mixture after being spread onto the road.

Figure 14. Figure 15.
The roughness of the SA-1 treated material on August 30, 1966.

Figure 16. Figure 17.
October 25, 1967. The appearance of the seal coated surface.

Figure 18. Figure 19.
October 25, 1967. The appearance of the seal coated surface.

Figure 20. Figure 21
February 14, 1967. Raveling along the edges of the road.

Figure 22. Figure 23.
February 14, 1967. Raveling along the edges of the road.

Figure 24. Figure 25.
February 14, 1967. Closeup photographs of the condition of
the SA-1 treated material where raveling has occurred.



Figure 2.
The grader scarifying the surface.



Figure 3.
The scarified surface.

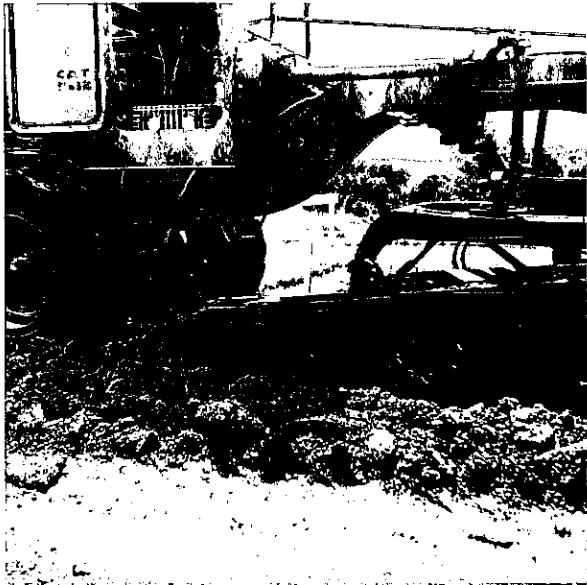


Figure 4.
The grader scraping the scarified surface into a windrow.



Figure 5.
The SA-1 water and asphaltic aggregate mixture in the windrow.



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Figure 6.

The windrow during the mixing operation. Some softening of the asphaltic aggregate material can be noted.

Figure 7.

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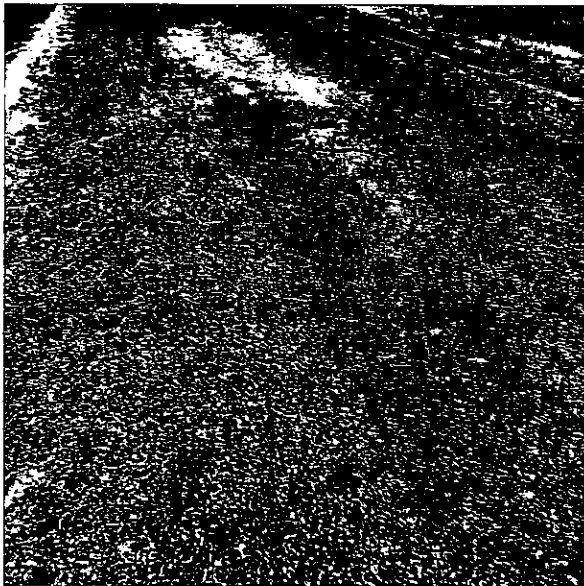
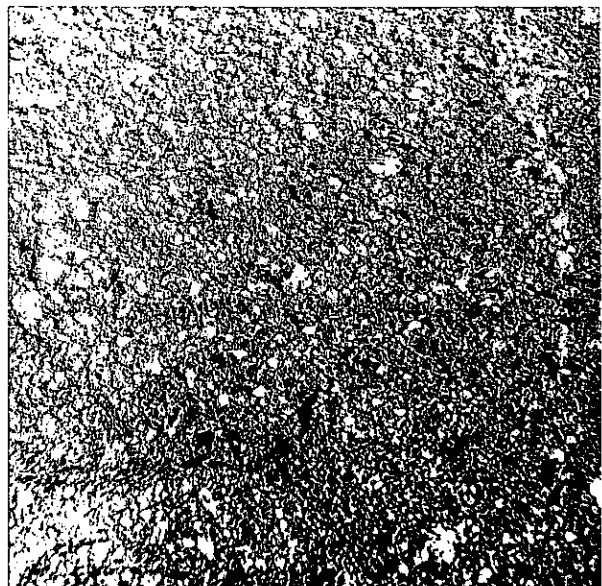


Figure 8.

