At Fogerty's mill the river is only about 1¼ miles from Junction City, and is the nearest point of the river to the town. It is also the best landing for the city.

The following results given are only approximate, as it was impossible to make anything more than a hurried reconnaissance with the small amount of money available for the purpose.

For the levels I am under obligations to the engineer office of the Kansas Pacific Railroad.

The general course of the Kansas River is nearly east, and empties into the Missouri at Kansas City, about 190 miles from Fogerty's mill. The distance here given, as well as those hereafter, are by the river.

The river passes through one of the finest agricultural districts in the State of Kansas. The counties bordering on the river are, Davis, Riley, Wabaunsee, Pottawatamie, Shawnee, Jefferson, Douglas, Leavenworth, Johnson, and Wyandotte.

The bed of the river is of a sandy nature, sand bars and snags being the principal natural obstructions to contend with, although there are a few rocks in the way.

The other obstructions are bridges and a mill-dam.

The best method of improvement for a river of this character is to contract the channel by the use of dams or dikes built of brush and stone.

The Smoky Hill River, from Fogerty's mill to its junction with the Republican, is a narrow and comparatively a deep stream, from 125 to 150 feet wide. Very little work would be necessary to make it navigable to the mill. Some snags are in the way, and one gravel bar would need improvement; 1,000 feet of dam will be sufficient between the mill and the mouth of the Republican.

Below the junction of the Smoky Hill and the Republican the river becomes more sandy, and takes its general character from the latter stream, the bed becoming wider, more shallow, and showing more bars.

Between the Republican and Manhattan, a distance of 24 miles, the river banks are but thinly timbered, much of the country passed through being prairie. The slope of the river between these points is 46.5 feet, or 1.93 feet per mile. The width of the river varies from 200 to 600 feet at low-water, excepting at Wild Cat Creek, one mile above Manhattan, where it is forced into a narrow channel of 125 feet.

The obstructions in this portion of the river consist of sand bars and snags. It will take about 500 feet of dam per mile to improve it, or 12,000 feet for the distance of 24 miles.

At Manhattan the Big Blue River comes in, but makes very little difference in the volume of water at a low stage.

There is an iron wagon-bridge at this place; it is 575 feet long, and 21.6 feet in the clear above the surface of the water at low-water. There are five spans, the three over the main part of the river being 129.5 feet in the clear at the top. There is no draw or passage to allow for the passing of steamboats, and in its present state it is an obstruction to navigation.

From Manhattan to Saint George, 13½ miles, the slope is 19.31 feet, or 1.43 per mile. The river has the same character as above, but snags are becoming more plentiful. The depth varies from 1 foot to 7 or 8 feet. About 1 mile above Saint George there are a number of rocks and bowlders in the bed of the river, extending for ½ mile, some of which are quite large. It will require about $3,000 to clear a channel through them. The other part of this section of river will require 500 feet of dike and dam per mile, making 6,750 feet for the distance of 13½ miles.

From Saint George to Wamego, a distance of 10¼ miles, the slope is 17.5 feet; per mile 1.7 feet. Some rocks ½ mile below Saint George can be avoided by throwing in a dike at the upper end of them and forcing the water to the right. Otherwise, the river resembles that above, and will require 500 feet of dike and dam per mile to improve it, or 5,125 for the distance of 10¼ miles.

At Wamego an iron wagon-bridge spans the river. It is 900 feet long, has six spans of 150 feet each, and is 21.3 feet from lower chord to water-surface at low-water. The bridge is similar in construction to the one at Manhattan; it is without any draw, and in its present state is an obstruction to navigation.

From Wamego to Saint Mary's the distance is 14 miles, and the difference of level 34 feet, giving a slope of nearly 2.4 per mile. Here the slope is greater than on any other part of the river. About six miles below Wamego and one-half mile above the mouth of Vermillion Creek is a rock riffle shooting out from the right bank. The river is about 500 feet wide, with a sand bar on the left. The rocks could probably be avoided by a dike at the upper end of them that would throw the water to the left bank. The river between Wamego and Saint Mary's has greater width in places than that above, getting as wide as 900 feet: but 500 feet of dike and dam will be sufficient to improve it, or 7,000 feet for the distance of 14 miles.

