

Indiana Land Surveys: Their Development and Uses

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Land surveys are used to precisely define the locations and boundaries of tracts of land. Surveys provide the stable foundation on which our nation's system of private land ownership is based.

Hoosiers benefit from two excellent land survey systems: the United States Public Lands Survey System and the Indiana State Plane Coordinate System. This publication reviews the history and development of each system, how they work, and the particular value of each. This publication also provides examples that show readers how to locate and describe property using the U.S. Public Lands Survey System. Also noted are those lands not included in the original state survey and the reasons why they were recorded with a different system.

United States Public Lands Survey System

Land Surveys in the Colonial Period

The original 13 colonies that formed the United States used a land survey system brought from England called metes and bounds. This system for identifying property ownership was well established in English Common Law.

The **metes and bounds** survey system is based on a verbal description of a route that starts at a **Point of Beginning**. From the Point of Beginning, the property boundaries were described by a series of

“metes,” which would be compass headings and distances. Property boundaries could also include “bounds,” which would be additional general verbal descriptions of general boundaries such as a stream or ridgeline. The survey progression and property description would then end at the Point of Beginning. Permanent marks may or may not be used even if no specific physical feature separated property.

Early surveyors, including George Washington, became experts in this technique. Settlers brought this system as far west as Kentucky and Tennessee because these areas were governed by Virginia (in the case of Kentucky) and North Carolina (in the case of Tennessee).

Despite its widespread use, however, this system was fraught with difficulties and disputes. The metes and bounds system was clearly inadequate to address the issues of land ownership and distribution in the Northwest Territory, which included what is now Indiana. The United States gained control of the Northwest Territory, as a result of the 1783 Treaty of Paris, which formally ended the Revolutionary War. Although under control of the United States, the territory was administered by Virginia. The Northwest Territory was so named because it was northwest of the Ohio River. The territory included what are currently the states of Illinois, Indiana, Ohio, Michigan, Wisconsin, and part of Minnesota.



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The United States needed to establish its sovereignty in the Northwest Territory to ensure the British would not return due to lack of control. Virginia took the first step to establish sovereignty by establishing a survey system that provided a clear system for distributing land.

The first priority for the Virginia legislature was to ensure that the men who served under Brigadier General (then Lieutenant Colonel) George Rogers Clark during the Revolutionary War received land that was due to them for their service. General Clark was the commander of the Illinois Regiment, which had been authorized by Virginia. A total of 150,000 acres were reserved for General Clark's men in what are now Clark, Floyd, and Scott counties in Indiana. Authorities selected this area to avoid potential conflicts with existing American Indian settlements, but this was not successful, as subsequent conflicts would demonstrate.

William Clark, a cousin of the general (not the brother who would explore the Louisiana Purchase), surveyed a total of 298 tracts of land oriented more or less perpendicular to the Ohio River. William Clark went on to supervise the distribution of land.

General Clark, as the regiment's commander, received approximately 8,000 acres of land. Decreasing amounts were given to lesser ranking members, down to privates who received 108 acres. Having met their obligations to the soldiers who served in the Illinois Regiment, the Virginia legislature relinquished all claim of sovereignty for the remaining territory northwest of the Ohio River in the 1783 Virginia Act of Cession. This was accepted by the U.S. Congress in 1784. Connecticut also relinquished its potential claim to northern Indiana by an act of its legislature in 1786.

A Survey System for a New Nation

The U.S. Public Lands Survey System originated with the Land Ordinances of 1784 and 1785, which were passed by the Congress operating under the Articles of Confederation prior to the adoption of the Constitution. The land ordinances established a system that replaced metes and bounds. The system consisted of a main north-south line called the **Principal Meridian** and a main east-west line called the **Baseline**. Parallel lines at one-mile and six-mile intervals were drawn to create a square and rectangular pattern.

Thomas Jefferson chaired the congressional committee working on land issues. The committee included Congressmen Dr. Hugh Williamson, Elbridge Gerry,

David Howell, and Jacob Read. Williamson, who had traveled in Europe and obtained a medical degree at the University of Utrecht in the Netherlands, undoubtedly had been exposed to the orderly distribution of land by the Dutch in areas reclaimed from the sea and to the arrangement of Roman settlements in several cities and farmland areas in Europe. Although there has not been any direct evidence linking the discussions of this committee with the Roman system the similarities are remarkable.

The Romans developed a survey system that allowed for clear understanding of ownership and exactly measured areas for taxation purposes. The Roman survey system successfully distributed land to military veterans and others in territory conquered by Rome. Initially, the Roman army had been made up of landowners, but this policy left home many who could fight. As an incentive, long-serving veterans were guaranteed land in exchange for their service. This gave many a reason to volunteer.

The Romans settled discharged soldiers in conquered territories for two purposes. First, it rewarded soldiers, made them comfortable, and in some cases, wealthy. Second, it provided Roman administrators with local residents who had military experience and were both loyal to Rome and concerned about continued Roman control of the area in case native populations rebelled.