The windrow prior to being spread onto the road.



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Figure 9.

The asphaltic aggregate mixture after being spread onto the road.

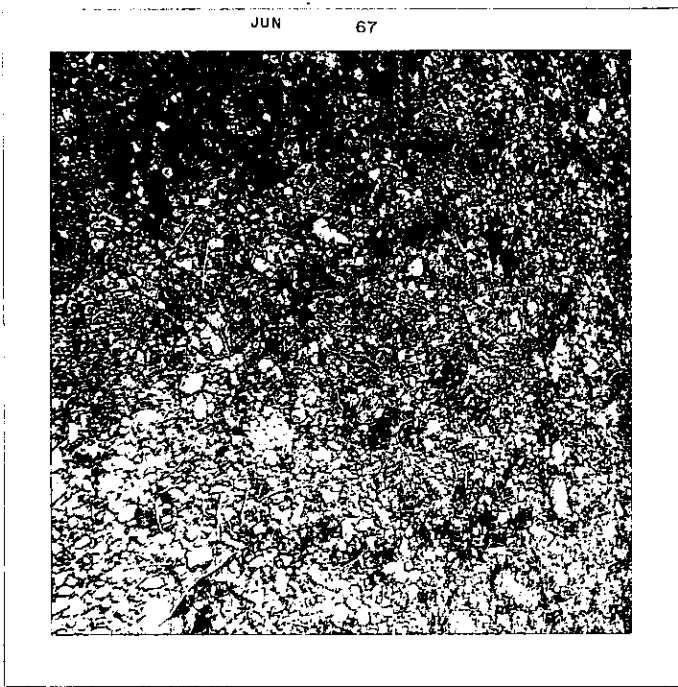


Figure 10.
The "compacted" SA-1 treated material.

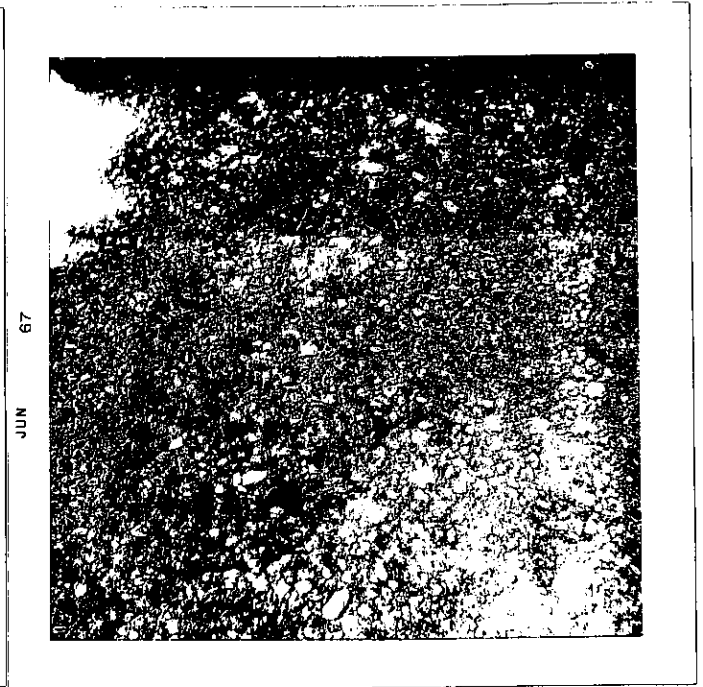


Figure 11.

