MATERIALS INVENTORY SECTION

GENERAL INFORMATION

Permian and Upper Pennsylvanian limestones make up a major part of the construction materials resources in Riley County. Siliceous sand and gravel can be produced from Pleistocene terraces in the Kansas and Big Blue River floodplains, but it is much more economical to produce such material from Recent Alluvium along the Kansas and Big Blue Rivers. A small amount of locally derived limestone gravel, which can be used for light type surfacing, can be found in some of the small streams.

There is also a limited amount of dune sand and a prospective site in glacial material of sand and gravel.

Construction materials types, their uses, and availability are tabulated in figure 7. Test results from a limited amount of sampling and testing are presented in figure 18 (page 25).

CONTENTS

MATERIALS INVENTORY SECTION

TYPE material and geologic source	USE	Page	AVAILABILITY
LIMESTONE Tarkio Limestone Member	Concrete and bituminous aggregate light type surfacing.	16	Moderate source in eastern Riley County. Plates IX & XII.
Cottonwood Limestone Member	Concrete aggregate, light type surfacing, building stone.	17	Moderate source in eastern and southern part of the county. Plates VIII, IX, XI & XII.
Havensville Shale Member "Reef"	Light type surfacing.	18	Very limited source in southeastern corner of the county. Plate XII.
Florence Limestone Member	Light type surfacing.	19	Moderate source in eastern and southern part of Riley County. All plates except IX & XII.
Fort Riley Limestone Member "Rimrock"	Concrete aggregate light type surfacing, riprap, agricultural lime.	20	Moderate source central part of county. Plates XI & XII.
Towanda Limestone Member	Concrete and bituminous aggregate, light type surfacing.	22	Moderate source northwestern part of Riley County. All plates except IX & XII.
SAND AND GRAVEL Glacial Drift	Light type surfacing.	22	Very limited source in northeastern corner. Plate II.
Terrace Deposits (Buck Creek and Newman)	Construction aggregate, light type surfacing.	23	Moderate source in stream and river valleys. Plates VIII, IX, XI, & XII.
Dune Sand	Used as sweetner or mortar sand.	23	Very limited source in Kansas River valley. Plate XI.
Quaternary Alluvium	Concrete and bituminous aggregate and light type surfacing.	24	Good source in Kansas and Big Blue River valleys. Plates VI, VIII, IX, & XII.

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

DESCRIPTION OF CONSTRUCTION MATERIALS

Limestone

Zeandale Limestone Formation

The Zeandale Limestone Formation is composed of two limestone members and one shale member. These members are, in ascending order, the Tarkio Limestone, Wamego Shale, and Maple Hill Limestone.

Tarkio Limestone Member

The Tarkio is a gray-orange to brownish gray, hard, dense, fossiliferous limestone that weathers to a rusty brown. It is composed of two thick limestones separated by a thin shale having a thickness of 0.2 feet (6.1 cm). The shale is olive gray, silty, and calcareous. Each limestone bed is approximately 6 feet (1.8 m) thick. Very large fusulinids, *Triticites ventricosus*, stand out on the weathered surface and give it a "rasp-like" appearance. It is easily recognized by its bold outcrop.

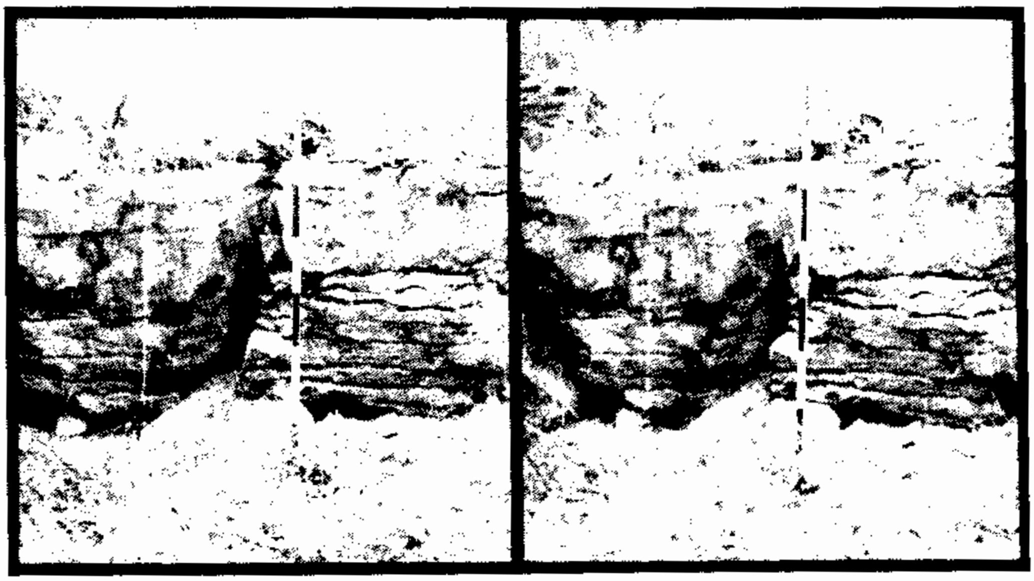


Figure 8. Exposure of Tarkio Limestone Member in the NW ¼, sec. 27, T10S, R9E. (Stereogram)

Quality test data on samples of the Tarkio from open sites indicate the material will meet all current highway specifications for construction aggregate. The Tarkio Member outcrops in the areas shown on plates IX and XII.

Beattie Limestone Formation

The Beattie Limestone Formation is composed of three members which are, in ascending order, the Cottonwood Limestone, Florena Shale, and Morrill Limestone.

Cottonwood Limestone Member

The Cottonwood Member consists of a single, massive limestone layer, with a uniform thickness of 6 feet (1.8 m) throughout the area. This limestone is gray, weathers almost white, and contains a great number of fusulinids. In this area the Cottonwood appears flinty but nodules of partly silicified material weather more slowly and give it the flinty appearance (Jewett, 1941).

Figure 9. Exposure of Cottonwood Limestone Member in the SE ¼, sec. 23, T9S, R7E. (Stereogram)

Many springs issue from the base of this limestone. A resultant bush-line forms at the base of the unit and can be seen for many miles.

Limestone from the Cottonwood Member is the most satisfactory for use as building stone in Riley County. However, only a small amount is currently being quarried for this purpose, but large quantities have been used in the past. Cottonwood Limestone has been produced in large quantities in and near Manhattan. The buildings on the campus of Kansas State University at Manhattan are constructed almost entirely of limestone from this unit.

Quality test data on samples of the Cottonwood from open sites indicate the material will meet specifications for concrete aggregate as well as light type surfacing material and riprap. It may meet specifications for bituminous aggregate when taken from select outcrops. However, tests should be run on any potential quarry sites.

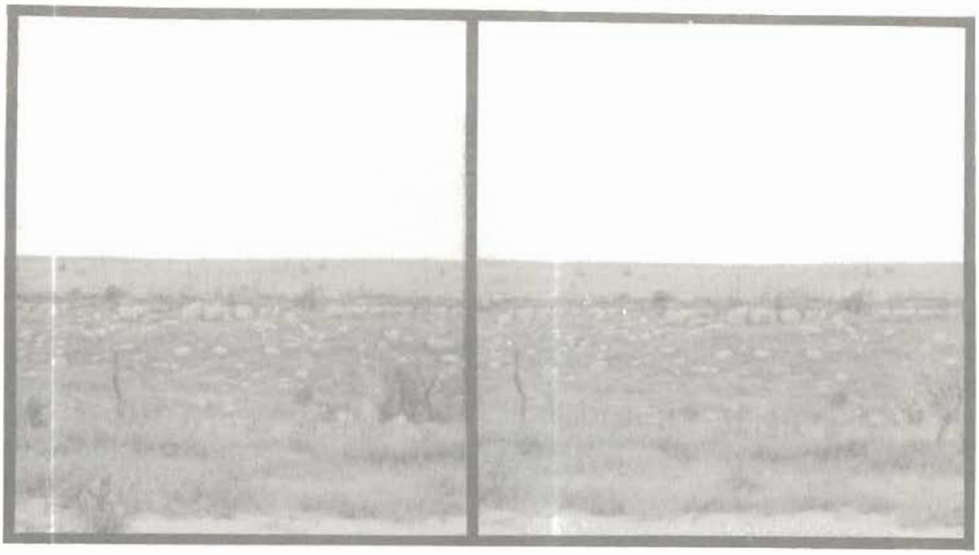


Figure 10. Cottonwood Limestone escarpment showing bush-line. (Stereogram)

The outcrop pattern of the Cottonwood Limestone is shown on plates VI, VII, IX, XI and XII.

Wreford Limestone Formation

The Wreford Limestone is composed of two limestone members and one shale member. These members are, in ascending order, the Threemile Limestone, Havensville Shale, and Schroyer Limestone. The Wreford Limestone has an approximate thickness of 40 feet (12.2m) in Riley County.

Havensville Limestone Member

The Havensville Shale Member is a gray-green,calcareous, argillaceous, fossiliferous shale. Several limestone zones of variable thickness occur throughout the member. Locally the lower portion has undergone a change in lithology due to a change in depositional environment. This resulted in a bioherm or reel-like mass of rock commonly referred to as the "Havensville Reef". This change can be observed along I-70 in the E½, sec. 29, T11S, R9E. The approximate thickness of the bioherm at this location is 10 feet (3m). During the time of this study there were no active "Havensville Reef" quarries. Quality test data on samples of the "Havensville Reef" from open sites indicate the material will not meet current Kansas Department of Transportation specifications for construction aggregate. The Havensville Limestone was not mapped for this report; however, a sampled open materials site is located on plate XII.

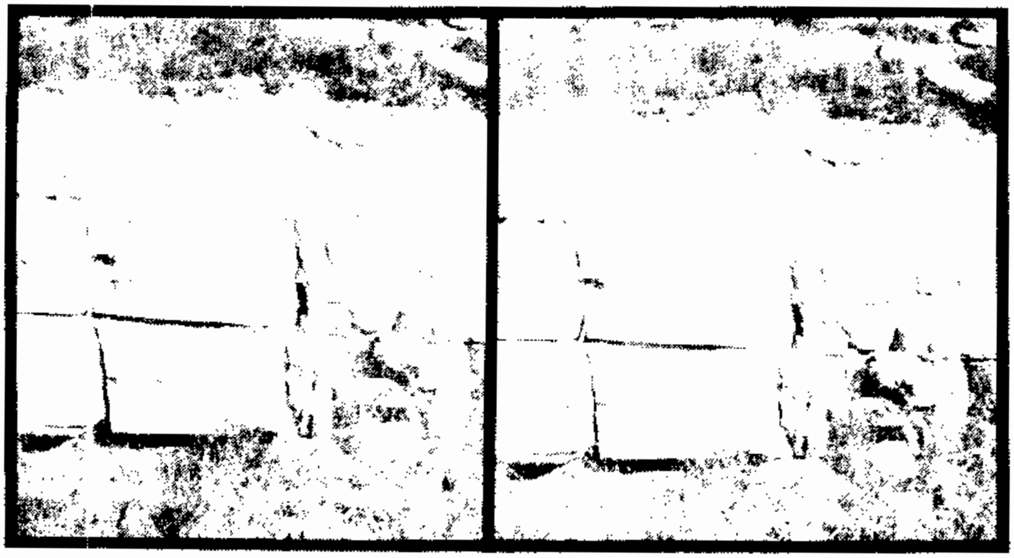


Figure 11. "Havensville Reef" exposed in backslope along I-70. E½, sec. 29, T11S, R9E. (Stereogram)

Barneston Limestone Formation

The Barneston Limestone is composed of two limestone members and one shale member. These members are, in ascending order, Florence Limestone, Oketo Shale, and Fort Riley Limestone. The total thickness of the formation in Riley County is in excess of 64 feet (19.5m).

Florence Limestone Member

The Florence Limestone is a light-gray, thin-bedded to massive unit that weathers to a light tan in color. The total thickness of this member is 15 to 30 feet (4.6 to 9.1m). The Florence is a very distinct bed due to the large amount of steel-gray chert embedded within the limestone. The chert consists of very irregular nodules, which are arranged in layers 1 to 6 inches (2.5 to 15.2 cm) thick. Nonflinty limestone layers are approximately 9 inches (22.9 cm) thick and represent about 15% of the member. There are commonly two shale partings in the upper 10 feet (3m) and one shale parting in the lower 5 feet (1.5m). This member is easily recognized by its outcrop expression, and the abundance of chert it contains.

This material will not meet the Kansas Department of Transportation specifications for use either in concrete or bituminous construction. The only active quarry is located on the Fort Riley Military Reservation where it is being used for light type surfacing.

The Florence Limestone was not mapped. However, the top of the Florence is located approximately 9 feet (2.7m) below the Fort Riley "rimrock" which was mapped on all plates, except IX and XII.