Roman city designs often started with the highly ordered design of the Roman military camp or *castrum*. The *castrum* featured a north-south axis called the *cardo maximus* and an east-west axis called *decumanus maximus*. Parallel lines were formed to both the north-south and east-west lines. This resulted in a very ordered pattern of squares and rectangles. These patterns can be seen today in Roman marching camps that have been preserved in the United Kingdom.

Similar patterns were established for nonmilitary settlements, which were called *colonia*. The Romans established many cities in Europe, the Middle East, and North Africa that followed the general outline of the military camp. Two Roman-designed cities are York in the United Kingdom and Cologne in Germany. A limited remnant of the Roman street design remains in Jerusalem.

Agricultural land outside the city was referred as the *territorium* and had similar patterns. This land was carefully surveyed by men who were called *agrimensors*. The *agrimensors* used a surveying device called a *groma*, or surveyor's cross (Figure 1). The *groma* consists of a

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vertical staff with horizontal crosspieces that intersect at right angles, each with a plumb bob that hangs vertically.

Surveyors used the instrument by lining up poles with the vertical strings. The device did an excellent job of laying out straight lines, squares, and rectangles. The end result was a survey that could be used for taxation, which was called a *cadaster*. The Romans also established stone boundary markers between property owners called a *terminus*.

Romans celebrated the boundary marks every February 23, the feast day of the Roman god of boundary marks, also called Terminus.

Although it was the last holiday of the Roman year, it was in some ways, the most important. Celebrants poured libations on the boundary marks to celebrate another year of peace between adjoining owners.

History of the U.S. Public Lands Survey in Indiana

The Northwest Ordinance of 1787 authorized settlement in the territory. The ordinance had far-reaching consequences as it outlined the basic principles that would guide not only the settlement of the Northwest Territory, but also the basic fabric of the United States.

Some researchers suggest that the Northwest Ordinance of 1787 was an ideal statement of the Enlightenment. It was long on concepts, but it would be years before these were fully implemented. The new ideas were concepts, revolutionary for the time, that we take for granted today. The ordinance stated that the people settling the Northwest Territory would enjoy freedom of religion (a civil liberty that would later be a key part of the Bill of Rights in the U.S. Constitution), private ownership of property, and government-sponsored public education. The ordinance further ensured that all states formed from the territory would be equal

(regardless of when they joined the Union), and prohibited slavery in the Northwest Territory.

The ordinance also recognized the prior land claims of the American Indians. The ordinance read, “The utmost good faith shall always be observed towards the Indians; their land and property shall never be taken without their consent; and, in their property, rights, and liberty, they shall never be invaded or disturbed.”

This provision made for a series of difficult situations. Many American Indians did not recognize the provisions of the Treaty of Paris or the Northwest Ordinance. Consequently, they made war on the United States in Ohio and Indiana. Under the leadership of Little Turtle of the Miami and Blue Jacket of the Shawnee, a confederacy of tribes conducted a series of successful attacks against a force commanded by General Josiah Harmar in 1790.

This same confederacy inflicted the largest defeat of U.S. forces by an American Indian force on November 4, 1791. In the Battle of the Wabash near Fort Recovery, Ohio, U.S. forces under the command of General Arthur St. Clair (who had replaced General Harmar) lost more than 600 troops, women, and civilian workers.

The defeat led to careful reconsideration of U.S. defense policy. President Washington selected General Anthony Wayne to command a new Army organization called the Legion of the United

States. The legion was a combined force of infantry, light infantry sharpshooters, dragoons, and artillery. General Wayne recruited and organized the force at Fort Lafayette in Pittsburgh, Pennsylvania, but avoided the temptations of city life and trained the force at a rural site on the west bank of the Ohio River in western Pennsylvania near Baden. The site was called Legion Ville.

