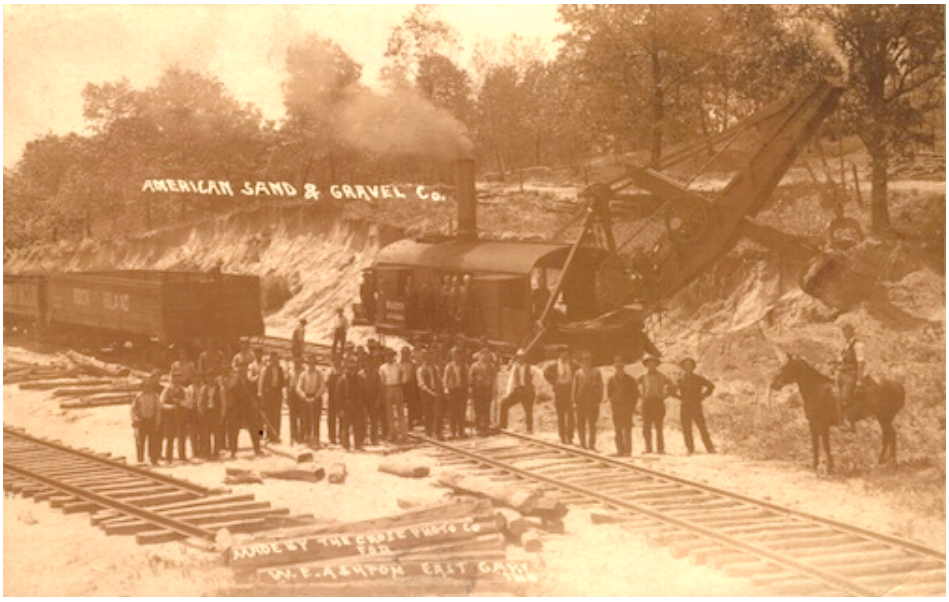
Sand Mining in and around the Indiana Dunes National Lakeshore



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A Report for the National Park Service
June, 2015

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Table of Contents

	Acknowledgements	iii
	Limitations to the Study	iv
Part 1	An Overview of sand and gravel resources in Northwest Indiana	1
Chapter 1	Commercial uses of Duneland sand and gravel	1
Chapter 2	Sand and gravel deposits in Northwest Indiana	8
Chapter 3	The Mining and moving of Duneland sand and gravel	12
Chapter 4	Sand mining companies and customers	21
Part 2	Sand and gravel mining location details	28
Chapter 5	Sand mining in Lake County	29
Chapter 6	Sand mining in Porter County, Part A: Portage Township	44
Chapter 7	Sand mining in Porter County, Part B: Westchester Township	62
Chapter 8	Sand mining in Porter County, Part C: Pine Township	70
Chapter 9	Sand mining in LaPorte County	74
Appendix A	Sand suckers sunk	80
Appendix B	1917 Topographic map of the Dune Park area	81
Appendix C	Indiana's natural gas boom	82
	Glossary	85
	Bibliography	86



Leveling the dune and swale landscape in 1906 for U.S. Steel's Gary Works.
[U.S. Steel Collection: Calumet Regional Archives]

Acknowledgements

The author is grateful for the assistance received from the following:

Erin Argyilan,Indiana University Northwest
Brandt Baughman, Property Manager, Indiana Dunes State Park
Geof Benson, Dunes Learning Center
Valerie Blumenfeld, President, Bulk Transport Corporation
Brad Bumgardner, Interpretive Naturalist, Indiana Dunes State Park
Young Choi, *Department* of *Biological* Sciences, *Purdue University Calumet*
Kenneth L. Cole, School of Earth Sciences and Env'l Sustainability, Northern Arizona Univ.
Judith Collins, Historical Architect, Indiana Dunes National Lakeshore
Robert Daum, Chief of Resource Management, Indiana Dunes National Lakeshore
Stephen E. Davis, Lake Michigan Specialist, Indiana Dept. of Natural Resources
Joe Eberts, GIS Specialist, Portage Department of Community Development
Jim Erdelac, *Education and Volunteer Manager, Shirley Heinze Land Trust*
Patricia Hodge, Curatorial Technician, Indiana Dunes National Lakeshore
Eva Hopkins, researcher, Westchester Township History Museum
Kris Krouse, *Executive Director, Shirley Heinze Land Trust*
Kurt Knutsen, Development Review Planner, Portage Department of Community Development
Anne Kohler, Unit Head - System Services, Indiana University Northwest Library
John Laue, former resident of the Edgewater Community
Sandra Nicholson Layton, Seymour, Indiana, Crisman Sand Company
John Magurean, President, Crisman Sand Company
Lou Malcomb, Geology Library, Indiana University Bloomington
Jeff Manuszak, Visual Information Specialist, Indiana Dunes National Lakeshore
Ken Martin, Historical Society of Ogden Dunes
Steve McShane, Archivist/Curator, Calumet Regional Archives, Indiana University Northwest
Dick Meister, Historical Society of Ogden Dunes
Mike Molnar, Indiana Department of Natural Resources
Sarah Myers, Archives Assistant, DePauw University Archives
Meredith B. Nevers, Research Ecologist, USGS Lake Michigan Ecological Research Station
Robert Nicholson, retired president, Crisman Sand Company
Noel B Pavlovic, Ecologist, United States Geological Survey
Trent D. Pendley, Furnessville historian
Brandon T. Pieczko, Digital Archivist for Manuscript Collections, Ball State University
Greg Reising, Miller Citizens' Corporation
Jim Retseck, President, Michigan City Historical Society
Peg Schoon, copy editor, indexer, Assistant Archivist, Calumet Regional Archives
Kathryn R. Shaffer, Mineral Statistician, Indiana Geological Survey
Susan M. *Smith,* Archivist *Minnetrista Cultural Center, Muncie, Indiana*
Todd A. Thompson, Assistant Director for Research, Indiana Geological Survey
Verlaine M. Wright, Bethel Evangelical Lutheran Church and Cemetery

Caption Credit Abbreviations

The following abbreviations are often used to designate these providers:

CRA	Calumet Regional Archives at Indiana University Northwest, Gary, Indiana
OLM	Old Lighthouse Museum at Michigan City, Indiana
WTHM	Westchester Township History Museum, Chesterton, Indiana

Limitations to this Study

Unfortunately, for a number of reasons, we will never be able to know the entire story of sand mining in the Indiana Dunes region.

Accuracy of USGS topographic maps:

- Lack of detail on the early 15-minute topographic maps
  - Because four-times the area was squeezed onto the same size map, small features (hills and/or depressions) simply couldn't be included on the map.
  - There are areas (especially on the Tolleston map) where there are no contour lines where hills did exist. It appears that the map makers (in the era before aerial photography) just didn't get to those areas to survey them.
- Not all changes to topography are noticed by map makers—even today.
  - For instance, as noted in Chapter 5, a rather high and steep dune is shown on the 2013 *Gary Quadrangle* map in the middle of a trailer park. Actually, the dune was mined away about 40 years ago, but has remained on all the USGS maps since then.

Lack of written or photographic records:

- Some mining was done without knowledge or permission of the property owner and so no records were ever made.
- Building contractors believed that the issuance of a building permit allowed them to remove the sand on a property in order to build the house, store, or industry at street level. Thus no record of sand removal was ever made.
- Much sand mining was done through private contracts or leases, which may not have required a sand mining permit. The only records were the contracts, which were in private hands.
- Many of the old municipal and county records have been discarded.

* * * * *

Fortunately, however, much written and photographic information about sand mining in the Indiana Dunes region does exist and is included in this report.

Part One: An Overview of sand and gravel resources in Northwest Indiana

Chapter 1:

Sand and Gravel Deposits in Northwest Indiana

Sand is a common material and is found all over the earth. However there is more of it in northwest Indiana than in most other places.

Definitions

Sand is formed by the weathering or the natural disintegration of rocks,[1] particularly of granite or sandstone. Unlike other natural resources such as coal or iron ore, sand and gravel are defined by their particle size rather than mineral composition. By definition, sand grains range in size from one-sixteenth of a millimeter to two millimeters. The next smaller size grains are called silt. Larger unconsolidated particles are called gravel[2]—although gravel particles can also be classified by size (small to large) as granule, pebble, cobble, and boulder.

Sand is most commonly made of quartz, the world's most common mineral. Sands come in a wide variety of colors; its grains may be purely quartz, mostly quartz, partially quartz, or entirely non-quartz. Indiana Dunes sand is mostly quartz.

Millimeters	Wentworth Grade	
>256	Gravel	Boulder
>64		Cobble
>4		Pebble
>2		Granule
>1	Very coarse sand	
>1/2	Coarse sand	
>1/4	Medium sand	
>1/8	Fine sand	
>1/16	Very fine sand	
>1/256	Silt	
<1/256	Clay	



by Arthur E. Anderson. 1913
[James Fisher Collection: CRA]

Sand is found in great abundance in northwest Indiana. This abundance is the direct result of glaciation and the natural geological processes of wind and water movement that have occurred since the last glaciers left northwest Indiana approximately 14,000 years ago.

It was glaciers that scooped out bedrock and created Lake Michigan. It was also glaciers that broke up that bedrock, grinding much of it, and, as they left, depositing it on both the ground and in the lakes. Thus, many of the major sand and gravel deposits in the state were originally placed in deposits formed either directly by glaciers (such as one of the many moraines in the state) or by glacial meltwaters.

However, in the thousands of years since the glaciers left, rivers and particularly the currents within Lake Michigan have moved great quantities of sand and gravel and deposited them elsewhere. Much of that sand and gravel has been deposited at or near the southern end of the lake.

[1] Carr and Webb, 1970, p. 1.
[2] Patton, 1976, p. 53.

This is because for most of the history of the lake, sand has been moving southward, carried by lake currents on both sides of the lake.[3] It was estimated by geologist Charles W. Shannon in 1911 that over the millennia at least half a *billion* cubic yards of sand had been naturally deposited on Lake Michigan's beaches by the waters of Lake Michigan. [4]

Waves at the south shore of Lake Michigan wash sand up onto the beach. Then when it dries much of it is blown away from the lake by dry northwest winds. When the wind slows up, it drops the sand that it's carrying. Various natural objects such as grass, trees, or rocks can cause the wind to slow up. Such items can then cause the wind to drop enough sand that small piles of sand are formed—which themselves can cause more wind to slow up causing even more sand to be dropped. In this way, large sand dunes can be slowly formed. The process is similar to the way that wind blows dry snow into drifts.

Except at times when the wind is exceedingly strong, gravel is simply too heavy to be moved by winds. It is not too heavy, however, to be carried by the moving waters of fast-moving streams or the waves of Lake Michigan. When these waters slow up, just like the winds, they drop their sediment loads. Gravel then can accumulate in riverbeds wherever water tends to slow up. This also happens most days along the beaches of the Great Lakes where waves have the strength to wash gravel up onto the shore, but not enough strength to carry it back into the lake.

Geologic History

Moraines: Duneland's Glacial Deposits

During the last years of the Pleistocene Ice Age there were numerous advances and retreats of the Lake Michigan lobe of the glacier, with most retreats followed by an advance not quite as extensive as the previous one. The last of these advances that invaded the Calumet Area occurred during the Crown Point Phase,[5] a 2400-year long period that began about 15,200 years ago. The Valparaiso, Tinley, and Lake Border moraines were built during this time period.

The Valparaiso Moraine was formed first. It is shaped like a huge, 200-mile long letter 'U' away from but still roughly parallel to the shoreline of Lake Michigan. The melting glacier released huge amounts of sediment (called till) along its stationary southern edge forming a long curved series of ridges and hills known today as the Valparaiso Moraine. It is the largest and highest of the moraines in the Calumet Area and together with the smaller Tinley/Lake Border Moraine forms the dominant landscape in much of the outlying Calumet Area. (See Map 1.) It gets its name from Valparaiso where the moraine is narrower, higher, and steeper than in places farther west.

The Tinley Moraine, just north of the Valparaiso Moraine, was formed after a glacial retreat and readvance. A short retreat followed by another period of equilibrium resulted in the **Lake Border Moraine**, the smallest of these moraines to be formed. The Lake Border Moraine includes a long band of till that extends from the Bailly Homestead area east and north into Michigan.

Characterized by a haphazard "swell and swale" (hill and lowland) landscape, the moraines today comprise just a small percentage of the land area of LaPorte County but more than 50% of Lake and Porter Counties.

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[3] Pettijohn, 1931, p. 433.
[4] Shannon, 1912.
[5] The Crown Point Phase is named for the deposits made at that time at what is now Crown Point, Indiana.

Although many other moraines were created by glaciers in what are now Indiana and Illinois, the Valparaiso and Tinley Moraines are significant because they form the Eastern Continental Divide, which separates the rivers that flow north and east to the North Atlantic from those that that flow west and south to the Gulf of Mexico.

Lake Michigan's Many Shorelines: The Creation of Waves and Wind

The three major ancient shorelines of Lake Michigan, the Glenwood, Calumet, and Tolleston, once had characteristics similar to the present shoreline. However, even though natural and manmade processes have greatly altered them, portions of these former shorelines can still be recognized by the careful observer.[6]

The Glenwood Shoreline

Glacial Lake Michigan (formerly called Lake Chicago) was formed about 14,500 years ago when the Lake Michigan lobe melted back from the Tinley/Lake Border Moraine. Much of its melt waters were then trapped between the ice to the north and the U-shaped moraine on the west, south, and east.

The Glenwood Shoreline is the oldest and highest (at 640 feet above sea level) and the furthest from the lake of the three major former Lake Michigan shorelines. Dunes of the Glenwood Shoreline are not very conspicuous. Today the shoreline forms a long band of low, forested hills generally between U.S. Highways 12 and 20 extending from Wagner Road northeast toward and beyond Greenwood Cemetery in Michigan City. Further west much of the original shoreline has been buried by more recent dunes or is south of the Duneland area.

The Calumet Shoreline

The Calumet Shoreline, a bit north of and 20 feet lower than the Glenwood, was formed about 11,800 years ago when the lake level stabilized at about 620 feet above sea level. Today this ancient beach can most easily be seen along U.S. Highway 12, through eastern Porter County. In Michigan City, the Indiana State Prison and the International Friendship Gardens are on the Calumet Shoreline.

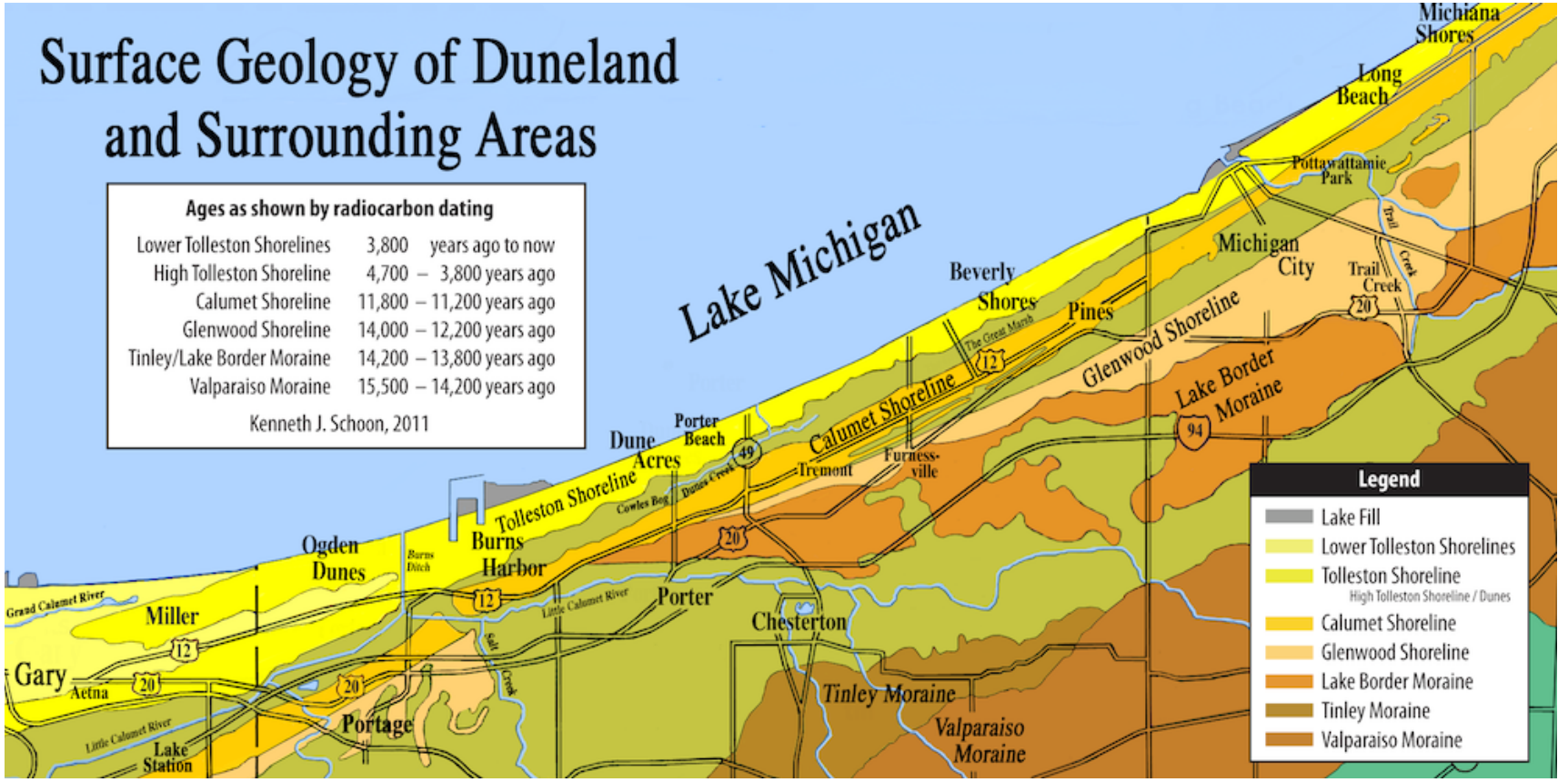
The Tolleston Shorelines

The Tolleston Shoreline got its start 4,700 years ago. It is north of, and about another 15 feet lower than, the Calumet Shoreline. As it formed, it was separated from the older Calumet Shoreline by a narrow band of lake water called the Calumet Lagoon. Roughly 3,800 years ago the lake level starting dropping and the lagoon was separated from Lake Michigan forming a long series of wetlands. Cowles Bog, Dunes Creek, and the Great Marsh are all remnants of this one-time part of Lake Michigan.

The Tolleston Shoreline extends from these wetlands north to the current lakeshore. It contains the tallest dunes in the area. In western Porter County and in Lake County, what is sometimes called the High Tolleston Shoreline is a sand ridge quite separate from the modern dunes to the north.

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[6] See Schoon, 2003, for detailed descriptions of the location and formation of the ancient shorelines of Lake Michigan.



Map 1. Surface Geology of Duneland and Surrounding Areas. *Dreams of Duneland*, 2013

As the lake receded from its highest level of the Tolleston phase it did so in a pulsating manner. Thw water level would drop because of drought or erosion south of Lake Huron; the water level would rise during periods of greater rainfall. Toward the west, this rising and falling resulted in more that 150 small beach ridges between Miller and Chicago, all roughly parallel to the lake-shore. Geologist J Harlan Bretz called these ridges the lower Tolleston beaches. Originally they ranged in height from 5 to 12 feet and averaged about 150 feet in width. Although most of them were leveled as the industrial cities from Chicago to Gary were developed, a few at Gibson Woods in Hammond, western Gary, and the Miller Woods section of the National Lakeshore can still be seen.

Physical and Chemical characteristics of Duneland Sand

Mineralogy

About 90% of the sand grains in both Duneland beach and sand dunes are quartz. Usually present are various feldspars. As would be expected of any sands that earlier had been transported by glaciers there is a large number of additional minerals that can be found in small amounts. This includes the minerals augite, diopside, hornblende, garnet, epidote, zircon, tourmaline, and iron ores. On the beach the weight of all these heavy minerals combined ranges from 0.5 to just 1.1%.

Whereas glaciers transport materials of many varying sizes and weights, the wind is highly selective in its action. Dune sand, made entirely of sands that had been blown away from the beach, is not surprisingly, slightly finer in texture and lower in total heavy mineral content than beach sand.[7] Interestingly, the mineral hornblende, which has an intermediate density but a somewhat flat grain shape, tends to be found with quartz and feldspars rather than with the heavier minerals. One fact that has tended to make mining of sand dunes easier is the fact that most dunes are nearly homogenous in content.[8]

Chemical Composition of Dune Sands[9]

Location of Dunes	Percentage of:							
	SiO_2	Al_sO_3	Fe_2O_3	MgO	CaO	Na_sO	TiO_2	ZnO_2
Lake Michigan beach[1]	91.9	3.8	0.53	0.41	1.4	0.38	0.085	0.0073
Tolleston beach[2]	91.4	4.7	0.50	0.26	0.8	0.38	0.071	0.0032
Calumet beach[3]	86.7	5.0	1.4	0.79	3.0	0.32	0.28	0.0068
Glenwood beach[4]	89.7	6.2	0.82	0.21	0.6	0.55	020	0.0079

Notes: 1. Lake Michigan sand collected from the Producers Core Sand Co. pit in LaPorte County
2. Tolleston Beach sand collected from the Bos Sand Company pit in Porter County
3. Calumet Beach sand collected from the Crisman Sand Company pit in Porter County
4. Glenwood Beach sand collected from Lake County

[7] Pettijohn, 1931, p. ,453.
[8] Bieber and Smith, 1952, p. 13.
[9] Carr, 1971, p. 15.

Grain Size Composition[10]

Location of Dunes	Sieve size percentage[11]					
	28	**48**	**80**	**100**	**200**	**<200**
Lake Michigan beach[1]	0.45	21.57	69.78	7.34	0.40	0.65
Tolleston beach[2]	0.68	90.38	7.54	1.08	0.29	0.02
Calumet beach[3]	2.51	87.02	7.48	1.15	1.15	0.69
Glenwood beach[4]	0.21	53.56	34.98	4.94	5.79	0.52

Notes: 1. Lake Michigan sand collected from the Producers Core Sand Co. pit in LaPorte County
2. Tolleston Beach sand collected from the Bos Sand Company pit in Porter County
3. Calumet Beach sand collected from the Crisman Sand Company pit in Porter County
4. Glenwood Beach sand collected from Lake County

Each dune has an average grain size that may differ from that of nearby dunes.[12] In general, dunes have finer sands in the western part of the Duneland area, and gradually become coarser eastward. Few sand grains are spherical; most are "sub-round." The dark heavy minerals are sub-round to round.[13] Both the beach sand and dune sands are porous and permeable. Most rainwater that falls on these sands soaks into the ground. Runoff is rare.

Buried sands in Duneland, those more than just a few inches below the surface, are nearly always damp. Thus sands lifted by a crane from a dune or sand ridge and placed into railroad cars are damp. Analysis done by Bieber and Smith (1952) showed that as much as 5 percent of the weight of wet sand was water.[14]

Color

Duneland sand generally ranges in color from near white to light buff. The older the sand (i.e. from the older, ancient shorelines) the darker its color. The dark color comes from oxidized iron in some of the dark mineral grains.[15]

Buried objects

Bones and antlers of animals have been found at or near the bottoms of some dunes. Occasionally bones of prehistoric animals have been discovered. Though not common, an Indian artifact was found near the base of a dune in a Crisman Sand Company pit in Calumet Shoreline dune sand.[16] Far more common, at least in the younger dunes, are old tree trunks still in upright positions. No wood has been found in Tolleston or older dunes.[17]

[10] Ibid.
[11] Tyler series sieve sizes
[12] Bieber and Smith, 1952, p. 20.
[13] Bieber and Smith, 1952, p. 21.
[14] Bieber and Smith, 1952, p. 22.
[15] Bieber and Smith, 1952, p. 23.
[16] Ibid.
[17] Ibid.

Gravel

Gravel deposits are not nearly as common in northwest Indiana as are sand deposits. The major deposits in Indiana were formed directly by glaciers or by glacial outwash as the various lobes of the glacier were either at equilibrium or were receding. According to geologists Donald Carr and William Webb only minor amounts can be obtained from the beach and from modern stream deposits.[18]

The size of gravel grains varies from location to location. Among the factors that influence particle size are the size of the original particles supplied by the bedrock from which they came, the hardness (and thus resistance to abrasion) of the particles themselves, and the distance that they were transported by both glacial ice and water. The mineral composition of a gravel deposit can be very complex with up to 20 different minerals present.[19]

Gravel deposits associated with glacial moraines have been rather small and have been found mainly by chance. Most have been found when folks were excavating for building foundations, wells, fence posts, or drainage ditches.[20]

[18] Carr and Webb, 1970, p. 15.
[19] Carr and Webb, 1970, p. 9.
[20] Bieber, 1949, p. 221.

Chapter 2

Commercial Uses of Duneland Sand and Gravel

Sand is an important natural resource. Commercially, it has many uses.

- Fill: Sand is desirable as a fill material because it settles quickly and can remain stationary as long as it is kept from the eroding actions of water, wind, and human intervention. Northwest Indiana sand has been shipped to Chicago and dumped into Lake Michigan to "create" new land east of the city and it has been used to elevate the land for Northwest Indiana and Chicago-area roads, highways[21], and railroad lines. It is also used for backfill around commercial and residential buildings. Sand's great permeability is an asset in many cases because it allows water to flow through it.



Using dune sand to raise the ground surface for construction of the tracks of the South Shore Railroad, circa 1906. Note that the source of energy is a horse. [Courtesy of Ed Hedstrom]

> "Practically all the railroads entering Chicago have used this sand in track ballast and elevation. Great trestles have been filled and swamps and marshes along rights of way have been covered with the sand."
>
> Shannon, *Proceedings of the Indiana Academy of Science, 1911*

- Mortar and concrete: Mortars may be made from sands that are either fine or coarse grained, rounded or sharp/angular, monochromatic or mixed hues. The color of the sand, however, affects the color of the mortar and is thus very important to the mason and architect.
- Paving: Sand can be mixed with petroleum products and used to fill potholes.
- Bottle glass: Glass is made of quartz that has been melted and then allowed to cool quickly so that quartz crystals do not reform. Thus in glass, all the original texture of the sand (grain size and roughness) is lost. Glass sand must have a silica content of about 98%. Another essential property of glass sand is particle size. Because the sand must be fused without burning, the majority of glass sand grains should be able to pass through a sieve of 20 meshes per inch but not through a sieve of 120 meshes per inch.[22] Calcium carbonate is not a problem since limestone is added to the sand mix as a flux. Iron oxide whenever present gives the glass a green color. Clay impurities make the glass cloudy.

[21] Whereas in the early days any type of sand could be used as fill for roadbeds, the State of Indiana now has strict guidelines that include particle size, composition, and durability. [Carr and Webb, 1970]

[22] Logan, et al., 1922, p. 1047.

- Silica brick (made from sand) is used for lining furnaces, kilns, and other chambers for high temperature processing.[23]
- Sand Lime Brick: This type of brick is made from a mixture of sand and lime (calcium oxide, CaO). The mixture is pressed into bricks and then subjected to 12-15 hours of high-pressure steam. The resultant brick becomes firmer and harder than clay-based bricks. The first Indiana plants to make this type of brick were located in Michigan City.[24]



The Sand Brick and Building Block Factory and rail tracks at the southeast corner of the Hoosier Slide in Michigan City. [Shannon, 1912, p. 205]

- Abrasives: sand paper, sanding disks, and sand blasting. Many commercial cleansers and scouring powders are made of pulverized quartz sand. Sand is the most widely used of all abrasives.[25]

In addition, sand is used commercially as an enabler—to make things that may not be made of sand, but require sand in their creation. This includes thousands of metal items used in the home and in industry such as kettles and skillets, candlesticks, bells, stoves, and locomotive wheels. The common process in the creation of these items is their being formed in a foundry from molten metal.[26] Quartz sand is useful for molding because the mineral quartz is refractory—that is it withstands high temperatures without deformation and without becoming part of the product. Most often, foundries discard the core after it is used once because the burned surfaces compact the sand. It was found to be more economical to use fresh dune sand for each use. Discarded cores, however, still make satisfactory fill material. Enabling uses of sand include:

- Molding and core sand: These sands are pressed into a variety of specific shapes (molds) and molten metal is poured inside. The qualities of sand used in this process are very specific. Molding sands of finer and finer textures have become required. Core sand is used to fill the spaces where metal is not needed or wanted. Indiana Dunes sand was particularly suited for cores in large castings and for the most exacting ferro-allow casting. [27]

> "Sand dunes near Michigan City supply most of the sand used by Indiana foundries for core-making."
> *Yearbook for the State of Indiana*. 1918.[28]

- Grinding and polishing, including sand paper.
- Engine sand is used to increase the friction between locomotives and the rails beneath them.[29] It is poured on the rails as necessary. A fairly sharp quartz sand containing no clay particles and which is fine grained and dry enough to be poured is useful for railroads. Indiana sand

[23] Patton, 1976, p. 58
[24] Blatchley, 1907, p. 68.
[25] Patton, 1976, p. 58.
[26] Patton, 1976, p. 57.
[27] Bieber and Smith, 1952, p. 24-25.
[28] Goodrich, 1919, p. 204
[29] Carr, 1971, p. 12

for this purpose has been valued by Chicago-area railroads because the quantity of sand was so high and the location so close.[30]

- Fire and furnace sand: Because sand is refractory, it has been used by Calumet-area steel mills in the troughs through which melted iron from blast furnaces flows to ladles or ingot molds. This use requires sand with a high silica content (and thus low content of calcium, phosphorous and sulfur). The sands located in the Calumet Beach deposits near Crisman have been especially suited for this use.



Crisman sand[31] lining the troughs through which molten iron flows from an Inland Steel blast furnace.
[Inland Steel Collection, Calumet Regional Archives]

- Other and minor uses: Dune sand was also used for filtering, sand beds for laying brick,[32] play (in sand boxes), traps (on golf courses—including one for a private golf course near Kentland, Indiana, owned by the Hoosier humorist, George Ade), sand bathing beaches for inland Indiana lakes, and flood control (via sand bags).

Probably the most surprising use of Duneland sand was for a cemetery. Pittsburgh Plate Glass Company at Kokomo, Indiana, used Michigan City sand for grinding and polishing. The used sand, with a worn-down flour-like consistency was discarded nearby. According to Carter Manny, who ran the Hoosier Slide Sand Company, the dump became a "gigantic hill." The company eventually sold the land with the sand hill to the city of Kokomo to be used as a cemetery.[33]

Production of Sand in Indiana: 1922[34]	
Glass sand	40,000 tons
Molding sand	300,000 tons
Building sand	2,000,000 tons
Abrasive sand	50,000 tons
Engine sand	60,000 tons
Paving sand	260,000 tons
Railroad ballast sand	100,000 tons
Other sands	140,000 tons
Total	**2,950,000 tons**

[30] Bieber and Smith, 1952, p. 26.
[31] John Magurean, President of Crisman Sand Company, confirmed in December, 2014, that the company did sell sand to Inland Steel Company.
[32] Bieber and Smith, 1952, p. 24-27
[33] Manny, 1961, p. 8.
[34] Logan,, et al., 1922, p. 1050.

Suitability of Indiana Dunes Sand for Commercial Purposes

Fortunately for those who wanted to mine and sell Indiana Dunes sand, this natural resource met many of the requirements for specialty sands. It had the high silica content or grain sizes that were needed by municipalities and industries.[35]

Beach and dune sands found in Lake, Porter, and LaPorte counties met the specifications for fill, bottle glass, core sand, engine sand, mortar, blasting sands, molding and furnace sand, and refractory brick.

Commercial Uses of Gravel

Gravel was one of the first natural resources mined in Indiana as it was used in large amounts for constructing all-weather roads. The industry grew rapidly soon after the organization of county governments,[36] which had the responsibility of building and maintaining road systems.[37] However, this was in the days before railroads had begun to crisscross northwest Indiana, and so most transportation was then by horse-drawn cart.

Many of the small abandoned gravel pits throughout Indiana were operated by the counties, which maintained their own pits and processing equipment in order to supply their needs.

The main uses of gravel have been as a coarse aggregate for concrete in order to build highways, runways, buildings, dams, and bridges.[38] Much gravel is also used for highway subgrades.

There has been no large-scale gravel mining in the Indiana Dunes.

[35] Carr, 1971, p. 13.
[36] LaPorte County was created in 1832, Porter County in 1836, and Lake County in 1837.
[37] Carr and Webb, 1970, p. 15.
[38] McGregor, 1963, p. 12.

Chapter 3

The Mining and Moving of Duneland Sand and Gravel

An early thought about Duneland sand:

There is an inexhaustible amount of sand . . . because the ridge is continually renewed by sand washing up from the lake and then moved by the wind and forming this huge dune.[39] Edward Barrett, Indiana State Geologist, 1914



Mining sand the old-fashioned way, with shovels and real horsepower. [Courtesy of Ed Hedstrom]

Sand mining in Northwest Indiana began in earnest as the first railroad lines were built across the region. In 1850-51, the first railroad to enter northwest Indiana, the Michigan Central, to some extent built along the top of sand ridges of the lower Tolleston Shoreline (just north of what is now Gibson Woods in Hammond), but even that line needed sand for fill in some places. However, at the same time, the Michigan Southern was building its line apparently with-out much regard to the topography of the land and so even more sand was needed to make its tracks level.

The building of each and every railroad line in the area required the flattening of the track bed. Sometimes this was done by removing the tops or sides of dunes. At other times it was done by filling in low areas. Rail companies never wanted their rails to be along routes lower than the surrounding area. Such areas would flood. Thus higher ground was better than low ground.

Within a short time, these rail lines discovered that much money could be made by hauling sand from the Duneland area to eager customers in both Indiana and Illinois. Sand mining became big business in northwest Indiana and thus the mining of sand for many years provided a source of income for much of the population.[40] Area cities and towns wanted sand to fill wetlands. For instance, at Jackson Park, the site of the 1893 Chicago World's Fair, much of the area was filled in with sand from the dune country just east of Miller.[41]

Much of the sand mined went to customers who wanted huge quantities of the material. Early on, Miller and Dune Park (now the Port of Indiana) were very successful points for the shipping of sand. In 1889 the *Chesterton Tribune* reported that the Santa Fe Railroad had placed an order for 150,000 cars of sand to be obtained from the Miller area. That same year, the Dune Park station

[39] Barrett, 1914, p. 49.
[40] Moore, 1959, p. 100
[41] Ibid.

was said to be the best grossing freight station on the Michigan Southern Railroad between Elkhart and Chicago. In 1898 more than three hundred cars of sand were shipped from there every day.[42] (See the 1917 topographic map of the Dune Park area in Appendix A.)

Gravel, ranging in size from a small marble up to an egg could be gathered from the Lake Michigan beach. It was occasionally raked up out of the shallow water by hand and shipped to Chicago for use in roofing and concrete mixes.[43] Gravel however, was not as plentiful in the dunes area and did not play a large part in the mining industry.

