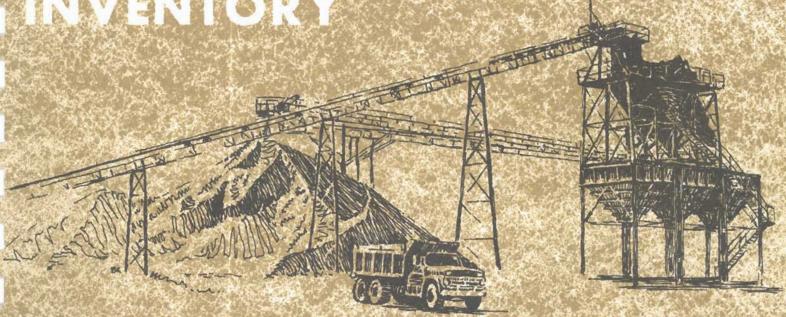
Engineenmadel George Section

REPORT NO. 26

CONSTRUCTION MATERIALS
INVENTORY



SHAWNEE COUNTY, KANSAS

STATE HIGHWAY COMMISSION OF KANSAS

State Highway Commission of Kansas Location and Design Concepts Department Planning and Development Department

OF SHAWNEE COUNTY, KANSAS

by

George E. Petersen, Geologist assisted by Jim Riordan and Maurice Cummings, Remote Sensing Section

Prepared in Cooperation with the U.S. Department of Transportation Federal Highway Administration

1974

Construction Materials Inventory Report No. 26

The WHY?

WHAT?

and HOW?

of This Report

This report was compiled for use as a guide when prospecting for construction material in Shawnee County.

Construction material includes all granular material, consolidated rock, and mineral filler suitable for use in highway construction.

Known open sites, prospective sites, both sampled and unsampled, and all geologic units considered to be a source of construction material are described and mapped.

Prospective sites are select geologic locations where construction materials may be found.

The diagram opposite shows how the MATERIALS INVENTORY SECTION may be used to evaluate and locate mapped sites.

The individually mapped sites certainly do not constitute the total construction material resources of the county. And, the data outlined in the diagram may be used for purposes other than the evaluation and location of these sites.

Beginning on Page 4 is a section explaining the geology of the county. This information (along with the maps, descriptions, and test data) provides the means of evaluating and locating additional construction material sources in the geologic units throughout Shawnee County.

TO LOCATE AND EVALUATE

A MAPPED SITE OF CONSTRUCTION MATERIAL IN SHAWNEE COUNTY

TURN TO THE MATERIAL INVENTORY SECTION

TABULATION OF CONSTRUCTION MATERIALS
Figure 7, Page 13

for material

BY TYPE
USE COLUMN 1

For Quality
Data
See Figure 14
Page 23

for material
BY INTENDED USE
USE COLUMN 2

for DESCRIPTION of material

Column 3 gives page of DE-SCRIPTION which includes engineering characteristics, approximate locations, and references to materials map. for AVAILABILITY of material

Column 4 gives relative amounts available, general location, and references to materials map.

MATERIALS MAP

SEE PINK SHEET, PAGE 25

Material source units, as well as all open sites, are mapped. Each site is referenced to an individual data form.

SITE DATA FORMS

OPEN SITES; SAMPLED

GREEN SHEET, PAGE 28

OPEN SITES; NOT SAMPLED

GREEN SHEET, PAGE 76

Each site data form includes a map for site location and provides information concerning landownership, material quality (if available), geologic age, and site accessibility.

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PREFACE

This report is one of a series compiled for the Highway Planning and Research Program, 'Materials Inventory by Photo Interpretation'. The program is a cooperative effort of the Federal Highway Administration and the State Highway Commission of Kansas, financed by highway planning and research funds. The objective of the project is to provide a statewide inventory of construction materials, on a county basis, to help meet the demands of present and future construction needs.

Publications issued by the State Geological Survey of Kansas, the U. S. Geological Survey, and U.S.D.A. Soil Conservation Service, concerning Shawnee and surrounding counties, provided the basic geologic information used in this investigation. Detailed geologic and soil data were obtained from soil surveys and centerline geologic profiles prepared for design of major highways in the county by the State Highway Commission.

Appreciation is extended to Mr. H. F. Foley, Shawnee County Engineer, and John Griffith, First Division Materials Engineer, for verbal information concerning construction materials discussed in this report, and to the project leader, R. R. Biege, Jr., P.E., Engineer of Location and Design Concepts, and A. H. Stallard, Chief of the Remote Sensing Section.

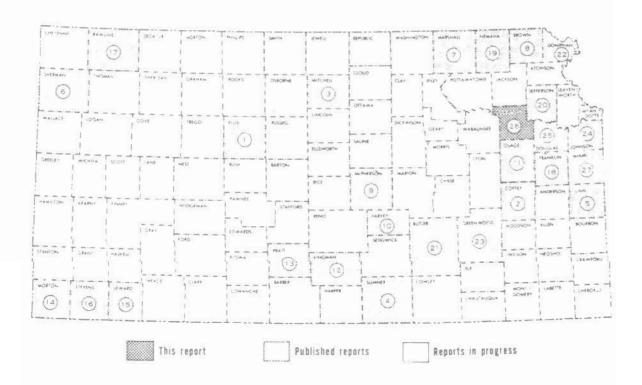


Fig. 1 Index map of Kansas showing the location of Shawnee County along with the report numbers and location of counties for which reports have been or are being completed.

ABSTRACT

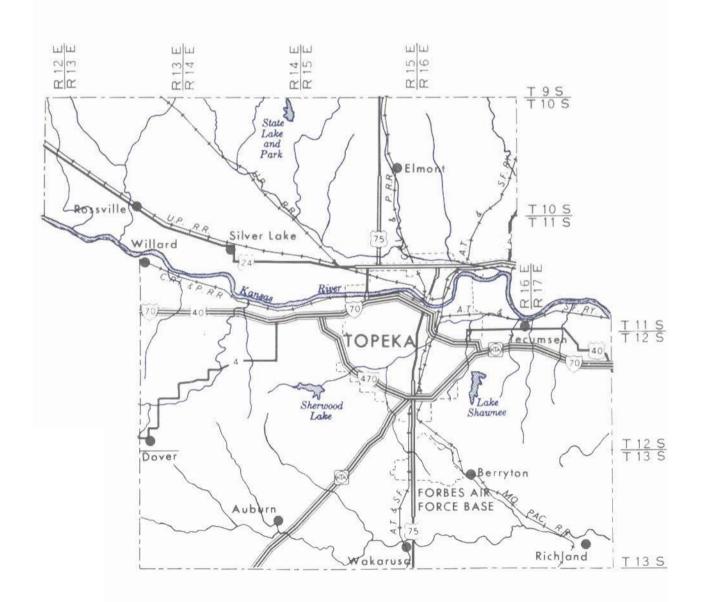
Shawnee County is located in northeastern Kansas, and lies in the Central Lowlands Physiographic Province. The topography is gently rolling in the uplands with steep slopes being prominent along major river valleys.

Sources of construction material in Shawnee County are limited to the thicker limestone beds of Pennsylvanian age, siliceous sand and gravel from the Kansas River valley, and a very limited amount of sand and gravel derived from Glacial Drift.

Sedimentary rocks of the Shawnee and Wabaunsee Groups of the late Pennsylvanian age are exposed in the eastern half of Shawnee County while sedimentary rocks of the Admire and Council Grove Groups of early Permian age cropout in western Shawnee County. Limestones of economic value as construction material are the Plattsmouth, Oread, Deer Creek, and Topeka Limestones of the Shawnee Group, and the Burlingame, Wakarusa, and Tarkio Limestones of the Wabaunsee Group. The quality and quantity of these units vary from one area of the county to another and quality tests should be run before use from a new location. Scattered deposits of chert gravel of pre-Kansan age occur in the area but are too small to be of economic value as construction material. River sands are being produced from the Kansas River; however, additional fines of minus 200 mesh size must be blended to meet specifications for concrete and bituminous aggregate.

Excellent water supplies of high quality are available from the Kansas River alluvium; however, the quality and quantity decrease in the Wakarusa River valley and its tributaries and only domestic water supplies are available in upland areas.

GENERAL INFORMATION SECTION



Scale in miles

Figure 2. Drainage and major transportation facilities in Shawnee County.

FACTS ABOUT SHAWNEE COUNTY

Shawnee County has an area of 545 square miles and a population of 171,999 as of January 1, 1972, according to the Kansas State Board of Agriculture. It lies in the Central Lowlands Physiographic Province. The elevations above sea level vary from 1,260 feet in the southwestern part of the county to 835 feet where the Kansas River leaves the county on the east.

A primary road system connects all major communities, and a well developed secondary road system provides access to all small communities. Figure 2 illustrates major drainage and transportation facilities in the county.

METHODS OF INVESTIGATION

Investigation and preparation of this report consisted of three phases: (1) research and review of available information, (2) photo interpretation, and (3) field reconnaissance.

During phase one, relevant information concerning geology, soils, and construction materials of the county was reviewed and the general geology determined. Quality-test results of samples taken in Shawnee County were then correlated with the various geologic units and unconsolidated deposits.

Phase two consisted of study and interpretation of aerial photographs taken by the Kansas Highway Commission at a scale of one inch equals 2000 feet. Figure 3 illustrates aerial photographic coverage of Shawnee County. Geologic source beds and all open materials sites were mapped and classified on aerial photographs. These materials sites were then correlated with the geology of the county.

Phase three was conducted after initial study of aerial photographs. A field reconnaissance was conducted by the author to examine construction materials, to verify doubtful mapping situations, and to acquire supplemental geologic information. Geologic classifications of open sites were confirmed, and prospective sites were observed.

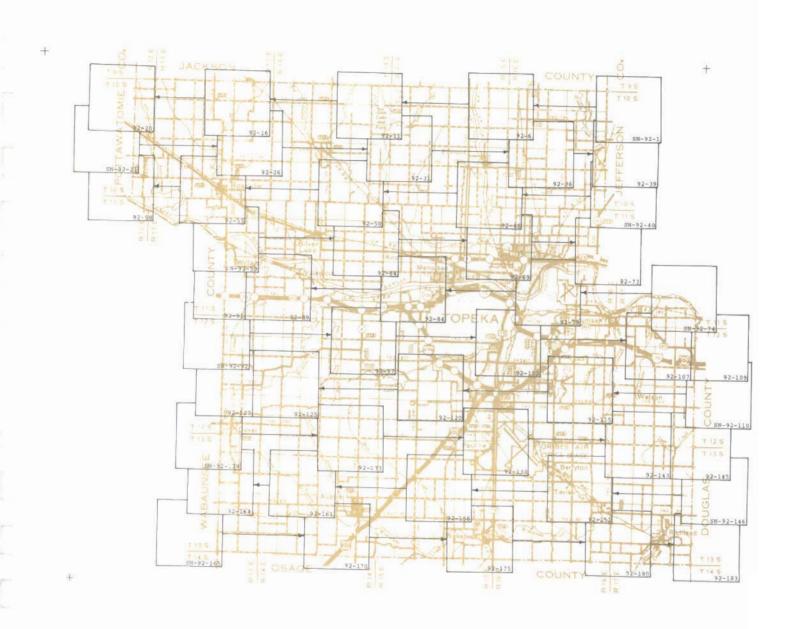
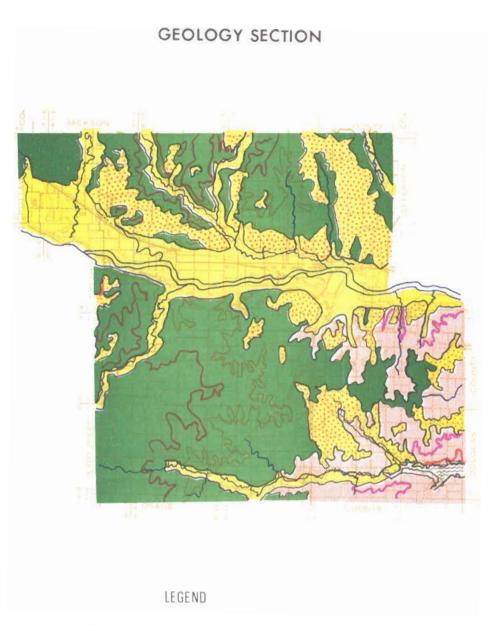
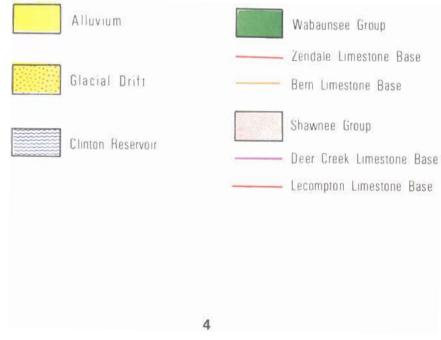


Figure 3. AERIAL PHOTOGRAPHIC COVERAGE MAP for Shawnee County. The numbers refer to photographs taken by the Photogrammetry Section, State Highway Commission of Kansas, on 4-10-69 at a scale of 1"=2000. Aerial photographs are on file in the Photogrammetry Laboratory, State Office Building, Topeka, Kansas.





GENERAL GEOLOGY

GEOLOGY is the basis for this materials inventory. Knowledge of the geology makes it possible to: (1) ascertain the general properties of the material source, (2) identify and classify each source according to current geologic nomenclature, and (3) establish a uniform system of material-source-bed classification. By knowing the geologic age, origin, landform, and quality information of the source units, one can derive general information for untested materials sites and prospective locations.

It is important to note that the quality of material from a given source may vary from one location to another, especially in unconsolidated deposits.

This discussion is based primarily on information obtained from The United States Geological Survey Bulletin 1215, 'Geology of Shawnee County, Kansas,' by William D. Johnson, W. L. Adkison, and H. C. Wagner. The geologic timetable, figure 4, shows in graphic form the major time periods and the approximate duration of each. Figure 5 illustrates the surface geology and stratigraphic position of each material source unit in Shawnee County.

Unexposed sedimentary rocks range in age from late Cambrian to late Pennsylvanian and vary in thickness from 2700 feet in the eastern part of the county to 3300 feet in the western part. Marine deposits of late Pennsylvanian and early Permian age are the oldest rocks exposed in Shawnee County. Limestones of the Shawnee and Wabaunsee Groups of late Pennsylvanian age are the most abundant and important materials source units in the county.

The Pleistocene Epoch of the Quaternary Period was a period of repeating glacial and interglacial cycles. These glacial activities reached their southern most terminus along the Wakarusa River in southeastern Shawnee County.

The Nebraskan, Kansan, Illinoisan, and Wisconsinan ages represent major glacial advances of which only the Kansan actually reached into Shawnee County. The Aftonian, Yarmouthian and Sangamonian Stages are periods of major glacial retreats. Glacial drift, glaciolacustrine and glaciofluvial deposits were laid down during this time. Alluvium of the Kansas and Wakarusa rivers in Shawnee County is composed of silt, sand, and gravel of late Wisconsinan and Recent age. Other unconsolidated sand and gravel deposits of Quaternary age are represented by the Menoken, Buck Creek, and Newman terraces; however, because of the difficulties in identification, the Menoken and a large portion of the Buck Creek terrace, has not been mapped. These are of limited value as a source of construction material. The Newman has been mapped where recognizable and could become a potential future source of sand and gravel.

ERAS	PERIODS	ESTIMATED LENGTH IN YEARS	TYPE OF ROCK IN KANSAS	PRINCIPAL MINERAL RESOURCES
2010	QUATERNARY (PLEISTOCENE)	1,000,000	Glacial drift; river silt, sand, and gravel; dune sand; wind-blown silt (loess); volcanic ash.	Sand and gravel; volcanic ash; agricultural soils; water.
CENOZOIC	TERTIARY	59,000,000	Silt, sand, and gravel; fresh-water limestone; volcanic ash; bento- nite; diatomaceous marl; opaline sand- stone.	Sand and gravel; volcanic ash; diatomaceous marl; water.
MESOZOIC	CRETACEOUS	70,000.000	Chalky shale, dark shale, vari-colored clay, sandstone, con-glomerate; outcropping igneous rock.	Concrete and bituminous ag- gregate, light type sur- facing, shoulder and sub- grade material, riprap, and building stone; ceramic ma- terials; water.
-	JURASSIC	25,000,000	Sandstone and shale,	
	TRIASSIC	30,000,000	chiefly subsurface.	
	PERMIAN SANS	25,000,000	Limestone, shale, evap- orites (salt, gypsum, anhydrite), red sand- stone and siltstone, chert, and some dolo- mite.	Concrete and bituminous aggregate, light type surfacing, shoulder and subgrade material, riprap, and building stone; natural gas, salt, gypsum, water.
2010	PENNSYLVANIAN	25,000,000	Alternating marine and non-marine shale: lime-stone, sandstone, coal, and chert.	Concrete and bituminous aggregate, light type surfacing, shoulder and subgrade material, riprap, and limestone and shale for cement; ceramic materials; oil, coal, gas, and water.
PALEOZO	MISSISSIPPIAN	30.000.000	Mostly limestone, pre- dominantly cherty.	Chat and other construction materials; oil, zinc, lead, and gas.
	DEVONIAN	55,000,000	Subsurface only. Lime- stone and black shale.	011.
	SILURIAN	40,000,000	Subsurface only. Lime- stone.	Oil.
	ORDOVICIAN	80,000,000	Subsurface only. Lime- stone. dolomite, sand- stone, and shale.	Oil, gas, and water.
	CAMBRIAN	80,000,000	Subsurface only. Dolo- mite and sandstone.	Oil.
CAMBRIAN	(Including PROTEROZOIC and ARCHEOZOIC ERAS)	1,600,000,000	Subsurface only. Gran- ite, other igneous rocks, and metamorphic rocks.	Oil and gas.

