

GEOLOGY OF CASS COUNTY.

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HISTORICAL AND DESCRIPTIVE.

Cass County is bounded on the east by Miami County, on the north by Fulton and Pulaski, on the west by White and Carroll and on the south by Carroll and Howard. It is twenty-four miles long on the east side by twenty-two miles wide on the north end. On the west side and south end the boundary line follows an irregular course; commencing at the northwest corner of the county it runs twelve miles south, three miles east, three miles south, eight miles east, nine miles south and eleven miles east, and includes within its limits 420 sections of land of 256,174 acres, as reported for taxation.

Cass County was included in Tippecanoe until 1828. The organization of the county was completed April 13, 1829, under acts of the Legislature passed December 18, 1828, and January 19, 1829, and at that time embraced all that portion of the State now included in the counties of Miami, Wabash, Fulton, Marshall, Kosciusko and St. Joseph, and parts of Laporte, Starke and Pulaski. The county seat was located at Logansport August 10, 1829. The county is divided into fourteen civil townships: Boone, Harrison, Bethlehem, Adams, Miami, Clay, Eel, Noble and Jefferson on the north side of the Wabash River, and Clinton, Washington, Tipton, Jackson and Deer Creek on the south side.

Logansport is located at the confluence of Eel River with the Wabash, near the center of the county. It was named in honor of Captain Logan, a Shawnee Chief, who lost his life in November, 1812, because of his fidelity to the whites, and not for Logan, the Mingo, as many suppose. The original plat of the town contained 111 lots, with streets 66 feet wide, except Broadway which is 82½ feet wide, and the same generous proportions have been preserved in all additional plats. No city of its size has better streets and sidewalks. Over one hundred miles of solid, commodious, well-drained, graveled or macadamized highways, with more than half as many miles of stone and cement sidewalks, have been built. The main thoroughfares are traversed by many miles of electric street railway, and well lighted with gas and arc lights. The water supply is

abundant and wholesome. The main part of the city lies nearly two miles distant from the junction of the rivers; its central elevation is crowded with churches, representing all the leading denominations; its west slope is covered with handsome business blocks, "while the more retired streets are lined with beautiful homes, from the mansion of wealth to the cottage of labor."

The natural gas plant of Logansport is one of the very best. It is supplied from the heart of the Indiana field, in which the company has 7,000 acres of territory.

The main line is twenty-six miles of eight-inch, screw joint, standard pipe. The gas is distributed to the city consumers through about fifty miles of piping. There are eight beautiful public school buildings within the corporate limits. Of these the Central, or High School, building is the largest. This building is 104 by 118 feet, three stories above the basement, and was erected at a cost of \$70,000.

The railroads centering here give employment to several hundred men, the majority of whom are in the Panhandle repair shops and yards. In addition to these are many other shops, together with factories, mills and foundries.

The location of Logansport, between and at the confluence of two broad and beautiful streams, has rendered necessary nine long bridges. Five of them are used for general traffic and four are beautiful and costly railway structures.

Royal Centre, an incorporated town, on the Pittsburgh, Cincinnati, Chicago & St. Louis Railway, eleven miles northwest, and Walton, on the same road, nine miles southeast of Logansport, are the principal towns in the county, the first having a population of 600 and the second 800. There are twenty-five postoffice towns and villages outside of Logansport, nearly all of them located on railroads. Seven of them are money-order offices.

The county is well supplied with railroads and Logansport is a railway center second to but few cities in the State. In these roads three systems are represented. The Wabash by its main line and the Eel River Division; the Pennsylvania by the Indianapolis, Richmond, Columbus, Chicago and Peoria Divisions; and the Vandalia by the Terre Haute, Logansport & Michigan Division.

Excellent turnpikes and gravel roads cross the county in every direction, affording its citizens easy and rapid transportation. The gravel, everywhere available, should be used until every mud road in the county is macadamized. The principal pikes are the Logansport and Marion; Logansport and Western; Logansport and Rock Creek; Logansport and Northern; Logansport and Burlington and the Logansport and Wabash.

TOPOGRAPHY.

In the immediate vicinity of Wabash and Eel Rivers the surface is undulating and broken; back from the rivers the country is level. All the southern part, in its natural state, was heavily timbered bottoms or table-land; the center is mostly bottom, with some high bluff land; the northern is principally prairie.

By reference to the table of elevations it will be seen that Waverly is 83 feet above the Wabash Railway station at Logansport; Lucerne, 209 feet; Gephart, 156; Lake Cicott, 105; Summit, one and three-fourths miles east of Clymers, 139 feet; Galveston, 199 feet; and Onward, 167 feet.

The drainage of the county is determined by the Wabash and Eel River valleys passing from east to west, and the highlands of the northern parts of Deer Creek and Jackson Townships, south of the Wabash River, and the high lands of the southern parts of Harrison and Boone Townships. The streams of Deer Creek, Jackson, Tipton and Washington Townships are Deer Creek and Big Rock Creek, which run nearly due west and empty into the Wabash in Carroll County. Pipe Creek enters the county from Miami and running north unites its waters with those of the Wabash opposite Lewisburg. Twelve Mile Creek drains the northeast part of the county and empties into Eel River. Crooked Creek joins the Wabash near the Carroll County line. All the other creeks of the county flow into the Wabash or Eel Rivers, except a few small streams in the northwest part of the county, which flow into the Tippecanoe River.

Lake Cicott, in Jefferson Township, is one mile long, east and west, and has an average width, north and south, of one-fourth of a mile; greatest depth, 64 feet. The bluffs on all sides are twenty-five feet high, except on the east side, where they are wanting, so that in times of high water it drains into Crooked Creek through an old lake bed lying between it and the creek. It contains sunfish, two kinds of catfish, and a small grass pike. It is not fed by any regular stream, and has no outlet except for flood water.

The principal agricultural product is corn, and according to recent statistics the county has an average yield of 55 bushels an acre, which is larger than that of any other county in the State. The warm, loamy alluvial soil of the river bottoms, in favorable years, produce immense crops of wheat. All agricultural products are successfully grown, and with the variety of soil, furnished by valley and upland, is given the greatest possible diversity to farming. These varieties of soil are so evenly adjusted as to prevent a complete crop failure throughout the county; and it is to this fact that the general thrift of the farmer, and those dependent upon him, is due. In its primeval state much of the

land in Cass County was wet and swampy, but the best of land when thoroughly drained. The portions especially requiring drainage, upland prairie, are readily recognized by the absence of creeks, as shown on any good map of the county.

GENERAL GEOLOGY.

DESCRIPTIVE AND DYNAMIC.

CONNECTED SECTION.

QUATERNARY.

Recent Period.

Soil 5 feet.

Drift Period.

Glacial clay, sand and gravel 0 to 150 "

DEVONIAN AGE.

Upper Helderberg Group.

Amorphous dove-colored stone 0 to 25 "

Buff quarry-stone, Fitch's quarry, etc 0 to 50 "

Blue limestone, Lux & Lux's quarry 0 to 10 "

Stromatopora beds, Keepport's limekilns 10 "

Schoharie grit 0 to 5 "

SILURIAN AGE.

UPPER SILURIAN DIVISION.

Lower Helderberg Group.

Waterlime strata, Pipe Creek falls 0 to 10 "

Niagara Group.

Niagara limestone 0 to 10 "

Total 0 to 275 feet.