Production and Transportation

Sand mining in the early days was very labor-intensive. Ruth Nicholson Lindstrom (1888-1978), who grew up in Miller and whose family later started the Crisman Sand Company remembered:

> A company had purchased a long high hill just east of the Miller Cemetery where railroad ties and rails had been laid out for quite a distance all along the eastern side of the hill from the main railroad, Baltimore & Ohio (B&O).
>
> The local train would come from Chicago with empty gondolas and box cars sent by the company. Men were hired to bring wheelbarrows, and planks were furnished for each man. He would select an empty car and start his work, loading the wheel-barrow with sand, then pushing the load on the "plank path" and dumping sand into the empty railroad car. . . .
>
> 
>
> Loading a boxcar using a wheelbarrow and a wooden plank. [Old Lighthouse Museum]
>
> Later in the afternoon or perhaps the next day a train from the east would pick up the loaded cars. The men usually were paid $1 per boxcar and if it were an extra big car, maybe they would receive a few more cents (10 or 25 cents). Seldom more than one car was loaded by each man.
>
> When the hill had been leveled down even with the railroad track, the job of moving track closer to the hill was done. I remember … hearing the railroad boss give orders so all men would at the same time lift the track. What a job—"Ho Heave." When leveling this hill was finished, which took years, another hill west of the Miller railroad station was converted into a "sand pit."[44]

Leasing land for sand or gravel mining was fairly common in the years before the National Park was created, but most of the larger companies did purchase their own land. In the early days, sand was used primarily for fill. Because any grade of sand could be used for this purpose, mining companies were not very concerned about grain size and chemical impurities. By the

[42] Moore, 1959, p.101.
[43] Ibid.
[44] Lindstrom, p. 4.

early twentieth century sand companies were more careful in the purchase or leasing of lands. Before deciding to lease or purchase property, the dunes on the property would be bored and sampled to determine the composition and grain size. The results would then be compared to predicted requirements of sand and gravel customers, and, if it was then still believed to be commercially viable, companies agreed to purchase or lease the land.[45]

By the middle of the twentieth century, approximately 5,000 tons of dune sand were being taken from the Indiana Dunes area every day![46] Because most purchasers of Indiana dune sand have needed large quantities of sand, shipment has been most efficient by rail. In 1952 it was reported that 99% of sand at that time was being removed by rail with less than 1% removed by truck. Making this demand much easier has been the fact that northwest Indiana has had since the mid-nineteenth century a large network of freight rail lines eager to provide the needed transportation. This resulted in the placement of large operations within one mile of existing rail lines so that spur lines could be run to the mining area.

In 1970, it was reported that trucks were being used more widely than railways. This was because trucks can carry sand and/or gravel directly to where it's needed. In either case, because of the massive weights of large amounts of sand and gravel, transportation is an important factor in pricing. It can make up from one-fourth to three-fourths of the selling price. Thus most producers find it difficult to transport their product more than 15 miles and still make a profit.[47]

In 1952, the Indiana Geologic Survey Bulletin noted that a three-person crew consisting of one crane operator and two helpers could load 10 to 15 railcars in one eight-hour shift. It recommended that the bank of available sand be long enough so that a crane could move easily along the bank and load a string of stationary cars.



A smoking steam shovel and a line of railroad cars filled with sand, circa 1910, probably in Miller. [Miller Collection, CRA]

Helpers were needed to clean the cars and to seal them with paper and burlap. The sand was usually removed down to the water table or when a clay or pebble layer made removing the sand

[45] Bieber and Smith, 1952, p. 29.
[46] Bieber and Smith, 1952, p. 29.
[47] Carr and Webb, 1970, p. 19.

unprofitable. If no such hindrances were found, and if there were no problems in doing so, the sand could be removed to levels below the level of the track.[48]



A clam bucket in action. [Calumet Regional Archives]

Many of the large companies used a diesel-powered crane, often with a 1¼-cubic yard "clam" bucket.[49]

The larger companies preferred long banks of sand. If the bank was short, a double track of cars was sometimes required even though this practice presented curve problems and often a cramped working environment.[50]

Many operations used locomotive cranes, which required an extra track. The sandbank was then not stripped, but instead the spoil, which consisted primarily of trees and stumps, was buried in the pit as the sand was removed below the level of the track, or it could be thrown over to the far side of the cars creating spoil ridges. In any case, the sand then was dumped into open gondola cars.[51]



A line of open gondola cars being filled by the smoking steam shovel. [Miller Collection, Calumet Regional Archives]

The job of the helpers was to clean out the cars and seal them with paper and burlap so that the cars were ready for sand as soon as the crane operator was ready to dump sand into them.[52] They did what was necessary to keep equipment in good condition so that cars could be loaded, moved from the pit, and empty cars brought in each day.

Rail spurs in the period from 1855-1966 tended to range from one-quarter mile to a full mile in length.

Poor weather conditions presented the greatest problems in sand mining. Excessive snow, frozen ground, and driving rain or winds could temporarily halt production. Extremes of heat

[48] Bieber and Smith, 1952, p. 27.
[49] Ibid.
[50] Ibid.
[51] Ibid.
[52] Ibid.

and cold affected the abilities of workers to clean cars, or even open or close boxcars. In the heat of summer much work tended to be done in the early morning to avoid the heat of the afternoon.

Sand Drying

By the middle of the twentieth century sand companies occasionally dried and cleaned sand before selling it. This procedure used cables or conveyor belts to place sand in oil-fired driers, which would burn any tree branches or roots, blow out the ash, and screen the product. The processed dried sand would then be conveyed into empty boxcars that had been sealed with paper linings. When the process outpaced the demand for dry sand, sand could be stored in additional boxcars, bins, or silos until needed.[53]



Slack line cableway, conveyor belt and drying equipment of the Manley Sand Company, Dune Park, 1950. [Bieber and Smith, p. 29]

Mining to Construct Rail Lines, Highways, Local Roads, and Ditches Through the Dunes

The first road-widening project in Duneland was the widening in 1837 of the old Chicago-Detroit Road (roughly along today's route of U.S. Highway 12). That project didn't excavate much sand, but the construction of railroads, beginning just 13 years later certainly did.

As noted above, the Michigan Central Railroad in 1850-52, rather closely followed the topography when its tracks were laid. All the others, beginning with the Michigan Southern route in 1851 through the construction of the South Shore in 1908 and the Indiana Harbor Belt Railroad which laid its line through Inland Steel property and Ogden Dunes about 1922, raised or lowered their routes to make them as level and dry as possible. In some cases large amounts of sand had to be removed from high areas and filled in low areas.

[53] Bieber and Smith, 1952, p. 28.

Each of the four east-west three-county highways (12, 20, 80/90, and 94) through dune country required a great amount of excavation. All three of these highways, by the way, had no surface-level rail crossings. Each railroad was either bridged over the highway, such as the Michigan Southern's (now Conrail's) bridge over U.S. 20 (in Porter) or the highway built a bridge over the tracks (such as U.S. 20's bridge over the B&O tracks in Portage).



The new Dunes Highway in 1923. The sand dune, mid-photo, was cut back when the road was constructed. Many other dunes along this highway have since been mined by the individual property owners. Remnants of the Calumet Dune Ridge can still be seen east of Route 12's intersection with Oak Hill Road. [Calumet Regional Archives]

Railroad and highway bridges required extra sand to elevate the one road going over moving water or another road.

Ditches



Burns Ditch when new in 1926. [National Park System]

The first ditch dug through the dunes and beach was Kintzele Ditch, dug about 1880 in eastern Porter County. It drained parts of the Great Marsh in Pine Township. Burns Ditch was completed in 1926. Even though it was dredged through mostly already-excavated properties, much more excavation was needed in order to connect the Little Calumet River with Lake Michigan. At the same time, the west branch of the Little Calumet River was dredged and straightened as far as Lake County and the east branch was dredged and straightened eastward to the mouth of Salt Creek.

Small-scale Sand Mining

Besides the large-scale and mid-scale sand mining operations that occurred in Duneland and are described in this report, there were hundreds of small-scale excavations. Many were done without government permits. Even when government permits were required, some sand mining was done illegally, leaving no written records of its having occurred.

Much mining in urban areas was done with the issuance of just a building (not a sand-mining) permit. For instance, in 1964, the *Post-Tribune* printed a story about sand mining in Miller where a lawyer, being accused of mining without a permit, said that he held a building permit and thus had the right to remove all the sand necessary so that he could build a house on the property.[54] Most operations like this, however, did not get coverage in newspapers. Many former residential areas have been incorporated into the National Lakeshore and thus much un-reported mining like this may have been done there.

Some excavations were very small, as when some local residents would take a shovel and laundry tub to a nearby sand dune along some highway and gather enough sand for their kids' sandboxes. Mid-sized operations were common as well, such as when landowners excavated sand on their own property in order to build a house or roadside business.

Many small-scale sand mining operations will likely never be known. Even if town permits were filed, many old records have been discarded or are now stored in nearly inaccessible locations.

Sucking It Up From the Lake Bottom

Another way to get sand from the Indiana Dunes was to suck it up from the lake bottom. This operation required specialized equipment placed on ships with hulls large enough to hold large quantities of sand. A definite advantage in the early days to the person or company obtaining sand this way was that one didn't need to purchase it, as there was no owner to purchase it from. However, eventually the state of Indiana made it illegal to do this except when permits were received from and royalties paid to the Indiana Department of Conservation.[55]

A definite disadvantage was that the sand taken from the lake bottom could cause erosion of sand from the beach. Another disadvantage was that the process could be dangerous.



A sand sucker moored off the Ogden Dunes shore in the 1920s. [Courtesy of Sandra Nicholson Layton]

Historian Powell Moore noted that "Sandsuckers from Chicago lurked in the lake between Miller and Michigan City."[56] They did their work within sight of the shore because that's where the sand was located. As the owners of the sand suckers paid nothing for the sand that they were taking, the land-based companies, who had to pay for the sand that they were taking from private property called upon the federal government to halt the water-based operations.[57] As late as 1913 the editor of the *Gary Evening Post* declared that the sand suckers were stealing the bottom of the lake.[58]

[54] *Gary Post-Tribune,* July 24, 1964, pp. 1 and 6.
[55] S., J. *Outdoor Indiana*, 1948, pp. 14-15.
[56] Moore, 1959, pp 100-101.
[57] *Chesterton Tribune*, September 13, 1890.
[58] *Gary Evening Post*, December 27, 1913.

After the State of Indiana began charging for permits to take sand from the lake bottom, it realized that it could reap considerable monies from these operations.

> ***Year Book of the State of Indiana for 1932*** [59]
>
> The year was an exceptionally good one for the removal of Lake Michigan sand. The general economic conditions [the Great Depression] resulted is very little sand being taken from the lake for commercial purposes, but two major fill projects were in progress along the Chicago lake front in which the filling material was sand drawn from the bed of the lake near Indiana Harbor and transported in especially equipped boats to add land to the extensive shore park system.
>
> One of these projects is the extension of Lincoln Park which was begun in the spring of 1931 and completed, so far as the sand fill is concerned, in the fall of 1932. This project required approximately 7,000,000 cubic yards of Indiana sand, and will add nearly 250 acres of valuable park land. Over this newly made land will be extended the beautiful out drive boulevard, along its shore will be one of Chicago' largest bathing beaches, and within its borders will be constructed a yacht harbor.
>
> The other project was a fill of about 700,000 cubic yards of sand for the construction of Southerly Island which is a part of the grounds of the Century of Progress. This project was begun and completed within the year.

Yet sand sucking continued with the blessings of the state of Indiana. Sand suckers were operating into the late 1940s. In the summer of 1948 the *S.S. Doville,* the *S.S. American*, and the *S.S. Michigan* were making two trips a day to the Indiana shoals to harvest sand for the building of Chicago's Northerly Island. By mid-summer of that year, these ships had paid more than $20,000 to the Department of Conservation for the privilege of removing Indiana sand.

According to the Department of Natural Resources, extracting sand from the near-shore bottom of Lake Michigan today is not illegal, but a permit from the Department of Natural Resources is still required. Current DNR policy is now to keep as much of Indiana's sand on the coast as possible because that sand protects the beach, dunes, and other coastal structures from severe storm wave attack. Today, of course, dredging is done to keep channels open at harbors or to keep water intake areas open. Sand removed must be paid for unless the dredged sand is then used for beach nourishment[60]

Interestingly, in an article entitled "The History of Spring Mill Inn" that appeared in the August-October, 2013, *Grist Mill Gazette*, the Spring Mill State Park newsletter, it states "Financing (of the inn] was finally obtained when the State of Indiana sold huge quantities of sand to the City of Chicago to use as fill following its World's Fair. This money was dedicated to the Spring Mill Inn project." The fair being referred to was the "Century of Progress" held in 1933-34. Construction of the Inn began in 1936. In the 1930s the state owned sand in Dunes State Park and off shore in Lake Michigan.

[59] Kettleborough, 1933, page 373.
[60] Davis, 2014.

The Status of Sand and Gravel Mining by Mid-Twentieth Century

In 1950 there were ten large and several smaller sand pits in operation. The output at that time was about 5,000 tons each workday. As can be seen in C. L. Bieber's map (right) most of the gravel pits were associated either with the Valparaiso and Tinley Moraines or the Kankakee River. Each of these sand mining sites, and as well as the others which preceded them, is discussed in the five chapters of this report that follow.



Sand and gravel pits in northwest Indiana in relation to Lake Michigan and the morainic areas. Note that most gravel pits were located in the moraines. From C. L. Beiber, 1949

Just fourteen years before the establishment of the National Lakeshore, it was predicted that even with urban encroachment, which was making much of the land inaccessible to mining companies, there was enough available sand in northwest Indiana that if removal of sand continued at the then current rate, commercial operations could continue for another 50 to 100 years.[61]

Disposing of Worked-Over Lands

When the all the retrievable sand or gravel has been removed from a pit, the properties can then be disposed of. Bieber and Smith noted that mined-out properties in northwest Indiana, all being in close proximity to urban areas, can be sold for development. Their point was that with the sand dunes or ridges gone, the land would be flatter and thus more suitable for development. They noted that "worked-over" lands brought very fair returns to the companies.

Similarly Carr and Webb noted that sand and gravel pits can be turned into pleasing recreational, residential, or industrial assets. They noted that when gravel producers inform a community of its reclamation plans, antagonism toward opening a new pit is generally less because the community has been assured that the land, when the mining is completed, will not be left as an eyesore or dangerous nuisance.[62]

Bieber and Smith also noted that there were many problem in building homes on sand dunes, and that the "average house holder probably will be better satisfied to live on the more level ground of the worked-out sand areas.[63]

Gravel Mining

There has been no large-scale gravel mining in the Indiana Dunes. The map above shows two gravel pits in northern Porter County, but they are both south of the Crisman sand pit, which is itself south of the Lakeshore.

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[61] Bieber and Smith, 1952, p. 30.
[62] Carr and Webb, 1970, p. 23.
[63] Bieber and Smith, 1952, p. 29.

Chapter 4

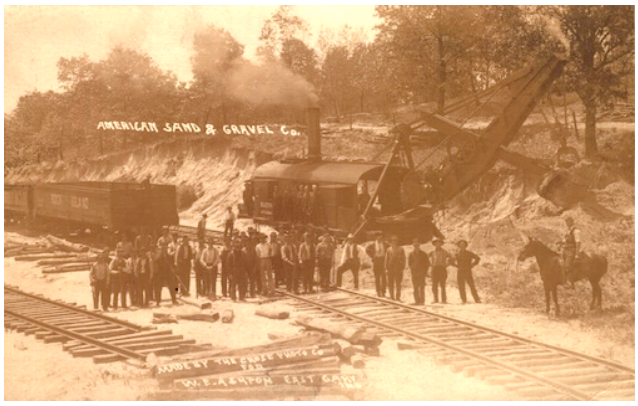
Major Sand Mining Companies



[Indiana Dunes National Lakeshore]

Many companies mined, bought, and sold Indiana dune sand. Some were mammoth corporations; others were small and family-owned. Some have been in existence for more than 100 years, others for much shorter periods, closing either because they were unprofitable or purchased by larger corporations. Many companies dealt with both ice and sand. Workers cut ice when lakes were frozen and mined sand when they weren't. The ice business declined after World War I with the advent of home refrigerators, but the sand mining business still flourishes.

Aetna Superior Sand Company, with offices in Chicago at 11 South LaSalle Street, was mining in Miller in the 1950s and selling to various foundries.[64]



The American Sand and Gravel Corporation sand pit.
[Courtesy of Sandra Nicholson Layton]

American Sand and Gravel in 1910 was listed in *Industrial World*[65] as having a new charter. In 1926 it owned and mined 80 acres of land in eastern Miller. In 1917, Napoleon C. Fisher, president of this company was also the secretary-treasurer of the Garden City Sand Company.

Artesian Sand and Gravel Company was organized March 1, 1890 and was the next year described in *Industrial Chicago: The Building Interests* as one of the leading firms of its kind in the city. It claimed to sell a superior grade of Indiana bank sand claiming its product was coarser and cleaner than "has before been brought to this market."[66]

John Bos Sand Company was a Chicago-based business, formed before 1914[67], that did considerable business in Lake and western Porter Counties in the mid-twentieth century.

Brown Trucking Company, now known as Bulk Transport Corp., was a locally-owned company that in the 1950s-80s had pits south of U.S. Rt. 20 in Pine Township.[68] The company has conducted site preparation work in many locations including the Port of Indiana area, Marquette Mall, and many subdivisions and schools.

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[64] Bieber's field notes, 1950, p. 15.
[65] *Industrial World,* 1910, p. 300.
[66] *Industrial Chicago: The building Interests*, 1891, p. 787-788
[67] Stevenson, 1915, p. 129.
[68] Bieber's field notes, 1950, p. 43 / Cole, 1986, p. 35-36

Castle Sand Company in 1906 owned about 90 acres of land in eastern Miller just south of the B&O Railroad.

Chicago Mutual Sand and Gravel Company was licensed in 1893[69] and two years later owned 320 acres of lakefront land in Portage Township. By 1906 that land was owned by Charles Shedd, director and treasurer of the Knickerbocker Ice Company.

Crisman Sand Company was created in the 1920s by the merger of mining oper-ations by the Nicholson family (upon whose land the sand was first quarried) and the neighboring Scofield operations. Both had the only sand in the area suitable for lining troughs for molten iron and thus supplied all the local steel mills.[70] About 1990 the company moved its headquarters to Valparaiso. In 2015, this locally-owned company is still in operation, mining property it owns in Porter County's Jackson Township.



A Crisman Sand Company crane. Circa 1924.
[Courtesy of Sandra Nicholson Layton]

Construction Aggregates Corporation in 1950 had offices at 33 North LaSalle Street in Chicago and was mining in west Aetna. Many of its customers were in Illinois (e.g. Champaign, Geneva, Joliet, Waukegan), but at least one was as distant as Alabama.[71] The company also had a sand sucker boat that operated in Lake Michigan.[72]

Consumers Company at 111 West Washington Street, Chicago, was incorporated in Illinois in 1913, a consolidation in February of that year of Knickerbocker Ice Company and City Fuel Company, both Illinois corporations. Chairman of the Board in 1918 was J. S. Field.[73] It operated at Dune Park until it sold its land to Bethlehem Steel Company.

Garden City Sand and Gravel Company in 1906 owned 160 acres of land east of Miller Cemetery aside the B&O Railroad.[74] The company was established in 1883[75] and claimed to be the first mining company to ship sand to Chicago by rail. If so, then the shipping of sand, described in 1882 in Goodspeed and Blanchard's *Counties of Porter and Lake,*[76] must have been carted by horse-drawn wagons, an unlikely means of transport because the trains had connected Porter County with Chicago thirty years earlier.[77] The company was involved in a law suit concerning its mining near Gary in 1908. Napoleon Fisher, treasurer of this company was, at his death in 1917, also the president of American Sand and Gravel Company.[78]

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[69] *Chicago Daily Tribune*, December 30, 1893, page 6.
[70] Magurean, December, 2014.
[71] Bieber's field notes, 1950, p. 52.
[72] S., J. *Outdoor Indiana,* October 1948, p. 14-15.
[73] *Fitzgerald* 1918, p. 332.
[74] Jones, 1906 map.
[75] *Concrete*, 1918,, p. 114.
[76] Garard, 1882, p. 214.
[77] *Industrial Chicago: The Building Interests*, 1891, p. 784-786.
[78] *Concrete*, 1918, p. 114.

Hoosier Slide Sand Company, incorporated in 1906 in Michigan City by William Manny but managed by his son Carter after 1912. It was evidently the largest of the three sand companies operating in the northwest part of that city. It claimed to be the first firm to purchase a locomotive crane to load the sand.[79] When the dune was gone, the company sold its land to the Northern Indiana Public Service Company (NIPSCO).



A Hoosier Slide Sand Company postcard, circa 1905. [Old Lighthouse Museum]

Inland Steel Company purchased Frances Ogden's Porter County lakefront property in 1920,[80] later selling much of the eastern portion to the syndicate that then created the Ogden Dunes development.

Although its Porter County lands had already been mined, Inland did continue, or at least resume sand mining of that area. Possibly, some of the sand was used for its own lake fill when Inland expanded its East Chicago plant peninsula in the 1960s. The photo to the right shows trucks on the new fill area loaded with sand apparently ready to dump their loads.


Looking northwest showing Inland's fill area, January 11, 1965. [Inland Steel collection, CRA]

Knickerbocker Ice Company of Chicago was incorporated in 1885 by Edward A. Shedd, the founder earlier of E. A. Shedd & Co. Both companies dealt in both harvesting ice and mining sand.[81] Except for the Missouri Valley Dredging Company (that cleared the Central Dunes for Bethlehem Steel Company) Knickerbocker probably mined more Duneland sand than any other company. It owned more than 2,000 acres of land in northwest Indiana, five steam shovels, and 200 gondola cars. Officers in 1886 included E. A. Shedd, president; J. S. Field, vice-president; and C. B. Shedd, secretary and treasurer. Field was president in 1909. (According to *Industrial Chicago: The Building Interests,* published in 1891, the Knickerbocker Ice Company's mammoth icehouses on Wolf Lake were the largest in the world.[82]) In July 1903, Knickerbocker acquired the Consumers Company (see above) owned then by Michigan City entrepreneur Chauncey J. Blair.

[79] Boomhower, 1993, p. 17.
[80] Gentz, 1966.
[81] Harrison, 1904, p. 202.
[82] *Industrial Chicago: The Building Interests*, 1891, p. 786-87.

The Indianapolis News, **May 6, 1908, p**age 13:

The Federal Government is investigating the charge that the Knickerbocker Ice Company, of Chicago, and the Indiana Harbor Railway Company have been violating interstate commerce laws by collusion, in controlling the sand lands along Lake Michigan, thereby fixing the price to Chicago contractors …. The general manager of the Indiana Harbor Railway, admitted on the witness stand … that his railway ... had furnished cars to the Knickerbocker Ice Company free of charge in the transportation of sand. He also admitted that John S. Field, president of the Knickerbocker Ice Company, was a director of the Indiana Harbor Railway.

Krug Sand Company was listed as a new Chicago corporation in 1896-97[83] and was still in business at least until 1931.[84] In the early twentieth century, it owned land in eastern Miller, just west of the Porter County Line. *The Inter Ocean* (newspaper) on January 1, 1904, noted that Mr. Krug was president of the Krug Sand Company, described as "one of the largest in its line in Chicago."[85]



Two cyclists in front of a Krug Sand Company rail car operating out of Millers Station. Circa 1900. [Miller Collection, CRA]



S. Krug, 1904 lithograph possibly by L.A. Searle

Lake Shore Sand Company from at least 1895-1906 owned 40 acres of land in Porter County.

Manley Sand Company, with an office in Gary, was owned (at least in 1950) by the Knickerbocker Ice Company.[86] It had operations in Miller, Dune Park, and east of Michigan City.

Missouri Valley Dredging Company in 1962 contracted with Bethlehem Steel Company to remove the Central Sand Dunes from its property so that Bethlehem could build its mills.

Pinkston Sand Company, of Michigan City, was one of the mining companies that removed sand from the Hoosier Slide.[87] (It is listed in the *1919 Yearbook of the State of Indiana*.[88]) When the dune was gone, the company sold its land to NIPSCO.[89]


WE thank our railroad friends for the many kind favors shown us. We appreciate their orders. Our Engine Sand is known to Master Mechanics and practical men as the very best. Orders for Engine Sand take precedence over all other orders.

Capacity Thirty Cars Daily — Kindly Order From Us

Engine Sand
Bedding Sand
Rolling Mill Sand
Building Sand
Grinding Sand
Core Sand

Always make requisition read "PINKSTON SAND"

Right: A portion of a Pinkston advertising flyer. [Old Lighthouse Museum]

[83] Moses, 1897.
[84] The Vidette-Messenger , Thursday, April 9, 1931, p. 2.
[85] *Bar Association* (Chicago) *Record. Vol. 1,* number 4. April, 1919.
[86] Bieber field notes, 1950, p. 26.
[87] Boomhower, 1993, p. 17.
[88] Kettleborough, 1919, p. 203.
[89] Boomhower, 1993, p. 17.

Producers Core Sand Corporation, located in Michigan City, was incorporated in 1926. According to the Michigan City *News-Dispatch,* it was the "outgrowth" of a number of earlier sand companies including the Hoosier Slide Sand Company.[90] In 1952, it was mining on both the west and east sides of Michigan City.[91]

E. A. Shedd & Company, one of many ice-harvesting companies in the Chicago area was founded in 1874 by Edward A. Shedd. The company grew, eventually owning huge ice storage houses. The ones next to Wolf Lake, were said to be the largest in the world. In January 1885, it became the Knickerbocker Ice Company with 200 summer employees and many more in the winter. [92]

Silica Sand Company of Michigan City, Indiana. (listed in the *1919 Yearbook of the State of Indiana*, page 203 as having an office in the county.)[93]

S. J. Taylor Sand Company of Michigan City in the 1920s had a spur line from the South Shore tracks to its sand mining operation east of Mount Baldy and west of where the Hoosier Slide mining occurred.[94] Samuel J. Taylor, was earlier president of the Pinkston Sand Company



Railcars waiting to be loaded by S. J. Taylor Company staff [Indiana Dunes National Lakeshore]

M. Walsh started in the sand and gravel business in 1880. In 1891 his business was modestly said to supply sand and gravel "of the very best quality, exceptionally free from foreign substances."[95]

[90] *News-Dispatch*, September 13, 1950, p. 23.
[91] Bieber and Smith (enclosed map), 1952.
[92] Currey, 1918, p. 193.
[93] Goodrich, 1919, p. 203.
[94] Nicewarner, 1980, p. 267.
[95] *Industrial Chicago: The building Interests*, 1891, p. 784

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Sand Sucking Companies

Sand suckers were boats (or barges) that carried equipment so that they could moor off shore and suck up sand from the lake bottom. In 1913 an editor of the Gary Evening Post complained that sandsuckers were "stealing the bottom of the lake."[96]

Two Duneland area shipwrecks, the *Muskegon* and the *J. D. Marshall* were sand suckers.

Eventually the Indiana state government realized that lake bottom sand was valuable, and so began requiring permits and payments in order to legally to suck Lake Michigan sand.



A sand sucker off the coast of Ogden Dunes.
[Courtesy of Sandra Nicholson Layton]

The three Chicago companies listed below owned sand suckers that mid-century legally sucked up sand from the bottom of Lake Michigan. In 1948 all three received a permit from the Indiana Department of Conservation to do so. Royalties were also paid to the state for the amount "harvested." The sand was then taken to Material Service yards where it was stored until needed. In 1948 much of the sand went to Chicago for the Lake fill project that created (or enlarged) Northerly Island so that Meigs Field could be built there. Three of these companies, all at least operating in the 1940s, were:[97]

Construction Aggregates Company

Great Lakes Dredge and Dock Company

Hanna Transportation Company

[96] *Gary Evening Post*, December, 27, 1913, in Moore, 1959, p. 101.
[97] S., J. *Outdoor Indiana,* October 1948, p. 14-15.

Major and Typical Customers

Chandler-Taylor Company Indianapolis foundry used Michigan City sand in making cores.[98]

City of Chicago: Large amounts of sand went to:

- The site of the Chicago World's Fair, the Columbian Exposition of 1893, which was filled in with sand from just east of Miller.[99]
- Jackson Park and Northerly Island (Meigs Field) received sand from northwest Indiana.[100]
- Railroads (see below) and construction businesses in Chicago also purchased large amounts of Indiana dune sand.

Glass companies: [101]

Ball Brothers Glass Company of Muncie**.** Starting in 1912, Ball used sand from the Hoosier Slide sand dune in Michigan City until the dune was leveled.

Pittsburgh Plate Glass Company of Kokomo.

Hemingray Glass Company, Muncie, for glass insulators for telegraph and telephone poles.

East Gary Concrete Products Company purchased Michigan City area sand from the Brown Trucking Company.

Hartong and Company at Pike Street and Central Avenue in East Gary was a drying plant. Its sand was an ingredient of patching asphalt.

Josam Manufacturing Company, described in 1967 as one of the largest foundries in the Michigan City area, had two main furnaces for melting metal.[102] It used Duneland sand for molding ferrous materials, which in the summer arrived by truck; in winter Josam purchased dried sand from Manley. (Brass materials needed a finer sand imported from Tennessee.[103])

Northwestern University: The 1963 campus expansion into Lake Michigan used sand that was removed by Bethlehem Steel Company from the Central Dunes[104]

Railroads: Rail lines needed to be as level as possible and, in low places, made high enough so that they weren't covered by water during floods. Many Chicago and northwest Indiana railroad lines were raised using Indiana Dunes sand. For instance:

Santa Fe Railroad: Powell Moore noted that in 1889 the Santa Fe Railroad placed an order for 150,000 cars of dune sand, which was obtained from the Miller area[105]

Illinois Central Railroad for its elevated track in Cook County[106]

Chicago and Northwestern Railroad in 1902 purchased 8000 carloads a month for three months from Knickerbocker to be used in elevating its tracks on the Mayfair division.[107]

Steel Mills: Mills such as U.S. and Inland needed Crisman-area sand for lining troughs for molten iron.

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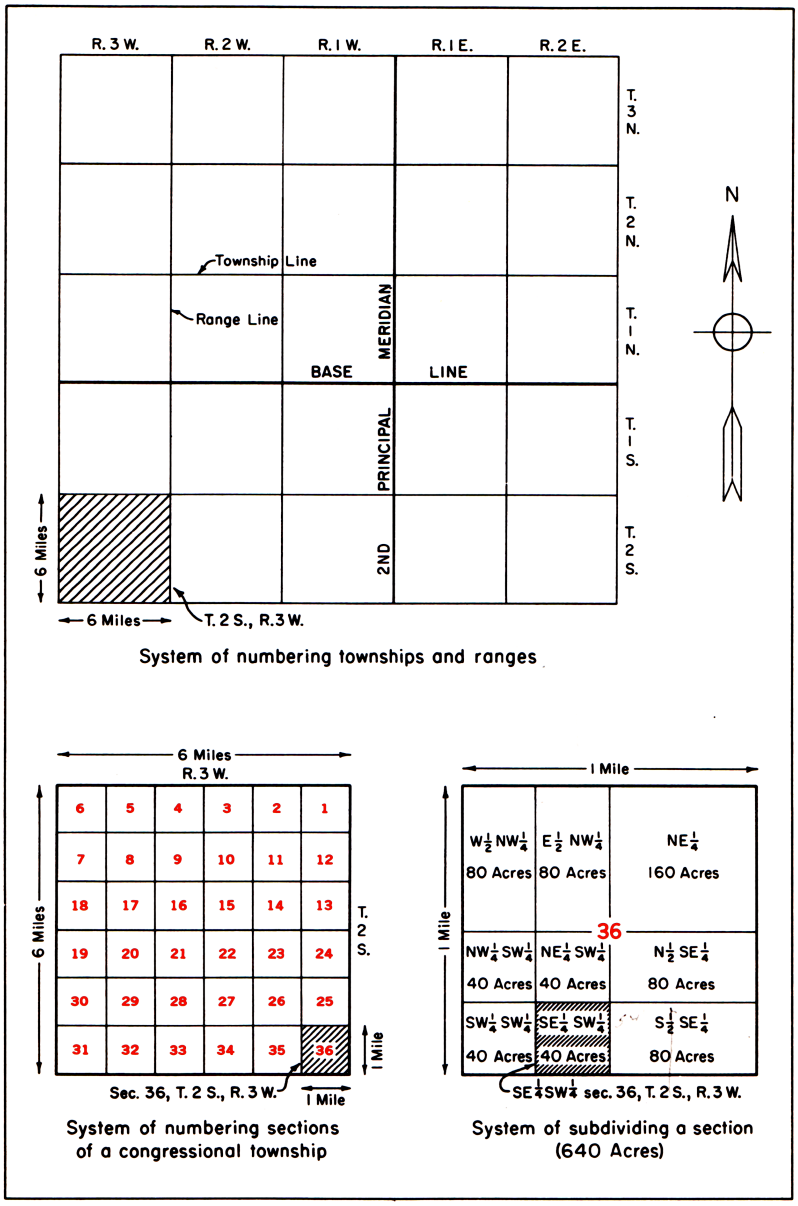
[98] Barrett, 1914, page 49.
[99] Moore, 1959, p. 100.
[100] Minnetrista, "Hoosier Slide;" *Outdoor Indiana*, October, 1952, p. 5.
[101] Minnetrista, "Hoosier Slide"
[102] *Chicago Tribune, August 20, 1967.*
[103] Bieber field notes, July 19, 1950, p. 37.
[104] Engle, 1983, p. 270.
[105] Moore, 1959, p. 101.
[106] Minnetrista, *Hoosier Slide*
[107] *Chicago Daily Tribune***, March 23, 1902**

Part 2

Sand Mining in and adjacent what is now the Indiana Dunes National Lakeshore

Part two of this report describes in detail sand mining operations in each of the five lakeshore townships in which the Indiana Dunes National Lakeshore is located. Each chapter begins with a 1952 map showing then major active mining areas, areas that had been "mined out," and still-existing dune resources. Each mined area is then described.

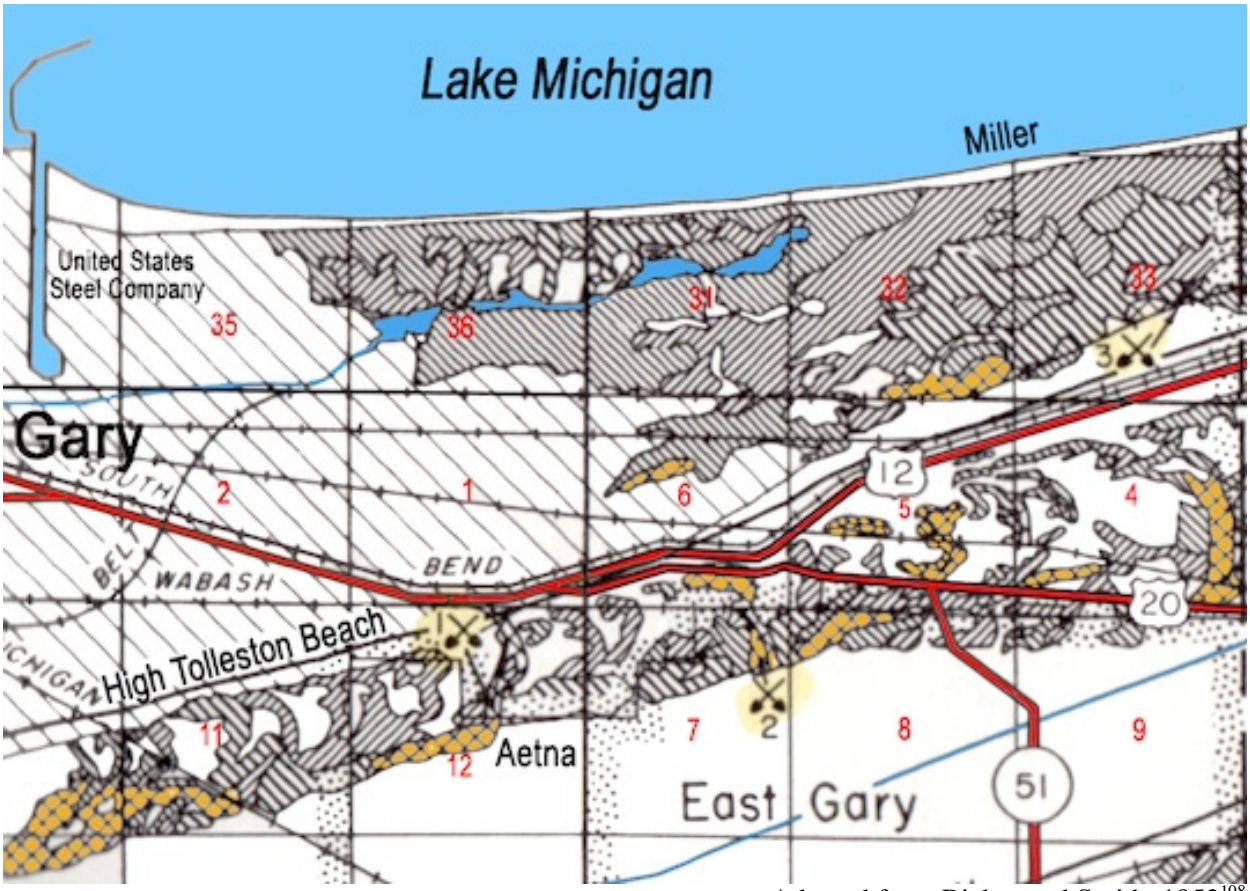
To avoid confusion, locations of all mining operations are identified by the Indiana township and range system described below. In this system, congressional townships are 6 miles square and are composed of 36 sections, numbered as shown below. As they are on all topographic maps, section numbers are printed in red.