Figure 4. Geologic timetable

System	Series	Stage	Graphic Legend	Thickness	Type of Deposit	Map	Grand Provide		T			
.,		Wisconsinan and		0-74'	Alluvium	Qu1	Clay, silt, and sand, gradic coarse gravel in river and		. ,	Fine and	Construction Material I coarse aggregate, light type	
	8	Mecent			Terrace	-	Clay, silt, and sand, gradit	a downward to		eurfacin Construc	tion aggregate, light type	
Queternary	Pleistocen			0-90'	Deposit (Nevman) Terrace	Qn .	Clay, wilt, and sand, grading			surfacin	8.	
ď	Z.	Illinoisan	1:/:/:/:/:/	0-901	Deposit (Buck Creek)	qbe	coarse gravel in river and	stream valley.		construc	tion aggregate , light type	
		Kanoae	1: [: [:] :]	0-85*	Glacial Drift	QGA	Predominately clay, silt, as locally contains zones of and and boulders.	d sandy clay,	tobble	Light ty	pe surfacing building stone. '	
System	Series	Group	Oraphic Legend		Format i	ons an	d Members	Map Symbol	Thickn	ness	General Description	Construction Materials
			25	Capesville Shale			Hamlin Shale		30 - 4	40		
							Five Point Lizestone		4 - 8	В		
- sa	eries	9					West Branch Shale		26 - 4	17		
Fermian System or Fermian Series	Permian	daire Gro		Palls City 1	Limestone				6 - 17	7		
Je.	Lower	. 4	Ø	Onaga Shale			Havxby Shale		12 = 2	_		
				Vinga Scale			Aspinvall Limestone Towle Shale		6 - 17			
							Brownville Limestone					
							Pony Creek Shale Gray Horse Linestone		1 - 3 5 - 1 0 - 4	1.1		
				Wood Siding			Plumb Shale		7 = 14			
			71 117				Nebraska City Limestone		0 - 3			7 7 7 7 7
	-			Root Shale			French Creck Stale Jin Creck Linestone		19 = 29			
			au in				Friedrich Shale		12 - 30	10		
				Stotler Lime	etone .		Grandhaven Limestone Dry Shwle		0 - 16			
				Pillsbury Sh	.).		Dover Limestone		2 - 3	+		
				1111000					. 40			
				Zeandale Lin	estone		Maple Hill Limestone Wanego Shale	ř:	12		Aght-olive-gray, a very-finely-crystalline,	
							Tarkio Limestone		2 - 5	- 6	olightly argillacous, thin-to medius-bedded, hard and commect, weathers light-olive-gray o yellowish. Forms wedge-shaped slabs.	Light type surfacing and base course aggregate. Shoulder material, concrete and bituminous aggregate and riprap.
				Willard State					40 = 47	7		
		Though a see					Elmont Limestone		3 - 5			
		Mobile		Emporia Lines	stone		Harveyville Shale Reading Limestone		10 - 15	-		
				Auburn Shale					25 = 45			
				Ξ			Wakarusa Limestone		3-5	;	No limestone beds separated by claystone limestone, light-olive-gray, finely crystalline very-thin-to medium-bedded, hard and compact weathers to platy fragments.	Concrete and bituminous construction aggregate, light type surfacing and ribrar.
							Soldier Creck Shale Burlingame Limestone	Po	2 = 15	-	light-gray, finely cyrstalline hard compact sparsely fossiliferous limestone with a bre-ciate spearance in the upper part.	Concrete and bituminous construction aggregate, light type surfacing and riprap.
			- d0 - G0				Silver Lake Shale		19 - 26	6		
							Rulo Limestone Cedar Vale Shale		30 = 35			
							Happy Hollov Limestone		0 = 1			
			9				White Cloud Shale		80 = 105	5		
ten	Series						Utopia Limestone		5 - 7			
Wenian Sys	2620		11111	Howard Lines	tone		Winzeler Shale Church Limestone Aarde Shale		1 - 5			
Pennsyl	Upper Pennsylva			Severy Stale	*				30 - 55			
	5						0.10					
							Coal Creek Limestone Holt Shale DuBois Limestone		0 - 4			
				Topeka Lines	tone		Turner Creek Shale Sheldon Linestone	R	2 - 6			
							Jones Point Shale Curzon Limestone		2 - 6	Pr cl li br	redominately limestone but has some thin beds of laystone near the middle. Limestone is dense, ight-gray drystalline that weathers to a yellow rown.	Light type surfacing material, riprap (marginal for bituminous and .on rete construction).
							Iowa Point Shale Hartford Linestone		0 - 2	Me 67 be	rdium-light gray and light-olive gray, very fine raiced to very-finely-crystalline, hard, and thi edded to massive, weathers to small moderate- ellowish-brown subangular or lens-shaped blocks.	
				Calhoun Stal	e				30 - 60			
							Ervine Creek Linestone		13 - 18	EA 5.0	ight-olive-gray to olive-gray or medium-light-gray or medium-gray, bease to very-finely-nystalline has to section was teels. Weathers to a light-olive and to sucherst yellowish brown.	y Light type surfacing material.
				Deer Creek L	imestone		Larsh & Burroak Shale Rock Bluff Limestone	Fit	13 - 18 1 - 3	67 67	man so megium wavey beds. Meathers to a light-oney to moderate yellowish brown.	1746
							Oskaloosa Shale Ozawkie Limestone		6 - 9	- Ye	ight-gray to olive-gray and brownish-gray to pale ellowish-brown, very-finely-crystalline to very rained, compact, and thin-bedded to massive. rathers to dark-yellowish-orange.	fine Bituminous and concrete construction, li type surfacing and riprap.
			E to the state of				Stull Shale		20 = 35		and a second and a second different	
				Kamuka Shali			Clay Creek Limestone		3 - 4			
							Jackson Park Shale	1	44 - 47			
		,					Kereford Limestone Heumnder Shale		5 - 7			
				Oread Limes	tore		Plattsmouth Limestone	Io	12 - 1	16		
				waread Limest	e 146		Reebner Shale Leavenworth Linestone Snyderville Shale		5 - 6 1 - 2 6			
							Toronto Limestone		10			

Figure 5. Generalized geologic column of the surface geology in Shawnee County.

	,	Division	s of the Quaternary Period	
Period	Epoch	Age	Estimated length of age duration in years	Estimated time in years
		Recent		10,000
		Wisconsinan Glacial	45,000	55,000
		Sangamonian Interglacial	135,000	190,000
2	e C	Illinoisan Glacial	100,000	290,000
Quaternary	Pleistocen	Yarmouthian Interglacial	310,000	600,000
0	٩	Kansan Glacial	100,000	700,000
		Aftonian Interglacial	200,000	900,000
		Nebraskan Glacial	100,000	1,000,000

Figure 6. Geologic Timetable of the Quaternary Period.

GEO-ENGINEERING

This section provides a general appraisal of the geo-engineering problems that may be encountered in Shawnee County during highway construction. Potential ground-water problems and the quality of water available for concrete are briefly reviewed along with engineering soil types present in the area. Detailed field investigations may be necessary to ascertain the severity of specific problems and to make recommendations in design and construction procedures.

Because of the diversification of Shawnee County geology, the nature of geoengineering problems varies considerably from one part of the county to another.

The area north of the Kansas River flood plain in Shawnee County is characterized by alluvial filled valleys, interbedded limestone and shale beds of moderate thickness and glacial drift of varying thickness capping the higher elevations. Moderate cuts

and fills will be required for construction in northern Shawnee County. Most cuts will be common excavation except in valley walls along major drainage channels where limestone beds will be encountered. In areas where cuts may encounter the White Cloud Shale, excess swelling may occur due to the high montmorillonite content. Large quartzite boulders may be encountered in the area along with isolated sand and gravel lenses in the glacial deposits. Ground water may be encountered along the base of many of the limestones in this area as well as in any lenses of sand and gravel which might occur in the glacial deposits. Most of the soils in this area are derived from glacial drift and are composed of silty clay, clay loam, and in severe cases clay. Most soil material is an A-6 or A-7 type of soil according to AASHO classification. Water is limited in both quality and quantity in this area although there is usually sufficient water available for domestic and stock usage.

The Kansas River valley is composed of relatively flat terrace deposits of Pleistocene age. The surface material is generally composed of clay, silt, and fine sand with granular material being prominent in the lower part of the alluvium. All excavation will be in common material and will generally encounter soils of A-6 or A-7 according to A.A.S.H.O. classification; however, better quality soil may be encountered in many areas. Soils of high organic content may be found in many old meander scars. Water problems will be minimal unless very deep excavation dips below the water table in the alluvium; however, poorly drained soils and perched water may be encountered in the Newman Terrace.

Southeastern Shawnee County (the area east of highway 75 and south of the Kansas River) is characterized by alluvium filled stream valleys, moderately thick limestone and shale sequences, and glacial deposits which cap much of the higher elevations near the Wakarusa River at Richland. Most cuts will be common excavation except in valley walls along major drainage channels where bedrock may be encountered. Large quarzite boulders and sand and gravel lenses may be encountered in the glacial deposits. Ground water may be encountered in the glacial deposits and along the base of many limestones, particularly the Hartford Member of the Topeka Formation. Soils will be predominantly A-6 or A-7 as in other parts of the county. Water supplies are limited, with larger supplies being found in the alluvium of the stream valleys.

Southwestern Shawnee County includes the area west of highway 75 and south of the Kansas River. The topography is gently rolling due to the thick shale, thin limestone sequence found in this area. Limited amounts of glacial deposits are found in the northeastern and northern edges of the area. Cuts and excavations will be in common material except where limestone units and unweathered shale are encountered. In areas where the White Cloud Shale is encountered, severe swelling of the shale can be expected upon contact with water. Where cuts and excavations intersect the Calhoun Shale, slope stability problems may be anticipated. Soils will generally be classified as A-6 or A-7 by A.A.S.H.O. standards, although other soil types may be found in the area. Water is limited in both quality and quantity with most supplies adequate for domestic use only. Minor water problems may be encountered in cut sections at the base of limestones.

Various coal beds including the Nodaway and Elmo coal beds have been mined county wide. Old drifts, shafts, strip pits, and unconsolidated mine tailings may be encountered in many areas of the county. There are no known coal mining operations now in existence in Shawnee County.

MATERIALS INVENTORY SECTION

GENERAL INFORMATION

Pennsylvanian limestones make up a major part of the construction materials resources in Shawnee County. Siliceous sand and gravel could be produced from Pleistocene terraces and the Kansas River floodplain, but it is much more economical to produce such material from the Kansas River. Sand and gravel has also been produced from glaciofluvial deposits; however, the material is poorly sorted and quantities limited.

Construction material types, their uses, and availability are tabulated in figure 7. Test results from a limited amount of sampling and testing are presented in figure 14 (page 23).

MATERIALS INVENTORY SECTION

GENERAL INFORM	ATION	•		ě		Ŧ	*	*	ė	*	*:	. 11
TABULATION OF CO	ONSTRUCTION MATERIALS	0.0	1.50	e.	2	*	*	*	*:	**	*)	. 13
DESCRIPTION OF C	ONSTRUCTION MATERIALS	280				,				e.		. 14
Limestone .	9 9 9 8 8 8 8 8 10 W			l.					25		745	. 14
Lecom	pton Limestone Formation .	9	3.00	1.00	,	÷	*	29				
	Spring Branch Limestone Mem	ber		9					(2)	(2)	127.0	. 14
	Beil Limestone Member			*		*	*:	*		(*)		. 15
Deer C	reek Limestone Formation .	- 3		×	v	v.			1120	(3)	2	. 15
	Ozawkie Limestone Member	99							2002			. 15
	Ervine Creek Limestone Memb	er					¥0		500	140	4	. 15
Topek	a Limestone Formation					-	29	120	(2)			. 16
100.00	Hartford Limestone Member											10
	Curzon Limestone Member .				- 63		T0 43	0.57	180			17
Rern I	imestone Formation											47
Derii L	Burlingame Limestone Member											17
	THE RESERVE OF THE PERSON NAMED IN COLUMN TWO IS NOT THE OWNER.			25								
	Wakarusa Limestone Member				*	*						
Zeand	ale Limestone Formation		*	*/	*	52	100	(4)	<u>_</u>	22	59	. 18
	Tarkio Limestone Member .	*	.*;	٠	**	• 1		(4)	×	i,	9	. 19
Sand and Grav	/el	×		¥8	20		848	à	:4	ů.	·z	. 19
Glacia	I Drift	- 9	-	20	020							. 19
	Terrace Deposits											
	Quaternary Alluvium	*	£		(4)	(4)3	(4)		2	Ğ.	¥	. 21
TABULATION OF T	EST RESULTS		20	140	193	4	- 52	N	12	*	*	. 23
COUNTY MATERIA	LS MAP (Index, Pink Sheet) .		1.5	nan	(2)	74	100	8	0.00	*	š	. 25
SITE DATE FORMS Open material	Is sites; sampled											28
	Is sites; not sampled		100	5,73	22			1.5		*		76
Opon matoria	,				. 9		(#		*			. 10

TYPE material and geologic source	USE	page	AVAILABILITY
LIMESTONE Spring Branch Limestone Member	Light type surfacing material		Very limited source in southeast part of the county. Plate VI.
Beil Limestone Member	Light type surfacing material.		Very limited source in southeast part of the county. Plate VI.
Ozawkie Limestone Member	Concrete and Bituminous aggregate. Light type surfacing, riprap.		Moderate source in eastern central Shawnee County. Plates IV and VI.
Ervine Creek Limestone Member	Concrete and Bituminous aggregate. Light type surfacing, riprap.		Moderate source in east central Shawnee County. Plates IV and VI.
Hartford Limestone Member	Light type surfacing, riprap.		Moderate source in eastern part of the county. Plates II, IV and VI.
Curzon Limestone Member	Light type surfacing, riprap.		Moderate source in eastern part of the county. Plates II, IV and VI.
Burlingame Limestone Member	Concrete and Bituminous aggregate. Light type surfacing, riprap.		Moderate source in northern and western parts of the county. Plates I, II, III and V.
Wakarusa Limestone Member	Concrete and Bituminous aggregate. Light type surfacing, riprap.		Moderate source in northern and western parts of the county. Plates I, II, III and V.
Tarkio Limestone Member	Concrete and Bituminous aggregate. Light type surfacing, riprap.		Limited source in western half of the county. Plates I, III and V.
SILICEOUS SAND AND GRAVEL			
Quaternary Glacial Drift	Light type surfacing. Building stone.		Very limited source. Plates I, II, III, IV and VI.
Terrace Deposits	Construction aggregate. Light type surfacing.		Moderate source in stream and river valleys. All plates.
Quaternary Alluvium	Fine and Coarse agaregate. Light type surfacing.		Good source in Kansas River Valley. Flates I, II, III and IV.

Figure 7. Tabulation of the construction materials types and their availability in Shawnee County.

DESCRIPTION OF CONSTRUCTION MATERIAL

Limestone

Lecompton Limestone Formation

The Lecompton Limestone Formation is composed of four limestone and three shale members which are, in ascending order, the Spring Branch Limestone, Doniphan Shale, Big Springs Limestone, Queen Hill Shale, Beil Limestone, King Hill Shale, and Avoca Limestone.

The Lecompton Limestone outcrops in the southeastern part of Shawnee County along the Wakarusa River, in the northeastern part along Deer Creek, and on the south side of the Kansas River.

The formation ranges in thickness from about 40 feet in the Kansas River valley to about 46 feet in the Wakarusa River valley.

Due to weathering characteristics of the upper beds only the Spring Branch and the Beil Members are considered potential sources of construction materials.

Spring Branch Limestone Member

The Spring Branch Limestone is made up of two units, a lower ledge-forming limestone ranging in thickness from five and one half - nine feet and an upper less resistant unit of interbedded limestone, claystone, and siltstone varying from two - seven feet thick. The limestone is a dark gray, finely-crystalline limestone that weathers yellow brownish in color and into rather massive ledges.

The Spring Branch has been quarried on a very limited basis in eastern Kansas and not at all in Shawnee County. No quality test data are available for this unit in Shawnee County; however, in most cases it will not meet specifications for concrete and bituminous aggregate due to the high clay content, but would be suitable for light type surfacing material. The Spring Branch is exposed in the southeastern part of the county and has been mapped as a part of The Lecompton Formation in this report (plate VI).

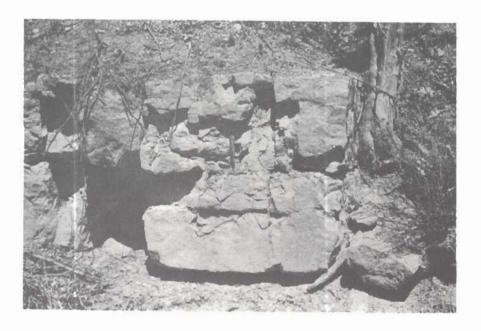


Figure 8. Exposure of the Spring Branch Limestone Member in the NE ¼ sec. 33, T.13 S. R. 17E.

Beil Limestone Member

The Beil Limestone Member is a light-gray, wavy-bedded limestone with interbedded shale. It weathers to a yellowish brown to light-olive-gray, and ranges from eight - ten feet in thickness in Shawnee County.

The Beil has not been produced in the county and only on a limited basis elsewhere in eastern Kansas. No quality test results are available for the Beil in Shawnee County; however, the soft shaly nature of the rock limits its use to light type surfacing material. In areas where the Beil has been produced and tested, it fails to meet specifications for concrete and bituminous construction aggregate. The Beil is exposed in southeast Shawnee County and has been mapped as a part of the Lecompton Formation in this report (plate VI).

Deer Creek Limestone Formation

The Deer Creek Limestone Formation is composed of five members. They are, in ascending order, the Ozawkie Limestone, Oskaloosa Shale, Rock Bluff Limestone, Larsh and Burroak Shale, and the Ervine Creek Limestone Members. The full thickness of the Deer Creek Formation varies from 32-43 feet in Shawnee County and is mapped as one unit. However, only two limestone members, the Ozawkie and the Ervine Creek are considered to be source units of construction materials (plates IV & VI).

Ozawkie Limestone Member

The Ozawkie Limestone Member is a six - ten foot thick, light-gray limestone that weathers to a yellow-brown color. In most localities in Shawnee County, the member is divided into two limestone units by a thin shale parting.

