



COMMONWEALTH OF KENTUCKY  
DEPARTMENT OF HIGHWAYS  
FRANKFORT

HENRY WARD  
COMMISSIONER OF HIGHWAYS

February 20, 1962

ADDRESS REPLY TO  
DEPARTMENT OF HIGHWAYS  
MATERIALS RESEARCH LABORATORY  
132 GRAHAM AVENUE  
LEXINGTON 29, KENTUCKY

MEMORANDUM

TO A. O. Neiser D. 1. 7.  
Assistant State Highway Engineer B. 3. 6.

SUBJECT: Base Stabilization  
Bryantsville - Beuna Vista Road  
Garrard County, RS 40-326

Early last spring, Mr. John W. Spurrier, Principal Assistant District Engineer for Maintenance, Traffic and Equipment, District 7, Lexington, requested the Research Division to co-operate in the above project. The objective was to provide an adequate base through the addition of stone blended in place with existing traffic-bound base material and the addition of calcium chloride. Plans were developed for an initial treatment of a C-1 roadmix to be applied later in the calendar year and some time after the beginning of the Highway Department's fiscal year when the funds would be available.

The attached memorandum by Robert C. Deen, Research Engineer Senior, describes the procedure used in determining the quantity of additional stone that would be needed. The construction of the stabilized base and its performance prior to surfacing with C-1 roadmix binder course is discussed. An inspection of the road on February 13, indicated the surface to be in excellent condition.

Due to the fact that the C-1 binder-type surface was placed without a seal coat, I believe that it would be advisable to seal this pavement this year. The binder mix is relatively open and is subject to rapid raveling even when placed over a stable base course.

Respectfully submitted,

W. B. Drake  
Director of Research

WBD:dl  
Enc.

cc: Research Committee Members  
Bureau of Public Roads (3)

Commonwealth of Kentucky  
Department of Highways

BASE STABILIZATION  
BRYANTSVILLE-BEUNA VISTA ROAD  
GARRARD COUNTY, RS 40-326

Robert C. Deen  
Research Engineer Senior

Highway Materials Research Laboratory  
Lexington, Kentucky  
February, 1962

February 19, 1962

D. 1. 7.

B. 3. 6.

MEMORANDUM

TO: W. B. Drake  
Director of Research

FROM: Robert C. Deen *RD*  
Research Engineer Senior

SUBJECT: Base Stabilization  
Bryantsville-Beuna Vista Road  
Garrard County, RS 40-326

Construction plans for the summer of 1961 called for the placement of a bituminous surface (Class C-1) on Ky. 753 in Garrard County (see Fig. 1). The project extends from US 27 in Bryantsville to Ky. 152 at Beuna Vista, a distance of approximately 2.8 miles. To prepare the roadbed for this bituminous surfacing, personnel of the Maintenance Division placed additional stone on the roadway and stabilized it with calcium chloride. The Research Division was requested to make recommendations as to application rates of the available stone and calcium chloride and to follow the general performance of the project.

On March 22, 1961, a condition survey (see Fig. 2) was made of the existing roadway. Samples were also taken of the traffic-bound material as well as from the subgrade. A summary of the laboratory test data is given in Table 1.

An attempt was made to proportion the available No. 610 stone and No. 10 stone so as to provide approximately 4-1/4 inches of compacted stabilized base.

It was desirable that the stabilized base have approximately the same gradation and structural thickness over the entire project. The approximate rates of application of the stone and calcium chloride are given in Table 2.