McGregor, 1960

Chapter 5

Sand Mining in Northeast Lake County



Adapted from Bieber and Smith, 1952[108]

In 1950 when this map was prepared by Geologists C. L. Bieber and Ned Smith, there were three large-scale active sand mining operations still occurring in Lake County. They were:

1. West Aetna: Construction Aggregates Corporation (in Section 12)
2. East Aetna: J. N. Bos Sand Company (in Section 7)
3. Southeast Miller: Aetna Superior Sand Company (in Section 33)

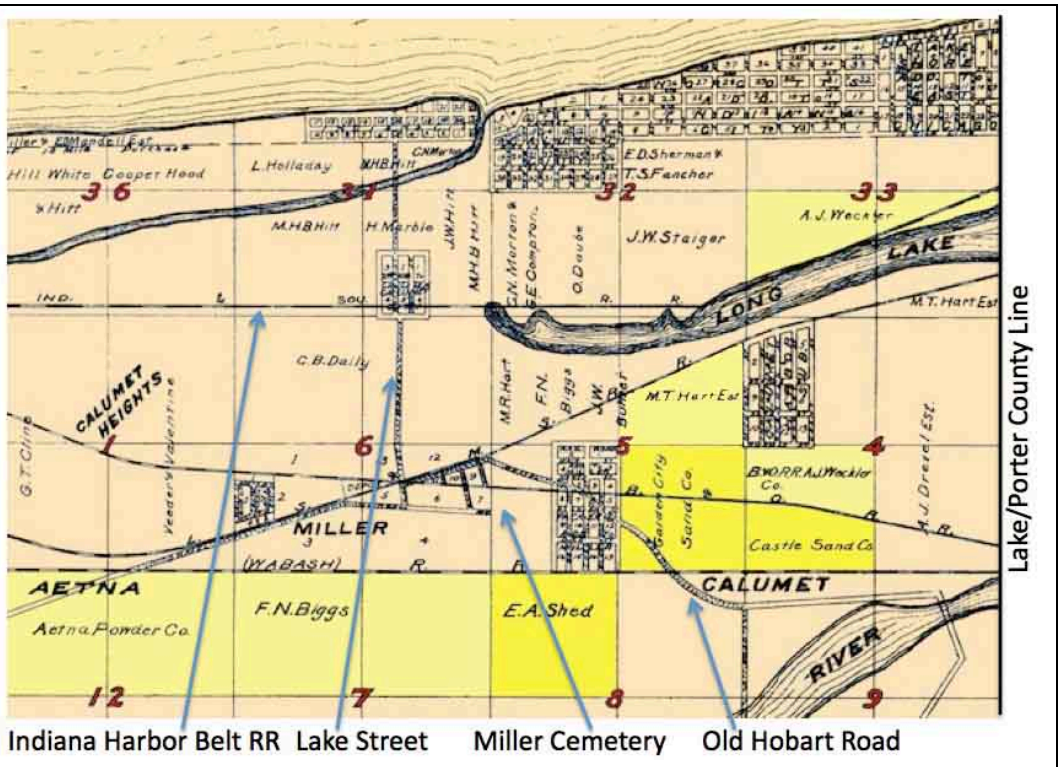
Large-scale sand mining in Lake County began at some time between 1873 and 1900. The tan areas on the map show places that were by 1950 "mined out," meaning that mining had occurred there in the past and the area was thought to have no more commercially available sand. Note that Bieber and Smith show Route 51 intersecting U.S. 20 at the Old Hobart Road. Color was added by this author.

[108] Upper left sections on the map are in Township 37 North, Range 8 West; Upper right: Township 37 North, Range 7 West; Lower left Township 36 North, Range 8 West; Lower right: Township 36 North, Range 7 West

Miller Area:

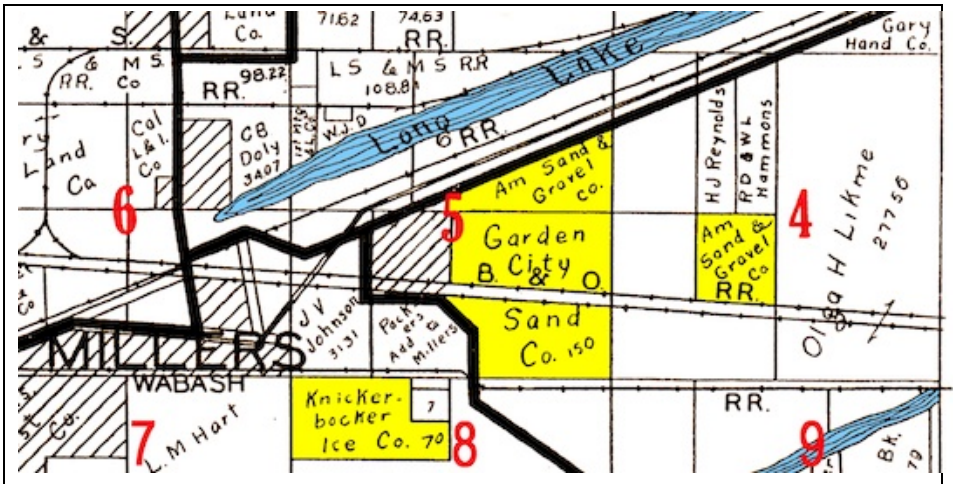
"Shipping sand from the large banks nearby is a profitable industry."
[Timothy Ball, 1900, p. 411]

From the 1850s until the 1870s Miller was a tiny hamlet along the Michigan Southern Railroad. It grew when the Baltimore and Ohio (B&O) Railroad crossed the Michigan Southern line and a depot was built serving both lines.



[Adapted from *Northern Portion of Lake County, Indiana*, 1906, W. D. Jones.]

Miller area in 1906. Indiana City (at the mouth of the Calumet River) and nearly all the other platted areas were never developed. Sand mining company lands are in yellow. Future sand mining land is in light yellow. E. A. Shedd became Knickerbocker Ice Company, which, in spite of its name, was one of the largest sand mining companies in the Chicago/Northwest Indiana area.



Plat Map of Miller: 1926 Color added by the author. [The Thrift Press]

By 1926 American Sand and Gravel Company had purchased part of the B&O land in Section 4 and the land south of the Michigan Southern tracks in Section 5 earlier belonging to Aaron and Martha Hart.

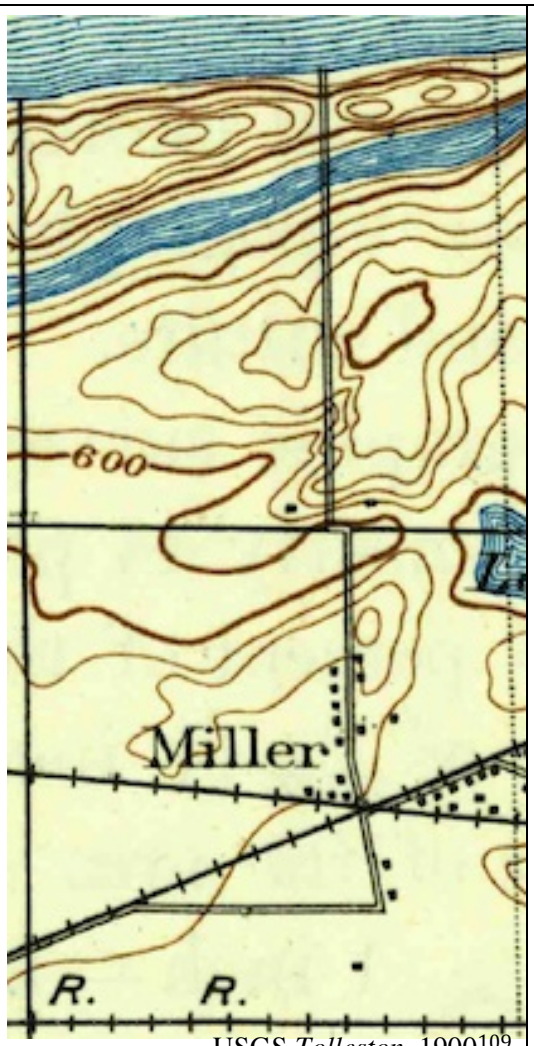
Note that all the sand mining properties were next to rail lines.

Lake Street Area (East ½ Section 31 and 6)

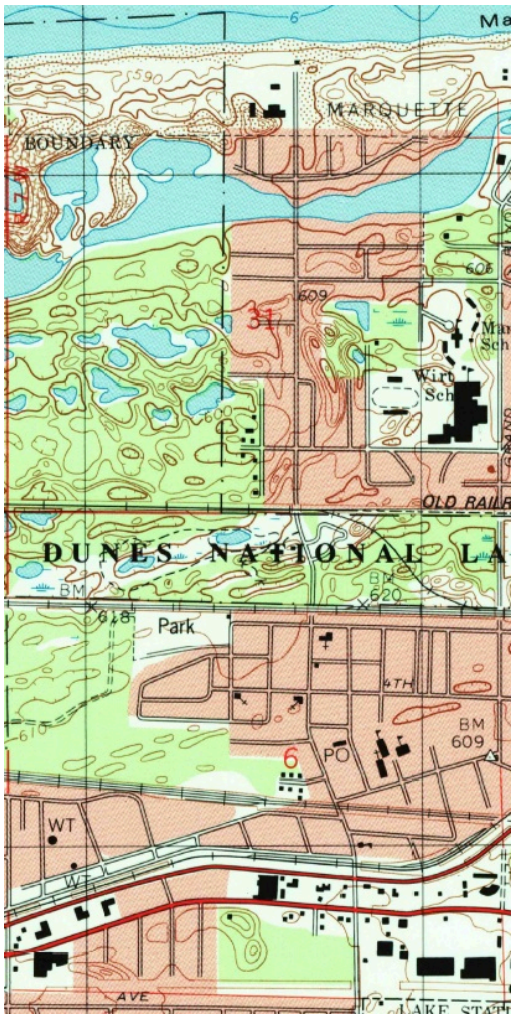
The Lake Street area has witnessed minimal sand mining. Lake Street, the oldest street in Miller, has always been its commercial center, if no longer its geographic center. Although there was no extensive sand mining of the size that occurred further east, nevertheless a significant amount of sand was removed from the Lake Street area before it was developed. Even though the 1900 map does not show small surface features, a number of alterations of the ground can be seen by comparing these two maps. Miller Avenue parallels the original Michigan Southern tracks.

Section 31 →

Section 6 →



USGS *Tolleston*, 1900[109]



USGS *Gary*, 1991

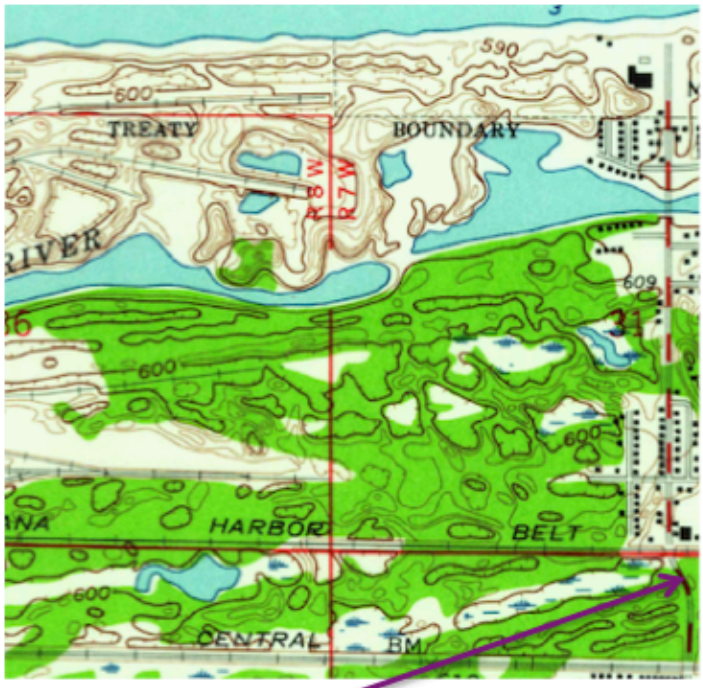
Besides the fact that the 1991 map shows more detail, compared to the 1900 map, it shows:

- The dunes along the lakeshore have moved and the river (lagoon) has been altered.
- The 50-foot dune in the center of Section 31 is lower and is replaced by several depressions and ponds. (Green Heron Pond is the one furthest northeast.)
- The 30-foot dune next to Lake Street in Section 6 is gone.

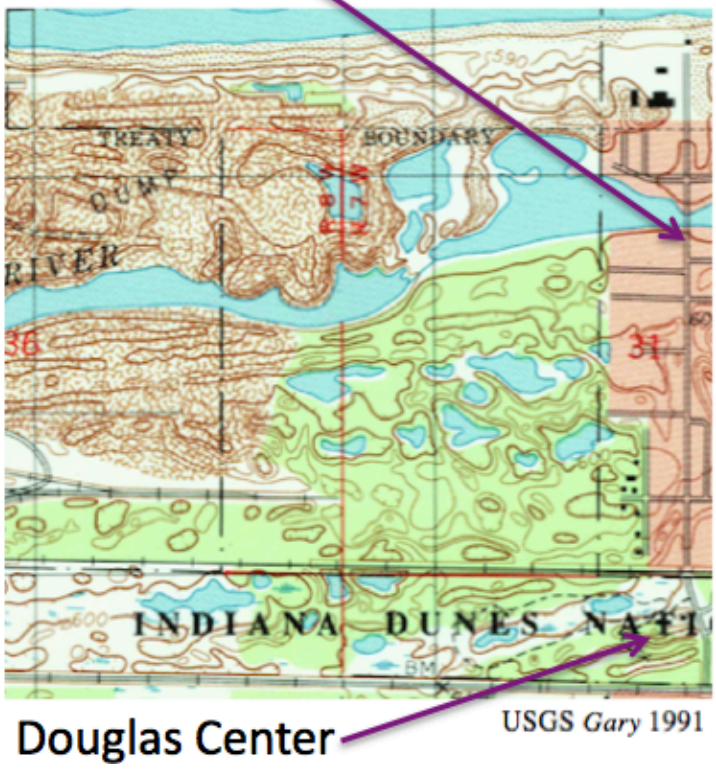
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[109] The earliest topographic map of the Duneland area is the Tolleston map published in 1900. It is a "15-minute map" which means it encompasses an area of both 15° latitude and longitude. All other topographic maps in this report except the Porter maps of 1935 and 1940 are "7.5 minute maps;" they encompass one-fourth the area and are thus roughly four times as detailed.

Miller Woods (E½ Section 36 and W½ Section 31)



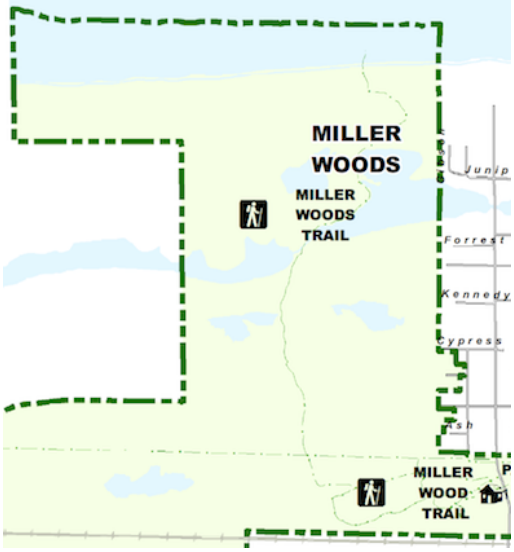
USGS *Gary* 1959



USGS *Gary* 1991

The northern part of Miller Woods, (north of the old Indiana Harbor Belt rail line) is land that was owned by U.S. Steel Company. It contains a short rail line, which by necessity required smoothing the land to accommodate the rails.

The southern section, the land between the two parallel rail lines, was owned by the New York Central Railroad. Both sections show the uneven, somewhat linear dune and swale topography that was typical of the original western Miller landscape. It has had very little other alteration.



National Lakeshore Boundaries, 2014

Most of Miller Woods was added to the National Lakeshore in 1976. (An expansion of the woods westward was added four years later.) Not included was most of the East half of Section 36 which did experience sand mining by U. S. Steel followed by the dumping of slag.

The Paul Douglas Center for Environmental Education, at the woods entrance, was built in 1985-86 just west of Lake Street (at the southeast corner of the lower maps)

Marquette Park Area (Section 32)

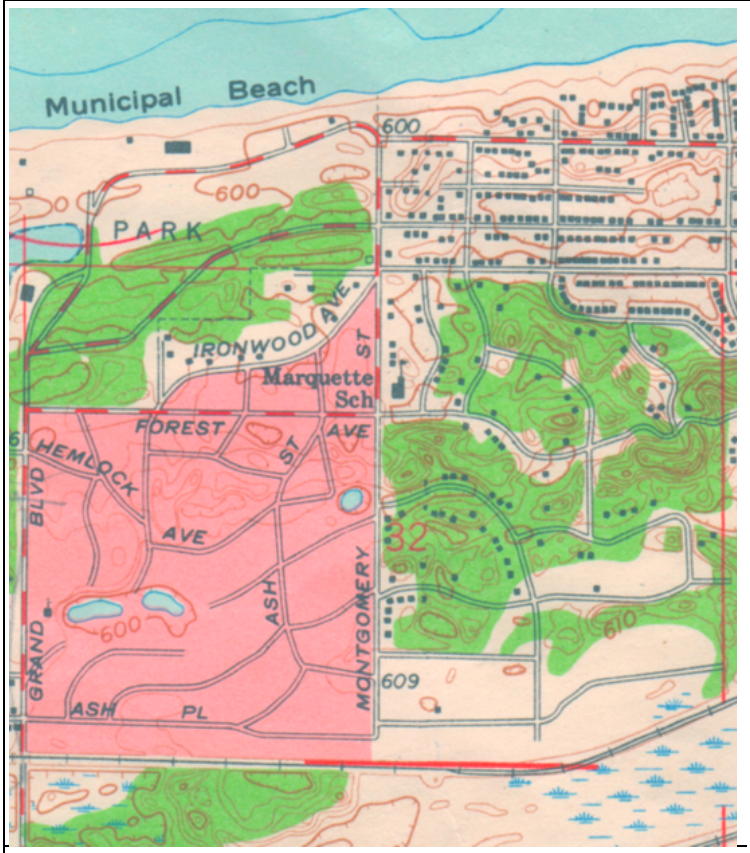
Section 32 is east of Grand Boulevard, west of Randolph Street, and immediately north of the now abandoned Indiana Harbor Belt railroad line and the National Lakeshore property south of the tracks.

Marquette Park, originally called Lake Front Park, occupies the northern-most area of the west half of Section 32. The land was purchased by United States Steel Company about 1918 and donated to the city of Gary to be used as a park. In the early 1920s the land was stripped of its underbrush and the undulating dune and swale topography was smoothed out. Most of the rest of the section is residential.

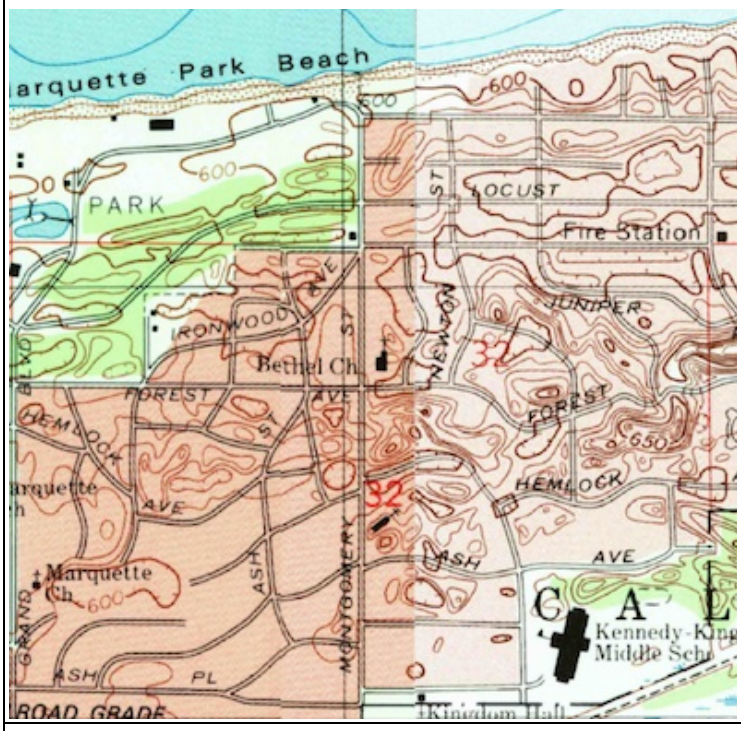
The flat southern part of the section, near Kennedy-King school and immediately north of National Lakeshore property, was mined before 1952 at which time it was deemed "mined out" by geologists C. L. Bieber and Ned M. Smith. (See map on the first page of this chapter.)



National Lakeshore boundary, 2014



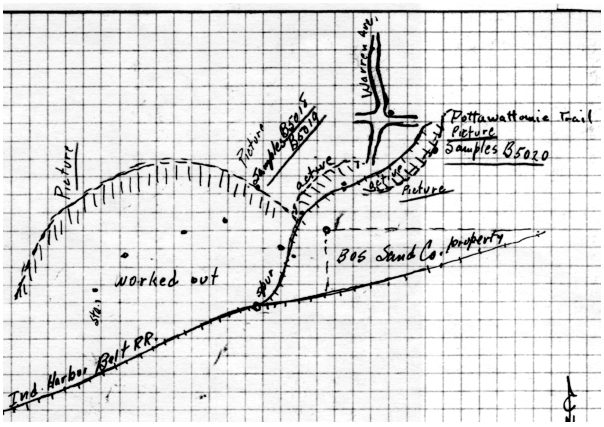
USGS *Gary* and Vicinity 1960



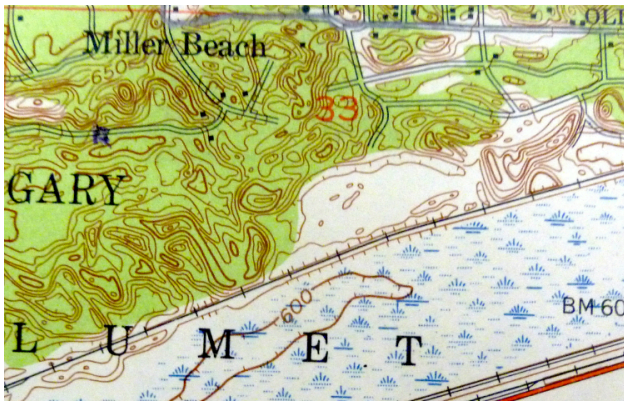
USGS *Gary*, 1991 USGS *Portage*, 1992

Nobel School Area (Section 33)

In the 1940s and '50s Aetna Superior and Bos Sand Companies both mined this area north of of the Indiana Harbor Belt Railroad (IHB). The Railroad built a spur into the property in 1949. In 1950, eight cars a day were being filled with sand, which was being sent to foundries.[110] The Marquette Trail today follows the abandoned Indiana Harbor Railroad route through this area.



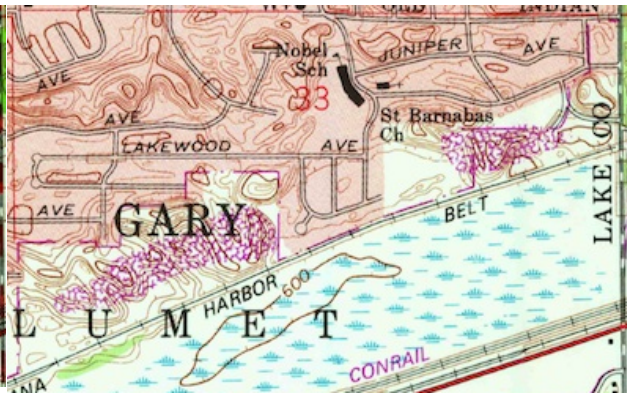
1950: Bieber's sketch of the Aetna Superior Sand pit. The IHB spur is not shown on any of the maps.



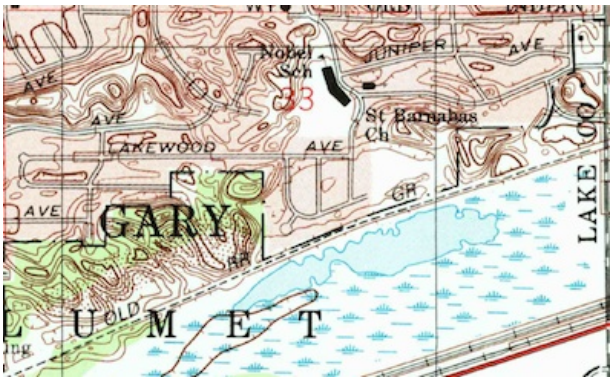
1953: Mining by Aetna Superior Sand in the area at the south end of Warren Street. Large bare area to its southwest is all "mined out."



1960: Housing on Lakewood and Nobel School have been built on land excavated since 1953.



1968 / Photo revision (in Purple) in 1980
ASSC land is residential. Areas east and west of that land are being mined by Bos Sand Company.



1992: Mining is completed. Some areas west of ASSC land is still wooded (green).



Green shaded area is within the National Lakeshore, 2014. The dashed line is the Marquette Trail.

[110] Bieber, Field notes, June 22, 1950.

Southeast Miller—Routes 12 & 20 Corridor (Sections 5 and 4)

Sections 5 and 4, east of the original town of Miller were likely the first areas in Lake County to be heavily sand mined. Unfortunately no topographic maps were made of the area before 1900, and none of the area east of (roughly today's) Montgomery Street until 1935. The 1900 Tolleston map was published before either Routes 12 or 20 were built. The 1934 map and all the subsequent ones show those two highways.

The 1900 map (below on the left side) shows several 20- and 30-foot dunes between Long Lake and the Wabash RR to the south. All were removed, in full or in part, by 1959. Most were replaced with depresssions.

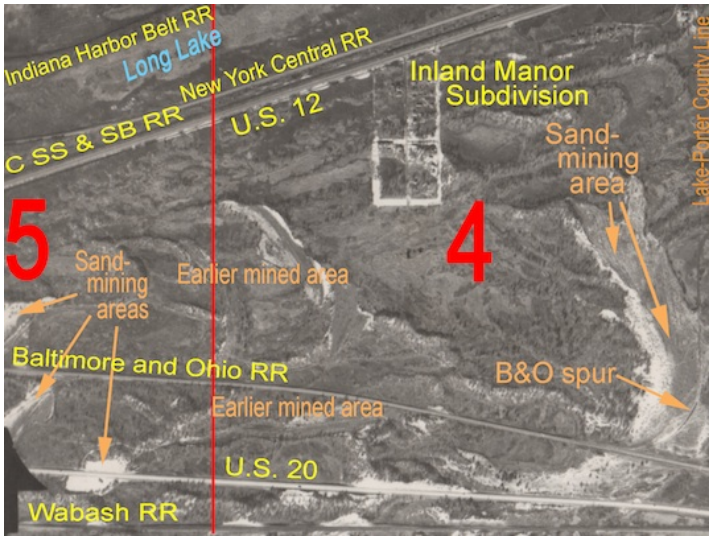
The 1934 map (right) faintly shows the B&O spur that was used for mining both here and on Inland Steel Company lands in western Porter County.



USGS *Tolleston,* 1900* USGS *Porter*, 1934

This 1938 aerial photograph (which unfortunately includes only the area seen on the 1934 Porter quadrangle map above it) vividly shows the large area then being mined on the southeast quarter of Section 4. After passing this area, the spur turned east into Porter County where it supported mining there on Inland Steel Company's property.

There has been much more mining here along Highway 20 than on 12. As can be seen on the land-ownership maps on page 2, the early companies that owned their own pits were in the southern half of Sections 5 and 4, where Rt. 20 is now.

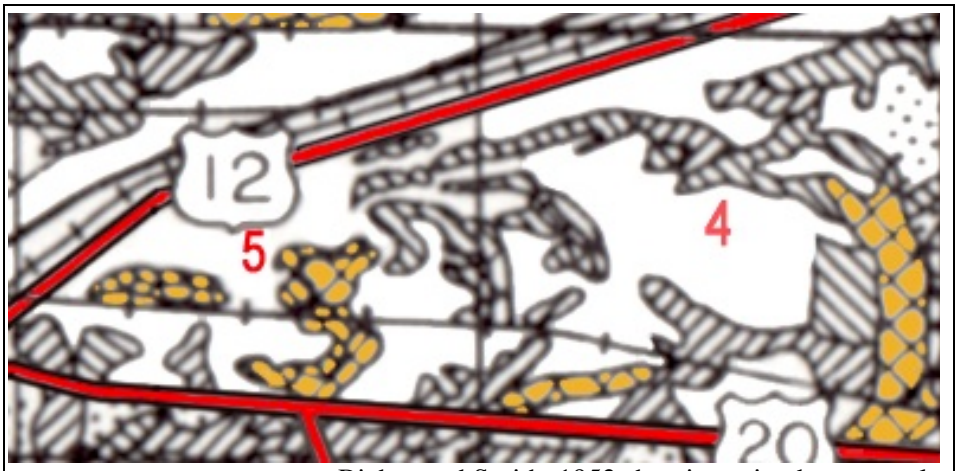


Aerial photograph taken November 9, 1938
[Indiana Dunes National Lakeshore]

***Notes:** On all topographic maps, Section 5 in Miller is split. The west portion appears on the *Tolleston* and *Gary* maps. The east portion on the *Porter* and *Portage* maps.

These two maps are the oldest Tolleston and Porter topographic maps. Surprisingly, they were published 34 years apart from each other.

The Bieber and Smith map (right and copied from page 29) shows how much of the available sand in these two sections of Southeast Miller was mined-out by 1950.



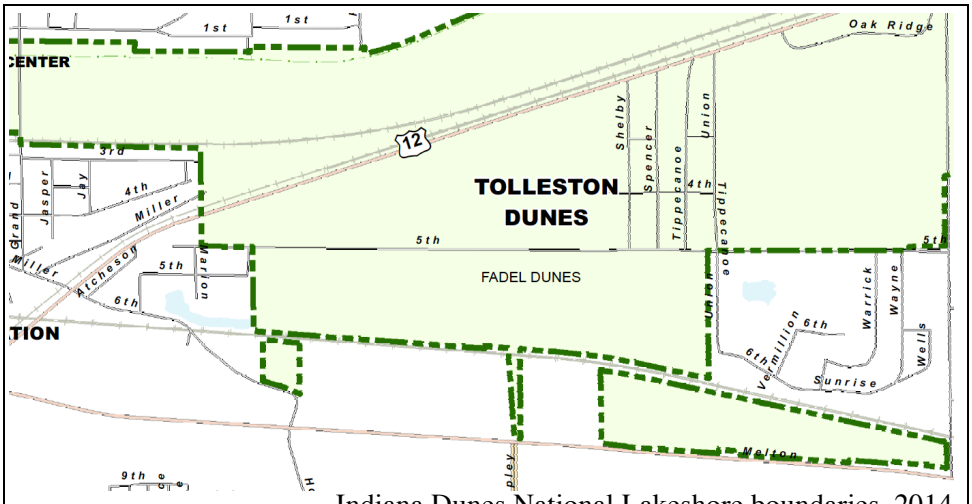
Bieber and Smith, 1952 showing mined out parcels

This 1992 map shows the lack of the tall dunes shown on the 1900 map on the previous page. A trailer park has replaced most of the dune in the SW¼ of section 5; a pond sits north of Old Hobart Road where another dune once sat. A residential area including Woodlake Village Apartments was built on the mined area west of the county line. The area around the intersection of Rts. 51 and 20 including the old Dunes Shopping Center northeast of that intersection has been leveled. The Fadell family mined the area to the east of that in the 1980s. That parcel, partly mined below the level of U.S. Rt. 20, is at the western boundary of that portion of the National Lakeshore.



Gary, 1991* Rt. 51 /\ *Portage*, 1992

The Tolleston Dunes in Lake County were added to the National Lakeshore as part of Congress' expansion bill in 1976.



Indiana Dunes National Lakeshore boundaries, 2014

American Sand and Gravel Company

The American Sand and Gravel Company, chartered in 1910, operated in both Sections 5 and 4 in eastern Miller from at least 1913, when it was involved in a law suit,[111] through at least 1926[112] when the land ownership map on the second page of this chapter was published. The horse at the right of this pho-to indicates that the photo was probably taken at the early end of this time period.

American Sand and Gravel Company had a close business relationship with the Garden City Sand Company with the president of this company also the secretary-treasurer of the Garden City Company. Garden City owned land in Section 5 immediately to the south of American's.



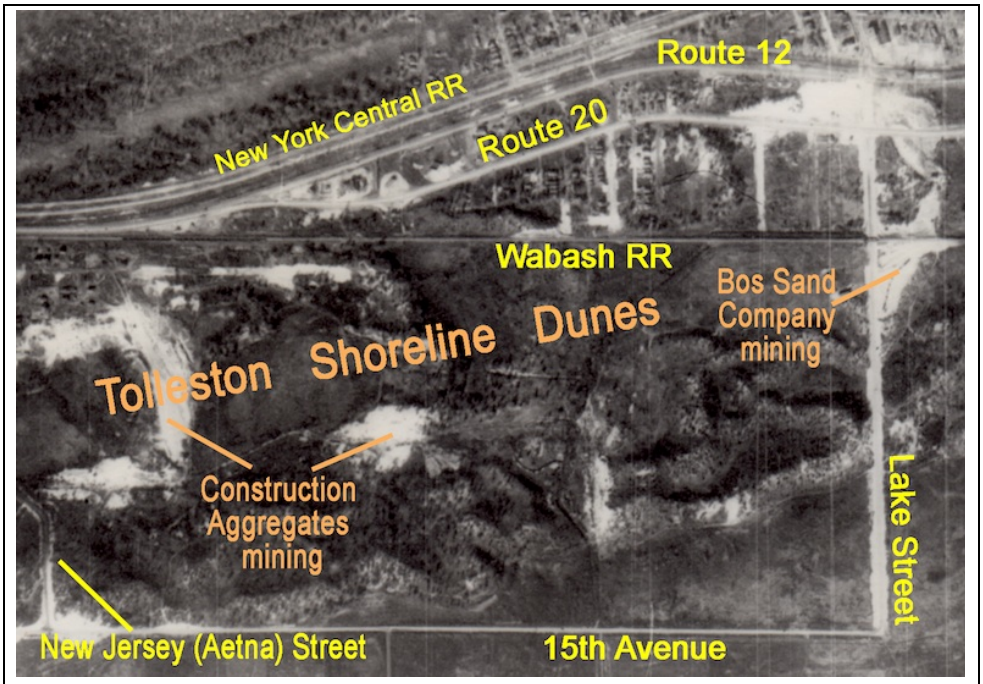
The American Sand and Gravel Company sand pit in Miller. A rather large-scale operation with three parallel tracks, a steam shovel, and a horse. Circa 1910-13. [Courtesy of Sandra Nicholson Layton]

[111] Zoercher, 1915, p. 525.
[112] Thrift Press [map], 1926.

Aetna Area **(Sections 12 and 7)**

Aetna, from 1881 to about 1920, was the home of the Aetna Powder Plant. It was incorporated as an independent town in 1907. The location amongst its several sand dunes was advantageous for the plant and its employees as the dunes were used to separate many of the buildings so that if any buildings exploded (and they occasionally did), others might be protected. However, after several devastating explosions and employee deaths, the factory closed after World War I. The little ½-square mile town was annexed by Gary in 1924.