The Ozawkie Limestone has been produced for riprap on dams and embankments associated with Pamona Dam and Reservoir in Osage County, and Perry Dam and Reservoir in Jefferson County. Test data available for the Ozawkie in Shawnee, Osage, and Jefferson Counties indicate the limestone is variable and wear and absorption qualities are marginal; however, test results on rock produced in some areas in Shawnee County show the material will meet specifications for bituminous and concrete construction as well as light type surfacing and riprap. The Ozawkie has been mapped as a member of the Deer Creek Formation in this report (plates IV & VI).

Ervine Creek Limestone Member

The Ervine Creek Limestone Member is a light-gray to white, fine-grained limestone containing scattered chert nodules. It varies in thickness from 13-18 feet. A fresh surface appears somewhat massive but it weathers into thin, wavy beds that are light brown in color. Small shale seams prominent in most weathered exposures lower the quality of the limestone.

The Ervine Creek has been quarried extensively in Jefferson County, in Shawnee County east of Topeka, and in other counties on a limited basis. Quality data on samples from these quarries indicate that most sources were good to marginal for concrete and bituminous construction; however, material quality is erratic due to weathering and changes

in lithology. Material produced from the Ervine Creek is acceptable for light type surfacing. The Ervine Creek has been mapped as a part of the Deer Creek Formation for this report (plates IV & VI).

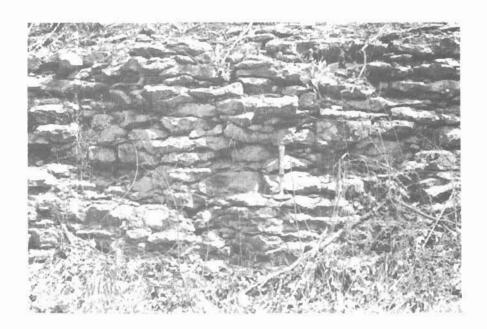


Figure 7. Exposure of the Ervine Creek Limestone Member located in the west side of sec. 33, T. 11S, R. 17E.

Topeka Limestone Formation

The Topeka Limestone Formation is composed of nine members. They are in ascending order: the Hartford Limestone, the Iowa Point Shale, the Curzon Limestone, the Jones Point Shale, the Sheldon Limestone, the Turner Creek Shale, the Du Bois Limestone, the Holt Shale, and the Coal Creek Limestone. The Topeka Limestone varies in thickness from ten feet in the Wakarusa River valley to 33 feet just east of Topeka.

The main sources of construction material are the Hartford and Curzon Limestone Members of the Topeka Formation which are shown on plates II, IV and VI.

Hartford Limestone Member.

The Hartford Limestone is a light-gray, fine-grained, thin-bedded to massive unit that weathers to a yellowish-brown color. It has a thickness of three - eight feet and a shale bed that varies in thickness near the base of the unit. The Hartford has been quarried on a limited basis in Shawnee County and no quality test results are available for this area; however, test results on samples obtained in Osage County indicate that the unit would be acceptable for light type surfacing and riprap, but marginal for concrete and bituminous construction aggregate. The Topeka Formation of which the Hartford is a member, is shown on plates II, IV & VI.

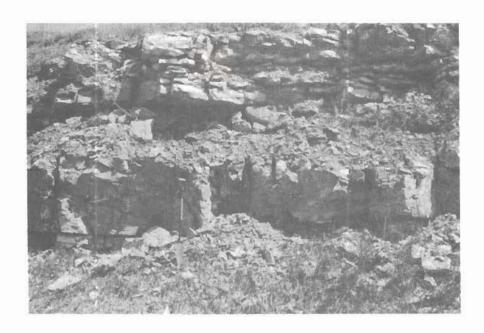


Figure 10. Hartford and Curzon Limestone exposures in the N.E. corner, SE ¼ sec. 10, T. 12S., R. 17E.

Curzon Limestone Member

The Curzon Limestone is a dense, light-gray, crystalline limestone that weathers to a yellow brown, and varies in thickness from four and one half - ten and one half feet with thin shale beds occurring near the middle of the unit. Quality test data are not available for the Curzon in Shawnee County but tests completed on samples obtained in Jefferson County indicate that the material is marginal for bituminous and concrete construction but acceptable for light type surfacing material and riprap. The Topeka Formation of which the Curzon is a member, is shown on plates II, IV, & VI.

Bern Limestone Formation

The Bern Limestone ranges in thickness from 12-24 feet and is comprised of the Burlingame Limestone, Soldier Creek Shale, and the Wakarusa Limestone Members. The Burlingame is the primary material source of construction material; however, the Wakarusa Member is sometimes quarried in conjunction with it. The outcrop pattern of the Bern Formation is shown on plates I, II, III and V.

Burlingame Limestone Member

The Burlingame is a light-gray limestone that weathers to a dark-brown color. It ranges in thickness from 1.5 to 12 feet and varies from a brecciated limestone north of the Kansas River to a dense crystalline rock south of the river. Quality tests of the Burlingame in Shawnee County show that in most areas the material is acceptable for concrete and bituminous aggregate as well as light type surfacing and riprap. The limestone is quarried extensively in north central Shawnee County where up to 70 feet of overburden has been removed.

Quality tests run on the Burlingame in Jackson, Jefferson, and Osage Counties

show the material to be marginal and that the unit is much thinner. The Burlingame is the basal member of the Bern Formation which is shown on plates I, II, III & V.



Figure 11. The Burlingame Limestone Member exposed in a roadcut in the SE ¼ sec. 36, T. 11S., R. 14E.

Wakarusa Limestone Member

The Wakarusa Limestone is a light-gray crystalline, dense limestone that weathers to a yellow brown, varies from three to four and one third feet in thickness, and is usually divided into two separate beds by a thin shale seam.

Quality test results on samples taken from the Wakarusa in Shawnee County show that it will generally meet specifications for concrete and bituminous construction aggregate as well as light type surfacing and riprap; however, due to its limited thickness, the Wakarusa is usually only produced in conjunction with the Burlingame Limestone. The Bern Formation of which the Wakarusa is the uppermost member, is shown on plates I, II, III and V.

Zeandale Limestone Formation

The Zeandale Limestone is composed of the Tarkio Limestone which is the basal member of the formation, Wamego Shale, and the Maple Hill Limestone which is the uppermost unit. It varies in thickness from 15-18 feet; however, the Tarkio Limestone is the only member of the Zeandale Formation that is quarried in Shawnee County. The Zeandale Formation is shown on plates I, II, III, and V.

Tarkio Limestone Member

The Tarkio is a light-gray, finely-cyrstalline limestone that weathers to a dark brown color. It forms a prominent ledge with widely spaced vertical joints and contains numerous small fossils called fusilinids which resemble wheat grains. The limestone is highly variable in both quality and quantity throughout eastern Kansas. In Shawnee County its thickness varying from one and eight tenths feet in the north central part to four and one half feet in the southwestern corner. In Wabaunsee County to the west, the Tarkio is approximately ten feet thick in the eastern part and thins to four feet to the west. In Osage County it varies from seven feet in the northern part to approximately two feet on the southern edge of the county.

Quality test results on selected outcrops show that the Tarkio meets specifications for concrete aggregrate as well as light type surfacing material and riprap; however, the quality is highly erratic and tests should be run on any potential quarry sites. The Tarkio Limestone is mapped as part of the Zeandale Formation shown on plates I, III and V.



Figure 12. The Tarkio Limestone Member exposed in the SE ¼ sec. 30, T.11S., R.14E.

Sand and Gravel

Glacial Drift

Glacial Drift is the term used here to include all material deposited directly or indirectly by glacial ice. These deposits, covering approximately 40 percent of Shawnee County, vary from a thin veneer to about 25 feet in thickness south of the Kansas River and up to 76 feet on some slopes north of the river. Deposits are also found in varying thicknesses in Wabaunsee and Pottawatomie Counties, to the north in Jackson County, and to the east in Jefferson and Douglas Counties. These deposits are composed of till, outwash and scattered erratics, with concentrations of sand and gravel in scattered lenses. Quality test data available for these deposits indicate a high percentage of clay and silt, therefore,

the material must be washed and graded to meet specifications. Sand and gravel produced from glacial deposits in Shawnee and surrounding counties is generally used in the immediate locality. The Glacial Drift is mapped on plates I, II, III, IV & VI.



Figure 13. Glacial boulders resting in a field in the SW ¼ NW ¼ sec. 11, T. 13S., R. 16E.

Terrace Deposits

Terrace deposits of Quaternary age are present in most of the stream valleys in Shawnee County but only two have been mapped, the Buck Creek Terrace of Illinoisan age and the Newman Terrace of Wisconsinan age. These terraces do not add to the construction material reserves of Shawnee County since the upper part of each terrace is composed of varying combinations of fine sand, silt, and clay. Granular material is found at lower depths but no material has been produced from this source in the county or elsewhere due mainly to the availability of siliceous sand and gravel from more recent deposits of the Kansas River alluvium and material pumped from the Kansas River channel. The greatest thickness of the Buck Creek was measured in Wabaunsee County just west of Willard where 49 feet of sediment was recorded while the Newman was found to be 75 feet thick just west of Silver Lake.

The Quaternary Terraces will assume a greater economic importance as a source of sand and gravel in coming years inasmuch as dams constructed on the tributaries of the Kansas River have eliminated the natural replenishment of sand and gravel from their sources to the north and west. These terrace deposits have been mapped on all plates.

Quaternary Alluvium

Kansas River alluvium is an excellent source of sand and gravel. The upper alluvium is composed of clay, silt, and fine sand. Test holes drilled in the Silver Lake area show a thickness of 50 to 75 feet with the lower 2/3 to 3/4 of the deposit containing sand with substantial amounts of gravel being encountered near the base.

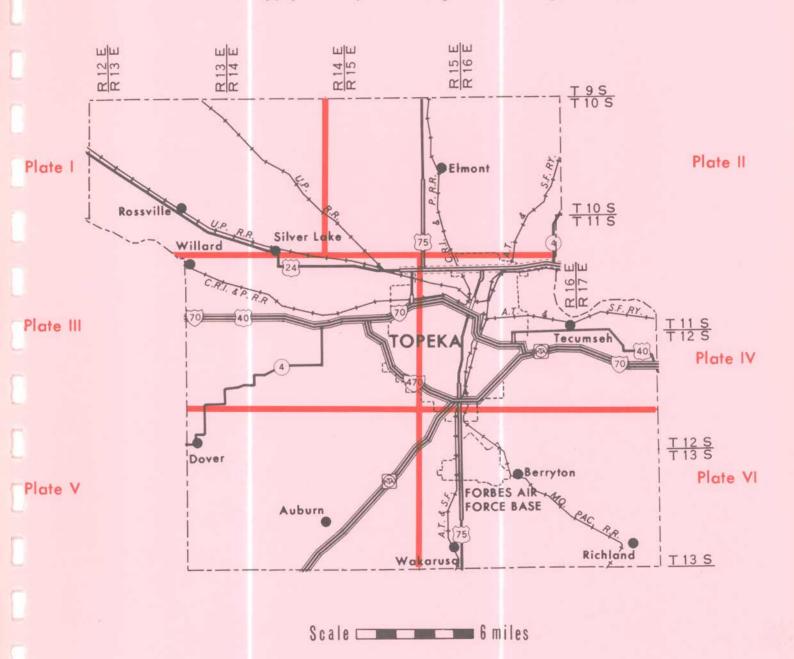
The alluvium of the Wakarusa River valley and other smaller stream valleys in Shawnee County contain such a limited amount of sand and gravel that they have been mapped as a part of the Newman Terrace and therefore will not be discussed here. Also, because of their clay and silt content and the relative ease of obtaining sand and gravel by pumping from the Kansas River, no material is presently being produced from the alluvium. The alluvium has been mapped on all plates.

Site					Per	cent R	etaine	d			I	Π					T			
Data Form No.	Material Type	Date of Test	3/4	3/8	4	8	16	30	50	100	Wash	G. F.	Sp. Gr. Sat.	Sp. Gr. Dry	Weight Cu. Ft.	% Wear	% Soundness	% Absorption	Source of Tata SHC Lab No.	Type of Sample
Source of)	%aterial: Alluvium − Qa	1																		
56+29 56-33	Sand and Gravel	12-20-60 3-18-59 8-23-61 12-20-60 7-02-63 3-03-59	0 0 -	0 0 0 0 2 0	2 4 2 1 6 1	5 13. 9 9 17	24 26 22 24 33 25 26	48 40 48 48 55	87 87 90 87 86 90 88	99 99 99 99 97 99	1.0 0.53 0.39 1.0 0.11 0.27	2.65 2.69 2.70 2.68 2.96 2.77	2.62 2.61 2.62 2.62 2.62 2.62 2.61		112.00 111.1 111.55 111.93 115.02 112.5	38.0 32.2 35.6 37.5 33.0	0.98 0.98 - 0.97 0.99 0.96	0.4 0.5 0.5 0.6 0.4	14520 5874 18665 14519 29052 5733	
56 - 27	Sand and Gravel	5-18-62 8-17-62 7-02-63 3-01-61 2-02-61 6-04-63 5-18-62	0	0 0 0 1	2 1 3 1 13 2	10 8 8 14 8 25 8	26 23 25 39 24 42 25 24	55 53 49 48 53 79 55 68 63	87 87 98 91	98 98 98 100 98 99 99	1.18 0.38 0.64 0.18 0.90 0.57 0.46	2.74 2.65 2.72 3.33 2.77 3.40 2.87	2.60 2.61 2.60 2.62 2.61 2.61 2.62		113.56 112.8 111.57 110.87 112.28 115.70 112.90	37.5 34.9 38.8 35.4 37.4	0.97 - 0.98 0.95 0.95 0.97	0.6 0.5 0.4 0.6 0.6 0.6	22443 24037 29051 15361 15045 28485 22216	
56-30	Sand and Gravel	3-05-59 2-01-61 1-08-57 4-28-61		0 0 3	1 2 9	7 13 13 24	37 35 47	63 56 64 65 75 58 97	92 90 87 87 88 93 85	95 97 98	0.42 2.12 0.67 0.67	2.73 2.97 3.00 3.49 2.86	2.62 2.60 2.62 2.62		112.4 116.63 113.5 113.16	34.3 32.7 34.2	0.96 0.98 0.98	0.6 0.6 0.03 0.4	5767 15041 96171 16406	
56-33 56-26	Sand and Gravel	2-03-61 3-01-61 3-18-59 4-04-63 2-01-61 3-05-59	0 0 - 0 -	0 4 1 4 1	9 2 14 5 11 4 0	13 40 19 23 13	33 81 41 40 30 21	97 67 57 64 60	99 89 82 95 94	95 99 97 98 98 99	2.10 0.44 1.20 0.18 1.73 0.42	3.10 3.15 3.05 2.77	2.62 2.61 2.63 2.60 2.62 2.62		111.49 108.07 112.8 115.74 112.06	33.8 35.8 33.0 38.3 34.0 31.8	0.96 0.96 0.97 0.98 0.97	1.1 0.9 0.6 0.8 0.7 0.5	15042 15359 5873 27559 15046 5768	
56-17 56-18 56-32 56-31	Sand and Gravel Sand and Gravel Sand and Gravel Sand and Gravel	4-04-63 3-01-61 9-16-58 7-25-60 4-04-63 3-02-61 2-17-64	0 0 0 0 0 0	0 2 2 2 0 1 1	6 7 4 8 3	17 50 22 23 19 36 7	40 79 51 49 46 75 30	73 92 76 70 72 90 77	98 99 94 90 91 94 90	99 100 99 97 98 97 93	0.21 0.08 0.26 1.04 0.65 1.68 5.94	3.33 4.34 3.50 3.38 3.30 4.01 3.01	2.61 2.62 2.62 2.62 2.62 2.62 2.62 2.57		112.28 111.51 114.8 115.83 112.28 111.49	35.0 37.1 32.7 36.5 38.7 39.2 30.0	0.97 0.94 0.97 0.97 0.97 0.98 0.91	8 0.7 0.5 0.6 0.8 1.00 2.42	27560 15360 15360 3397 12424 27561 15362 31917	
Source of Material: Glacial Deposits Qgd																				
80-15 80+1 8G+16 8G+44	Clay-Sand & Gravel Clay-Sand & Gravel Clay-Gravel Sand-Gravel	3-02-61 3-03-61 3-06-61 261	0 19 16 0	1 35 29 1	3 52 40 2	7 60 51 4	30 67 63 10	77 75 71 19	90 80 74 25	93 81 78 31	5.94 17.6 25.2 .56	3.01 4.69 4.22	2.57 2.48 2.52	2.36 2.43	96.19	30.0 30.2 31.1	0.91 0.93 0.94	2.42 4.82 3.80	15498 15499 15363 AB710	
Source of	Material: Zeandale Liz	mestone Forms	ation	(Tarkio	Lime	stone l	Member) Pzt					l			1. 7				**
L8+40 L8+23	Limestone Limestone	2-09-61 10-06-61											2.65 2.49 2.48B 2.47C 2.45D	2.60 2.40 2.38 2.37 2.35		27.9 28.0B	0.96 0.97 - -	1.95 3.77 4.00 4.18 4.35	15143 19382 19382 19382 19382	Crushed Crushed Crushed Crushed Crushed
Source of	Material: Bern Limesto	one Formation	n Pbb					,					l		l	L				
IS+14 IS+7 IS+21 IS+19 IS+3 IS+22 IS+6 IS+12 IS+41 IS+5 IS+9	Limestone	7-03-63 3-01-59 2-09-61 2-14-61 12-20-60 1-31-61 261 261 2-09-61 1-27-61 2-14-61 3-05-59 5-24-60 4-09-63 12-20-63 12-20-63											2.62 2.57 2.64 2.64 2.63 2.648 2.638 2.638 2.638 2.58A 2.58B 2.58 2.50 2.50 2.61 2.61 2.62 2.62 2.62	2.58 2.59 2.59 2.59 2.57 2.57 2.57 2.52 2.52 2.52 2.52 2.55 2.55		25,2 28,68 23,4 23,5 37,7 25,4 	0.98 0.97 0.96 0.96 0.94 0.94 - - 0.97 0.97 0.96 0.95 0.98 0.95 0.98	1.67 1.50 1.96 1.56 2.63 1.93 1.16 2.14 1.89 1.80 3.65 2.04 2.62	29189 96537 15145 15271 14521 15043 15044 15044 15044 15146 14990 15272 15274 5776 11576 27459 29837 29838 29190	Crushed
IS+13 IS+11 IS+20 IS+8 IS+10 IS+2	Idmestone Idmestone Idmestone Idmestone Idmestone Idmestone Idmestone Idmestone Idmestone	2-20-66 1-28-68 2-28-68 8-10-71 8-09-72 6-20-72 7-09-70											2.62 2.65 2.57 2.60 2.65 2.60 2.60 2.62 2.62 2.62	2.58 2.60 2.48 2.56 2.62 2.54 2.53 2.56 2.57 2.57		25.2 27.0 31.0B 25.5B 23.8B 28.0 29B 2.70 26.4 27.5B	0.98 0.92 - - 0.97 0.96 0.97 0.94 0.97	2.11 3.27 1.60 1.33 2.26 2.66	29189 30707 65-4361 65-1245 67-5005 71-2441 72-2483 72-1828 69-2354 70428	Crushed
Source of	Material: Topeka Limes	tone Formati	ion Pt	h						-								1		
LS+43 LS+39 LS+24	Limestone Limestone Limestone	2-09-61 2-09-61 3-04-59 2-27-56											2.59 2.44 2.58 2.47	2.54 2.34 -		28.0 29.6 24.0 29.8	0.95 0.97 0.97 0.96	1.88 4.16 4.00 4.71	15147 15144 91542 91543	Crushed Crushed Crushed Crushed
Source of	Material: Deer Creek I	Amestone For	rmation	n Ede							-	1					1	1		.:
LS+46 LS+34 LS+42 LS+35 LS+37 LS+38	Idmestone Idmestone Idmestone Idmestone Idmestone Idmestone Idmestone Idmestone Idmestone	3-04-59 3-04-59 2-14-61 2-09-61 3-05-59 1-04-61 261											2.65 2.59 2.56 2.54 2.58 2.53 2.52 2.45 2.49 2.48 2.55 2.54A 2.57B	2.61 2.55 2.52 - 2.39 2.32 2.42 - 2.47 2.46 2.49		25.8 25.7 27.4 31.1 26.2 28.6B 37.4 35.7 29.5 30.2 32.9	0.94 0.93 0.91 0.95 0.82 0.89 0.87 0.93 0.96 0.94	1,43 1,76 1,87 2,14 2,21 2,74 5,53 2,96 3,21 3,25 3,31 3,11	50445 50446 50447 62086 62087 62088 15273 15269 15149 2057 14672 14673	Crushed
LS+36 LS+25 LS+45	Limestone Limestone Limestone Limestone	3-16-61 9-28-60 9-28-60 10-20-60 261 261 7-13-61											2.56c 2.56 2.50 2.55 2.52 2.52 2.50 2.51 2.56	2.48 2.49 2.40 2.44 2.39 2.37 2.38 2.48		32.4 39.3 38.6 36.9 - 32.6	0.92 0.97 0.94 0.89 -	3.08 2.82 4.11 4.43 5.09 5.31 5.32 2.98	14673 15699 13349 13348 13657 13658 13658	Crushed Crushed Ledge Ledge Crushed Crushed Crushed Crushed