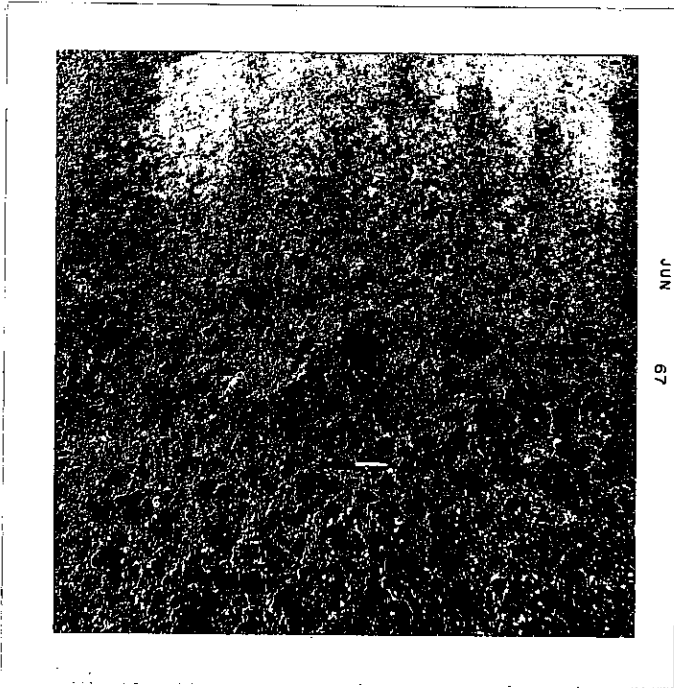


Figure 12.
Raveling which had occurred before August 30, 1966.

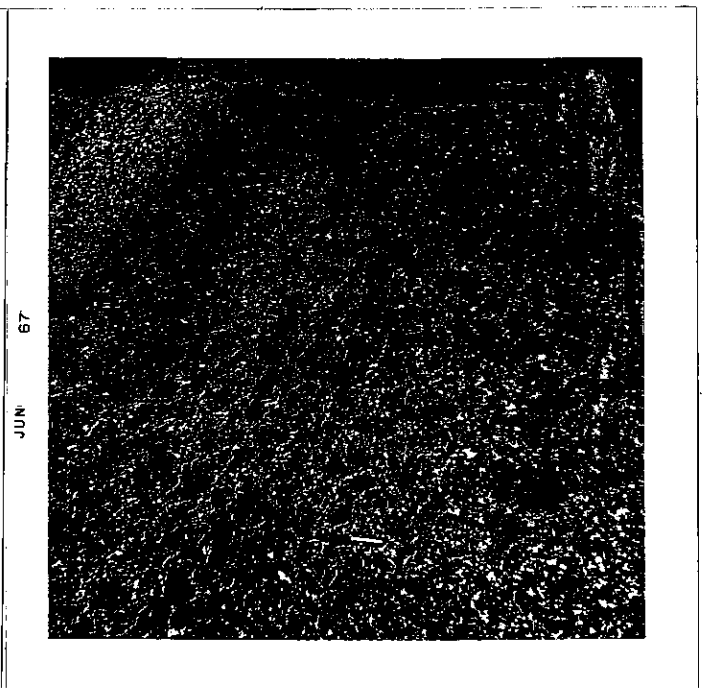
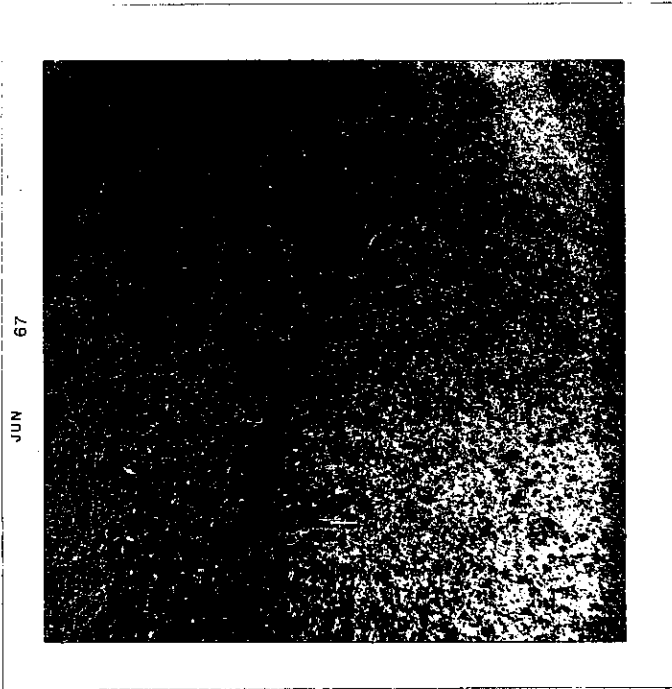
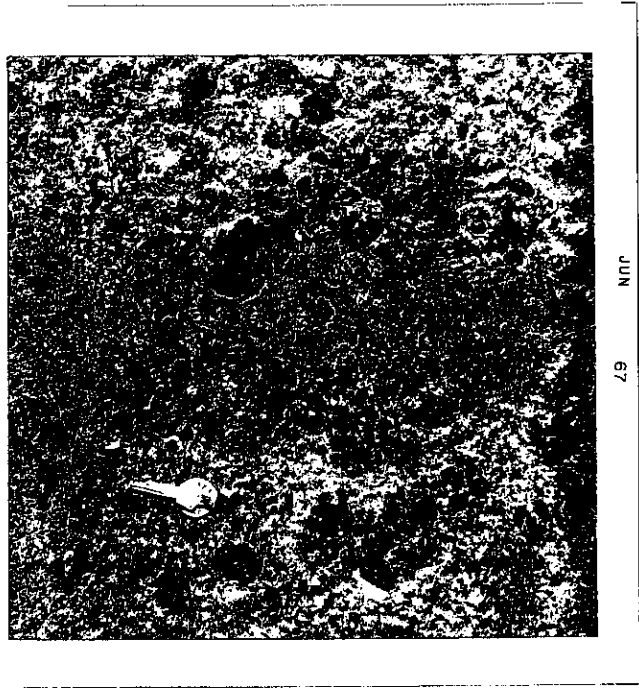


