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SAND AND GRAVEL RESOURCES OF BOONE COUNTY, ILLINOIS

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ABSTRACT

Boone County has sand and gravel resources that could be adequate to meet needs for many years. The largest deposits occur in terraces and floodplains along Piscasaw Creek and along the Kishwaukee River downstream from its junction with Piscasaw Creek. Other deposits are found in the northeastern part of the county, along parts of Beaver Creek, east of Piscasaw Creek, and south of the Kishwaukee River. Only small deposits are found in the northwestern part of the county.

The deposits have been mapped on the scale 1:62,500.

INTRODUCTION

Purpose of Study

This report is part of a program of the Illinois State Geological Survey to supply information regarding sand and gravel resources of the state (fig. 1). Boone County was selected for investigation because no report on sand and gravel resources was available and because the county is undergoing rapid urban growth and industrialization, which call for increasing quantities of sand and gravel for the construction of roads, buildings, and other structures.

The report points out the distribution of potential sources of sand and gravel in the county to those concerned with producing sand and gravel. In addition, knowledge of the distribution of these resources may be useful in local and regional land use planning. The preservation of potential sand and gravel sources for future exploitation should be considered in decisions concerning land use.

Previous Investigations

Because most of the sand and gravel deposits of Boone County are of glacial origin, a knowledge of the glacial geology of the area helps in understanding