All the surface stone of Cass County is referred to the Devonian and Silurian systems. In the vicinity of Logansport and west from that place, including the quarries at Georgetown, the country rocks belong to the Upper Helderberg Group of the Devonian Age. The lowest member of this group, the Schoharie grit, is only seen on Deer Creek in Jackson Township. The next member, in descending order of the geological scale, is the waterlime formation of the Lower Helderberg, which outcrops in the bed of Pipe Creek at the Pipe Creek Falls. That the dark stone, with a strong smell of petroleum, seen only at this place in the county, is the equivalent of the beds at Kokomo seems very probable on lithological grounds alone; and this inference is confirmed when it is taken into consideration that the Pipe Creek Falls and the Kokomo quarries are very nearly on the same geological level and altitude above

the ocean. No fossils were found to confirm the conclusions drawn from the physical appearance of the exposure, and it is freely granted that the character of the stone in the Wabash Valley so rapidly changes within a few hundred feet on the same horizon, that any determination where no fossils are seen, must be of doubtful value, yet that this is its true place seems very probable. Below the Waterlime strata comes the Niagara Group limestone in the channel of Pipe Creek, in the bed of the Wabash River east of Cass, at Cedar Island, immediately south of Keepport's quarry, and perhaps at Miller's Falls, near Waverly. Because of the general dip to the west, the Niagara stone disappears under the bed of the Wabash before reaching Logansport.

It has been claimed that the Lower Helderberg Group, other than the Waterlime member, has been identified in this county at a point one-fourth of a mile above the Vandalia Railway bridge at Logansport, but as only one imperfect fossil could be found the determination can not be confirmed. On the contrary, it must be an error, and this is made more than probable when it is remembered that the same party, who claims to have found Lower Helderberg rocks in Cass County, refers the quarry stone of South Wabash to the same group. Fossils are abundant at South Wabash, and it is hard to understand on what grounds the quarry stone of that locality can be referred to any other group than the Niagara. The cephalopods, of which there are six genera and many species here found, have all been described as from rocks of the Niagara Age. The genus *Pisocrinus*, a characteristic fossil of the Niagara rocks at Lockport, N. Y., St. Paul, Hartsville, Versailles, and at many other places in Indiana, is quite common in the quarry stone of Wabash County. It also occurs in rocks of an equivalent age in England. In view of the fact that such authorities as De Koninck, Hall, Miller, Newell and Pengueberg have all united in pronouncing the *Pisocrinus* beds of Niagara Age, and that the presence of *Echinodermata* is the most delicate test the paleontologist can apply in determining the geological horizon of a given strata, further proof is desired before any of the rocks of the Wabash Valley, and especially in Cass and Wabash Counties, except the Waterlime formation, are referred to the Lower Helderberg Group.

All the rocky strata of the county lie as they were deposited at the bottom of the ocean, other than the changes wrought by the continental elevations that made the interior of North America dry land. The general dip is to the west, a few degrees south. This is true of the entire Wabash Valley, and in fact of the whole State. There are local exceptions to this statement, but they are of very limited extent, rarely extending more than a few yards, and are not to be taken into consideration in studying the geology of a county, nor even a township.

Irregular bedding was seen at many places, among the most conspicuous examples being those exposed at Keepert's limekilns and at the Pipe Creek Falls. At the latter place the strata grow thinner in one direction and thicker in the other. In this county, as in Wabash, the greatest apparent departure from normal stratification is confined to the Niagara rocks, or those immediately overlying them.

The theory that the rocks of the Wabash Valley have been disturbed and upturned by a local upheaval co-extensive with the limits of the State, finds no support in the geology of Cass County. Nowhere was seen the equivalent of the porous or "picket rocks" so characteristic of what has been described as an upheaval. It is admitted, however, that no general disturbance of the strata, either at Delphi or Wabash City, could have occurred without leaving some impress on the rocks of this county, and for this reason it may be worth while to show briefly why we do not think there has been any change caused in the relationship of the strata of the Wabash Valley since the formation of the Cincinnati Arch.

Prof. John Collett pointed out in the Geological Survey of Indiana, 1872, that the mass of "compact, porous limestone, irregularly bedded and dipping N. W. at 45 degrees," at Hanging Rock, near the mouth of the Salamonie River, was underlaid by "horizontal clay stones" and five feet of "choice blue limestone." This section alone was sufficient, in his mind, to disprove the evidences of an upheaval seen at other points, notably those at Wabash City and Delphi. To this exposure at Hanging Rock others of a similar character on the Salamonie and in the vicinity of La Gro have been added, showing clearly under the porous stone even-bedded strata with clay or shale partings, such as only occur in true stratification wholly undisturbed by any influence other than that which elevated the continent. Second, the "porous picket rock" is not an exotic production intruded into the place where now found, but an indigenous country rock in which the lithological characters have been changed by chemical action. At Shutz's Cone, near La Gro, all the gradations of change can be traced from the unaltered hydraulic limestone beds of the base to the hard, porous stone of the apex. Third, the lines of separation between the strata of the cones, on which the tilted appearance of the stone depends, are not planes of stratification, but a modified form of joint structure. But, aside from any question of a subterranean disturbance in the Wabash Valley at the close of the Niagara Period, many very remarkable phenomena in stratification and lithification are presented that need further elucidation. A careful study of this region would add a chapter to stratigraphical geology of great interest not now found in any American text-book.

The lower strata, the blue limestone of Lux & Lux's quarry, is of Devonian age, filled with Upper Helderberg fossils, and is the equivalent

of the famous blue quarry stone of Vernon, Jennings County, Indiana, and is an excellent building stone. The buff arenaceous material overlying the blue stone is the equivalent of the rather soft, banded, semi-buff limestone overlying the blue at Vernon. At Lux & Lux's quarry the arenaceous material is the highest member of the Upper Helderberg shown, but going west along the Wabash River this stone dips rapidly to the west until, at the quarries two or three miles below the city, it has a thickness of thirty or more feet. It is here capped by a considerable thickness of hard, amorphous dove-colored limestone. Passing on down the Wabash the even-bedded buff-colored limestone is seen outcropping in the west bank of the river fifty or more feet in thickness, still capped by the dove-colored stone. Opposite Georgetown, still further down the stream, there is only a few feet of the even-bedded stone exposed in the east bank of the river. Here the amorphous, dove-colored stone is replaced by a gray stratified stone filled with poorly preserved Devonian fossils.

ECONOMIC GEOLOGY.

As to the quality of the stone seen in Cass County it is not necessary to go into details. In the days of the old Wabash and Erie Canal great quantities of the even-bedded, buff stone was quarried and used in bridge and architectural work. It has stood the test of time well, and is destined to hold its place in the market with the best. Before the present financial depression came the quarry interests of the county were growing daily in value and importance, and are destined to grow in the future.

Logansport has always been famous for the production of excellent lime, and with the modern advantage of natural gas will steadily increase its output. The lime produced is caustic and has been used by many gas companies for years as a deodorizer. It is an excellent lime, when thoroughly slacked, for plastering purposes, and makes a hard, compact wall, free from blisters. For mason work it makes a mortar which is generally harder and more enduring than common bricks.

DRIFT.

The glacial clays, sand and gravel, cover the whole county, except on the creeks and rivers. On the uplands it seems to be unmodified, and in places has a depth of 150 feet. The sand ridges of the northern part of the county are peculiar, and deserve study in connection with the surface geology of the adjoining counties. The same is true of the trail of bowlders seen in Bethlehem Township. Bowlders are more common north of the Wabash River.

PALEOZOIC GEOLOGY.

LOCAL DETAILS.

TALBOTT & PARKER'S LIME KILN.

Two miles west of Logansport, on the State line division of the Pennsylvania Railroad, Eel Township.

Soil	2 ft. 6 in.
Hard, dove-colored, concretionary limestone, not regularly bedded	11 ft. 0 in.
Rough bedded, dove-colored limestone	10 in.
Rough bedded, dove-colored limestone	8 in.
Total	15 ft. 0 in.