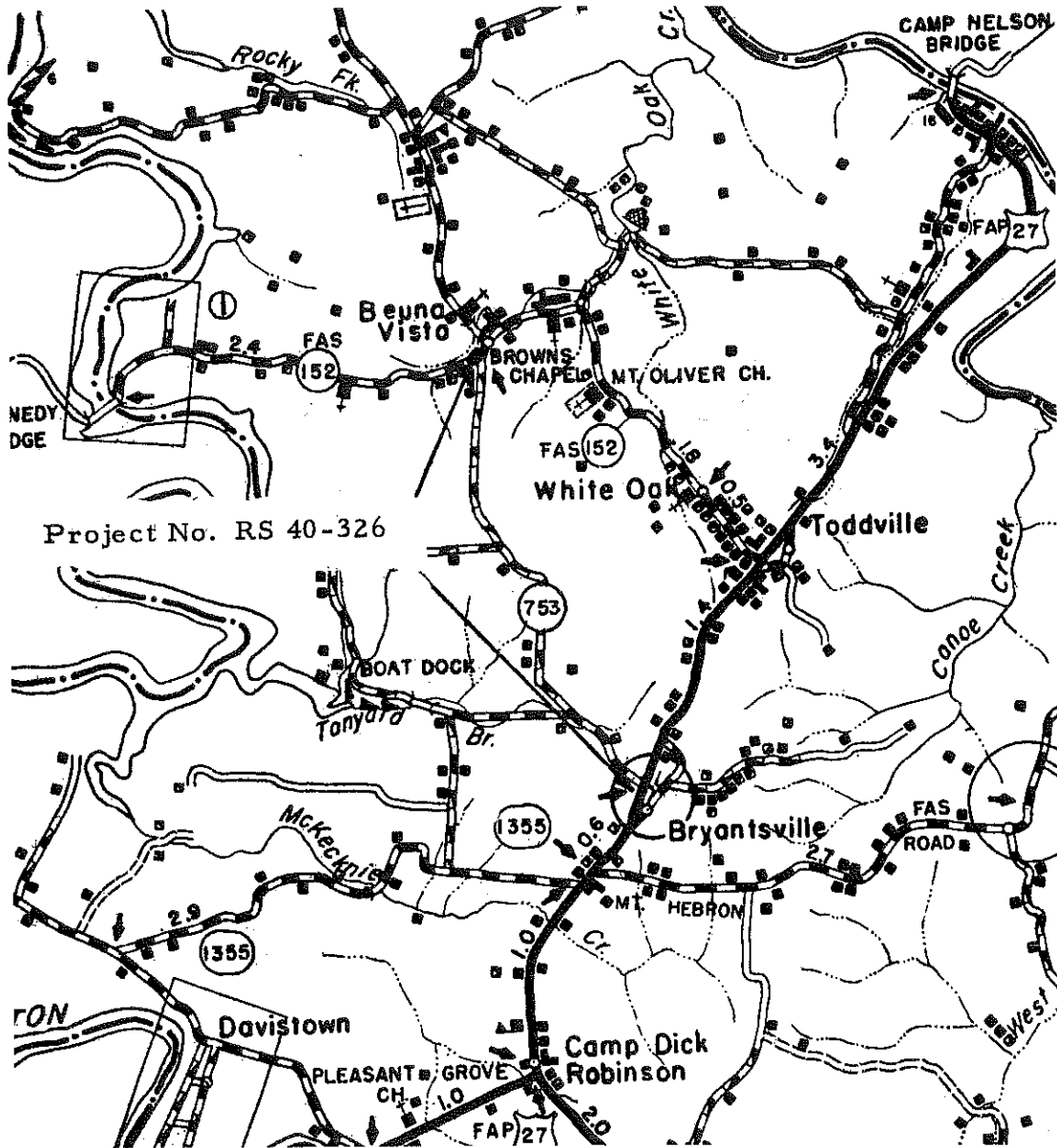


Fig. 1. Map Showing Location of Project.