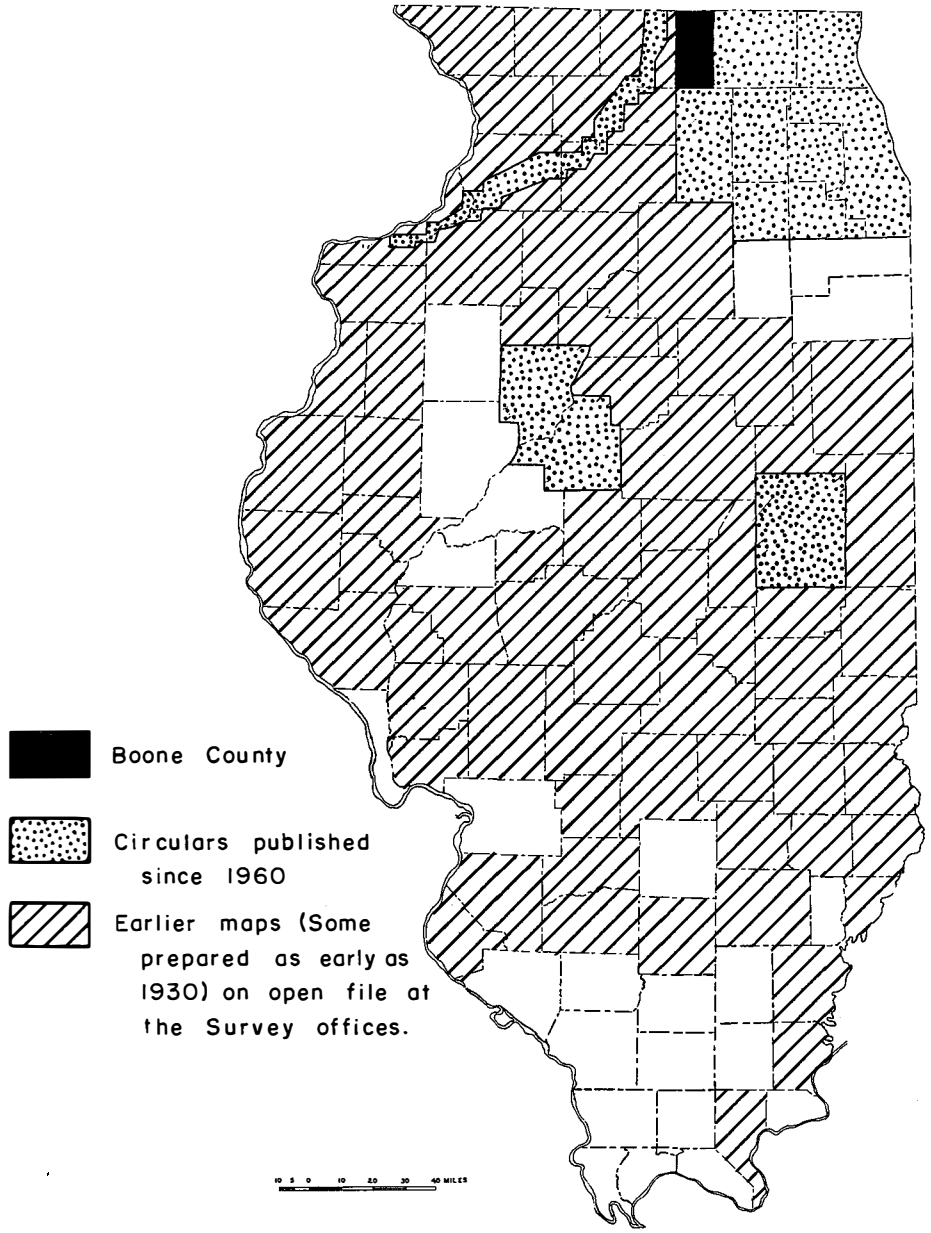

Figure 1 - Index map showing Boone County and other areas where sand and gravel resources have been mapped.

the distribution and character of the deposits. The glacial history of the county and adjacent areas has been described by Leverett (1899), Leighton (1923, 1966), Ekblaw (1929), Shaffer (1956), Kempton (1963), and Frye, Willman, and Black (1965). Kempton (1963) described the character and stratigraphy of the subsurface glacial materials, including sand and gravel, that occur along the Northwest Tollway (Interstate 90) and elsewhere in Boone County and adjacent areas. The soils of Boone County, which offer clues to the nature of the underlying materials, were described and mapped by Wascher, Smith, and Smith (1939).

Methods of Study

The earth materials occurring at and near the surface in Boone County were examined in natural and man-made exposures and in hand-auger borings ranging in depth from 2 to 14 feet. The character of the material at depth was determined mainly by laboratory study of well samples and by interpretation of drillers' logs of wells. Landforms, as studied in the field and by means of topographic maps and aerial photographs, were useful in determining the extents of the deposits. Soil types, mapped by Wascher, Smith, and Smith (1939), were also useful in showing the distribution of the deposits. It should be kept in mind, however, that the boundaries of some of the deposits shown in plate 1 are imperfectly known.

TYPES OF DEPOSITS

General Statement

Most of Boone County is covered by unconsolidated materials that were deposited by glacial ice during the Pleistocene Epoch or Ice Age. This material, called till, is a poorly sorted mixture of clay, silt, sand, pebbles, cobbles, and boulders. Although the till contains sand and pebbles, the clay and silt content is too great for the till to be considered a sand and gravel resource at the present time.

Other large areas in Boone County contain material deposited by water from the melting glaciers. This material is called stratified or water-laid glacial drift. The action of running water separated the coarser grained material from the finer grained material, thereby forming beds of sand and gravel containing very little silt or clay. Most of the sand and gravel deposits of Boone County are water-laid glacial drift.

Areas in Boone County along the present streams contain material deposited by these streams after the withdrawal of the glaciers. This material is called alluvium and may be a sand and gravel resource in places.

Water-Laid Glacial Drift

Much of the sand and gravel of Boone County is water-laid glacial drift that was deposited beyond the margin of the ice. Such deposits are called glacial outwash and may be divided into two types—outwash plains and valley trains. Outwash plains are relatively flat areas of outwash bordering the former edge of a glacier. Valley trains are outwash confined within a valley leading away from

the glacier. If a valley train is partially removed by later stream erosion, the flat-surfaced remnants perched above the stream's floodplain are referred to as terraces. Outwash in Boone County occurs mainly in the form of terraces.

Some of the sand and gravel of Boone County is water-laid glacial drift that was deposited on top of, within, below, or alongside glacial ice. Such deposits are called ice-contact deposits. Some of the ice-contact deposits of Boone County form hills or ridges, most of which are of the type called kames. Other ice-contact deposits of the area are layers of sand and gravel that were later covered by glacial till and that now crop out only where post-glacial stream erosion has removed the overlying till.

Alluvium

Although the post-glacial alluvium of Boone County contains sand and gravel locally, it is generally more clayey and silty than the water-laid glacial drift and, therefore, is a less valuable source of sand and gravel. However, in valleys that were filled with glacial outwash, the post-glacial alluvium may overlie glacial sand and gravel. Such a distinction is so important from the standpoint of sand and gravel resources that in this report alluvium overlying glacial sand and gravel is mapped separately from alluvium that is not known to overlie glacial sand and gravel.