The concretions seen in this quarry vary in size from that of a hulled walnut to that of one's fist, and are cemented together by a greenish white material that weathers black. From the center of the quarry the stone dips in every direction as if it had been deposited on a low mound, and indicative that it was formed in an eddy.

One-eighth of a mile west of the Talbott & Parker kiln an exposure by the side of the railroad gave the following:

SECTION.

Eel Township.

Soil	6 ft. 0 in.
Conchoidal, concretionary limestone	1 ft. 6 in.
Parting, a trace.	
Conchoidal, concretionary limestone	2 ft. 0 in.
Parting, a trace.	
Irregularly bedded, conchoidal, concretionary, dove-colored limestone	2 ft. 0 in.
Covered slope to base of rail	4 ft. 0 in.
Total	15 ft. 6 in.

The dip here is slightly to the east. The stone of the last section occupies a higher place in the series and immediately overlies the stone exposed in the old lime kiln quarries of Talbott & Parker.

SECTION OF WILLIAM TALBOTT'S QUARRY.

Three miles west of Logansport, on the south side of the State line division of the Pennsylvania Railroad, Eel Township.

Soil and covered slope	12 ft. 0 in.
Thin fissile, buff limestone	3 ft. 0 in.
Heavy bedded, buff limestone	1 ft. 3 in.
Soft buff limestone	0 ft. 7 in.
Hard buff limestone	0 ft. 9 in.
Hard buff limestone	1 ft. 9 in.
Irregularly bedded, fissile limestone	4 ft. 4 in.
Even bedded, buff limestone	1 ft. 2 in.
Irregularly bedded, gray limestone	0 ft. 8 in.
Rotten, buff limestone	0 ft. 2 in.
Vermicular buff limestone	1 ft. 0 in.
Hard, buff limestone	0 ft. 6 in.
Hard, buff limestone	1 ft. 0 in.
Hard, buff limestone	0 ft. 8 in.
Hard, buff limestone	0 ft. 8 in.
Total	30 ft. 4 in.

The bottom of the quarry shows an arenaceous limestone stratum. No fossils, except some obscure casts, were seen here, and, in fact, this is true of all equivalent exposures of this rock in the county. This stone lies horizontally bedded in every outcrop except one, that at Georgetown, where it has a slight dip to the west.

A few rods south of William Talbott's quarry, in a gravel pit, limestone boulders were seen corresponding lithologically with the stone at Talbott & Parker's lime kiln quarries, and these boulders no doubt were derived from stone that capped this quarry before glacial action removed it.

SECTION OF DR. FITCH'S QUARRY.

North bank of the Wabash River, three and a half miles west of Logansport, Eel Township.

Soil and covered slope	10 ft. 0 in.
Hard, dove-colored, cherty limestone with chert bands	12 ft. 0 in.
Massive, heavy bedded, dove-colored limestone, even bedded	10 ft. 0 in.
Rough bedded, dove-colored limestone	1 ft. 4 in.
Rough bedded, dove-colored limestone	1 ft. 0 in.
Rough bedded, dove-colored limestone	1 ft. 8 in.
Irregularly bedded, fissile, gray limestone	4 ft. 0 in.
Fissile, buff limestone	2 ft. 10 in.
Silicious, dove-colored limestone to bottom of the valley	5 ft. 0 in.
Total	47 ft. 10 in.

Below the farm house and just west of Fitch's Glen the dove-colored stone has thinned to fifteen feet, as shown in the perpendicular face of

the bluff; but the buff stone, owing to its softness, was covered in the greater part by the soil of the slope. The thickness of the latter is here estimated at thirty feet.

H. M. WHISTLER'S QUARRY.

Pipe Creek, one mile above its junction with the Wabash River, Tipton Township.	
Soil	1 ft. 8 in.
Buff-gray limestone, that splits into thin layers	6 ft. 0 in.
Even-bedded, gray limestone	9 in.
Even-bedded, gray limestone	10 in.
Even-bedded, gray limestone	10 in.
Even-bedded, gray limestone	7 in.
Even-bedded, gray limestone, to bed of stream	10 in.
Total	11 ft. 6 in.

This, so far as seen, is the best building stone in the county. The iron contained in it being thoroughly oxidized, it is not affected by atmospheric changes, and when once thoroughly seasoned will withstand all changes of atmosphere. When this quarry is worked farther back, and when the unseasoned stone is removed from atmospheric influences, it will be found that the six feet of thin material has become solid ledges of from six to twelve inches in thickness, but not as valuable a stone as that of the lower strata.

A short distance up the creek from Whistler's is another quarry that shows the following:

SECTION.

Soil	2 ft. 0 in.
Buff limestone	6 in.
Buff limestone	6 in.
Buff limestone	7 in.
Gray limestone	10 in.
Gray limestone	3 in.
Gray limestone	5 in.
Buff limestone	8 in.
Thin-shell buff limestone	7 in.
Buff limestone	6 in.
Buff limestone	3 in.
Buff limestone	2 in.
Buff limestone	10 in.
Buff limestone	1 ft. 2 in.
Buff limestone to stream	2 ft. 2 in.
Total	11 ft. 5 in.

This is a very fine stone, of much the same quality of that seen in the Whistler quarry, but more evenly bedded. The dip here is 2° north.

On the bank of the creek in the rear of the Pipe Creek school-house there is a twenty-foot exposure of unstratified buff stone with sand holes and miniature caves in it. This outcrop overlies that of the last section.

SECTION ON PIPE CREEK.

Near the school-house.

Soil and slope	5 ft. 0 in.
Buff magnesian limestone, obscurely bedded, and breaking into irregular pieces	11 ft. 0 in.
Heavy bedded, buff limestone	2 ft. 0 in.
Heavy bedded, buff limestone	2 ft. 0 in.
Heavy bedded, buff limestone	2 ft. 5 in.
Heavy bedded, buff limestone	1 ft. 8 in.
Heavy bedded, buff limestone	10 in.
Rotten, amorphous stone to the water's edge	1 ft. 8 in.
Total	26 ft. 7 in.

SECTION AT ADAMSBORO.

East end of the bridge over Eel River.

Soil	1 ft. 2 in.
Hard, gray magnesian limestone containing <i>Stromatopora perforata</i> , <i>Favosites limitaris</i> , <i>Favosites polymorpha</i> , <i>F. emmornisia</i> , <i>Productella</i> , sp.?, <i>Streptorhynchus</i> , sp.?, <i>Atrypa reticularis</i> , <i>Platyceras</i> , sp.?, and a number of undetermined corals and polyzoa to the water's edge	10 ft. 0 in.
Total	11 ft. 2 in.

SECTION AT MILLER'S FALLS.

Two miles southwest of Waverly, Miami Township.

Rough-bedded, uneven, thin gray limestone, containing <i>Stromatopora</i> , sp.?, and <i>Favosites polymorpha</i>	12 ft. 0 in.
Rough-bedded limestone (Niagara) to the bottom of the fall	3 ft. 0 in.
Total	15 ft. 0 in.

This stream occupies a preglacial channel that starts west from the Wabash River, opposite the mouth of the Mississinewa, above Peru, and runs in a western direction until it reaches a point about one mile west of Waverly, where it turns south and intersects the Wabash one-half mile west of Lewisburg. At the time of our visit a diminutive streamlet was trickling over the rocks where once a volume of water poured.

SECTION AT CEDAR ISLAND.

