HR-182

AN EVALUATION
OF
COVER AGGREGATE STRIPPING CHARACTERISTICS

PROGRESS REPORT
TO
IOWA HIGHWAY RESEARCH BOARD

SUBMITTED BY
IOWA DEPARTMENT OF TRANSPORTATION
HIGHWAY DIVISION

OFFICES OF CONSTRUCTION, MAINTENANCE & MATERIALS

MARCH 25, 1977

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INTRODUCTION

The increasing use of seal coats for surface restoration and the concurrent increase in failures of such treatments prompted the current research. Field observations indicated that certain aggregate types seemed to be more susceptible to failure, including stripping and disintegration. The research was thus designed to try to identify those aggregate types which would perform satisfactorily under normal conditions.

PROCEDURE

To achieve the objective of identifying satisfactory aggregates, thirty aggregates were chosen to represent a cross section of those normally available. Twenty-nine of these were available at the time of project construction and are listed and described in Appendix A. The aggregates were randomly assigned to test sections that were 400 feet in length, with two replicates of each aggregate for a total of 58 test sections. A schematic of the aggregate test sections is shown in Appendix B.

To investigate the effect of bitumen type, both a cutback asphalt, MC-3000, and a cationic emulsified asphalt, RS-2, were used with each aggregate type. The eastbound lane was treated with the emulsion and the westbound lane received the cutback. To simulate rain conditions, the outside one-half of each lane was sprayed with water after rolling was completed. The end

result was that each test section contained aggregate subjected to four different treatments:

1. Emulsified asphalt and water spray
2. Emulsified asphalt
3. Cutback asphalt
4. Cutback asphalt and water spray

This resulted in 232 sampling sites (4 treatments per test section X 58 test sections).

The project proposal called for a determination of the amount of aggregate retained on the surface to be made at periodic intervals. Specifically:

a.) day of construction

b.) one week after construction

c.) one month after construction

d.) one year after construction

e.) two years after construction

On the day of construction, determination of aggregate retained was made by placing specially designed collecting pans in the path of the contractor's aggregate spreader.

All sampling subsequent to the day of construction was done by placing a 1' X 3' template on a sampling site. The surface was heated by a propane torch, scraped off, and put in containers to be sent to the lab for extraction of the asphalt. It was felt that with the proper combination of heat and care only the

recently applied seal coat would be removed without disturbing the old surface underneath.

TEST RESULTS AND INTERPRETATION

a) Day of construction

This sampling was to be used as the basis for further comparisons of aggregate retention. However, procedural problems in obtaining the samples made some of the data obtained non-representative. Thus, it was decided to use the one week samples as the basis for comparison.

b) Amount retained after one week

These samples were obtained by the heating and scraping method described previously and sent to the Central Laboratory. After extraction of the asphalt, the total aggregate weight and gradation were determined. Without other samplings to compare against, the only observation that could be made on these samples was that the amount of aggregate retained (or obtained in the sampling) varied significantly, both between treatments within a test section, and between test sections.

c) Amount retained after one month

The first observation made after these samples were processed in the laboratory was that the large variances within and between test sections encountered in the previous samples were repeated in these. It was also noticed that over 40% of the samples indicated more aggregate retained at one month than at one week.

Examination of the samples showed the presence of sand in direct proportion to the gain in weight. Apparently, in sampling the seal coats in the field, it is very easy to break through into the old surface underneath, thus contaminating the samples. To eliminate the effect of the sand, the gradations were recalculated using only the plus #8 fraction. The adjusted gradations indicate that after one month of traffic and weather, degradation and/or aggregate loss is occurring at all sampling sites with all aggregates performing equally.