DISTRIBUTION OF SAND AND GRAVEL

The sand and gravel deposits of Boone County are discussed in order of their probable importance as resources. They are shown in the same order in the explanation of plate 1. Locations of deposits from which samples were taken and results of sieve tests and pebble counts are shown in tables 1, 2, and 3, respectively.

Upper Terrace Sand and Gravel

The most widespread sand and gravel deposit of Boone County is a terrace along Piscasaw Creek and along the Kishwaukee River downstream from its junction with Piscasaw Creek. It is called the upper terrace to distinguish it from a terrace at a lower elevation. The upper terrace is a partially eroded valley train of outwash from the glacier that formed the ridge of glacial till called the Marengo end moraine in McHenry County (Anderson and Block, 1962, pl. 1).

Also mapped as upper terrace are (1) a small area along the South Branch of the Kishwaukee River in the southwestern corner of the county, and (2) a small area along Mud Creek along the eastern edge of the county.

The total thickness of sand and gravel below the upper terrace throughout much of the region is not accurately known. Normally, the sand and gravel of the upper terrace extends below the levels of the adjoining streams. The difference in elevation between the terrace surface and the adjoining floodplain surface gives the approximate thickness of sand and gravel, plus overburden, that can be excavated in dry pits. This difference in elevation is 20 to 25 feet near the western edge of the county, but the two surfaces are only about 5 feet apart near the east-

ern edge. The uppermost 3 to 5 feet of the terrace material is soil and silt overburden.

The thickness of sand and gravel is known along the Northwest Tollway (Interstate 90), where borings were made, and in the vicinity of Belvidere, where several well logs are available. Along the tollway, borings near the northwestern corner of sec. 5, T. 43 N., R. 3 E., penetrated a minimum of 43 feet of sand and gravel before reaching glacial till, and a boring near the southeastern corner of sec. 31, T. 44 N., R. 3 E., penetrated 66½ feet of sand and gravel without reaching other material. In the large gravel pit west of Belvidere, near the center of sec. 27, T. 44 N., R. 3 E., sand and gravel extends to a depth of about 20 feet below the terrace surface and overlies a thin bed of clay (possibly glacial till), which in turn reportedly overlies sand and gravel that extends down to bedrock. Drillers' logs of several water wells on the upper terrace in or near Belvidere, in secs. 24 and 26, T. 44 N., R. 3 E., indicate sand and gravel extending to bedrock at depths of from 20 to 122 feet.

The variability in thickness of sand and gravel in the upper terrace appears to be related to the surface on which the materials were deposited. In places, the sand and gravel overlies glacial till at relatively shallow depths. Elsewhere, the till may have been eroded by running water, so that younger sand and gravel now rests on older sand and gravel that originally underlay the till and that may extend down to bedrock. The depth to bedrock, which defines the maximum possible thickness of sand and gravel, is more than 50 feet under the terrace, except in small areas in the vicinity of Belvidere and along the southeastern edge of the terrace in the area southwest of Belvidere (parts of secs. 26, 27, 33, 34, and 35, T. 44 N., R. 3 E., and secs. 4, 8, 17, 18, and 19, T. 43 N., R. 3 E.). The minimum

TABLE 1 - LOCATION OF SAND AND GRAVEL SAMPLES FROM BOONE COUNTY

Sample number	Location					Thickness sampled (feet)	Source	Kind of deposit
	¼	¼	Sec.	T.	R.			
1	SW	NE	27	44N	3E	10	Gravel pit	Upper terrace
2	NE	SW	8	44N	3E	7	Gravel pit	Sand and gravel cropping out beneath glacial till
3	SW	SE	8	45N	4E	10	Gravel pit	Sand and gravel cropping out beneath glacial till
4	SE	SW	28	44N	4E	7	Gravel pit	Sand and gravel cropping out beneath glacial till
5	NE	NW	32	43N	3E	6	Gravel pit	Hills and ridges of sand and gravel
6	NE	NE	24	46N	4E	7	Gravel pit	Hills and ridges of sand and gravel
7	NW	NW	17	43N	4E	10	Gravel pit	Hills and ridges of sand and gravel