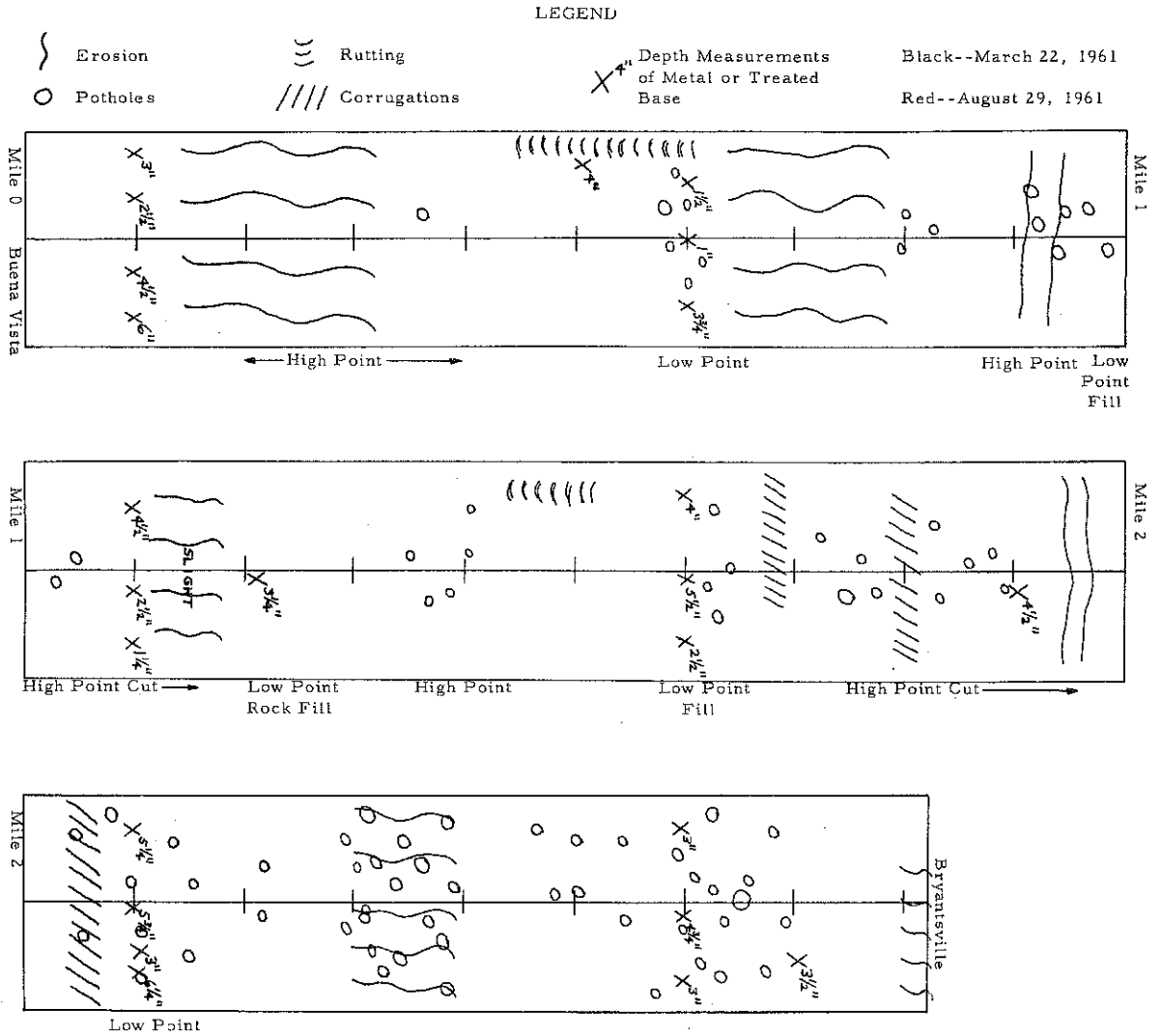


Fig. 2. Condition Surveys.

Table 1. Summary of Laboratory Test Data, Garrard County,  
RSF 40-326-251

	Southern Portion (Bryantsville End)	Central Portion	Northern Portion (Beuna Vista End)
Subgrade:			
Specific Gravity	2.77	2.78	2.75
Liquid Limit	44	32	40
Plasticity Index	22	11	18
Percent Clay	53	41	43
Percent Clay & Silt	85	83	83
Percent Minus No. 10	100	100	100
Percent Minus No. 40	93	95	91
Opt. Moisture Content	19	21	23
Max. Dry Density	105	107	102
Traffic-Bound Macadam:			
Percent Minus No. 200	15	18	6
Percent Minus No. 40	20	23	11
Percent Minus No. 10	29	30	15
Avg. Thickness (In.)	3	2-1/2	1-1/2

Table 2. Rates of Applications, Garrard County, RS 40-326-521

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South - 1.8 miles (Bryantsville End)

$$1.8 \text{ miles} \times 5280 \frac{\text{ft.}}{\text{mile}} \times 2 \frac{\text{sq. yd.}}{\text{ft.}} = 19,008 \text{ sq. yd.}$$