Figure 13.

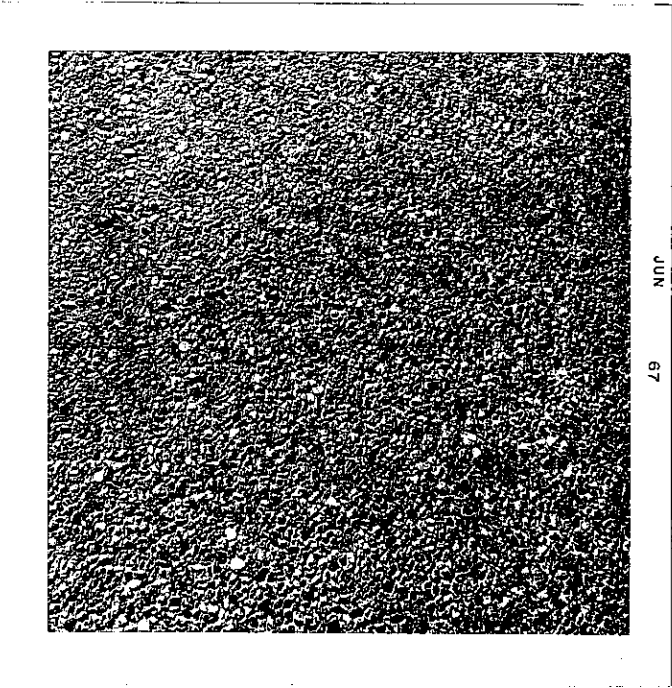


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Figure 14. The roughness of the SA-1 treated material on August 30, 1966. Figure 15.



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Figure 16. October 25, 1967. The appearance of the seal coated surface. Figure 17.

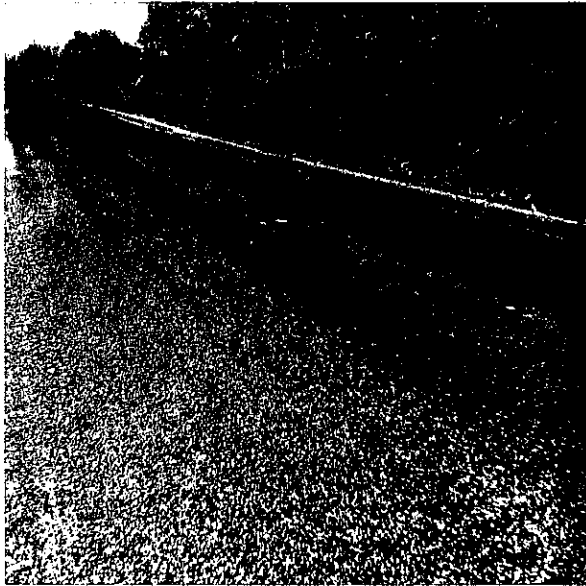


Figure 18.
October 25, 1967. The appearance of the seal coated surface.



Figure 19.



Figure 20.
February 14, 1967. Raveling along the edges of the road.



Figure 21



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Figure 22. February 14, 1967. Raveling along the edges of the road.

Figure 23.



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Figure 24. February 14, 1967. Closeup photographs of the condition of the SA-1 treated material where raveling has occurred.

Figure 25.