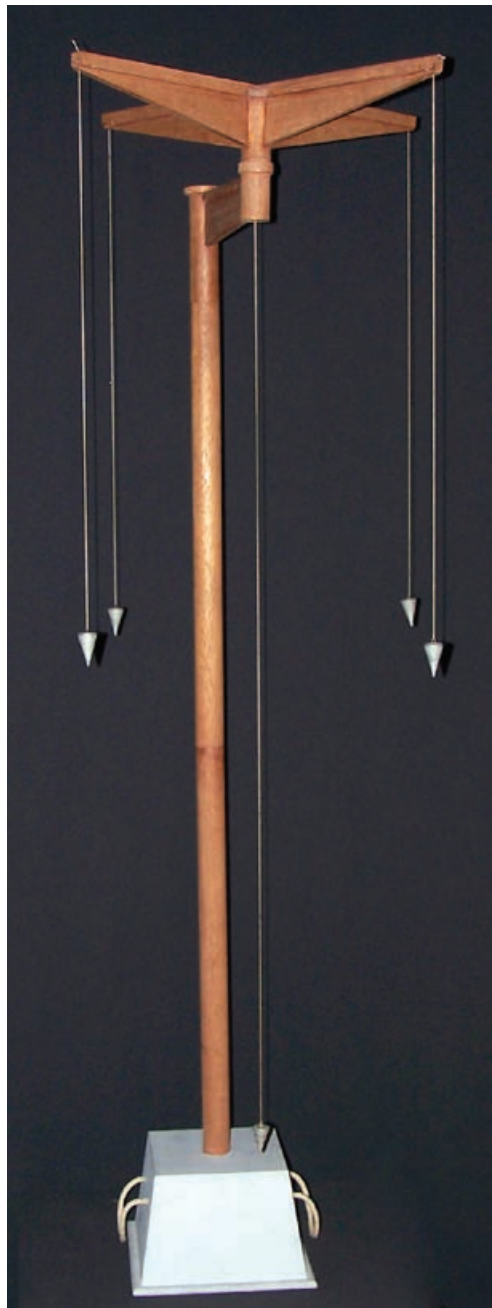


Figure 1. The groma was a Roman survey instrument. Photo provided by Sebastià Giralt.

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General Wayne and the legion met the American Indian confederation on August 20, 1794, near present-day Toledo, Ohio. It was called the Battle of Fallen Timbers because it occurred on a forest site that had been damaged by a wind storm.

Casualties were low on both sides because it was obvious to the American Indian leaders that the U.S. forces were too strong to be defeated with their resources. The confederation also found out that the British were not going to risk a confrontation with the United States by aiding them overtly.

When American Indian survivors of the battle attempted to enter the British Fort Miamis, they were turned away. The British had illegally built Fort Miamis, near present day Maumee, Ohio, in defiance of the Treaty of Paris. It was used to supply and encourage Indian tribes hostile to the United States. It was obvious to the American Indians that the British could not deliver when it counted. The tribes agreed to participate in peace talks, which concluded with the Greenville Treaty of 1795.

The treaty provided, among other things, for the settlement of approximately two-thirds of Ohio and a small, triangle-shaped piece of land that would eventually become part of Indiana. This small sliver of land is the only part of Indiana taken by military conquest.

A number of survey models were tested in Ohio. Based on those experiences, Indiana was the proving ground for what would be used across the remainder of the United States. The earliest survey work done in Indiana using the land ordinance model was in the wedge-shaped area formed by the Greenville Treaty Line on the west, the Ohio-Indiana border on the east, and the Ohio River on the south (Figure 2).

This land was the first in the state to be laid out in townships, sections, and quarter-sections. It was referred to as the **Gore of Indiana**. Gore is a term that refers to triangle-

shaped pieces of land, common occurrences in metes and bounds surveys — so common that it had a special name.

The Greenville Treaty Line, surveyed by Israel Ludlow in 1797, was the western boundary of territory ceded to the United States by various American Indian tribes as part of the Greenville Treaty. In Indiana, it runs south-southwest from a point 10 miles northwest of Greenville, Ohio (near Union City in Randolph County, Indiana) to the junction of the Ohio and Kentucky rivers east of Madison, Indiana (and more specifically the tiny settlement of Lamb). The boundary between Dearborn and Ripley counties is on the Greenville Treaty Line.

Soon after the Greenville Treaty, a boundary was also established between Ohio and Indiana on a meridian line running north from the junction of the Miami and Ohio rivers (later called the First Principal Meridian). This was also surveyed by Israel Ludlow.

Surveying the rest of Indiana, which began in 1803, was not without problems. Colonel Jared Mansfield, who later became the nation's second surveyor general, corrected many technical flaws and provided the framework for the current system.

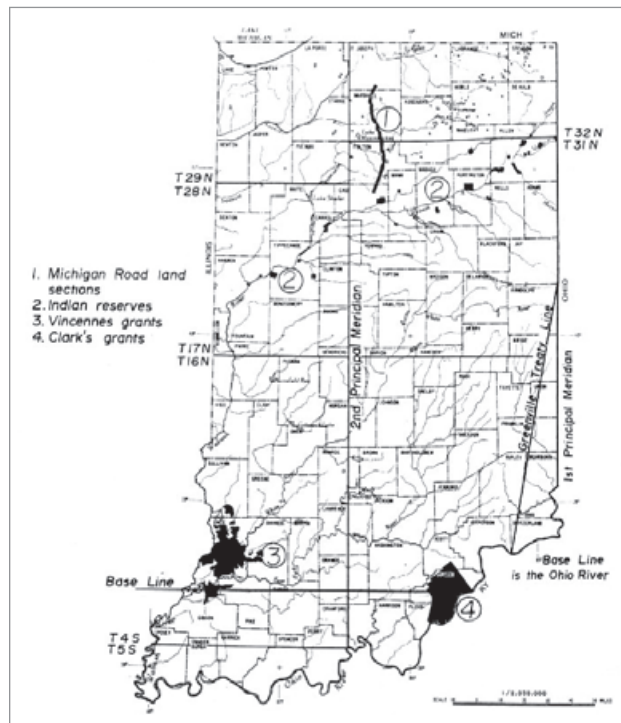


Figure 2. Location in Indiana of: the Greenville Treaty Line (in the southeast of the state); components of the U.S. Public Lands Survey System, including principal meridians, base lines, initial point, and correction lines; and nonsurvey areas.