TBM - 2-1/2 inches

$$\left. \begin{array}{l} \text{Add: No. 610's - 122 lbs. per sq. yd. - 1159.5 tons} \\ \text{No. 10's - 53 lbs. per sq. yd. - 503.7 tons} \end{array} \right\} \begin{array}{l} 1-3/4 \\ 4-1/4'' \end{array}$$

Estimated - No. 200 mat'l. of combination: 11%

North - 1.0 mile (Buena Vista End)

$$1.0 \text{ mile} \times 5280 \frac{\text{ft.}}{\text{mile}} \times 2 \frac{\text{sq. yd.}}{\text{ft.}} = 10,560 \text{ sq. yd.}$$

TBM - 1-1/2"

$$\left. \begin{array}{l} \text{Add: No. 610's - 92 lb. per sq. yd. - 485.8 tons} \\ \text{No. 10's - 186 lb. per sq. yd. - 982.1 tons} \end{array} \right\} \begin{array}{l} 2-3/4 \\ 4-1/4'' \end{array}$$

Estimated - No. 200 mat'l. of combination: 8%

Calcium Chloride (Flake) for Entire Project

Intermixed:

$$1 \text{ lb. per sq. yd.} \times 29,568 \text{ sq. yd.} = 14.7 \text{ tons}$$

Top Dressing:

$$1/2 \text{ lb. per sq. yd.} \times 29,568 \text{ sq. yd.} = 7.3 \text{ tons}$$


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The stabilization work was started on April 19, 1961, and completed the following week. The No. 610 stone was spread first and then the No. 10 stone. The existing traffic-bound base was then scarified to a depth of approximately six inches from the top of the pre-spread material. Care was taken not to disturb the existing subgrade but still there were areas where the scarifying teeth of the patrol grader penetrated into the subgrade. After an area had been scarified, a pulvimixer was used to partially mix the materials. The calcium chloride (one lb. per sq. yd.) was added and mixing continued until the materials were well blended. Additional water was added when needed to provide optimum moisture for compaction. All compacting was done with a pneumatic roller. The compacted base was given a final top dressing of calcium chloride (1/2 lb. per sq. yd.).

This is a rural secondary project and was constructed by force account procedures. District No. 7 records indicate the cost as follows:

Labor	\$ 430.02
Materials	
Stone	7053.75
Calc. Chloride	910.03
Equipment	
Rental	235.35
	<u>\$8629.15</u>

On August 29, 1961, a second condition survey was made (see Fig. 2). This survey was approximately five months after stabilizing and shortly before surfacing. The general condition of the base at this time appeared to be rather good. The indications of distress (pot-holes in particular) were those that might be expected in a fairly stable base. There were also several areas where the rapid runoff of surface water had eroded some fines from the surface of the base. The average thickness of compacted base was noted to be about 3-3/4 inches with sufficient amount of loose stone on the shoulders to account for about 1/2 inch of thickness.

The placement of the roadmix was started on September 23, and completed on September 30, 1961. The work was done on contract by Walden and Grubbs. RT-2 was used as a primer at a rate of 0.40 gal. per sq. yd. The Class C-1 roadmix surface (binder type gradation) consisted of 165 lbs. per sq. yd. of limestone aggregate (50% No. 6's



and 50% No. 9's) and liquid asphalt MC-4 at the rate of 1.30 gal. per square yard.

A visual inspection was made of the project on February 13, 1962. The general condition of the project was excellent (see Fig. 3). There were, however, some areas of rutting and base failures in the outside wheel track of the southbound lane (see Fig. 4) over a distance of approximately 0.3 mile near Beuna Vista. These areas of distress coincide with areas of rutting and weakness noted in the previous surveys. Some of this edge distress might also be attributed to the placement of a wider pavement than originally existed and thus the edges have less support in many places. There also appeared to be some water trapped in the pavement system between the surface and base.

RCD:dl



Fig. 3. Photograph Showing the Generally Excellent Condition of the Surface over the Entire Project. In the background are indications of some slight rutting in the right hand outside wheel track.



Fig. 4. Photograph Showing Area of Distress in Outside Wheel Track.