Figure 14 . Results of tests completed on samples of material from the various geologic source beds in Shawnee County.

SHAWNEE COUNTY MATERIALS MAP INDEX

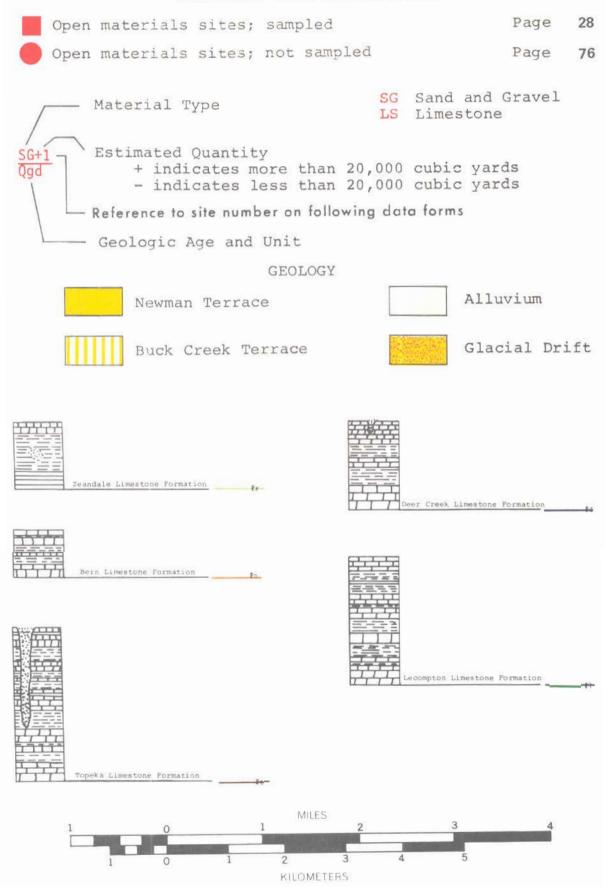
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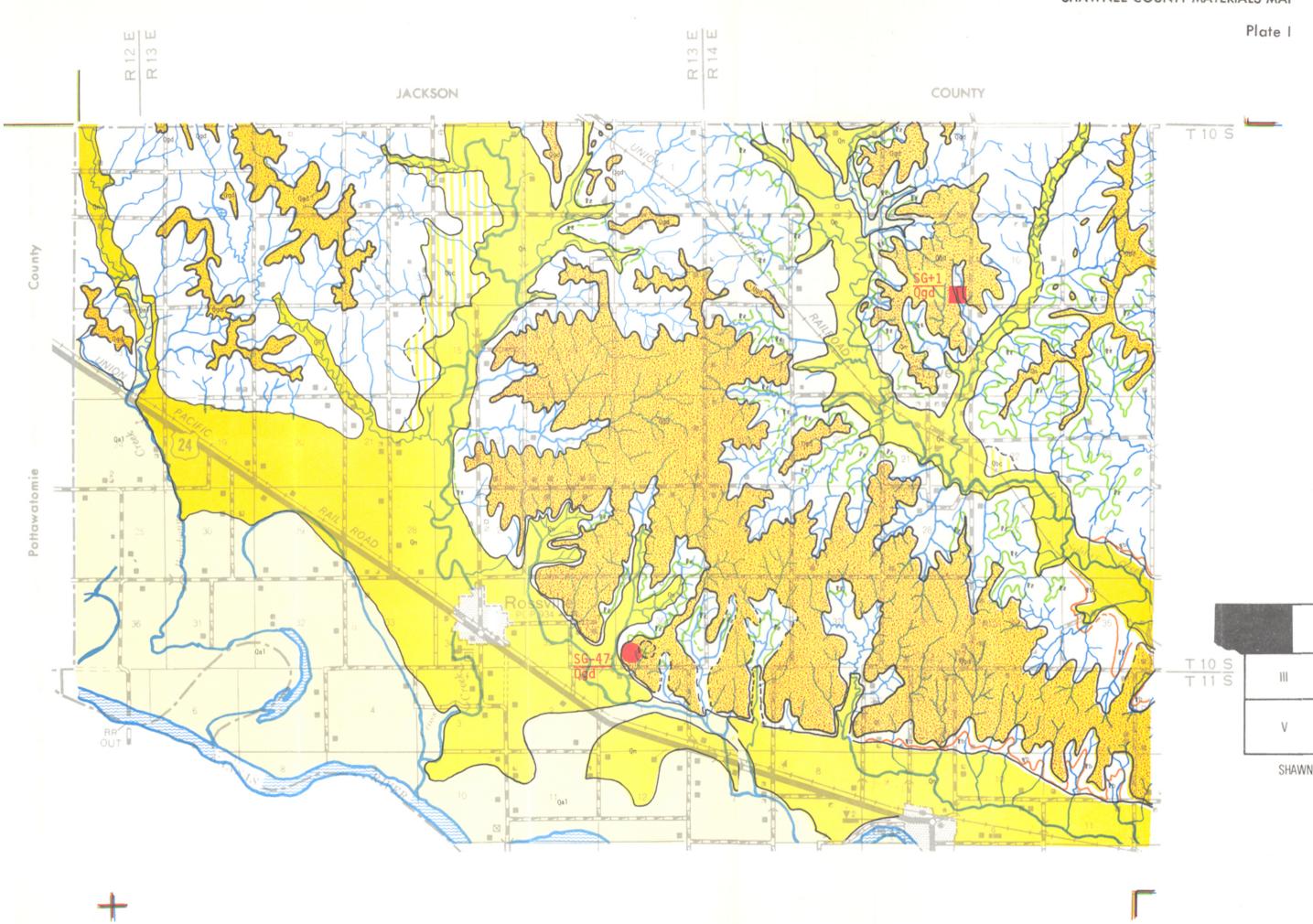


Note: The individual site data forms follow Plate VI.

LEGEND

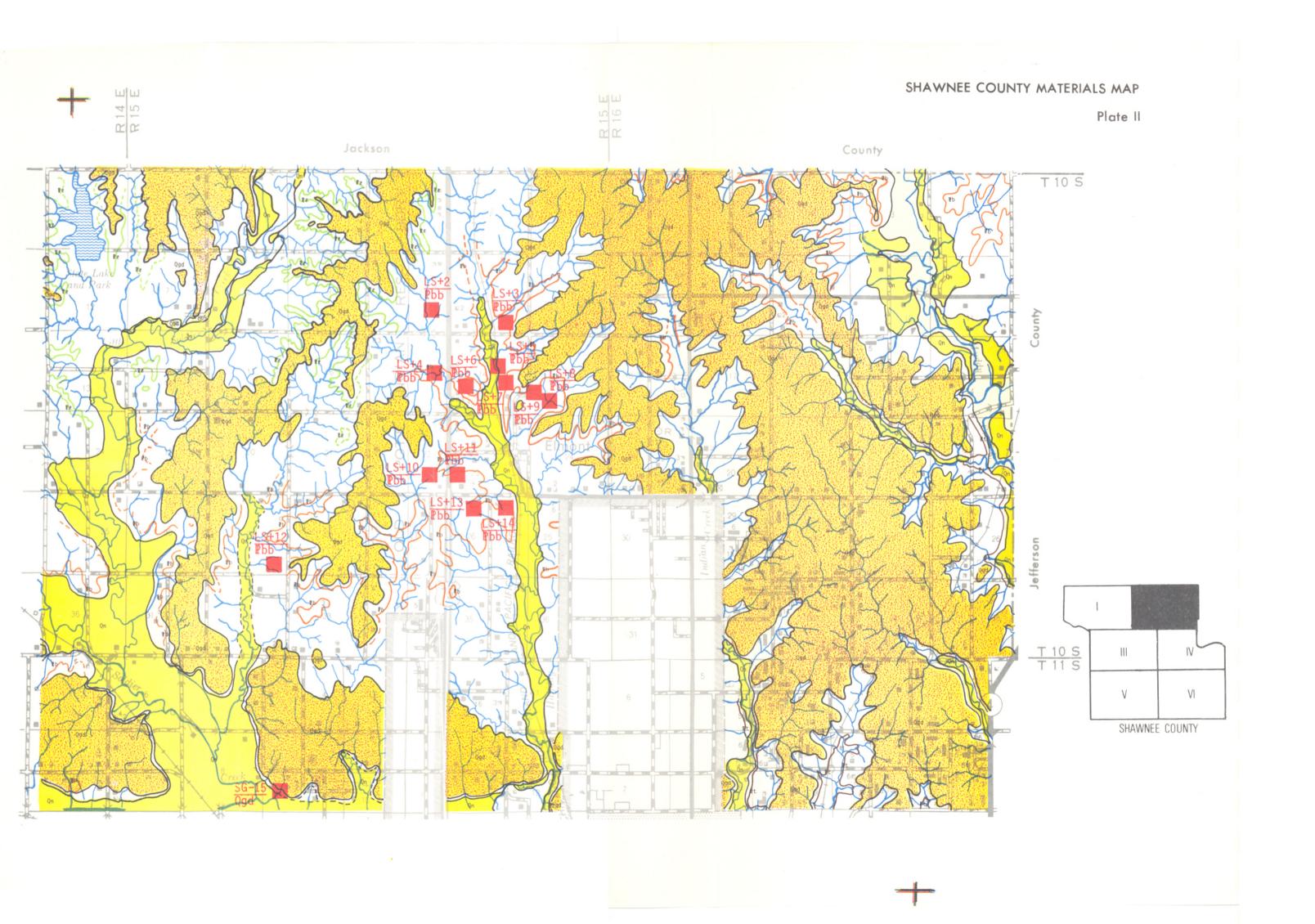
MATERIALS SITE DESIGNATIONS





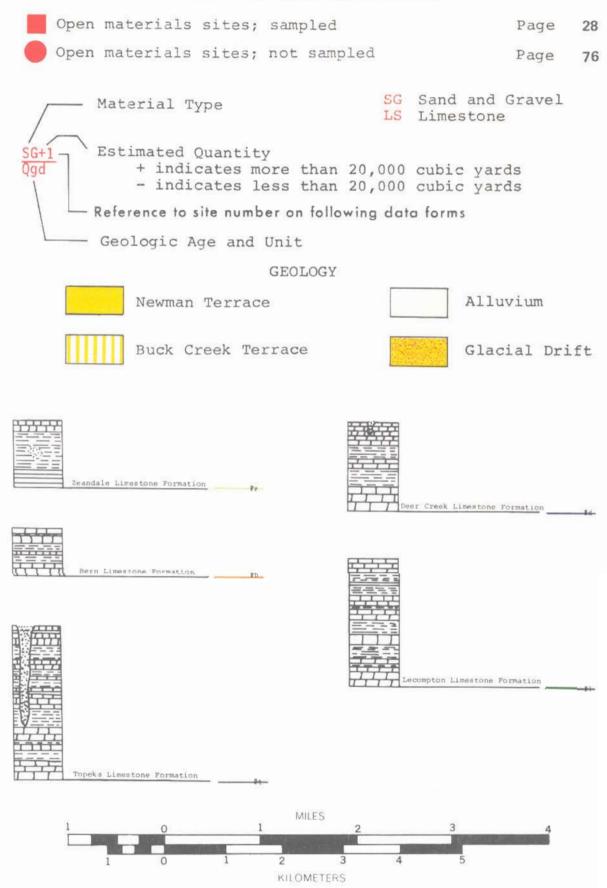
LEGEND MATERIALS SITE DESIGNATIONS Open materials sites; sampled Page 28 Open materials sites; not sampled Page 76 SG Sand and Gravel Material Type LS Limestone SG+1 Qgd Estimated Quantity + indicates more than 20,000 cubic yards - indicates less than 20,000 cubic yards Reference to site number on following data forms Geologic Age and Unit GEOLOGY Alluvium Newman Terrace Buck Creek Terrace Glacial Drift Bern Limestone Formation compton Limestone Formation Topeka Limestone Formation

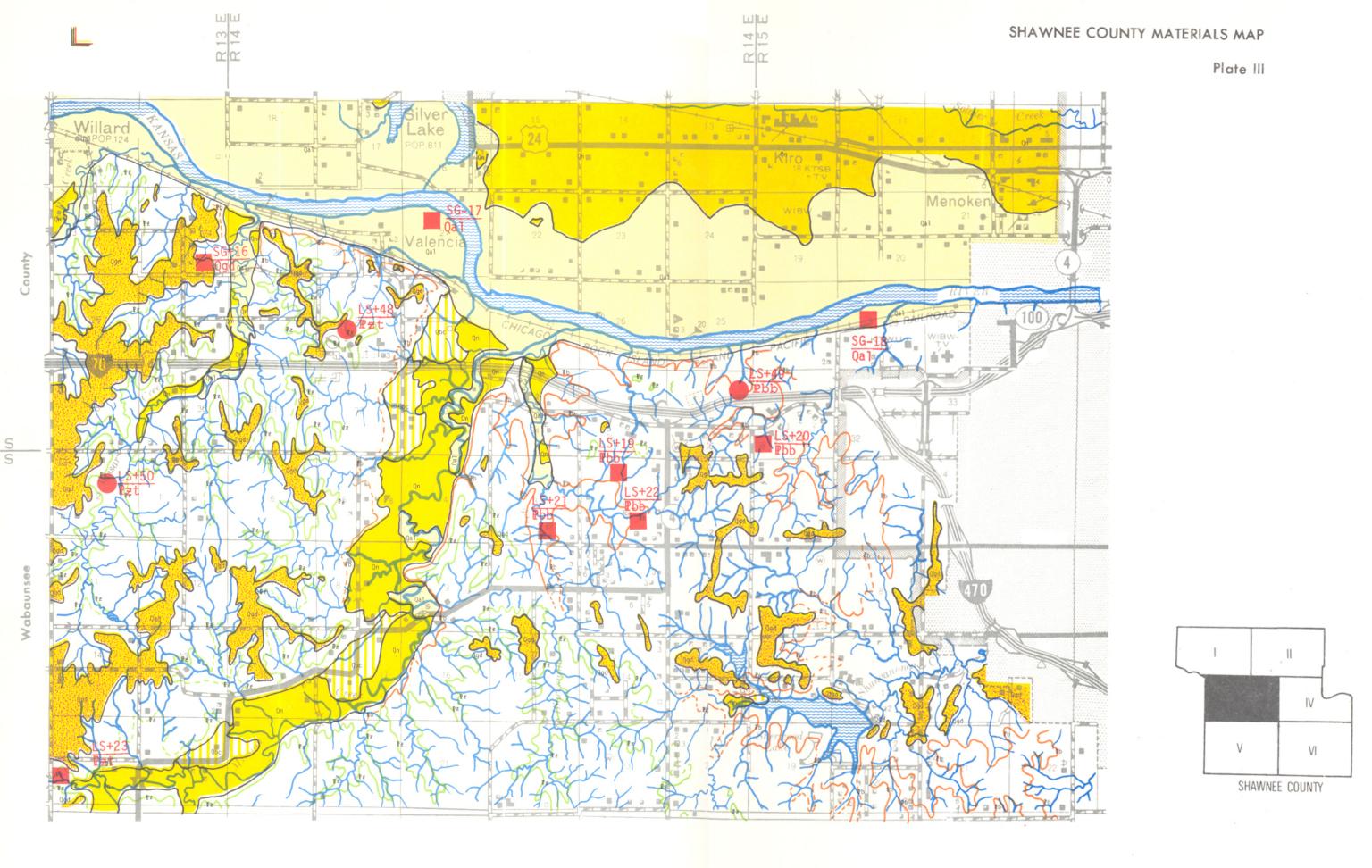




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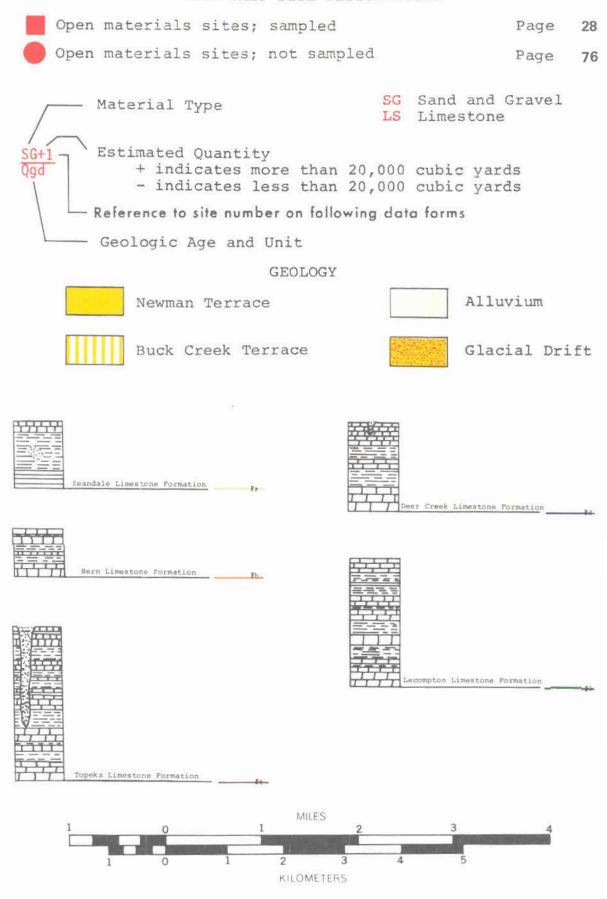
MATERIALS SITE DESIGNATIONS