At Saint Mary's there is another iron wagon-bridge crossing the river. It is 17 feet from the lower chord to water-surface, 600 feet long, with four spans of 150 feet each. It is of the same pattern as those above, and is an obstruction to navigation.

The Vermillion Creek empties about 8½ miles above Saint Mary's, but at a low stage of water it makes but very little difference in the amount of water in the river.

From Saint Mary's to Topeka the distance is 32½ miles. The slope of the river is 61.2 feet, or 1.88 per mile. The river between these points will require about 460 feet of dam per mile, or 15,000 feet for the distance of 32½ miles. There are a number of snags in the way. One place (Snaggy Bend) is almost impassable on account of them. Rocky Ford, about 18 miles above Topeka, and near Darling's old ferry, is a rock rapids, extending about 200 feet to the foot of the rapids proper. In this distance there is a fall of 1.25 feet; from there to a point 2,700 feet below the fall is 1 foot, making 2.25 feet in 2,900 feet. The rocks appear to be loose, and most, if not all, can be easily removed. A short distance is another rapids, but with good water toward the left bank. An expenditure of $5,000 would clear the obstructions.

At Topeka there are two bridges. The upper one is an iron wagon-bridge, similar in construction to those above. The lower chord is 22.4 feet above low-water. The bridge is 900 feet in length, and has six spans of 150 feet each. About ⅝ of a mile below is the railroad-bridge. This is a wooden trussed bridge. The lower chord is 19.8 feet above low-water. Both of these bridges are made without draws, and are obstructions to navigation. In the vicinity of Topeka there are a great many island chutes to be closed; one directly in front of the city.

From Topeka to Lawrence, a distance of 37¼ miles, the slope of the river is 67.8 feet, or 1.0 per mile. This part of the river will require 16,000 feet of dam, or about 430 feet per mile. About 6 miles above Lawrence is met the back-water from the mill-dam at that place. Here the river is naturally in a bad condition. The sand, as it is washed down the stream, is deposited at the head of the back-water, where there is not sufficient current to move it; consequently the water is divided and split up into a number of channels, each of which is shallow. This place will probably always be troublesome as long as the dam stands. Below this, as far as the dam, there is good slack-water navigation.

The dam is built of rock and timber, and has been washed away three or four times by freshets. The difference of level above and below the dam is 9.1 feet. A lock will be necessary to get past this place, and, perhaps, on a more careful survey, a short canal around it on the left bank would be found advisable.

At the dam there is an iron wagon-bridge of 783 feet in length. The three principal spans are 150 feet each. The height of the lower chord above the surface of the water and above the dam is 18 feet. The width of the river at this point is 660 feet.

About ½ mile below the dam is the railroad-bridge of the Kansas Pacific Railroad. Its height above the water is 29 feet (to the lower chord).

The depth of water in the channel between Topeka and Lawrence is seldom less than 2 feet in the shoalest places, excepting where the current meets the back-water from the Lawrence dam. The banks of the river become more heavily timbered as we go down, and consequently snags are more plentiful.

From Lawrence to Tiblow, a distance of 30½ miles, the slope of the river is 41.5 feet, or nearly 1.4 per mile. Between these places there is wanted 13,000 feet of dike and dam, or about 424 feet per mile. At De Soto, 10 miles above Tiblow, the piers of an old wagon-bridge are standing, two of them in the river and one of them at the edge of the water. There is sufficient room between them for boats to pass, and they need not be taken out at present. At a bend of the river, about 9 or 10 miles above Tiblow, there are a great many snags in the way.

From Tiblow to Kansas City Bridge, a distance of 20½ miles, the fall is 33.75 feet, or a little more than 1.6 feet per mile. Between these two points there will be required about 7,000 feet of dam, or about 341 feet per mile. As we get down the river the channel improves in depth. Two feet of water in the shallowest places is to be found between Tiblow and Kansas City at low-water.