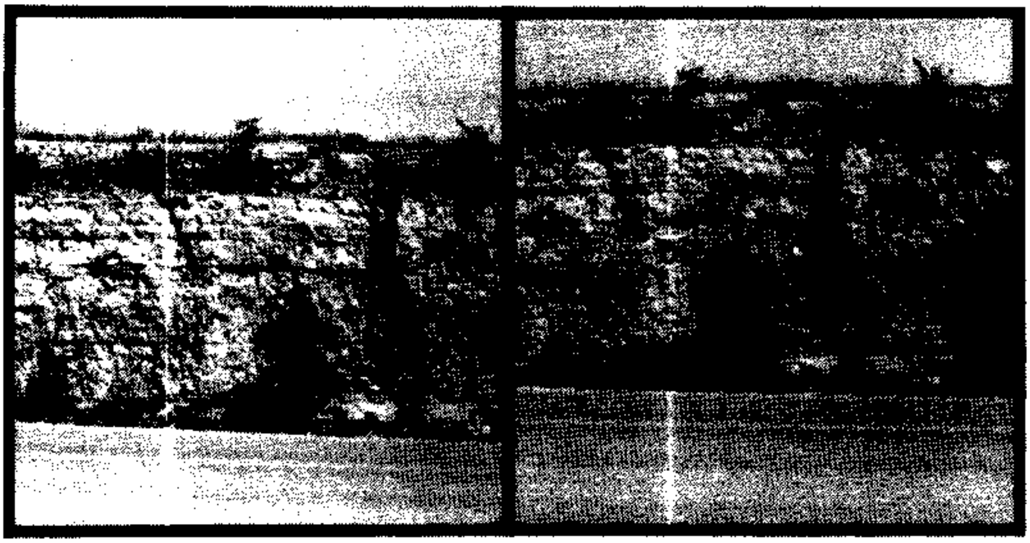


Figure 12. Florence Limestone in backslope along US-24, SW¼, sec. 22, T9S, R7E. (Stereogram)

Fort Riley Limestone Member

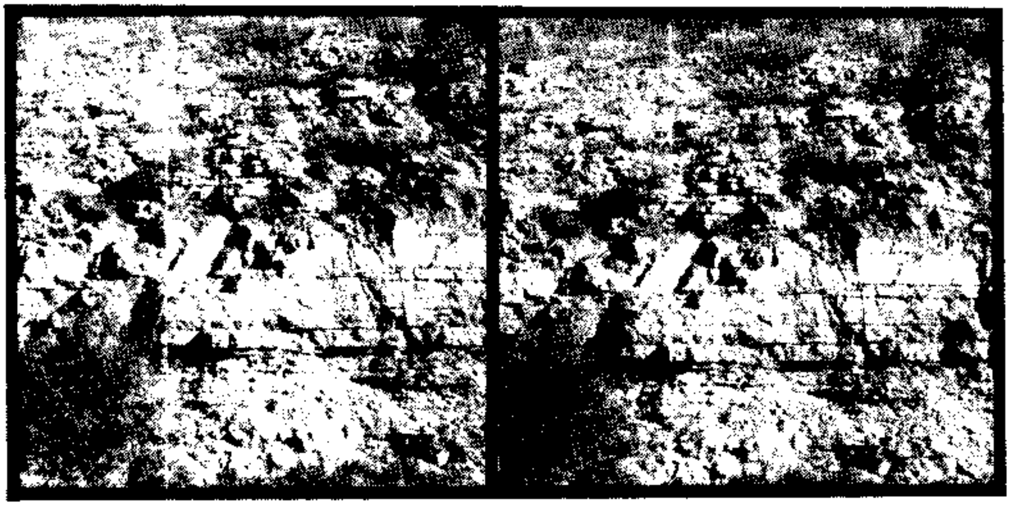


Figure 13. Exposure of Fort Riley Limestone Member in the SE¼, sec. 21, T9S, R7E. (Stereogram)

The Fort Riley Limestone is a soft, fine textured, gray limestone which weathers to a light tan color. A massive bed of limestone termed the "rimrock" zone, occurs near the base of the unit. The "rimrock", which may be as much as 6 feet (1.8m) thick, was used extensively in earlier years for building stone. Total thickness of this member is approximately 26 feet (7.9m). Bedding and joint planes in the thinner-bedded and more argillaceous strata below the "rimrock" carry a moderate amount of ground water and many springs issue from this zone.

Figure 14. "Rimrock" escarpment in S½, sec. 32, T6S, R6E. (Stereogram)

Material from the Fort Riley, other than the "rimrock", is of low quality and probably not suitable for use in concrete or bituminous construction. It is undesirable for use as a light type surfacing material due to its soft nature. Although some material from this source has been used for light type surfacing, its major use today is for agricultural lime. Quality test data on samples of the "rimrock" from select open sites indicate that it will meet specifications for concrete aggregate as well as light type surfacing. The U.S. Army Corps of Engineers used the "rimrock" in the Tuttle Creek Reservoir area on dikes and fills subject to periodic water action above conservation level. However, tests should be run on material from any potential quarry sites. The "rimrock" was mapped on all plates but IV and XII.

Doyle Shale Formation

The Doyle Shale Formation is composed of two shale members and one limestone member. These members are, in ascending order, Holmesville Shale, Towanda Limestone, and Gage Shale.

Towanda Limestone Member

The Towanda Member is a yellow to tan-brown massive, dense, hard, unfossiliferous limestone that weathers to form small blocks and plates. Limonite stains and nodules are abundant on weathered surfaces. It may contain one or more lensing shale parting. The thickness throughout the area ranges from 19 to 23 feet (5.8 to 7.0m).

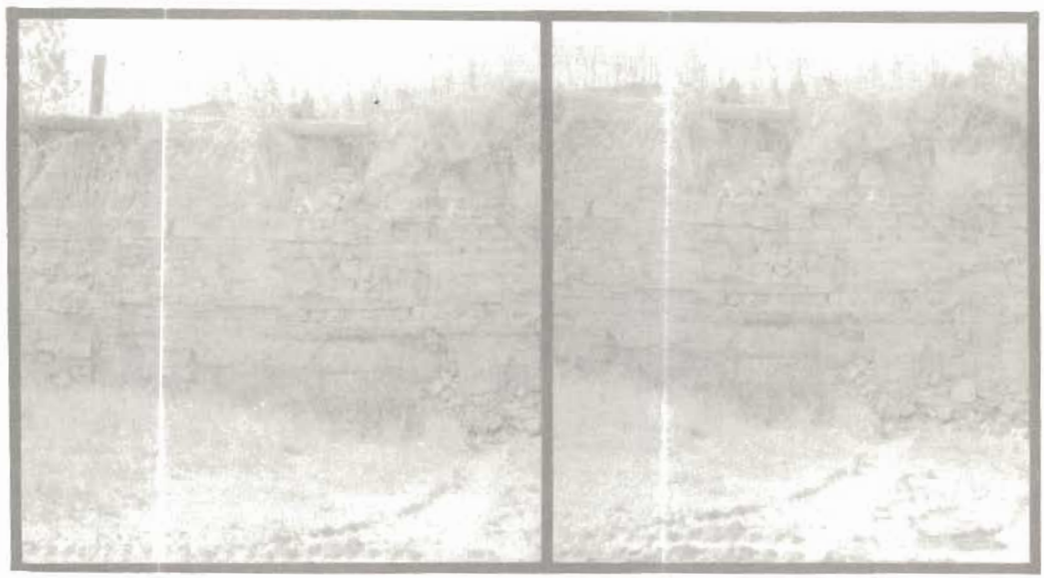


Figure 15. Towanda Limestone Member exposed in the face of a quarry in the SE¼, sec. 11, T9S, R4E. (Stereogram)

Quality test data on samples of the Towanda Limestone from open sites indicate the material will meet all current KDOT specifications for construction aggregate.

The Towanda Limestone outcrops in the areas shown on plates I, II, III, IV, V, VI, VII and X.

Sand and Gravel

Glacial Drift

Glacial drift is the term used here to include all material deposited directly or indirectly by glacial ice. In Marshall County, which is located just north of Riley County, the composition of Kansan Till is mostly silt and clay. However, some localized areas contain deposits of sand and gravel. The location of scattered sand and gravel deposits is of concern since material of this type may be used for light type surfacing. A glacial deposit of sand and gravel with clay and silt binder was noted on aerial photographs and in the backslope of a county road (SE¼ sec. 2, T6S, R7E, plate II). The extent and thickness of this deposit will have to be determined by drilling. This area has been included as a prospective site for light type surfacing material on Plate II.

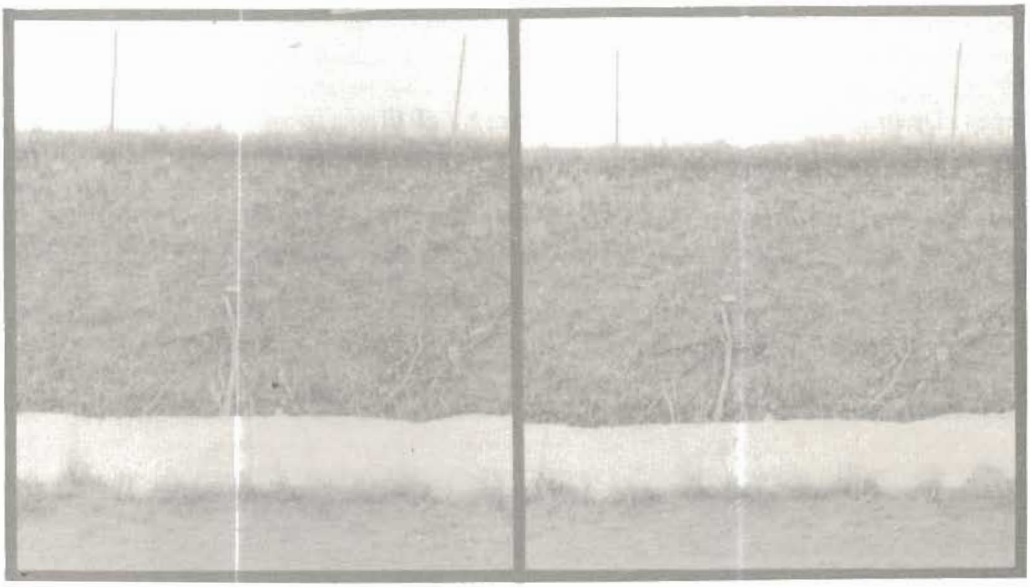


Figure 16. Glacial drift exposed in a backslope on the side SE¼, sec. 2, T6S, R7E. (Stereogram)

Terrace Deposits

Terrace deposits of Quaternary age are present in major stream valleys in Riley County. Two were mapped, the Buck Creek Terrace of Illinoisan age and the Newman Terrace of Wisconsinan age (plates VIII, IX, XI and XII). The upper ± 40 feet (12.2m) of each terrace is composed of varying combinations of fine sand, silt, and clay. Granular material is found at depth, but has not been produced from this source in the county due to the relatively thick overburden. The Buck Creek Terrace is ± 95 feet (29m) thick and the Newman Terrace is ± 70 feet (21.3m) thick in Riley County.

Pleistocene terraces may assume a greater economic importance as a source of sand and gravel in coming years due to increasing environmental regulation of dredging operations in stream channels.

Terrace deposits have been mapped on plates VIII, IX, XI, and XII.

Dune Sand

Sand dunes of Recent age are found southwest of Manhattan in the valley of the Kansas River (plates VIII and XI). Dunes are comprised of mineral particles of sand size that have been deposited by the wind. They are tan-gray in color, exhibit hummocky topography, and are typically crossbedded. At the time of this study they were well covered with vegetation. Their thickness varies from a feather edge to approximately 25 feet (7.6m). The dune sand can generally be used as mortar sand. However, tests should be run on this material before use from any location.

Quaternary Alluvium

The alluvium of the Kansas and Big Blue Rivers is an excellent source of large quantities of granular material. This material consists of fine sand to coarse gravel composed dominantly of quart, feldspar, chert, calcite, and limestone fragments. It is produced through pumping operations because of the relatively high water table in these valleys. During production oversized chert and limestone are screened out and discarded because of their deleterious nature. The alluvium has an approximate thickness of 100 feet (30.5m) in Riley County. Sand and gravel, obtained from Kansas and Big Blue River alluvium, will meet current KDOT specifications for all types of construction aggregate. However, when chert from these deposits are used with cement, the cement is susceptible to expansion, cracking and distress. To alleviate these problems prescribed amounts of sweetner such as limestone, sandstone, or specified sand and gravel must be added to meet KDOT standard specifications.

The alluvium has been mapped on plates VIII, IX, X, XI, and XII.