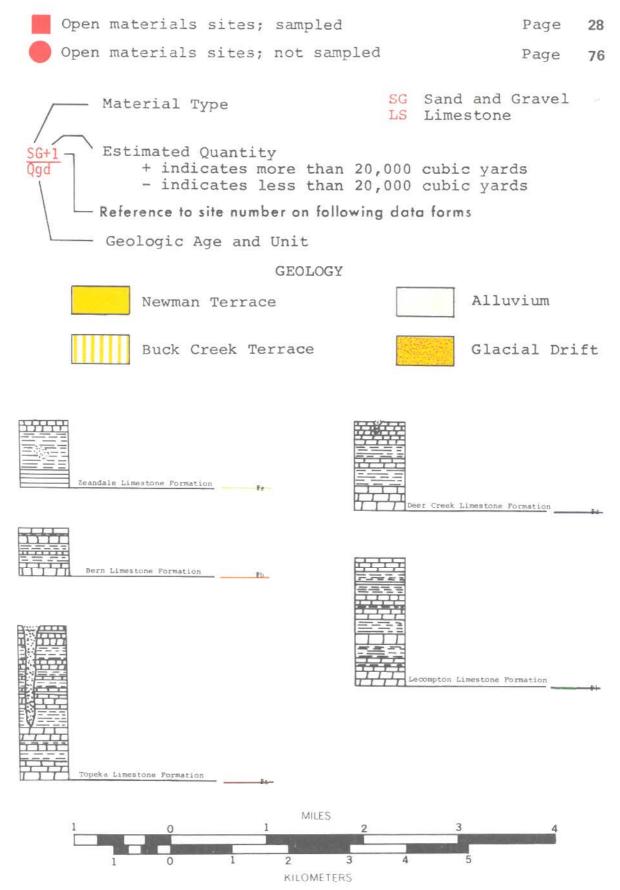
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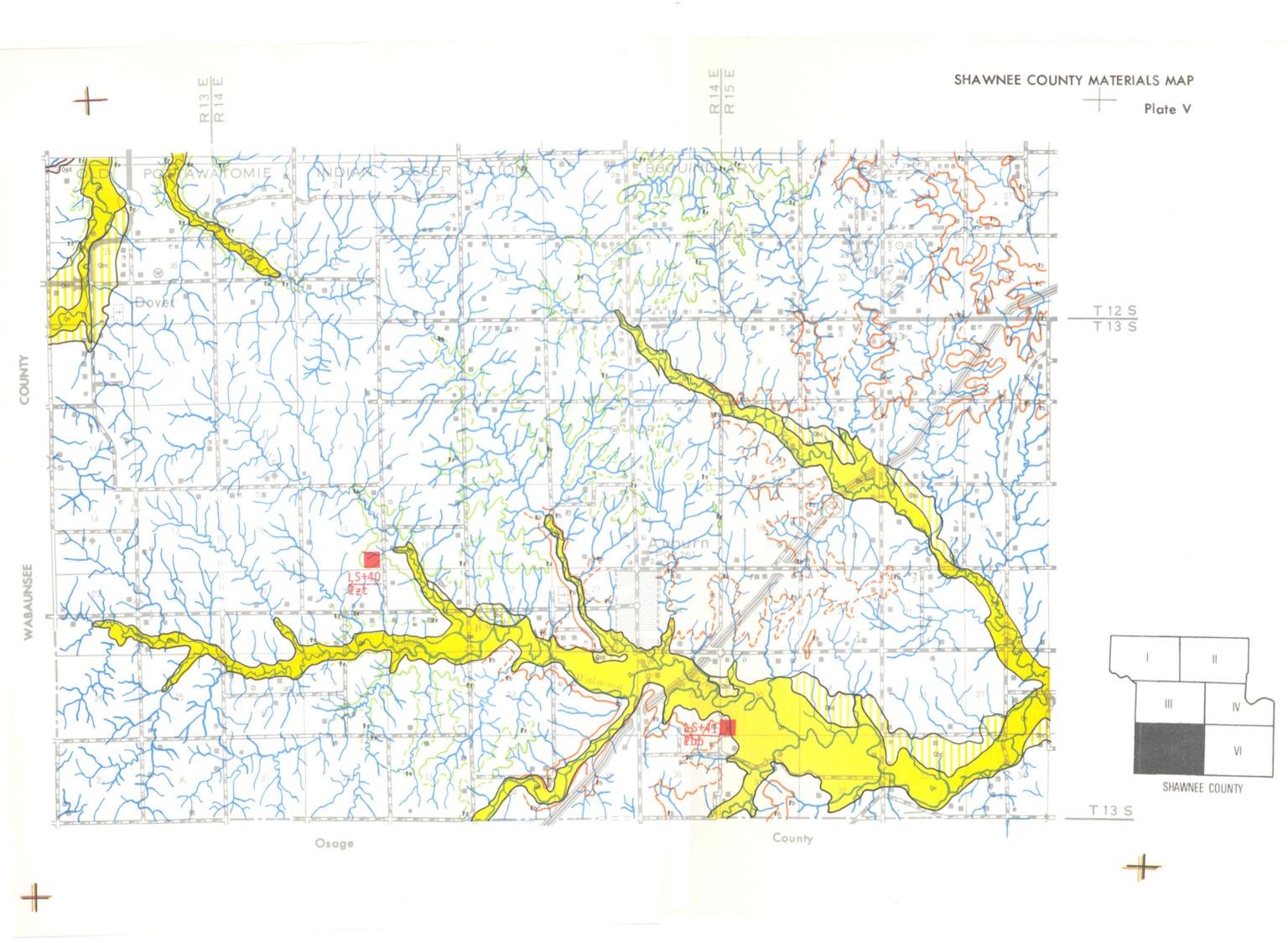
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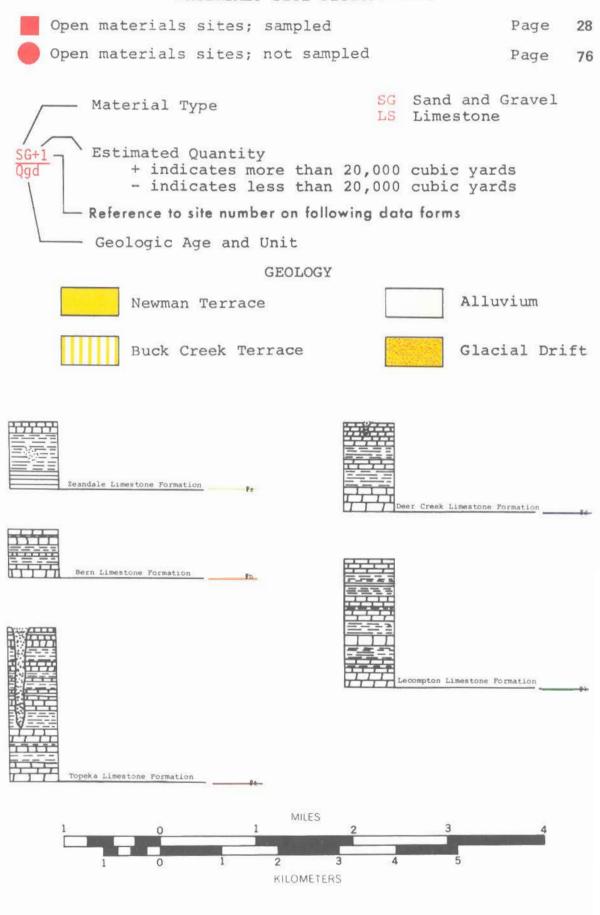
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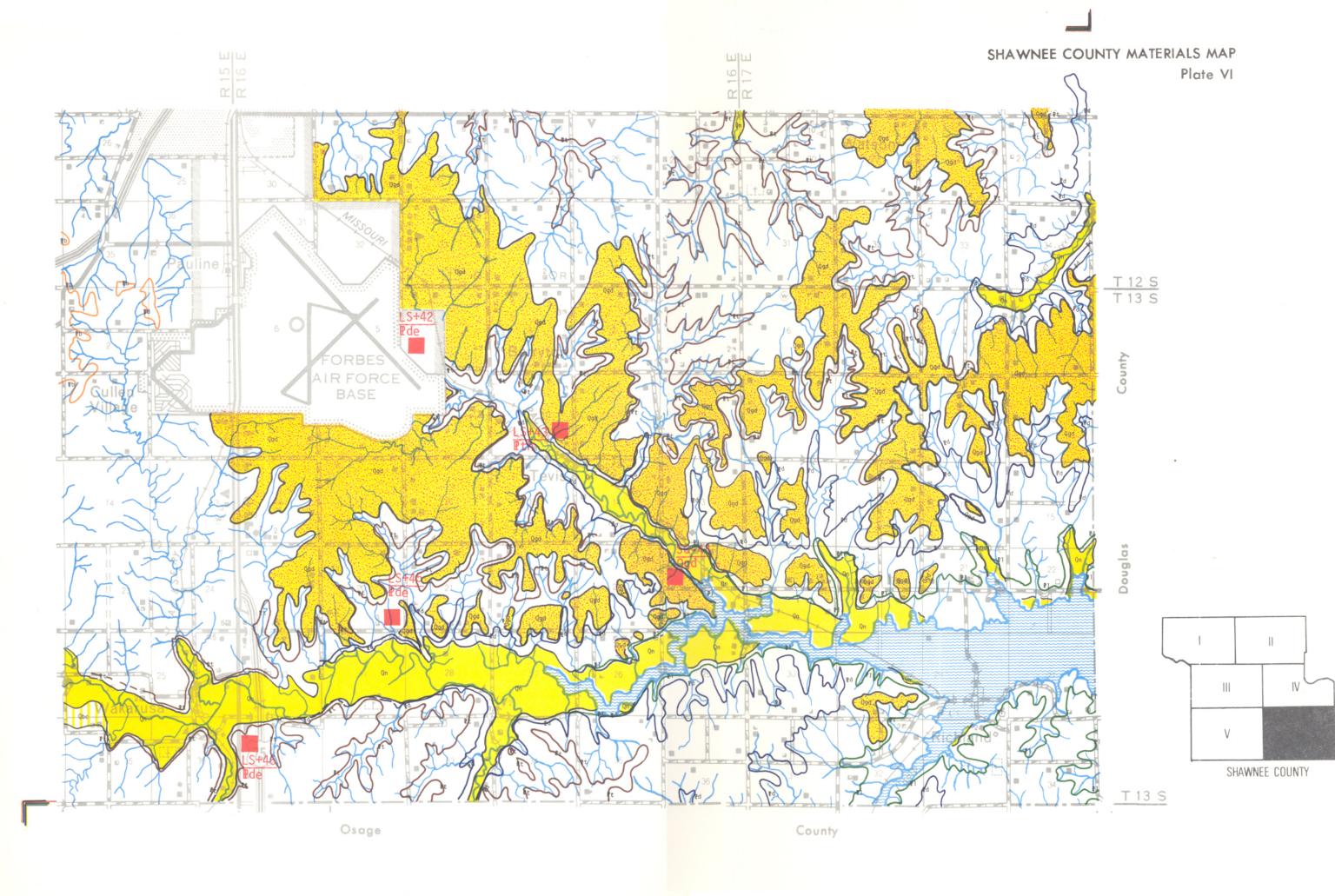




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MATERIALS SITE DESIGNATIONS





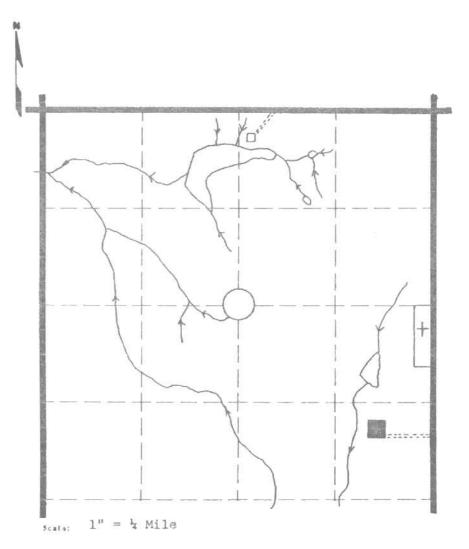
OPEN MATERIALS SITES; SAMPLED

LEGEND

		Trail or lane		Open materials sites; sampled
		Road	•	Open materials sites; not sampled
	 	Railroad		
	G000000	Hedge or trees	3	Center of section Dwelling
28	Name	Major streams	+	Cemetery
			6	School
	- 0	Intermittent streams	古	Church
		Pond or lake		Town or city

N

.tari	J San	d-Gra	avel	(Cla	ay (Gra	vel;) .	untu	5	Shar	wnee	3			
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wn er -	James	Di	name					3000	3				address		T	
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latus	of Site -	oper	n Mate	erle	ils	51	ce,	San	nple	ed						-
							EXPLO	10 I TAS	DATA	1						
Test	Material	Peoth	Depth		,	1	7	ent Ret	ained		_	_	Wash			
No le	bottom of Note	over- surden	Material	1 1/2	3/4	3/8	4	8	16	30	50	100		8.7.	L.L.	
				9	19	35	52	60	67	75	80	81	17.6	4.69		
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	i limitar		SHC	La	b.	No.	15	499								
steris	l limitar	10														
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	c Gravity									(Dry	1	. 30				
	eles Wear		30.2				-									
n Ang	100	4	.82					Soun	dnest	0	.93	3				
naret	F+							4.4		0 Tax						

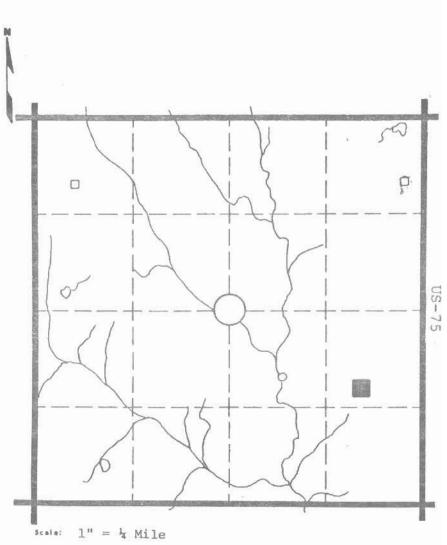


EXPLORATION DATA

	Katerial	Posth	Death	-			Perce	nt Rot	ained							
Test Note	at bottom of Note	ot over- Burden	Death of Meterial	1 1/2	3/4	3/8	4.	8	16	30	50	100	Wash 200	6.7.	Like	P. I.
-			-													
-	-															
										-		-				_

CORRELATION DATA

Geological Ag	Pennsylvanian	
Geological So	Bern Limesto	ne Formation - Burlingame Member
Material Simi	ler to SHC Lab. No.	72-2483
Specific Grav	ity (set.) 2.60	(Bry) 2.53
Los Angeles W	oor 29B	
Absorption	2.66	Soundness 0.97
st. Cu.Ft. —		Str. Ratio
Reserks		



e No	Fbb						_	Oato		Sep	ten	ber	, 19	973			No.	
eria	I	imest	tone					_ Co	unty.		Sha	wne	e				A	
	sE					3ec	_1	1		Tup.	10	S	1	enge 1	5E			
., K	Keith	L. &	JoAni	L.	Hi	lde	bra	ndt	-Sh	awn	iee_	Fed	eral	-Top	eka		1 1	Lamonton
	ol Deposi																	5
	of Site -										37.14		FG 04	E-1.43.6				
6 11 2	of Site -	22.00		-					DATA									
	Haterial	Pepth	1	1		, E		nt Het							1			
est ole	at bottom	01	Depth of Material	1 1/2	3/4	3/8	4	8	16	30	50	100	Wash 200	4.F.	L.L.	P. L.		
	of Hole	Burden	1						-						1			
		1 100			227										1		1	
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															1			
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logi	cal Source	•Be	ern Li	mes	ton	e F	orm	ati	on_	- B	url	ing	ame	Membe	er			
eria	l Similar	To S	HC La	b.	No.	15	146											
2 8	9352355	0000																
CITI	c Gravity	(5+1-)	2.	63						(prv	1	2	.60					
	ales Wear									1807	,							
	Ion -								Market	0	97	0						Scale: 1"
94.10	108	- A A A						20 4 1	dness		9 0 1							