At Kansas City, about 1½ miles above the mouth of the river, there is the railroad-bridge of the Kansas Pacific Railroad. It is 21.4 feet from the lower chord to the surface of the water.

One mile and a quarter below the railroad-bridge is an iron wagon-bridge 300 feet in length, with two spans 150 feet each. Neither of these bridges is furnished with a draw, and are an obstruction to navigation.

I neglected to mention that there is an old wooden bridge, which is considered unsafe to travel, about 5 miles above Kansas City. It is 25.8 feet from the lower chord to the water surface. It is an obstruction to navigation, and should be removed.

There are a number of snags scattered through the length of the river, and in some few places so plentiful as to be a serious impediment to navigation. The approximate cost of removing those in the way will average about $150 per mile.

The following approximate estimate of the cost of improving the river from Junction City to its mouth is respectfully submitted:

Locality.	Cost of dam.	Cost of taking out rock.	Cost of taking out snags.	Total cost.
Fogerty's mill to Republican River	$4,500 00	.....	$937 50	$5,437 50
Republican River to Manhattan	54,000 00	.....	3,600 00	57,600 00
Manhattan to Saint George	30,375 00	$3,000 00	2,025 00	35,400 00
Saint George to Wamego	23,062 50	.....	1,537 50	24,600 00
Wamego to Saint Mary's	31,500 00	5,000 00	2,100 00	33,600 00
Saint Mary's to Topeka	67,500 00	.....	4,875 00	72,375 00
Topeka to Lawrence	72,000 00	.....	5,587 50	77,587 50
Lawrence to Tiblow	58,500 00	.....	4,575 00	63,075 00
Tiblow to mouth of	31,500 00	.....	3,300 00	34,800 00
	372,937 50	8,000 00	28,537 50	409,475 00
Added for engineering expenses and contingencies				40,525 00
Total				450,000 00

The foregoing estimate is made with the view of giving a channel of 4½ feet in depth from Topeka to the mouth, and of 3½ feet from Junction City to Topeka.

In the above estimate I have not taken into consideration the cost of altering the bridges or of the work necessary to be done at the Lawrence dam.

Between Wamego and Saint Mary's a section and discharge of the river was taken. The result shows the passage of 2,500 cubic feet of water per second. The stage of water, as near as could be ascertained, was $\frac{4}{10}$ of a foot above low-water.

The range between high and low water at the following places was given by the bridge-tenders:

At Wamego, 15.7 feet.

At Saint Mary's, 15.8 feet.

At Topeka, 14.3 feet.

The highest water was in 1877.

The Kansas River flows through a very productive agricultural district, and below I give some statistics obtained from the Kansas State board of agriculture, through the kindness of Mr. Alfred Gray, the secretary, to whom I owe many thanks for favors shown:

Statement showing the average product and value of the five principal crops in the counties bordering on the Kansas River, between Junction City and the mouth of said river, for the year 1877, as shown by the official records of the Kansas State board of agriculture.

Product.	Acres.	Bushels.	Value.
Wheat	95,542	1,424,146	$1,383,030 28
Rye	21,583	422,856	145,263 69
Corn	442,137	18,366,981	4,008,938 46
Barley	7,086	161,567	51,515 90
Oats	51,516	2,157,249	355,382 07
Total	618,134	22,532 799	5,944,130 40

The increase in acreage of wheat in 1878 over that of 1877 is 74,092 acres, or 77.55 per cent.

The population of these ten counties, March 1, 1878, was 139,743, or 19.72 per cent. of that of the whole State.

It is reported, and I believe a matter of early history of the State, that as early as 1855 boats plied regularly between Topeka and the Missouri, sometimes going as far west as Manhattan and Fort Riley; and I was informed that much of the material at Fort Riley was taken there by steamboats.

The opening of the Kansas River to navigation would be of the greatest benefit to the people of that part of the State through which it flows, and I would respectfully suggest that an appropriation for that purpose be recommended.

As an appendix, I inclose herewith the statement of Mr. Gray, secretary of the Kansas State board of agriculture.

Respectfully, your obedient servant,

J. D. McKown,
Assistant Engineer.

Maj. Charles R. Suter,
Corps of Engineers, U. S. A.