One of the first difficulties was the fact that the land was already occupied. In compliance with the Northwest Ordinance of 1787, American Indian claims to land had to be respected. This resulted in a slow process of negotiation and, after the defeat at Fallen Timbers; it was not a negotiation between equals. Not all American Indian leaders supported the negotiations and many rallied around Tecumseh, a charismatic leader, opposed to encroachment on American Indian land by European settlers.

Tecumseh managed to put together a coalition of like-minded people and they gathered at a village called Prophetstown at the fork of

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the Tippecanoe and Wabash rivers, near present day Battleground, Indiana. Tecumseh was away gathering political support among other American Indian tribes to resist settlement, when his brother, Tenskwatawa (also known as the Prophet) attacked a force under the command of Territorial Governor William Henry Harrison that was camped near the village.

The attack, known as the Battle of Tippecanoe, occurred on November 7, 1811. The American Indian forces were soundly defeated and U.S. forces destroyed their village. Tecumseh was bitterly disappointed with this turn of events. He tried to bring back the coalition but was unsuccessful. He died fighting in the Battle of the Thames at Chatham, Ontario, on October 15, 1813, commanding 500 American Indian warriors as an ally of British forces in the War of 1812. These defeats effectively ended the military option for American Indian tribes in the territory.

Figure 3 shows the slow but steady reduction of American Indian land claims in Indiana. The survey system kept up with the progress of negotiation, which eventually ended American Indian claims in Indiana with the final treaty. Some effects of this land tenure can be seen in unusual angles in some properties, which are a result of American Indian treaty lines.

The end of American Indian tribal claims to land in Indiana came with the passage of the Indian Removal Act of 1830, championed by President Andrew Jackson, and passed after bitter debate in Congress. After a period of attempts to buy or trade land with the remaining tribes, Governor Daniel Wallace ordered the removal of the Potawatomi Band living near Twin Lakes under Chief Menominee in 1838. Negotiations continued on smaller tracts and were concluded by 1846. Many American Indians continued to live in Indiana but owned land as individuals.

The Public Lands Survey of Indiana was completed about 1834. In the process, the surveyors took notes that vividly described the land's physiography and vegetation, the location of settlements and Indian villages, and the problems they encountered.

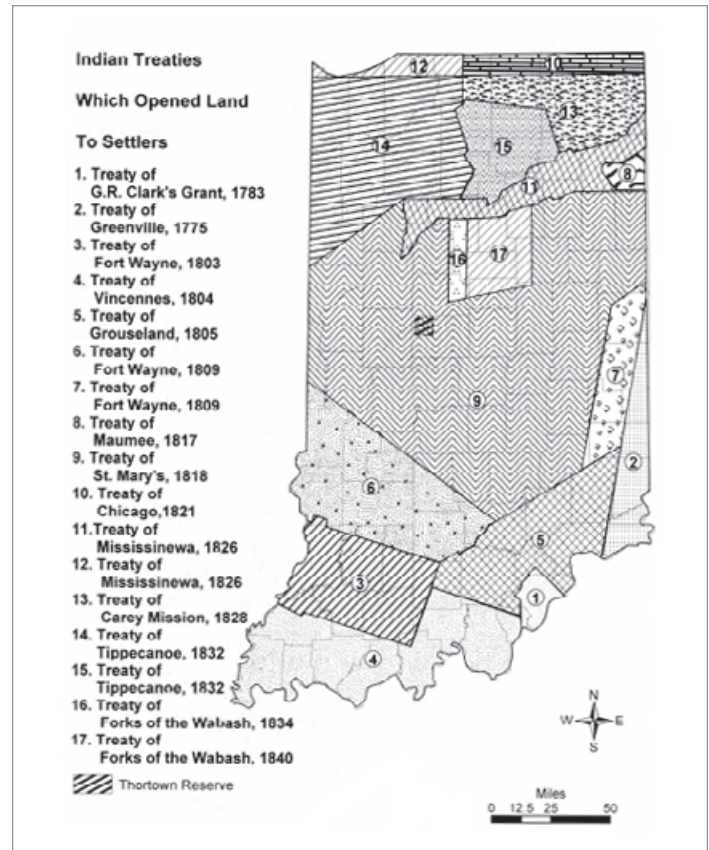


Figure 3. Location in American Indian treaty lines in Indiana

Elements of the U.S. Public Lands Survey System

The U.S. Public Lands Survey System established lines tracing north-south and east-west that permitted parcels of land to be located in a uniform descriptive manner.

