Give an Inch, Take a Mile

A Kit Kat Club Essay
January 20, 2009
Columbus Club, Columbus, Ohio
by Bob Loversidge

Good evening. This is my first Kit Kat essay. OK . . . I think I have figured out the "great secret Kit Kat initiation hazing routine." First you sandwich me between Jim Carpenter's great essay of last month and Tad Jeffrey's "umpteenth" essay. Then you schedule my talk the same day that one of our age's great orators delivers his historic inaugural address in Washington, D.C. It all seemed so easy – and so far away, when Ric first asked me if I would speak to you on this January evening in 2009. Oh well . . .

The title of my essay is ***Give an Inch, Take a Mile***. Many of you know that I have a fifteen year old daughter at home, so you may be thinking that this essay has something to do with the occasionally arduous task of negotiating with teens . . . you know, how they always try to get just a little more out of us . . . but it is not. My talk tonight has been directly inspired by a book -- *Measuring America*, by Andro Linklater[1], and by Kit Kat member Tom Moyer, with whom I had an interesting discussion about the role of the early courts in Ohio in resolving land ownership and boundary disputes. Additional valuable assistance has been rendered by another Kit Kat member, Bill Laidlaw (which will become apparent in a little while).

I offer you *greetings* from Phil Schneider, my Kit Kat sponsor, who reports that his absence tonight has absolutely nothing to do with the fact that it is 10° and cloudy in Columbus and 80° and sunny in Phoenix.

The subject that caught my interest when I first read Linklater's book is the incredible and immense task of organizing a new country from the wilderness -- a task that we don't hear all that much about when we review American history. So, we won the war for American independence. So, we acquired all that land – more than the land area of the original colonies. Now what? The founding fathers – or "founding brothers" as one recent author[2] called them, had an immense set of tasks before them -- with an incredible sense of urgency -- one that rivals the important issues before our new Administration in Washington, today.

There was *so* much to be done . . . creating unity and an identity for the new country (George Washington), a currency and banking system (Alexander Hamilton), a diplomatic stature (Thomas Jefferson), a system of laws and courts (John Jay) -- this list goes on and on. From the

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[1] Linklater, Andro. *Measuring America: How the United States Was Shaped by the Greatest Land Sale in History.* (New York; Plume, 2003)
[2] Joseph J. Ellis

recent war, there was the tremendous debt to the states and to foreign governments owed by the government, with very few ways to generate revenue. And, many Revolutionary War soldiers had been promised land in compensation for their army service. So, with little cash and all that land -- millions of acres of basically untamed wilderness -- a new plan was needed. Furthermore, there was an incentive for the Federal government to control this land, and to sell it to pay down the debt and run the government. As you might expect, there were many obstacles to this, not the least of which were the Native American inhabitants of the land and the fact that a number of the original states had claims for parts or all of the new territory.

Clearly there is much more to this topic that we can cover in the course of one essay, so I will narrow the topic to three aspects, conveniently ignoring or at least deferring the rest. We will not deal directly with the "disposal" of Native American rights, with slavery, with the creation of states, or with many other important issues. What we will discuss is the concept of individual land ownership, which, as it turns out, is a relatively recent development; the concept of accurate and consistent measurement and recording of land claims, which, as it turns out, is a relatively recent development; and, finally, the incredibly important role of surveyors to the development of the country, and, especially, to the development of our own state of Ohio, which was the real "guinea pig" for the westward expansion of the United States.

Individual Land Ownership

Do you (or you and your bank?) "own" your house and the land on which it is built? Most of us think of this as a basic right –– but it was not always so. In the 16th Century, as the ancient feudal system, wherein everything was "owned" by the king, was winding down, the idea of knowing precise quantities of land ownership was fairly new. Before this time, the amount of yield of a piece of ground was more important than its size. The great survey of England ordered by William the Conqueror in 1086 recorded lands in terms of the richness of the soil or the amount of livestock an area would support. The big change from feudalism was from the idea of being allowed to live on the land in exchange for services rendered to the overlord, to one of paying money to own land. This was solidified when King Henry VIII, having separated the Church of England from the Catholic Church, took control of over 400 monasteries using his feudal authority as king, and then sold them to rich nobles to raise funds to pay for England's defenses.

When English estate owners began to record their holdings they usually assigned the work to their *surveyor* – a word derived from the French *sur* [over] and *voir* [see], or "overseer." The surveyor's job entailed walking over the land to oversee and make notes of the boundaries --

the "buttes and bounds" or "metes and bounds" -- of the landed nobleman's possessions.[3] This type of survey, then, simply follows edges of a site and records it from point to point. The surveyor would record distances with a "rod" or "pole" that was exactly 16 1/2 feet long. Then he would record a written description and a diagram of what he had seen. This system of recording land often resulted in pretty inadequate descriptions of land – not to mention lots of work for lawyers. But, this is the system that traveled over the Atlantic to the British colonies in America. Here is part of a metes and bounds description from an 1812 Connecticut record:

> . . . after turning around in another direction, and by a sloping straight line to a certain heap of stone which is by pacing, just 18 rods and about one half a rod more from the stump of the big hemlock tree where Philo Blake killed the bear; . . .[4]

Metes and bounds surveys still exist today in all of the original colonies and in much of the land south of the Ohio River and east of the Mississippi. This recording system did gradually become more accurate with measuring tools and the ability to accurately record angles, but relying on landmarks can be tricky at best. I remember, years ago, when my wife was studying community nursing, she was given directions to a rural site that included, "up the road a piece, turn right where the safe factory used to be" and "turn in at the driveway with the pick-up truck on blocks with its hood up."

