BUREAU of MATERIALS and RESEARCH

GEOTECHNICAL UNIT
GEOLOGY SECTION

GEOLOGY REPORT

Proj.No. 024-075 K-3325-01

From 4 Lane East of Manhattan East approx. 11.6 miles
to East of K-99 in Wamego

Sta.35+00 to Sta.652+00

Pottawatomie County

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BY

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October 1992

Kansas Department of Transportation

BUREAU OF MATERIALS AND RESEARCH
GEOLOGY SECTION

TOPEKA, KANSAS

October 18, 1992

Proj.No. 024-075 K-3325-01
End of 4 Lane in Manhattan East approx. 11.6 miles
to East of K-99 in Wamego
Sta.35+00 to Sta.652+00
Pottawatomie County

MEMORANDUM TO: MR. WARREN SICK, P.E.
CHIEF, BUREAU OF DESIGN

ATTENTION: MR. JAMES O. BREWER, P.E.
ENGINEERING MANAGER / STATE ROAD OFFICE

SUBJECT: GEOLOGY REPORT

Three copies of the above referenced report are attached to this memorandum.

Geology has been plotted on blueline prints of the cross-sections and plan-profiles and will need to be transferred to the originals by the consultants for the project. The Geology Section will need to review the finished cross-sections once this has been completed.

A mylar of the Geologic Section is also attached for the plans.

A Final design Geology Report will be submitted detailing subgrading areas when Field Check plans become available.

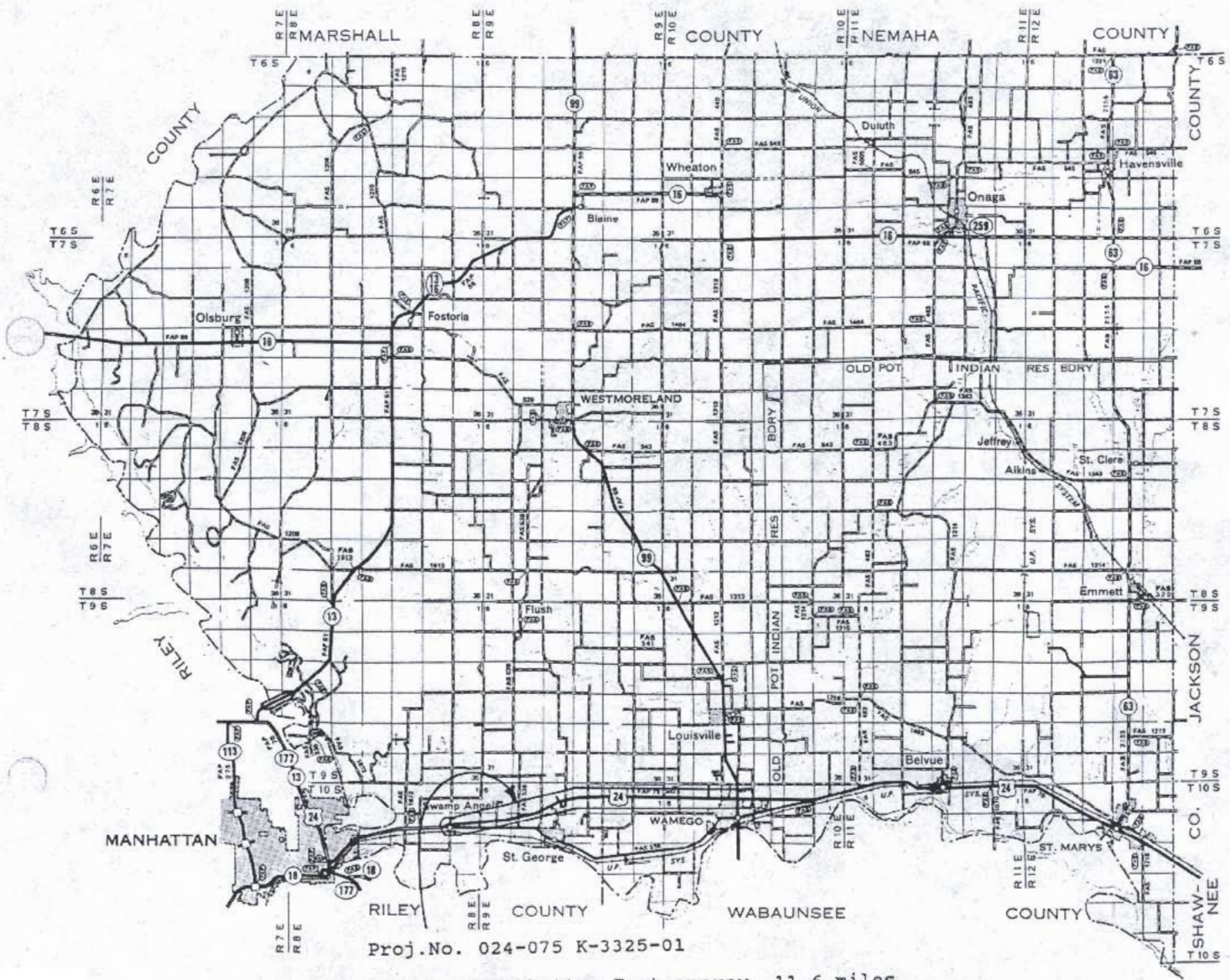
If any questions arise over the contents of this report or the information on the cross-sections and plan-profiles, donot hesitate to contact the Geology Section.