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6

Rouarks -

LS+4

Site No. Thb Dete September, 1973

Material Limestone townty Shawnee

Location SE¹/₄ Sec. 15 Two. 10S Range 15E

Domer E.A. & Evelyn A. Bronson Route 1 Meriden, Kansas

Material Dry Accessibility Good Site Located on Plate II

Status of Site Open Materials Site; Sampled

EXPLORATION DATA

	Material	Pepth	Depth				Perce	nt Ret	arned							
Test hole	at bottom of Hole	over- Burden	of Haterial	1 1/2	3/4	3/8	4	8	16	30	50	100	Wesh 200	G.F.	Lite	P. I
						-										
						3.										
								-								

CORRELATION DATA

Specific Gravity (Sat.) 2.62 (Dry) 2.57

Los Angeles Wear 27.5 B

Absorption 1.88 Soundness 0.97

Wit. Cu.ft. 31.0 Pennsylvanian

Bern Limestone Formation - Burlingame Member

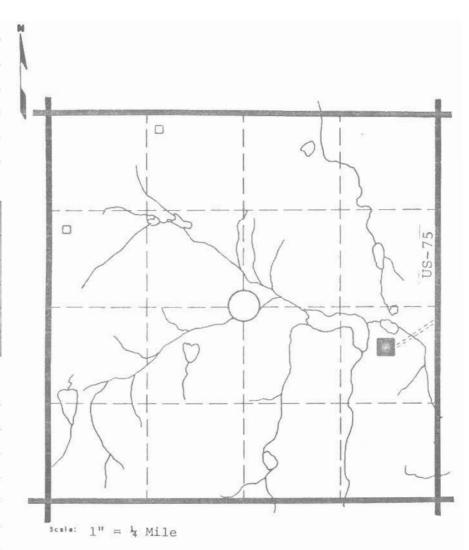
Geological Source Bern Limestone Formation - Burlingame Member

SHC Lab. No. 70428

(Dry) 2.57

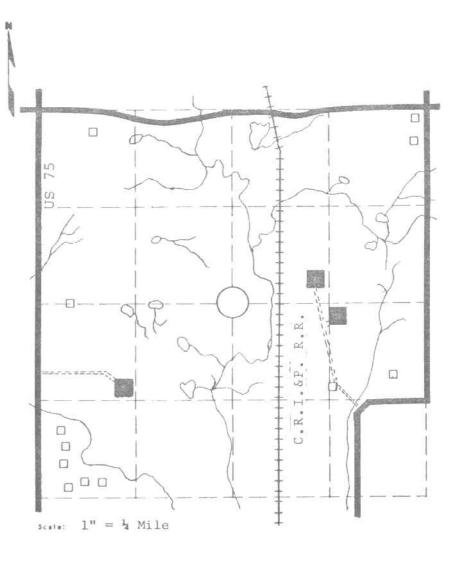
Specific Gravity (Sat.) 2.62 (Dry) 2.57

Soundness 0.97



3

	Fbb												197			
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en pr	Chas	E. E.	& Ed:	th	Maı	ıs	72	33.1	W I	el mo	ont,	, To	peka	a, Ka	nsas	
	of Deposi		10.00													
											5:11	Locat	ed on	Plate -		
tates	of Site -	Open	Mate	ria.	ls s	site	9) :	am	orec	1		-				
						Ε	MPLOR	ATION	DATA							
	Material	Pepth	T				Perce	nt Ret	ained		-		1		T	
Tost Mole	at bottom	of over-	Depth of Material	1 1/2	1/4	3/8	ч	1	16	30	50	100	W4sh 200	6.f.	1-1	P. 1.
	of Hole	Burden	Haterial			-			-						1	_
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eclosi	cal Source	B	ern L	ime	sto	ne l	For	nati	ion	- I	Bur!	ling	game	Memb	er	
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ateria	il Similar	10	III Lid	1.	MO.			100								
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pegiti	c Gravity	(Fat.)	_ 2.6	0						(Dry)	2.5!	5			
	oles Wear	2	5.2B													
	100	04						Soun	dness		0.90	3				-
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	Ft															



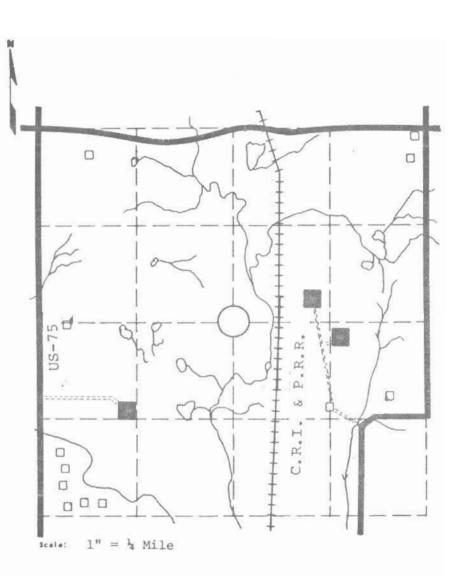
ial I	imes	stone			County .	Shawnee	
ion N	Wl	SW		_ sec. 1	4	Tup105	Range II
E	d &	Elsie	R. Becke	er	Route 2	Top	eka, Kansas

EXPLORATION DATA

Deployer	Material	Depth	Desth				Perce	ot Ret	ained							
lest Hols	at Bottom of Mole	Burden	1 1/2	3/4	3/8	4	8	16	30	50	100	Wash 200	6. F.	L-t.	Pel	
_															-	_

CORRELATION DATA

leological Source Bern Limestone	Formation - Burlingame Member
eterial Similar to SHC Lab. No.	15274
Specific Gravity (Sat.) 2.61	(Ory) 2.56
Los Angeles Wear25.2	
Apporation 1.89	Soundness 0.97
St. Cu.ft.	Str. Ratio
Begarka	



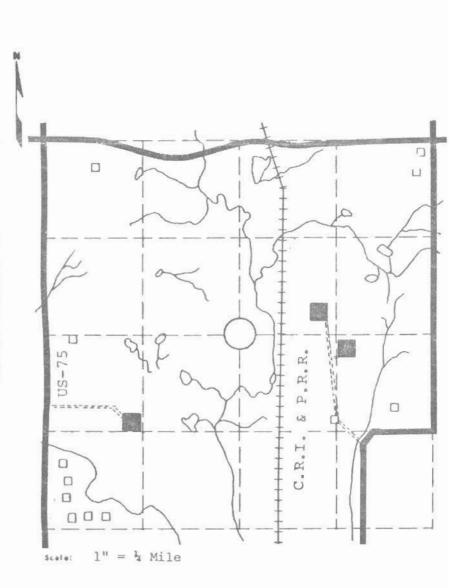
	LS+7 Pbb	September, 1973
Site No		Pate September, 1973
Material -	Limestone	county Shawnee
Location	SE4	sec. 14 1wp. 10S Ronge 15E
Owner	William E. Maus	Silver Lake State Bank, Silver Lake, Ks
Baturo of	Beposit Dry	Accessibility Good Site Localed on Plate II
Status of	siteOpen Mater	rials Site; Sampled
		2020 200 2000 2000 200

EXPLORATION DATA

	Material	Pepth	Depth			9.455	Perce	ni Ret	sined				2000 20		1	
Test Note	at Bottom of Hole	of over- Burdon Material	1 1/2	3/4	3/8	4	8	16	30	50	100	Wash 200	6.1.	L.L.	P. 1	
						-										

CORRELATION DATA

Acological Source Deall Diffication	ne Formation - Burlingame Member
Meterial Similar to SHC Lab. No.	. 15145
Specific Bravity (Sat.) 2.57	(01) 2.53
ios Angeles Wear23.4	
Asserption 1.96	Soundness 0,96
	Str. Retio
lonerh e	



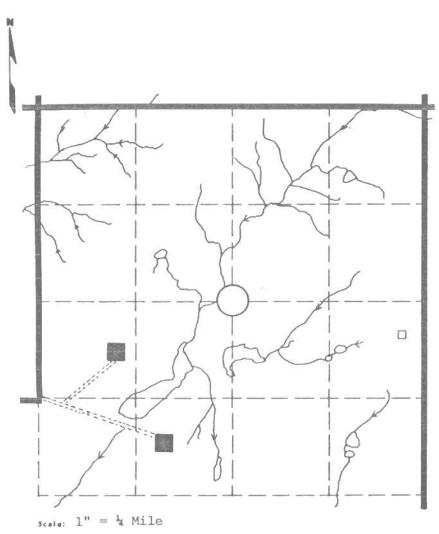
ω

ite Bi	Pbb						Date		Se	pte	mbe	r, 1	.973		
	Lime		ne				_ Co	unty.	Sh	awn	99				
ocati	e E ¹ 2	SW	<u> </u>		 Sec	_1	3		Twp.	_1	0S		anga —	15E	
whor -	N. 1	R. Ha	mm, I	nc.		9				Pe:	rry	. Ka	nsas		
aturo	of Deposi														
aturo					Site	e; .		ole	d						
aturo	of Deposi				Site	eş :	Samp	DATA	d						

	Material	Perth	Depth				Perce	nt Ret	ained							
Test Note	et bottom of Hole	ot over- Burden	of Material	1 1/2	3/4	3/8	ų	8	16	30	50	100	Wash 200	6.F.	L.L.	P. I.
						,										

CORRELATION DATA

Geological Age Pennsylvanian	
	Formation - Burlingame Member
Material Similar to SHC Lab. No.	67-5005
Specific Gravity (Sat.) 2.65	(017) 2.62
Los Angeles Weer 23.8B	
Assorption 1.33	1oundness0.97
Wt. Cu.ft.	str. Batio
Rowarks	

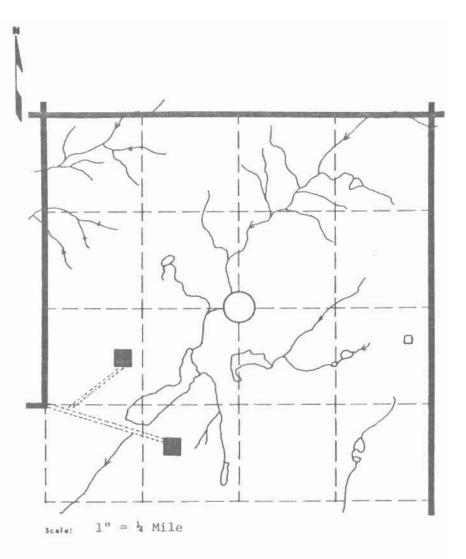


to No. —	LS+9 Pbb	Date .	September	, 1973
	Limestone	Cox	shawnee	
ation _	Wh - SWh	sec. 13	1us10S	_ 8anga 15E
her	N.R. Hamm Quarries		Perry, Kansa	is dress
ture of 6	Daposit Dry Access	Good Good	- Site Located	on Plate II
tus of 1	Open Materials	Site; Samp	led	
		EXPLORATION	DATA	

20000	Meterial	Pepth	Dopth		3-		Perce	nt Ret	sined							4
Test Mole	set pottom of Note	of over- Burden	of Material	1 1/2	3/4	3/8		0	16	30	50	100	Wash 200	4. F.	L.L.	P. (
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										H		-				

CORNELATION DATA

Seelogical Source Bern Limestone	e Formation - Burlingame Member
	29837
Specific Gravity (Sat.) 2.62	(ery)
Los Angeles Wear 27,7B	
Assorption 2.62	80undness 0.95
Wt. Cu.Ft.	3tr. Ratio
Rowarks	



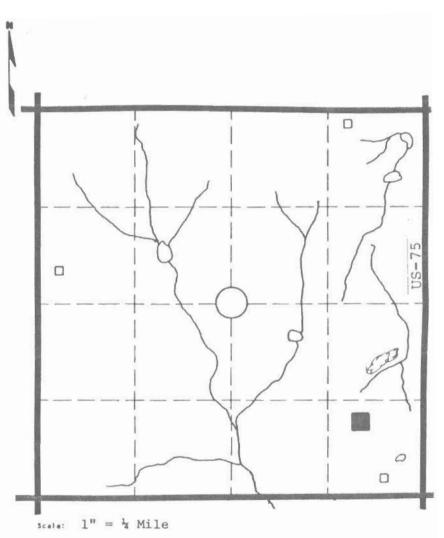
W

	Fbb Limes		ne			127.755.00		nawnee		
cation -									Ranga	15E
		E 8	Helen	Ε.	Wendel	4045	NW	62nd	Topeka,	Kansas
iture of	Deposit			Acc	essibility —			Site Loca	ted on Plate	II

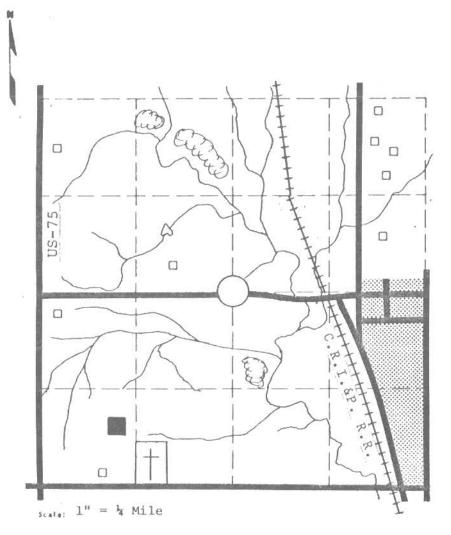
Material	Pepth	Depth				rerce	nt Ret	ained						1 1	
at mottom of Noie	over- Burden	of Material	1 1/2	3/4	3/8	4	8	16	30	50	100	200	0. f.	L.L.	P. 1.
			9		,										
	at	at of Bottom over-	at of of sottom over- Material	at of of sottom over- Material 1/2	at of of of bottom over-	at of of bottom over- of Nois Burden Material 1/2 3/4 3/8	at of bottom over- of Hole Burden Material 1/2 3/4 3/8 4	at of pottom over- of Hole Burdon Haterial 1/2 3/4 3/8 4 8	at of over- burden of Noie Burden Haterial 1/2 3/4 3/8 4 8 16	at of off bottom over- of Noie Burden Haterial 1/2 3/4 3/8 4 8 16 30	at of or of hole Burden Haterial 1 1/2 3/4 3/8 4 8 16 30 50	at of portion of of over of NoIe Burden Haterial 1/2 3/4 3/8 4 8 16 30 50 100	at of of or of Material 1/2 3/4 3/8 4 8 16 30 50 100 Wash 200	at bottom of over of NoIe Burden Haterial 1/2 3/4 3/8 4 8 16 30 50 100 200 6-F-	at of or of of over- of Noie Burden Haterial 1/2 3/4 3/8 4 8 16 30 50 100 200 6-f. L.L.

CORRELATION DATA

Beerks Pennsylvanian Pennsylvanian Beological Source Bern Limestone Formation = Burlingame Member Material Similar To SHC Lab. No. 71-2441 Specific Gravity (Set.) 2.60 (Dry) 2.54 Los Angeles Wear 28.0 Assorption 2.26 Soundness 0.96 Wt. Cu.ft. Str. Ratio

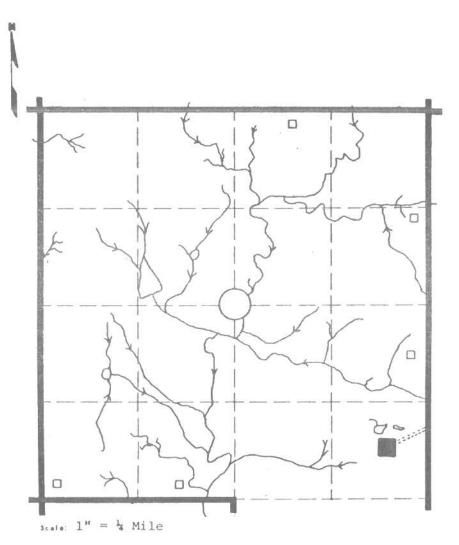


te N	. Pbb						_	Date	-	De,	p ce.	iiibe.	r, 1	313		-
ateri	. Lime	eston													_	
	SW ¹ 4													15	E	
	Ali															
	of Deposi															
tatus	of Site -	Open	Mate	ria	ls	Sit	e.i_	Sam	ple	<u>d</u>						
						E	KPLOR	#017a	DATA							
lest	Material	(*epth	Depth				Perce	nt Ret	ained				Wash			
Nole	notton of Nole	over- Burden	of Material	1 1/2	3/4	3/8	4	8	16	30	50	100	200	6. F.	L.L.	P. I.
	-											-	-:			
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						COR	RELAT	100 0	ATA							
an I na	cal Age -	Penn	sylva	nia	n											
	rcal Source					ne	For	ma t	ton	_	Bur	lin	game	Memb	er	
100 0000																
steri	al Similar	To	SHC L	ap.	NO	. 0	5 -	436	1							
-	-,			a re	-		-	_				2	4.0			
ecit	ic Gravits	(5±1.)		2.5	1					(Dry	}	2.0	40			-
	geles Wear	3	1.0B							97-						
a An		3.2	7					Soun	dness							
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8019	. Ft								r. 8-	110						



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ita No	. Pbb							0410		Se	pte	mbe	r			
ateria	Lim	estor	ie					_ Co	unty	Sh	awn	ee				
ocatio	SE4	SE				Sec		29		Two.	1	0S	#	anga	15E	
	Dani	a Pri	ddv			Rou	te	2		N	т.	ope	ka.	Kansa	a c	
	of Deposi															
														Plate	do de	
tatus	of Site (Open	Mater	ial	s S	ite	S	amp	led		-					
						8	XPLOR	AT:OR	DATA							
	Haterial	Pepth	Depth				Perce	nt Ret	pined						T	
Test	at button of Nois	of over- burden	of Material	1 1/2	3/4	3/8	N.	8	16	30	50	100	Wash 200	6. F.	L.L.	P. I.
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								_								-
						33.5	RELAT									
	cal Age -															
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ateria	l Scuiler	ro_S	.H.C.	La	b.	No.	57	76								
	c Gravity		2	.61								2.5	7			
										(Dry	,					
	eles Wear										-					-
psorpt	108	1.80					-	Soun	dness	_0	.98	-				
t. Cw.	F1							S t	r. Ra	tio -						



ite No	Pbb	Date -	September,	1973
sterial -	Limestone	fount	Shawnee	
cation -	Wh NWh	sec26	_ fee. 10S	tenge 15E
mer —	P.H. & Maggie Le	e Netherland	Route 2 Top	peka, Ks.
ture of	Deposit Dry	Goo	d site constant on	Plate II
alus of	site Open Materi	als Site; Samp	ole	
		EXPLORATION DA	ATA .	