TABLE 2 – SCREEN ANALYSES[1]
(Percent retained)

Sieve	Sample number						
	1	2	3	4	5	6	7
2½ inch			1.2	9.2	6.9	8.3	13.5
2 inch	4.6	0.5	2.5	0.5	3.2	0.5	3.0
1½ inch	2.7	0.5	3.3	3.9	6.5	5.5	2.7
1 inch	1.5	0.8	5.2	7.0	10.6	7.2	7.3
3/4 inch	2.8	1.9	7.7	7.7	9.2	5.8	7.5
1/2 inch	4.4	2.5	6.2	6.3	6.6	5.4	4.9
3/8 inch	6.1	4.0	7.4	8.3	7.9	6.7	6.0
3 mesh	5.2	4.2	4.8	7.3	6.4	6.9	4.7
4 mesh	5.0	4.9	5.3	7.0	5.9	6.7	4.6
6 mesh	8.1	4.4	5.2	8.3	7.8	10.1	2.9
8 mesh	11.7	6.5	4.9	9.4	7.6	11.4	2.8
10 mesh	9.4	7.6	3.8	9.1	6.0	8.1	2.9
14 mesh	7.1	7.9	3.5	6.2	4.5	5.2	3.3
20 mesh	5.4	7.6	2.9	3.5	3.1	3.0	3.3
28 mesh	7.4	9.8	3.8	2.6	2.8	2.7	4.5
35 mesh	7.1	9.2	4.1	1.5	1.8	2.3	4.4
48 mesh	8.3	13.8	6.7	1.2	1.2	2.4	5.6
65 mesh	2.4	8.6	6.3	0.5	0.5	1.1	3.5
100 mesh	0.5	3.6	6.1	0.2	0.2	0.4	2.5
150 mesh	0.1	0.7	3.2	0.1	0.1	0.1	1.1
200 mesh		0.3	1.8			0.1	0.7
270 mesh		0.1	1.0			0.1	0.5
Pan	0.2	0.7	3.2	0.2	0.2	0.3	7.6
Total	100.0	100.1	100.1	100.0	99.0	100.3	99.8
+1 inch	8.8	1.8	12.2	20.6	27.2	21.5	26.5
+4 mesh	32.3	19.3	43.6	57.2	63.2	53.0	54.2
–4 mesh	67.7	80.8	56.5	42.8	35.8	47.3	45.6

[1]Sieve tests by Carl W. Henderson, October 1966.

thickness of sand and gravel is probably about 20 feet, except near the border of the terrace where the sand and gravel laps onto the uplands.

The material exposed in gravel pits and in natural exposures extending down to floodplain level is sandy, relatively fine-grained gravel (table 2, sample 1). Few pebbles are larger than 3 inches in diameter. The deposit is relatively uniform, compared to other deposits in the county. The material along Piscasaw Creek, near the eastern edge of the county, is probably coarser grained than the material farther downstream. Also, the material below floodplain level may be coarser grained than the exposed material. Most of the pebbles are dolomite (table 3, sample 1).

Gravel pits have been operated chiefly along the scarp between the upper terrace and adjoining floodplain where the difference in elevation between the two levels is more than 15 feet. Much more gravel is available away from the terrace scarps, in the upstream part of Piscasaw Creek, and below floodplain level, but in these situations, extensive drainage or pumping or operation of a water-filled pit by a dredge would probably be required.

Lower Terrace Sand and Gravel

Near the junction of Piscasaw Creek and the Kishwaukee River, two terrace levels may be distinguished. The lower terrace occurs mainly along Coon Creek and along the Kishwaukee River upstream from its junction with Piscasaw Creek. It was not identified along Piscasaw Creek, except near its mouth. Small patches may occur along the Kishwaukee River downstream from Belvidere, but they are too poorly defined to map here. The lower terrace may be traced upstream along the Kishwaukee River to glacial end moraines younger than the Marengo end moraine (Anderson and Block, 1962, pl. 1).