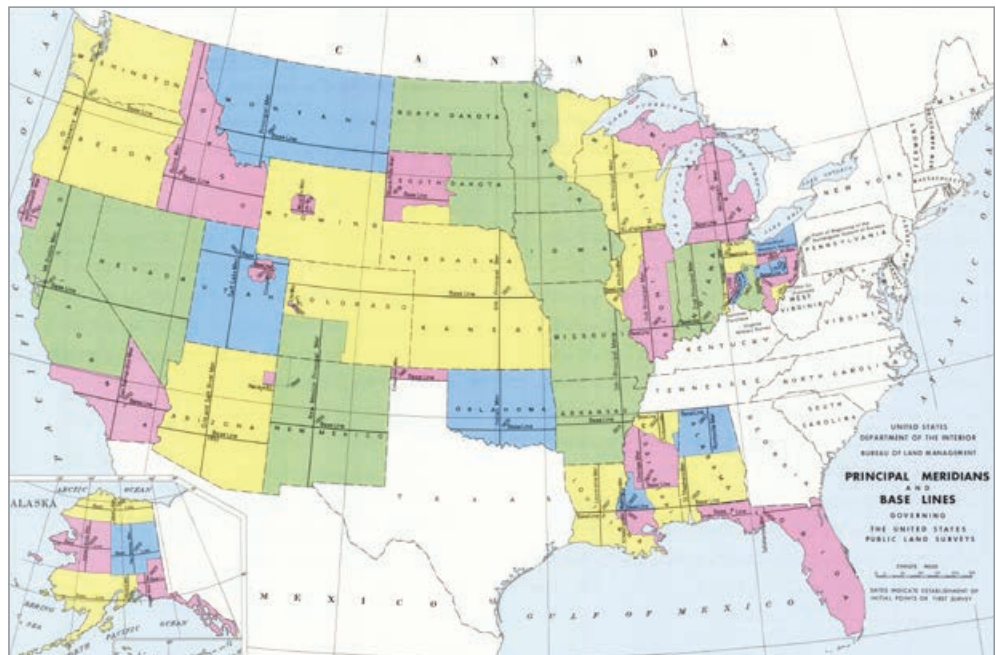


Figure 4. Principal meridians and baselines in the United States. Image provided by U.S. Bureau of Land Management.

Principal Meridians and Parallel Lines

Surveyors platted north-south lines by astronomic (“true”) north rather than by magnetic north, which changes with time. The controlling north-south line for an area is called a **principal meridian**. Principal meridians are located throughout the United States except for the 13 original states, plus Vermont, Maine, Tennessee, West Virginia, Texas, Kentucky, Hawaii, and parts of Ohio (Figure 4).

Indiana has two principal meridians (Figure 2). The First Principal Meridian (on the Indiana-Ohio border at 84° 48’ 50” longitude) was used to survey the wedge of land that had been part of the Greenville Treaty. The Second Principal Meridian runs through the center of the state at 86° 27’ 21” longitude. This meridian was used to survey the remainder of Indiana’s land. Drawn at six-mile intervals to the principal meridian lines were **parallel north-south lines**.

Baselines and Cardinal Lines

Surveyors also needed a controlling east-west reference line to define a given location. In the U.S. Public Lands Survey System, this is called the **baseline**. Two baselines were established in Indiana: the Ohio River, and another that runs through Knox, Gibson, Pike, Dubois, Greene, Washington, and Clark counties (Figure 2). These **cardinal east-west lines** were surveyed every six miles north and south of the baseline.

Initial Points

The location where a principal meridian and a baseline cross is called an **initial point**. The intersection of the First Principal Meridian and its baseline is along the Ohio River. In their first efforts, surveyors reset the baseline to the Ohio River every six miles. However, moving the baseline like that was very confusing and not used again.

The intersection of the Second Principal Meridian and its baseline is south of Paoli (Orange County) in the Hoosier National Forest (Figure 2). This particular spot has been marked and set aside for visitors in recognition of the importance of the survey to Indiana’s settlement and development. One would imagine that this was the place where surveying started but in reality surveyors worked their way over to the initial point from Vincennes.

Survey Townships

The 36-square-mile area within a set of survey lines running parallel to a principal meridian and a set of cardinal lines parallel to a baseline is referred to as a survey township. Such a township is distinct from a civil township, which is a unit of government that may or may not coincide geographically with the survey township.

Each survey township is identified by its distance from both the principal meridian and the baseline (Figure 5). For instance, the first six-mile segment north of the baseline is designated Township 1 North, or T1N; the second is T2N; the third T3N, etc. Similarly, the six-mile segments east and west of the principal meridian are called Range 1 East (R1E), Range 1 West (R1W), etc.

In identifying a specific survey township in the system, first the north-south block is listed, then the east-west block. For example, the shaded township in Figure 5 is T15N R3E, Second Principal Meridian. This particular township contains the state capital and downtown Indianapolis.