	Haterial	Pepth	Depth	100			Perce	nt Ret	benie							
Test Mole	sottom of Noie	over- Burden	Material	1 1/2	3/4	3/8	4	8	16	30	50	100	200	G. F.	1.1.	P. 1.
														-	-	
						-										
												2	- 27	2001		
											-					

CORRELATION DATA

Geological Age Pennsylvanian

Geological Source Bern Limestone Formation - Burlingame Member

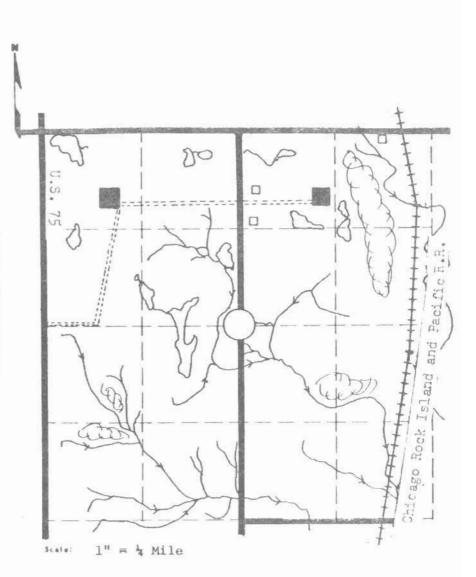
Haterial Similar to SHC Lab. No. 30707

Specific Gravity (Sat.) 2.65 (Nrg.) 2.60

Los Angeles Wear 27.0

Assorption 2.11 Soundness 0.92

Wt. Cu.ft. Str. Matie

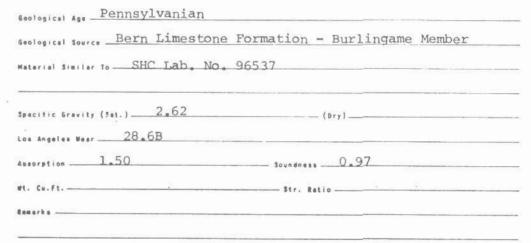


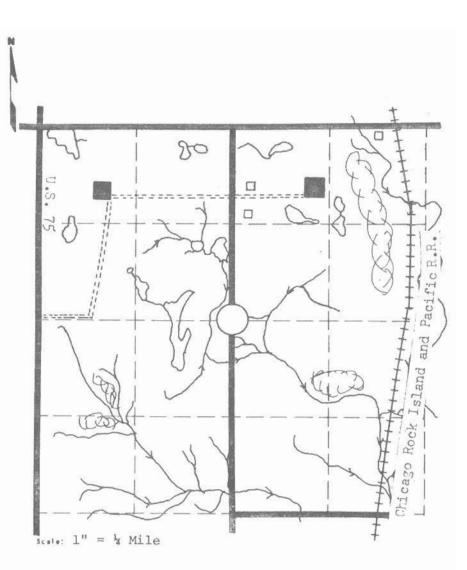
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ne			
110	Coun	Shawnee	
	_ \$0026	10S	Renge 15E
Maggie Lee	Netherland	Route 2 To	peka, Kansas
Y Acce	11.6.1.1, GOOG	d site tocate	d on Plate II
	Maggie Lee	Maggie Lee Netherland	Maggie Lee Netherland Route 2 To

Test	Material	Copth	Depth				Perce	at Ret	sined	411						
Hole	bottom of Hole	of over- Burden	of Material	1 1/2	3/4	3/8	- (4	8	16	30	50	100	Wash 200	G. F.	L.L.	P. 1.
20002																

CORRELATION DATA



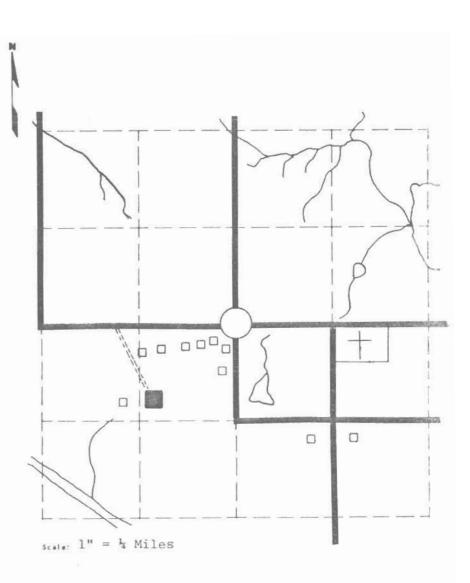


		Date			
of Sand, C	Tay-Graver	Co	unty Silawile	2	
NE' SW4		Sec. 9	rwp118	Ronge 1	5E
Fred &	Laura E. D	oyle 1246	College	Ottawa, Kan	nsas
of Deposit		Fa Fa	ir s.te to		II_

	Material	Pepth	Depth				Perce	nt Ret	ained							
lest Hole	at bottom of Hole	of over- burden	of Haterial	1 1/2	3/4	3/8	4	8	16	30	50	100	200	G.F.	L.L.	P. 1.
			-		0	1	3	7	30	77	90	93	5.94	3.01		

CORRELATION DATA

Geological Age Quaternary Geological Source Glacial Drift Material Similar To S.H.C. Lab. No. 15498 Specific Gravity (Set.) 2.57 (0rg) Los Angeles Wear 30.0 Absorption 2.42 Soundness 0.91 Wt. Cu.ft. 96.19 Str. Ratio



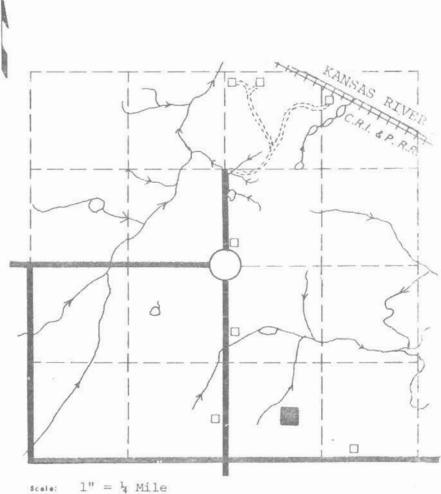
SG+16 Qgd September, 1973 Material Glacial Clay Gravel county Shawnee Location SW4 SE4 sec. 24 Two. 11S Range 13E Owner Floyd Taber 1225 Jewell Avenue Topeka, Kansas Mature of Deposit Dry Accessibility Good Site Located on Plate III Status of Site Open Materials Site; Sampled

EXPLORATION DATA

05/05/0	Material	Pepth	Depth				Perce	nt Ret	ained							
Test Hole	at bottom of Noie	ot over- Burden	Depth of Material	1 1/2	1/4	3/8	1	ð	16	30	50	100	200	G.F.	L.L.	P. 1.
				13	16	29	40	51	63	71	74	78	25	4.22		
	:1															
			-								_					
	-															
												1				

CORRELATION DATA

Seological Age Quaternary	
Geological Source Glacial Drift	
Naterial Similar To S.H.C. Lab. No.	15363
Specific Gravity (Sat.) 2.52	(017) 2.43
Apporation 3.80	Soundness 0.94
	Str. Matio
Benarks	



	Ωal		910										r,]	973		
ateria	San	d-Gra	vel					- 00	ounty	_Sn	awn	ee		5,2773		
	SE4													5.5		
wner -	Artl	hur A	twood	1	R	out	e 2				Si	lve	r La	ke, K	ansa	
atere	of Deposi	t_We	t		ccess	. 5 . 1 .	ty	Fa	ir		Site	Lacat	ed on	Plate -	III	
tatus	of Site -	Op	en Ma	ter	ial	Si	te:	Sa	mpl	ed						
						E	XPLO	RATIO	DAT	ķ.						
	Haterial	Pepth	Depth			_	Perce	ent Ret	ained			_				
Test	nt notion of Hole	of over- Burden	of Material	1 1/2	3/4	3/8	.4	8	16	30	50	100	Wash 200	G.F.	L.L.	P. 1.
					0	2	6	22	51	76	94	99	0.26	3.50		
														Ψ.		
		_							10	10.						
	Commence													8		
eologi	cal Age — cal Sourc	•A	lluvi	um	- No			7								
eologi eteria	cal Sourc	To	SHC 2.	um Lab		0.	339	7		- (Dr))					
eologi ateria peciti os Ang	cal Sourc	To	SHC 2.0	um Lab 62		0.	339	7		- (Dr))					
eologi eteria peciti os Ang	cal Sourc	(sat.)	SHC 2.0	um Lab		0.	339	7	dnes	- (Or))					

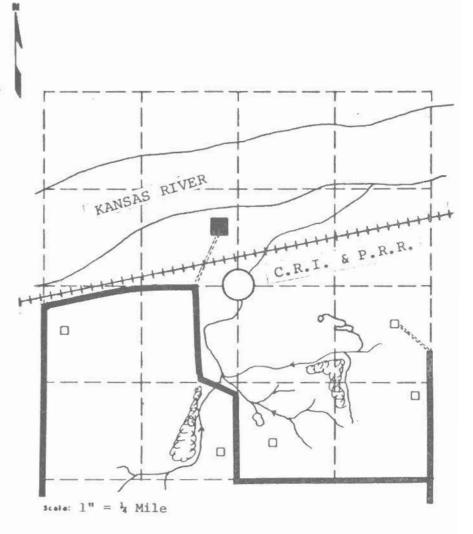
	SG-18								
to ho	Qal			ate	Sept	ember	, 197	73	
terial -	Sand-Grav	rel		County .	Shaw	nee			
	N ¹ 2		sec. 29		T#8	118	Range	15E	
or	Florence	Richardson	3516	N.W.	44th	,Okla	homa	City,	Okla.
ere of	Besonit Wet		Fa Fa	ir	3.1	-		III	
atus of	open	Materials	Site;	Sampl	ed				

EXPLORATION DATA

	Haterial	Pepth	Dopth				Perc	ent Ret	ained							
Test Mole	nt hotton of Note	ot over- Burden	Material	1 1/2	3/4	3/8	4		16	30	50	100	200	B.F.	L.L.	P. I.
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								-		-	-					
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CORRELATION DATA

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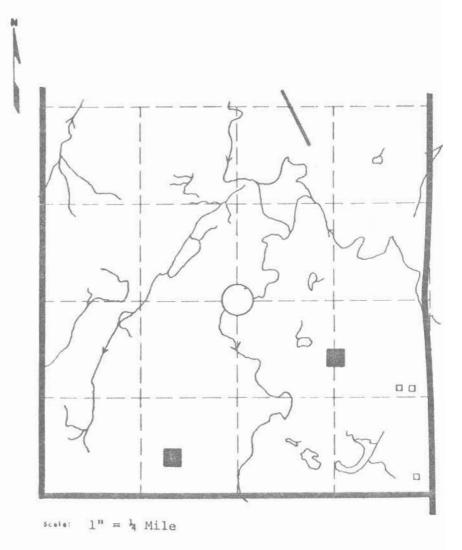
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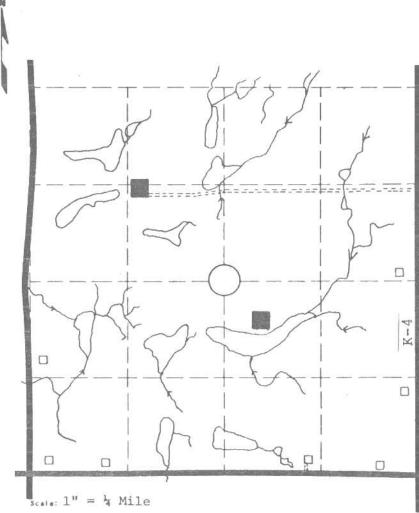
MATERIAL SITE DATA FORM

LS+21 Pbb September, 1973 Site No. -Material Limestone Bureingan 6' county Shawnee tocotion W1 E12 Sec. 3 Twp. 12S Songe 14E Ned N. Fleming Topeka, Ks. P.O. Box 1160 Between of Deposit Dry Accessibility Good Site Located on Plate III Status of Site Open Materials Site; Sampled EXPLORATION DATA 1.L. P.1. 8. F. Haterial 1 1/2 3/4 CORRELATION DATA Sectorical Age Pennsylvanian Bern Limestone Formation - Burlingame Member Motorial Similar to SHC Lab. No. 15271 Specific Gravity (Set.) 2.63 (err) 2.59 Los Angeles Weer _____ 23.5 4000retion 1,56 Soundares 0,96

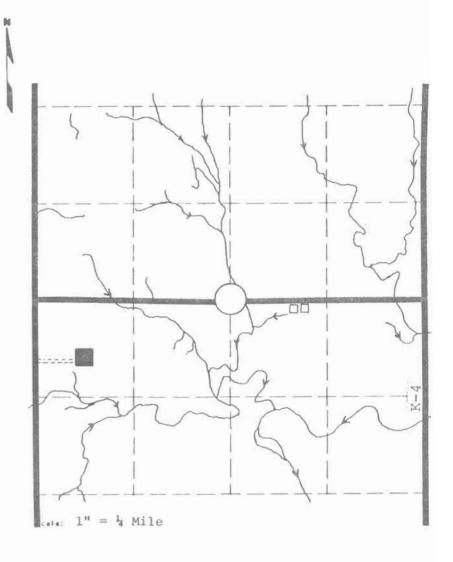
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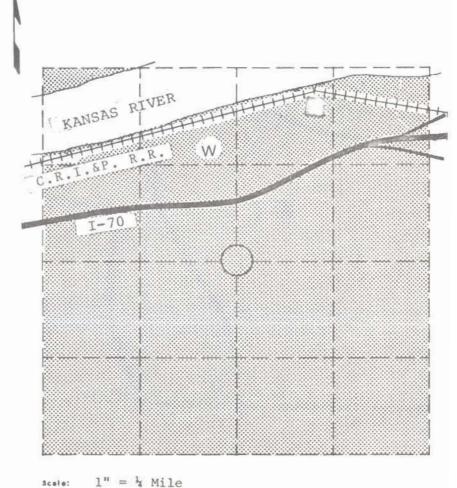
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Ede September, 1973 Limestone County Shawnee NW' SE' September Govern Shawnee Robert Gladfelter, Jr., State Bank, Lancaster, Ks. Robert Gladfelter, Jr., State Bank, Lancaster, Ks. Open Materials Site, Sampled Liftensite Pata Liftensite Pata Referral Person Returns Site Sampled Liftensite September, 1973 Counties Pata Counti	
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Robert Gladfelter, Jr., State Bank, Lancaster, Ks. ***Base*** ***Property Dry ***Cessibility Poor *** State Located on Flate IV ***Open Materials Site; Sampled ***Lancaster, Ks.** ***Open Materials Site; Sampled **Lancaster, Ks.** ***Open Materials Site; Sampled ***Lancaster, Ks.** **Lancaster, Ks.**	
Open Materials Site; Sampled Exploration pata Material New In	d -
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Pennsylvanian Deer Creek Limestone Pormation - Ervine Creek Member SHC Lab. No. 13657 Tic Stavity (Set.) 2.52 (Bry) 2.39	
Pennsylvanian Deer Creek Limestone Pormation - Ervine Creek Member SHC Lab. No. 13657 Decreative (Set.) 2.52 (Pry) 2.39	
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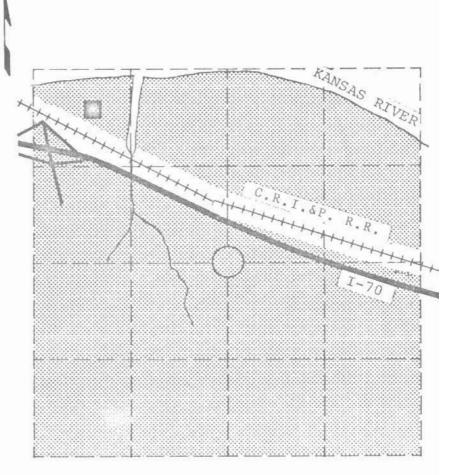


No.	SG- 27 Qal	September, 1973
	Sand & Sand Gravel	
tion -	Foot of Waite Street, 25	Twe. 11S Renge 15E
Vi	ctory Sand Co.	Topeka, Kansas
re of De	oposit Wet Accussibility C	Good Site Located on PlateIV
us of Si	Open Materials Site;	Sampled

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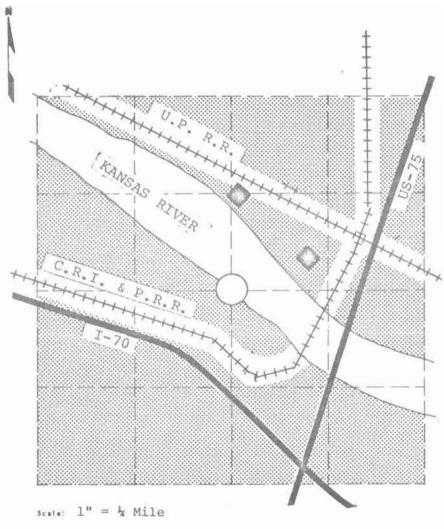
CORRELATION DATA

Quaternary Geological Age — Quaternary Geological Source — Alluvium Noterial Similar to — SHC Lab. No. 15361 Specific Grevity (Sat.) — 2.62 — (Dry) — 38.8 Absorption — 0.6 — Soundness — 0.95 Wt. Cu.ft. — Str. Estio — Geometric Geo