Using metes and bounds for selling off vast tracts had other problems, too. Settlers would simply pick the very best land, usually along a river, and mark off their land accordingly. This would result in irregular lots with odd in-between or leftover sites. How in the world would the central government in New York administer such a system in the remote wilderness north and west of the Ohio River?

Accurate and Consistent Measurement (Gunter's Chain)

First, we need to go back to the establishment of standardized measurements and accurate tools. Everybody complains about the quirky English system of measurement, with its feet and inches and acres, and, of course, nobody but us uses it any more – not even the English, who moved to the newer Metric system some years ago.

[3] Linklater, p. 7
[4] Cook, p. 1

Land measurement goes back to the feudal notion of service. The basic unit of measurement was the perch (or rod or pole – all the same). The perch originally varied according to the quality of the ground for agriculture. Consider this partial example from William's *Domesday Book*:

> In the village in which St. Peter's church is situated, the abbot of the same place holds 13 1/2 hides. There is land for 11 ploughs . . . [There is] meadow for 11 ploughs, pasture for the livestock of the village, woodland for 100 pigs, and 25 houses of the abbot's knights and other men who pay 8 shillings a year . . .

Over time, the perch became standardized at 16 1/2 feet. This seemingly strange dimension is derived from the amount of land that could be worked by one man in a day – determined to be 2 perches by 2 perches (33 feet x 33 feet). So, a day's work amounted to 4 square perches. 40 days work – or *dayworks* – made an acre, which, conveniently, corresponded to the amount of land that could be worked by a team of oxen in a day. And . . . 640 acres made a square mile. It should be noted that all of these figures are evenly divisible by 4, making calculations of square fields easy[5]. *Got it?*

It gets better. Now, we need a simple, portable and reliable tool for measuring land. The surveyor's rod (remember? 16 1/2 feet), which had been around for hundreds of years, would not really do for surveying large areas. Meet Edmund Gunter, possibly one of the most significant inventors of all time, inventor of Gunter's Chain, a 100 link iron chain that was the basis of almost all surveys made for about 300 years.

Edmund Gunter was born in 1581 in Hertfordshire, England, and he died in London in 1626. He was a prodigy mathematician and professor of astronomy at Gresham College in London. He was a leader in the creation of accurate instruments for simplifying calculations needed for astronomical and navigational needs, even creating a slide rule like device using logarithms[6]. Gunter is credited with devising a simple chain in iron, which was relatively easy to use and was considerably more accurate than the "cords" used previously.

Gunter's Chain was 66 feet long, made up of 100 links, marked off in 10s for ease in counting. The make-up of the chain was:

> 1 link = 7.92 inches
> 25 links = 1 rod (pole or perch) or 16 1/2 feet
> **100 links = 1 chain or 66 feet or 22 yards**

5 Baez, p. 2
6 Bell Book Files, p. 1

10 chains = 1 furlong or 220 yards
80 chains = 1 mile or 5,280 feet or 1,760 yards

Although more sophisticated instruments including transits, levels, theodolite, etc. existed and were known, much of the Northwest Territory was surveyed using just the Gunter's Chain and a compass. Kit Kat Bill Laidlaw, who in his other life is Director of the Ohio Historical Society, has graciously agreed to show us an actual Gunter's Chain, which he has borrowed just for us from the Society's collections. Here it is . . .

Thank you, Bill!

Surveying Ohio

Surveying has been around for a long time. We know, for instance, that the ancient Egyptians would measure and mark property relative to the annual flooding of the Nile. But, as we have just seen, measurement for land ownership is a more recent development – one that was essential to the expansion of the nation in to the Ohio country. The government needed to – quickly – devise a way to sell the vast western expansion area, sight unseen, and from a remote place (in this case, the capital of the country at New York).

Once the Revolutionary War was officially over, veterans were clamoring for their land bounties, and squatters were increasingly crossing the Appalachian Mountains or traveling up the Ohio River to claim "free" lands belonging to the government before the government could devise a system to measure the land and collect fees. At one point, the Federal army actually had to go into the Ohio country to evict illegal squatters.

In 1784, Thomas Jefferson chaired the first Congressional Committee on Public Lands. This committee, as you might imagine from its chairman, wanted to dispose of the awkward English system in favor of one devised by Jefferson – one which would artificially divide the land in to "hundreds" that would be 10 geographical miles square. Jefferson's system would have revised the lengths of the traditional units of measure to more "logical" ones, using a decimal-based mathematical system.

Due to the traumatic nature of change (so many everyday things were changing at this time anyway, and this might have meant re-doing all existing land descriptions), and the fact that Jefferson was called away to become our Ambassador to France, and, thus was taken away from the debate, the 1784 proposal was not entirely enacted. However, Jefferson's principle of

subdividing the land into artificial squares that could be given a standardized address and sold from afar was carried through into the next proposal, in 1785.

The Land Ordinance of 1785 created rules for the orderly survey, sale and settlement of the public domain, with settlement to occur only on surveyed land. Land ceded to the Federal government by the states and by the Indians was to be divided into six mile square townships created by lines running north and south intersecting at right angles with east – west lines. Townships were to be divided into 36 one-mile square sections. Each range, township and section was to be numbered in a regular, consistent sequence. [7]

The Continental Congress called for the establishment of "Seven Ranges of Townships," using the intersection of the Ohio River and the western boundary of Pennsylvania as the "point of beginning" for the public lands survey. On September 30, 1795,[8] Thomas Hutchins, the Geographer of the United States and his crew started on the north bank of the Ohio River and headed due west into the forest. The Seven Ranges run west 42 miles (7 x 6 miles each) and south to Marietta, covering about 1.6 million acres of land.