LON S. INGRAM, P.E.
CHIEF, BUREAU OF MATERIALS AND RESEARCH

G.N. CLARK, P.E.
GEOTECHNICAL ENGINEER

LSI:GNC:LAR:jbc

Attachments
cc: Project File (1)
L. S. Ingram (1)
G. N. Clark (1)
Bureau of Construction and Maintenance (3)
Bureau of Design, Road Section (3)
Regional Geology Offices (1)



Proj.No. 024-075 K-3325-01

From 4 Lane East of Manhattan East approx. 11.6 miles
to East of K-99 in Wamego

ROADS AND ROADWAY FEATURES

ROAD SYSTEM DESIGNATION

GENERAL HIGHWAY MAP
POTTAWATOMIE COUNTY
KANSAS

KANSAS DEPARTMENT OF TRANSPORTATION
BUREAU OF TRANSPORTATION PLANNING

FA SYSTEM REVISED TO APRIL 1, 1982

INTRODUCTION

The following Geology Report presents geological information obtained by the Kansas Department of Transportation through field study and is submitted for use in the design and construction of the above referenced project. It is to be used in reference to the formations that occur and with the potential engineering problems that may be affected by the geology of the project.

The report is divided into three sections for the purpose of grouping the information together and in the discussion of the different phases.

INDEX OF SECTIONS

SECTION II

GEOLOGY OF THE PROJECT

Soil mantle is on the project consists of deep glacial deposits up to 150 feet thick. These deposits are primarily reworked glacial till and sandy to silty clays. The color of these deposits varies from light tan to a deeper, reddish color. There are areas of scattered chert gravel and glacial erratics all along the project.

Due to the amount of the geologic column covered along the project, only those units that are shown on the cross-sections and plan-profile sheets will be described in the following section.

Janesville Shale Formation

West Branch Shale Member

The West Branch Shale is a thin shale approximately 3.0 feet thick. It is gray/green and calcareous in nature. It will only be encountered at the first cut section between Stations 344+50 and 348+50.

Falls City Limestone Formation

This limestone unit is generally pitted and soft due to solution weathering. Where overlain by shale, it drilled hard and may require some overbreakage in order to remove it. The total thickness is about 5.0 feet.

Onaga Shale Formation

Hawxby Shale Member

This shale is generally a tan, limy shale containing numerous zones of hard, shaly limestones. Only the upper few feet will be encountered during construction. Total thickness is approximately 38.0 feet.

Indian Cave Sandstone

This sandstone of unknown origin overlies the bedrock East of Sta.506+00. It is a tan, micaceous, iron stained sandstone that has hardened at the surface yet is quite soft with depth. Even though there are areas of tight cementation, it will generally be *common* excavation.