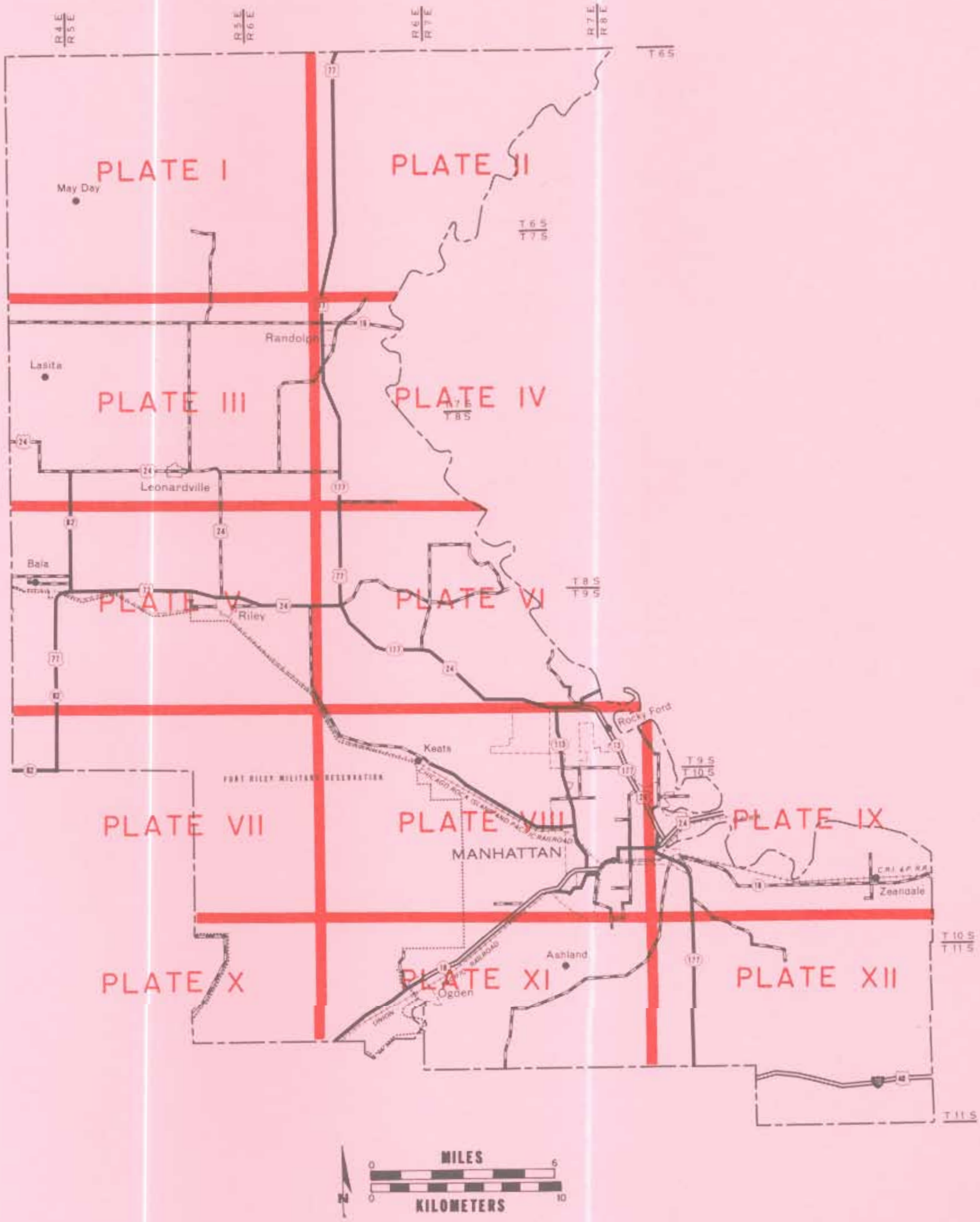
Figure 17. Sand pumping operation in the Blue River.

Site Data Form No.	Material Type	Date of Test	Percent Retained								Wash 200	G.F.	Sp.Gr. Sat.	Sp.Gr. Dry	Weight Cu. Ft.	% Wear	% Soundness	% Absorption	Source of Data SHC Lab. No.	Type of Sample
			3/4	3/8	4	8	16	30	50	100										
Source of Material: Alluvium Qal																				
SG+7	Sand & Gravel	2-62	3	7	17	35	55	79	94	99	0.25	3.90	2.61		116.18	35.8	0.97	0.5	18973	
FS+25	Fine Sand	3-63											2.59					0.6	23273	
FS+26	Fine Sand	2-7-66											2.61					0.30	65-4272	
SG+27	Sand & Gravel	3-1-57											2.59		108.2	37.3(D)	0.97	0.5	96545	
SG+28	Sand & Gravel	3-4-59											2.62		114.0		0.97	0.40	96544	
SG+29	Sand & Gravel	2-61	0	3	21	60	90	97	99	99	0.95	4.69	2.61		107.30	34.4	0.97	0.90	14860	
SG+33	Sand & Gravel	2-17-64											2.50			27.4		3.43	31914	
SG+34	Sand & Gravel	2-61	0	3	12	27	42	65	92	98	0.56	3.39	2.61		115.68	36.8	0.98	0.5	15548	
SG+42	Sand & Gravel	2-61											2.62		112.86	35.6	0.95	0.6	15279	
LS+52	Limestone Gravel	3-4-59	48	80	93	96					0.56		2.45		95.2	27.4(H)	0.95		53717	
Source of Material: Doyle Shale Formation (Towanda Limestone Member) Pdt																				
LS+1	Limestone	3-29-68											2.35	2.17		42.9(B)	0.81	8.01	67-4573	Crushed
LS+3	Limestone	3-4-68											2.51	2.43		32.7	0.93	3.42	67-2482	Crushed
													2.50	2.41		35.8	0.92	3.42	67-3027	Crushed
LS+8	Limestone	2-61											2.46	2.35		32.0	0.89	4.86	11657	Crushed
													2.44	2.32				5.51	11697 A	Crushed
													2.46	2.34				4.98	11697 B	Crushed
													2.48	2.38				4.42	11697 C	Crushed
LS+9	Limestone	2-61											2.52	2.42		28.6	0.89	4.18	8807	Crushed
LS-10	Limestone	3-4-59											2.50			32.9(A)	0.95	3.06	49442	Crushed
													2.22			28.4(A)	0.95	2.77	49443	Crushed
LS+11	Limestone	3-4-68											2.45	2.36		31.6(B)	0.93	4.03	67-1935	Crushed
													2.48	2.40		28.5(B)	0.97	3.34	67-2769	Crushed
													2.43	2.32		34.1(B)	0.95	4.66	67-2484	Crushed
LS+12	Limestone	3-4-59											2.37			37.2(B)	0.95	6.00	84677	Crushed
													2.37			32.6(B)	0.95	5.70	85678	Crushed
													2.11			45.0(B)	0.93	8.10	85679	Crushed
													2.13			39.0(B)	0.98	7.40	85680	Crushed
													2.31			37.0(B)	0.92	6.93	86234	Crushed
LS+13	Limestone	2-28-63											2.43	2.34				4.15	24342	Crushed
													2.43	2.33				4.14		Crushed
													2.43	2.32				4.33		Crushed
LS+15	Limestone	3-4-59											2.61			25.8(A)	0.96	2.16	76268	Crushed
LS+16	Limestone	2-62											2.68	2.47				2.54	23129	Crushed
													2.65	2.47				2.54	23129	Crushed
													2.79	2.47				2.54	23129	Crushed
LS+17	Limestone	3-4-59											2.53			32.3(A)	0.86	2.04	49444	Crushed
													2.44			30.5(A)	0.91	2.72	49445	Crushed
LS+18	Limestone	3-4-59											2.48			28.0(B)	0.98	3.28	95534	Crushed
LS+19	Limestone	2-61											2.44	2.35		31.2	0.98	3.87	15625	Crushed
													2.46	2.37				3.71	15788	Crushed
LS+21	Limestone	1-14-65											2.38	2.25		33.4(B)	0.89	5.93	38039	Crushed
Source of Material: Barneston Limestone Formation (Fort Riley Limestone Member) Pbfr																				
LS-2	Limestone	3-4-59											2.22			52.4	0.77	7.82	49439	Crushed
													2.34			49.5	0.98	4.18	49440	Crushed
													2.43			33.6	0.89	4.51	49441	Crushed
LS-4	Limestone	2-61											2.32	2.14		47.5	0.88	8.49	14072	Crushed
													2.36	2.22		42.1	0.90	6.47	14614	Crushed
													2.37	2.18		58.1	0.64		14418	Crushed
LS+5	Limestone	3-20-69											2.56	2.48		26.9(B)	0.97	3.07	68-399	Crushed
LS+6	Limestone	2-27-68											2.56	2.49		29.2(B)	0.97	2.97	67-3763	Crushed
Source of Material: Wreford Limestone Formation (Havensville Shale Member) Pwh																				
LS+45	Limestone	3-4-59											2.28			52.5(A)	0.95	6.17	81636	Crushed
																53.8(A)				Crushed
Source of Material: Beattie Limestone Formation (Cottonwood Limestone Member) Pbc																				
LS+20	Limestone	3-4-59											2.38			44.6(B)	0.92	6.53	92218	Crushed
LS+22	Limestone	2-61											2.39	2.23		47.8	0.77	6.95	3069	Crushed
LS+23	Limestone	3-4-59											2.51			33.6(B)	0.97	3.54	96543	Crushed
LS+41	Limestone	2-17-64											2.43	2.31		30.5(B)		5.25	65-750	Crushed
LS+43	Limestone	2-28-63											2.41	2.28				5.73	24877	Crushed
													2.42	2.29				5.41	24877	Crushed
													2.41	2.29				5.49	24877	Crushed
LS+44	Limestone	2-62											2.43	2.31		39.7(B)	0.90	5.55	21039	Crushed
													2.43	2.31				5.53	21040	Crushed
													2.43	2.30				5.63	21040	Crushed
													2.43	2.30				5.74	21040	Crushed
Source of Material: Grenola Limestone Formation (Neva Limestone Member) Pgn																				
LS+23	Limestone	3-4-59											2.51			33.6(B)	0.97	3.54	96543	Crushed
LS+24	Limestone	3-4-59											2.49			32.2(A)	0.91	3.09	50150	Crushed
													2.54			30.6(A)	0.97	2.20	50151	Crushed
													2.51			36.5(B)	0.87	4.68	79577	Crushed
LS+30	Limestone	3-4-59											2.50			32.3(A)	0.88	3.15	49446	Crushed
													2.44			37.2(A)	0.47	4.12	49447	Crushed
													[illegible]			33.7(A)	0.82	3.96	49448	Crushed
													2.40			38.5(A)	0.83	4.88	49449	Crushed
													2.49			30.9(A)	0.89	2.84	49450	Crushed
LS+32	Limestone	12-28-65											2.51	2.41		30.5(B)	0.89	3.93	65-854	Crushed
													2.51 A	2.42				3.71	65-855	Crushed
													2.51 B	2.42				3.83		Crushed
													2.51 C	2.42				3.77		Crushed
LS+40	Limestone	3-4-59											2.34			43.0(B)	0.87	8.77	93202	Crushed
													2.30			50.6(B)	0.72	8.63	93203	Crushed
Source of Material: Zeandale Limestone Formation (Tarkio Limestone Member) Pzt																				
LS+35	Limestone	12-29-65											2.54	2.46		28.3(B)	0.98	3.31	65-4273	Crushed
													2.61	2.55				2.17	65-2826	Crushed
													2.61	2.55				2.14	65-2825	Crushed
													2.60	2.56				1.92		Crushed
													2.60	2.55				2.21		Crushed
LS+36	Limestone	3-3-67											2.62	2.56				2.32	62-244	Crushed
LS+37	Limestone	2-62											2.61	2.54		36.9	0.95	2.73	13109	Crushed
LS+38	Limestone	2-61											2.61	2.54				2.79	13109	Crushed
LS+50	Limestone	3-4-59											2.60	2.53				2.85	13109	Crushed
													2.58	2.48				2.67	12919	Crushed
													2.61			31.5(A)	0.97	1.62	57236	Crushed
													2.56			35.1(A)	0.89	2.95	57237	Crushed
													2.63			29.6(A)	0.93	1.04	57238	Crushed

Figure 18. Results of test completed on samples of material from the various geologic source beds in Riley County.

RILEY COUNTY MATERIALS MAP INDEX

On the following pages are the twelve plates covering Riley County as shown below.



Note: The individual site data forms follow plate XII.

LEGEND

MATERIALS SITE DESIGNATIONS

Open Materials Sites; Sampled — Page 30

Open Materials Sites; Not Sampled — Page 78

Prospective Materi als Sites; Not Sampled — Page 88

LS+1 / Pdt

- Material Type
- Estimated Quantity
  - + indicates more than 20,000 cubic yards
  - - indicates less than 20,000 cubic yards
- **Reference to site number of following data forms**
- Geological Age and Unit

SG Sand Gravel
FS Fine Sand
LS Limestone

GEOLOGY

Unit	Symbol
Alluvium	Qal
Dune Sand	Qds
Wisconsinan Terrace	Qtw
Buck Creek Terrace	Qbc
Kansan Glacial Drift	Qkd
Towanda Ls. Mbr.	Pdt
Fort Riley Ls. Mbr.	Pbfr
Cottonwood Ls. Mbr.	Pbc
Tarkio Ls. Mbr.	Pzt
Igneous Rock (Kimberlite)	Kbi