What must it have been like to survey this wilderness? This photo of a Revolutionary War era re-enactment group called the *Department of the Geographer to the Army* gives one view. However, consider that this was what we now call virgin forest, with hills . . . and lakes . . . and swamps . . . and Indians! I think it may have been more like this photo.

In any case, it was hard work. Hutchins' original survey team included 40 men, including a number of "heavy shouldered axmen recruited to cut down trees that might obscure the view."[9] This description of the work can be found in an early history of Fayette County:

> Three assistant surveyors, with himself making the fourth, were generally engaged at the same time in making surveys. To each surveyor was detailed six men, which made a mess of seven. Every man had his prescribed duty to perform. Their plan of operations was somewhat thus: In front went the hunter, who kept in advance of the surveyor two or three hundred yards, looking for game, and prepared to give notice should any danger from Indians threaten. Then followed, after the surveyor, the two chainmen, marker, and pack-horse men with the baggage, who always kept near each other, prepared for defence in case of an attack. Lastly, two or three hundred yards in the rear came a man called the spy, whose duty it was to

[7] Knepper, The Official Ohio Lands Book, p.9
[8] Linklater, p.
[9] Linklater, p.75

> keep on the back track, and look out lest the party in advance might be pursued or attacked by surprise.

After only about a week or so and only four miles of marked line, Hutchins' team retreated all the way back to Pittsburgh because of the dangers and technical difficulties they had encountered. The next year, they returned with a larger crew, this time accompanied by a military guard of General Josiah Harmar's troops – to keep the Indians away. The Seven Ranges survey was finally complete in June of 1787. The work done was late and not very accurate, but the first public land sale went ahead at New York in September. The results were disappointing with fewer than 100,000 acres purchased.

At the same time land speculators and commercial land ventures were being formed to buy up the new lands, at bargain prices. One group, founded in January 1786, that some of you might be familiar with was the "Ohio Company of Associates," formed by Rufus Putnam, a Revolutionary War veteran, military engineer and surveyor, and the Reverend Manasseh Cutler, a Congregational minister, who persuaded Congress to sell them about 1.5 million acres, with an option to buy almost 4 million more, to be paid for with devalued military warrants.

In the meantime, on July 13, 1787, the Northwest Ordinance was passed, providing governance of the vast territory, as well as procedures for creating between three and five new states. This was three years before the US Constitution.

In the Spring of 1788, Rufus Putnam led a group of 47 settlers to the Ohio Company's new lands, at the confluence of the Muskingum and Ohio Rivers – a landing the was partially an error, but that's another story. At any rate, they founded the first permanent settlement in the Northwest Territory – a place initially called *Castrapolis*, the "armed city," then *Adelphia*, meaning "brotherhood', and finally the name we are familiar with, *Marietta*, after the French Queen, Marie Antoinette. The rest, as they say, is history.

Many more surveys and land auctions followed in the Ohio country, before and after statehood in 1803. Sometimes the surveys were crude and often contained errors that had to be corrected in ways still evident in modern maps. If you look closely, you can see a large area of the state that did not participate in the rectangular survey. The Virginia Military District, claimed by the Commonwealth of Virginia as military bounty land prior to the Ordinance of 1785, was allowed to be surveyed according to the metes and bounds method used in Virginia.

But, Thomas Jefferson's experiment – the rectangular survey -- is evident as we fly across the country today, and see its influence in 30 states. As the country expanded westward, the gov-

ernment tried to keep one step ahead of the settlers, forming multiple "points of beginning" for surveys to open up new land areas to development. *All of this land was measured in 7.9 inch links, 66 foot long chains and 80 chain miles.* And, as inaccurate as that may seem by today's GIS and laser driven accuracy, it has worked for all this time.

I end with one final image – that of our own Franklin County. If you look carefully at the map, you can see a lot of history. The western portion of the county is irregular, indicating metes and bounds surveys. This area was part of the Virginia Military District. The north east section, part of the United States Military District, has regular, square townships. The center contains a narrow tract called the Refugee Tract, land set aside by Congress as compensation to Canadians who had lost property because of their loyalty to American revolutionaries during the American Revolution[10], hence Refugee Road. South-east Franklin County was part of the Congress Lands, to be sold directly by the government.

Ohio is where the great government land sale began, and the experiments carried out on our land allowed for the westward expansion of the nation. *Nowhere is this more evident than here in our own Franklin County.*

Thank you.