Stotler Limestone Formation

Dry Shale Member

The Dry Shale Member is a firm, green, limy shale between 28 and 38 feet thick.

Dover Limestone Member

The Dover Member consists of two limestones separated by a limy shale bed. The upper limestone was found to be between 1.5 and 4.0 feet thick weathering to large tan blocks. The lower limestone varies between 2 to 3 feet thick and weathers from small blocks to platy chips. The middle shale bed may either be hard and limy or soft and clayey depending on the degree of weathering. The maximum shale thickness is approximately 3.0 feet.

Pillsbury Shale Formation

The Pillsbury Shale, sometimes called the Langdon Shale, is a silty to sandy shale with scattered calcareous concretions. Total thickness is between 19 and 22 feet thick.

Zeandale Limestone Formation

Maple Hill Limestone Member

The Maple Hill Limestone is a thin, unit bedded, blue/gray limestone between 1.0 and 1.5 feet thick.

Wamego Shale Member

This shale member is a clayey to sandy shale approximately 18 to 20 feet thick. In the area of station 491+00 to 492+00, the unweathered, upper portion of the unit is exposed in a ditch left of centerline. This exposed material could easily be classified as shaly, micaceous sandstone.

Tarkio Limestone Member

The Tarkio Limestone is a heavily jointed limestone approximately 6.5 feet thick. This material will not be encountered during construction.

SECTION III

ENGINEERING GEOLOGY RECOMMENDATIONS

Backslope recommendations in this report are based on the performance of the same or similar material on nearby slopes or from past experience on other projects. Additional information on the performance of mantle material can be found in the Soil Survey report for this project.

The project is split into several cut and fill sections. Slope recommendations and excavation classifications are as follows.

CUT AND FILL SECTION
Sta.35+00 to Sta.344+50

Excavation

All excavation in this section will be in the soil mantle and all slopes should be placed on 3:1 or flatter.

Hydrology

Groundwater in this section does not appear to be a problem.

CUT AND FILL SECTION
Sta.344+50 to Sta.348+50

Excavation

We anticipate slopes and ditches to be constructed in the shales of the West Branch and Hawxby Members and the limestone of the Falls City Formation. The shale of the West Branch Member will be *common* and the shale of the Hawxby Member will be both *common* and *rock* excavation. The Falls City Limestone will be *rock* excavation. Slopes of 3:1 or flatter should be used in this section and it may also be necessary to overbreak the limestone and backfill with appropriate material. VMF values of 1.05 for the *common* shale, 1.10 for the *rock* shale and 1.25 for the limestone should be used.

MATERIAL NAME	TYPE	EXCAVATION	SLOPE	VMF
MANTLE		(C)	3:1	
WBRC1SHC	Sh	(C)	3:1	1.05
FLSC1LSR	Ls	(R)	*3:1	1.25
HXBY1SHC	Sh	(C)	3:1	1.05
HXBY1SHR	Sh	(R)	3:1	1.10

* Will require overbreakage and backfilling.

Hydrology

Groundwater does not appear to be a problem in this area.

CUT AND FILL SECTION
Sta.348+50 to Sta.415+50

Excavation

Slopes and ditches in this section will be constructed in the soil mantle. All excavation will be *common* and all slopes should be placed on 3:1 or flatter.

Hydrology

Groundwater will not be a problem in this section.

CUT AND FILL SECTION
Sta.415+50 to Sta.426+50

Excavation

Slopes and ditches in this section will be constructed in the soil mantle and the shale of the Dry Member. The shale will be both *common* and *rock* excavation and slopes should be placed on 3:1 or flatter. A VMF value of 1.05 and 1.10 for the *common* and *rock* shales should be used.

Hydrology

Groundwater does not appear to be a problem in this area.

CUT AND FILL SECTION
Sta.426+50 to Sta.487+50

Excavation

Slopes and ditches in this section will be constructed in the soil mantle. All excavation will be *common* and all slopes should be placed on 3:1 or flatter.

Hydrology

Again, groundwater will not be a problem in this area.