Extensive mining began well before this aerial photograph was taken in 1938. In the 1940s and into the '60s Construction Aggregates Corporation mined the area south of Aetna in Section 12, while Bos Sand Company mined the area east of the residential area in Section 7. The sand deposits here are of Tolleston age.



Aetna / Southwest Miller, November 2, 1938.
[Indiana Dunes National Lakeshore collection]

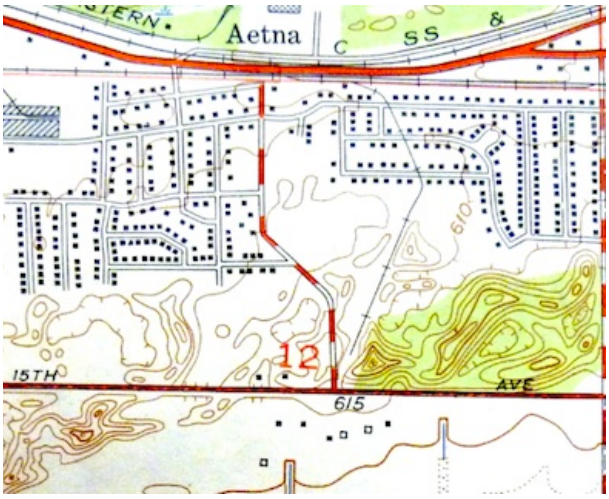
Aetna in 1952.



Aetna Street (formerly New Jersey Street) Clay Street Lake Street
[USGS *Gary*, 1953]

Aetna South (N½ Section 12)

The sand mined area was on both sides of the southern part of Aetna Street.



Note the rail spur. [USGS *Gary*, 1953]



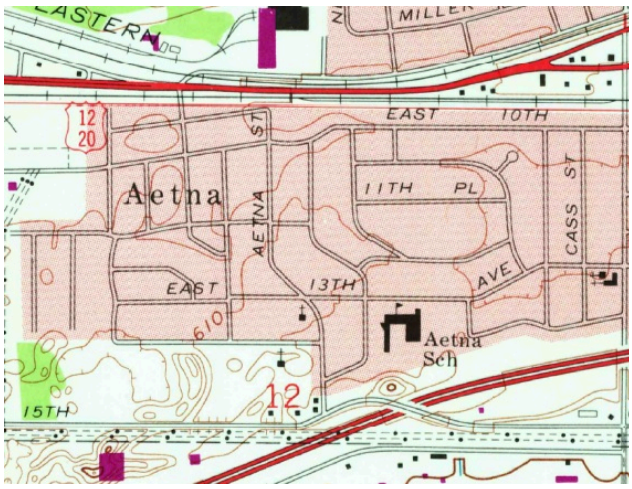
[USGS *Gary*, 1959]

Construction Aggregates Corporation mined the area that became part of the southern part of the Aetna neighborhood. The mining area was serviced in the early '50s by a long rail spur from the Wabash Railroad. According to geologists Smith and Patton (1952) the shortness of the dune ridge here necessitated the use of two parallel tracks for the rail cars. Production then was four cars a day.[113] The company also had a sand sucker boat operating in Lake Michigan waters.[114]

The Indiana Toll Road was completed in 1956. By 1959 new streets were added to the neighborhood.

Mining was occurring past 1959 as one can see that the two dunes east of Aetna School on either side of the Toll Road were present in 1959 but not in 1968.

Red Top trucking got a permit in 1963 from the City of Gary to finish that work.[115] When the northern dune was gone, 13th Place was added to the subdivision. It had houses by the time the 1968 map was created.



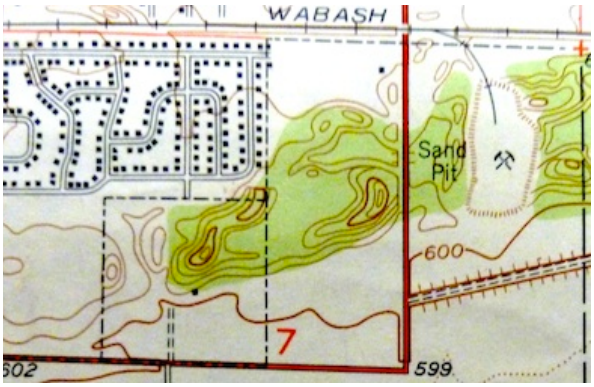
[USGS *Gary*, 1968]

The sand found in this area was finer grained than sand found further east. That texture of sand was preferred by the Crane Company and other valve manufacturers, who purchased large amounts of it. Some sand from this pit also was mixed with bituminous material and used as a top dressing on local roads.[116] The dune due south of Aetna School and next to the 15th Avenue bridge over the toll road still stands.

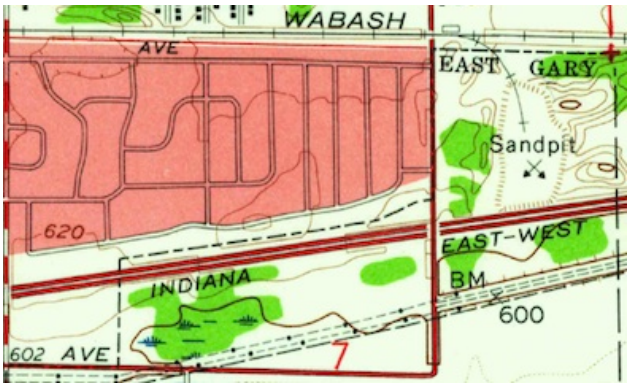
[113] Bieber's field notes, p. 52, August 1, 1950.
[114] S., J. *Outdoor Indiana*, October 1948, p. 14-15.
[115] *Gary Post-Tribune*, September 24, 1963.
[116] Smith and Patton, 1952. p. 6.

Aetna East (Section 7)

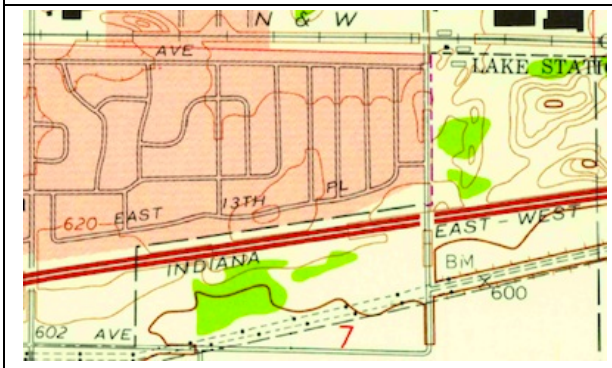
The Bos Sand Company mined the area to the east of Lake Street east of Aetna and immediately west of the area Knickerbocker mined in the 1920s. This pit was also serviced by spurs from the Wabash Railroad. Mining appears to have been completed here by 1968.



Aetna: East [USGS *Gary*, 1953]
Bos Sand Company is mining east of Lake Street. West of Lake Street is has woodland.



Aetna: East [USGS *Gary*, 1959]
Toll Road built. Dunes west of Lake Street are gone and replaced by a residential neighborhood. The sand pit east of Lake Street has a lower elevation.

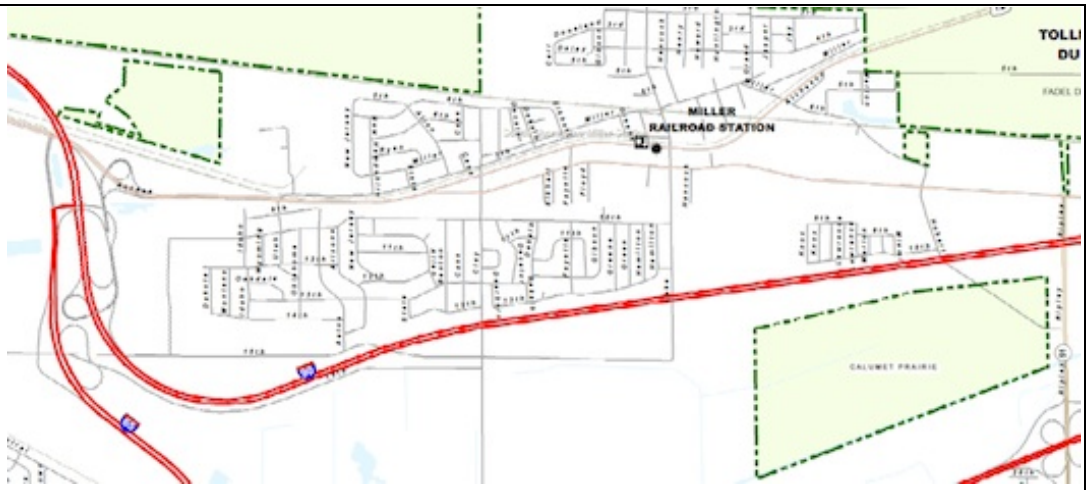


Aetna: East [USGS *Gary*, 1968]
Sand pit apparently closed.



A Bos Company crane. Circa 1920s.
[Courtesy of Sandra Nicholson Layton]

National Lakeshore properties near Aetna.



Indiana Dunes National Lakeshore boundaries, 2014

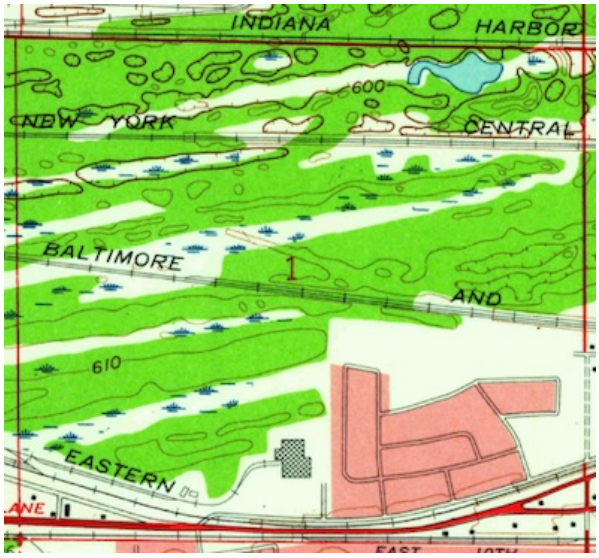
Dune and Swale Topography (Section 1 and west)

There is little land in the industrial, commercial, and residential areas of northern Lake County that has not been altered. Alterations in the 19th century were primarily along the rail lines which had to be as level as possible. Development at first then centered around railroad stations.

Before the early 20th century, when U. S. Steel was established in Gary, much of the land in north central Gary had a dune (ridge) and swale topography. This type of landscape was composed of up to 125 parallel low sand ridges separated by low and linear wetlands. Vestiges of this type of landscape still exist at Gibson Woods Nature Preserve in Hammond, the Ivanhoe Preserves near the Gary Airport, and at Miller Woods within the National Lakeshore.

This portion of southwest Miller (Section 1, today along east 7th Avenue) was nearly all dune and swale until about 1950 when the parcel in the southeast quarter, north of Routes 12 and 20 and the South Shore Railroad was leveled for a new housing development (in pink). That, plus the clear, white area, show where the trees, sand ridges, and wetlands have all been "wiped off the map."

By 1968, the residential area had been extended north to the B&O tracks and east past the Section line.



[USGS *Gary*, 1959]

United States Steel Property West of Miller Woods

This undulating dune and swale landscape was unsuitable for either heavy industry or typical urban development. Thus in the years 1906 to 1909, much of this landscape in the northern parts of Gary, including many residential neighborhoods (but excluding Miller, which was not part of Gary at that time) was leveled. The ridges were scraped and the wetlands filled in.



Leveling the land for Gary Works [U. S. Steel Collection, CRA]



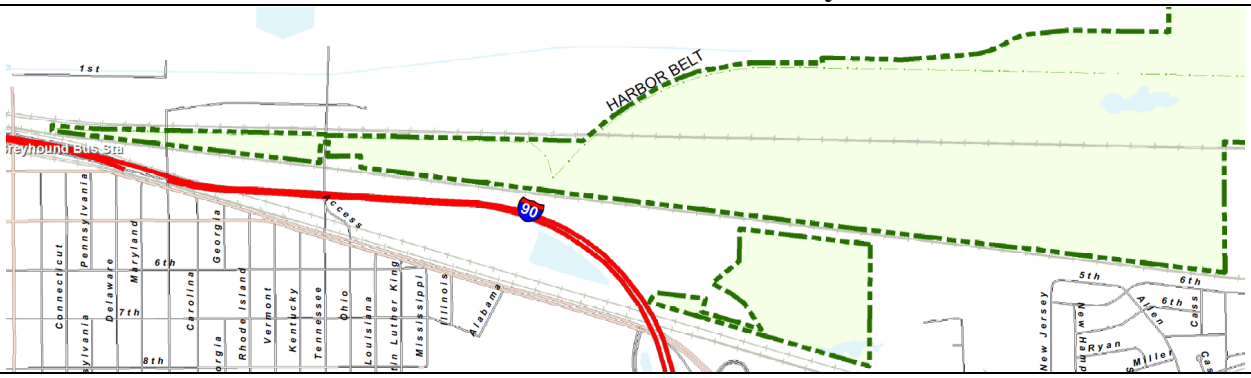
Dredging a new channel for the Grand Calumet River.
[U. S. Steel Collection, Calumet Regional Archives]

Besides flattening the landscape to allow the constuction of its mills, U.S. Steel also moved the Grand Calumet River itself by dredging a new channel for it about one-half mile south of the original channel.

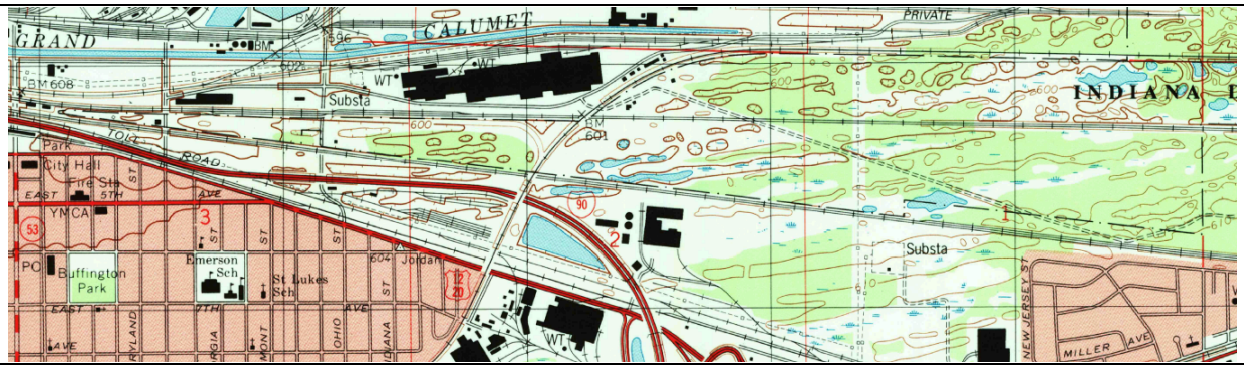
In areas where lawns were to grow, Gary imported black dirt from Munster and other nearby locations. The American Brick Company in Munster had removed the top soil from an area south of the Pennsylvania Railroad in order to excavate clay for its new brick works. The brick company wanted to get rid of the black dirt. Gary needed it for landscaping.

Many of the areas owned by railroads or U.S. Steel that were not built on have kept their original dune and swale topography.

Between the Rail Lines: Downtown Gary to Miller



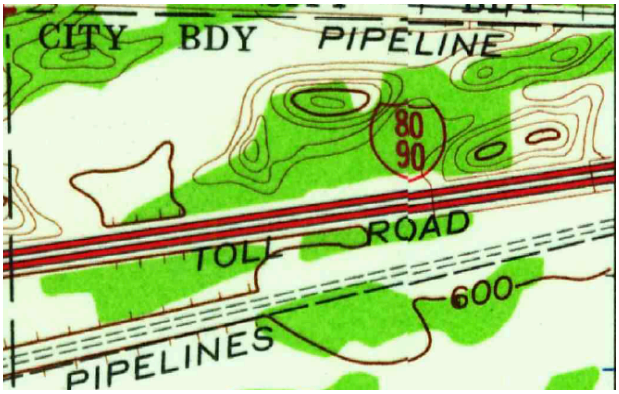
Outline of the western end of the National Lakeshore boundaries.



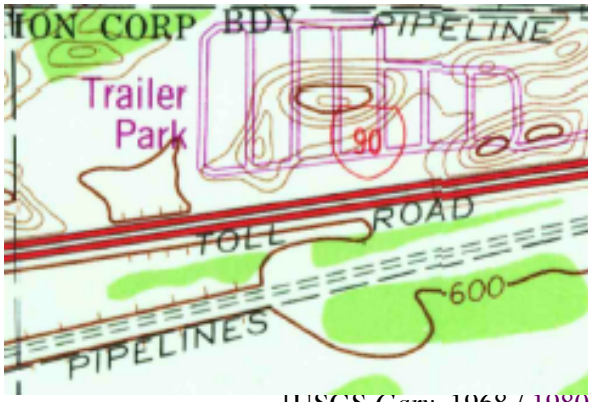
As can be seen in the above 1991 topographic map, much of the landscape “between the rails” and within the National Park boundaries is composed of parallel, linear ridges and wetlands. Much of the land between the two rail lines that nearly meet at the west end of these maps was owned by the Michigan Southern (later New York Central) Railroad and never developed.

East Gary / Lake Station (Section 8)

As can be seen on the land ownership map shown at the beginning of this chapter, the northwest quarter of Section 8 was purchased about or before the turn of the last century by the E. A. Shedd Company, later Knickerbocker Ice Company. In 1950 Indiana geologists Bieber and Smith noted that a diagonal swath of that section was "mined out"—shown as white near the upper left corner of the two topographic maps shown here, leaving the 40 and 50-foot high dunes in the center. Those dunes were then excavated before the trailer park was built at some time between 1968 and 1980.



NW ¼, Section 8 [USGS *Gary*, 1959



[USGS *Gary*, 1968 / 1980]

This mid-scale mining has apparently escaped the eagle eyes of USGS mapmakers. The contour lines on the maps above were drawn in 1953 when the dunes were still there but the Mansard Du Lac trailer park had not yet been built. The contour lines appeared unchanged on an updated 1968 map. The dunes were certainly excavated before the trailer park was established in the 1970s, its roadways added to the map in purple when the map was revised for the 1980 publication. The contour lines, representing the no-longer extant dunes were still shown on the 1991 USGS map and, surprisingly, are still shown on the newest USGS map published in 2013.

Gravel

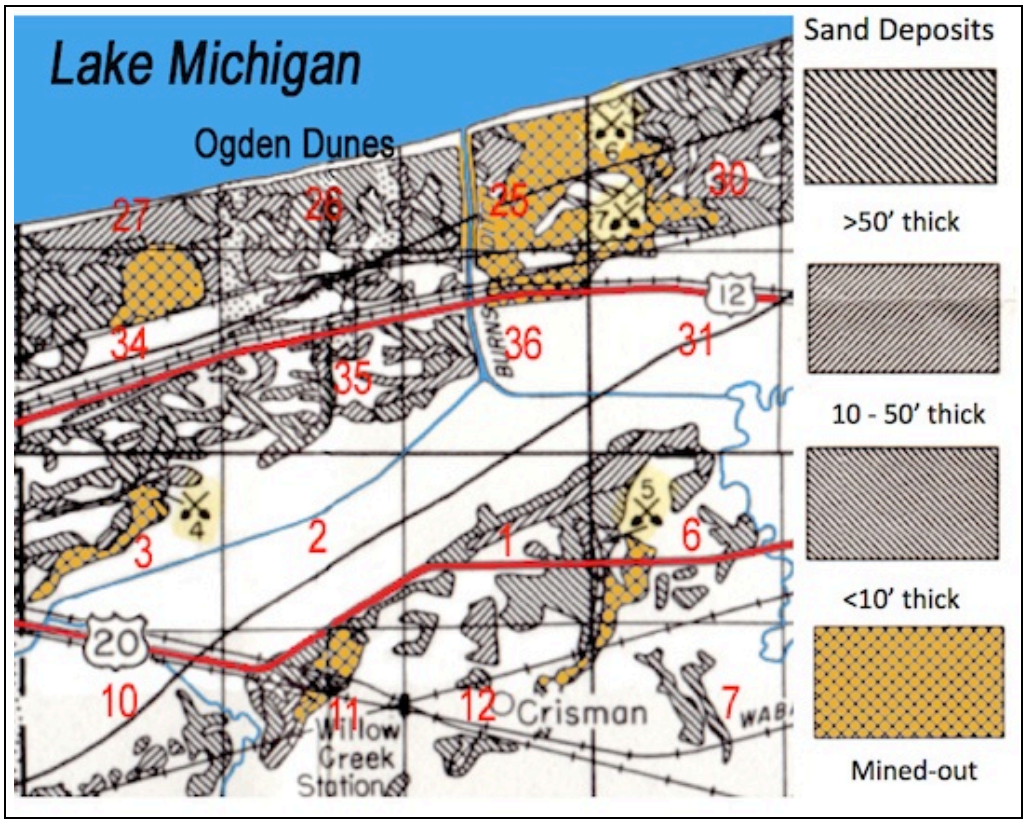
In 1907, W. S. Blatchley, the Indiana state geologist, reported that there were some small gravel deposits in the southern part of the county but none in the dune country. Of the 700 miles of roads in the county at that time, only 71 miles had been improved with gravel and 81 miles with crushed stone—all of which had been imported from Illinois.[117]

[117] Blatchley, 1907, p. 183-184.

Chapter 6

Sand Mining in Porter County, Portage Township

> Much sand is shipped from this [Portage] township to Chicago, and it may be that in time this will be a fruitful source of wealth, for the supply is almost limitless. That found south of the [Little] Calumet [River] is thought to be of the best quality. Garard , 1882[118]



Adapted from Bieber and Smith, 1952[119]

Sand mining in Portage Township has occurred in two diagonal bands both paralleling the shoreline of Lake Michigan: The northern band close to the lake is composed of Tolleston / Recent sand deposits plus some Calumet sand dunes east of Burns Waterway, and a southern band south of the Little Calumet River composed of Calumet and Glenwood deposits. No sand mining, except for the ditching in the 1920s, occurred along the river as its bed and floodplain are composed primarily of clay soils. In 1950 when this map was prepared, there were five active sand mining operations still occurring in the Township. They were:

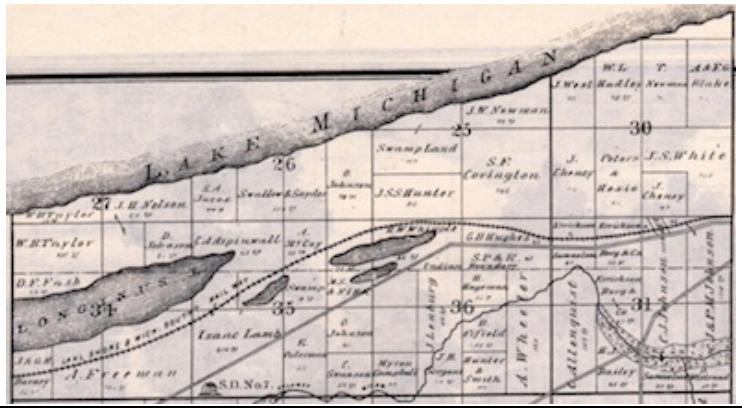
-- Inland south: Inland Steel Company (Section 27, but not indicated on the map)
4. Stagecoach Road: J. N. Bos Sand Company
5. Crisman: Crisman Sand Company
6. Dune Park North: Consumers [Sand] Company
7. Dune Park South: Manley Sand Company

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[118] Garard, 1882, p. 214.

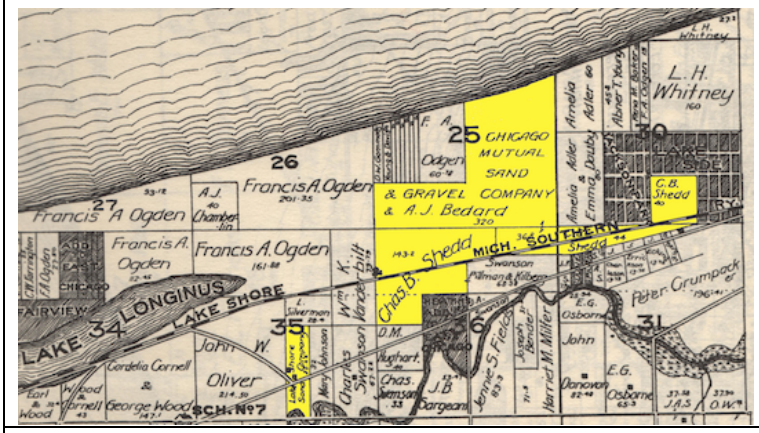
[119] Upper left: Township 37 North, Range 7 West; Upper right: Township 37 North, Range 6 West; Lower left Town-ship 36 North, Range 7 West; Lower right: Township 36 North, Range 6 West.

Portage Township Northern Tier Land Ownership:

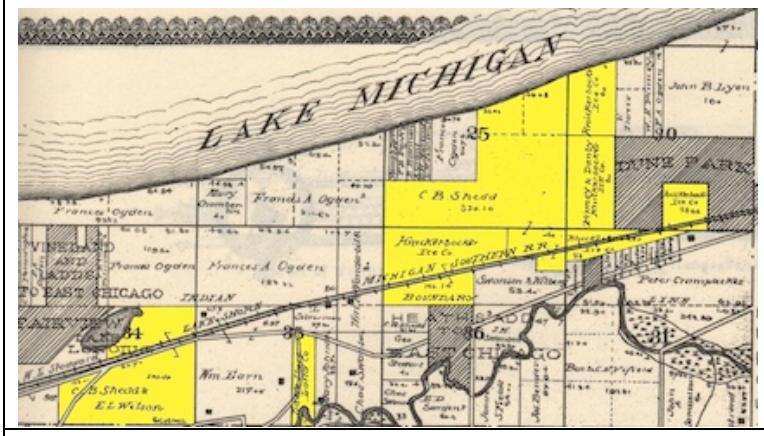


1876: No evidence of sand mining.

But in the next twenty years there would be much land speculation with Francis Ogden purchasing much of the land on the west side of the township and C. B. Shedd much of the land on the east side.

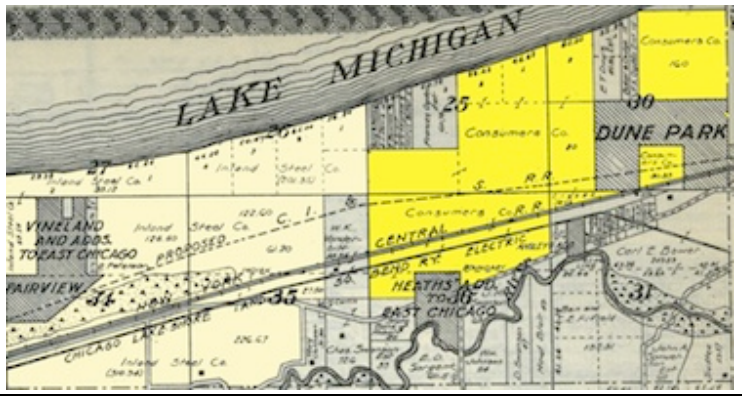


1895: Ogden owned much of Sections 26, 27, and 35 while the Chicago Mutual Sand and Gravel Company owned most of Section 25 where Burns Ditch (Waterway) and Midwest Steel would eventually be located. Shedd owned acreage south and east of it—and probably all of Dune Park. The Lake Shore Sand Company owned 36 acres south of today's Route 12 and west of today's Stagecoach Road.



1906: Knickerbocker had purchased 80 acres west of Dune Park. Chicago Mutual's land is now owned by C. B. Shedd as are about 200 acres to the west in Section 34 and another 10 acres in Section 36.

It is likely that Francis Ogden arranged for Shedd to do sand mining on his adjacent property.

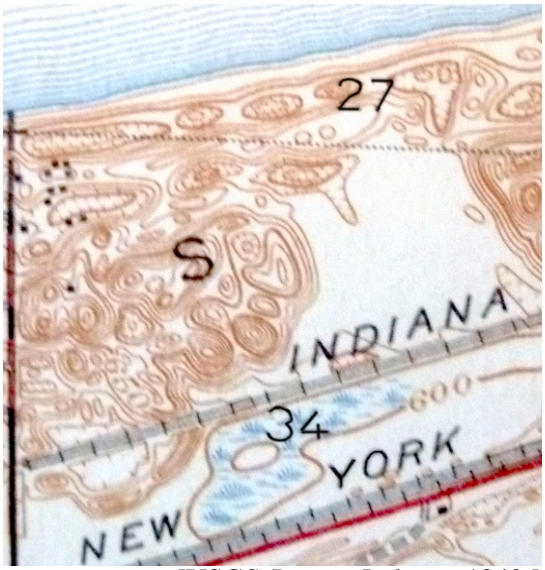


1921: Inland Steel owned all of Ogden's and Shedd's property on the western half of the township while the Consumers Company (a Knickerbocker subsidiary) owned all of the former Knickerbocker and Shedd lands to the east.

West Beach (Sections 27 and 34)

The West Beach area of Indiana Dunes National Lakeshore is the site of the largest sand mining operations that have occurred on what is now National Lakeshore property. Not mined was the Edgewater community, in the northwestern portion of Section 34, which was, in the late 1800s, subdivided into two proposed residential communities, Vineland and Fairview (See map on the previous page).

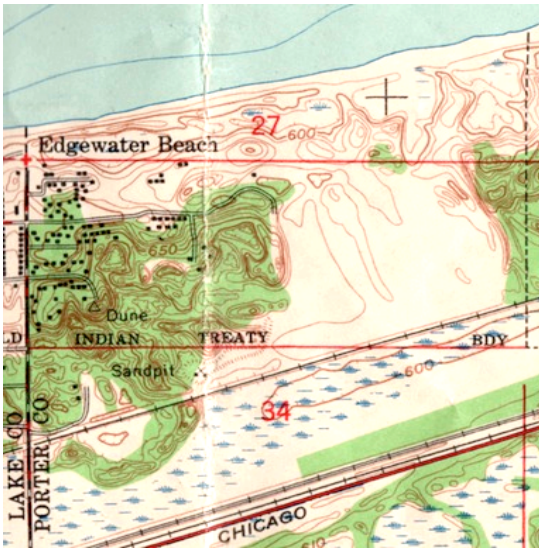
In 1906, 1,200 acres of this corner of Porter County were owned by Francis A. Ogden, a Wisconsin-based land speculator. 240 acres were owned by Knickerbocker's C. B. Shedd and E.L. Wilson, for whom the Wilson Station (and the state park shelter) are named. Knickerbocker probably mined sand on both properties using the Lake Shore and Michigan Southern Railroad for transportation of the sand to Chicago. Both properties were sold to Inland Steel Company in 1920.



[USGS *Porter, Indiana*, 1940.]

Mining became much easier about 1922 when the Indiana Harbor Belt Railroad (IHB) built its line right across Inland's property, but Inland Steel documents claim that most of the mining there was done before it made its purchase.[120] That rail line has since been abandoned. The route is today used for trails.

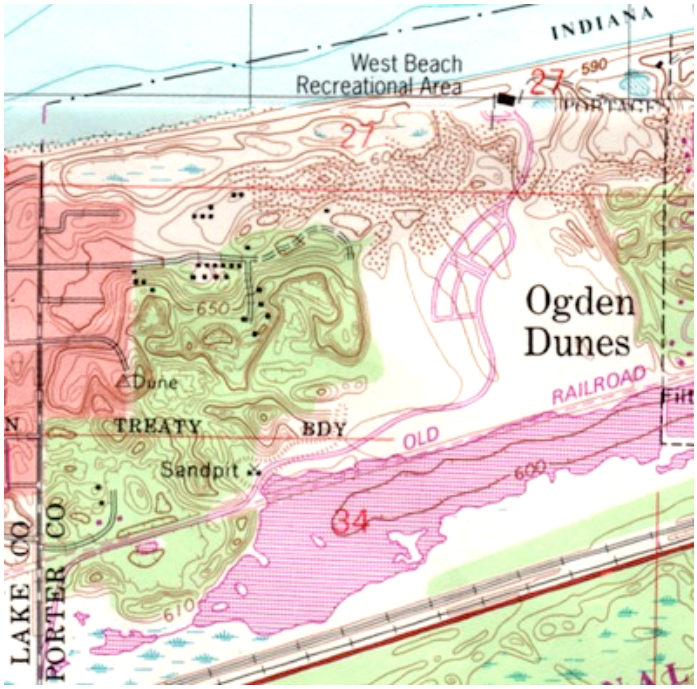
The land that was mined can be recognized by the lack of contour lines on the 1940 map. In 2005, researchers Wilcox, Chun, and Choi used tree rings on the oldest trees in the cleared southern portion of the area to surmise that mining ceased there about 1930.[121] Inland Steel, however, continued to mine sand in the northern and central parts of the property into the 1960s.[122] Both the 1960 and '68 maps show a mining symbol south of the Indian Treaty line on the Inland property. Some of the sand was taken by railroad cars to the beach where it was loaded on barges and apparently taken to Chicago. One Edgewater resident who watched this operation said that she had been told that the sand was going to be used as lake fill around Grant Park and what is called today Chicago's museum campus.[123]



[USGS *Gary and Vicinity*, 1960.]

[120] Gentz, R. S. Letter to Inland Steel Company employees. March 22, 1966.
[121] Wilcox, Chun, and Choi, 2005, p. 18.
[122] As observed by nearby Edgewater residents. [Laue, Steel Shavings, 1998]
[123] Kadlec in Steel Shavings, 1998.

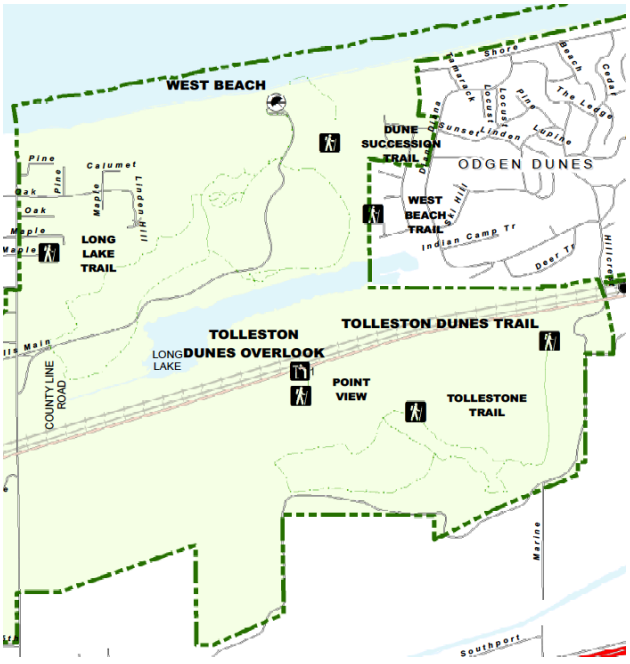
The area called Fairview (see maps on the second page of this chapter) was subdivided into 600 tiny lots in 1891[124], but left undeveloped until the 1920s. Vineland, just north of Fairview, was subdivided before 1895. By the 1950s, both areas had become a beach-oriented residential area called Edgewater (pink on the map to the right). Other than excavations for streets and houses, it was not sand mined and remained largely in a natural condition. The West Beach maintenance building (east of County Line Road) is in what used to be called Fairview.



[USGS *Portage*, 1968.]
Ogden Dunes was to the right of the dashed line. The purple text and features were added in 1983.

The National Park Service purchased the acreage in Sections 27 and 34 in 1967-68. Today that land, north of U.S. Route 12 and the rail lines, is the site of West Beach. An access road, parking lot, and bathhouse have all been built on previously sand mined lands. Long Lake (in purple) is being restored, and three trails, Long Lake Trail, the Dune Succession Trail, and the West Beach Trail, offer visitors varied hiking experiences.

