February 15, 1957

MEMORANDUM TO: MR. H. O. REED, ENGINEER OF DESIGN

SUBJECT: Geological Report
Project 13-73 S-311 (3), Part I
Stations 56,000 to 331-20
Pottawatomie County

We are transmitting herewith five copies of the geological report for Project 13-73 S-311 (3), Part I in Pottawatomie County.

John D. McNeal
Chief Geologist

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Enc.
MEMORANDUM TO: MR. H. O. REED, ENGINEER OF DESIGN

FROM: MR. JOHN D. McKEAL, CHIEF GEOLOGIST
By Wallace F. Taylor, Billie J. Johnson
and Larry Knoch, Geologists
Vance L. Hurd, Regional Geologist

SUBJECT: Geological Report, Part I
Project 13-75 & 821 (3)
Stations 25/00 to 33/50
Pottawatomie County

INTRODUCTION

This report presents geological information obtained by the Kansas Highway Commission through field study and is submitted for use in the design and construction of the above project with reference to the formations that occur and the engineering problems affected by the geology of the project.

The report is divided into three sections for the purpose of grouping the information and discussions of the different phases. This report is intended to be complete within itself, but is best used in connection with the Geo-Engineering Survey.

RESUME OF SECTIONS

Section I: Geological Description and Stratigraphical Sequence
Section II: Geology of the Project
Section III: Geo-Engineering Aspects
Blue Rapids Shale Formation
19. Shale, green, blocky, lumpy.
20. Shale, grey, blocky.
22. Lumpy shale, light grey, blocky, potential water zone.
23. Shale, olive, blocky, somewhat lumpy.
24. Shale, grey, blocky.

Creal Springs Limestone Formation
25. Shaly limestone, white, platy.
26. Limestone, grey, weathered brown, blocky, somewhat massive.

Eddy Creek Shale Formation
27. Shale, dark grey, platy.
28. Shale, dark blue grey, platy.
29. Shale, black, platy.
30. Shaly limestone, fossiliferous.
31. Limestone, light grey, blocky.
32. Shale, green, blocky.
33. Shale, maroon and green, blocky.

Cannelton Limestone Member
34. Limestone, light grey, blocky.
35. Shale, green, blocky.
36. Limestone, light grey, blocky, has several horizontal partings.

Hanson Shale Member
37. Shale, green, blocky.
38. Shale, dark green, lumpy.
39. Shaly limestone, grey.
40. Shale, green, blocky.
Eskridge Shale Formation

55. Shale, bright green, blocky.
56. Shale, green, blocky, lamy.
57. Shale, pale marine, blocky, lamy.
58. Shale, light green, blocky, lamy.
59. Shale, gray-green, blocky, lamy.
60. Shale, dark gray, blocky, lamy.
61. Shale, maroon, blocky, lamy.
62. Shale, green, blocky.
63. Shale, light green, blocky, lamy.
64. Shale, green, dark green bands, blocky, lamy.
65. Shale, green, blocky, lamy.
66. Shale, green, blocky, lamy.
67. Shale, light green, blocky, lamy.
68. Shale, green, blocky, lamy.
69. Shale, green, blocky, lamy.
70. Shale, green, blocky, lamy.
71. Shale, green, blocky, lamy.

Greenbush Limestone Formation

72. Limestone, white, blocky.
73. Limestone, buff, blocky, contains several leaching impure zones, several horizontal partings.
74. Limestone, buff, blocky, contains several leaching impure zones, several horizontal partings.
75. Limestone, buff, blocky, contains several leaching impure zones, several horizontal partings.
76. Limestone, buff, blocky, contains several leaching impure zones, several horizontal partings.
77. Limestone, buff, blocky, contains solution holes and cavities.
78. Shale, green, lamy.
79. Limestone, light gray, blocky.
Saline Point Shale Member
30. Shale, green, blocky.
31. Shale, dark green, very platy.
32. Shaly limestone, white, chalky, blocky, lenticular.
33. Shale, dark green, very platy.
34. Shale, green, blocky.

New Limestone Member
35. Limestone, light grey, blocky.
36. Shale, black, very platy.
37. Limestone, light grey, blocky.

Legion Shale Member
38. Shale, green, platy.
40. Shale, grey-green, platy.

Sullyville Limestone Member
41. Limestone, light grey, blocky.

Poca Shale Formation
42. Shale, varicolored, usually blocky, lamy.
<table>
<thead>
<tr>
<th>Layer</th>
<th>Description</th>
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<tbody>
<tr>
<td>1.</td>
<td>Shale, weathered green.</td>
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<tr>
<td>2.</td>
<td>Shaly limestone, light grey, platy, impure.</td>
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<tr>
<td>3.</td>
<td>Shaly limestone, buff, platy, contains local shale zones.</td>
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<td>4.</td>
<td>Limestone, light grey, weathers brown, dense, blocky.</td>
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<tr>
<td>5.</td>
<td>Shale, dark grey, platy.</td>
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<tr>
<td>7.</td>
<td>Shale, black, platy.</td>
</tr>
<tr>
<td>8.</td>
<td>Limestone, grey, blocky, horizontal partings in center.</td>
</tr>
<tr>
<td>9.</td>
<td>Shaly limestone, grey-green, blocky.</td>
</tr>
<tr>
<td>10.</td>
<td>Shale, green, blocky.</td>
</tr>
<tr>
<td>11.</td>
<td>Shaly limestone, grey-green, blocky.</td>
</tr>
<tr>
<td>12.</td>
<td>Shale, light grey, blocky.</td>
</tr>
<tr>
<td>13.</td>
<td>Shale, maroon, blocky, limy.</td>
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<tr>
<td>14.</td>
<td>Shale, green, blocky.</td>
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<tr>
<td>15.</td>
<td>Lacy zone, light grey.</td>
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<tr>
<td>17.</td>
<td>Shale, green, blocky.</td>
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<tr>
<td>18.</td>
<td>Limestone, blocky, dense.</td>
</tr>
<tr>
<td>20.</td>
<td>Limestone, light grey, blocky, shaly, weathers platy.</td>
</tr>
</tbody>
</table>
30. Limestone, light grey, weathers tan, cellular and granular, blocky.
31. Secondary limestone, cellular, brown, water carrier.
32. Shale, green, blocky.
33. Shaly limestone, light grey, blocky.

Steam-Scale Formation
34. Shale, green, blocky.
35. Shale, grey, platy.
36. Shale, black, platy.
37. Limestone, light grey, blocky, two horizontal partings.
38. Shale, dark grey, blocky, lamy.
39. Lamy shale, grey mottled with green, has irregular partings.
40. Shale, green, blocky.
41. Shale, mottled, blocky.
42. Shale, grey-green, blocky.

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Frasnian Limestone Formation

83. Limestone, light grey, blocky, dense.
84. Shale, light green, platy.
85. Limestone, brown, water saturated.
86. Shale, buff, blocky, lumpy.
87. Limestone, brown, blocky, water saturated.

Famennian shale Member

88. Shale, light grey, blocky.
89. Largy shale, light green, varnished brown, blocky.
90. Shale, green, blocky, lumpy.
91. Shale, grey, blocky.
92. Fusiliferous zone, brown.
93. Shale, light green, platy.

Cretaceous Limestone Member

94. Shaly limestone, light green, blocky.
95. Limestone, light grey, blocky, has several horizontal partings, numerous fossils.