——— Geologic Unit Exposed

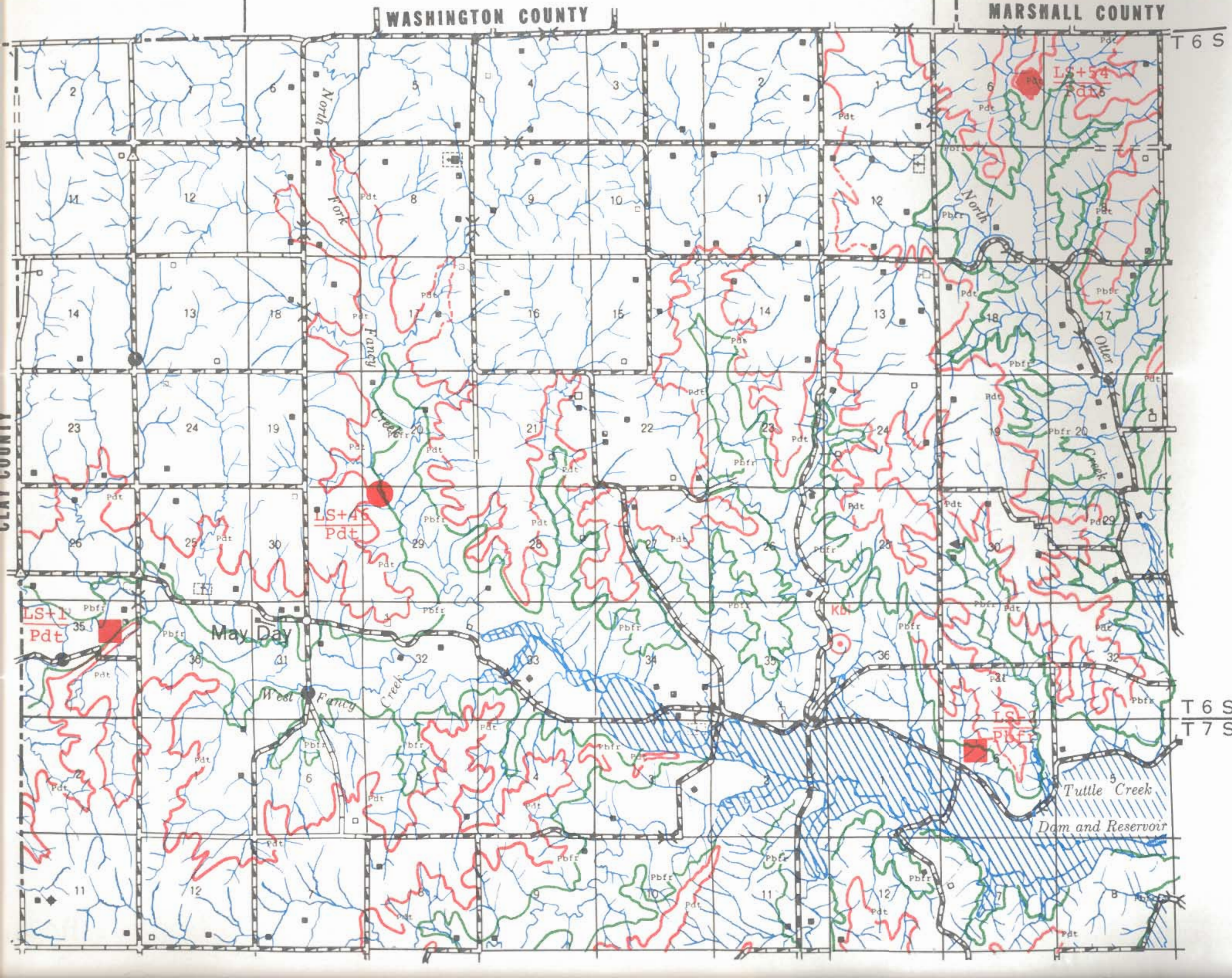
------- Geologic Unit Not Exposed

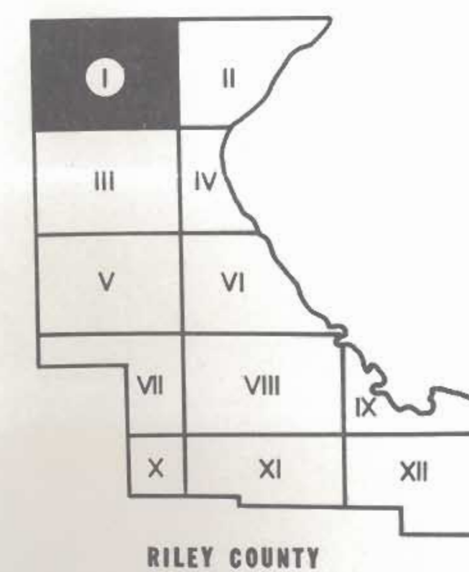
MILES

1 0 1 2 3 4

1 0 1 2 3 4 5

KILOMETERS


WASHINGTON COUNTY
MARSHALL COUNTY
CLAY COUNTY
T 6 S
T 7 S
LS+54
Pdt
LS+46
Pdt
LS+1
Pdt
LS+1
Pbfr
May Day
North Fork Fancy Creek
West Fancy Creek
Otter Creek
Tuttle Creek
Dam and Reservoir
Pdt
Pbfr
Kbl


I
II
III
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VII
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IX
X
XI
XII
RILEY COUNTY

LEGEND

MATERIALS SITE DESIGNATIONS

Open Materials Sites; Sampled	Page 30
Open Materials Sites; Not Sampled	Page 78
Prospective Materi als Sites; Not Sampled	Page 88

LS+1
Pdt

Material Type

Estimated Quantity

+ indicates more than 20,000 cubic yards
- indicates less than 20,000 cubic yards

Reference to site number of following data forms

Geological Age and Unit

SG Sand Gravel
FS Fine Sand
LS Limestone

GEOLOGY

Alluvium — Qal

Dune Sand — Qds

Wisconsinan Terrace — Qtw

Buck Creek Terrace — Qbc

Kansan Glacial Drift — Qgd

Towanda Ls. Mbr. — Pdt

Fort Riley Ls. Mbr. — Pbfr

Cottonwood Ls. Mbr. — Pbc

Tarkio Ls. Mbr. — Pzt

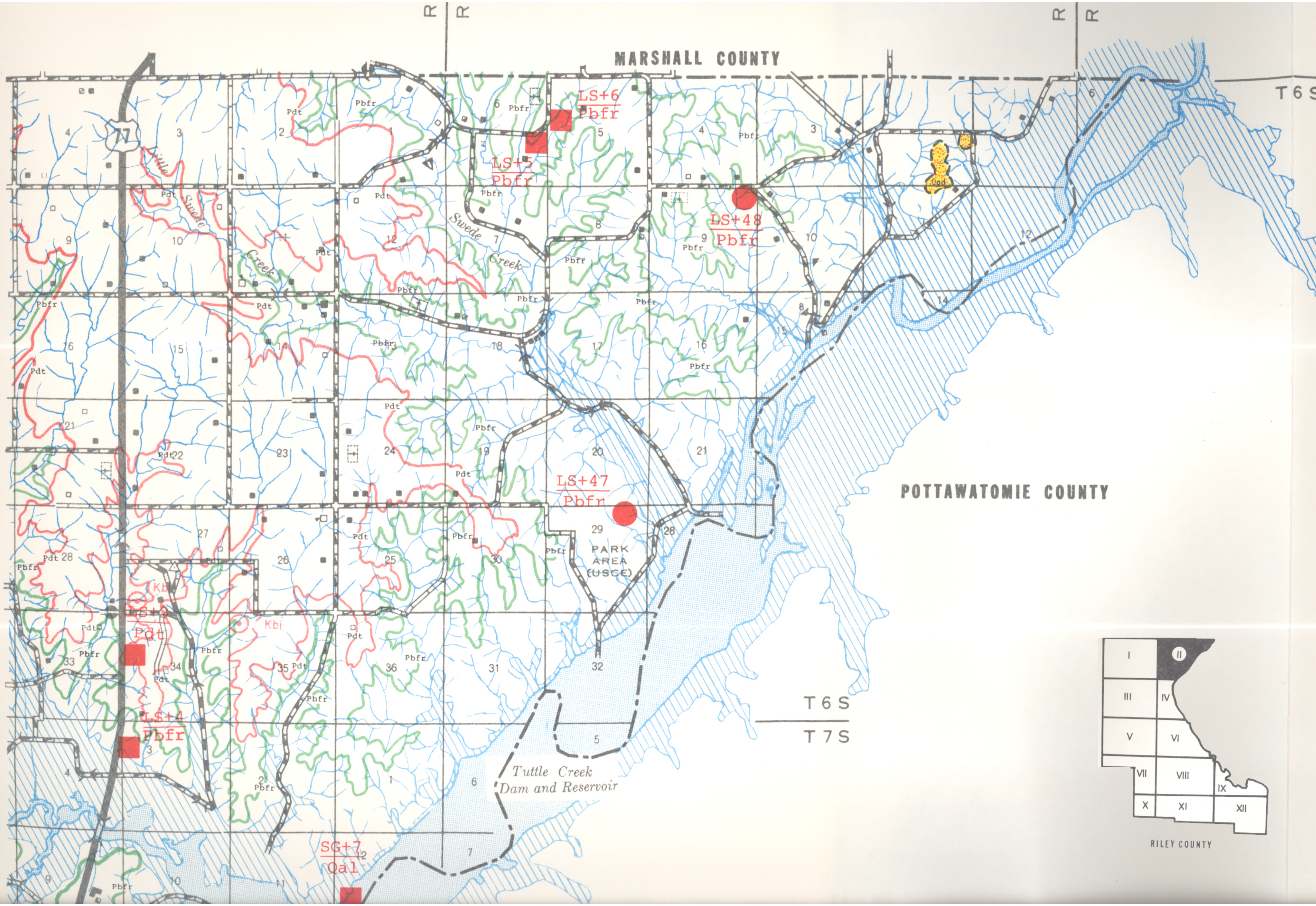
Igneous Rock (Kimberlite) — Kbi

——— Geologic Unit Exposed

- - - - - - - Geologic Unit Not Exposed

MILES
1 0 1 2 3 4

1 0 1 2 3 4 5
KILOMETERS


MARSHALL COUNTY
POTTAWATOMIE COUNTY
T 6 S
T 7 S
77
Little Swede Creek
Swede Creek
LS+6
Pbfr
LS+5
Pbfr
LS+48
Pbfr
LS+47
Pbfr
PARK AREA (USCE)
LS+3
Pdt
LS+4
Pbfr
SG+7
Qal
Kbi
Pdt
Qal
Tuttle Creek Dam and Reservoir
I
II
III
IV
V
VI
VII
VIII
IX
X
XI
XII
RILEY COUNTY

LEGEND

MATERIALS SITE DESIGNATIONS

■	Open Materials Sites; Sampled	Page 30
●	Open Materials Sites; Not Sampled	Page 78
⬢	Prospective Materi als Sites; Not Sampled	Page 88

LS+1 / Pdt

Material Type

Estimated Quantity

+ indicates more than 20,000 cubic yards
- indicates less than 20,000 cubic yards

Reference to site number of following data forms

Geological Age and Unit

SG Sand Gravel
FS Fine Sand
LS Limestone

GEOLOGY

Alluvium — Qal

Dune Sand — Qds

Wisconsinan Terrace — Qtw

Buck Creek Terrace — Qbc

Kansan Glacial Drift — Qgd

Towanda Ls. Mbr. — Pdt

Fort Riley Ls. Mbr. — Pbfr

Cottonwood Ls. Mbr. — Pbc

Tarkio Ls. Mbr. — Ptt

Igneous Rock (Kimberlite) — Kbi

——— Geologic Unit Exposed

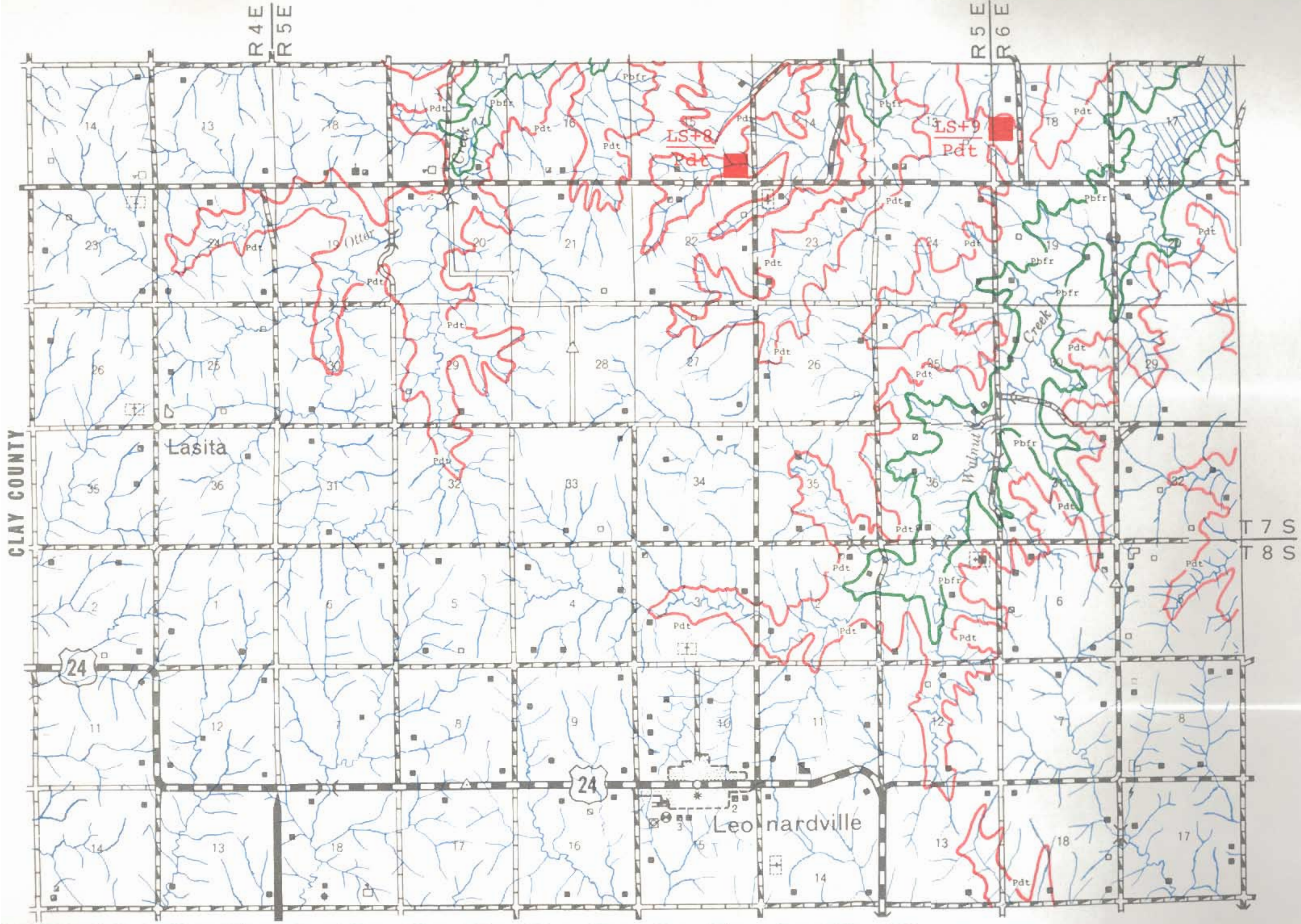
------- Geologic Unit Not Exposed

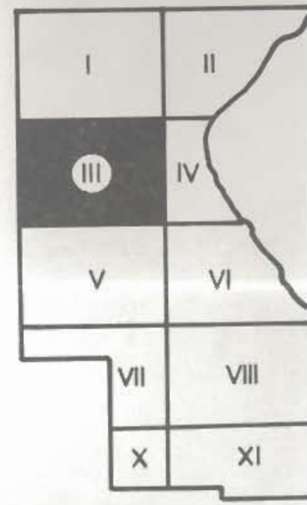
MILES

1 0 1 2 3 4

1 0 1 2 3 4 5

KILOMETERS


R 4 E
R 5 E
R 5 E
R 6 E
CLAY COUNTY
LS+8
Pdt
LS+9
Pdt
Pdt
Pbfr
Otter
Creek
Walnut
Creek
Lasita
Leonardville
24
24
T 7 S
T 8 S