The lower terrace surface is only about 5 feet above the adjoining floodplain level. Little information is available concerning the thickness of sand and gravel. The driller's log of a well on the lower terrace at Garden Prairie, near the northeastern corner of sec. 35, T. 44 N., R. 4 E., indicates that sand and gravel extends down to bedrock at a depth of 50 feet. A thickness of at least 20 feet seems likely in most places.

The overburden on the lower terrace sand and gravel consists of from 2 to 5 feet of soil and silt in most places. Along Coon Creek, fine-grained alluvium that may be somewhat thicker covers parts of the terrace surface. The sand and gravel itself is poorly exposed. Along the Kishwaukee River, near Garden Prairie, 3 feet of pebbly sand and sandy gravel containing pebbles as much as 2 inches in diameter are exposed. The material may be coarser grained below floodplain level.

Alluvium Overlying Glacial Sand and Gravel

The post-glacial alluvium in floodplains along the Kishwaukee River, Piscasaw Creek, and Coon Creek probably overlies glacial sand and gravel similar to that of the adjoining terraces. In parts of the Beaver Creek floodplain, post-glacial alluvium overlies glacial sand and gravel similar to that cropping out beneath glacial till in adjacent areas. Although some of the sand and gravel below

TABLE 3 – PEBBLE COUNTS OF GRAVEL SAMPLES
(Percent by number of pebbles)

Sample number	1		2		3		4		5		6		7	
Size (inches)	3/4 x 1/2	1/2 x 3/8	3/4 x 1/2	1/2 x 3/8	3/4 x 1/2	1/2 x 3/8	3/4 x 1/2	1/2 x 3/8	3/4 x 1/2	1/2 x 3/8	3/4 x 1/2	1/2 x 3/8	3/4 x 1/2	1/2 x 3/8
Dolomite	75	65	61	53	63	61	70	65	82	79	70	63	80	79
Limestone	6	7	13	13	7	8	4	4	3	4	9	10	5	7
Weathered carbonate rock	—	1	1	4	1	—	—	1	1	2	1	2	1	—
Chert	11	16	14	13	17	20	10	13	5	5	8	10	4	4
Shale	—	—	1	2	—	—	2	4	1	1	—	1	—	—
Sandstone and siltstone	—	—	1	1	—	—	1	1	—	1	—	1	1	1
Dark-colored igneous	2	3	2	2	2	2	5	5	3	1	4	5	4	5
Granitic igneous	1	2	1	1	2	1	2	2	1	1	2	2	1	1
Rhyolitic igneous	2	2	1	1	1	2	2	1	1	1	3	2	—	1
Quartz	—	—	—	—	1	—	1	—	—	—	—	—	—	—
Quartzite	2	2	2	4	2	2	1	1	1	—	—	1	1	1
Gneiss	—	1	1	1	2	2	—	2	1	2	2	1	2	—
Schist	—	—	—	1	1	—	—	—	—	—	—	1	—	—
Graywacke	1	1	2	4	1	2	2	1	1	3	1	1	1	1
Total	100	100	100	100	100	100	100	100	100	100	100	100	100	100

the silty and clayey alluvium of these floodplains may be post-glacial alluvium deposited in stream channels, most of it is probably of glacial origin.

The thickness of sand and gravel in areas of alluvium overlying glacial sand and gravel is poorly known except in the vicinity of the Northwest Tollway and near Belvidere. Along the tollway, two borings in the Kishwaukee River floodplain in sec. 36, T. 44 N., R. 2 E., Winnebago County, just west of the Boone County line, penetrated sand and gravel to depths of 23 to 28 feet (Kempton, 1963, fig. 9, borings 16 and 17). The sand and gravel in the two borings was underlain by 10 to nearly 40 feet of glacial till and clay, which were in turn underlain by 38 to more than 68 feet of sand and gravel. In a large gravel pit operating in the Kishwaukee River floodplain, near the western edge of Belvidere, near the southern edge of sec. 22, T. 44 N., R. 3 E., sand and gravel is reported to extend down to bedrock at a depth of about 60 feet.

The thickness of the sand and gravel in the post-glacial alluvium and in the underlying glacial sand and gravel of valley train areas is evidently as variable as the thickness of the upper terrace sand and gravel. In places, the sand and gravel overlies glacial till at relatively shallow depths. Elsewhere, the till may have been eroded, so that younger sand and gravel now rests on older sand and gravel that originally underlay the till and that may extend down to bedrock. The maximum possible thickness of sand and gravel, which is given by the depth to bedrock, is more than 50 feet, except in small areas in the vicinity of Belvidere near the junction of Piscasaw Creek and the Kishwaukee River and along parts of the Kishwaukee River above its junction with Coon Creek. The minimum thickness is probably about 20 feet, except near the edge of the alluvium.