[10] Ohio History Central

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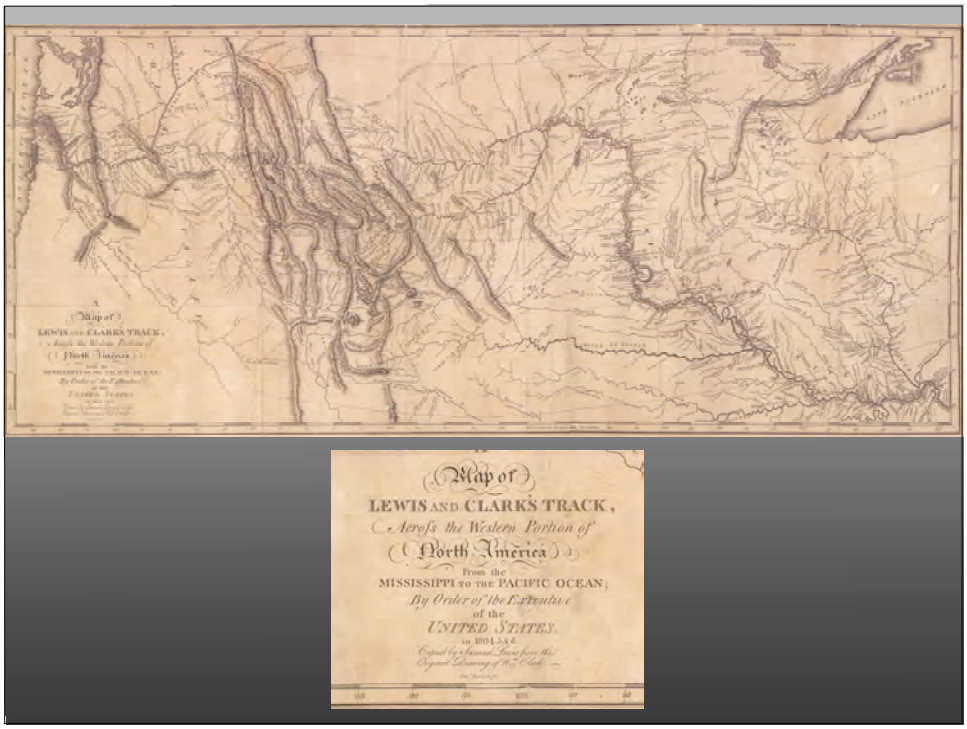
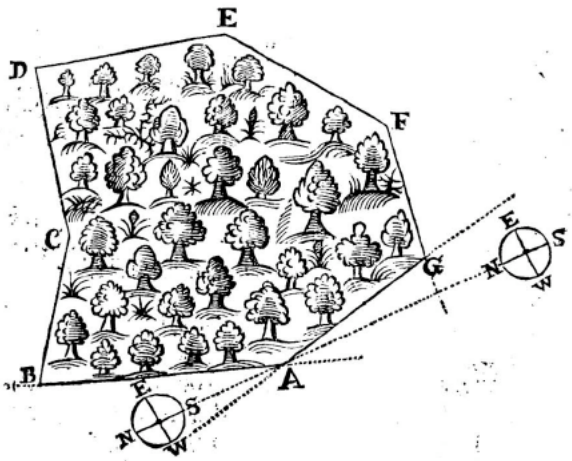
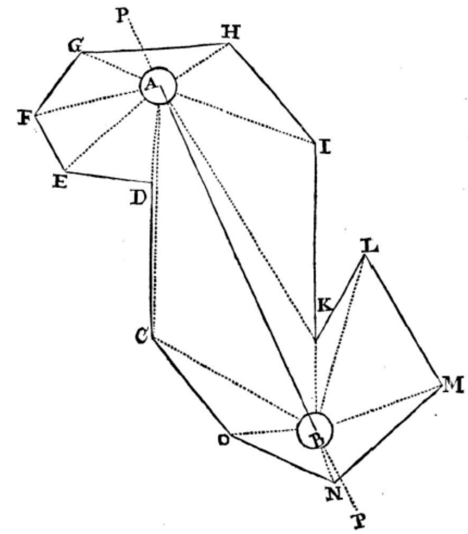


Federal Hall -- New York City -- watercolor by Archibald Robertson

How to take the Plot of a Large Field or Wood, by measuring round the same, and taking Observations at every Angle thereof, by the Semicircle.



How to take the Plot of a Field at two Stations, when the Field is so Irregular, that from one Station you cannot see all the Angles.



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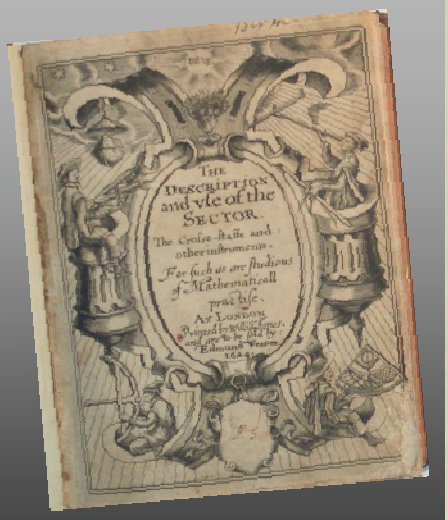
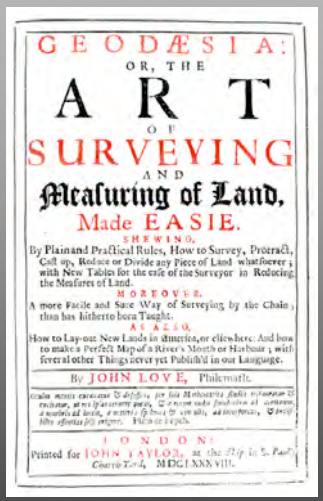
IIII. The Land of St. Peter of Westminster
In 'Ossulstone' Hundred
In the vill in which St. Peter's Church is situated [Westminster] the abbot of the same place holds 13½ hides. There is land for 11 ploughs. To the demesne belongs 9 hides and 1 virgate, and there are 4 ploughs. The villeins have 6 ploughs, and there could be 1 plough more. There are 9 villeins each on 1 virgate and 1 villein on 1 hide, and 9 villeins on each half a virgate and 1 cottar on 5 acres, and 41 cottars who pay 40 shillings a year for their gardens. [There is] Meadow for 11 ploughs, pasture for the livestock of the vill, woodland for 100 pigs, and 25 houses of the abbot's knights and other men who pay 8 shillings a year. In all it is worth £10; when received, the same; TRE £12. This manor belonged and belongs to the demesne of St. Peter's Church, Westminster.