West Beach and surrounding areas



[National Lakeshore boundaries, 2014]

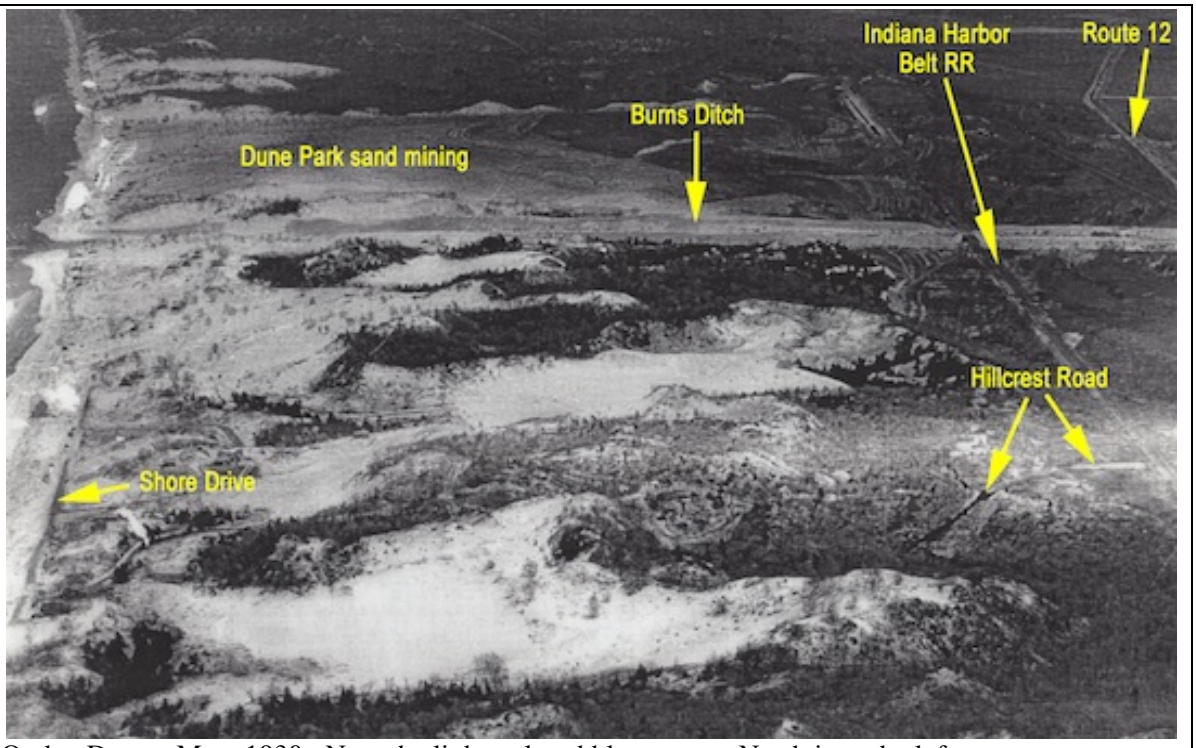
For this portion of the Tolleston Dunes see "Tolleston Dunes" later in this chapter.

[124] Lewis Publishing Company, p. 168-69.

Ogden Dunes (Section 26 and N½ Section 35)

While back around the turn of the last century Francis Ogden had the land west of what is now Ogden Dunes sand mined, he apparently did not remove any sand in what later became Ogden Dunes.

The intent then of the developers of Ogden Dunes back in the 1920s was to use the dunes to create an alternative to noisy (and flat) cities. Thus rather than remove the dunes and then build a neighborhood, the dunes became the foundation for the neighborhood. But that doesn't mean that there was no mining. In order to make roadways and foundations for houses, sand had to be moved. Much sand was also moved when the Indiana Harbor Belt Railroad was built right through the middle of the area. More mining would have taken place if the original plans for a golf course, hotel, and clubhouse had come to fruition, but those plans were never developed.



Ogden Dunes, May, 1930. Note the light-colored blowouts. North is to the left.
[National Park Service]



Ogden Dunes Ski Jump, ca. 1928.

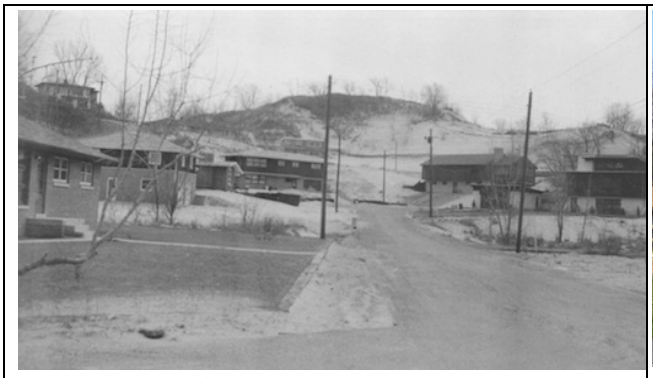
Ski Hill back in 1927 was the country's highest ski jump. The slide itself was 590 feet long and thirty stories high. Several competitions with international participants were held there, but the Ogden Dunes Ski Club that had it built during the Roaring '20's, couldn't afford to keep it through the Depression. The last competition was in 1932. The apparatus was dismantled in 1937. The land was then rezoned for residential use.[125]

Ski Hill is not visible in the above photo.

[125] In 1997 the Indiana Historical Bureau placed a Ski Hill historical marker on Kratz Field.

Ogden Dunes' two tallest dunes are gone. Mount Everest at 745 feet, was once the highest dune in Portage Township. It was leveled and the sand used to fill in part of Long Lake down by the water filtration plant.[126] Summit Road is today the only physical reminder of that dune. In the same way, Ski Hill Road, just south of Summit, is the only physical reminder Ogden Dunes' early claim to fame.

Other smaller dunes have also been removed to make way for roads and houses. For instance, the dune at the south end of Locust Place, was removed to make room for a cul-de-sac.



Locust Place, 1956 [Historical Society of Ogden Dunes]



Locust Place, 2015 [K. J. Schoon]

As can be seen on the aerial photograph on the previous page, the Ogden Dunes area used to have a lot of bare sand. The photo below shows that as late as 1956 some bare sand could still be seen, even in the residential areas of town. But bare sand is open to the wind and thus rather unpopular with many homeowners. Today, little, if any bare sand is visible in town—except, of course, at the beach.



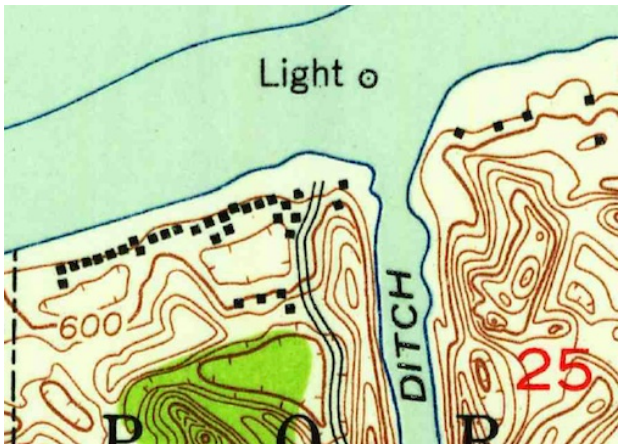
Looking west from Aspen Road in Spring, 1956. http://members.tripod.com/Ogden_Dunes/pix1.html

[126] The Historical Society of Ogden Dunes.

Portage Lakefront and Riverwalk **(East ½ Sections 26 and 35 / West ½ Sections 25, and 36)**

Much of Section 36 north of the New York Central (formerly Michigan Southern) tracks was already flat when Burns Ditch was excavated in 1926 having been sand mined earlier by the Consumers Company. National Steel Company purchased much of this site east of the new town of Ogden Dunes as early as 1929.[127]

As can be seen on the maps on the second page of this chapter, much of the lakefront west of Burns Ditch was subdivided before the turn of the last century and had cottages facing the lake. By the early 1950s, there were 18-20 cottages in the area by then informally called both the "East End" and "Rubert's Subdivision." (The Rupert family had leased some of the land and subleased to others.)



[USGS *Ogden Dunes*, 1953]

Boat Clubs on Burns Ditch

The Gary Boat Club, with many US Steel Company executives as members, was founded in 1936. It constructed piers along Burns Ditch and an impressive clubhouse on the beach. Some members had cottages built on the lakefront between Burns Ditch and Ogden Dunes.[128] Also along the Ditch were facilities of the Marquette Boat Club and the Miller chapter of the Izaak Walton League. In late summer of 1959 the *Chicago Daily Tribune* noted that about 700 boats were docked along Burns Ditch.[129]


Mouth of Burns Ditch, circa 1955. [Indiana Dunes National Lakeshore collection]

Note the large dune still on the lakefront on the east side (left) of the Ditch and the many boats heading into or out of Lake Michigan. The sand dune on the left was leveled in 1959.[130] The large building on the beach, west (right) of the Ditch is the Gary Boat Club clubhouse. An access road, visible behind the clubhouse, was built to serve the lakefront residents and the Boat Club members. On the day this photo was taken, the parking lot was full.

[127] *Indiana Dunes Administrative History*, Pt I, Ch. 2 http://www.nps.gov/parkhistory/online_books/indu/adhi2.htm
[128] Shack: http://sdhistoricalsociety.net/oralhistory/interviews/APersonalHistoryofRJPeterson.htm.
[129] Shepherd, 1959, p. 7.
[130] Ibid.

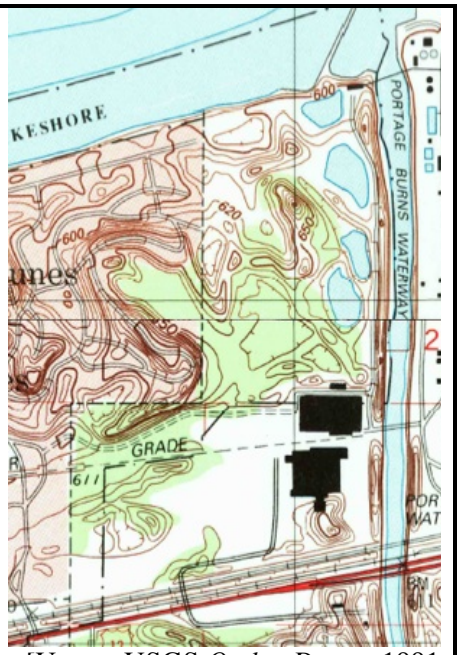
The two sand ridges paralleling the ditch were likely built with sand excavated when the ditch was dug in 1926. The 1953 map (above) and the 1940 map (right) show the several lakefront and dune-edge cottages there. Many more were there by 1953.

Sections 26 (left) and 25 →

Sections 35 (left) and 36→



Note cottages along the lakefront. [USGS *Porter*, 1940]

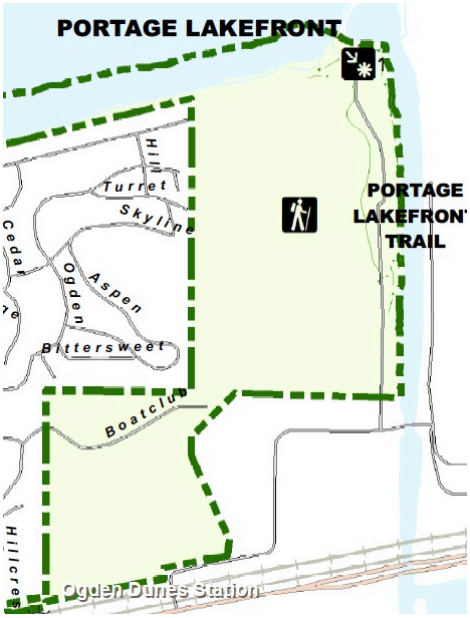


[Upper: USGS *Ogden Dunes*, 1991 Lower: *Portage*, 1992]

In 1959, National Steel Company, which owned the land had the cottages removed. After its mill was built east of Burns Ditch, the mill used a portion of this area as an open pit to store acids and other liquid residues. The steel company also had a waste-water treatment facility at the site. In order to use the land this way, the steel company had to remove sand and reshape some of the land to create the retention basins.

In 1986, Congress authorized this 57-acre tract to become part of the National Lakeshore. National Steel began cleaning the site, a job finished by the property's subsequent owner, United States Steel Company. The National Park Service purchased the site in 2004. The project was designed in partnership between the National Park Service and the City of Portage. The restored area, with its 125-vehicle parking lot, was opened to the public in 2008.[131]

Unfortunately the 2013 topographic map (not shown) does not show the changes made to the land when it was restored and became part of the National Lakeshore and became the Portage Lakefront and Riverwalk.



National Lakeshore boundaries, 2014



Left: The pavilion at the Portage Lakefront and Riverwalk [K. J. Schoon]

[131] Indiana Dunes National Lakeshore. www.nps.gov/indu/planyourvisit/portage-lakefront-and-riverwalk.htm.

Dune Park: Burns Ditch and Dune Park (Sections 25, 30, 31 and 36)

The most extensive sand mining operations in the Dunes area of northwest Indiana occurred in the industrial belt around where the Port of Indiana is today. This sand mining, however, began long before plans for today's port were created.

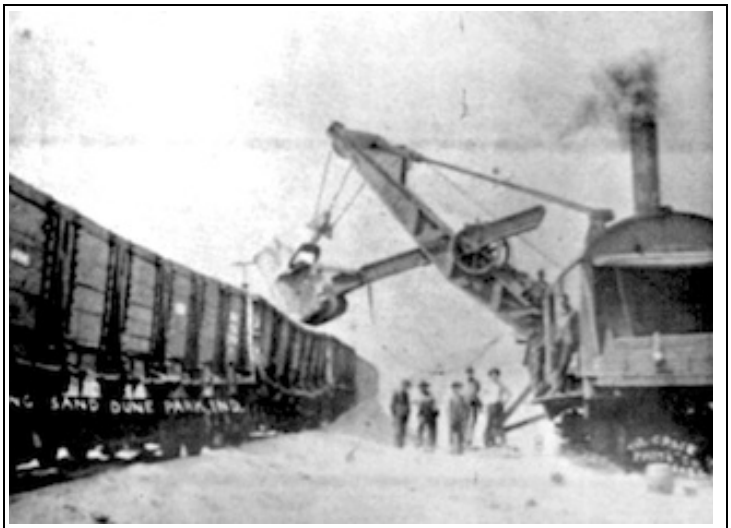
Because of its sand shipments, the Dune Park station on the Michigan Southern (New York Central) Railroad (shown on this map as Wilson and not to be confused with today's Dune Park station on the South Shore) was in 1889 the best paying freight station on the Michigan Southern in Indiana. The previous year more than three hundred cars of sand were shipped from the Dune Park station every twenty-four hours.[132]



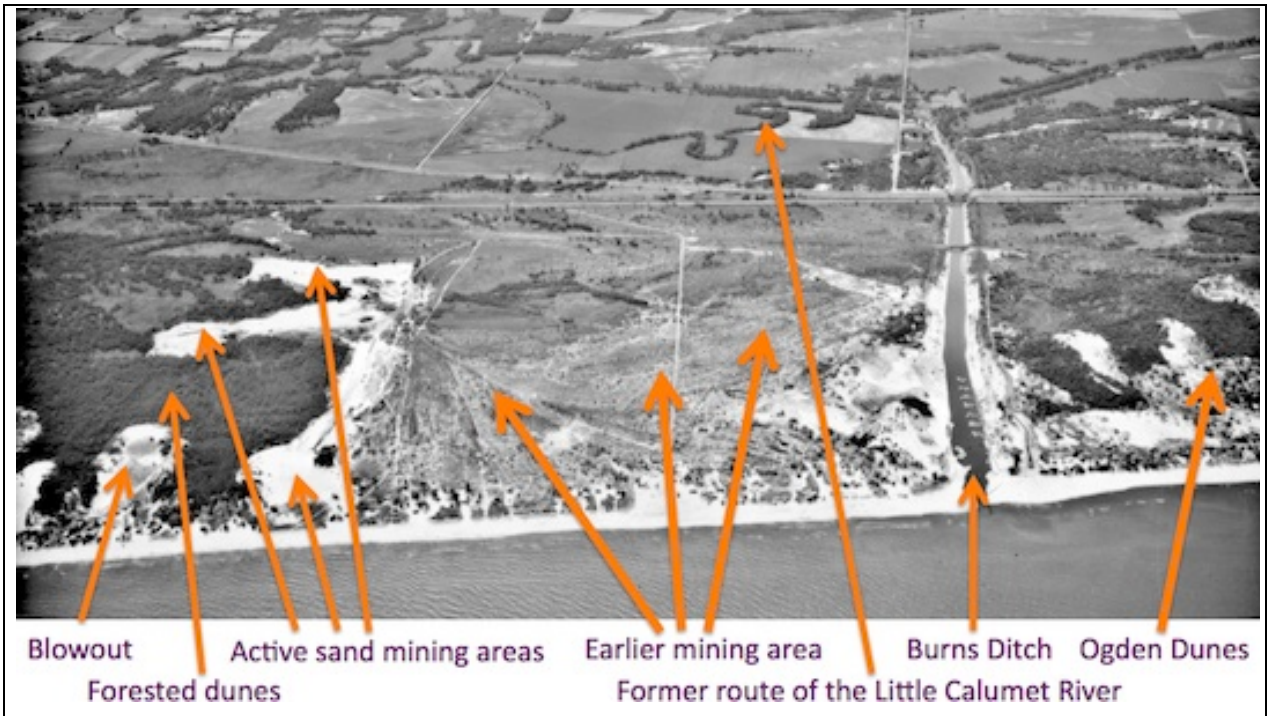
Burns Ditch and Dune Park in 1940. Note all the houses along the beach. [USGS *Porter*, 1940]

The "town" of Dune Park, on the Portage/ Westchester township border, was neither a typical town nor a park. It was also not located where either the state or national parks are today. The *Chesterton Tribune* reported in 1898 that the "town" was composed of one boarding house, five steam shovels, and one "unpretentious" depot.[133] (That depot on the Michigan Southern line, however, handled more freight —sand— than any other Indiana depot west of Elkhart.) Between the depot and boarding house was a network of sidetracks, usually filled with railroad cars, which made the place look like a rail yard.

Three of the shovels ran in daylight and four at night. Laborers earned $1.50 for a ten-hour shift. Five locomotives were used to transfer cars to the pits. The crew of each shovel consisted of seven men: an engineer, fireman, craner, and four common laborers who laid the tracks for the shovel and leveled the sand in the cars as they were being filled. Altogether there were about sixty men who worked for the sand company and another forty who worked for the railroad. The author of the *Tribune* article noted that a saloon would have had a thriving business if the company allowed such establishments.


Sand mining at Dune Park [Calumet Regional Archives]

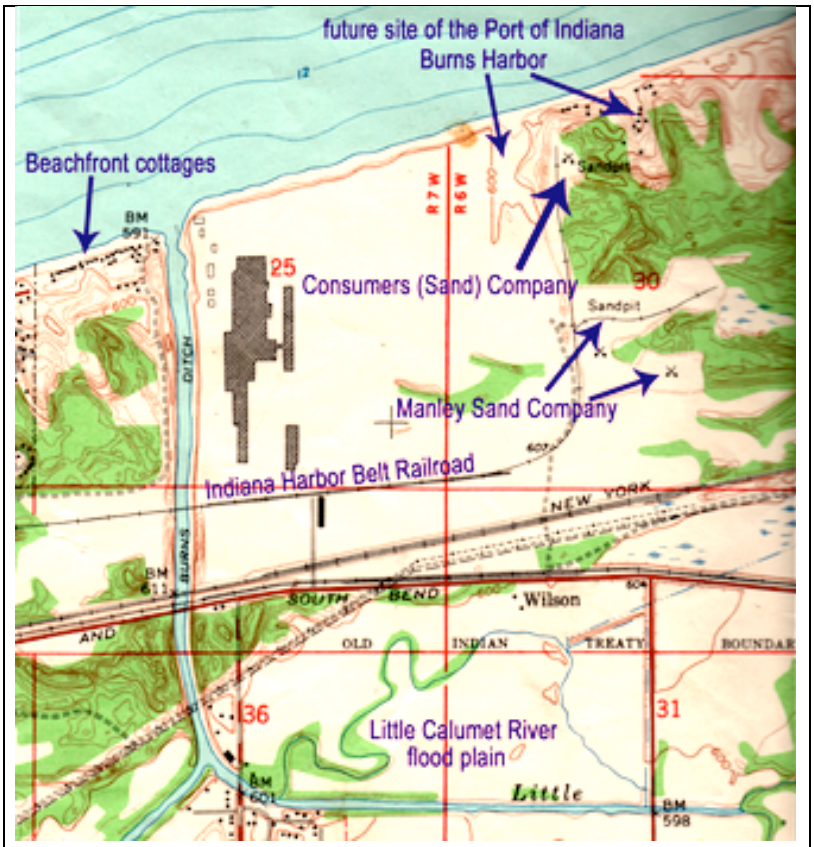
[132] Moore: pages 100-101
[133] *Chesterton Tribune*, May 7, 1898. Reprinted Friday, September 3, 1976.



Dune Park area, 1958 [Indiana Dunes National Lakeshore collection]

The 1960 map to the right shows three active sand mining operations in Section 30. Spurs from the Indiana Harbor Belt Railroad were then serving the operations. As can be seen by the lack of contour lines, extensive mining had already occurred in Section 25 on both sides of Burns Ditch, and the western and southern portions of Section 30.

Consumers Company's production in 1950 was slow—claimed to be only 5 to 6 rail cars a day. It picked up in the fall as buyers stocked up for winter. According to staff interviewed in the 1950s, much of the sand taken from the square mile between its 1950 pit and Burns Ditch was used as fill material elevating roads and railroads in the Chicago area.[134]

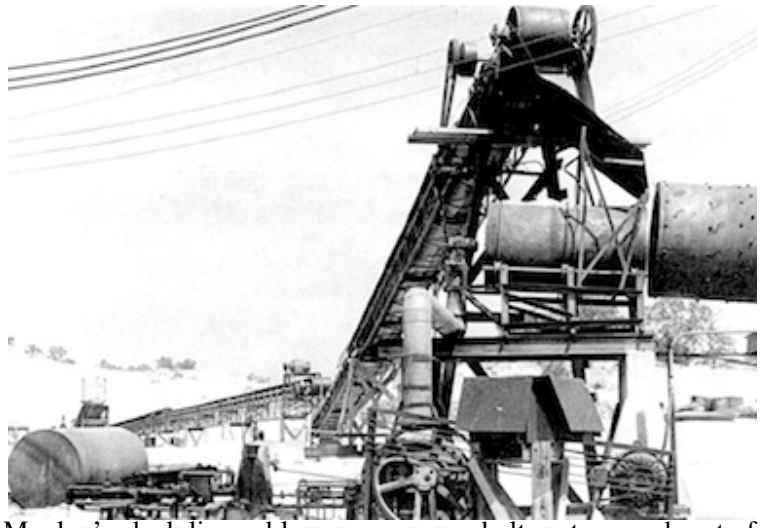


USGS *Gary and Vicinity*, 1960
Purple text added by the author.

[134] Smith and Patton, 1952, p. 6.

According to Russel Manley, who was interviewed by geologist C. L. Bieber in 1950, mining at the Manley pit area began in 1893. It stopped during the Depression and restarted in 1943.[135]

The Manley Sand Company also operated an oil-fired sand-drying operation at Dune Park, which not only removed moisture from the sand but burned any small pieces of wood that might have been mixed with the sand. The sand was then blown to remove the ash and loaded into sealed boxcars to be shipped to foundries.



Manley's slack line cableway, conveyor belt system, and part of the drying equipment at the company's sand pit at Dune Park. [Bieber and Smith, 1952.]

The demand for oil-dried sand was greater during freezing weather when frozen chunks of sand could be very difficult to work with.[136]

Congress approved the Port of Indiana in 1966. Construction began almost immediately. The first ore boat arrived in September.[137]

[135] Bieber field notes, 1950, p. 32.
[136] Bieber and Smith, 1952, p. 28.
[137] Gray, 1998, pp. 45-59.

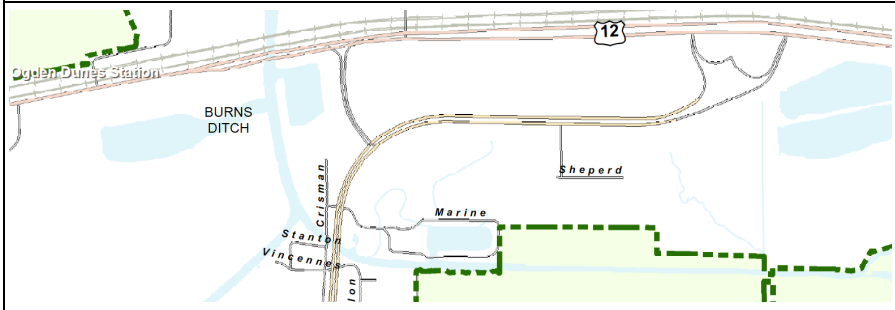
Burns Junction (Sections 35, 36, and 31—south of Rt. 12)

There has been much sand mining in the Burns Junction area since the mid-1980s. Some sand was taken for the new beds of Indiana Rt. 249 and U.S. Rt. 12. Much was removed to make basins for the marinas along Burns Waterway and the Little Calumet River. Excavation just for the Portage City Marina east of the Burns Waterway removed 700,000 cubic yards of sand.[138]



Burns Junction showing borrow pits at U.S. Rt.12 / Indiana 249 junction and dunes on both sides of Burns Ditch. [USGS *Portage*, 1992]


Burns Junction showing the marina basins on the Waterway and two shallow basins north of the Little Calumet River. [City of Portage]



National Lakeshore boundaries, 2014.

In order for the marinas to be created, the sand dunes located on both sides of the ditch just south of Rt. 12 were removed. The Por-tage Marina east of the waterway opened in 1996. After many years of efforts by the owner of Lefty's Coho Landing, the Marina Shores development west of the waterway opened in 2008. There are now eight marina facilities along the Burns Waterway and Little Calumet River that cater to boaters.





Left top: The Portage Public Marina as viewed from Indiana highway 249. [K. J. Schoon, 2011]

Left bottom: Marina Shores at Dune Harbor, constructed on the site of a former boat launch operation.
http://marinashoresindiana.com/

[138] Bieker, 1992.

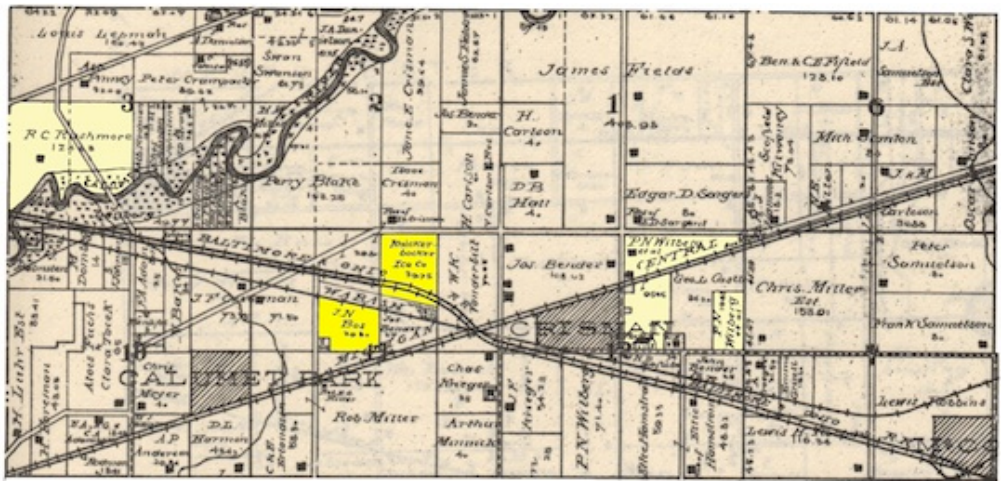
Portage Township Southern Tier

The southern tier of sand dunes in Portage Township was mined in much smaller segments than those up near the lakefront. The sand there was formed during Lake Michigan's older Glenwood and Calumet stages. The sand dunes here were not as high as those further north, and being older had been covered by black dirt. This area by the turn of the last century was primarily rural. A small community called Crisman had grown up around the Willow Creek railroad station where both the B & O and Wabash tracks crossed the old Michigan Central line.

Land Ownership:

On an 1895 map, the only sand company to own property in the southern tier of sand ridges was E. A. Shedd, who also owned much land in the northern tier.

By 1906 (below), mining had been found to be advantageous. The John Bos Sand Company had purchased land near Shedd's, which by then had become the Knickerbocker Company. The Rushmores were having Krug Sand Company mine their land and the Nicholsons were mining their own land (apparently owned jointly with P.W. Wilborg, a brother-in-law).



Crisman area in 1906 [Westchester Township History Museum]

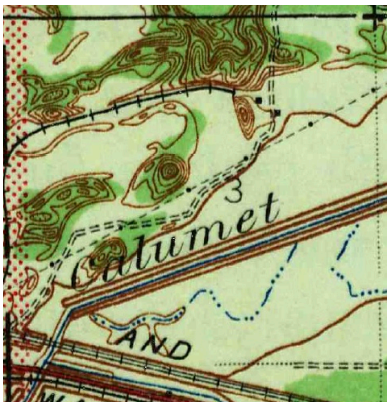
By 1921, the Real Estate Improvement Company was mining the north half of Section 3. The Rushmores had stopped mining, but the Nicholsons were expanding their Crisman Company. Bos, American Sand, and Lake Shore Sand companies had all Crisman-area purchased land.



Crisman area in 1921 [Westchester Township History Museum]

Tolleston Dunes south of Rt. 12 and just east of County Line Road (Section 3)

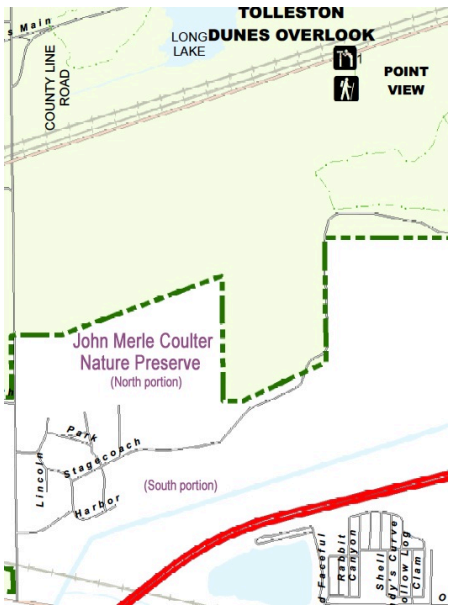
Sand mining in the northern half of Section 3 began early in the 20th century. The 1940 map shows the high dunes at the north-center edge of the section. In 1950, mining was being done by the Bos Sand Company and was being serviced by a mile-long rail spur from the B&O Railroad (on both maps). That year the company filled and sent off to foundries an average of ten railroad cars of sand per day.[139]



USGS *Porter* 1940



USGS *Garyton*, 1953



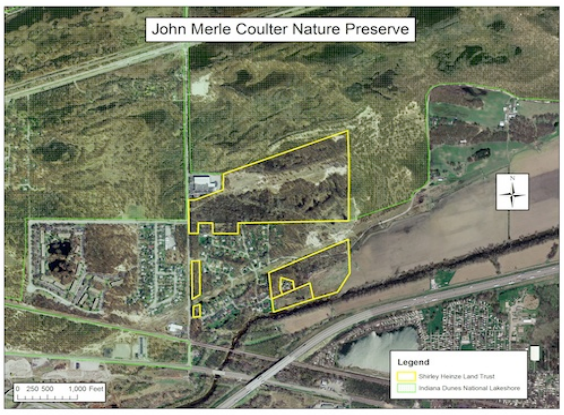
IDNL Boundaries, also showing the S½ of Section 34; 2014

Sand mining in the SW¼ of Section 3 began in 1905 on land owned by Mary C. Rushmore who contracted with Krug Sand Company and American Sand and Gravel Company to take sand from her land down to a level of four feet above the bed of the Calumet marsh.[140] The mining, however, was stopped in 1916 before the job was finished. By that time American Sand and Gravel had conveyed to Krug the entire sand rights on that tract. Quite interested in sand in this area, American purchased a tract immediately east of the Rushmore tract.

Much of this mined area is now part of the National Lakeshore. The Shirley Heinze Land Trust owns and maintains several sections now called the John Merle Coulter Preserve.



The Bos Sand Company Pit. Foreground is a spoil ridge. To the right is the dune (of the high Tolleston Shoreline) being mined. They are separated by a line of gondola cars. [Bieber and Smith, 1952, p. 29]



Shirley Heinze Land Trust's John Merle Coulter Nature Preserve. The old railroad spur now serves as an east-west path through the preserve. [Shirley Heinze Land Trust]

[139] Bieber field notes, 1950.
[140] *Valparaiso Porter County Vidette*, 1916, p. 3.

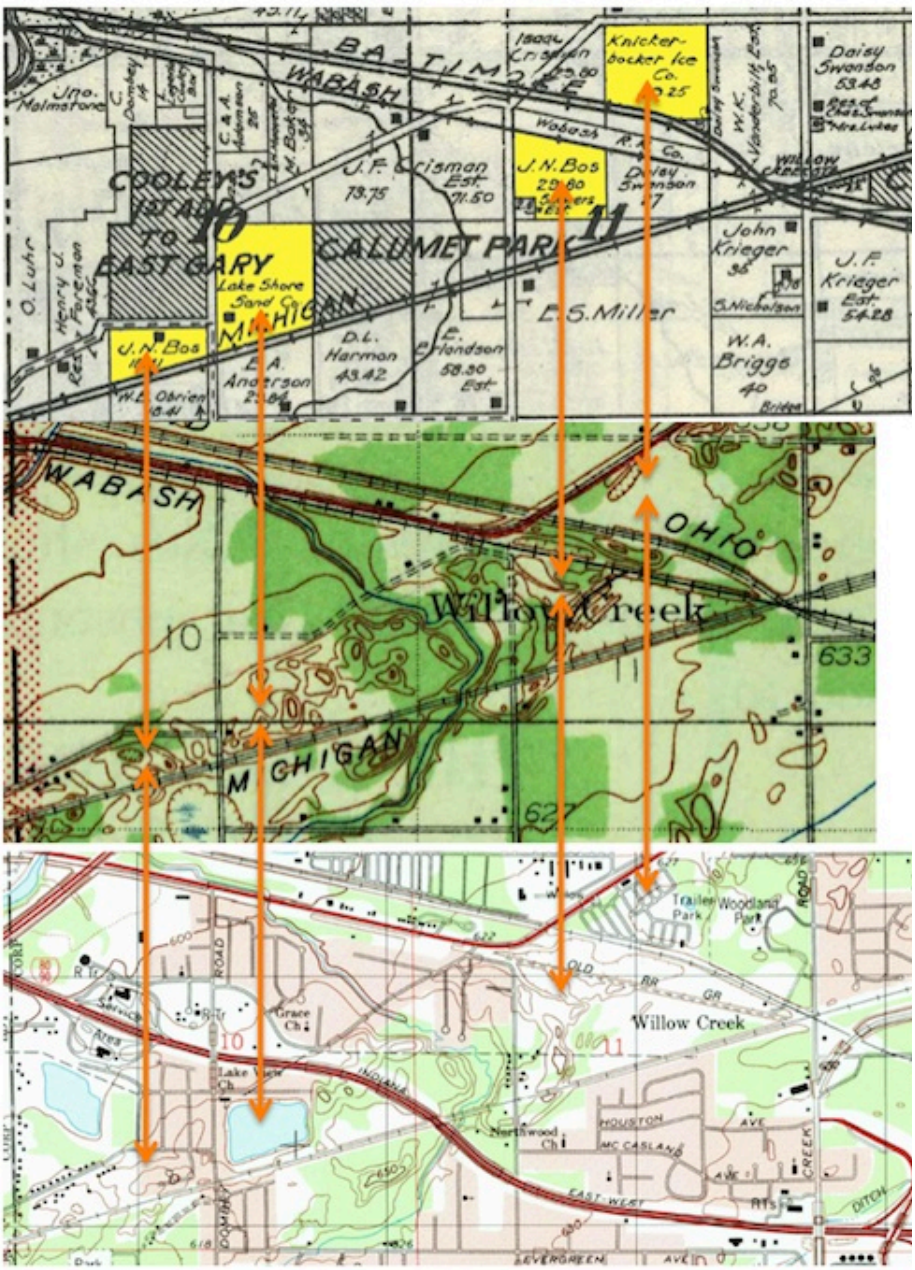
Crisman-West (Sections 10 and 11)

The Crisman area is south of the National Lakeshore, but mining played a big part in its development. In 1921 three sand-mining companies owned four small parcels of primarily Calumet Shoreline sand. All four locations were conveniently located along pre-existing railroad lines.