In the areas along Beaver Creek where the alluvium is underlain by glacial sand and gravel, the thickness of sand and gravel is known only along U. S. Highway 20, in sec. 20, T. 44 N., R. 3 E. Here, one boring penetrated sand and gravel to a depth of 22 feet before reaching till, and another boring penetrated 26 feet of sand and gravel without reaching till.

The overburden on the sand and gravel is from 2 to about 6 feet of dark colored silty, clayey, and/or sandy alluvium or, in places, muck. The upper part of the sand and gravel is commonly clayey and may be post-glacial alluvium rather than glacial outwash. In a few small areas, the overburden is a silty terrace soil rather than alluvium.

Due to its occurrence only in stream floodplains, the material forming the alluvium is poorly known. In the large pit near the western edge of Belvidere, near the south line of sec. 22, T. 44 N., R. 3 E., coarse-grained cobble-bearing gravel is dredged from below water level. Along Piscasaw Creek, near the eastern edge of the county ($SE\frac{1}{4}$ sec. 28, T. 45 N., R. 4 E.), coarse-grained gravel is exposed at stream level.

Sand and Gravel Cropping Out Beneath Glacial Till

In several parts of the county, layers of sand and gravel that were originally overlain by glacial till are now exposed at the surface because of the removal of the till by stream erosion. The sand and gravel layers extend beyond their mapped outcrop areas into the surrounding uplands, where they are still overlain by glacial till. However, the till overburden in these upland areas is too thick for exploitation of the sand and gravel a short distance beyond the outcrop areas. For this reason, only the outcrop areas of the sand and gravel were mapped as sand and gravel resources.

Three main areas and several smaller areas of sand and gravel cropping out beneath glacial till are found in Boone County. One of the larger areas is along Beaver Creek and along the northwestern edge of the Kishwaukee Valley in T. 44 N., R. 3 E. Another area is along the valleys of the Kishwaukee River and Coon Creek near their junction in the southern part of T. 44 N., R. 4 E. The third area is along Beaver Creek in T. 45 N., R. 4 E., and the southwestern part of T. 46 N., R. 4 E.

The overburden is 2 to 5 feet of soil and silt in most places. A few areas having glacial till overburden as much as 10 feet thick are included. The upper few feet of the sand and gravel is commonly weathered and clayey.

The character of the sand and gravel varies greatly over short distances, both vertically and along the bedding. Many beds are coarse grained and contain abundant cobbles, but other parts of the deposits are largely sand and fine-grained gravel. The variability and the coarseness of some beds suggests an ice-contact origin. Three screen analyses of samples from these deposits are given in table 2 (samples 2, 3, and 4), but because of the variability of the deposits, they may not be typical of the areas from which they were taken. The gravels are composed largely of dolomite pebbles (table 3, samples 2, 3, and 4).

In most places, the sand and gravel extends to below valley level, so that the total thickness is not known. However, in parts of the westernmost area, chiefly in secs. 5, 8, and 19, T. 44 N., R. 3 E., till and bedrock underlying the sand and gravel are exposed. Here, the sand and gravel deposit is 15 to 30 feet thick. Where the base of the sand and gravel is not exposed, the thickness of sand and gravel above valley level is the difference in elevation of the top of the sand and gravel deposit and the adjoining valley floor.

In the northeastern area, the maximum exposed thickness, found in sec. 8, T. 45 N., R. 4 E., is about 20 feet, but the base of the sand and gravel is not exposed. In three wells within a distance of 2 miles west, north, and northeast of the outcrop area, this sand and gravel layer is from 30 to 50 feet thick (Kempton, 1963, fig. 5, well nos. 77, 78, and 79). Well sample studies and outcrops strongly suggest that no sand and gravel is present above valley level along Beaver Creek between this area in the upper part of the Beaver Creek Valley (T. 45 N., R. 4 E.) and the area near the mouth of Beaver Creek (T. 44 N., R. 3 E.).