Soil	4 ft. 0 in.
Buff limestone.	3 in.
Buff limestone.	4 in.
Chert band	2 in.
Buff limestone.	5 in.
Buff limestone.	5 in.
Buff limestone.	4 in.
Buff limestone.	5 in.
Buff limestone.	3 in.
Buff limestone.	4 in.
Buff limestone.	4 in.
Buff limestone.	3 in.
Buff limestone.	3 in.
Buff limestone.	4 in.
Buff limestone.	2 in.
Buff limestone.	4 in.
Buff limestone.	3 in.
Buff limestone.	4 in.
Buff limestone.	2 in.
Buff limestone.	6 in.
Total	10 ft. 3 in.

This stone is referred to the Niagara Group on lithological grounds alone, as no fossils could be found. The dip is five degrees to the west, and the strata seems to thicken rapidly in the same direction. Fifty feet west of this exposure an outcropping was seen, in what appeared to be an abandoned quarry, which showed intercalated, wedge-shaped strata that greatly increased the apparent dip of the rock. At Keepport's limekiln this stone underlies the Devonian, and can be traced one-half mile east along the Wabash Railroad, where it disappears, dipping to the east; west from Keepport's it dips at about the same rate along the river, until it finally disappears under the bed of the river.

SECTION AT KEEPPORT'S LIMEKILN.

Gray limestone, bedding very irregular	4 ft. 0 in.
Blue limestone, bedding obscure, Upper Helderberg Group	4 ft. 0 in.
Blue limestone to the bottom of the quarry, bedding not obvious except near the vertical seams, vertical seams infrequent. What stratification is shown rapidly changes, and thin. Dip slight and variable	4 ft. 0 in.
Total	12 ft. 0 in.

The two upper members of this section contain great numbers of *Stromatopora*, some of them one foot in diameter, but their presence does not interfere in burning the stone to lime, as they are not siliceous.

South of the railroad, near the last section, and underlying it, the following exposure was seen in an abandoned quarry and the stone seen in it is referred to the Niagara Group:

SECTION.

Dark limestone	2 ft. 0 in.
Dry parting	4 in.
Thin bedded limestone	2 ft. 2 in.
Heavy blue limestone	1 ft. 2 in.
Buff limestone	2 ft. 9 in.
Buff limestone	9 in.
Buff limestone, apparently arenaceous, bedding irregular	3 ft. 4 in.
Total	12 ft. 6 in.

SECTION ON THE FARM OF W. H. TYNER.

Across the river from Georgetown, Clinton Township.

Soil	14 ft. 0 in.
Limestone	51 ft. 0 in.
Total	65 ft. 0 in.

This stone is reported very hard and the drillers say they were all day making a depth of six inches. At the bottom of the bore "slate of a dark color" was struck. This so-called strata was probably the Niagara shale that is frequently found underlying the Upper Helderberg Group of Devonian Age.

SECTION NEAR GEORGETOWN.

East bank of the Wabash River, Clinton Township.

Soil	3 ft. 0 in.
Gray limestone, varying to buff, in places sandy	10 ft. 0 in.
Dark colored, fissile limestone, breaking into small pieces	4 ft. 6 in.
Heavy bedded, dark arenaceous limestone	2 ft. 0 in.
Fissile, gray, arenaceous limestone to bed of the river	3 ft. 0 in.
Total	22 ft. 6 in.

The upper member of this section contains an abundance of crinoidal remains with a great many corals, all too poorly preserved to be identified. The surface of the next member, where exposed, shows evidence of having been eroded into channels and hummocks before the overlying rock was deposited.

SECTION IN JEFFERSON TOWNSHIP,

One-half mile above Georgetown.

Soil	3 ft. 0 in.
Dark limestone, full of crinoidal remains, very rough bedded	2 ft. 0 in.
Dark limestone, full of crinoidal remains, very rough bedded	3 in.
Fissile, light colored material, full of comminuted crinoids, resting on a hard blue siliceous stone that is locally a "fire rock"	2 ft. 0 in.
Total	7 ft. 3 in.

This is the only exposure of stone seen in the township and is, together with the stone just across the river, referred, on lithological grounds alone, to the Waterlime Group, but is thought to be correct because of its dark color and strong smell of petroleum when freshly fractured.

On the farm of John Stanffer, near the forks of Deer Creek, there is an outcrop of Schoharie grit about five feet in thickness, that is underlaid and covered by buff limestone. At another point on Deer Creek there is an outcrop of gray magnesian limestone for one and a half miles that has a vertical exposure of ten feet.

SECTION AT ANTON GLEITZ'S QUARRY.

Near Long Cliff.

Soil	2 ft. 0 in.
Hard, concretionary, dove-colored limestone	18 ft. 0 in.
Covered slope	20 ft. 0 in.
Thin-bedded, buff, arenaceous limestone	6 ft. 6 in.
Heavy-bedded buff limestone	12 ft. 6 in.
Covered slope to river bed where was seen heavy-bedded, dove-colored limestone	8 ft. 0 in.
Total	67 ft. 0 in.

Between the bottom of the quarry proper and the dove-colored stone seen in the river bank there is five feet of thin-bedded, dark, magnesian limestone, followed by the same thickness of lighter colored stone that shows color bands of deposition.

SECTION AT LUX & LUX'S QUARRY.

City of Logansport.

Soil, gravel and bowlders	5 ft. 0 in.
Buff arenaceous limestone, strata from 3 inches to 1 foot in thick- ness, bedding very irregular, closed vertical seams frequent at all angles	10 ft. 6 in.
Blue limestone, good quarry stone	8 ft. 0 in.
Total	23 ft. 6 in.

At the time of our visit it was not possible to see the whole of the blue limestone uncovered by the quarrymen, because of the high water which covered the lower members of the exposure. The portions seen show

DRIFT PERIOD.

LOCAL DETAILS.

SECTION IN LOGANSPOBT.

Corner Broadway and Seventh Streets.

Soil	3 ft. 0 in.
Stratified gravel	8 ft. 0 in.
Total	11 ft. 0 in.

This section reaches down to a level of the street grade, but the gravel probably continues to the underlying Upper Helderberg rocks, as they were seen cropping out at the corner of Broadway and Sixth Street.

SECTION OF GRAVEL PIT.

North bank of Eel River, near the upper dam, Eel Township.

Soil	2 ft. 4 in.
Gravel to rock	32 ft. 0 in.
Total	34 ft. 4 in.

This is a good coarse gravel with numerous boulders in it, varying in size from an egg to a barrel or larger. At one place is shown a lens-shaped mass of much finer gray colored gravel without any boulders in it. The other beds are strongly colored with oxide of iron.

Generally in the southern part of Adams Township seven or eight feet of gravelly soil overlies from two to six feet of yellow clay. Under the clay is a bed of coarse gravel that is water bearing. Occasionally the gravelly yellow clay is much thicker before water is found. Good road gravel is abundant in beds that have been worked to a depth of ten feet and probably reach a much greater depth. The northern part of the township is locally known as "the barrens" and is made up of a succession of sand ridges and prairies. The latter is first-class farming land when properly underdrained. For years many farmers did not appreciate the value of ditching for this kind of soil, and consequently it was neglected for the dryer lands of the southern part of the township. The sand ridges have a general east and west direction.

SECTION ON EEL RIVER.

One mile east of Adamsboro in Clay Township.

Soil	5 ft. 0 in.
Coarse gray gravel	10 ft. 0 in.
Fine yellow sand	5 ft. 0 in.
Fine gray gravel	5 ft. 0 in.
Total	25 ft. 0 in.

There is a large amount of gravel in the northeast part of this township. One quarter of a mile north of here, a good exposure of the upper member of this section was seen in a ravine leading into Eel River.

WELL ON THE FARM OF MARION KRIDER.

Sec. 31, town. 28, range 3 east. Adams Township.

Soil, sandy loam	15 ft. 0 in.
Blue clay	25 ft. 0 in.
Gravel	3 ft. 0 in.
Blue clay	46 ft. 0 in.
Water-bearing gravel	7 ft. 0 in.
Total	96 ft. 0 in.