THE DESCRIPTION and vse of the SECTOR. The Crosse-staffe and other instruments. For such as are studious of Mathematicall practise.

AT LONDON, Printed by [illegible] for Edmund Weauer.



GEODÆSIA: OR, THE ART OF SURVEYING AND Measuring of Land, Made EASIE.

SHEWING,

By Plain and Practical Rules, How to Survey, Protract, Cast up, Reduce or Divide any Piece of Land whatsoever; with New Tables for the ease of the Surveyor in Reducing the Measures of Land.

MOREOVER,

A more Facile and Sure Way of Surveying by the Chain, than has hitherto been Taught.

AS ALSO,

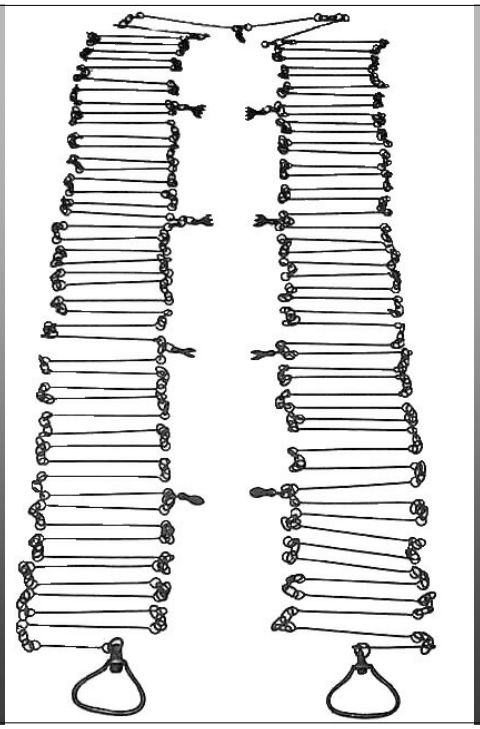
How to Lay-out New Lands in America, or elsewhere: And how to make a Perfect Map of a River's Mouth or Harbour; with several other Things never yet Published in our Language.

By JOHN LOVE, Philomath.

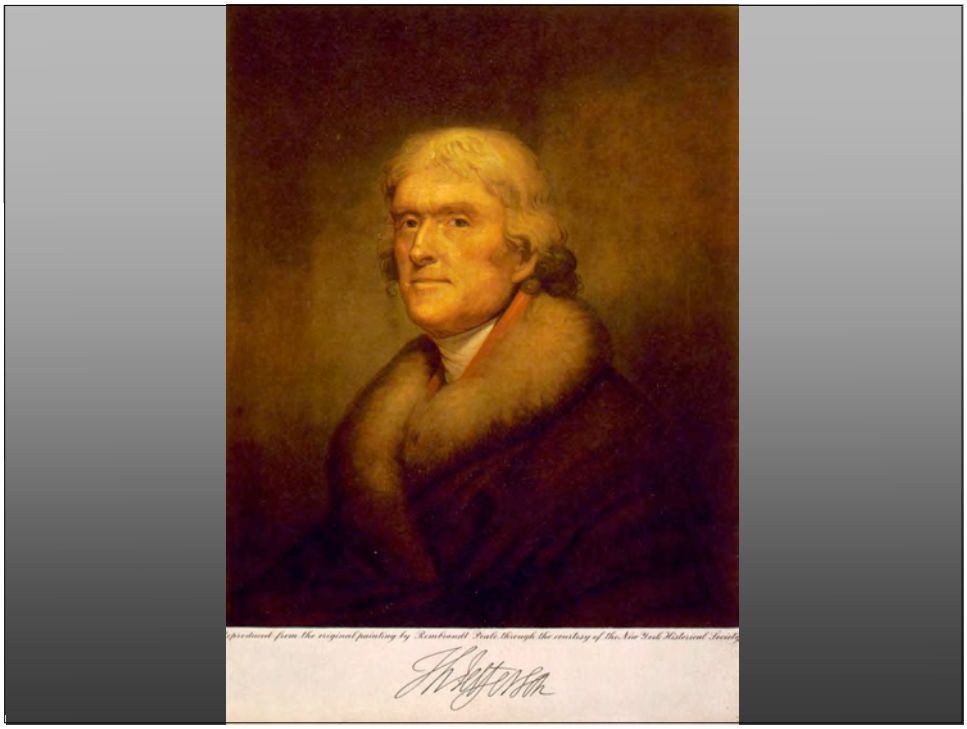
LONDON: Printed for JOHN TAYLOR, at the Ship in St. Paul's Church-yard, MDCLXXXVIII.

Long	Link	Foot	Yard	Perch	Chain	Mile
Inches	7.92	12	36	198	792	63360
	Links	1.515	4.56	25	100	8000
		Feet	3	16.5	66	5280
			Yards	5.5	22	1760
				Perch	4	320
					Chain	80

Fig.1 - Illustrations from John Ogilby's *Britannia* of 1675.
left - cherub holding chain. centre - complete chain folded at front of table



OHIO HISTORICAL SOCIETY



Sections before 1796

36	30	24	18	12	6
35	29	23	17	11	5
34	28	22	16	10	4
33	27	21	15	9	3
32	26	20	14	8	2
31	25	19	13	7	1