I
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IV
V
VI
VII
VIII
X
XI

RILEY COUNT

LEGEND

MATERIALS SITE DESIGNATIONS

■	Open Materials Sites; Sampled	Page 30
●	Open Materials Sites; Not Sampled	Page 78
⬢	Prospective Materi als Sites; Not Sampled	Page 88

LS+1 / Pdt

- Material Type
- Estimated Quantity
  - \+ indicates more than 20,000 cubic yards
  - \- indicates less than 20,000 cubic yards
- **Reference to site number of following data forms**
- Geological Age and Unit

SG Sand Gravel
FS Fine Sand
LS Limestone

GEOLOGY

Unit	Symbol
Alluvium	Qal
Dune Sand	Qds
Wisconsinan Terrace	Qtw
Buck Creek Terrace	Qbc
Kansan Glacial Drift	Qgd
Towanda Ls. Mbr.	Pdt
Fort Riley Ls. Mbr.	Pbfr
Cottonwood Ls. Mbr.	Pbc
Tarkio Ls. Mbr.	Ptt
Igneous Rock (Kimberlite)	Kbi

——— Geologic Unit Exposed

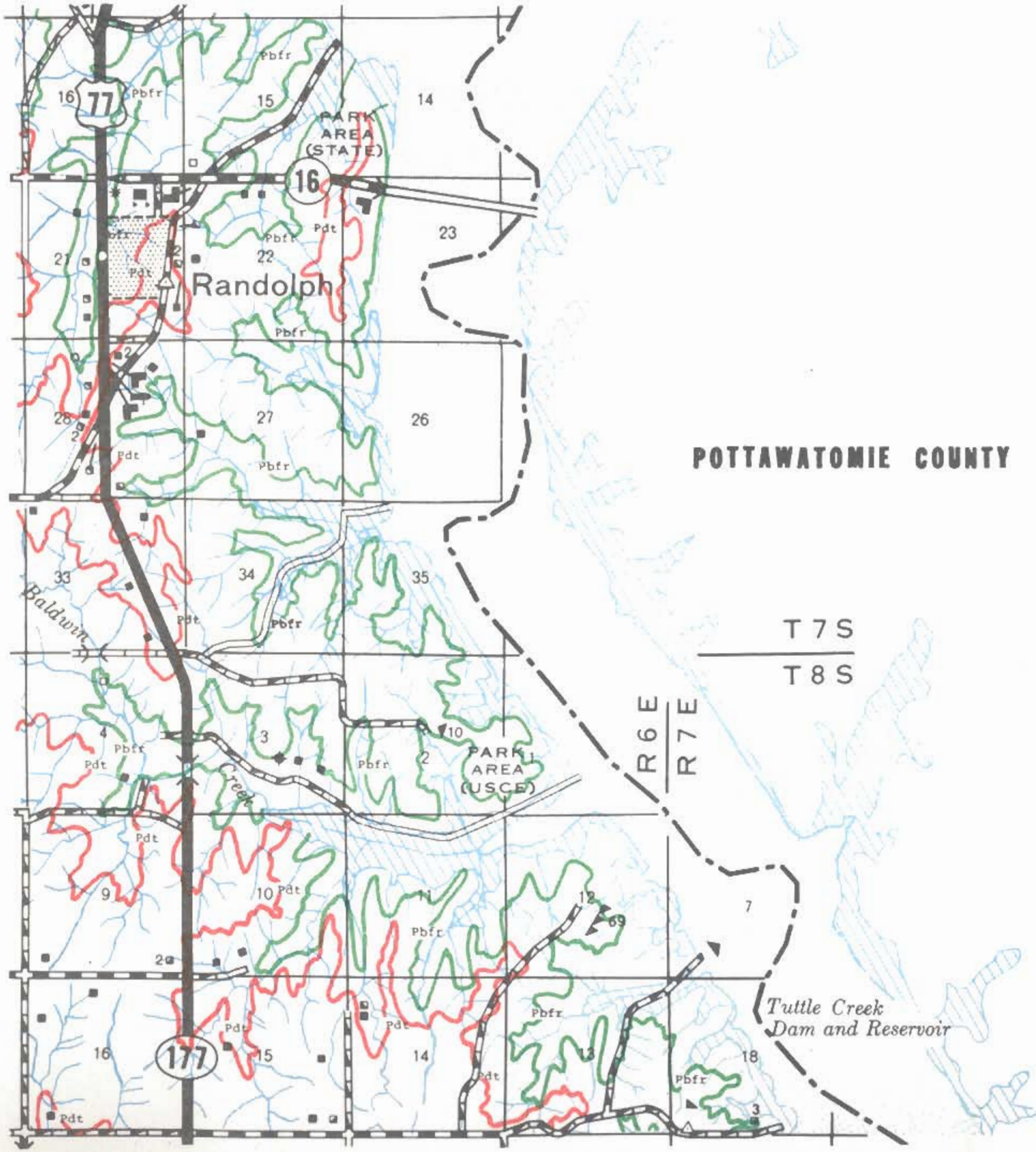
------- Geologic Unit Not Exposed

MILES

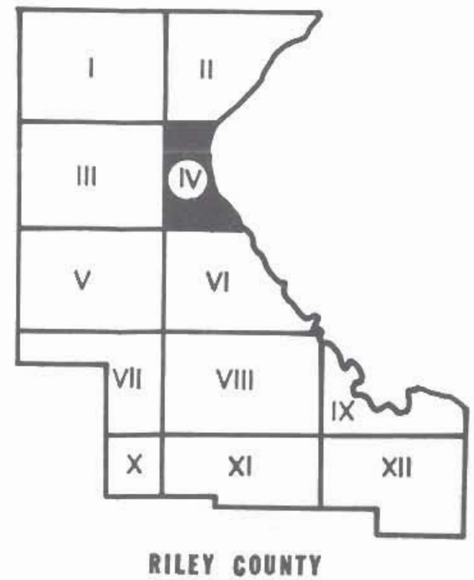
1 0 1 2 3 4

1 0 1 2 3 4 5

KILOMETERS



Randolph
PARK AREA (STATE)
PARK AREA (USCE)
POTTAWATOMIE COUNTY
T 7 S
T 8 S
R 6 E
R 7 E
Baldwin
Creek
Tuttle Creek Dam and Reservoir
Pbfr
Pdt
77
16
177



I
II
III
IV
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VI
VII
VIII
IX
X
XI
XII
RILEY COUNTY

LEGEND

MATERIALS SITE DESIGNATIONS

■	Open Materials Sites; Sampled	Page 30
●	Open Materials Sites; Not Sampled	Page 78
⬢	Prospective Materi als Sites; Not Sampled	Page 88

LS+1 / Pdt

- Material Type
- Estimated Quantity
  - + indicates more than 20,000 cubic yards
  - - indicates less than 20,000 cubic yards
- **Reference to site number of following data forms**
- Geological Age and Unit

SG Sand Gravel
FS Fine Sand
LS Limestone

GEOLOGY

Alluvium	Qal
Dune Sand	Qds
Wisconsinan Terrace	Qtw
Buck Creek Terrace	Qbc
Kansan Glacial Drift	Qgd
Towanda Ls. Mbr.	Pdt
Fort Riley Ls. Mbr.	Pbfr
Cottonwood Ls. Mbr.	Pbc
Tarkio Ls. Mbr.	Pzt
Igneous Rock (Kimberlite)	Kbi

——— Geologic Unit Exposed

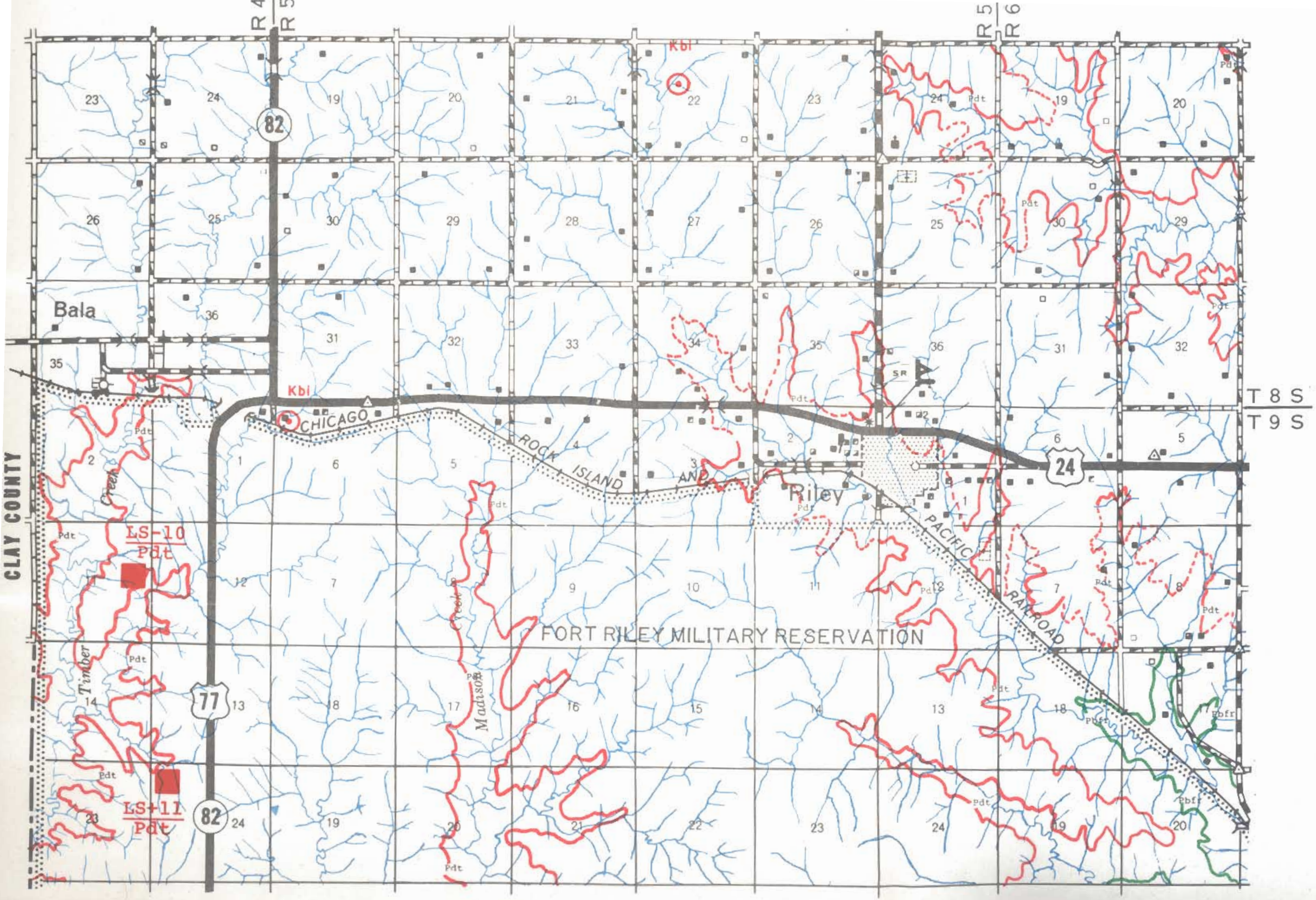
------- Geologic Unit Not Exposed

MILES

1 0 1 2 3 4

1 0 1 2 3 4 5

KILOMETERS



RILEY COUNTY

LEGEND

MATERIALS SITE DESIGNATIONS

■	Open Materials Sites; Sampled	Page 30
●	Open Materials Sites; Not Sampled	Page 78
⬢	Prospective Materi als Sites; Not Sampled	Page 88

LS+1 / Pdt

- Material Type
- Estimated Quantity
  - + indicates more than 20,000 cubic yards
  - - indicates less than 20,000 cubic yards
- **Reference to site number of following data forms**
- Geological Age and Unit

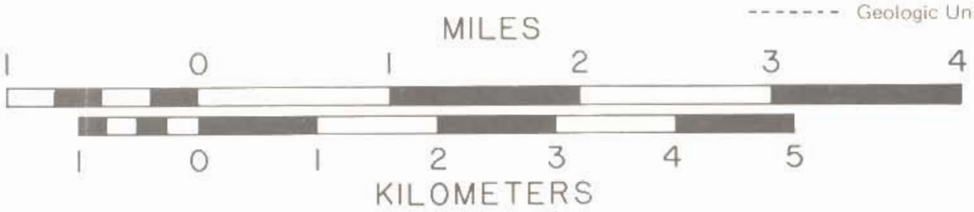
SG Sand Gravel
FS Fine Sand
LS Limestone