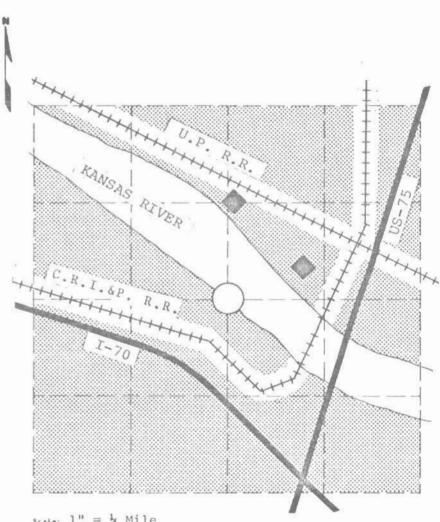


scale: 1" = 4 Mile

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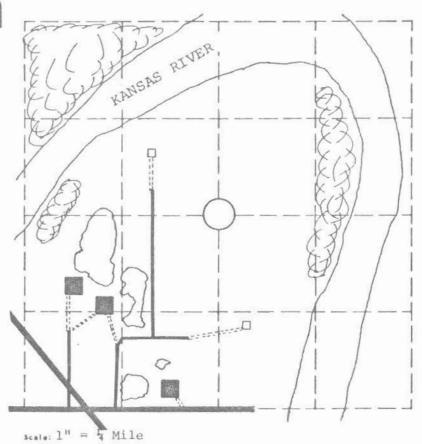
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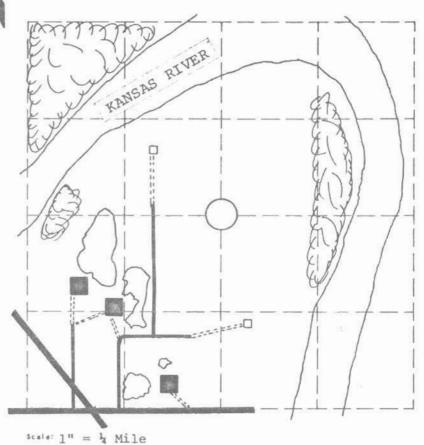
MATERIAL SITE DATA FORM

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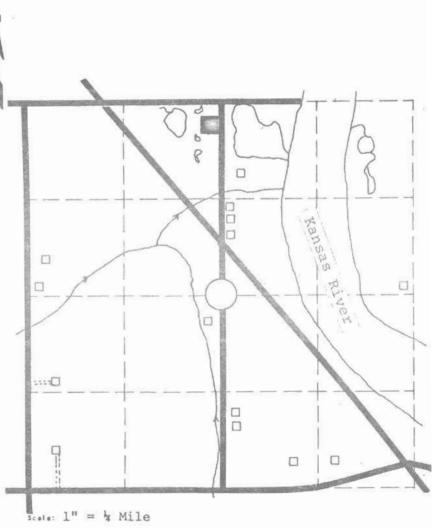
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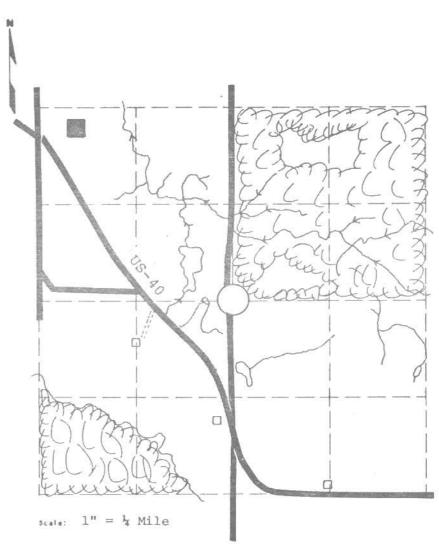


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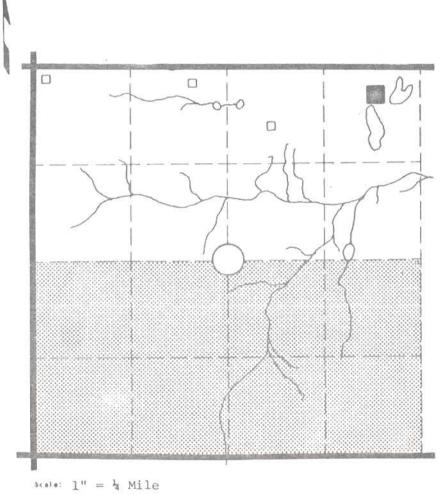


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	\$inilar									an granea.			ALC: Y	4412	A 36.364	B _2845
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turo	of Deposi	t Dr	У			e b olla	ty_C	5 00	d_		Site	Locat	ed on	s Plate -	IV	
atus	of Site -	Ope	n Mat	erı	als		te;									
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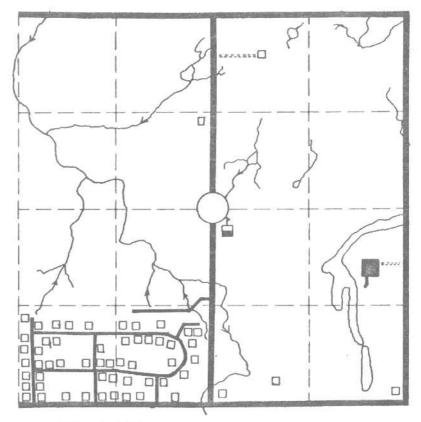
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Ronarks -

MATERIAL SITE DATA FORM

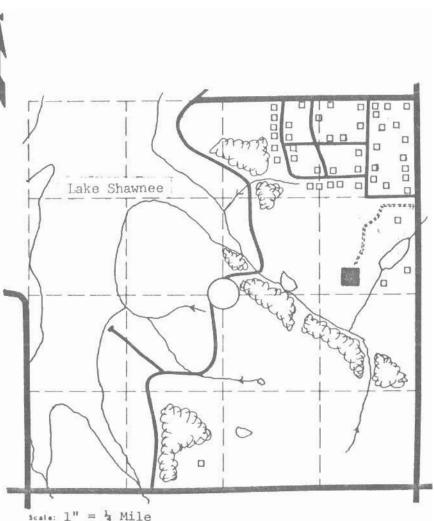
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	or Deposi		0.000										944162	1		
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ng		/ 1	6					Soun	dnesi		0	.97							
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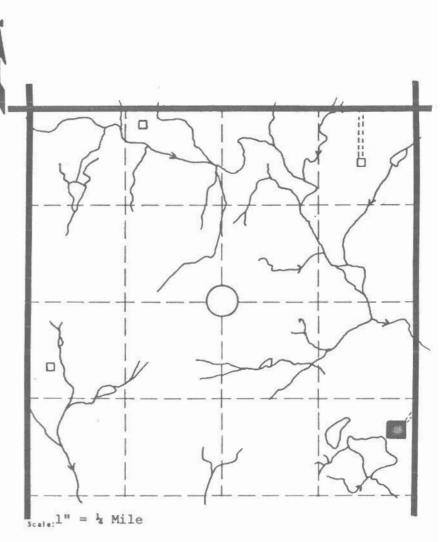


Wt. Cu.Ft. -

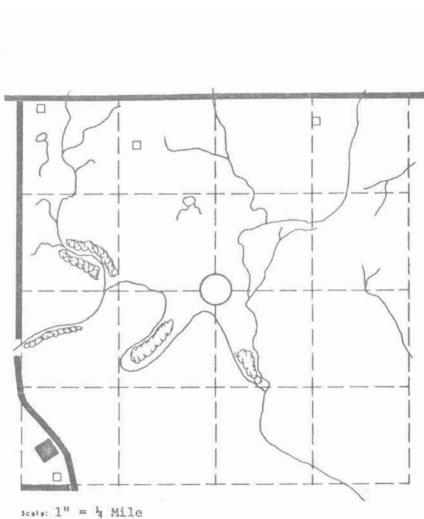
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- Str. Hatio -



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	ol Besoni															
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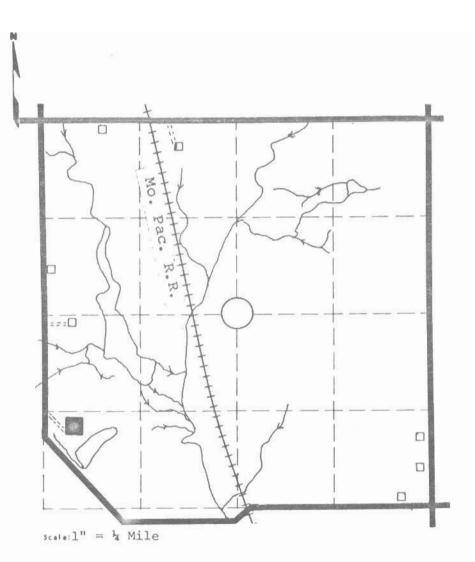
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Alley	, Ella	M.	1125	Taylor	Topeka,	Kansa	S
		u ou c				don Plate	VI
lus of Site	Ope	n Mat	erials S	Site; Sam	pled		

EXPLORATION DATA

Material	Pepth	Denth				Perce	nt Ret	ained							
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CORRELATION DATA

600 logical Source Deer Creek Li	mestone Formation-Ervine Creek Member
Meterial Similar To SHC Lab.	No. 15269
	(ory) 2.32
Los Angeles West35.7	
Assorption 5.53	
Wt. Cw.Ft	str. Ratio
Senarks	



Specific Gravity (Sat.) 2.59

Los Angeles Wear _____28.0

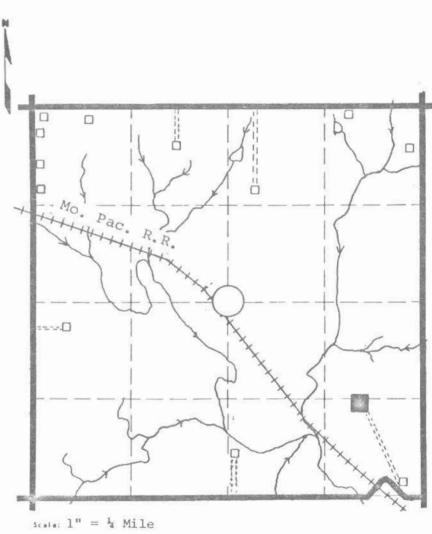
Apportion 1.88

Remarks -

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n Plate	VI
	L.L. P. I
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0.95

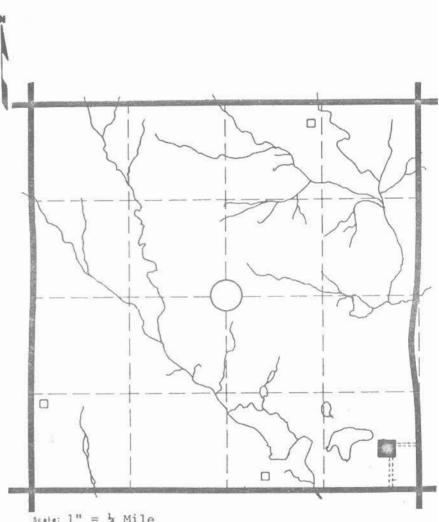
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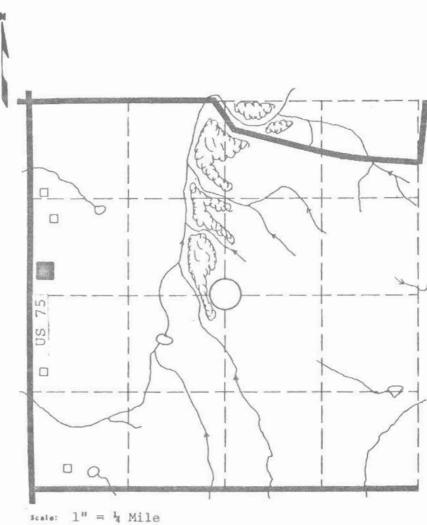
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orpt	ion 1.	43-1	. 76-1	.87				Soun	dness	-0,	.94.	-0.9	33-0	.91				



OPEN MATERIALS SITES; NOT SAMPLED

LEGEND

Road

HHIHHHH Railroad

Hedge or trees

Name Major streams

Intermittent streams

Pond or lake

Open materials sites; not sampled

Open materials sites; sampled

Center of section

Dwelling

Cemetery

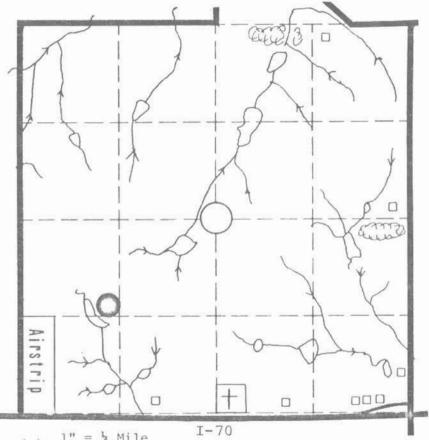
Church

Church

Town or city

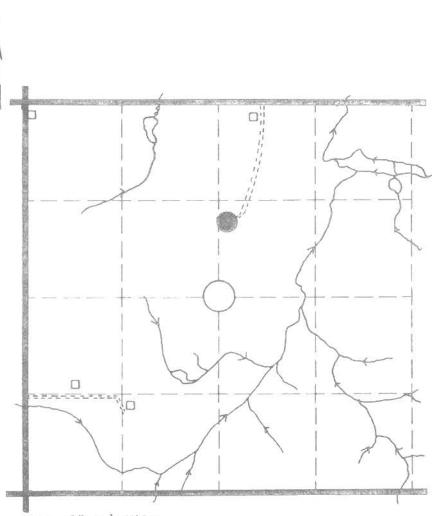
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	S															
	R. D.															
	of Dagosi															
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	of Nole	Burden														
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Owner -	Oscar	H. 8	Inga	V.	Sw	ans	on		Rou	te	8		TOP	peka,	Ks.	
Satura	of Depos	t	-	_ ;	lcc# n s	. 5 : 1 :	ty —				5.10	Locat	ted on	Plate	I	II
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GLOSSARY

A.A.S.H.O.: American Association of State Highway Officials.

Absorption: Determined by tests performed in accordance with A.A.S.H.O. designation T85.

Alluvium: Deposit of clay, silt, sand, or gravel laid down by flowing water.

Aquifer: Water-bearing geologic unit.

Arkosic gravel: Gravel composed of mineral fragments derived from weathered granite.

Bedding: Characteristic of some rock units which shows distinct layers due to the manner in which they were deposited.

Chert: A dull, flint-like, siliceous rock.

Coarse sand: An aggregate of unconsolidated mineral or rock particles, the dimensions of which are not less than 0.42 of a millimeter and not more than 2.00 millimeters.

Degrade: To lower the level of a stream or river valley by stream erosive action.

Exposure pattern: Topographic feature formed on the land surface by the exposure of geologic units.

Fine sand: An aggregate of unconsolidated minerals or rock particles the dimensions of which are not less than 0.05 of a millimeter and not more than 0.42 of a millimeter. The term refers to size of grain and not to composition; however, since most sands are composed of quartz and feldspar, and the term is used without qualifications, a siliceous composition is implied.

Fluvial deposit: Deposits laid down by a river or stream.

Formation: A layer of persistent strata of one general kind of rock.

Fusilinids: Small marine fossils, about the shape and size of a grain of wheat, belonging to the Foraminifera.

Geologic era: Largest unit of geologic time (e.g. Paleozoic, Mesozoic, and Cenozoic).

Geologic period: A unit of geologic time, shorter than an era and longer than an epoch (e.g. Cambrian, Cretaceous, and Tertiary).

Geologic process: Term pertaining to erosion, deposition, and disastrophic methods by which the earth's surface has been shaped.

Glacial drift: A general term for all rock debris which has been transported and deposited either directly by the ice or from the accompanying meltwater of the glacier.

Glaciolacustrine: Term applied to deposits laid down in glacial lakes.

Grading A, B, C, and D: Determined by the abrasive charge for the Los Angeles wear test as specified in A.A.S.H.O. designation T96 and section Y1-14 of the State Highway Commission of Kansas Standard Specifications, 1966 edition.

Ground-water: Water in the zone of saturation, that is, below the water table.

Light type surfacing: A surface course constructed from aggregate which is not bound by water, cement, or bituminous material.

Lithology: Physical properties or rocks such as grain size, mineral content, and color.

Los Angeles wear: Determined by tests performed in accordance with A.A.S.H.O. designation T96 as modified by section Y1-14 of the State Highway Commission of Kansas Standard Specifications, 1966 edition.

Outwash: Material that is transported and deposited by glacial meltwater.

Material source bed: A geologic unit from which construction material is being or can be produced.

Matrix: The fine components of a rock that binds the larger components, sometimes called aroundmass.

Member: A division of a formation, generally of distinct lithologic character or of only local extent

Montmorillonite: A clay mineral which has the outstanding feature of allowing water and other polar molecules to enter into the lattice causing it to expand.

Open materials site: A pit or quarry from which material is produced for possible construction purposes:

Perched groundwater: Groundwater separated from an underlying body of groundwater by unsaturated material.

Physiographic division: A division of the state, based on general geologic and (or) geographic features.

Plasticity index: Determined by tests performed in accordance with section Y1-18 of the State Highway Commission of Kansas Standard Specifications, 1966 edition.

Pleistocene Series: Deposits laid down during the Pleistocene Epoch.

Pliocene Epoch: The youngest major subdivision of the Tertiary Period.

Prospective materials site: A location where the geologic conditions are favorable for finding construction materials.

Quartzite: Metamorphic rock produced by recrystallization of primarily quartz sandstone under heat and pressure. Term is sometimes misapplied for unmetamorphosed sandstone.

Residual soil: In place material resulting from the decomposition of rocks.

Soundness: Determined by tests performed in accordance with section Y1-15 of the State Highway Commission of Kansas Standard Specifications, 1966 edition.

Specific gravity: Determined by tests performed in accordance with A.A.S.H.O. designation T84 for fine aggregate and T85 for coarse aggregate.

Stereoscopic vision: Three-dimensional vision by means of viewing identical images on two photographs exposed from equal distance but at different angles.

Stratigraphic position: The vertical position of a geologic unit in relation to other geologic units.

Terrace: A plain built up by the deposition of sediments by water.

Wash: (Material passing the no. 200 sieve). Determined by tests performed in accordance with A.A.S.H.O. designation T11.

Weathering: The disintegration (physical change) or decomposition (chemical change) of rock by atmospheric agents.

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