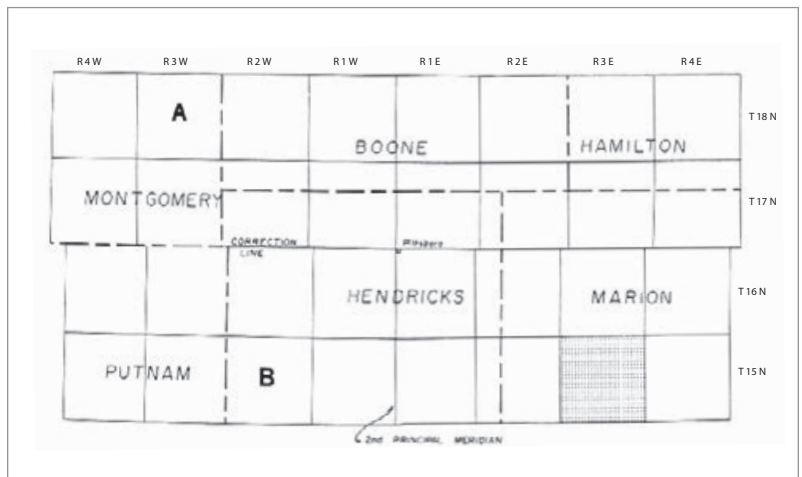


Figure 5. This area in central Indiana illustrates the survey township identification scheme east and west of the Second Principal Meridian and at the correction line between T16N and T17N. Township A is designated T18N R3W, Second Principal Meridian. Township B is T15N R2W, Second Principal Meridian.

Now test yourself on survey township identification. Referring again to Figure 5, write the designation for blocks A and B. The answers are at the end of the figure caption.

Township A _____

Township B _____

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Sections and Smaller

Each survey township, being approximately 36 square miles, is divided into 36 **sections**, which are numbered as shown in Figure 6. Theoretically, each section is 1 square mile and contains 640 acres. However, they are rarely exactly that size for a variety of reasons. Adjustments in townships that are more or less than 36 square miles are made in the northern and western tiers of sections (Sections 1, 2, 3, 4, 5, 6, 7, 18, 19, 30, and 31 in Figure 6).

Every section in the state has a unique designation based on section number and township identification. For example, the shaded area in Figure 6 is Section 10 T2N R3W, Second Principal Meridian.

To locate and identify particular parcels of land, a section is broken down into fractions that describe location and approximate area within the location. Figure 7 shows examples of this descriptive system. These fractions can be used in many combinations to describe a property.

For example, Parcel A in Figure 7 contains 160 acres and is called the Northwest 1/4 of Section 10 T2N R3W, Second Principal Meridian. Parcel B, which is 10 acres, would be described as the Southeast 1/4 of the Southeast 1/4 of the Southwest 1/4 of Section 10 T2N

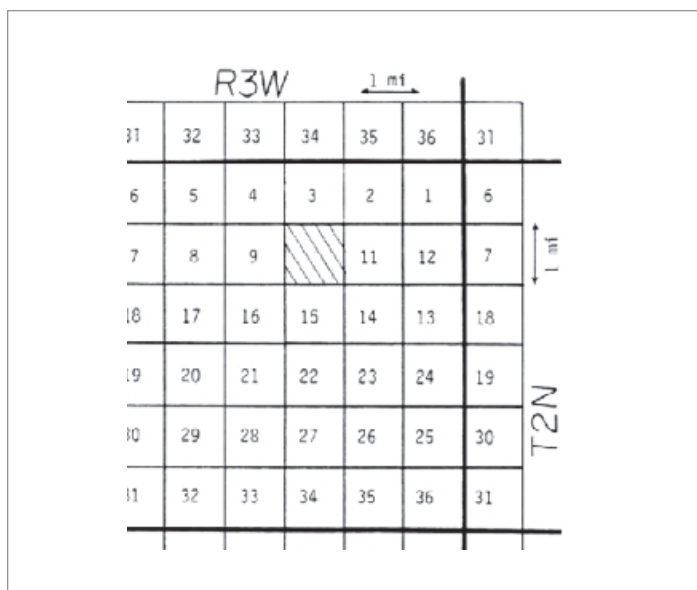


Figure 6. Sections within a survey township were numbered in the pattern shown here. Figure 7 shows a detail of Section 10.

R3W, Second Principal Meridian (written SE1/4 of SE1/4 of SW1/4 of Sec. 10 T2N R3W Second Principal Meridian).

Give the descriptions for parcels C, D and E. Answers are provided in the caption for Figure 7.

Parcel C _____

Parcel D _____

Parcel E _____

Lots

The U.S. Public Lands Survey System did not accommodate some small, irregular areas, such as those found on adjusted north and west sides of survey townships or adjoining major rivers or large lakes. These parcels are referred to as **lots**.

Correction Lines

Surveyors found that occasional corrections were needed to keep meridian lines from converging (as the survey moved north from the baseline) and from diverging as it moved south. To solve this problem, four east-west **correction lines** were designated where north-south township lines were adjusted to restore the six-mile interval.