Statement showing the acreage, product, and value of the five principal crops in the counties bordering on the Kansas River, between Junction City and the mouth of said river, for the year 1877, as shown by the official records of the Kansas State board of agriculture; also, the aggregate acreage of the crops named for 1878, and an estimated increase of tonnage of said products from 1877 to 1878.

Counties.	Wheat.		
	Acres.	Bushels.	Value.
Davis	9,456	106,928	$102,753 80
Riley	8,553	127,930	104,946 40
Wabaunsee	5,728	51,984	46,041 30
Pottawatomie	7,102	124,138	108,533 30
Shawnee	5,046	51,655	50,938 00
Jefferson	14,561	218,575	218,319 00
Douglas	10,779	204,458	204,381 56
Leavenworth	15,102	207,224	215,977 20
Johnson	10,408	208,076	207,977 72
Wyandotte	8,807	123,178	123,162 00
Total	95,542	1,424,146	1,383,030 28

Counties.	Rye.		
	Acres.	Bushels.	Value.
Davis	1,257	27,654	$8,296 20
Riley	2,805	58,905	17,671 50
Wabaunsee	1,542	29,298	11,719 20
Pottawatomie	4,046	80,920	26,703 60
Shawnee	2,779	52,801	18,480 35
Jefferson	2,279	34,185	11,964 75
Douglas	2,241	51,543	18,040 05
Leavenworth	2,096	37,728	14,336 64
Johnson	2,086	37,548	13,141 80
Wyandotte	722	12,274	4,909 60
Total	21,853	422,856	145,263 69

Counties.	Corn.		
	Acres.	Bushels.	Value.
Davis	11,118	466,956	$84,052 08
Riley	26,764	1,204,380	216,788 40
Wabaunsee	19,847	893,115	178,623 00
Pottawatamie	47,657	2,144,565	428,913 00
Shawnee	61,539	2,769,255	664,621 20
Jefferson	67,625	2,705,000	541,000 00
Douglas	61,557	2,646,951	635,268 24
Leavenworth	54,095	1,893,325	492,264 50
Johnson	74,952	2,998,080	599,616 00
Wyandotte	16,983	645,354	167,792 04
Total	442,137	18,366,981	4,008,938 46

Counties.	Barley.		
	Acres.	Bushels.	Value.
Davis	770	15,400	$4,620 00
Riley	1,520	33,440	10,032 00
Wabaunsee	551	13,224	5,025 12
Pottawatamie	2,610	62,640	18,165 60
Shawnee	287	6,888	2,755 20
Jefferson	628	15,072	5,124 48
Douglas	136	2,040	816 00
Leavenworth	409	8,589	3,435 60
Johnson	129	3,354	1,173 90
Wyandotte	46	920	368 00
Total	7,086	161,567	51,515 90

Statement showing the acreage, product, and value, &c.—Continued.

Counties.	Oats.		
	Acres.	Bushels.	Value.
Davis	1,313	59,085	$9,453 60
Riley	2,267	113,350	20,403 00
Wabaunsee	2,265	92,865	16,715 70
Pottawatamie	7,203	360,150	57,624 00
Shawnee	2,758	110,320	19,857 60
Jefferson	8,617	310,212	49,633 92
Douglas	6,434	257,360	41,177 60
Leavenworth	5,756	212,972	42,594 40
Johnson	12,923	581,535	87,230 25
Wyandotte	1,980	59,400	10,692 00
Total	51,516	2,156,249	355,382 07

Products.	Summary.		
	Acres.	Bushels.	Value.
Wheat	95,542	1,424,146	$1,383,030 28
Rye	21,853	422,856	145,263 69
Corn	442,137	18,366,981	4,008,938 46
Barley	7,086	161,567	51,515 90
Oats	51,516	2,157,249	355,382 07
Total	618,134	22,532,799	5,944,130 40

The combined product of the five crops above named gives 735,802 tons, or 73,580 car-loads.