GRAVEL PIT.

Sec. 31, town. 28, range 3 east.

Soil	3 ft.
Good, coarse, gray gravel	6 ft.
Gray sand	3 ft.
Total	12 ft.

This gravel is a fine road material, and the sand is excellent for masonry and plastering purposes.

GENERAL SECTION AT ALTONA.

Harrison Township.

Soil	1 ft.
Yellow clay with an occasional sand parting	6 ft.
Blue clay	25 ft.
Total	32 ft.

SECTION OF OSCAR SARGENT'S WELL.

Bethlehem Township, sec. 21, town. 28, range 2 east.

Soil	3 ft.
Yellow clay	10 ft.
Gravel	2 ft.
Blue clay	115 ft.
Total	130 ft.

SECTION OF HORACE SMITH'S WELL.

Bethlehem Township, sec. 27, town. 28, range 2 east.

Sandy loam	6 ft.
Fine gravel	8 ft.
Yellow clay	12 ft.
Gravel	8 ft.
Quicksand	56 ft.
Coarse water-bearing gravel	3 ft.
Total	93 ft.

SECTION OF GRAVEL PIT.

On the farm of D. Calvert, Bethlehem Township, sec. 33, town. 28, range 2 east.

Soil	10 ft.
Good gravel	20 ft.
Total	30 ft.

This pit furnishes fine road-making material, and it was used on the Michigan Pike.

SECTION OF SAMUEL GRABLE'S WELL.

South of Fletcher's Lake, Bethlehem Township.

Soil	1 ft.
Yellow clay	10 ft.
Yellow and gray sand	2 ft.
Water bearing gravel	3 ft.
Total	16 ft.

This is a very shallow well for this neighborhood. One mile southwest Mr. Pindar has a driven well that is 150 feet in depth. East of Grable's Mr. Bennett went down 100 feet before finding water.

In the south part of this township good gravel for road making is abundant, in beds from ten to fourteen feet thick, under two feet of soil. Gravel, regularly stratified, with beds of good plaster sand are common, in strata from eight inches to two feet thick, in sections 23, 24, 25, 33, 34 and 35. Boulders are rather common and vary in diameter from a few inches to six by eight feet in size. They are frequently used for foundation stone under light structures. A trail of them, with an average width of one-fourth of a mile, extends across the township in a northwest and southeast direction.

SECTION OF MR. DONOVAN'S WELL.

Harrison Township, section 13, town. 28, range 1 east.

Soil.	2 ft.
Yellow clay	8 ft.
Blue clay	15 ft.
Water bearing gravel	1 ft.
Total	26 ft.

Wells in this neighborhood vary in depth from twenty to eighty feet.

SECTION OF JAMES CASS' WELL.

Harrison Township.

Soil, a sandy loam	12 ft.
Blue clay	68 ft.
Water bearing gravel	6 ft.
Total	<u>86 ft.</u>

A well on the farm of Richard Burton, sec. 4, town. 28, range 1 east, gave very nearly the same section as that of Mr. Cass.

SECTION OF GRAVEL PIT.

On the farm of John Eglin, near Jacktown, Harrison Township.

Loam	4 ft.
Good, coarse, gray gravel, with bands and pockets of coarse gray sand . . .	<u>10 ft.</u>
Total	14 ft.

This bed of gravel outcrops for two miles along the bank of Big Indian Creek, in the northern part of the township.

The soil of the western part of Harrison Township is a rich, warm loam that produces abundant crops. In places the surface is level and swampy, the swamps being surrounded by low, round knolls and ridges. When ditched the unsightly swamps are transferred into the best of farming land.

SECTION OF GEORGE HIRD'S WELL.

Jacktown, Harrison Township.

Soil	3 ft.
Gravel, with partings and pockets of sand to water bearing stratum . . .	<u>42 ft.</u>
Total	45 ft.

SECTION OF WELL.

Royal Centre, Boone Township.

Soil	3 ft.
Sand	2 ft.
Blue clay to water bearing gravel	<u>12 ft.</u>
Total	17 ft.

The south half of Boone and the northern and eastern parts of Jefferson Township are traversed by parallel sand ridges, varying in height from ten to thirty feet. The sand is of a yellow color, and the ridges have a general trend from northeast to southwest.

SECTION NEAR LAKE CICOTT.

On the railroad, 100 yards west of the station, Jefferson Township.

Soil	5 ft.
Fine gravel to road-bed	18 ft.
Total	23 ft.

A short distance west of here the gravel changes to a fine ferruginous sand.

SECTION OF DRIVEN WELL.

Lake Cicott.

Sandy soil	8 ft.
Yellow clay and gravel	8 ft.
Fine gravel	5 ft.
Blue glacial clay	5 ft.
Water-bearing gravel	2 ft.
Total	28 ft.

J. E. BUCHANAN'S WELL.

Jefferson Township, sec. 14, town. 27, range 1 west.

Sandy soil	6 ft.
Sand and gravel	8 ft.
Yellow glacial clay	7 ft.
Blue glacial clay	2 ft.
Coarse, white gravel	4 ft.
Yellow, ferruginous gravel	4 ft.
Gray glacial clay	1 ft.
Total	32 ft.

After passing through the last member of the section, water rose six feet in the well, and is locally known as "iron water."

SECTION ON THE FARM OF L. E. ROGERS.

Sec 17, town. 27, range 1 west, Jefferson Township.

Soil	2 ft.
Red glacial clay	11 ft.
Coarse gravel	13 ft.
Gray glacial clay, with sand partings	6 ft.
Water-bearing gravel	6 ft.
Total	38 ft.

In this township the sand ridges have a northwest and southeast direction. One ridge of this sand had a thickness of twenty-five feet and was capped with yellow clay from two to four feet thick.

SECTION OF GRAVEL PIT.

On the railroad one-fourth of a mile east of Curveton.

Soil and sand	18 ft. to 24 ft.
Good, coarse, gray gravel	15 ft. to 30 ft.
Total	33 ft. to 54 ft.

This exposure extends along the railroad for three-quarters of a mile, and about 75,000 car loads have been taken out in the last fifteen years.

SECTION OF GRAVEL PIT.

On the farm of Samuel Robinson, Noble Township.

Soil	3 ft.
Gray gravel, with sand strata	10 ft.
Total	13 ft.

Ten feet is all the gravel here exposed, but it probably extends much deeper.

In Clay Township the soil has a depth of from one to ten feet, and under this cones from ten to twenty feet of gray hard-pan clay, with sand partings that are generally water bearing. Along the hills are numerous springs wherever the sand partings of the hard-pan come to the surface.

SECTION OF GLACIAL DRIFT.

North Bank of Wabash River, One-fourth of a Mile Below the Lewisburg Bridge.

Soil	5 ft.
Obscurely stratified gravel, with bowlders varying from one-half to twenty pounds in weight	15 ft.
Gray hard-pan to bed of the canal	20 ft.
Total	40 ft.

A section taken 100 feet away from this would vary, as the bedding changes rapidly in either direction.

SECTION OF OWEN ENGLIN'S WELL.

Walton.

Black loam	1 ft. 6 in.
Yellow clay, changing to a clay sand	15 ft. 0 in.
Total	16 ft. 6 in.

David Englin, in digging a well in Walton, reports that at a depth of seven feet the earth sounded hollow, and on breaking through the crust water two feet deep was found that has furnished a never-failing supply.

SECTION OF M. H. THOMAS'S WELL.

Galveston.

Soil, gravel and clay	58 ft.
Limestone	5 ft.
Total	63 ft.

This well is on higher ground than the gas well and, consequently, the water does not overflow.