Public Schools
Future Sale

Sections after 1796

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
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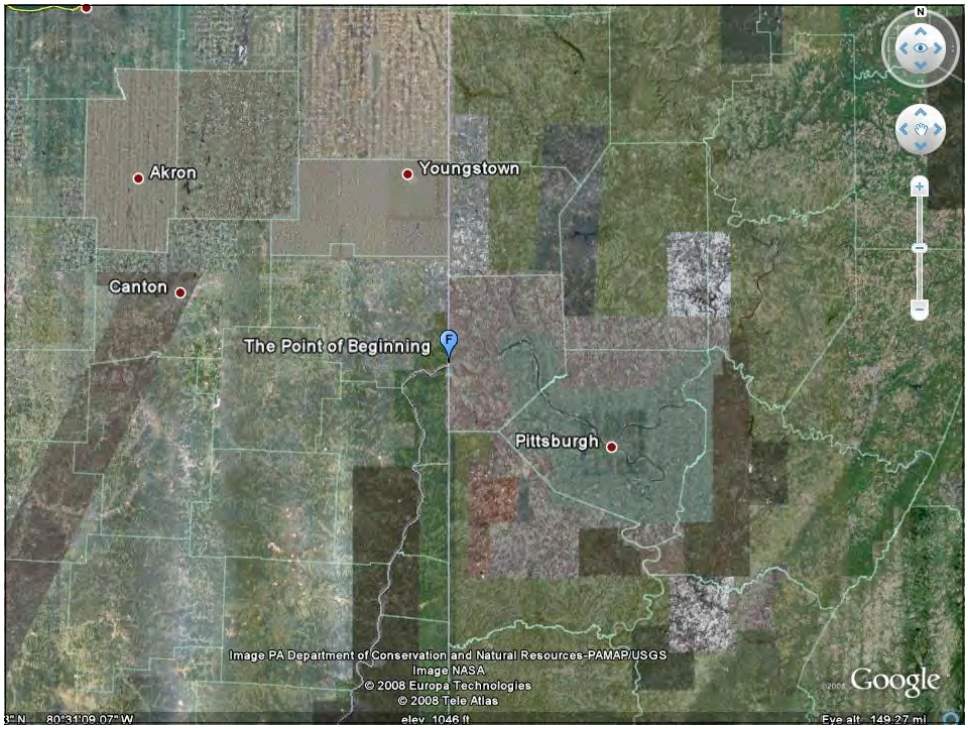
Public Schools
Future Sale


OHIO


Akron
Youngstown
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Pittsburgh
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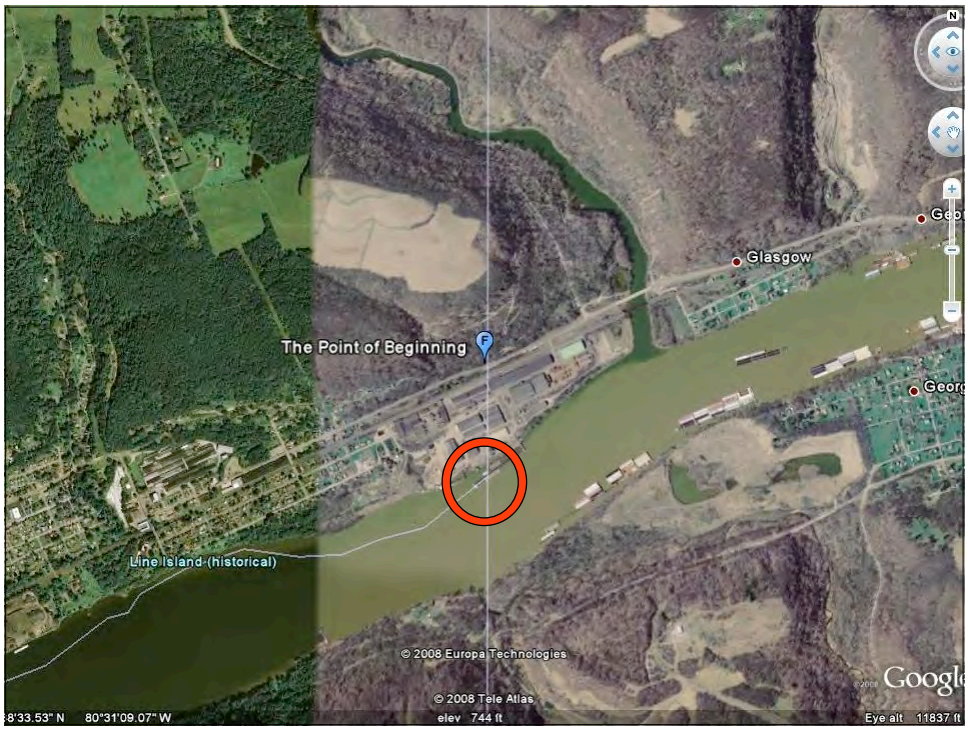
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The Point of Beginning
Line Island (historical)
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elev 744 ft
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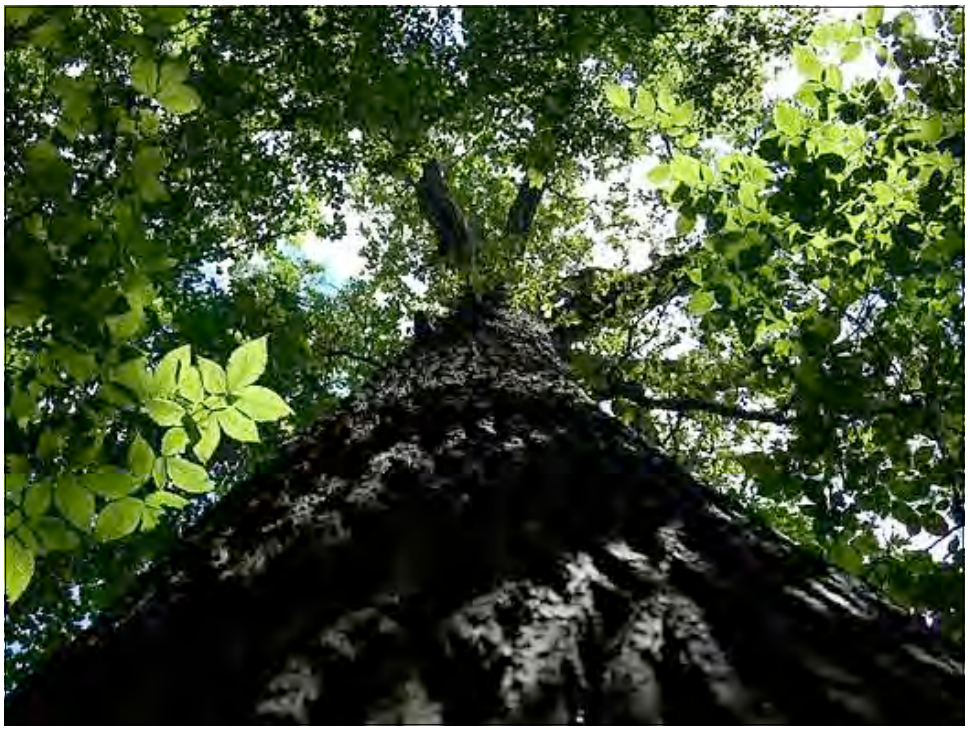