The increase in the acreage of wheat alone in 1878 over that of 1877 is 74,092 acres, or 77.55 per cent. Estimating the yield at 20 bushels per acre, we have a product of 3,392,680 bushels, or 101,780 tons, an equivalent to 10,178 car-loads.

Assuming that the other crops named will hold their own, we shall have a grand tonnage of products of the five crops for 1878 of 794,858.

Table showing by counties the total number of acres, number of acres under cultivation, number of acres not under cultivation, and the per cent. of cultivated to whole number of acres, for 1877.

Counties.	Total number of acres.	Acres cultivated.	Not cultivated.	Percentage cultivated to whole number of acres.
Davis	260,480	33,422.25	227,057.75	12.83+
Riley	394,880	62,189.00	332,691.00	15.75—
Wabaunsee	514,560	46,147.25	468,412.75	8.97—
Pottawatamie	542,720	91,272.87	451,447.13	16.82—
Shawnee	357,120	98,420.37	258,699.63	27.56—
Jefferson	425,600	135,581.00	290,019.00	31.86—
Douglas	300,160	136,683.75	163,476.25	45.54—
Leavenworth	291,200	120,397.50	170,802.50	41.35—
Johnson	307,200	160,255.50	146,944.50	52.17—
Wyandotte	97,920	39,755.25	58,164.75	40.60—
Total	3,491,840	924,124.74	2,567,715.26	26.47—

The total acreage of the above ten counties is 10.39 per cent. of the total acreage of the seventy organized counties of the State, and the cultivated acreage of the same counties is 16.52 per cent. of the cultivated acreage of the seventy organized counties.

The population of the ten counties March 1, 1878, was as follows:

Davis, 5,382; Riley, 7,419; Wabaunsee, 5,386; Pottawatamie, 11,196; Shawnee, 19,114; Jefferson, 12,471; Douglas, 18,931; Leavenworth, 28,544; Johnson, 18,139; Wyandotte, 13,161.

The aggregate population is 19.72+ per cent. of that of the whole State.

APPENDIX P.

ANNUAL REPORT OF LIEUTENANT EDWARD MAGUIRE, CORPS OF ENGINEERS, FOR THE FISCAL YEAR ENDING JUNE 30, 1879.

UNITED STATES ENGINEER OFFICE,
Saint Paul, Minn., August 12, 1879.

GENERAL: I have the honor to forward herewith my annual reports for the fiscal year ending June 30, 1879, upon the improvement of the Missouri River above the mouth of the Yellowstone, and upon the survey of the Yellowstone River.

Very respectfully, your obedient servant,

EDWD. MAGUIRE,
First Lieutenant, Corps of Engineers.

Brig. Gen. H. G. WRIGHT,
Chief of Engineers, U. S. A.

P 1.

IMPROVEMENT OF MISSOURI RIVER ABOVE THE MOUTH OF THE YELLOWSTONE.

My report for the previous year treated in detail of the section of country to be specially benefited by the improvement of navigation on the Missouri, of the nature and value of its productions, and of the importance of the river as a line of communication and transportation.

For that portion of the river below Benton it remains therefore but to give a statement of its commerce for the season of 1878, and to report upon the engineering work accomplished during the same year.

COMMERCE.

The number of steamboat arrivals at Benton was 46, an increase of 21 over 1877. The freight carried up the river amounted to 8,764 tons, of a value of about $2,631,300, showing an increase over 1877 of 3,091 tons, of an approximate value of $927,300. Maj. William B. Hughes, Quartermaster U. S. A., under date of October 16, 1878, informed me that he had shipped from Yankton, Dak., for the Missouri River above Buford, 261,131 pounds of government freight. Capt. E. B. Kirk, Assistant Quartermaster U. S. A., informs me that the government freight shipped up the river from Buford amounted to 94,424 pounds.

I have been unable to obtain a full exhibit of the exports, but the amount of wool shipped down the river was 696,000 pounds, an increase over 1877 of 487,541 pounds. For purposes of comparison the value of the wool is assumed as that of 1877 shipments; hence, the money value on the increased shipment amounted to about $169,639, or the total value of the 1878 wool was $242,599.