FUTURE WORK

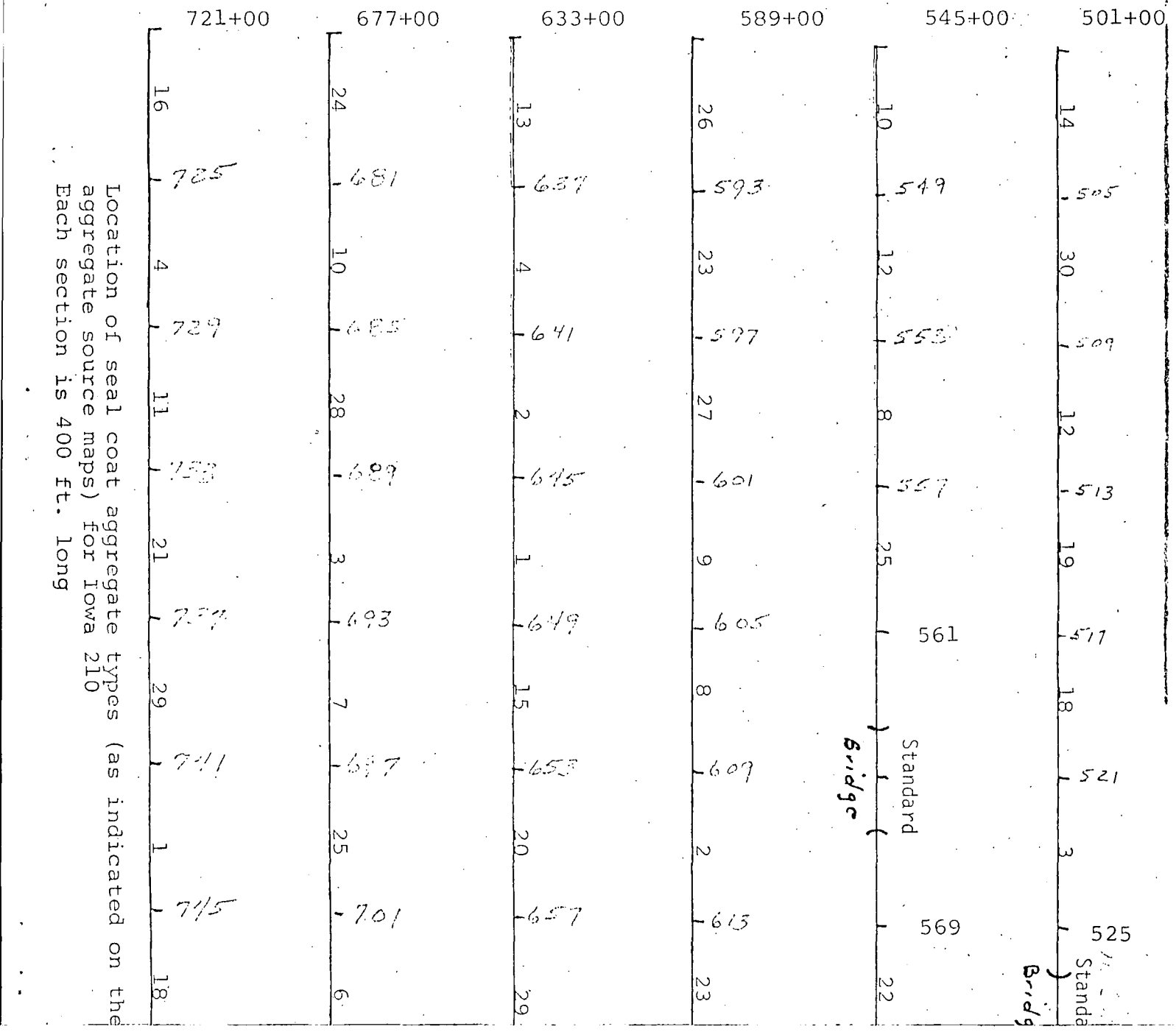
Samples are to be obtained at one year and two years of age, that is August 1977 and August 1978. Visual observations will also be made and recorded at that time. A final report is to be completed as soon as practicable after the two year determination.

APPENDIX A

Aggregate Sources

Source No.	Producer	Name	County	
1	L.G. Everist	Hawarden	Sioux	Gravel
2	Estherville S&G	Estherville	Emmet	Gravel
3	Hallett Const.	Geneva	Franklin	Gravel
4	F&D Const.	Farm	Greene	Gravel
5	Hallett Const.	Ames	Story	Gravel
6	Schildberg Const.	Mt. Etna	Adams	Gravel
7	Northern Gravel	Northern Gravel	Muscatine	Gravel
8	Ideal Sand Co.	Farmington	Van Buren	Gravel
9	Concrete Materials	Quartzite Qr.	Minnehaha, S.D.	Quartzite
10	Martin Marietta	Fertile	Worth	Fine grained dolomite
11	Not Used			Not Used
12	Niemann Const.	Eldorado	Fayette	Fine grained dolomite
13	P&M Stone Co.	Hodges	Humboldt	Fine grained limestone
14	Fort Dodge Lst.	Ft. Dodge Mine	Webster	Fine grained limestone
15	Dubuque Stone	Dubuque Stone	Dubuque	Medium grained dolomite
16	Martin Marietta	Ferguson	Marshall	Fine to med. grained lst. & dolo
17	B. L. Anderson	Garrison	Benton	Fine to med. grained dolomite
18	Schemmer Const.	Logan	Harrison	Fine grained limestone
19	Kerford Lst. Co.	Weeping Water	Cass, Nebr.	Fine grained limestone
20	Schildberg Const.	Menlo	Adair	Fine grained limestone
21	Schildberg Const.	Corning	Adams	Fine to med. grained limestone
22	Sargent Quarries	Dr. Jefferies	Harrison,Mo.	Fine grained limestone
23	Carter-Waters	Haydite	Appanoose	Expanded shale
24	L&W Const.	#2 Quarry	Appanoose	Fine to med. grained limestone
25	Kaser Corp.	Keswick	Keokuk	Fine grained dolomite
26	Douds Stone	Selma	Van Buren	Fine grained dolomite
27	Kaser Corp.	Coppock	Washington	Fine grained limestone
28	River Products	Columbus Jct.	Louisa	Fine to med. grained dolomite
29	Wendling Quarries	Moscow	Muscatine	Medium grained dolomite
30	LeClaire Quarries	LeClaire	Scott	Fine to med. grained dolomite

APPENDIX B



Location of seal coat aggregate types (as indicated on the aggregate source maps) for Iowa 210
Each section is 400 ft. long