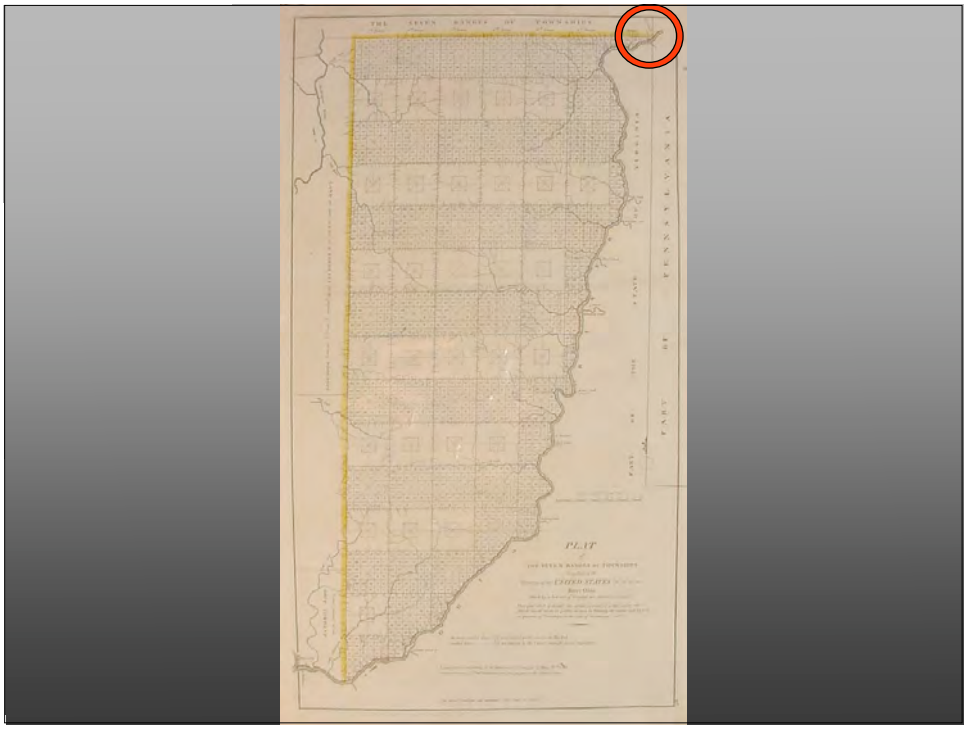
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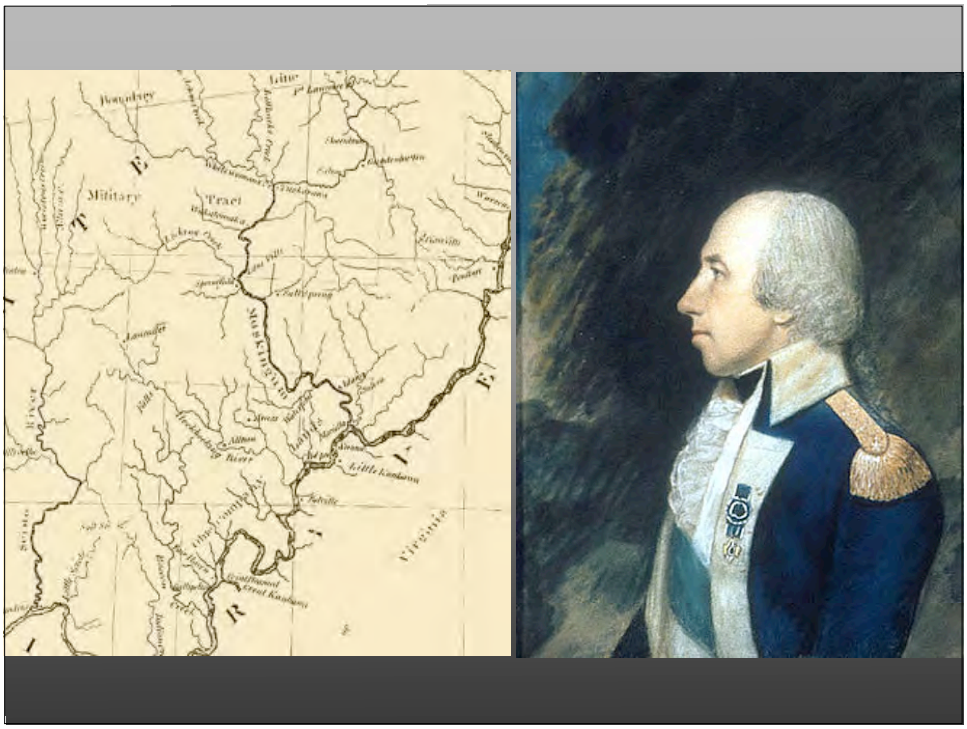
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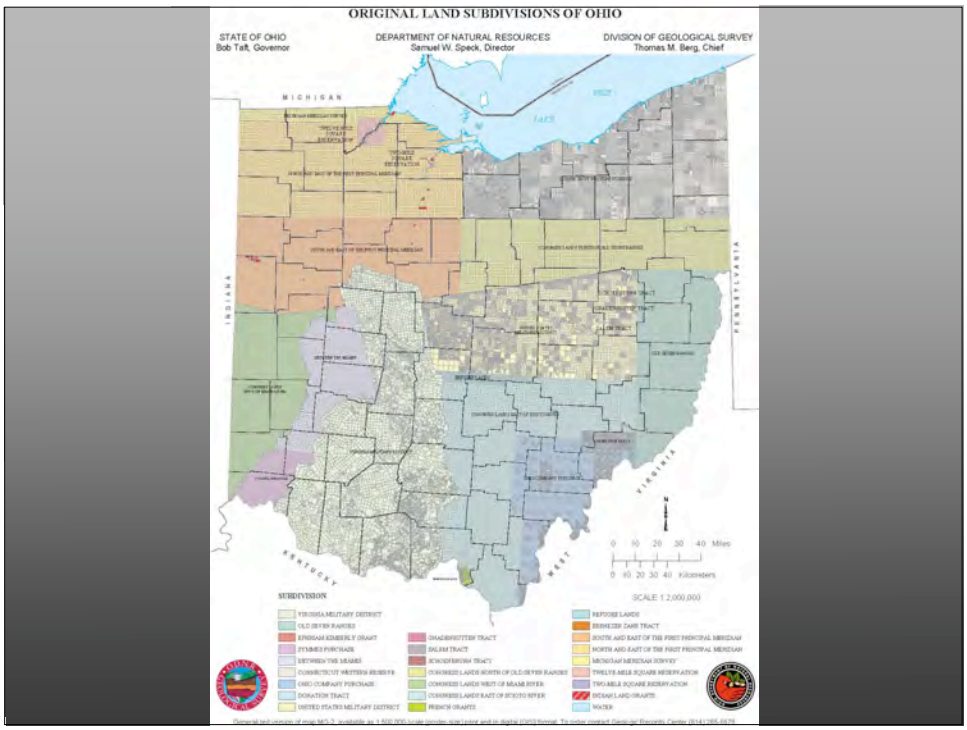
ORIGINAL LAND SUBDIVISIONS OF OHIO
STATE OF OHIO