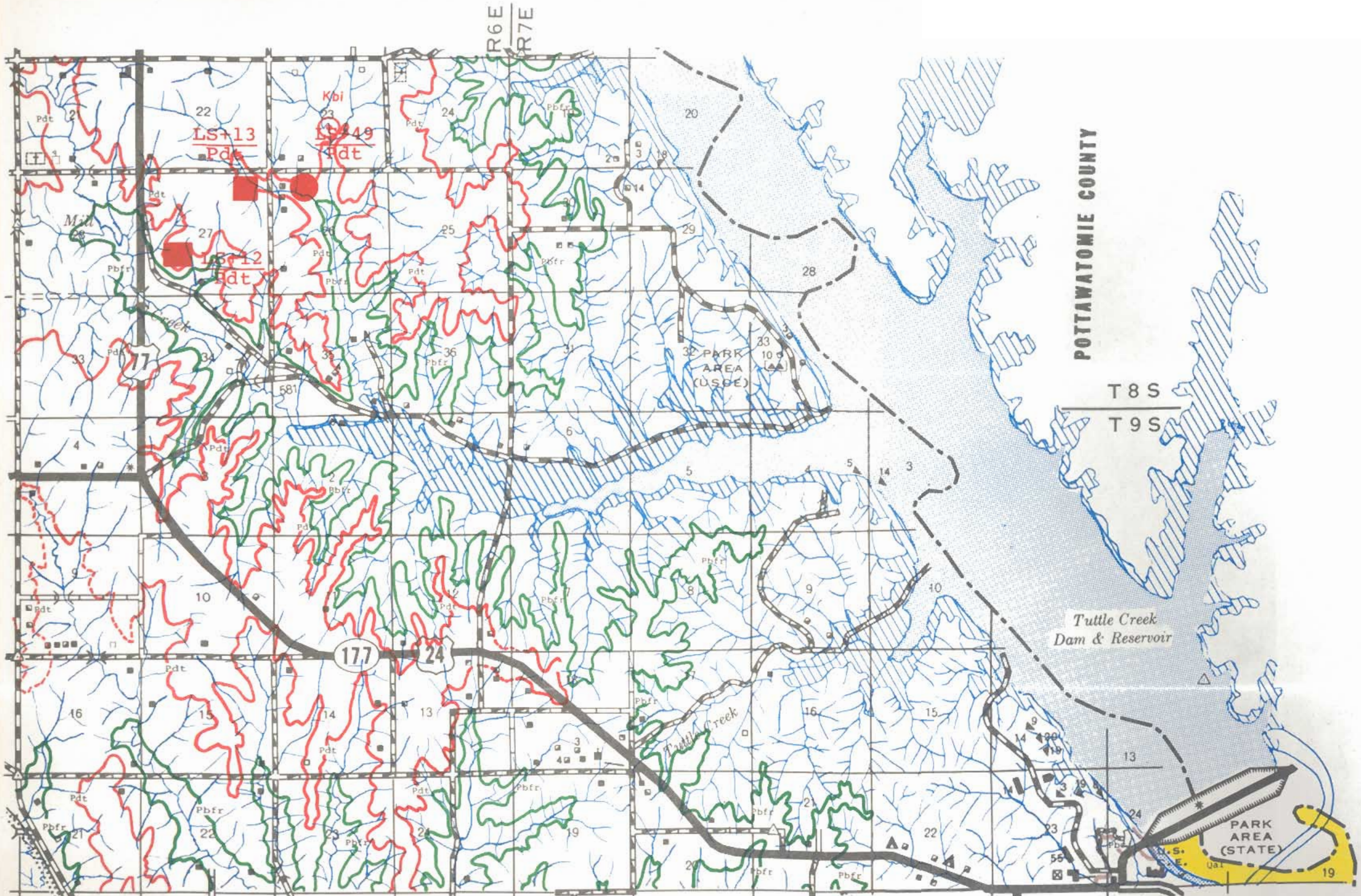
GEOLOGY

Unit	Symbol
Alluvium	Qal
Dune Sand	Qds
Wisconsinan Terrace	Qtw
Buck Creek Terrace	Qbc
Kansan Glacial Drift	Qkd
Towanda Ls. Mbr.	Pdt
Fort Riley Ls. Mbr.	Pbfr
Cottonwood Ls. Mbr.	Pbc
Tarkio Ls. Mbr.	Pzt
Igneous Rock (Kimberlite)	Kbi

——— Geologic Unit Exposed

------- Geologic Unit Not Exposed




R6E
R7E
POTTAWATOMIE COUNTY
T8S
T9S
Tuttle Creek
Dam & Reservoir
PARK
AREA
(USCOE)
PARK
AREA
(STATE)
U.S.
C.E.
LS+13
Pdt
LS+12
Pdt
Kbi
Pdt
Pbfr
Qal
Mill
Creek
Tuttle Creek
177
24
77
581


I
II
III
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VI
VII
VIII
X
XI

RILEY COUN

LEGEND

MATERIALS SITE DESIGNATIONS

Open Materials Sites; Sampled	Page 30
Open Materials Sites; Not Sampled	Page 78
Prospective Materi als Sites; Not Sampled	Page 88

LS+1
Pdt

- Material Type
- Estimated Quantity
  - + indicates more than 20,000 cubic yards
  - - indicates less than 20,000 cubic yards
- **Reference to site number of following data forms**
- Geological Age and Unit

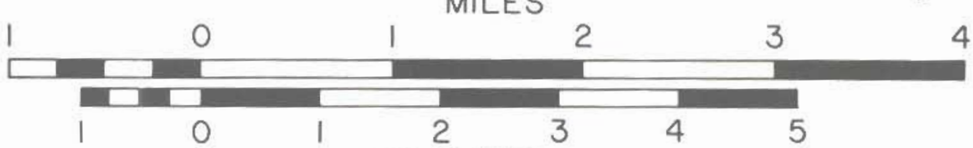
SG Sand Gravel
FS Fine Sand
LS Limestone

GEOLOGY

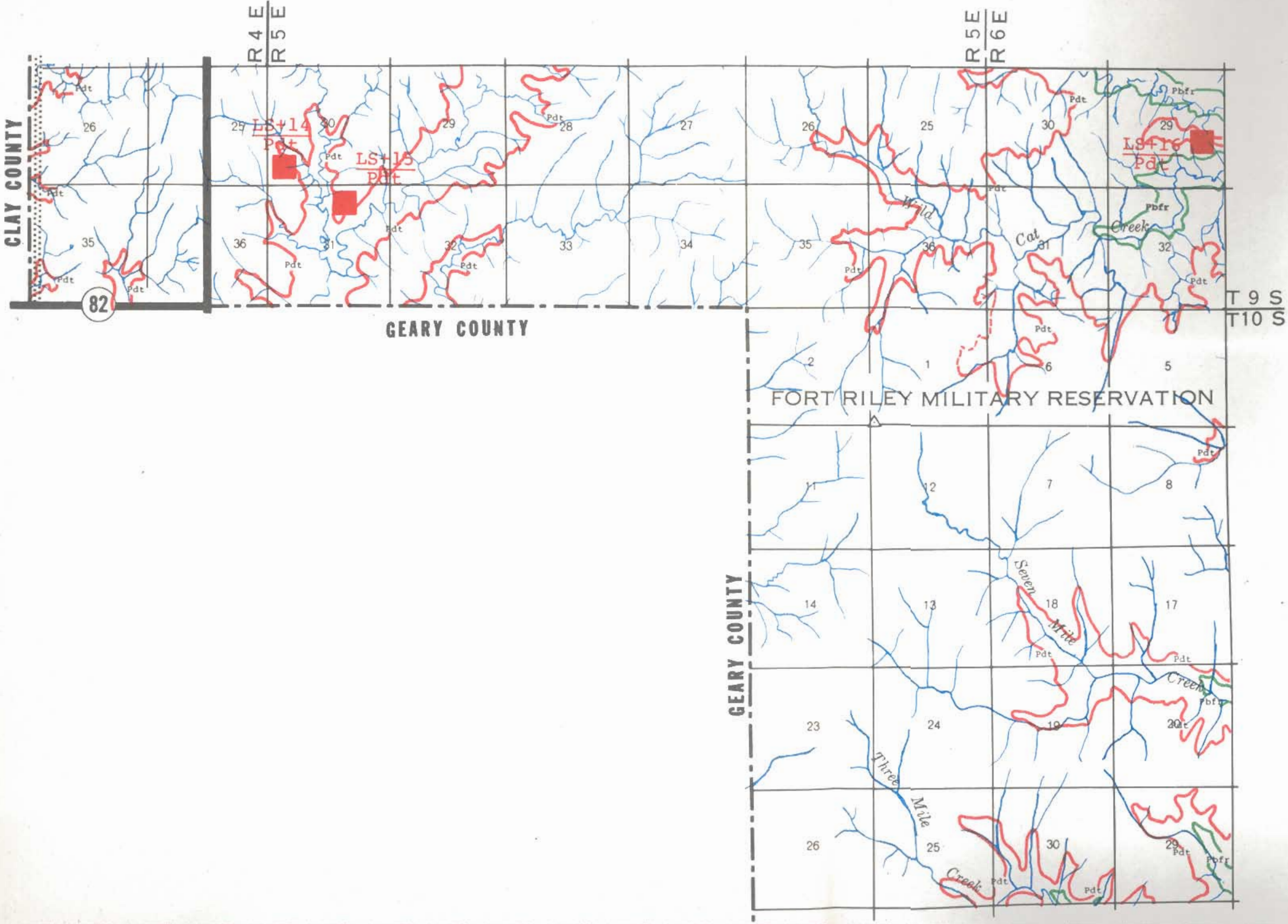
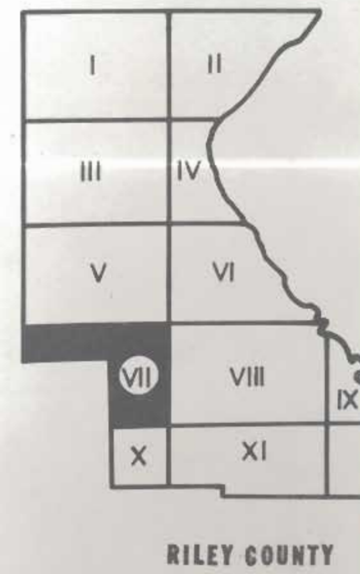
Alluvium	Qal
Dune Sand	Qds
Wisconsinan Terrace	Qtw
Buck Creek Terrace	Qbc
Kansan Glacial Drift	Qgd
Towanda Ls. Mbr.	Pdt
Fort Riley Ls. Mbr.	Pbfr
Cottonwood Ls. Mbr.	Pbc
Tarkio Ls. Mbr.	Pzt
Igneous Rock (Kimberlite)	Kbi

Geologic Unit Exposed
Geologic Unit Not Exposed

MILES



KILOMETERS


R 4 E
R 5 E
R 5 E
R 6 E
CLAY COUNTY
GEARY COUNTY
GEARY COUNTY
FORT RILEY MILITARY RESERVATION
T 9 S
T 10 S
82
LS+14
Pdt
LS+15
Pdt
LS+16
Pdt
Pbfr
Wild
Cat
Creek
Seven
Mile
Creek
Three
Mile
Creek

I
II
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VI
VII
VIII
IX
X
XI
RILEY COUNTY

LEGEND

MATERIALS SITE DESIGNATIONS

Open Materials Sites; Sampled	Page 30
Open Materials Sites; Not Sampled	Page 78
Prospective Materi als Sites; Not Sampled	Page 88

LS+1 / Pdt

- Material Type
- Estimated Quantity
  - \+ indicates more than 20,000 cubic yards
  - \- indicates less than 20,000 cubic yards
- **Reference to site number of following data forms**
- Geological Age and Unit

SG Sand Gravel
FS Fine Sand
LS Limestone

GEOLOGY

Alluvium	Qal
Dune Sand	
Wisconsinan Terrace	
Buck Creek Terrace	
Kansan Glacial Drift	

Towanda Ls. Mbr.	Pdt
Fort Riley Ls. Mbr.	Pbfr
Cottonwood Ls. Mbr.	Pbc
Tarkio Ls. Mbr.	
Igneous Rock (Kimberlite)	Kbi