Knickerbocker got involved with this area before 1895 when company president E. A. Shedd purchased land containing both Calumet and Glenwood sands north of the B&O tracks. That land was "mined out" by 1950.[141] Excavated below Melton Road (Route 20), it is today a trailer park.

J. N. Bos purchased its land in Section 11 adjacent to the Wabash tracks prior to 1906. It removed the dune that was where Carnation Avenue is today.

Both the Bos and Lake Shore Sand Companies purchased their acreage in Section 10 north of the Michigan Central line by 1921 containing only Calumet-aged sand. Lake Shore's property (east of Dombey Road) was later excavated deeper to make a borow pit for the Indiana Toll Road. Now called Dombey Lake, it contains water year round. Bos small parcel was west of Dombey Road and south of Marquette Road.



Top: 1921 plat map / Middle: USGS *Porter* 1940 / Bottom: *Portage* 1992

[141] Bieber and Smith, 1952.

Crisman-East (E½ Sections 1 and 12, W½ Sections 6 and 7)

The Crisman area of Portage, south of the Little Calumet River, is the site of both the ancient Calumet Beach ridge and the older Glenwood sand spit.

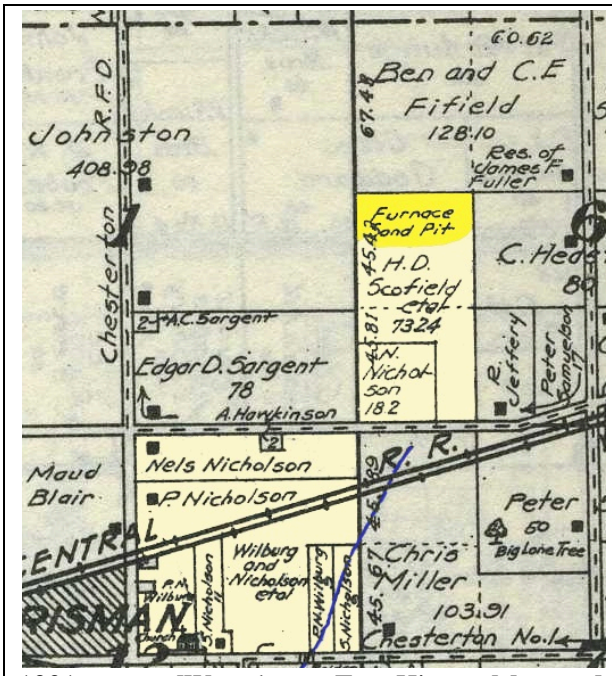
Unlike many other dune sands, the clay content in this Glenwood-aged sand[142] had a rare chemical makeup that allowed it to withstand heat up to 3200°F making it useful as a lining material for runners used to direct the flow of molten steel from area blast furnaces. (See photograph in Chapter 2.)

Around the turn of the last century, three Nicholson brothers, Sam, Nels, and Peter, all owners of farms in Section 12 east of Crisman, started mining the sand on their land when representatives from Chicago's U.S. Steel plant offered to purchase it.

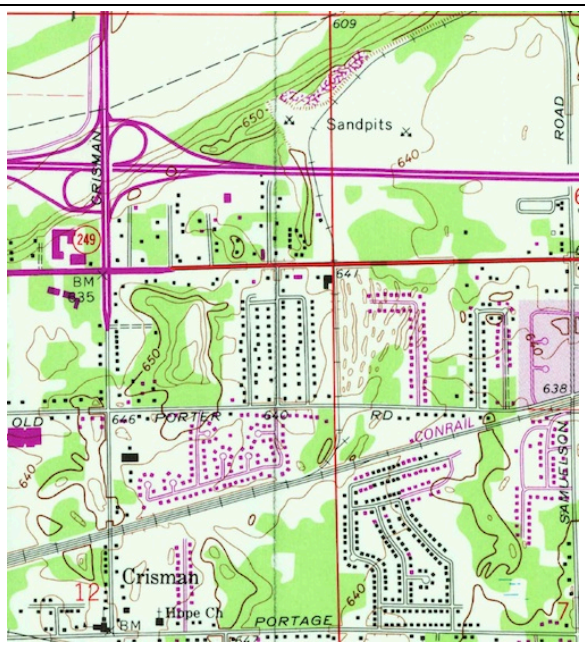
By 1914,[143] the Nicholsons had competition as H. D. Scofield, whose farm also had this specialized sand started his own sand mining. The *furnace sand pit*, seen on this1921 plat map, was his. Soon the two families joined forces and in the 1920s created the Crisman Sand Company, with much of the excavated sand going to the steel mills in East Chicago and Gary.[144]

At first they could excavate as deep as they wanted, but for safety reasons local government set limits to depth of the pits.[145] U.S. Highway 20 was built through this area in 1929. The Crisman Sand Company at times worked both sides of the highway.

Two sand mines were active northeast of Crisman when this 1968 map was published. They were serviced by a mile-long spur from the Michigan (NY) Central Railroad. Interstate 80/94 was not there in the '60s. Its construction in the 1970s cut the sand mining area in half.



1921. [Westchester Twp History Museum]



USGS *Portage* 1968 with 1980 additions in purple.

[142] Misidentified by earlier geologists as Calumet Beach sand
[143] Bieber field notes, 1950, p. 7
[144] Smith and Patton, 1952, p. 3, Magurean and Nicholson, 2014
[145] Coambs, 1986.

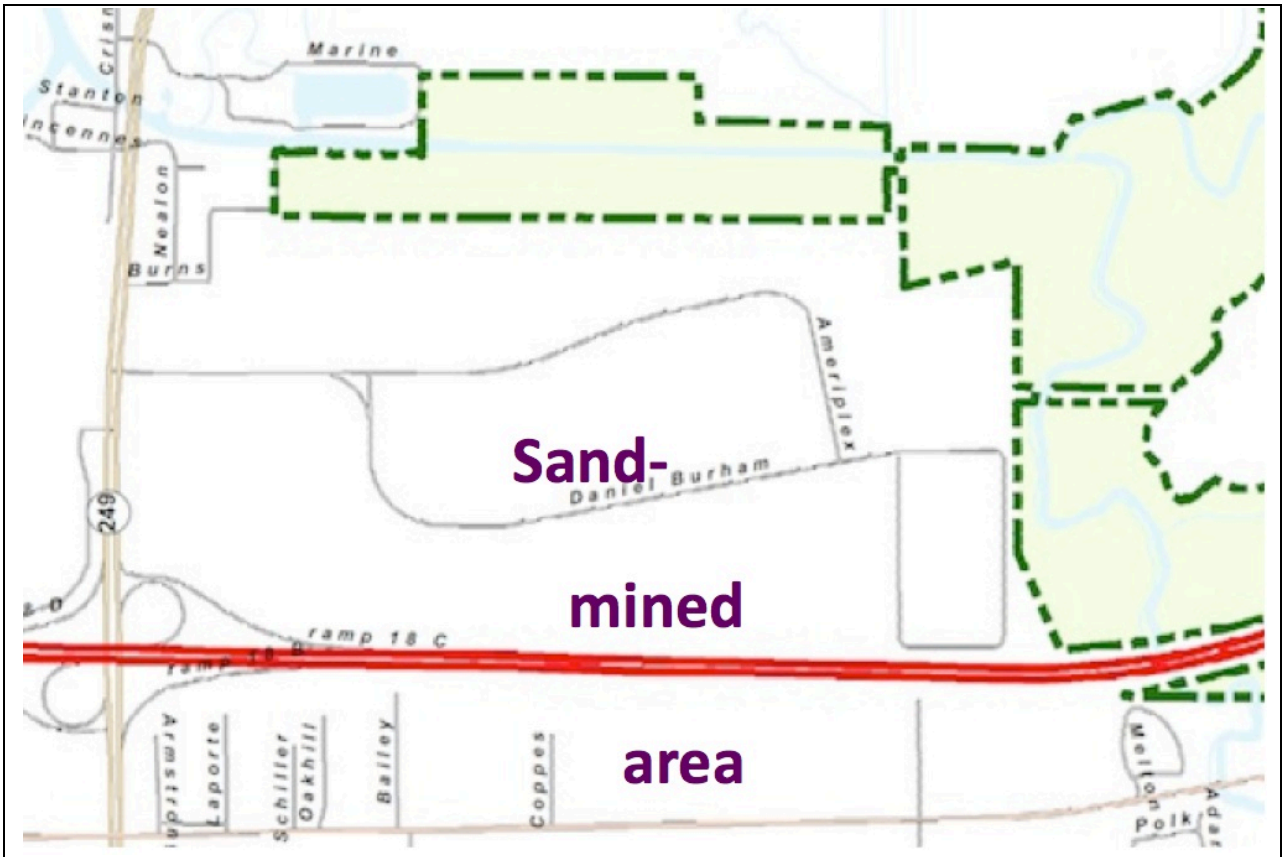


Sand bank one mile NE of Crisman. Note the spoils at the bottom of the photo. [Bieber and Smith, 1952, p. 23]



Crisman Sand Company cranes, Porter County [Carr, 1971]

As of 2015, the company is still in business. The company moved its headquarters to Valparaiso in the 1990s and the is now excavating land that it has purchased from Anderson Orchards south of U. S. Highway 6 in Jackson Township.



National Lakeshore properties north (Little Calumet River) and west (Salt Creek) of Crisman Sand Company mining areas north of Rt. 20 (the brown east-west line) and Interstate 94 (the double-red lines).

Little Calumet River—West Corridor

Although the Little Calumet River corridor did not have desirable sand for mining, its surface features have nevertheless been significantly altered. The river was prone to flooding, which made the floodplain less useful for farming and/or development. As wetlands then were seen practically as wastelands, in the mid-1920s Burns Ditch was dug from the river north through the dunes to Lake Michigan. At the same time the river was channeled and straightened westward from the mouth of Salt Creek (at the far right on the maps below.



1921 Land ownership map. [Westchester Township History Musuem]



USGS *Portage*, 1960

Gravel

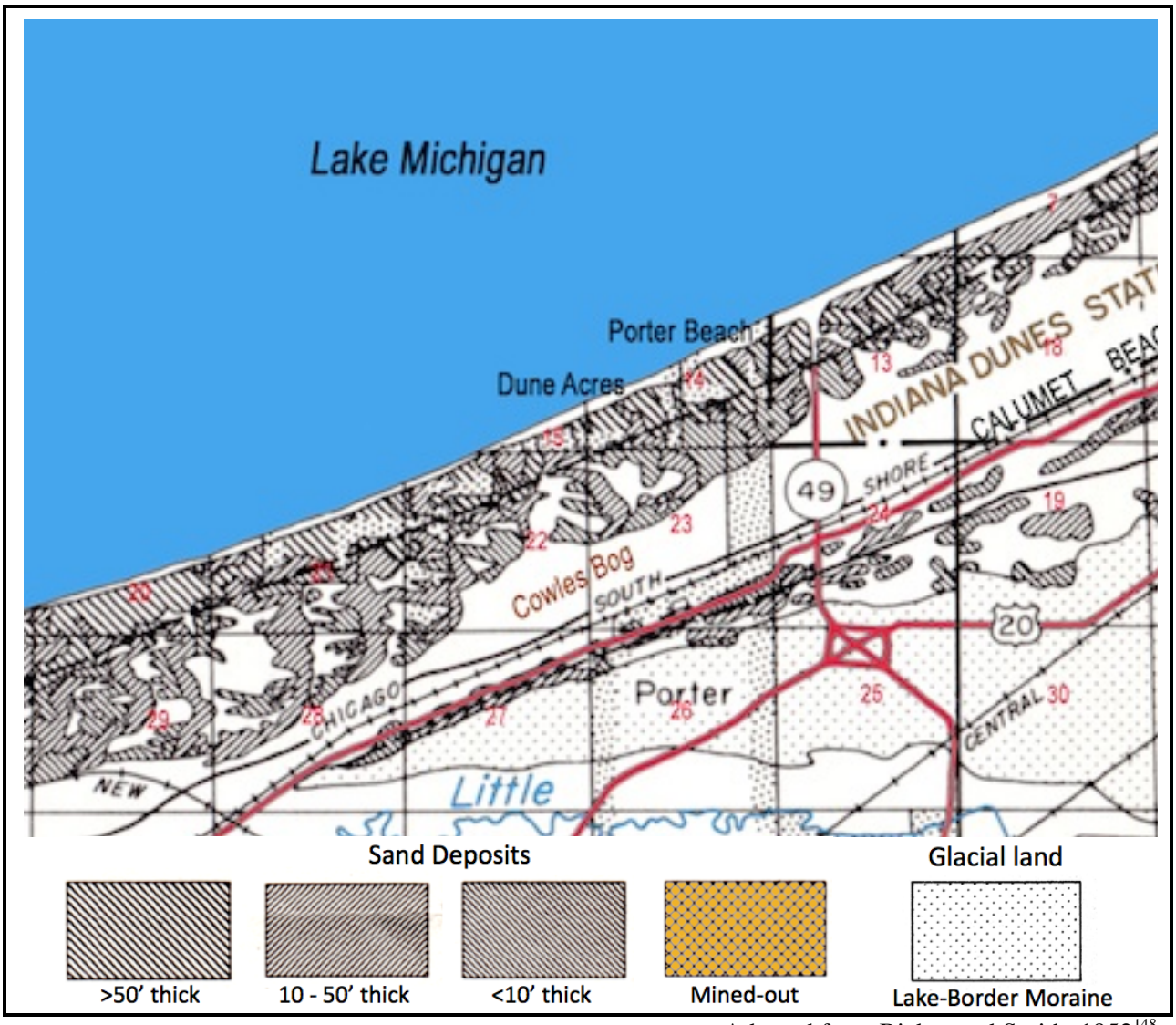
In 1906, W. S. Blatchley, the Indiana state geologist, reported that little, if any, gravel "suitable for road purposes has been found in the county" though he admitted that some deposits may yet be found in the southern part of the county.[146] A few small deposits had been found south and west of Valparaiso. Some of it was used to cover streets in Valparaiso. Another small deposit was found on the Valparaiso—LaPorte road. But nothing substantial in dune country.

Whereas in 1906 there were 1000 miles of roads in the county, only 91 of those miles were then covered with gravel. An additional 19 miles of roads were covered with crushed stone. The gravel and stone used on the 110 miles of improved roads at that time in the county had all been imported from Illinois.[147]

[146] Blatchley, 1906, p. 181-82.
[147] Blatchley, 1906, p. 180-81.

Chapter 7

Sand Mining in Porter County: Westchester Township



Adapted from Bieber and Smith, 1952[148]

Most of the sand mining in Porter County has occurred in its western portion, within Portage and northwestern Westchester Townships. Because in the mid-1920s the dunes in the eastern half of Westchester Township were largely unspoiled, that area was chosen for Indiana Dunes State Park.

In 1950, when the above map was prepared by Geologists Bieber and Smith, there were no mined-out areas and no active sand mining operations occurring in Westchester Township. However, mining on the Bethlehem Steel and NIPSCO properties (on the west side of the township) was soon to begin.

[148] Sections from Route 49 west are in Township 37 North, Range 6 West. Sections east of that are in Township 37 North, Range 5 West.

Dune Park / Bethlehem and NIPSCO Properties (Sections 20, 21 and 22; 29, 28, and 27)

As early as the 1920s NIPSCO officials recognized that the heavy industry expected to be established in northwest Indiana would require much more electricity that the company was then able to supply, so two years after[149] National Steel Company's 1930 announcement that it planned to build a steel plant at Burns Ditch, NIPSCO purchased 350 acres of dune land east of the proposed plant.[150]

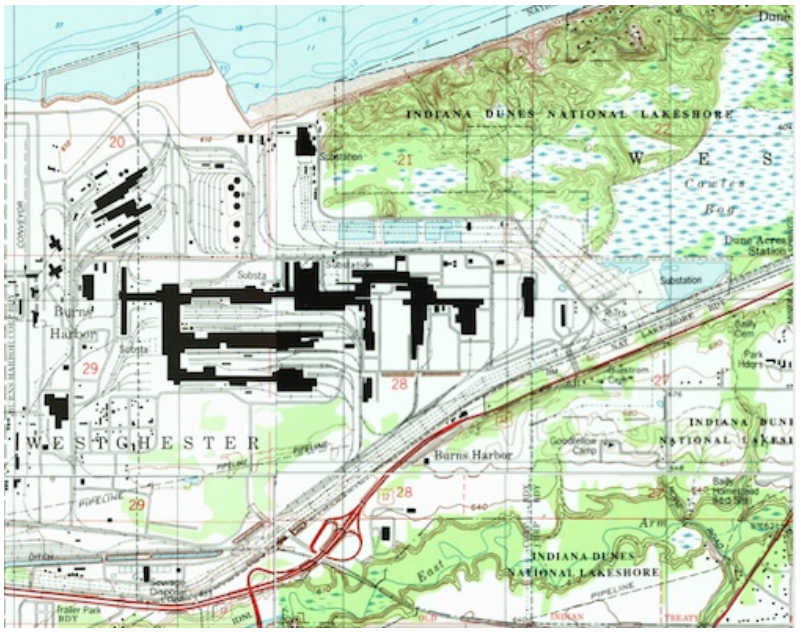
The Bethlehem Steel Company, wanting a steel mill closer to its customers in the Midwest, and assuming that the efforts to build a public port would be successful, in 1956 began purchasing land still owned by Consumers Corporation immediately east of the proposed port.

In 1962 Bethlehem announced that it intended to build a mill at this site. Assured that Congress would soon approve funding for a port that it could use, Bethlehem arranged for Missouri Valley Dredging Company to remove 2½ million cubic yards of sand and deliver the sand to Northwestern University where it would be used for Northwestern's eastward expansion into Lake Michigan. Bethlehem began construction soon thereafter.

Accused of complicity with the destruction of the Indiana Dunes,[151] the University's board president claimed that when Northwestern signed its contract with Missouri Valley, it was not aware of where the sand was coming from.[152]



Upper part: USGS *Ogden Dunes*, 1953 and *Dune Acres*, 1953
Lower part: USGS *Portage*, 1960 and *Chesterton*, 1953



Upper part: USGS *Ogden Dunes*, 1991 and *Dune Acres*, 1991
Lower part: USGS *Portage*, 1992 and *Chesterton*, 1991

[149] Engle, 1983, p. 236.
[150] Ibid.
[151] *Izaak Walton Magazine*, 1962.
[152] *NU Alumni News*, July 1962, p. 1.

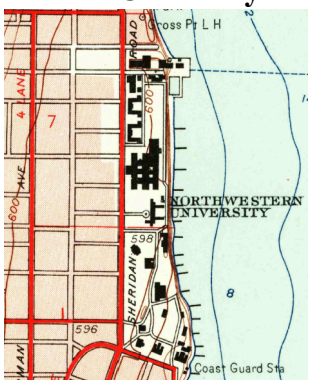
Assured that Congress would soon authorize a port, mining of the Central Dunes began in December of 1962.[153] Bethlehem's grand opening was held September 16, 1965. By 1966 it had 2,400 employees.

The Port of Indiana was approved by Congress in 1966. Construction on it began almost immediately. The first ore boat arrived in September, 1969, and Bethlehem produced its first steel in December of that same year.[154]

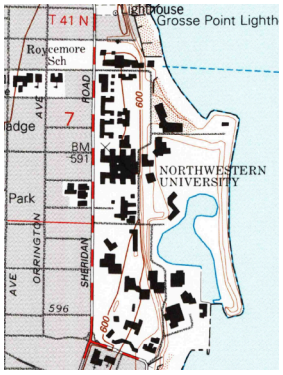


The continuous conveyor system that carried sand from the Central Dunes to a loading slip where it was put on barges for cross-lake delivery to Northwestern University. [Post Tribune photo (7-25-63) held at the CRA]

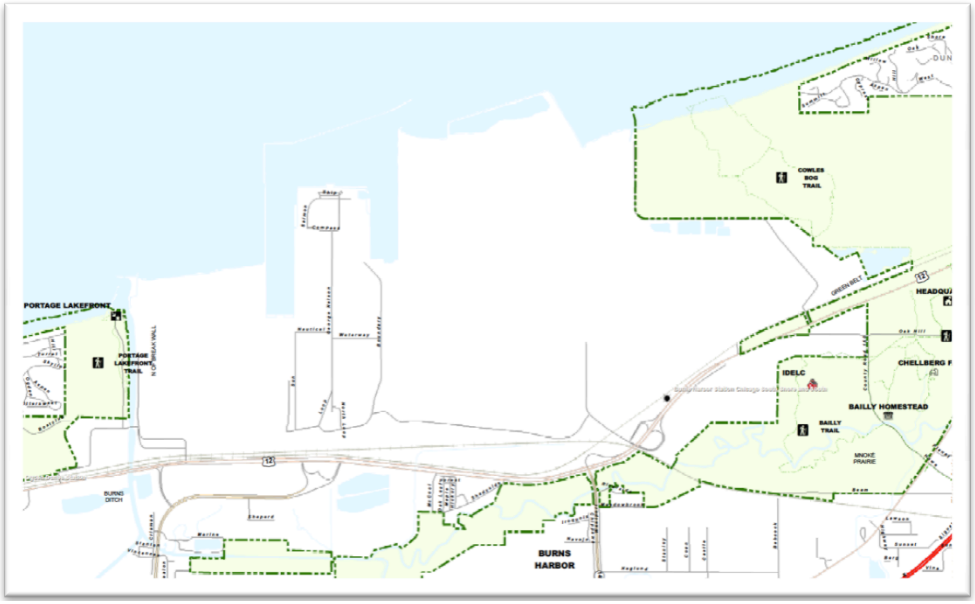
Northwestern University's expansion: Before and After



USGS *Evanston*, 1953



USGS *Evanston*, 1993



Indiana Dunes National Lakeshore boundaries, 2014

[153] Engle, 1983, p. 270.
[154] Gray, 1998, pp. 45-59.

Johnson's Beach (Porter Beach) and Waverly Beach (E¼ Section 14)

The Swedish John P. Johnson family established a commercial fishing operation at Waverly Beach (where Indiana Dunes State Park is now) in 1907. A decade or so later they opened a restaurant where freshly caught fish dinners were the prime attraction. (See ad below.) When, in the mid-1920s, the state bought Waverly Beach for its new state park, the Johnsons moved their family business about a quarter mile west and started over at what came to be called "Johnson's Beach." There they constructed several buildings as well as a road (Waverly) south to the Dunes Highway so that their customers could easily get to their new restaurant and inn.


COME TO

WAVERLY BEACH

FOR A GOOD TIME

J. P. Johnson & Son have just opened their New Restaurant and are prepared to serve fine

FISH DINNERS

Bathing House In Connection.

Bathing Suits and Boats to Rent.

Fine Furnished Cottage to Rent.

Waverly Beach is an ideal place to spend your vacation. Fine accomodations, excellent macadamized road to beach

For Appointments Telephone 504-M 2

P. O. Address Chesterton, Box 16

Chesterton Tribune ad
[Westchester Museum]

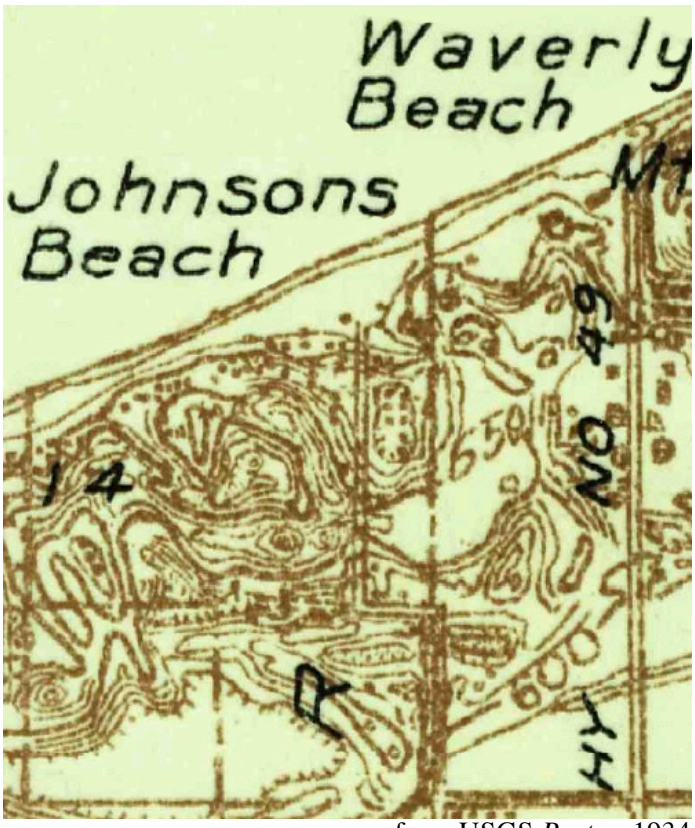

Waverly Beach before 1925
[Westchester Twp History Museum]


Johnson's Beach, 1936
[Calumet Regional Archives]

As can be seen on the 1934 topographic map (the earliest made for the area) at that time at least both beaches were quite wide where the Johnsons had their fishing operations. The family could have easily removed small dunes on the property, but did not have the equipment for large-scale excavation. They certainly did move sand around in order to provide foundations for their buildings and a decent road south to U.S. Highway 12.

Although subdivided in the 1890s, there was little or no development of the Porter Beach area until after the Dunes Highway was built in 1922-23.

At first, families purchased lots and built summer cottages to be near the lake. Later on, folks purchased several adjacent lots (the originals were just 25-feet wide) and built much nicer and larger year-round homes.



from USGS *Porter*, 1934

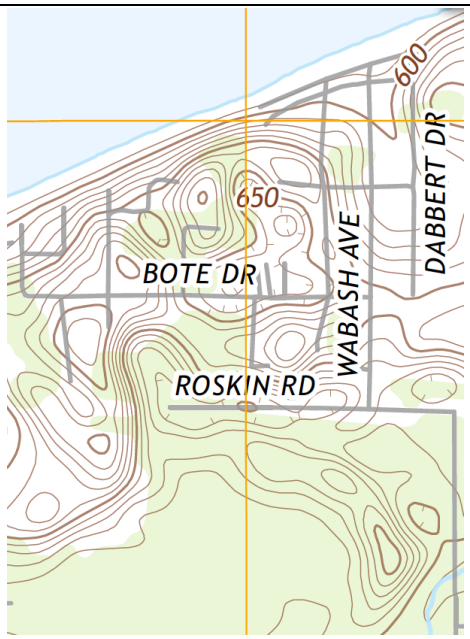
In 2015, a property owner must have five adjacent lots in order to build. Although it has made for some rather steep roads, the goal of developers has been to build upon the dunes and not remove them first.

As seen in the above and following topographic maps, there has been little change in the topography of the Porter Beach area since the 1930s.

The wetland south of Porter Beach is part of Cowles Bog, which is part of the Great Marsh. Years back, the goal of the early settlers in the area was to "reclaim" the land by draining wetlands. In years since, the goal has been to preserve and restore wetlands. Since the 2013 map was surveyed, much of the Great Marsh has been restored. There has been no sand mining in this area—because where there is sand, the water table is too high to economically extract sand from the ground.

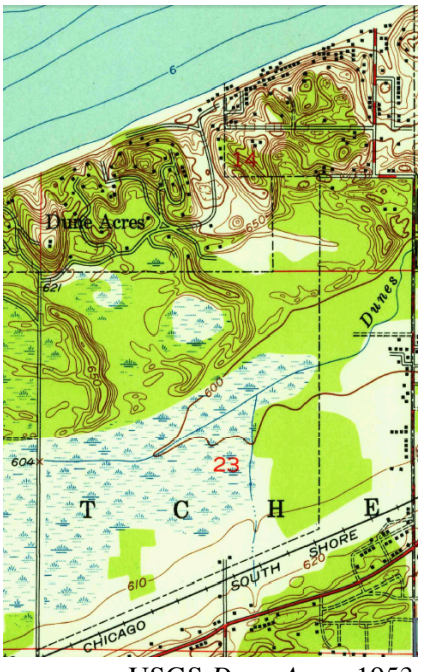


[USGS *Dune Acres*,1953]

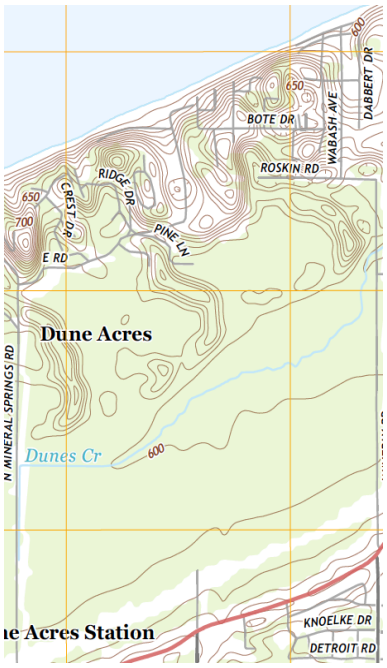


[USGS *Dune Acres*, 2013]

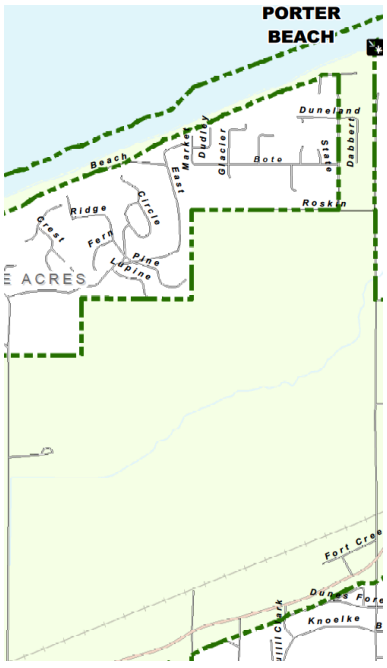
A comparison of the 1953 and 2013 topographic maps shows how little the landscape changed within the last 60 years. Congress included the portion of Porter Beach east of Wabash Avenue in the National Lakeshore. Dabbbert Drive, east of Wabash and within the Park boundaries, closely follows the natural topography as it goes up a former blowout, but some modifications, done years back when cottages were built there, are still evident.



USGS *Dune Acres*,1953



USGS *Dune Acres*, 2013



National Park Boundaries, 2014

Dunes State Park (Sections 12, 7, 8, 14, 13, 18, and 17)

Indiana Dunes State Park is a direct result of the Save-the-Dunes movement of 1915. Previously-owned properties were purchased by the state in the early 1920s, and the park opened July 1, 1926. Containing about 3 miles of beach and roughly 3½ square miles of land, it soon became one of the state's most popular parks. The eastern 2/3 of the park, including its three highest dunes, is a nature preserve.



Johnson's Beach (far left) and the State Park in the early 1950s still showing several of the beach houses near Mt. Holden. [USGS *Dune Acres*, 1953]



Bucket Crane at the east [west?] end of Dunes State Park, June 15, 1931. [Arthur Anderson: Fisher Collection, CRA.]

There is no record of large-scale sand mining at Indiana Dunes State Park, yet the flat area south of the pavilion is evidence that some excavation has occurred. The photo to the left was taken by Arthur E. Anderson in 1931. Its caption (probably typed by James Fisher in 1955) noted that the excavation was at the east end of the park. Perhaps that was in error and the excavation was at the west end where that year the Dunes Arcade Hotel was built and the park entrance road improved. Ground was obviously slightly reshaped in order to build roads and establish features such as the park campgrounds.

Borrow Pits

Along Interstate 94 in Westchester Township there are a number of small ponds that were excavated when the highway was built. The soil removed was used to raise the level of the highway. This includes the lake in Lakewood Park, Lake Charles, Lake Florence, and Pratt Lake[155].

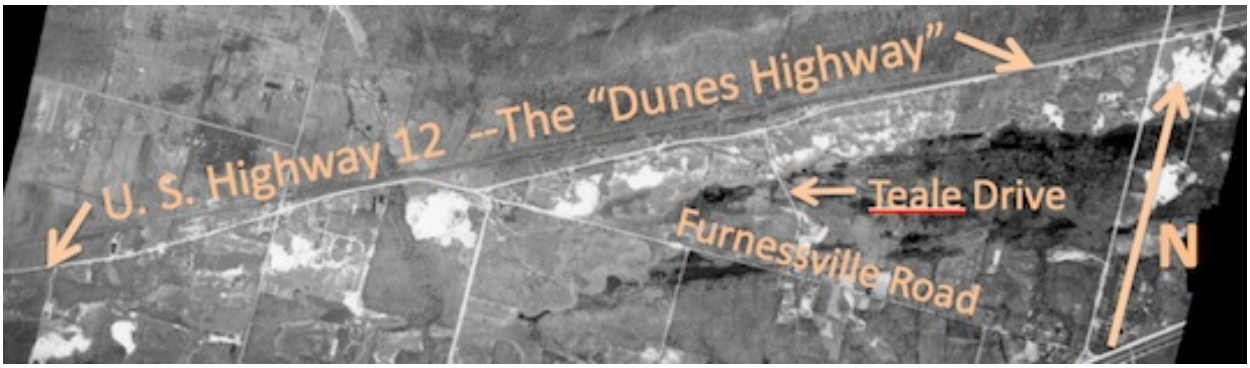
[155] The *Vidette-Messenger*, **July 25, 1973, p**age 14**.** Pratt Lake was excavated in 1969: Canright and Hopkins, 2011

The Dunes Highway (Parts of sections 24, 19, 18, 17, and 16)

The Dunes Highway in Westchester Township generally follows the old Calumet Shoreline and, at least when it was built in 1922-23, there were Calumet-aged dunes along the highway on the south side. Designated U. S. 12, and connecting Chicago with Detroit, it soon became the busiest highway in all of Indiana.

Thus gas stations, restaurants, and motels sprang up along the highway—but because many folks wanted to build on the south side of the road, dunes were removed to make room for development at or slightly above the road level.

> The 1939 photograph below shows, in white, those areas that were cleared of their vegetative cover, many then also cleared of their dunes, exposing the bright, nearly white sands. Note that nearly all the excavations were on the south side of the road, where the dunes had been located.



Aerial photograph showing the Dunes Highway, U. S. Highway 12 [Indiana Dunes National Lakeshore]

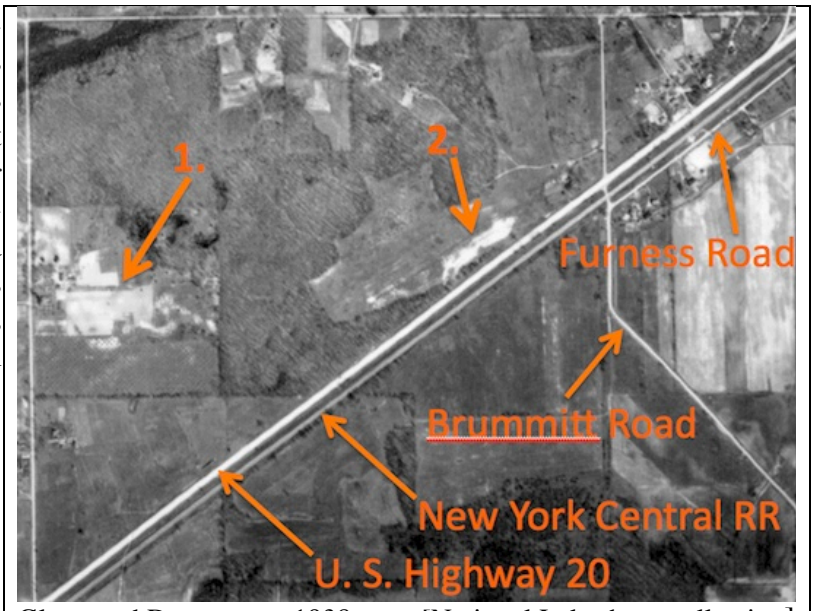


The Dunes Highway in eastern Porter County, facing west, during its 1922-23 construction. The northern (right) portion of this dune was removed to make room for the highway. [Calumet Regional Archives]

Glenwood Dunes // (Old Ly-co-ki-we) Horse Trail (Section 20)

Section 20 contains Glenwood-aged dunes—primarily in its northern half, Calumet-aged dunes—but only in its far north-west corner, and the Lake Border Moraine—primarily in its southern half. In the 1930s, a small area of these Glenwood-aged dunes was cleared and the small dunes parallel to the highway were mined (shown in white, #2, to the right).