CUT AND FILL SECTION
Sta.487+50 to Sta.506+50

Excavation

Slopes and ditch construction in this area will involve soil mantle material, the Dry Shale Member, Dover Member and the shale of the Pillsbury Formation. The limestone beds of the Dover Member will be *rock* excavation and the shale will be *common*. The shale of the Dry Member will be *common* and the shale of the Pillsbury Formation will be both *common* and *rock* excavation. VMF values to be used should be 1.05 for the weathered shales, 1.10 for the *rock* shale and 1.25 for the limestones. Constructed slopes should be 3:1 or flatter. This slope may require overbreakage and backfilling of the Dover limestones. There may be minor amounts of the Indian Cave Sandstone overlying the other units on top of the hills. This material will be *common* excavation and should be placed on 3:1 with the other units. A VMF value of 1.05 should be used for this material.

MATERIAL NAME	TYPE	EXCAVATION	SLOPE	VMF
MANTLE		(C)	3:1	
INCV1SSC	Ss	(C)	3:1	1.05
DRYZ1SHC	Sh	(C)	3:1	1.05
OVR1LSR	Ls	(R)	*3:1	1.25
PLBR1SHC	Sh	(C)	3:1	1.05
PLBR1SHR	Sh	(R)	3:1	1.10

* Will require overbreakage and backfilling.

Hydrology

Groundwater is not a concern in this area.

CUT AND FILL SECTION
Sta.506+50 to Sta.529+50

Excavation

Slopes and ditches in this section will be constructed in the soil mantle. All excavation will be *common* and all slopes should be placed on 3:1 or flatter.

Hydrology

Groundwater should not be a problem in this area.

CUT AND FILL SECTION
Sta.529+50 to Sta.539+50

Excavation

Slopes and ditch construction in this area will involve soil mantle material and the Indian Cave Sandstone. The sandstone will be *common* excavation and should be laid back on a 3:1 or flatter slope. A VMF value of 1.05 should be used for this material.

MATERIAL NAME	TYPE	EXCAVATION	SLOPE	VMF
MANTLE		(C)	3:1	
INCV1SSC	Ss	(C)	3:1	1.05

Hydrology

Groundwater elevations fall far enough below grade to not be a problem in this area.

CUT AND FILL SECTION
Sta.539+50 to Sta.652+00

Excavation

All slopes and ditches from Sta.539+50 to the end of the project will be in the soil mantle. Slopes should be 3:1 or flatter.

Hydrology

Groundwater is deep enough below grade to not be a concern.

General Note

The sandy and silty nature of the soil mantle on the project causes the mantle slopes to rut and gulley badly during times of rain. We feel that the newly constructed slopes in the mantle should be seeded to help in alleviating this problem.

PLOTTING AND USE OF GEOLOGY

All geologic members and formations have been plotted on blueline copies of the plan-profile and cross-section sheets. This information will need to be transferred onto the original sheets.

These sheets indicate the boundaries between the soil mantle and the geologic units that occur on that particular cross-section. Also shown are the different types of material and the division between *common* and *rock* excavation within that unit.

ICES GEOLOGY ABBREVIATIONS

The following abbreviations were used on the cross-sections and further in this report to identify the various members on the project.

Soil Mantle	MANTLE
West Branch Shale	WBRCSH
Falls City Limestone	FLSCLS
Hawxby Shale	HXBYSH
Indian Cave Sandstone	INCVSS
Dry Shale	DRYZSH
Dover Limestone	DOVRLS
Pillsbury Shale	PLBRSH
Maple Hill Limestone	MPHLLS
Wamego Shale	WMGOSH
Tarkio Limestone	TRKOLS
Common Excavation	C
Rock Excavation	R

SUBGRADING

Subgrading of *rock* shale will be dealt with when final templates have been placed on the cross-sections.

HYDROLOGY

Underdrainage plans if necessary will be submitted with the Final Design Geology Report.

CONCLUSIONS

The recommendations contained in this report will provide all necessary information pertaining to the geo-engineering aspects of the project. If any questions should arise pertaining to these recommendations, do not hesitate to contact the geology section.