In the southeastern area, the maximum exposed thickness of sand and gravel, in sec. 5, T. 44 N., R. 4 E., is about 20 feet, but the base is not exposed. On the south side of Coon Creek, in the SE$\frac{1}{4}$ sec. 30, T. 44 N., R. 4 E., the thickness is nearly as great, but a thin layer of till occurs within the sand and gravel. Well sample studies show that two wells just south of Coon Creek, in the NW$\frac{1}{4}$ sec. 31, T. 44 N., R. 4 E., penetrated 30 and 60 feet, respectively, of sand and gravel below till that probably belong to this unit. Another well just north of the outcrop area, near the northeastern corner of sec. 19, T. 44 N., R. 4 E., penetrated 27 feet of sand and gravel below till.

Several smaller areas in the northwestern part of the county are mapped as sand and gravel cropping out beneath glacial till, although the materials in two of these areas (sec. 14, T. 45 N., R. 3 E., and secs. 31 and 32, T. 46 N., R. 3 E.) are so poorly exposed that the relations of the sand and gravel to the adjacent till are not known for certain. All of these smaller deposits are probably of minor importance as sand and gravel resources.

Hills and Ridges of Sand and Gravel

Ice-contact deposits of sand and gravel in the form of hills and ridges are fairly common near the eastern edge of the county in T. 44, 45, and 46 N., R. 4 E., and in the area south of the Kishwaukee River. Undiscovered small hills of sand and gravel may be present in addition to those mapped, but most of the prominent hills not mapped as sand and gravel are underlain by glacial till. Most of the hills of sand and gravel are of the type known as kames, but the elongate ridge in the southwestern part of the county, centered in sec. 32, T. 43 N., R. 3 E., may be an esker (Anderson, 1964, p. 16).

The thickness of sand and gravel in the hills is quite variable. As a general rule, the maximum thickness is approximately the difference in elevation between the top of the hill and the surrounding land level. This is about 40 feet in the high ridge in secs. 29 and 32, T. 43 N., R. 3 E., 60 feet in the two large hills centered in secs. 8 and 22, T. 43 N., R. 4 E., and 30 feet in the large hill in the SE$\frac{1}{4}$ sec. 23, T. 46 N., R. 4 E. The largest sand and gravel pits, in the NE$\frac{1}{4}$ sec. 32, T. 43 N., R. 3 E.; NW$\frac{1}{4}$ sec. 17, T. 43 N., R. 4 E.; NE$\frac{1}{4}$ sec. 24, T. 46 N., R. 4 E.; and SW$\frac{1}{4}$ sec. 5, T. 45 N., R. 4 E., are about 20 feet deep.

The overburden on the sand and gravel is only 1 or 2 feet of soil in most places. However, the upper few feet of sand and gravel are weathered and clayey in some places.

The character of the sand and gravel is extremely variable and changes in short distances vertically and laterally from coarse-grained cobble-bearing gravel to sand. Channel samples through three of the deposits contained over 50 percent +4 mesh gravel (table 2, samples 5, 6, and 7). The gravel is composed mainly of dolomite pebbles (table 3, samples 5, 6, and 7). Most of the deposits contain irregular masses or beds of till, commonly overlying or interbedded with sand and gravel and hindering exploitation of the sand and gravel. The high clay and silt content of sample 7 (table 2) is due to masses of till that could not be avoided in the sampling.

Other Sand and Gravel Deposits

Small deposits of sand and gravel in several parts of the county were laid down during the melting of the last ice sheet that covered the region. One area that includes such deposits is located along the southeastern side of the upper terrace southwest of Belvidere in T. 43 N., R. 3 E., and in the southern part of T. 44 N., R. 3 E. In much of this area, bedrock is at a depth of less than 10 feet. In other parts of the area, sand and gravel overlies glacial till at depths of less than 10 feet, as shown by borings along the Northwest Tollway in sec. 4, T. 43 N., R. 3 E. (Kempton, 1963, fig. 9, borings 20, 21, and 22). The thickness of sand and gravel is probably less than 10 feet in most of this area. From 3 to 6 feet of silt and soil overburden are found. Some of the material is coarse-grained gravel, but most of it is sand. Till masses or beds are associated with the sand and gravel in many places. Because of the thinness, generally fine grain size, and associated till, the sand and gravel is not very important commercially, and no pits have been active in these deposits in recent years.