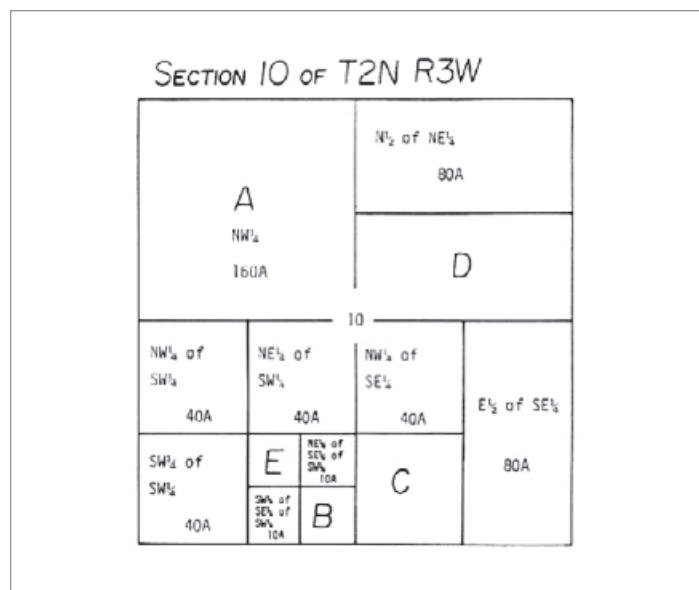


Figure 7. Detail of Section 10 of T2N R3W that illustrates the fractioning system used to locate and describe specific parcels of land. Parcel C is described as SW1/4 of SE1/4 of Section 10 T2N R3W, Second Principal Meridian. Parcel D is the S1/2 of NE1/4 of Section 10 T2N R3W, Second Principal Meridian. Parcel E is the NW1/4 of SE1/4 of SW1/4 of Section 10 T2N R3W, Second Principal Meridian.

Figure 2 locates the correction lines in the state:

1. Between T31N and T32N, north of Fort Wayne (Allen County), east of the Second Principal Meridian.
2. Between T28N and T29N, south of Rensselaer (Jasper County), west of the Meridian.
3. Between T16N and T17N, north of Indianapolis (Marion County), across the entire state.
4. Between T4S and T5S, north of Evansville (Vanderburgh County), west of the Meridian.

Correction lines are responsible for the doglegs in the east and west boundaries of the counties through which the correction lines pass. For example, Figure 2 shows the Marion-Hancock, Hancock-Henry, and Henry-Wayne county borders. Figure 3 shows the correction near Indianapolis in more detail. In a number of areas, section lines are offset by other correction lines. These areas are recognized by the tight, abrupt jogs in county roads that happen to follow section lines. These offsets resulted from original survey techniques, later improved, and do not denote major correction lines.

In later surveys of other states, correction lines were simply placed every 24 miles, instead of at long, irregular intervals as was used in Indiana when the system was just being developed.

The Five-point System

One procedure that is possible because of the U.S. Public Lands Survey allows one to locate specific places using the **five-point system**. This procedure gives a general location — such as might be needed for a soil survey. The five points are the four corners and center of a section. The specific place is located by giving the distance from one of these points.

For example, in Marshall County, the typical location of Plainfield soil is 1,100 feet west and 1,400 feet north of the center of Section 30, T34N R1E. The typical Rensselaer soil is 1,150 feet east and 380 feet north of the southwest corner of Section 9, T33N R4E. Note that in any location from a corner, the cardinal directions (east west, north, and south) will be used.

Nonsurvey Areas in Indiana

When the state survey was completed in 1834, some fairly sizable tracts of land had been excluded. What was not included (and why) is explained below. The locations of these tracts are shown in Figure 2.

The Michigan Road Land Sections

This area contains 45 sections. The land was part of what the Pottawatomi ceded to the United States in a treaty. The U.S. government then gave the land to the State of Indiana, which subsequently sold off the 45 sections to fund a road to be built from Michigan City to Madison through Indianapolis.

The road was called the Michigan Road. It was not ever intended to travel to the state of Michigan, but to Lake Michigan. There was no settlement at Michigan City when the road was proposed to end there. Madison, on the other hand, was a thriving river port. The Michigan City location was selected because it provided the only natural port, albeit small, where Trail Creek empties into Lake Michigan. This port was always somewhat small but now has great use for recreational boating.

The land sold for the Michigan Road begins just south of Lakeville, Indiana, on U.S. Highway 31 in St. Joseph County, proceeds along U.S. Highway 31 through Marshall and Fulton counties, and follows Indiana State Road 25 out of Rochester, ending where Indiana State Road 25 and Indiana State Road 16 intersect in Cass County. Since these sections were surveyed before the official land survey was complete, they were not included.

The Indian Reserves

There were a number of areas not ceded to the federal government when the American Indian tribes completed negotiations. These areas (or reserves) are carefully spelled out and located in the various treaties. They are mostly along rivers in 15 counties from Warren County in the west to Allen and Jay counties in the east.

Some are named for the owners or Indian leaders, while others are identified only by number. Usually, the owners were tribal members or individuals who had some connection to the tribe such as traders or the descendents of marriages between tribal members and Europeans.

The Vincennes Grants

These lands in Knox, Sullivan, Daviess, Pike, and Gibson counties represent claims or settlements from the U.S. government or previous French or British administrations that were settled prior to the survey; thus, they were not included.

Most of the lands in these grants were surveyed on a diagonal perpendicular to the Wabash River.

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The Clark Military Grants

Land in Clark, Scott, and Floyd counties was given to men who served with General George Rogers Clark during the American Revolution. Since the grants had been surveyed earlier, they were not included in the U.S. Public Lands Survey. This land was surveyed on lines generally perpendicular to the Ohio River.