SECTION OF GRAVEL PIT.

On the farm of Samuel Wallace, Jackson Township, sec. 34, town. 25, range 3, east.

Soil	3 ft.
Coarse, yellow gravel	20 ft.
Total	23 ft.

This is on the second bottom of Deer Creek. In the bluffs above the pits the gravel is alternated with strata of sand and clay. The continuity of the sand beds is broken by perpendicular seams of clay that vary from three to six feet in thickness.

SECTION ON THE FARM OF A. BURKIT.

South Part of Washington Township.

Yellow loam	5 ft.
Gravelly loam	5 ft.
Blue clay	5 ft.
Hard, yellow, gravelly clay, to water bearing gravel	3 ft.
Total	18 ft.

The last member of this section is so hard it has to be loosened with a pick.

SECTION ON THE FARM OF OLIVER BAUGHMAN.

North Part of Washington Township.

Yellow loam	6 ft.
Gravelly loam	16 ft.
Blue clay	3 ft.
Water-bearing gravel	2 ft.
Total	27 ft.

There is no gravel available in this township for roadmaking purposes. Boulders are very scarce, and the same is true of the southern part of Tipton Township. Fifteen feet of good road gravel under one foot of soil was seen on the farm of John Hines in Clinton Township, and the bed is exposed for more than half a mile.

An average of six wells in sections 15 and 16, township 26, range 1 east, gave the following:

SECTION.

Soil, black rich loam	2 to 3 ft.
Yellow glacial clay	8 to 10 ft.
Blue glacial clay to water	6 to 10 ft.
Total	16 to 23 ft.

GAS AND OIL WELLS.

GAS WELLS AT LOGANSPOUT.

West of Eel River, on the Barnett Farm.

Soil, gravel and clay	80 ft.
Blue, hard limestone	70 ft.
White limestone	335 ft.
Gray shale, slightly gritty	200 ft.
Coffee-colored shale	240 ft.
Trenton limestone	— ft.
Total	925 ft.

No gas.

At twenty-five feet in the Trenton limestone sulphuretted hydrogen water was found, which flows from the top of the well. The Trenton rock at this well is said to have been a dark colored, hard stone for one hundred feet, gradually changing, as the well was sunk deeper, to rotten stone.

SECTION OF OIL WELL.

Walton.

Soil, gravel and clay	80 ft.
Limestone	520 ft.
Shale	400 ft.
Trenton limestone	34 ft.
Total	1,034 ft.

Oil was found at one thousand feet and is a heavy lubricating oil, and is used locally in preference to the best West Virginia oil.

GAS WELL AT GALVESTON.

Soil	4 ft.
Glacial clay and gravel	36 ft.
Limestone	400 ft.
Shale	400 ft.
Trenton limestone	20 ft.
Total	<u>860 ft.</u>

At eighty feet artesian water was found. No other veins of water were found until salt water was struck in the Trenton. No gas.

OIL WELL AT ROYAL CENTER.

No. 1.

Soil	5 ft.
Glacial gravel mixed with yellow clay.	85 ft.
Gray limestone, the lower part blue, and probably Niagara Group stone	400 ft.
Hudson River and Utica shales.	481 ft.
Trenton limestone	20 ft.
Total	<u>991 ft.</u>

OIL WELL AT ROYAL CENTER.

No. 2.

Soil and drift	109 ft.
Limestone	486 ft.
Hudson River and Utica shales.	330 ft.
Oil in Trenton limestone	15 ft.
To salt water	26 ft.
Total	<u>966 ft.</u>

These wells when first drilled flowed two and a half barrels of dark lubricating oil daily.

ELEVATIONS OF INDIANA RAILWAYS PASSING THROUGH CASS AND WABASH COUNTIES.

COMPILED BY M. N. ELROD AND A. C. BENEDICT.

The altitudes given in the following tables, except those of the Wabash and Vandalia systems, in which the same datum was used, are reduced to the level of the railroad crossings of the Wabash and Pennsylvania at Logansport, and the Wabash and the Chicago & Erie at Huntington, the Wabash being taken as the standard.

The datum of the Wabash and Vandalia railways is fully explained in the following extract from a letter written by Mr. W. S. Lincoln, chief engineer of the Wabash Company, at St. Louis, Mo.:

“Enclosed please find elevations of our lines through the State of Indiana. They are based on the datum of the City Directrix of St. Louis, the elevation of which is 433.978 feet above tide of the Gulf of Mexico. The elevation of the St. Louis datum has been changed a number of times, it being computed at one time at 403.0 feet, later at 413.9 above tide of Gulf of Mexico, but now is computed at 433.978 feet by the city office and the Mississippi River Commission of the United States, although the United States Geological Survey still considers it to be 413.9 feet, and owing to this fact these elevations may not strictly conform with those of several other roads centering here, they probably having used the former elevations of the city datum.”

The altitudes here given, however, are not computed from the elevation of the datum used by Mr. Lincoln, but from the more recent determinations of the United States Coast and Geodetic Survey, by whom heights have been determined by the most refined geodetic methods. According to the latest determinations the St. Louis City Directrix, as given in Prof. Henry Gannett's Dictionary of Altitudes, is 416 feet above tide water.

In making these compilations we are indebted to Mr. W. S. Lincoln, of the Wabash Company; Mr. Ben McKeen, Engineer of the Vandalia; Mr. Aug. Mordecai, Roadmaster of the Chicago & Erie Railroad Company; Mr. M. U. Becker, Chief Engineer of the Pennsylvania System West of Pittsburgh, and to Prof. Gannett's Dictionary of Altitudes, second edition.

WABASH RAILROAD.

<i>Stations.</i>	<i>Elevation.</i>
Ohio and Indiana State line	731.40
Woodburn	741.00
Car Creek Station	747.40
Crossing of N. Y., St. L. & C. at New Haven	741.00
New Haven	742.40
Summit, one mile east of Fort Wayne, grade and surface	781.40
Crossing of P., Ft. W. & Chicago Railway, Fort Wayne, grade	774.40
Fort Wayne Station and Calhoun Street	764.00
St. Mary's River bridge, grade	753.00
St. Mary's River bridge, low water	726.40
St. Mary's River bridge, extreme bottom	723.40
Fort Wayne, Cincinnati & Louisville Railway crossing	773.00
Midway	751.00
Prairie Switch	744.00
Aboite	740.00
Little River bridge, 169, near county line, grade	740.00
Little River bridge, 169, near county line, bottom	731.40
Line between Allen and Huntington counties	740.00
Roanoke Station	740.00
Bend of Little River, two miles west of Mahon, grade	734.00
Bend of Little River, two miles west of Mahon, low water	712.00
Bend of Little River, two miles west of Mahon, bottom	717.40
Bend of Little River, two miles west of Mahon, high water	731.00
Union	735.00
Lillie	735.00
Huntington, crossing Chicago & Atlantic Railway, grade	729.00
Huntington Station	719.00
Little River, grade	707.00
Little River, low water	692.40
Little River, extreme bottom	689.40
Wabash River bridge west of Huntington, grade	707.00
Wabash River bridge west of Huntington, bottom	680.40
Wabash River bridge west of Huntington, low water	688.00
Loose Creek bridge, grade	701.00
Loose Creek bridge, bottom	686.00
Andrews Station, central yard	699.00
Line between Wabash and Huntington counties	684.40
Wabash River at Belden, Wabash County, grade	684.40
Wabash River at Belden, Wabash County, low water	663.40
Wabash River at Belden, Wabash County, extreme bottom	659.90
Wabash & Erie Canal east of Lagro, grade	698.40
Wabash & Erie Canal east of Lagro, extreme bottom	678.40
Lagro Creek bridge, Wabash County, grade	684.40
Lagro Creek bridge, Wabash County, extreme bottom	664.40
Lagro Station, Wabash County	687.40
Crossing C., W. & M. Ry., $\frac{3}{4}$ mile east of Wabash, grade	712.40
Crossing C., W. & M. Ry., $\frac{3}{4}$ mile east of C., W. & M. Ry., grade	692.40
Wabash City station	727.40
Chaslet Creek Wabash City, grade	704.40

WABASH RAILROAD—Continued.