Several small areas at the edge of the upper terrace along Piscasaw Creek were mapped in this category but are poorly exposed and may be sand and gravel

cropping out beneath glacial till. An abandoned pit in the NE$\frac{1}{4}$ sec. 28, T. 45 N., R. 4 E., exposes about 15 feet of pebbly sand and fine-grained gravel.

Other small areas occur west and north of Capron in the northeastern part of the county. The material is poorly exposed but is probably sand and fine-grained gravel less than 10 feet thick. From 3 to 6 feet of silt and soil overburden lie on the sand and gravel. No pits have been active in the area in recent years.

In the southeastern part of the county (T. 43 N., R. 4 E.), some sand and gravel outwash was deposited in ponded areas between kames and other hills and in valleys leading away from these ponded areas. The material is poorly exposed, but the thickness of sand and gravel is probably less than 10 feet, and much of the area may contain no gravel. From 3 to 6 feet of silt, clay, and soil overburden is present. No pits have been operated in the area in recent years.

Slackwater Deposits

Silt, clay, and small amounts of sand and gravel were deposited in ponded tributaries of valleys that were being filled by glacial outwash now preserved as terraces. These slackwater deposits occur as terraces along Beaver Creek, along Kingsbury and Trimble Creeks, which are tributaries of the South Branch of the Kishwaukee River, and in several small valleys tributary to Piscasaw and Mud Creeks.

Most of the slackwater sediment is silt, but a few feet of sand and gravel commonly occur at the base of the deposit. Near the junctions of the tributary valleys and the sand and gravel terraces of the major valleys, sand is interbedded with the silt below depths of about 5 feet, and gravel may be present in places. The thickness of the deposits, including interbedded silt, is less than 10 feet in most places, but greater thicknesses may be found where the deposits adjoin the sand and gravel terraces of the major valleys.

Alluvium

The alluvium of most of the smaller streams of the county differs from that of the Kishwaukee River, Piscasaw Creek, Coon Creek, and parts of Beaver Creek in that it generally overlies glacial till at shallow depth rather than glacial sand and gravel. However, in a few places, the alluvium may overlie glacial sand and gravel. In most places, the alluvium is less than 10 feet thick, and most of this is silty or clayey. However, the basal few feet are commonly sand and gravel that may be suitable for local use.

Peat

Several areas of peat or peaty muck occur in depressions in valleys in the northeastern part of the county (Wascher, Smith, and Smith, 1939, p. 27). In places, the peat may overlie sand and gravel.

Areas Devoid of Sand and Gravel

The areas in which sand and gravel deposits were not mapped are underlain largely by glacial till, but small areas of bedrock are also included. Well sample studies indicate that in parts of these areas sand and gravel occurs be-

TABLE 4 – SAND AND GRAVEL PRODUCERS
HAVING PERMANENTLY PLACED EQUIPMENT

Company name	Location	Type of deposit
Kishwaukee Sand and Gravel Company	SE¼ SW¼ sec. 22, T. 44 N., R. 3 E.	Alluvium overlying glacial sand and gravel
Rockford Blacktop Company	SW¼ NE¼ sec. 27, T. 44 N., R. 3 E.	Upper terrace

neath glacial till, but the thickness of till overburden is considered too great to map such areas as sand and gravel resources at the present time. Some of the till, especially in the area north and west of Piscasaw Creek and west of Capron, is very sandy and pebbly and may eventually be considered a sand and gravel resource. However, most of this till contains at least 25 percent silt plus clay, a value probably too high for the till to be considered a sand and gravel resource at the present time.

SAND AND GRAVEL INDUSTRY

The two largest gravel pits in the county are located near the western edge of Belvidere and take gravel from the upper terrace and from valley train material underlying the alluvium in the Kishwaukee River floodplain (table 4). Smaller amounts of sand and gravel are taken periodically from the sand and gravel cropping out beneath glacial till and from hills and ridges of sand and gravel. Other deposits in the county have furnished only small amounts of sand and gravel, and most of the pits in these deposits have been abandoned many years. Pits that were operating at one time or another during the summer of 1966 are shown as active pits on plate 1.

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