Geologic Unit Exposed

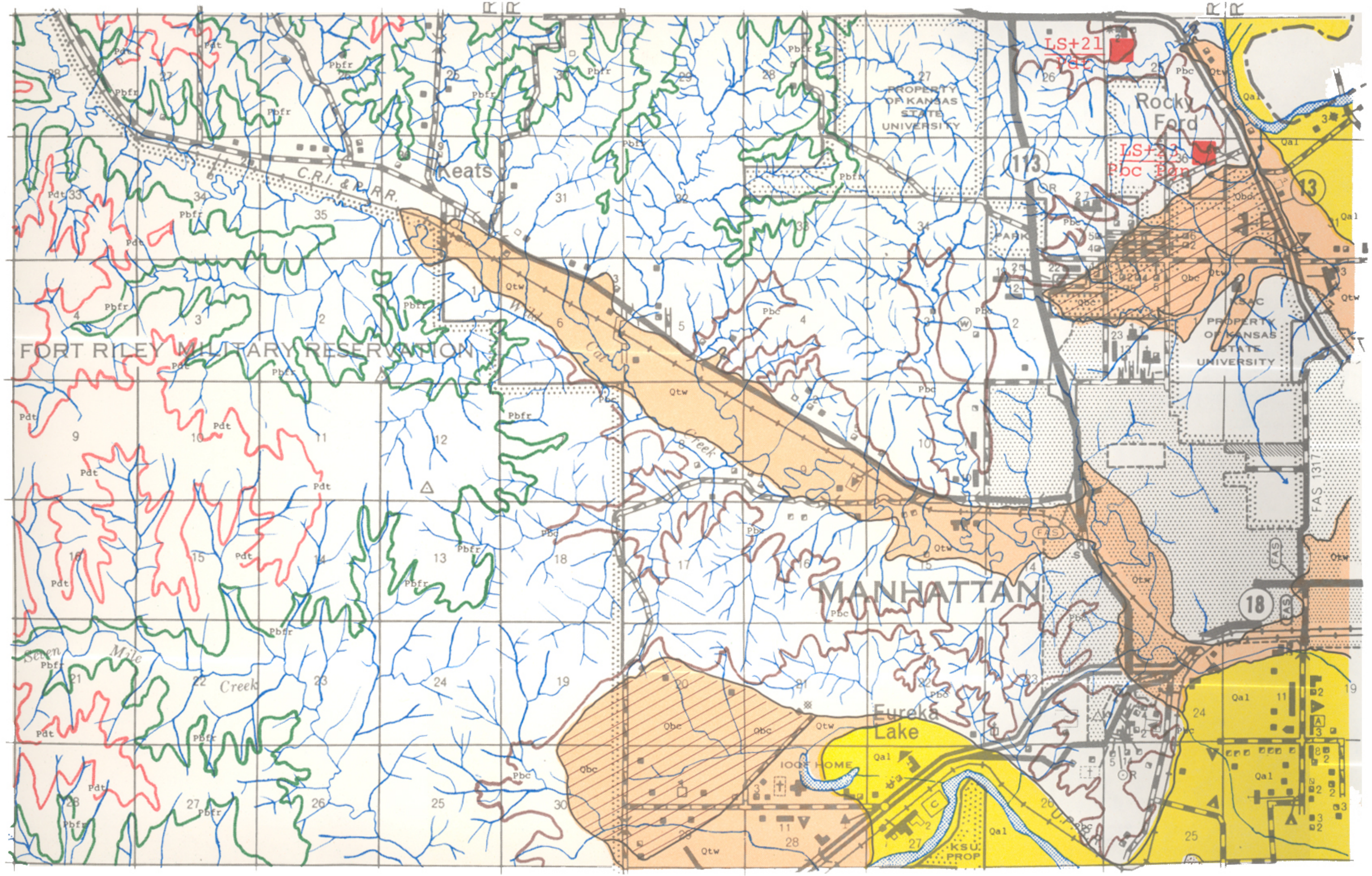
Geologic Unit Not Exposed

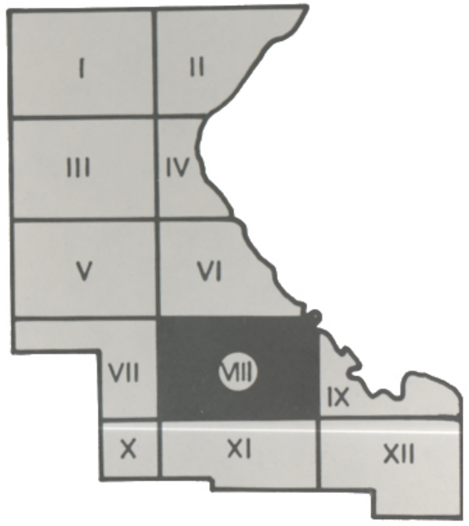
MILES

1 0 1 2 3 4

1 0 1 2 3 4 5

KILOMETERS





RILEY COUNTY

LEGEND

MATERIALS SITE DESIGNATIONS

Open Materials Sites; Sampled	Page 30
Open Materials Sites; Not Sampled	Page 78
Prospective Materi als Sites; Not Sampled	Page 88

LS+1 / Pdt

- Material Type
- Estimated Quantity
  - \+ indicates more than 20,000 cubic yards
  - \- indicates less than 20,000 cubic yards
- **Reference to site number of following data forms**
- Geological Age and Unit

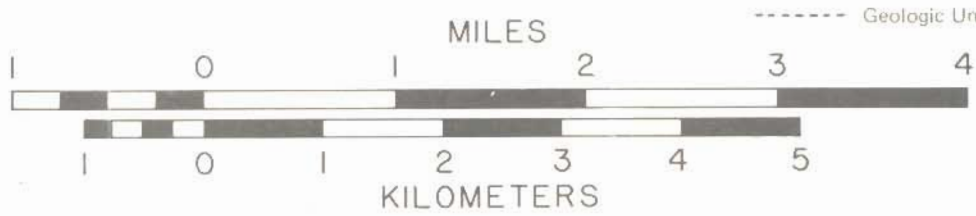
SG Sand Gravel
FS Fine Sand
LS Limestone

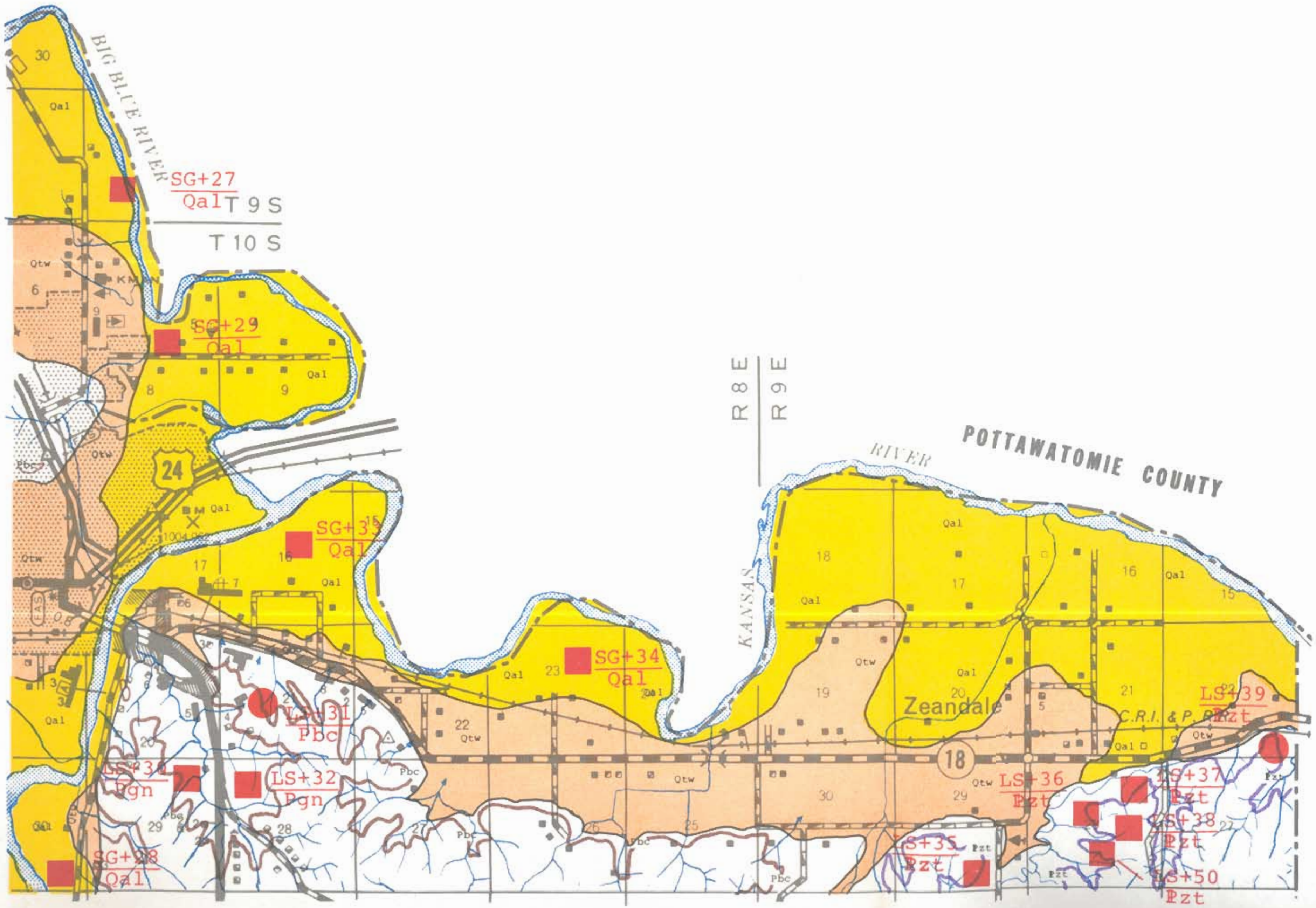
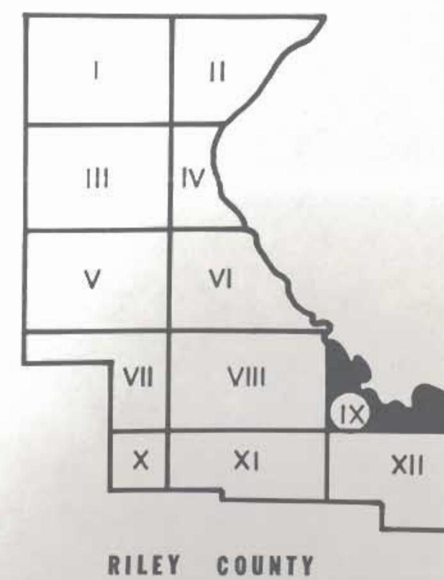
GEOLOGY

Alluvium	Qal
Dune Sand	Qds
Wisconsinan Terrace	Qtw
Buck Creek Terrace	Qbc
Kansan Glacial Drift	Qg
Towanda Ls. Mbr.	Pdt
Fort Riley Ls. Mbr.	Pbfr
Cottonwood Ls. Mbr.	Pbc
Tarkio Ls. Mbr.	Pzt
Igneous Rock (Kimberlite)	Kbi

——— Geologic Unit Exposed

\- - - - - - Geologic Unit Not Exposed




BIG BLUE RIVER
SG+27
Qal
T 9 S
T 10 S
SG+29
Qal
SG+33
Qal
SG+34
Qal
LS+31
Pbc
LS+30
Pgn
LS+32
Pgn
SG+28
Qal
LS+35
Pzt
LS+36
Pzt
LS+37
Pzt
LS+38
Pzt
LS+50
Pzt
LS+39
Pzt
R 8 E
R 9 E
KANSAS RIVER
POTTAWATOMIE COUNTY
WABAUNSEE COUNTY
Zeandale
C.R.I. & P. RR
24
18
Qtw
Pbc

I
II
III
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VI
VII
VIII
IX
X
XI
XII
RILEY COUNTY

LEGEND

MATERIALS SITE DESIGNATIONS

■	Open Materials Sites; Sampled	Page 30
●	Open Materials Sites; Not Sampled	Page 78
⬢	Prospective Materi als Sites; Not Sampled	Page 88

LS+1 / Pdt

- Material Type
- Estimated Quantity
  - \+ indicates more than 20,000 cubic yards
  - \- indicates less than 20,000 cubic yards
- **Reference to site number of following data forms**
- Geological Age and Unit

SG Sand Gravel
FS Fine Sand
LS Limestone

GEOLOGY

Unit	Symbol
Alluvium	Qal
Dune Sand	Qds
Wisconsinan Terrace	Qtw
Buck Creek Terrace	Qbc
Kansan Glacial Drift	Qgd
Towanda Ls. Mbr.	Pdt
Fort Riley Ls. Mbr.	Pbfr
Cottonwood Ls. Mbr.	Pbc
Tarkio Ls. Mbr.	
Igneous Rock (Kimberlite)	Kbi