<i>Stations.</i>	<i>Elevation.</i>
Charley Creek, Wabash City, extreme bottom	675.40
Helm's Creek, Wabash County, grade	700.40
Helm's Creek, Wabash County, extreme bottom	666.40
Kentners, Wabash County, grade	676.40
Kentners, Wabash County, extreme bottom	649.40
Keller's Station, Rich Valley P. O., Wabash County	649.40
County line, Miami and Wabash counties	667.40
Erie	649.40
Peru, I. P. & C. Ry. crossing	639.90
Peru Station	641.40
County line, Cass and Miami counties	678.40
Waverly, Cass County	673.40
Cass Station, Keyport's lime kilns	624.40
Wabash & Erie Canal bridge, East Logansport, grade	616.10
Wabash & Erie Canal bridge, East Logansport, bottom	697.40
Logansport, center line of 17th Street produced south to main track	602.40
Logansport Station	590.40
Logansport Crossing Panhandle Ry	591.40
Wabash River bridge, Logansport, grade	597.40
Wabash River bridge, Logansport, average bottom	568.40
Summit 1½ miles east of Clymers	729.90
Clymers, Station, Cass County	719.90
Crossing, Wabash and L., C. & S. W. Ry., west of Clymers	713.40
Carroll and Cass County line	702.40
Burrows	695.90
Rock Creek, grade	668.40
Rock Creek, extreme bottom	620.40
Rockfield Station	691.40
Delphi crossing Wabash and L., N. A. & C. Ry.	553.40
Delphi Station	541.40
Deer Creek, West Delphi, grade	565.90
Deer Creek, West Delphi, extreme bottom	525.40
Colburn	651.40
Sugar Creek, grade	650.40
Sugar Creek, natural surface, average bottom	628.40
Buck Creek Station	659.40
Wild Cat Creek bridge, grade	576.40
Wild Cat Creek bridge, extreme bottom	523.40
Lafayette Station and Main Street	579.40
Lafayette Junction, Wabash and I., C. & L. and L. E. & W.	570.40
Durkees Run, Lafayette, grade	575.40
Durkees Run, Lafayette, extreme bottom	517.40
Wea Creek bridge, grade	591.80
Wea Creek bridge, extreme bottom	530.40
L., N. A. & C. Ry. crossing Wabash Ry., grade	617.40
L., N. A. & C. Ry. crossing Wabash Ry., extreme bottom	599.40
Wea Station	605.40
West Point	609.40
Flint Creek, grade	520.40

WABASH RAILROAD—Continued.

<i>Stations.</i>	<i>Elevation.</i>
Flint Creek, extreme bottom	542.40
Monaqua Creek, grade	567.40
Monaqua Creek, extreme bottom	535.40
Grindstone Creek, grade	560.40
Grindstone Creek, extreme bottom.	521.40
Turkey Run, 1½ miles east of Independence, grade	569.40
Turkey Run, 1½ miles east of Independence, extreme bottom.	521.40
Hemphill's Branch, grade.	544.40
Hemphill's Branch, extreme bottom	520.40
Independence	544.40
Attica Station	533.40
Junction A., C. & S., head block	531.90
C. & G. S. Ry., under crossing	513.40
Wabash River bridge, Attica, west end, grade	532.40
Wabash River bridge, Attica, east end, grade.	530.40
Wabash River bridge, Attica, Flint Creek bottom.	484.40
Williamsport Station, grade.	601.90
Williamsport Ravine, extreme bottom	530.40
Summit between Rock Creek and Williamsport, grade.	698.40
Summit between Rock Creek and Williamsport, natural surface	705.40
Rock Creek, one mile east of Lebanon, grade	654.40
Rock Creek, one mile east of Lebanon, average bottom	625.40
West Lebanon and connection with H. R. & E. Ry	683.90
Foster's branch of Redwood Creek, grade.	656.40
Marshfield	689.90
Sumner, Wabash, C. & E. I. connection	677.40
Sumner crossing of C. & E. I. R. R	673.40
State Line Station	703.40
State line between Illinois and Indiana, grade	709.40
State line between Illinois and Indiana, natural surface	713.40

EEL RIVER DIVISION OF WABASH RAILWAY.

<i>Station.</i>	<i>Elevation.</i>
Logansport, Wabash depot	590.40
Crossing of Eel River with Chicago branch of Pan Handle Railway	586.90
Connection of Seventeenth Street produced to Eel River Railway track	606.40
Bottom of Eel River at Seventeenth Street produced west	590.40
Adamsboro, Cass County	658.40
Hooover's, Cass County	682.40
Mexico	591.40
Denver crossing of I., P. C. & Eel River R. R	697.40
Chili	717.40
Eel River bridge, 2 miles west of county line, grade	718.40
Eel River bridge, 2 miles west of county line, extreme bottom	683.40
County line, Wabash and Miami counties	734.40
Roann, Wabash County	743.40
Bear Grass Creek, 3 miles north of Roann, grade	732.40
Bear Grass Creek, 3 miles north of Roann, average bottom	720.40
Laketon station, Wabash County	754.40

EEL RIVER DIVISION OF WABASH RAILWAY—Continued.

<i>Stations.</i>	<i>Elevation.</i>
Laketon, crossing of Chicago & Erie Railway	745.40
Eel River at North Manchester, grade	750.40
Eel River at North Manchester, bottom	726.40
North Manchester, crossing C., W. & M. Ry	761.40
North Manchester station, Wabash County	768.40
Eel River at Liberty Mills, grade	764.40
Eel River at Liberty Mills, bottom	745.40
Liberty Mills station, Wabash County	766.40
County line between Wabash and Kosciusko counties	783.40
County line between Kosciusko and Whitley counties	796.40
Collamer	785.40
Eel River at Collamer, grade	781.40
Eel River at Collamer, bottom	763.40
South Whitley	800.40
Spring Creek, $\frac{1}{3}$ of mile north of South Whitley, grade	806.40
Spring Creek, $\frac{1}{3}$ of mile north of South Whitley, bottom	784.40
Taylor's Station	856.40
Crossing of P., Ft. W. & C. Ry	836.40
Columbia City	830.40
Collins	862.40
Churubusco	887.40
County line between Whitley and Allen counties	878.40
County line between Allen and Noble counties	871.40
Potters	872.40
La Otts	867.40
Crossing of G. R. & I. Ry	868.40
Cedar Station	852.40
Cedar Creek bridge near Auburn Junction, grade	856.40
Cedar Creek bridge near Auburn Junction, bottom	846.40
Crossing of Ft. W., J. & S. Ry	860.40
Auburn	857.40
Mooreville	867.40
Butler yard and L. S. & M. S. Ry	862.40

CHICAGO & ERIE RAILWAY.

<i>Station.</i>	<i>Elevation.</i>
Huntington, crossing Wabash Ry	729.00
Wabash & Erie Canal	745.00
Flint Creek bridge No. 1	774.00
Flint Creek bridge No. 2	759.00
Flint Creek bridge No. 3	757.50
Clear Creek	784.00
West Point	835.00
Line between Wabash and Huntington counties	824.00
Servia, New Madison, Wabash County	800.00
Bolivar, crossing of C., W. & M. Ry	780.00
Eel River Railroad crossing	739.00
Eel River bridge	739.00
Laketon, Wabash County	739.00

CHICAGO & ERIE RAILWAY—Continued.