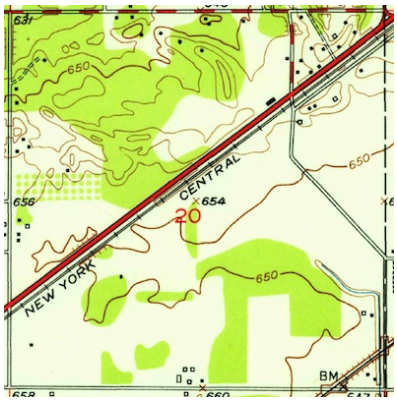
The larger white area (#1) was cleared, apparently graded, and used as a Christmas tree farm. It is shown on the 1953 and 1991 maps below as three rows of small green dots.



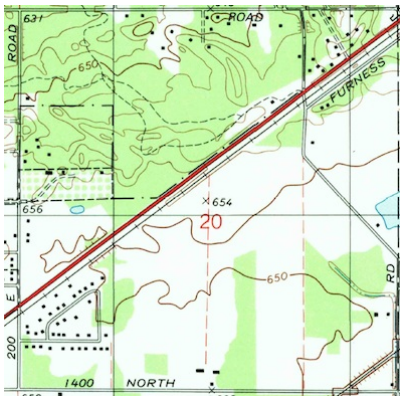
Glenwood Dunes area, 1938 [National Lakeshore collection]



USGS *Porter*, 1940



USGS *Dune Acres*, 1953



USGS *Dune Acres*, 1991

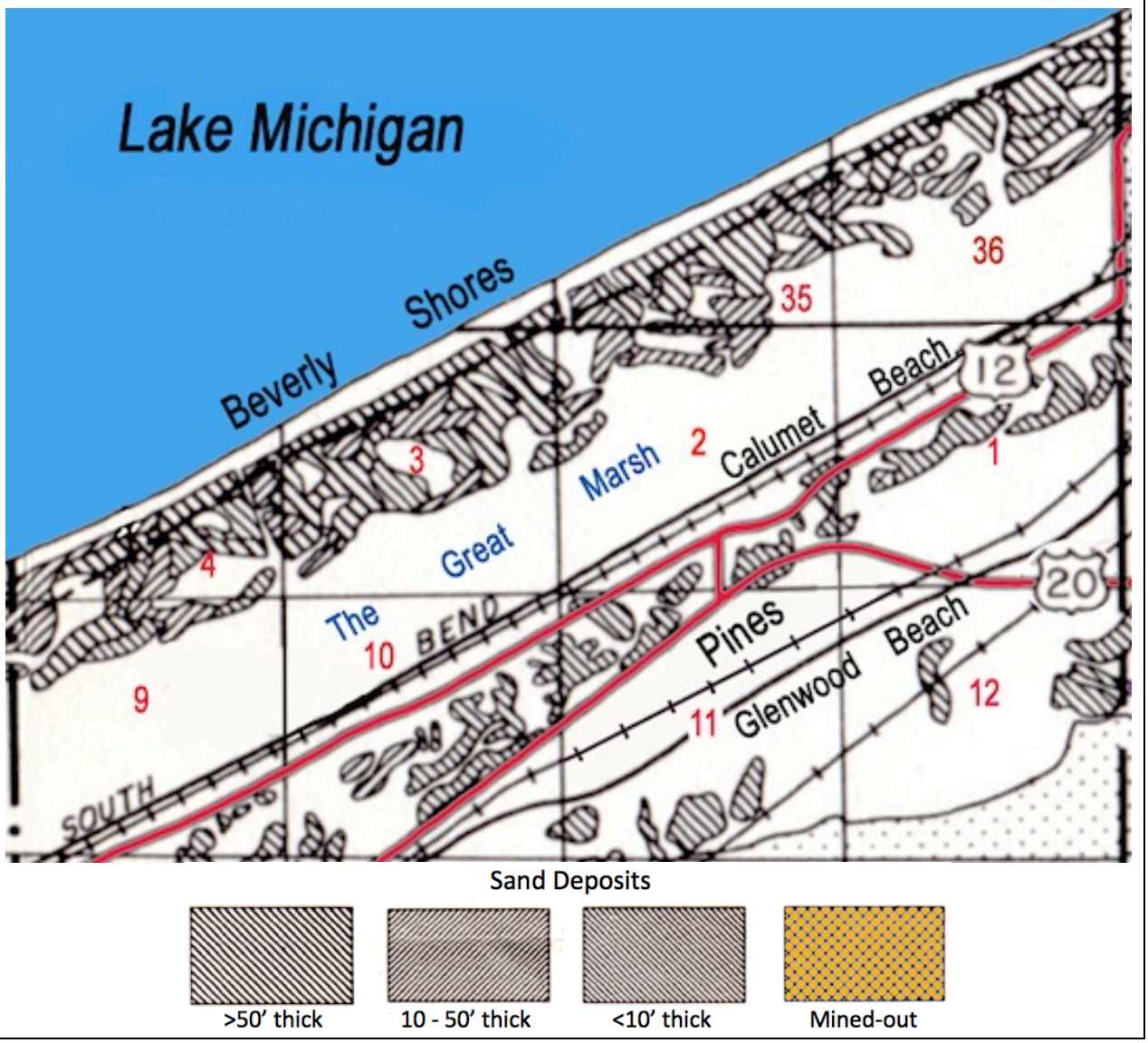
The Glenwood Dunes portion of the Indiana Dunes National Lakeshore includes the Glenwood Dunes trail (formerly titled "Ly-co-ki-we"). Horseback riding is welcomed from March 16 through December 14; cross-country skiers when snow permits.



National Lakeshore boundaries, 2014

Chapter 8

Sand Mining Porter County: Pine Township



Adapted from Bieber and Smith, 1952[156]

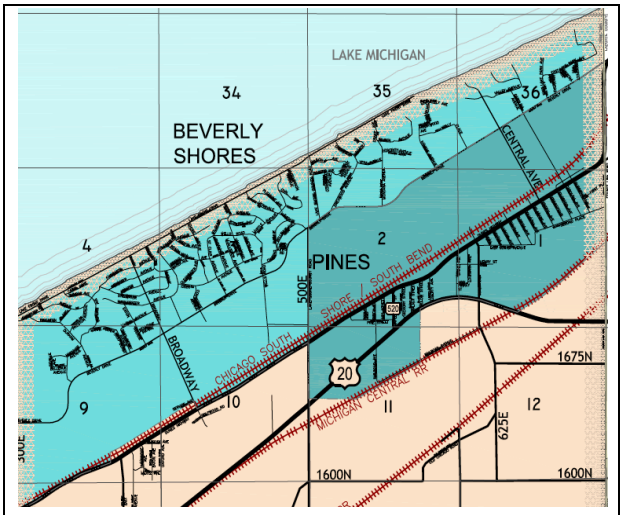
Pine Township has not had large amounts of sand mining largely because it was further from Chicago customers than were Lake County or Portage Township, there were no rail lines north of the Great Marsh, and because there was plenty of sand and rail lines in neighboring LaPorte County. There were, however, a few isolated mining locations; they are discussed below.

[156] Sections 35 and 36 are in Township 38 North, Range 5 West. The remainder of the sections are in Township 37 North, Range 5 West.

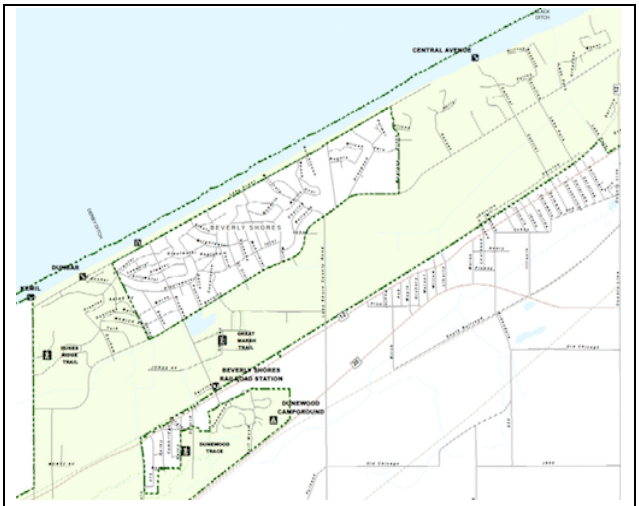
Beverly Shores and Pines (Sections 35, 36, 1, 2, 3, 4, and 9)

Beverly Shores and Pines were both platted after the Dunes Highway was built in 1922-23. Before that, much of the land south of the dunes was agricultural. The earliest crop, cranberries, thrived in its marshy soils. Nevertheless, as early as the 1870s, many ditches were dug to drain the Great Marsh and cranberries were replaced by other crops. Pines was platted south of the new highway in 1923.

Beverly Shores, which extends across the entire width of Pine Township, was platted in 1929. Roads were graded, houses and commercial establishments built, and a golf course created south of U.S. 12. There were no railroads north of the Great Marsh and so there were no major sand excavations in the town. Nevertheless, Broadway and other streets were flattened; there was extensive minor reshaping of the land in order to turn the "wild" dunes into a town. Parts of the less densely developed sections of both towns were incorporated into the National Lakeshore.



[Porter County Surveyor's office, 2015]



[National Lakeshore Boundaries, 2014]

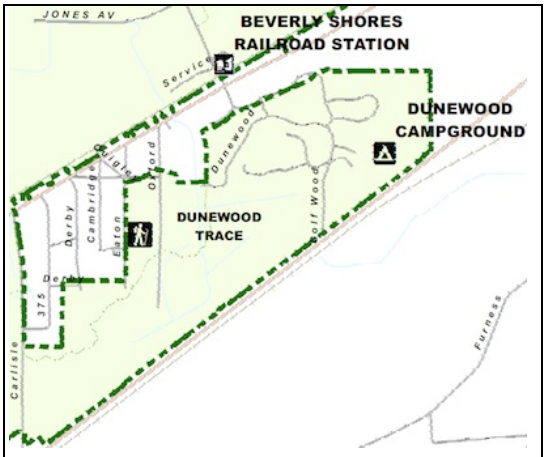
Dunewood Campground (Section 10)

Dunewood Campground occupies the site of what had been the Beverly Shores golf course. The course closed during World War II and never reopened. The land was added to the national park in 1980 and was designated its new campground. Its topography was altered when the course and clubhouse were built in the 1930s. Thus the campground, which relieved the often filled-to-capacity state park campground, was established on already-disturbed land.



Beverly Shores plat map showing the golf course and clubhouse south of Route 12. Circa 1933.

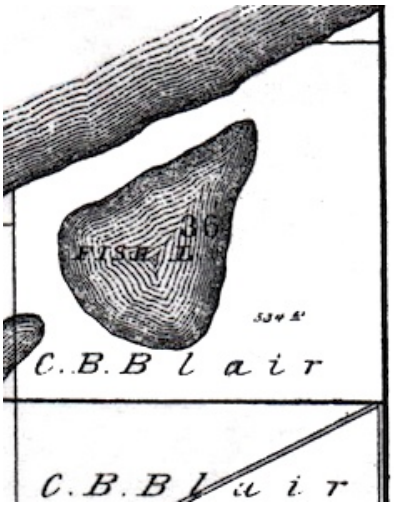
[Porter County Surveyor]



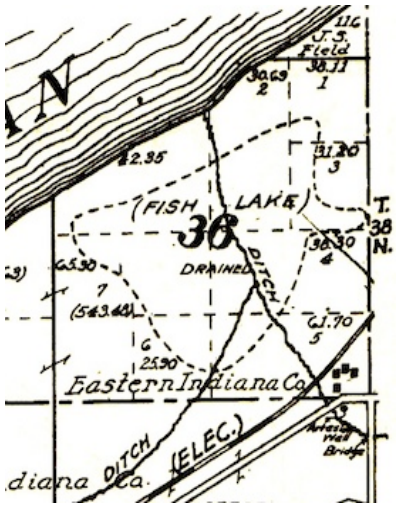
National Lakeshore Boundaries 2014]

Kintzele Ditch (Section 36 and N¼ Section 1)

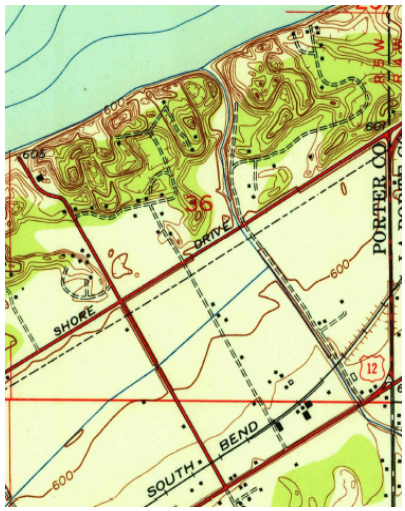
In the mid-nineteenth century, Chauncey B. Blair purchased much of the land across the northern portion of Pine Township—adjacent to land he owned in LaPorte County.[157] The ground was sandy, poorly drained, and, besides the Great Marsh, contained several small lakes including the 300-acre[158] Fish Lake in the far northeast corner of the township. The dunes shown on the topographic map below (right) show that the lake could not have been quite as large as what was shown on the plat maps made 75 and 32 years earlier.



1875 [Westchester Twp. Museum]



1921 [Westchester Twp. Museum]



[USGS *Michigan City West* 1953]

According to State Geologist David Dale Owen, who visited the area in 1859-1860, at some time previous to then Blair "had successfully drained several thousand acres of swamps."[159] Likely much earlier, but at least by 1882, Blair had drained Fish Lake and turned the land into what historian George Garard called a "fine cranberry plantation."[160] This is probably when at least the northern portion of Kintzele Ditch was excavated up to Lake Michigan. Other ditches were dug, and some dams built to control the flow of water.[161]



[Bieber and Smith, 1952]

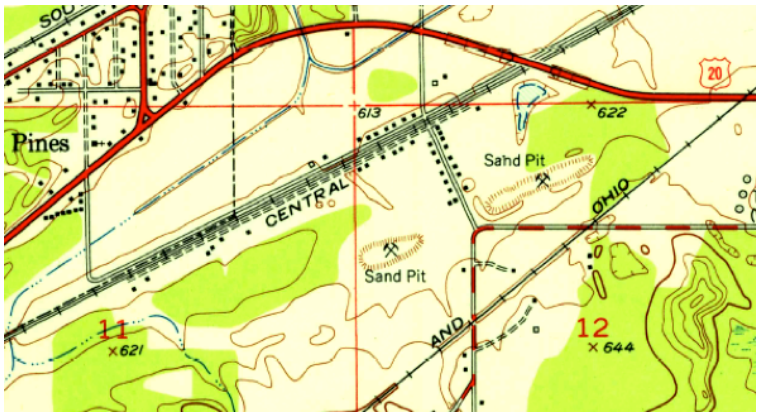


[NPS: Jeff Manuszak, 2010]

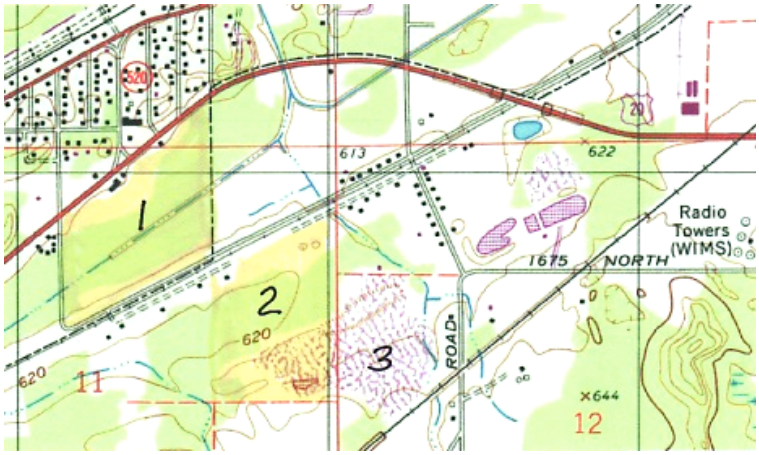
[157] Conard, 1891. Blair also owned Mount Baldy and Crescent Dune, which were much closer to rail transportation.
[158] Plampin, 2011, p. 6. See her article for more information about early history and native plants in the area.
[159] Owen, 1862. P. 202.
[160] Garard, 1882, p. 230.
[161] Blair had five cranberry marshes on his land and in 1882 harvested 2,000 bushels, which, according to the Michigan City *Dispatch* (Oct. 12, 1882), then sold for $3.00 a bushel-- Nicewarner, 1980, p. 110.

Sand Pits South of the Town of Pines (NE¼ Section 11 and NW¼ Section 12)

Sand pits, just south of the Town of Pines, are well known to Indiana geologists as it was here that the remains of an ancient spruce forest was found—under the sand being mined!



Brown's sand pits [USGS *Michigan City West*, 1953]



The Brown sand pit site. [USGS *Michigan City West*, 1994]

Mining at the eastern pit (upper map) was visited in 1950 by Bieber who noted that it had been underway for some time then. It was then being done by the Brown Trucking Company. The sand there was only 3½ feet thick and Bieber estimated that that pit would be worked out by the fall of that year.[162] This is one of the few pits where some gravel had been excavated. That gravel was deposited on the beach during Lake Michigan's Glenwood phase. Mining at the western pit (in Sections 12 and the ajacent area in Section 11) was underway by 1953.

Attempted mining in Section 11, north of the New York Central tracks (#1 on the lower map) had to stop in the mid-1980s when a layer of spruce logs was found under the ground sand being excavated. These logs were from spruce trees that were growing here roughly 12,000 years ago when this area was an interdunal wetland during a low-water stage of Lake Michigan. During the subsequent Calumet stage, the trees were buried by sand. This site was turned into what was called the "Yard 520 landfill." It is now closed, restricted, and under Indiana Department of Environmental Management oversite. South of this site was once an unregulated dump.

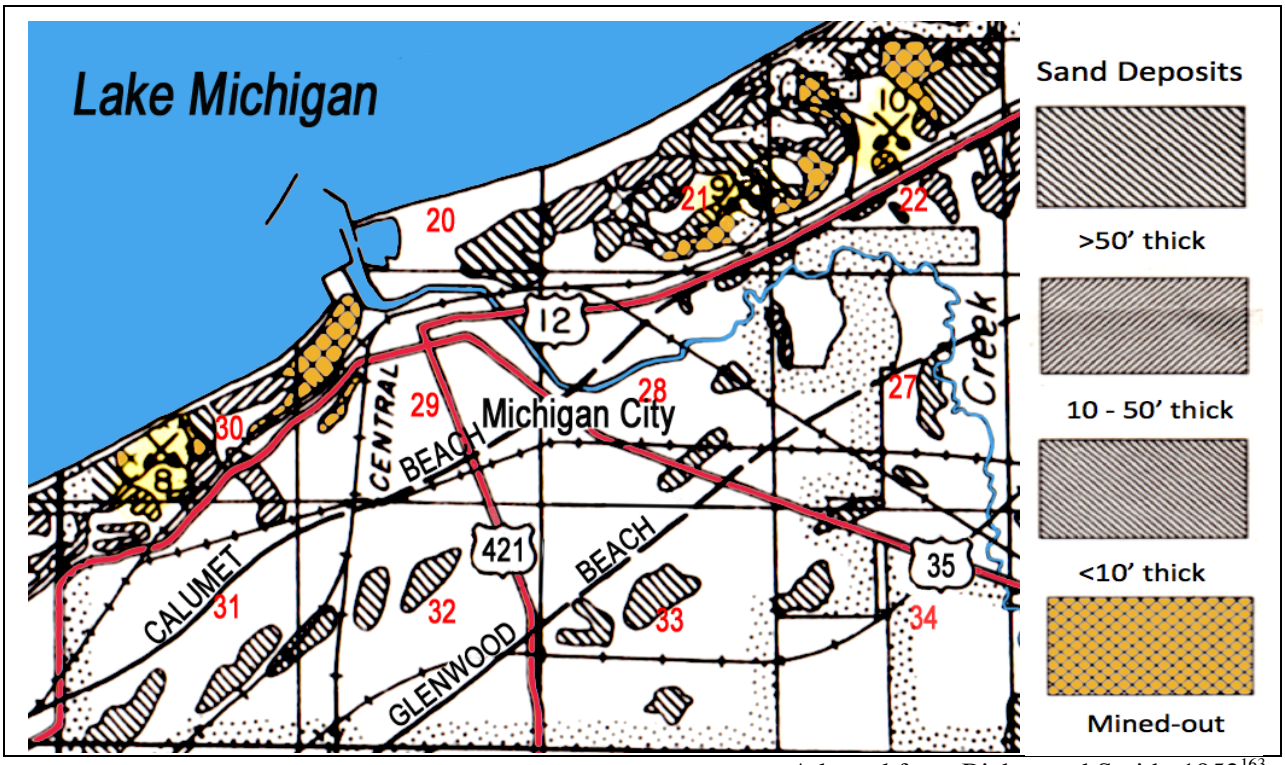
Today there are two landfills and that former dump within or south of the town limits of Pines (shaded in yellow and numbered on the 1994 map). Except for the areas around the two sand pits marked on the 1953 map, they were not preceded by much removal of sand. Site number 2 is a closed Waste Management site.

Site 3 on the map had a pond excavated and was home of Folmer Nybe who operated site #2 and sold it to Waste Management.

[162] Bieber, field notes, July 27, 1950.

Chapter 7

Sand Mining LaPorte County

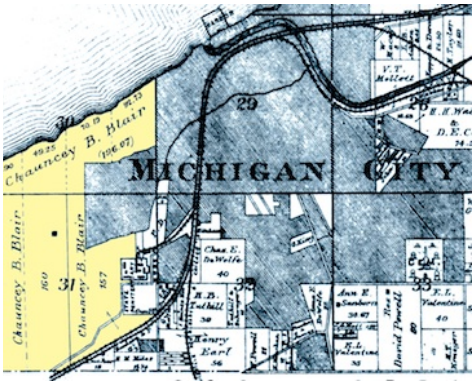


Adapted from Bieber and Smith, 1952[163]

In 1950 when this map was prepared by Geologists C. L. Bieber and Ned Smith, there were three active sand mining operations still occurring in LaPorte County. They were:

8. Michigan City west: Producers Core Sand Corporation
9. Sheridan Beach: Manley Sand Company (in Section 21)
10. Michigan City east: Producers Core Sand Corporation

Through much of the 19th century, Chauncey B. Blair was the largest landowner in the Michigan City area. (The 100-acre state prison site, seen on many of the maps in this chapter, was purchased from Blair for $4,500 in 1860.[164]) Blair, a Michigan City businessman who went on to become founder and president of Chicago's Merchants National Bank, was the father of Chauncey J. Blair, owner of Consumers [Sand] Company. The northern portion of Chauncey Blair's property is where Mount Baldy and the Crescent Dune are. The Hoosier Slide, said by early settlers to be the tallest sand dune along Indiana's shoreline, was immediately to the east, inside the corporate boundaries of Michigan City.



[*Platbook of LaPorte County*, 1892]

[163] Sections on the map are in Township 38 North, Range 4 West.
[164] Goodan, 2010

Michigan City and the Hoosier Slide (Section 29)

> Michigan City is built on beds of sand, deep, heavy sand that sometimes blows and drifts like snow, for there are very light particles in what is called heavy sand. Immense quantities of sand from the Hoosier Slide are taken away in carloads to Chicago, but it is a huge mass yet.[165] [Timothy Ball, 1900.]

> The sand which has been washed up from Lake Michigan and piled mountains high, has been found useful in polishing plate glass, and also in stove and range factories. The Lake Erie and Western Railroad ships over three thousand carloads of this sand annually to the south, the Monon ships about the same quantity in the same direction, and the Michigan Central ships over two thousand, five hundred carloads east to Detroit and other places. Here is a total of over eight thousand, five hundred carloads of sand an-nually. . . . . There is practically an inexhaustible amount of sand, yet under this steady demand some of the sand dunes on our lake shore are diminishing very noticeably. Hoosier Slide is not nearly as high and large as it used to be.[166] [E. D. Daniels, 1904]

The Hoosier Slide, originally 175 to 200 feet tall[167], was once said to be Indiana's tallest sand dune. Right on the beach at the mouth of Trail Creek, this bare sand mountain could be seen by sailors way out in the lake and was used by them as a guiding beacon. Certainly the most photographed Indiana dune, it was even said to be Indiana's most famous landmark with many postcards, including some colorized, sending its image to many places across the globe.

Its name has been attributed to both the avalanches of sand that occasionally came cascading down as well as to the sport of sliding down the dune as one does on a sled in winter. At least once the cascading sand had fatal consequences.[168]



Above: The Hoosier Slide and adjacent rail yards, 1906 [Old Lighthouse Museum]



Sliding down the Hoosier Slide, 1906. [Old Lighthouse Museum]

[165] Ball, 1900, p. 411.
[166] Daniels, 1904, p. 168.
[167] Most writers said that the dune was originally 200 feet tall, but the only on-site description made before mining began was by state geologist David Dale Owen (with a surveyor) who noted (in 1859) that it was 176 feet tall.
[168] Manny, 1961. P. 5.

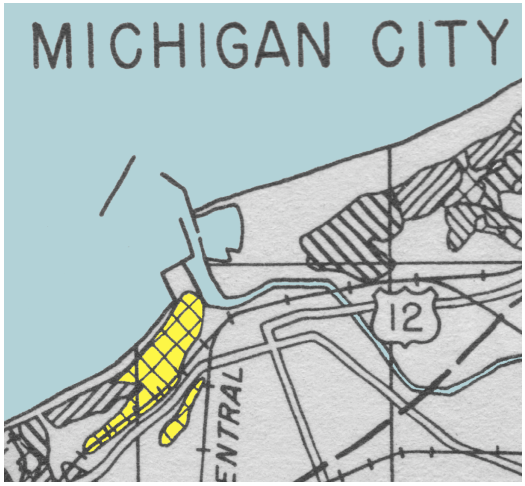
The sand in and around Michigan City was originally, probably universally, thought to be practically useless, even a nuisance. Its major use was to fill in the wetlands that had constituted much of the downtown area. High winds would blow the sand from the Hoosier Slide all the way to the primitive but busy downtown area of the city[169]. When it seemed that blowing sand might almost bury the Methodist Church at Second and Pine, the congregation built a new building five blocks further south.[170]



Franklin Street, Downtown Michigan City, circa 1880. Note the wooden plank pavement. [Old Lighthouse Museum]

In 1874, E. T. Cox, Indiana state geologist, noted that the Hoosier Slide, which originally had been covered with "small white oaks and other hardy vegetation," was by then bare and smaller as the trees had been cut down for fuel and the wind had eroded the hill so that it was (in 1874) only 120 feet tall.[171] He made no reference to its being mined.

Climbing the Hoosier Slide was a popular sport. Tourists came to see it. Many weddings were held at its summit.[172]



Michigan City area showing (in yellow) the mined-out area that had been the Hoosier Slide. [Bieber & Smith, 1952]

Commercial sand mining began about 1890, perhaps a bit earlier, after the Monon Railroad laid tracks along the east side of the dune to serve the docks along the west side of Trail Creek.[173] When dockworkers weren't needed at the docks, they used shovels to dig and wheelbarrows to transport sand to waiting cars.[174] (See photo on next page with the silhouette of a man doing precisely this. Another photo appears in Chapter 3.)

[169] Manny, 1961
[170] Munger, 1969, p. 47.
[171] Cox, 1874, p. 467. Estimates of the dunes' heights can hardly all be correct. However, the Hoosier Slide was undoubtedly Indiana's best known and most photographed dune. It stood by itself next to both Lake Michigan and Trail Creek and was easy to frame by photographers. Mount Tom, further west was part of a series of dunes and thus not as easily photographed.
[172] Manny, 1961, p. 2.
[173] Manny, 1961, p. 3.
[174] http://www.monon.monon.org/bygone/hoosierslide.html

An early account, from an 1891 edition of the *Lafayette Morning Journal,* gave this account:

An Indiana Landmark Going to Chicago
An Interesting Letter from the Lake—The Fate of "Hoosier Slide."

MICHIGAN CITY, Ind.,—May 16—Your readers may be surprised to learn that "Hoosier Slide is disappearing, but such is the fact. …. The east line of its summit was the highest point and a scrubby tree used to stand up there…. A force of men are at work six days in the week shoveling the sand on to flat cars for railway uses, and as they burrow into it at the foot, it rolls down from the top. It is a mountain of sand yet and will be for years to come—even should the shoveling process go on. But even now the east line is no longer the highest point. The scrub tree is gone, the shape of the whole top has changed and what is now the chief outlook was a year ago a secondary point.

[*Lafayette Morning Journal,* Monday May 18, 1891.]

When, in the late 1890s[175] Monon employee William Manny realized that many railroads needed "engine sand" to increase the traction between locomotive wheels and the rails, he began purchasing sections of the dune (primarily on its north side) and established the Hoosier Slide Sand Company.[176] The Company was incorporated in 1906.[177] Meanwhile the Pinkston Sand Company, served by the Michigan Central Railroad, started mining sand on the south slope of the Slide.[178] In 1907 the Pinkston company advertised sand at 20¢ a ton in *Foundry Magazine*.[179]



Hoosier Slide, Michigan City, Ind.

E. W. Lindemann's pharmacy, also called the Hoosier Slide mining office, at the base of the Hoosier Slide. Note the man with a wheelbarrow in the boxcar in the left photo.

[Old Lighthouse Museum]

A sand brick and building block factory was located in the southeastern part of the Slide. Because sand removed at the bottom of the dune was shortly replaced by sand sliding down from above, the factory found its supply of raw material continually replaced at its shed doors.[180]

In 1912, Indiana geologist Edward Barrett reported that with much mining of the Hoosier Slide, its summit was then only 75-100 feet above the surface of the lake.[181]

[175] Manny, 1961, pp. 2-3.
[176] Boomhower, 1993, p. 15.
[177] News-Dispatch, September 13, 1950, p. 23
[178] Manny, p. 6.
[179] Nicewarner, 1980
[180] Shannon. 1912, p. 199

> Several of the glass sand industries of the State use this sand in the manufacture of glass products. Notable among these is the well-known firm of Ball Bros. of Muncie, Indiana, manufacturers of jars. The company has been using the sand from Lake Michigan for about twenty-five years and it has proved very satisfactory. The sand has the advantages of freedom from the usual impurities, which accompany indurated deposits for the reason that it comes ready washed from the lake. Ball Bros. use about 150 tons of this sand per day. … The Michigan City sand is also used in foundry work in making cores, particularly by the Chandler-Taylor Company of Indianapolis.[182]
>
> Edward Barrett, Indiana State Geologist, 1914.

By the early 1920s the excavation was done and the dune was gone. In 1925[183] the Northern Indiana Public Service Company (NIPSCO) purchased the property that the Hoosier Slide used to occupy and all the land west to and including Mount Baldy. In 1929 NIPSCO began construction there of its Michigan City generating station.

Michigan City and the State Prison (E½ Section 31)

Construction of the Indiana State Prison just north of the Calumet-era dune ridge began in 1860. It has been greatly enlarged since then.

More than one hundred years later in 1970 the Brown Partnership purchased some of the adjacent dune lands south of the prison for excavation. When human bones were discovered, the mining was stopped. Some of that area in the triangular plot of land immediately southeast of the prison, is now an Indiana Department of Natural Resources classified burial ground. It is assumed that some prisoners who died at the prison were buried there in unmarked graves.



USGS *Michigan City West,* 1994

[181] Barrett, Edward, 1912.
[182] Barrett, 1914, p. 49.
[183] Calvert

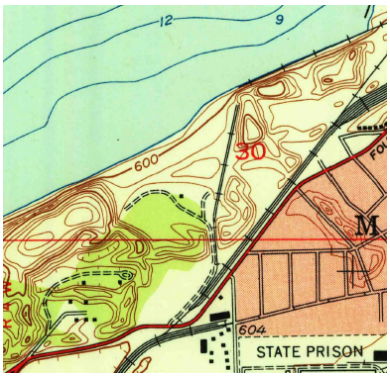
Western Michigan City: Mount Baldy / Crescent Dune (Section 30)

In the 1920s, with Hoosier Slide gone, the S. J. Taylor Sand Company had the South Shore run a line to its mining operation east of Mount Baldy and west of what had been the Hoosier Slide.[184]

Although it was not shown by sand pit symbols the area was, in mid-twentieth century, being mined by Producers Core Sand Corporation. In 1950 Producers Corp. was able to load and send out 10 cars per day.[185] They were also mining the area southeast of Mount Baldy. The area was then served by unimproved roads (the dashed double lines) with a spur from the South Shore Railroad. Bieber's notes show that the "large dune ¼-mile to the west" (Mount Baldy) was under lease.[186]

At this one location Producers was able to mine three grades of sand:[187]

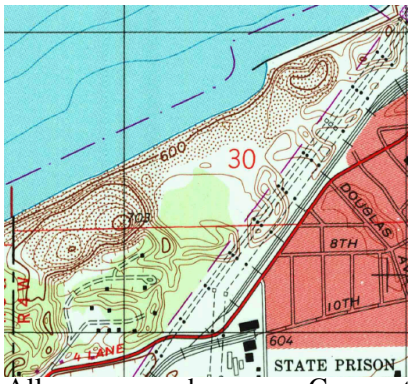
- Fine-grained sand from the top of old dunes
- Medium-grained sand – from below the tops of dunes
- Coarse-grained sand – from lower in the old dune and also from new dunes



USGS *Michigan City West* 1953



Tear drop dune, rail spur and most access roads gone. Power lines added..
USGS *Michigan City West* 1962



All access roads gone. Crescent Dune remains. (Mount Baldy contours not redrawn since 1962.)
USGS *Michigan City West*, 1994

Peoria Caterpillar purchased much of the sand and used it for making molds. Other customers used the sand for cores, for glass, and for abrasives.

Mount Baldy has significantly migrated southeastward since the 1962 map was platted, and is now close to advancing onto the NPS public parking lot that serves the area.

The 33-acre Crescent Dune area owned by NIPSCO was purchased by the National Lakeshore in 1996.

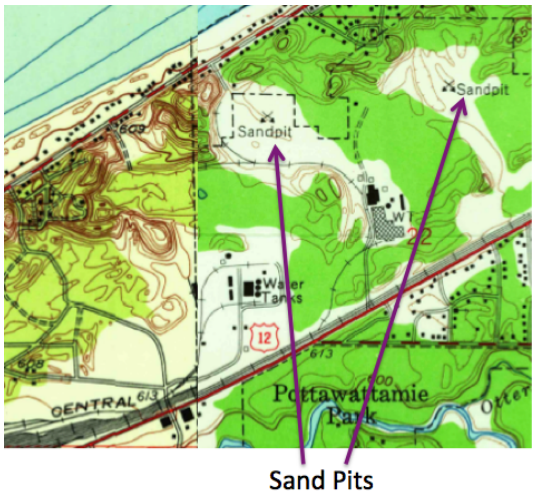


National Lakeshore boundaries. 2014

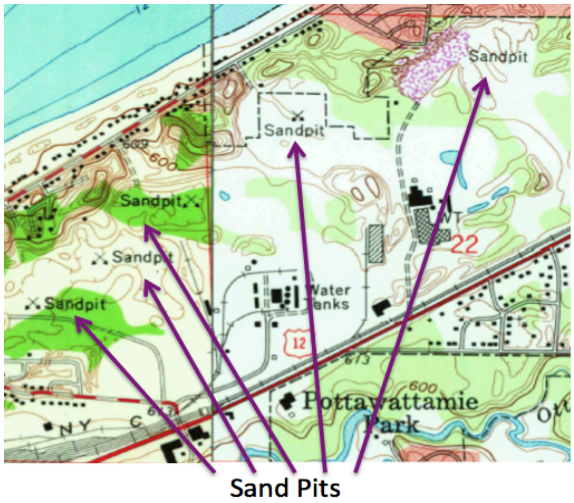
[184] Nicewarner, p. 267.
[185] Bieber's field notes, 1950, p. 27. He noted that the demand for sand was higher during the Second World War and at that time they were moving 20 cars per day.
[186] Bieber's field notes, 1950, p. 27.
[187] Ibid.