Indiana State Plane Coordinate Survey System

The State Plane Coordinate System provides an alternate method for identifying tracts of land in Indiana. Established by the Indiana Legislature in 1951, it is modeled after a system suggested by the U.S. Coast and Geodetic Survey (now National Geodetic Survey) and the Council of State Governments in the 1930s.

Figure 8 shows the arrangement of this system. This survey has several features useful to professional land surveyors. It establishes the location of points on the Earth's surface by traversing from points that have been previously identified with considerable accuracy. A location is designated as the intersection of two distance measurements — one in the east-west direction (x-axis), the other in the north-south direction (y-axis).

The state is divided into an east zone and a west zone. These zones are relatively narrow to minimize error from representing the Earth's curvature on a flat map. Figure 8 shows the locations of the zones and the x- and y-axes. The counties in the east zone use longitude $85^{\circ} 40'$ as the central meridian (y-axis), and counties in the west zone use longitude $87^{\circ} 05'$ as the central meridian. The x-axis is at latitude $37^{\circ} 30'$ in Kentucky, ensuring that all Indiana State Plane Coordinates will be positive.

The system is based on hundreds of horizontal control stations on the ground. These coordinates are published and descriptions are available, enabling surveyors to tie their horizontal control surveys to a common horizontal figure — much like vertical control leveling can be tied to a common vertical figure of sea level. The location of any point surveyed in this system is fixed relative to the stations and may be relocated even if local markers are destroyed.

The Indiana State Plane Coordinate System has gained considerable support since its adoption and has proven a valuable tool. Its coordinates are included on U.S. Geological Survey topographic maps and county soil survey maps.

Summary

When land is sold or purchased, it is wise to obtain another survey of the tract to make sure the boundaries are located accurately. For instance, if farmland acreage is described relative to the U.S. Public Lands Survey, consider having it resurveyed according to the State Plane Coordinate System for confirmation.

Regardless of the system to be used, consult a professional land surveyor who has the qualifications to deal with technical aspects of finding precise points and lines on the land.

More information about land surveys, their development, and uses is available in:

Curtis, K. S. 1974. *The Indiana State Plane Coordinate System*, Surveying Publications Series No.2, June Indiana Society of Professional Land Surveyors, 196 pp.

Linklater, Andro 2002. *Measuring America*. Walker and Co., 310 pp.

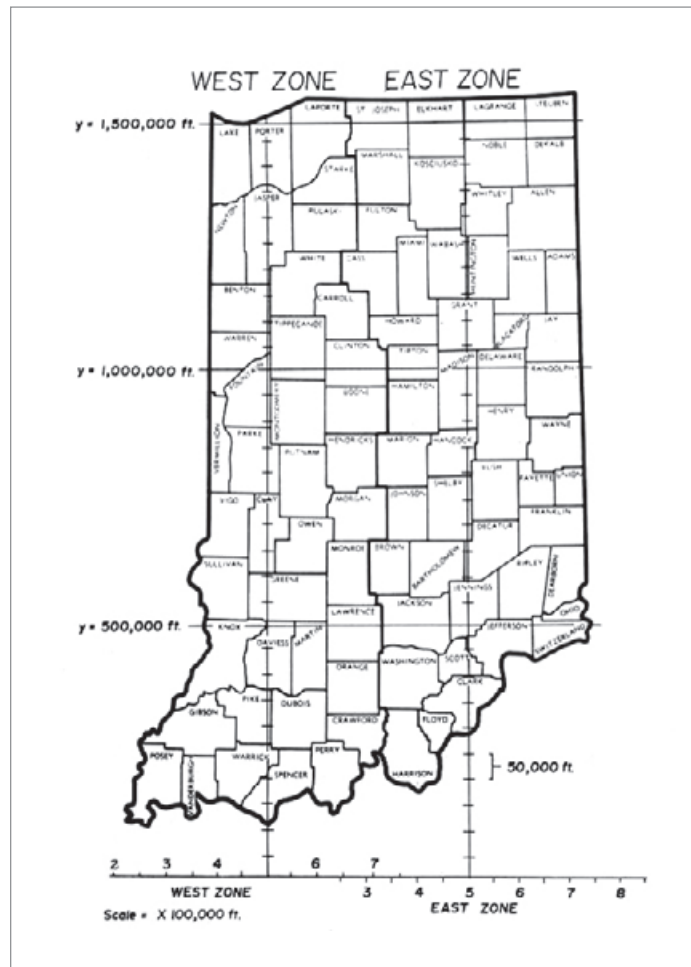


Figure 8: The Indiana State Plane Coordinate System. Note that the east and west meridians have different numbering systems on the x-axis.

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Lindsey, A. A. "The Indiana of 1816," p. 10-29. In *Lindsey's Natural Features of Indiana*, Indiana Academy of Science, 600 pp.

McEntyre, J. G. 1978. *Land Survey Systems*. John Wiley & Sons, Inc., 537 pp.

White, C. A. *A History of the Rectangular Survey System*. US Government Printing Office, 774 pp.

Wilson, George R. 1919. *Early Indiana Trails and Surveys*, Indiana Historical Society Press, 114 pp.

March 2013

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