——— Geologic Unit Exposed

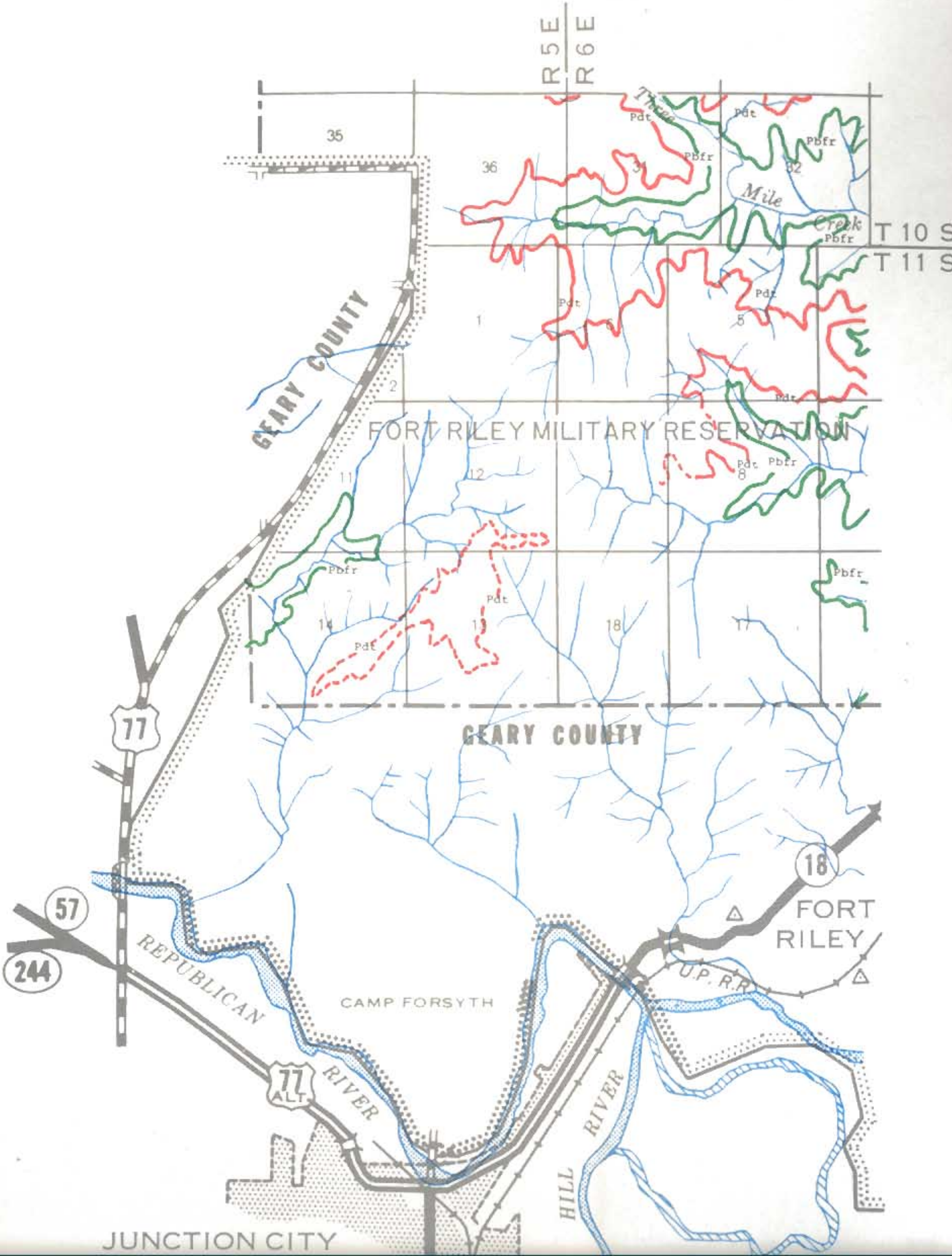
- - - - - - - Geologic Unit Not Expo

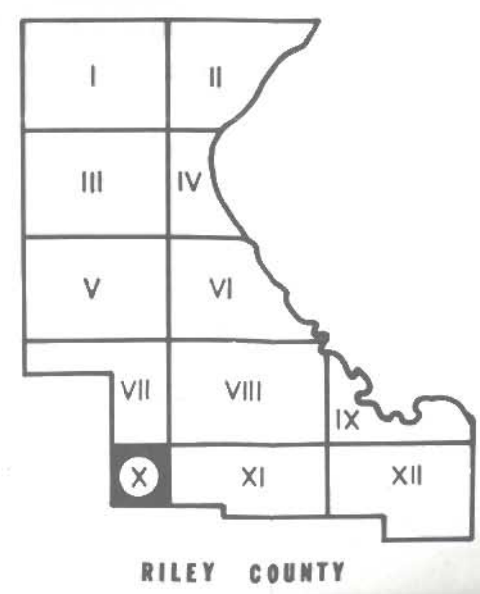
MILES

1 0 1 2 3 4

1 0 1 2 3 4 5

KILOMETERS


R 5 E
R 6 E
T 10 S
T 11 S
Three Mile Creek
Pdt
Pbfr
35
36
31
32
1
2
5
6
8
11
12
14
13
18
17
GEARY COUNTY
FORT RILEY MILITARY RESERVATION
GEARY COUNTY
77
57
244
18
FORT RILEY
U.P. R.R.
REPUBLICAN RIVER
CAMP FORSYTH
77 ALT
SMOKY HILL RIVER
JUNCTION CITY


I
II
III
IV
V
VI
VII
VIII
IX
X
XI
XII
RILEY COUNTY

LEGEND

MATERIALS SITE DESIGNATIONS

Symbol	Designation	Page
Square	Open Materials Sites; Sampled	Page 30
Circle	Open Materials Sites; Not Sampled	Page 78
Hexagon	Prospective Materi als Sites; Not Sampled	Page 88

LS+1
Pdt

- Material Type
- Estimated Quantity
  - \+ indicates more than 20,000 cubic yards
  - – indicates less than 20,000 cubic yards
- **Reference to site number of following data forms**
- Geological Age and Unit

SG Sand Gravel
FS Fine Sand
LS Limestone

GEOLOGY

Unit	Symbol
Alluvium	Qal
Dune Sand	Qds
Wisconsinan Terrace	Qtw
Buck Creek Terrace	Qbc
Kansan Glacial Drift	Qgd
Towanda Ls. Mbr.	Pdt
Fort Riley Ls. Mbr.	Pbfr
Cottonwood Ls. Mbr.	Pbc
Tarkio Ls. Mbr.	Pzt
Igneous Rock (Kimberlite)	Kbi

——— Geologic Unit Exposed

------- Geologic Unit Not Expose

MILES

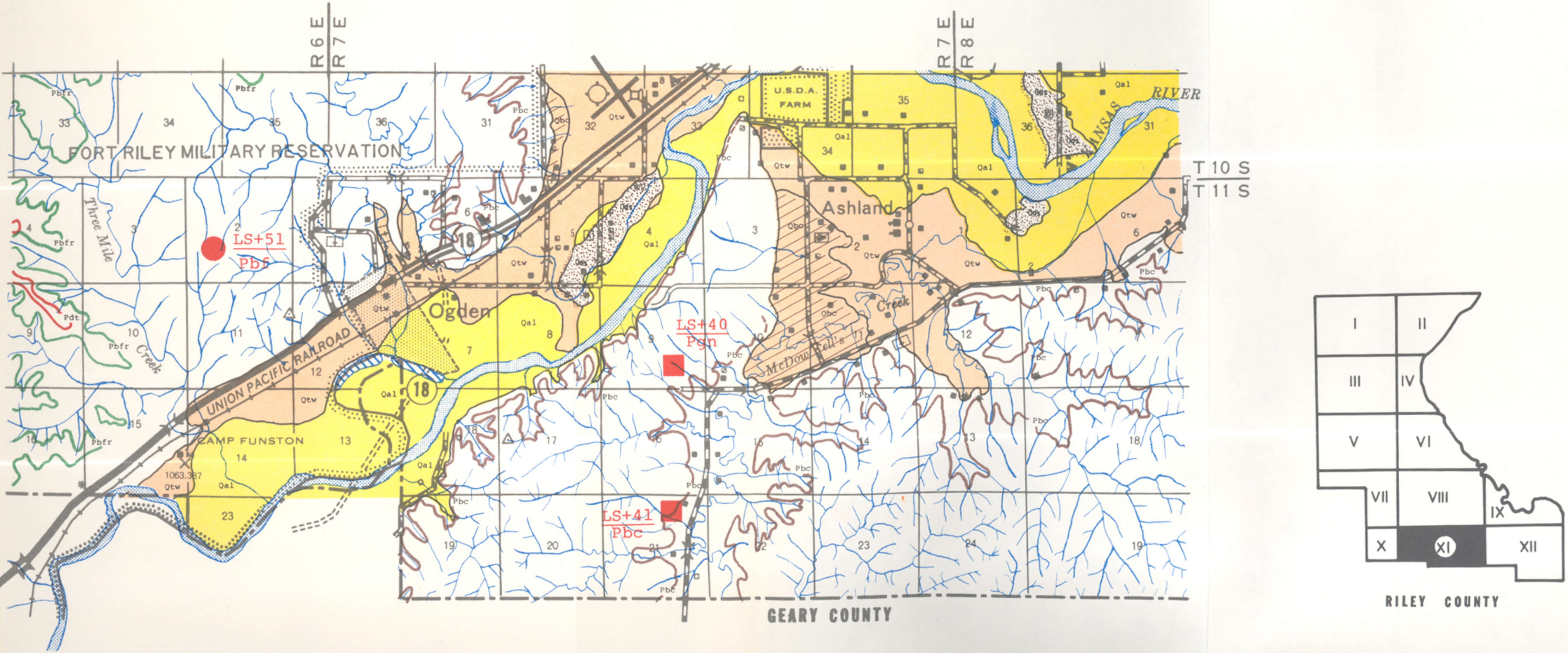
1 0 1 2 3 4

1 0 1 2 3 4 5

KILOMETERS

RILEY COUNTY MATERIALS MAP

PLATE XI



LEGEND

MATERIALS SITE DESIGNATIONS

■	Open Materials Sites; Sampled	Page 30
●	Open Materials Sites; Not Sampled	Page 78
⬢	Prospective Materi als Sites; Not Sampled	Page 88

LS+1 / Pdt

- Material Type
- Estimated Quantity
  - \+ indicates more than 20,000 cubic yards
  - \- indicates less than 20,000 cubic yards
- **Reference to site number of following data forms**
- Geological Age and Unit

SG Sand Gravel
FS Fine Sand
LS Limestone

GEOLOGY

Alluvium	Qal
Dune Sand	Qds
Wisconsinan Terrace	Qtw
Buck Creek Terrace	Qbc
Kansan Glacial Drift	Qkd
Towanda Ls. Mbr.	Pdt
Fort Riley Ls. Mbr.	Pbfr
Cottonwood Ls. Mbr.	Pbc
Tarkio Ls. Mbr.	Pzt
Igneous Rock (Kimberlite)	Kbi

——— Geologic Unit Exposed

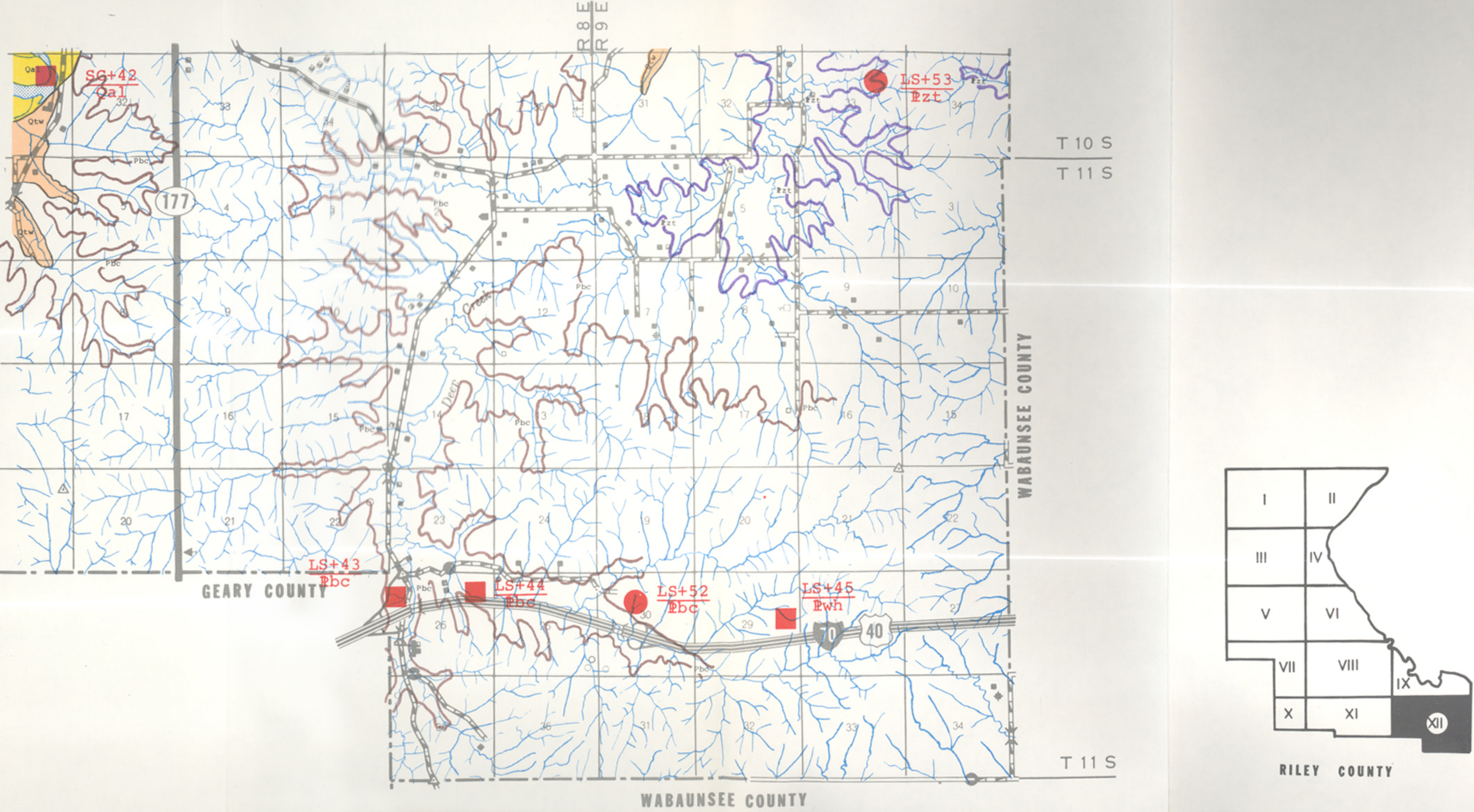
- - - - - - - Geologic Unit Not Exposed

MILES

1 0 1 2 3 4

1 0 1 2 3 4 5

KILOMETERS



SG+42 Qal
LS+53 Pzt
LS+43 Pbc
LS+44 Pbc
LS+52 Pbc
LS+45 Pwh
T 10 S
T 11 S
R 8 E
R 9 E
GEARY COUNTY
WABAUNSEE COUNTY
177
70
40
RILEY COUNTY
I
II
III
IV
V
VI
VII
VIII
IX
X
XI
XII