Michigan City—East (Sections 21 and 22)

In the mid-20th century, Producers Core Sand Corporation and Manley Sand Division of Martin Marietta Corporation[188] mined sand in eastern Michigan City between Sheridan Beach and Long Beach to the north and Pottawattamie Park. Producer's pits were located in Section 22 (to the right on the maps below). Manley's pits were located in Section 21. In April 1984 Manley Brothers firm was approved to continue the mining in this area. Note the differences between the three maps. The contour interval on all maps is 10 feet.



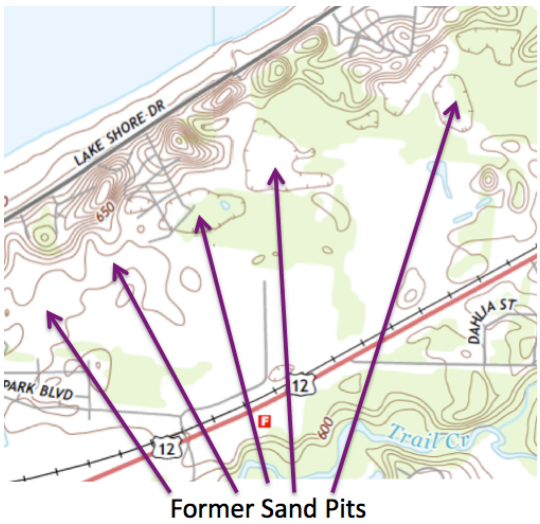
Left: USGS *Michigan City West* 1953
Right: USGS *Michigan City East* 1958



Left: USGS *Michigan City West* 1962
Right: USGS *Michigan City East* 1969



1958 aerial photograph showing the mined areas in eastern Michigan City.



USGS *Michigan City West* 2013 and *East* 2013

Gravel

In 1906, W. S. Blatchley, the Indiana state geologist, reported that there was "very little" gravel in the county and no place where a deposit was large enough to mine it for roads. Whereas there were then 1200 miles of roads in the county, only 89 of those miles were covered with crushed stone and none of them with gravel. [189]

[188] Bieber and Smith, 1950; McGregor, 1963.
[189] Blatchley, 1906, p. 180-181.

Appendix A

Sandsuckers Sunk

Two ill-fated sandsuckers have sunk off the coast of the Duneland area.

The *Muskegon* was built in 1872 as a combination passenger and package freight vessel called the *Peerless*. In 1908 it was sold to the Buck and Mullen Steamship Company and renamed the *Muskegon*. It was said to have used its private rooms as an offshore gambling house and possibly a bordello. It was later refitted as a sand-sucker.[190]

In any case, in 1910 the *Muskegon* burned at Michigan City's harbor and sank. The next year it was re-floated, some of its sand-sucking machinery was salvaged after which the ship was scuttled about two miles west of the harbor. The *Muskegon*, believed to be the oldest vessel in Indiana's waters, is listed on the Indiana Register of Historic Sites and Structures.



The *J. D. Marshall* [Indiana Department of Natural Resources]

The *J. D. Marshall* was built in 1891 to transport lumber. But as the lumber business was dying down it was purchased in 1911 by the Sand and Gravel Company with funds from an insurance settlement when the Muskegon burned, and converted into a sand sucker. The new owners then outfitted it with some of the equipment salvaged from the Muskegon.[191]

The *J. D. Marshall* set out on June 10, *1911,* to a spot immediately north of today's Dunes State Park and collected about 400 cubic yards of sand. Unfortunately, it then sprang a leak late that afternoon. A storm that evening caused the sand in the hull to shift and the vessel rolled over. Four lives were lost.

The shipwreck was found in 1979 and believed then to be the most intact of all Indiana shipwrecks in Lake Michigan. Unfortunately, there was an illegal salvage of the vessel in 1882 at which time the ship was partially raised, the propeller removed, then accidently dropped causing considerable damage when it hit the lake bottom.[192] The artifacts that had been removed were confiscated; many of them are on display in the park's nature center. The J. D. Marshall's propeller now sits just outside the Dunes State Park pavilion.

On September 30, 2013, the *J.D. Marshall* became Indiana's first underwater preserve. As such it is given the highest amount of protection a tract of land or now water can have within Indiana. The intent is simply to keep the *J D Marshall* in an undisturbed condition.[193]

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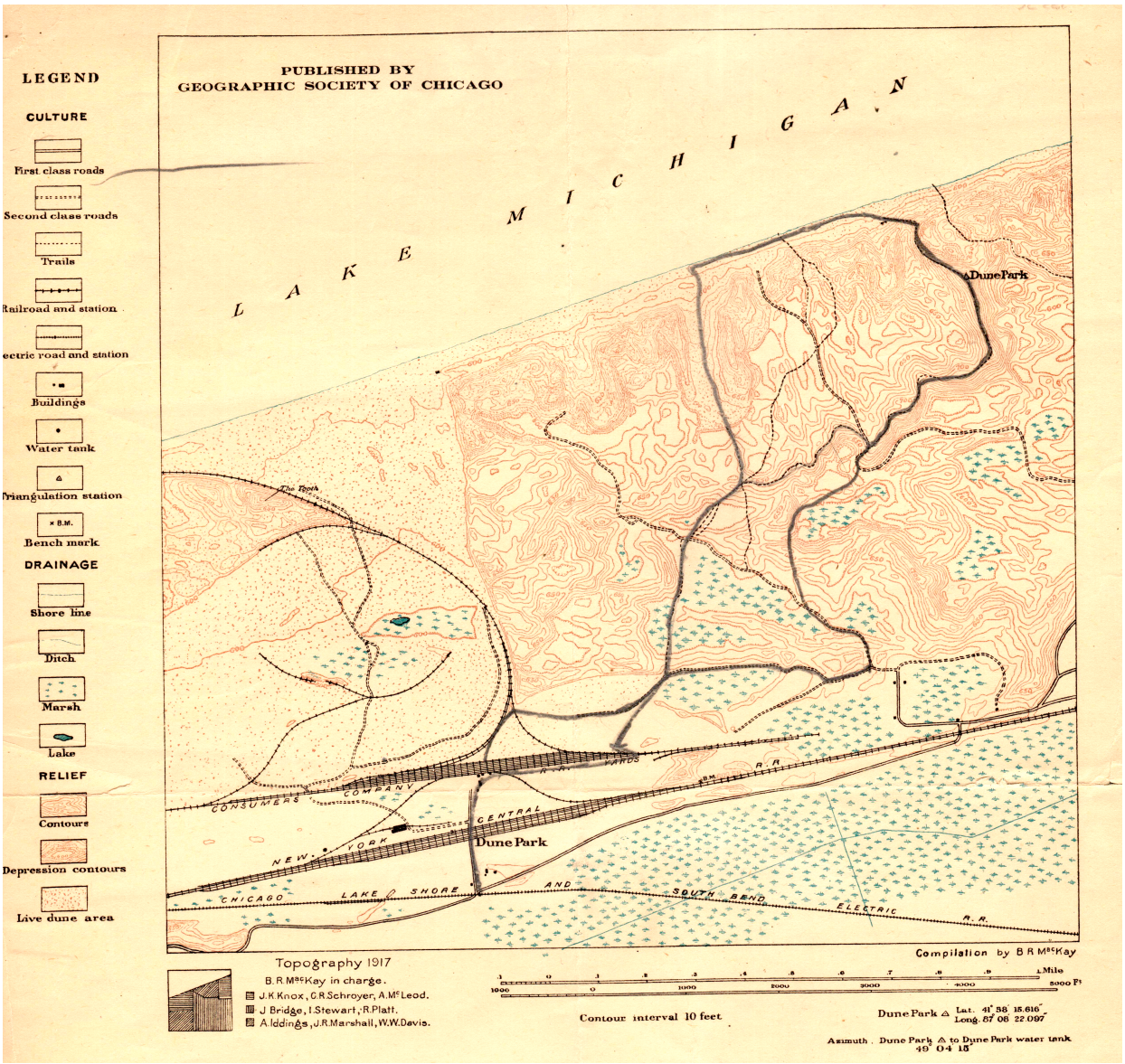
[190] Kaufmann, 2013, p. 85.
[191] Kaufmann, 2013, p. 79.
[192] Kaufmann, 2013, p. 80
[193] Indiana Department of Natural Resources. http://www.in.gov/dnr/parklake/files/sp-JDM_FAQ.PDF

Appendix B

1917 Topographic Map of Dune Park

The Dune Park map reproduced here is the oldest topographic map found of any location in Porter County. It clearly shows the dunes and wetlands as well as the trails, roads, and rail lines built in order to mine the area. Unlike the other topographic maps in this report, this map was not produced by the United States Geological Survey, but privately by the Geographic Society of Chicago. The map was so revolutionary (for its time) that it was necessary to include a definition of contour lines.

This map was part of the John Bergendahl folio donated by him to the Westchester Township Historical Society.



[Westchester Township History Museum.]

Appendix C

The Indiana Natural Gas Boom and its Effects on Sand Mining in the Dunes

The glass industry in Indiana expanded in the latter part of the nineteenth century when natural gas was found to be plentiful (and cheap) within bedrock located in east-central Indiana. Glass is made from silica, the major component of sand, but the cost of heating the sand to its melting point was prohibitive until this gas field was found.

The Trenton gas field was discovered in 1876 near the town of Muncie but not until 1884 recognized for what it was—t*he largest natural gas field yet known in the world*. Soon every town in that part of the state had gas wells and natural gas was being shipped by pipeline to cities as far away as Chicago.



The Trenton gas field in East-Central Indiana

The availability of cheap natural gas attracted many industries to the state.[194] The Muncie, Anderson, Alexandria, Elwood, Marion, and Kokomo areas of the state all took advantage of the availability of cheap natural gas and began offering incentives for companies to move there. Even tiny Harrisburg, Indiana, which changed its name to Gas City, induced 35 industries to move to town.[195] In 1887 the city of Kokomo convinced the Diamond Plate Glass Company of Pittsburgh to move to town and build a thirteen-acre factory, one of the largest in the state.[196] Diamond later opened a second plant in Elwood. In 1888, the Opalescent Glass Company was established, also in Kokomo.[197]

But of all the companies to move to East-Central Indiana to take advantage of this cheap gas, probably the best known was the Ball Brothers Manufacturing Company, which relocated from Buffalo, New York, to Muncie, in 1888. [198]



The famous Ball logo that has been embossed on millions of glass jars.

Ball was undoubtedly the best-known canning jar manufacturer in the world, but it also made a large number of other glass jars for the packaging industry during it's long history—many with the name Ball on the bottom.[199]

Arriving the same year, and building across the street from the Ball Company, was the Hemingray Glass Company, best known for its glass insulators needed then on telegraph poles, but soon to be used for telephone poles as well.[200]

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[194] Glass, 2000a, p. 313.
[195] Glass, 2000b, p. 22.
[196] Glass, 2000b, p. 22.
[197] Indiana Historical Society. http://www.indianahistory.org/our-services/books-publications/hbr/kokomo-glass.pdf.
[198] David Whitten. http://www.glassbottlemarks .com /ball-bros-glass-company.
[199] Ibid.
[200] Ohio History Connection. http://www.ohiohistorycentral.org/w/Hemingray_Glass_Company?rec=3329.

By 1900 Indiana ranked second among glass making states in the country.[201] By 1905 there were 71 glassworks working in Indiana and together, these produced about one-third of the entire production in the United States.[202]

Requirements for Making Glass

Quartz (silica or silicon dioxide, SiO2) is the major raw material used in the manufacture of glass, making up from 52 to 65 percent by weight of the ingredients.203 Sands used for glass must be uniformly sized without any course or fine particles. Coarse grains require too high a temperature and too much time in order to melt. Fine sand is too easily blown away by air currents in the furnaces.[204]

To make glass one needs sand, limestone, and fuel. Indiana had all three in abundance in the 1890s. However much of the sand at first used in the manufacture of Indiana glass came from the mining and crushing of sandstone, not sand dunes. In fact dune sand isn't even mentioned in a USGS 1907 report on the glass-sand industry of Indiana.[205] However, in 1922, the Indiana Department of Conservation promoted northwest Indiana noting that one of the largest areas of sand suitable for making glass was in the dune region of Lake, Porter, and LaPorte counties. It added, "the area contains an inexhaustible supply of glass sand."[206]

Dune Sand in Glass Making

As early as 1883, just before the realization that the Trenton gas field was a valuable source of energy, a glass factory was built in the Michigan City area. It succeeded in making some glass, but the efforts to do so commercially failed and the factory closed the next year.[207]

The percentage of silica in the sand determines the type of glass that can be made. Optical glass requires a very high silica content. Amber glass can be made with a lower silica content.[208]

An analysis of the glass sands of Indiana by the Indiana Department of Geology and Natural Resources (1914), shows that the sand from Michigan City was unique among 13 other sand sources analyzed from around the state. It shows that the silica content was least of those analyzed at 91.98%. The sand was third highest in alumina at 4.44%; very low in ferric oxide (iron) at .56%; highest of all in calcium oxide (lime) at 2.20%, and with only a trace of magnesium oxide (a glass clarifier).[209]

The Hoosier Slide

Although mining of the Hoosier Slide in Michigan City had begun in the 1890s, it wasn't used in Indiana's glass industries until 1912.[210] Probably, one drawback to using Hoosier Slide sand for glass was that the specific chemical makeup of the sand gave glass made from it a bluish color.[211]

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[201] Glass, 2000b, p. 22.
[202] Burchard, 1907, pp 361-376.
[203] Bates, p. 101.
[204] Murray, 1952, p. 2.
[205] Burchard, 1907, pp 361-376.
[206] Burford, 1922, p. 1049.
[207] Daniels, 1904, p. 183.
[208] Murray, 1952, p. 2.
[209] Barrett,1914.
[210] Minnetrista Cultural Center: "Colors of Ball Glass."
[211] Ibid.

The Hemingray Glass Company, in Muncie, made glass insulators and particularly liked colored glass. Over the years, they made insulators in many different colors. Hoosier Slide sand was particularly good because it needed no additives to create the blue color.



A Hemingray insulator

When Muncie's Ball Brothers Company owners decided that blue was good (because it limited the amount of sunlight that could pass through it and therefore might keep foods fresher longer), orders were sent north for this unique Hoosier Slide sand.

Soon the Ball company became closely identified with this shade of blue-aquamarine. No colorizing additives were used: the glass formed this color quite naturally. For many people then, the standard color for home canning jars was 'Ball Blue.' The Ball Company produced millions of Ball "Perfection" Mason and Ball "Ideal" jars, some in clear glass, but most of them blue.[212]



Ball's famous "blue" canning jars.

If the glass companies discovered what impurities in Hoosier Slide sand made glass blue, they have not made it known to the public.
In any case, by the early 1920s, the Hoosier Slide was mined out and the source of this very special kind of sand was gone. In anticipation of this, and finding no other source of sand than made "Ball Blue" jars, the Ball company stockpiled Hoosier Slide sand. This source allowed the continuing production of blue jars until 1936. After that the company went back to making clear glass jars.

Unfortunately much of the free natural gas in east-central Indiana had been wasted through unnecessary 24-hour heating, lighting, and flares. By 1902 so much gas had been consumed that underground gas pressures were noticeably dropping. By 1913, soon after Hoosier Slide sand started being used in the glass industry, Indiana was importing natural gas from West Virginia. By 1920, for the most part, Indiana had become a consumer rather than producer of natural gas. The gas boom was over.

Some glass companies continued making glass products in the state, but had to use other, and more expensive, sources of fuel. Ball ceased its glass making at the Muncie plant in 1962.[213] The Kokomo Opalescent Glass Company in Kokomo, however, is still in operation.

[212] Ministrista Cultural Center: "Hoosier Slide."
[213] Minnetrista Cultural Center: "Colors of Ball Glass."

Glossary

Blast Furnace: A type of furnace used to create the heat and environment to produce a metal such as iron.

Calumet Shoreline: A former shoreline of Lake Michigan, formed approximately 11,500 years ago, that runs parallel to the Dunes Highway in eastern Porter County (and Ridge Road in central and western Lake County). In Michigan City it crosses Franklin Street at about 9th Street.

Dune: A pile of sand produced by blowing wind.

Foundry: an industrial factory that produces metal castings, usually made of aluminum or cast iron. Foundries use sand to create a mold into which molten metal is poured.

Glenwood Shoreline: The oldest former shoreline of Lake Michigan, formed approximately 12,000 to 14,000 years ago. In Michigan City it crosses Franklin Street about Superior Street.

Gravel: A collection of rounded mineral or rock fragments at least 2 mm in diameter.

Moraine: A raised landmass composed of sediments (sand, silt, gravel) deposited by a melting glacier.

Lake Border Moraine: The younger portion of the Tinley/Lake Border Moraine in northwest Indiana found in Porter County near the Bailly homestead and in Lake County from Hobart to Merrillville.

Tinley Moraine: The older portion of the Tinley/Lake Border Moraine in northwest Indiana, found in Lake and Porter Counties north of the Valparaiso Moraine.

Valparaiso Moraine: The oldest moraine in northwest Indiana extending from the Cedar Lake region, past Valparaiso, northeastward to north of the city of LaPorte. Regionally, it extends from southeast Wisconsin, through Illinois and Indiana, to southwest Michigan.

Pleistocene: The geologic epoch in which the Ice Age occurred. When this era began and ended is still under scrutiny. The International Commission on Stratigraphy (in 2009) listed the dates as 2.6 million to 11,700 years ago.

Quartz: SiO_2; A very common mineral composed of silicon and oxygen. The primary constituent of Duneland sand.

Refractory: The ability of a solid material to be heated and maintain its physical and chemical properties, to be heated without deformation and without becoming part of the product.

Sand: An unconsolidated (uncemented) loose material whose grains are larger than 1/16 mm and smaller than 2mm.

Shoal: A portion of a lake or sea bottom where the water is shallow.

Till: Poorly sorted material deposited directly by a glacier.

Tolleston Shoreline: The youngest of Lake Michigan shorelines found north of the Little Calumet River. Formation started about 4,700 years ago. The Tolleston dunes nearest the lake are often called "recent dunes." In Lake County, the oldest portion of the shoreline, south of the Grand Calumet River, is often called the High Tolleston Shoreline. In Lake County the lower Tolleston shorelines compose a "dune and swale" landscape of more than 100 parallel small ridges.

Bibliography and Other Resources

Adams, Will. *Reports of Cases Decided in the Appellate Court of the State of Indiana, Volume 72*. Fort Wayne, Indiana: Fort Wayne Printing Company, 1921.

Ali, Maria F., HABS (Historic American Buildings Survey). Century of Progress Historic District. Summer 1994. http://www.livingplaces.com/IN/Porter_County/Beverly_Shores_Town/Century_of_Progress_Historic_District.html. Downloaded December 8, 2014.

Andreas, Alfred Theodore. *History of Chicago: From the Earliest Period to the Present Time*. New York: Arno Press, 1886.

Ball, Timothy Horton. *Northwestern Indiana from 1800 to 1900*. Chicago: Donohue & Henneberry, 1900.

Bar Association (Chicago) *Record*. *Vol. 1,* number 4. April, 1919. http://books.google.com/books?id=cTEVAQAAIAAJ&pg=PA117&lpg=PA117&dq=1890+OR+1891+OR+1892+OR+1893+OR+1894+OR+1895+OR+1896+OR+1897+%22A.+J.+Bedard%22&source=bl&ots=GehFMyj41Z&sig=Pr9tx4WP2_rAQptP_MQpy3eeHCU&hl=en&sa=X&ei=ys9YVMqGE-qUsQS9gIG4AQ&ved=0CDIQ6AEwAQ#v=onepage&q=1890%20OR%201891%20OR%201892%20OR%201893%20OR%201894%20OR%201895%20OR%201896%20OR%201897%20%22A.%20J.%20Bedard%22&f=false

Barrett, Edward. *Thirty-sixth Annual Report of Department of Geology and Natural Resources, Indiana. 1911*. Indianapolis. 1912.

Barrett, Edward. *Thirty-eighth Annual Report of Department of Geology and Natural Resources, Indiana. 1913*. Indianapolis. 1914.

Bates, Robert L. *Geology of Industrial Rocks and Minerals*. New York: Dover Publications, 1969.

Bieber, Charles L. Unpublished field notes held at the DePauw University Archives. 1950.

Bieber, Charles L. "Distribution Patterns of Sand and Gravel Pits in Northwestern Indiana." *Proceedings of the Indiana Academy of Science,* 59 [1949]: pp. 221-24.

Bieber, Charles L. and Ned M. Smith. *Industrial Sands of the Indiana Dunes: Bulletin No. 7*. Bloomington, Indiana: Indiana Department of Conservation: Geological Survey. 1952.

Bieker, Katherine. "Moving Sand for Marina Project." *The Vidette-Messenger*. July 16, 1992.

Blatchley, W. S. *Annual Repor*t, no. 30. Indianapolis: Indiana Department of Geology and Natural Resources, 1906.

Blatchley, W. S. *Annual Report*, no. 31. Indianapolis Indiana Department of Geology and Natural Resources, 1907

Blumenfeld, Valerie. Personal email, May 9, 2015.

Boomhower, Ray. "The Hoosier Slide: *Monument of Never Ending Sand*" *Traces of Indiana and Midwestern History* 5, no. 2 [Spring 1993]: pp. 12–17.

Burchard, E. F. "Glass-sand Industry of Indiana, Kentucky, and Ohio." *United States Geological Survey Bulletin* 315 [1907]: pp. 361-76.

Bureau, Indiana General Assembly Legislative. *Yearbook of the State of Indiana*. State of Indiana. Executive Dept., 1933.

Burford, William. B. *Hand Book of Indiana Geology: Publication No. 21*. Indianapolis: Indiana Department of Conservation, 1922.

John Bergendahl collection. Westchester Township History Museum.

Calvert, Gwalter C. "Hoosier Slide." Typewritten manuscript held by the Michigan City (Indiana) Historical Society. Undated.

Canright, Betty and Eva Hopkins. *A Porter Chronology*. 2011 Downloaded January 14, 2015. http://www.townofporter.com/index.php?page=history
Carr, Donald D. *Location of Sand and Gravel Operations in Indiana* (map). Bloomington, Indiana: Indiana Geological Survey, 1964.
Carr, Donald D. "Specialty Sand Resources of Indiana." *Bulletin 42-F* Bloomington, Indiana: Indiana Geological Survey, 1971.
Carr, Donald D. and William M. Webb. "Sand and Gravel Resources of Indiana." *Bulletin 42-D*. Bloomington, Indiana: Indiana Geological Survey, 1970.
Chesterton Tribune, September 13, 1890.
Chesterton Tribune, May 7, 1898. Reprinted September 3, 1976.
Chesterton Tribune, "He's Some Dreamer: Man Named Ogden Would Transform Lake Front at Miller." Thursday, January 23, 1913.
Chicago Association of Commerce. *Blue Book of Chicago Commerce*, 1917.
Chicago Bar Association. See Bar Association
*Chicago Daily Tribune***,** December 30, 1893.
*Chicago Daily Tribune***,** March 23, 1902.
Chicago Tribune, "Prepare Pollution Control Ordinance for Foundries." Aug. 20, 1967.
Coambs, Norris. "Historians Hear about Sand Mining." *Chesterton Tribune. March 28, 1986.*
Cole, Kenneth L. "Twocreekan Spruce Forest at the South End of Lake Michigan." In *Quaternary Record of Northeastern Illinois and Northwestern Indiana*, edited by Ardith K. Hansel and W. Hilton Johnson. 35-37. American Quaternary Association. 1986.
Conard, Howard L. *Magazine of Western History* 14. [May-October 1891]: 192-200.
Concrete 12, no. 1. "Men and Mills: Napoleon C. Fisher." (Obituary). 1918.
Cox, E. T. *Fifth Annual Report of the Geological Survey of Indiana, Made During the Year 1873*. Indianapolis: Sentinel Company, 1873.
Currey, Josiah Seymour. *Chicago: Its History and its Builders: A Century of Marvelous Growth*. Chicago: S. J. Clarke Publishing Company, 1918.
Daniels, E. D. *A Twentieth Century History and Biographical Record of LaPorte County Indiana*. Chicago: Lewis Publishing Company, 1904.
Davis, Stephen E. Personal email, November 18, 2014.
Engle, J. Ronald. *Sacred Sands: The Struggle for Community in the Indiana Dunes*. Middletown, Connecticut: Wesleyan University Press, 1983.
Fitzgerald, James J. *Burnham's Manual of Chicago Securities*. Chicago: John Burnham & Company, 1918.
Garard, George A. "Portage Township." In *The Counties of Porter and Lake,* edited by Weston A. Goodspeed and Charles Blanchard, 213-18. Chicago: F. A. Battery and Company, 1882.
Gary Evening Post, December 27, 1913.
Gary Post-Tribune. "Dyer, 2nd Firm Get Sand Permits." September 24, 1963. Elmer Jacobsen Papers, Calumet Regional Archives.
Gary Post-Tribune, "Arrest Jail Sand Mine Figure Again." July 24, 1964, pp. 1 and 6.
Gentz, R. S. Letter to Inland Steel Company employees. March 22, 1966.
Geographic Society of Chicago. *Dune Park* [map.] Chicago: 1917.
Glass, James A. "The Gas Boom in East Central Indiana." *Indiana Magazine of History* 96. No. 4 [December 2000]: pp. 313-335.
Glass, James A. "The Indiana Gas Boom and its Legacies." *Traces of Indiana and Midwestern History*. Summer 2000.
Goodan, Anita. Indiana State Prison to Celebrate Sesquicentennial. December 1, 2010.

http://www.wkvi.com/tag/michigan-city-indiana/. Downloaded December 8, 2014.
Goodrich, James P., Governor, *Yearbook for the State of Indiana for the year 1918*. Indianapolis. 1919.
Goodspeed, Weston A. and Charles Blanchard. *The Counties of Porter and Lake*. Chicago: F. A. Battery and Company, 1882.
Gray, Ralph D. *Public Ports for Indiana: A History of the Indiana Port Commission*. Indianapolis: Indiana Historical Bureau, 1998.
Harrison, Mitchell C. *Prominent and Progressive Americans: An Encyclopædia of Contemporaneous Biography*. New York: New York Tribune. 1904.
Historical Society of Ogden Dunes. http://odhistory.org/3701/4001.html. Downloaded October 12, 2014.
Indiana Department of Natural Resources. The J.D. Marshall Preserve: Frequently Asked Questions. http://www.in.gov/dnr/parklake/files/sp-JDM_FAQ.PDF. Downloaded October 13, 2014.
Indiana Dunes National Lakeshore. http://www.nps.gov/indu/planyourvisit/portage-lakefront-and-riverwalk.htm
Indiana Dunes Administrative History, Part I, Chapter 2. www.nps.gov/parkhistory/online_books
Indiana Historical Society web page. "Kokomo Opalescent Glass Company, Inc." http://www.indianahistory.org/our-services/books-publications/hbr/kokomo-glass.pdf. Downloaded November, 14, 2014.
Indianapolis News. **May 6, 1908, p.** 13.
Industrial Chicago: The Building Interests. Chicago: Goodspeed Publishing Company, 1891.
Industrial World. Pittsburgh, January 3, 1910.
Izaak Walton League. "Northwestern University's Removal of Indiana Dunes Sand Creates a Furor." *Izaak Walton Magazine* 27, no. 7, [July 1962]: p. 17.
Jones, W. D. *Northern Portion of Lake County, Indian*a [map], Chicago: Rufus Blanchard, 1906.
Kadlec, Georgie Silha. In *Steel Shavings* 28. Edited by James Lane. Gary, Indiana: Indiana University Northwest, 1998. pp. 117-119.
Kaufmann, Kira E. "Hoosier History in the Deep: Survey of Lake Michigan Historic Shipwrecks in Indiana's Waters. *Indiana Archaeology* 8, no. 1 [2013]: pp. 72-103.
Kettleborough, Charles. *Year Book of the State of Indiana for the Year 1918*. Indianapolis: The Legislative Reference Bureau, 1919.
Lafayette Morning Journal. "An Indiana Landmark Going to Chicago: An Interesting Letter from the Lake—The Fate of "Hoosier Slide." Monday May 18, 1891.
Lane, James, *Steel Shavings* 28. Gary, Indiana: Indiana University Northwest, 1998.
Laue, John. "An Oral History of Edgewater, A Disappearing Community." In *Steel Shavings: Tales of Lake Michigan and the Northwest Indiana Dunelands*. Illustrated by Dale Fleming and edited by James Lane. Gary, Indiana: Indiana University Northwest, 1998.
Lewis Publishing Company. *History of Porter County, Indiana: A Narrative Account of its Historical Progress, its People and its Principal Interests*. Chicago. 1912
Lindstrom, Ruth Nicholson. *Sand in My Shoes*: *The Writings of Ruth Nicholson Lindstrom*. Edited by Verlaine Wright. New York. Universe, Inc., 2006.
Logan, W. N., E.R. Cumings, C. A. Malott, S. S. Visher, W. M. Tucker, and J. R. Reeves. *Handbook of Indiana Geology: Publication No. 21*. Indianapolis: The Department of Conservation, Division of Geology, 1922.

Magurean, John, and Bob Nicholson, personal interview, September 30, 2014.
Magurean, John, personal email, December 6, 2014.
Manny, Carter Hugh. Unpublished manuscript of an undated speech, held at the Old Lighthouse Museum, Michigan City, Indiana: 1961.
McGregor, Duncan J. *Gravels of Indiana*. Bloomington: Indiana Geological Survey: 1960.
McGregor, Duncan J. *Sand and Gravel Operations* [map]. Bloomington: Indiana Geological Survey, 1963.
Minnetrista Cultural Center. *Colors of Ball Glass*. Muncie, Indiana. Undated manuscript.
Minnetrista Cultural Center. *Hoosier Slide*. Muncie, Indiana. Undated manuscript.
Moore, Powell. *The Calumet Region: Indiana's Last Frontier*. Indianapolis: Indiana Historical Bureau, 1959.
Moses, Adolph. *The National Corporation Reporter: 1896-97*. Chicago: The United States Corporation Bureau, 1897.
Munger, Elizabeth M. *Michigan City's First Hundred Years*. Typewritten manuscript at the Old Lighthouse Museum at Michigan City. [Published in 1990.] Michigan City: Indiana Michigan City Historical Society, 1969.
Murray, Haydn H. "A Search for Silica Sands in Indiana." *Outdoor Indiana* 19, no. 4 [April 1952]: pp. 2-3.
News-Dispatch. "Credit Manny with Removal of Big Slide." Michigan City, Indiana. September 13, 1950. pp. 77.
News-Dispatch. "Producers Core Sand Co. Is Combine of Old Firms." Michigan City, Indiana. September 13, 1950.
Nicewarner, Gladys Bull. *Michigan City, Indiana – The Life of a Town*. Michigan City, Indiana: Self-published. 1980.
Notable Men of Illinois and their State. The Chicago Daily Journal. 1912
Northwest Indiana Genealogical Society. http://www.nwigs.org/ImageArchive/LakeStation/LakeStationImages.php
Northwestern University. "First Barge-Load of Rock for Lake Campus." *N U Alumni News*. July, 1962, p. 1.
Ohio History Connection. http://www.ohiohistorycentral.org/w/Hemingray_Glass_Company?rec=3329. Downloaded January, 2015.
Olson, N. K. ""Silica sand for glass production in a portion of the Atlantic Coastal Plain." *Pennsylvania Geological Survey Bulletin M-64*. 1969. 3-22.
Olson, N. K. "Silica sand for glass production in a portion of the Atlantic Coastal Plain: Proc. 5th Forum Geol." *Industrial. Minerals, Penn. Bur. Topo., Geol. Survey, Min. Res. Report* 64 (1969): pp. 3-22.
Outdoor Indiana. 19 [October, 1952]: 5.
Owen, Richard. *Report of a Geological Reconnoissance of Indiana, Made During the Years 1859 and 1860, under the direction of the late David Dale Owen, State Geologist*. Indianapolis, 1862.
Patton, John B. "Such Quantities of Sand." *Proceedings of the Indiana Academy of Science for 1975,* 85 [1976]: pp. 53-61.
Pettijohn, F.J. "Petrography of the beach sands of southern Lake Michigan." *The Journal of Geology* 39, [1931]: pp. 432-55.
Plampin, Barbara. "Tales of a Vanished Lake." *INPAWS Journal* 18, no. 3 [Autumn, 2011]: 6-7.
Platbook of LaPorte County. Chicago: George A. Ogle and Company, 1892.

S., J. "Indiana Sand is Fine Stuff." *Outdoor Indiana* 15 [October, 1948]: pp. 14-15.
Shack, John R. A Personal History Synopsis of R.J. Peterson. http://sdhistoricalsociety.net/oralhistory/interviews/APersonalHistoryofRJPeterson.htm
Schoon, Kenneth J. *Calumet Beginnings: Ancient Shorelines and Settlements at the South End of Lake Michigan*. Indiana University Press: Bloomington, Indiana. 2003.
Shaffer, Nelson R. "The Time of Sands: Quartz-rich Sand Deposits as a Renewable Resource." *Electronic Green Journal* 1, no. 24 [Winter 2006].
Shannon, Charles W. "The Sand Areas of Indiana." *Proceedings of the Indiana Academy of Science, 1911*. J. J. Rettger, Editor. Indianapolis [1912]: pp. 197-210.
Shepherd, Sylvia. "Wealthy Citizens, Steel Firms Clash Over Burns Ditch." *Chicago Daily Tribune,* September 3, 1959.
Sims, Fred A. *Biennial Report of the Secretary of State for the Fiscal Year ending September 30, 1908*. Indianapolis. 1908.
Smith Ned. M. and John B. Patton. *Industrial Sand Deposits of the Indiana Dunes*. Indianapolis: Indiana Department of Conservation Geological Survey. 1952.
Spring Mill Gazette. "The History of Spring Mill Inn." Indianapolis: Indiana Department of Natural Resources. Fall, 2013.
Stevenson, Lewis B. *Biennial Report of the Secretary of State of the State of Illinois*. Springfield, Illinois, 1915.
Thompson, Todd Alan. *Sedimentology, Internal Architecture, and Depositional History of the Indiana Dunes National Lakeshore and State Park*. Ph.D. dissertation for Indiana University Bloomington. 1987.
Thrift Press. *Atlas and Plat Book of Lake County, Indiana*. Rockford, Illinois: 1926.
United States Geological Survey. (Source of the topographic maps.) usgsstore@usgs.gov.
Valparaiso Porter County Vidette. "Effort to Bar Further Removal of Sand." December 13, 1916, p. 3.
Vidette-Messenger. *"The Krug Sand Company."* Valparaiso, *Indiana*, Thursday, April 9, 1931.
Vidette-Messenger. Valparaiso, *Indiana*, **July 25, 1973,** p. 14.
Whitten, David. http://www.glassbottlemarks .com /ball-bros-glass-company. Downloaded November 17, 2014.
Wilcox, Christina A., Young-Moon Chun, and Young D. Choi. "Redevelopment of Black Oak Savanna in an Abandoned Sand Mine in Indiana Dunes National Lakeshore, USA." *American Midland Naturalist* 154. [2005]: pp. 11-27.
Youngman, Peter. "An update on the Beginning of the Town." *The Hour Glass, Volume 7,* Number 6. June, 1999. *http://members.tripod.com/Ogden_Dunes/newsltr/7/hg7-6.html*. Downloaded November 1, 2014.
Youngman, Peter. old Ogden Dunes area photos. http://members.tripod.com/Ogden_Dunes/pix1.html. Downloaded December 6, 2015
Zoercher, Philip. *Reports of Cases Decided in the Appellate Court of the State of Indiana* 55. Indianapolis: The State of Indiana. 1915.