<i>Stations.</i>	<i>Elevation.</i>
Silver Creek bridge	765.00
New Harrisburg, Wabash County	812.00
Outlet to Lake	870.50
Akron	843.00
Lake No. 16	802.50
Rochester, crossing L. E. & W. Ry	761.60
Rochester, Mill Creek	756.50
Rochester, Main Street	756.50

VANDALIA RAILWAY, LOGANSPOUT DIVISION.

<i>Stations.</i>	<i>Elevation.</i>
Terre Haute	486.22
Terre Haute, I. & St. L. R. R. Crossing	487.68
Ellsworth	486.34
Crossing C. & E. I. R. R	498.98
Heckland	512.34
Rosedale	530.64
Jessup	527.53
Catlin	540.76
Rockville	700.55
Sand Creek	587.75
Judson	605.10
Crossing I., D. & W. R. R., I., D. & W. track	654.52
Crossing I., D. & W. R. R., Vandalia track	531.92
Guion	627.15
Dooley	646.37
Waveland	732.30
Brown's Valley	808.55
New Market	804.54
North Union	807.50
Crawfordsville Junction, O., I. & W. R. R	786.13
Crawfordsville Junction, L., N. A. & C. R. R	786.12
Crawfordsville	768.35
Garfield	788.50
Darlington	760.16
Bowers	811.76
Colfax, C., C., C. & St. L. Ry	841.83
Manson	860.62
Frankfort, L. E. & W. R. R	859.14
Frankfort, T., St. L. & K. C. Ry	859.14
Frankfort, L., N. A. & C. Ry	859.14
Kilmore	830.67
Moran	800.21
Sedalia	777.84
Cutler	784.77
Bringhurst	723.08
Flora	703.09
Camden	664.32
Woodville	690.59

VANDALIA RAILWAY, LOGANSPOBT DIVISION—Continued.

<i>Stations.</i>	<i>Elevation.</i>
Clymers, Cass County, W., St. L. & P. R. R	720.89
Crossing P., C., C. & St. L., State Line Division	599.49
Logansport, T. H. & I. R. R	593.35
Crossing P., C., C. & St. L., Chicago Division	613.60
Logansport station	600.85
Verona, Cass County	750.35
Lucerne, Cass County	799.35
Grass Creek	767.85
Kewanna	780.35
Bruce Lake	774.35
DeLong, C. & E. R. R	745.35
Marmot	742.35
Hibbard, N. Y., C. & St. L. R. R	778.35
Twin Lakes	801.35
Plymouth, P., Ft. W. & C. R. R	791.35
Plymouth station	794.35
Harris	836.35
LaPaz Junction, B. & O. R. R	851.17
Lakeville	832.35
Nutwood	848.35
South Bend	728.35
South Bend, I. & L. M. Junction	744.85
Olivers, C. & G. T. R. R	725.27
Rugby, L. S. & M. S. R. R	733.56
Michigan State Line	768.64

PENNSYLVANIA RAILWAY, RICHMOND DIVISION.

<i>Station.</i>	<i>Elevation.</i>
Logansport Station	584.92
Wabash Railroad crossing	591.40
Wabash River bridge, rail	597.68
Wabash River, bottom	571.28
Minnow Run, Cass County	672.28
Minnow Run, Cass County, rail	687.78
Anoka Junction, Cass County	688.39
Wallbaum, Cass County	721.28
Shirk's Mill, Cass County	738.48
Big Rock Creek, Cass County	735.25
Big Rock Creek, Cass County, rail	745.28
Walton, Cass County	768.78
Lincoln, Cass County	777.98
Deer Creek, Cass County, north fork	742.28
Deer Creek, Cass County, rail	758.68
Deer Creek, Cass County, south fork	760.28
Deer Creek, Cass County, rail	786.78
Galveston, Cass County	789.68
Highest point north of Kokomo	824.85
L., P. & C. Ry. crossing	810.15

PENNSYLVANIA RAILWAY, RICHMOND DIVISION—Continued.

<i>Stations.</i>	<i>Elevation.</i>
T., C. & St. L. Ry. crossing	808.95
Windfall	854.59
Elwood	850.55
L., M. & B. Ry. crossing	851.51
Frankton	826.61
C., W. & M. Ry. crossing	867.70
Anderson	843.73
Middletown	946.09
Honey Creek Station	1,009.82
Ft. W., M. & C. Ry., west junction	1,065.17
I., B. & W. R. R. crossing	982.92
Ft. W., M. & C. Ry., east crossing	989.90
New Castle	1,016.94
Millville	1,180.38
Highest point on the road	1,149.46
Hagerstown	978.46
Richmond	953.81

PENNSYLVANIA RAILWAY, BRADFORD DIVISION.

<i>Station.</i>	<i>Elevation.</i>
Anoka Junction	688.39
Little Deer Creek, Cass County	709.00
Little Deer Creek, rail	739.48
Onward, Cass County	757.52
I., P. & C. Railway crossing	791.77
Bunker Hill	791.72
Marion	803.34
T., C. & St. L. Railway crossing	803.34
C., W. & M. Railway crossing	803.34
Jonesboro	837.65
Upland	931.49
Hartford City	900.59
Ft. W., M. & C. Ry. crossing	875.78
Dunkirk	938.99
Redkey	956.69
Ridgeville	983.69
Union City	1096.57
C., C., C. & I. Ry. crossing	1095.40

PENNSYLVANIA RAILWAY, CHICAGO DIVISION.

<i>Station.</i>	<i>Elevation.</i>
Peoria Junction, Logansport	582.38
Gephart, Cass County	746.88
Ford Crossing, Cass County	724.18
Royal Centre, Cass County	726.78
Little Indian Creek	708.28
Little Indian Creek, rail	715.58
Peonada	714.08

PENNSYLVANIA RAILWAY, CHICAGO DIVISION—Continued.

<i>Stations.</i>	<i>Elevation.</i>
Star City	708.88
Winamac	701.89
Gundrum	701.55
North Judson	692.91
I., I. & I. Ry. crossing	689.51
C. & E. Ry. crossing	688.43
English Lake	664.53
Pennymede	664.53
La Cross	668.73
Grassmen	677.03
Kouts	673.95
Le Roy	675.42
Crown Point	706.30
Chicago, Canal Street	582.87

PENNSYLVANIA RAILWAY, STATE LINE DIVISION.

<i>Station.</i>	<i>Elevation.</i>
Eel River bridge, bottom	568.28
Eel River bridge, rail	589.38
Peoria Junction	572.38
Fitches Switch, Cass County	577.11
Cottonwood Creek, Cass County	559.28
Cottonwood Creek, Cass County, rail	575.38
Paw Paw Creek, Cass County, rail	616.28
Paw Paw Creek, Cass County	575.38
Curveton	659.18
Crooked Creek, Cass County	598.28
Crooked Creek, Cass County, rail	644.38
Lake Chicott, Cass County	695.18
Burnettsville	701.51
Idaville	703.93
Monticello	666.89
Air Line branch of the Monon	667.10
L., N. A. & C. R. R. crossing	684.56
Reynolds	684.36
Seafeld	690.28
Walcott	705.74
Remington	726.20
Goodland	705.96
Kentland	662.62
State line	669.14

MISCELLANEOUS.

<i>Station.</i>	<i>Elevation.</i>
Lafontaine, Wabash County, C., W. & M. Ry	790.00
Treaty, Wabash County, C., W. & M. Ry	791.00
Urbana, Wabash County, C., W. & M. Ry	780.00
Rose Hill, Wabash County, C., W. & M. Ry	845.00