Bob Taft, Governor
DEPARTMENT OF NATURAL RESOURCES
Samuel W. Speck, Director
DIVISION OF GEOLOGICAL SURVEY
Thomas M. Berg, Chief
MICHIGAN
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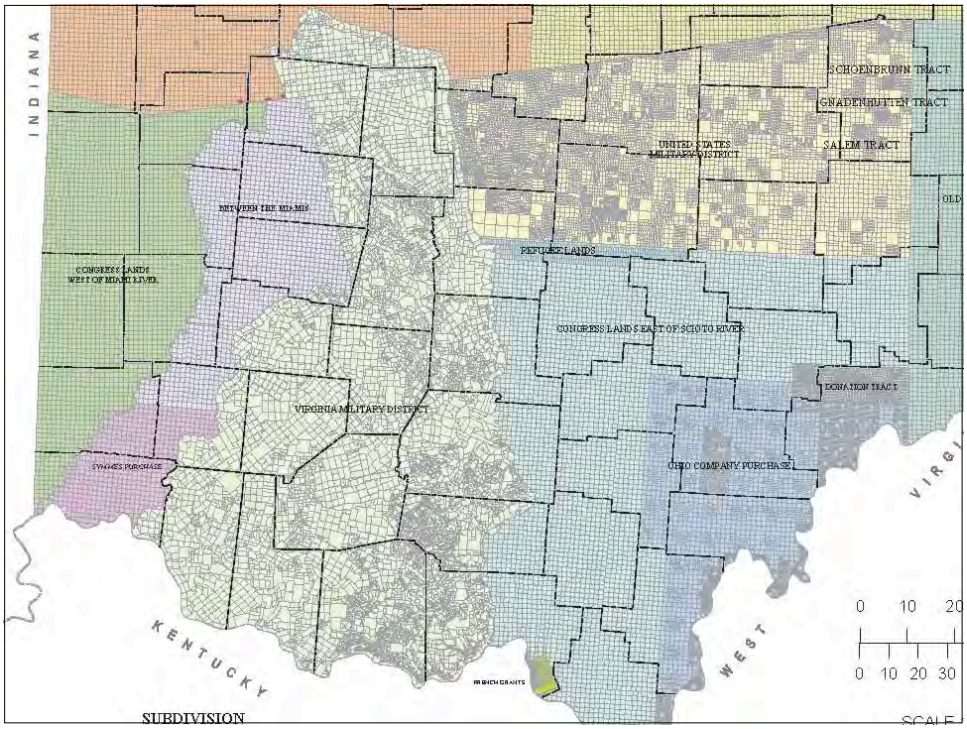
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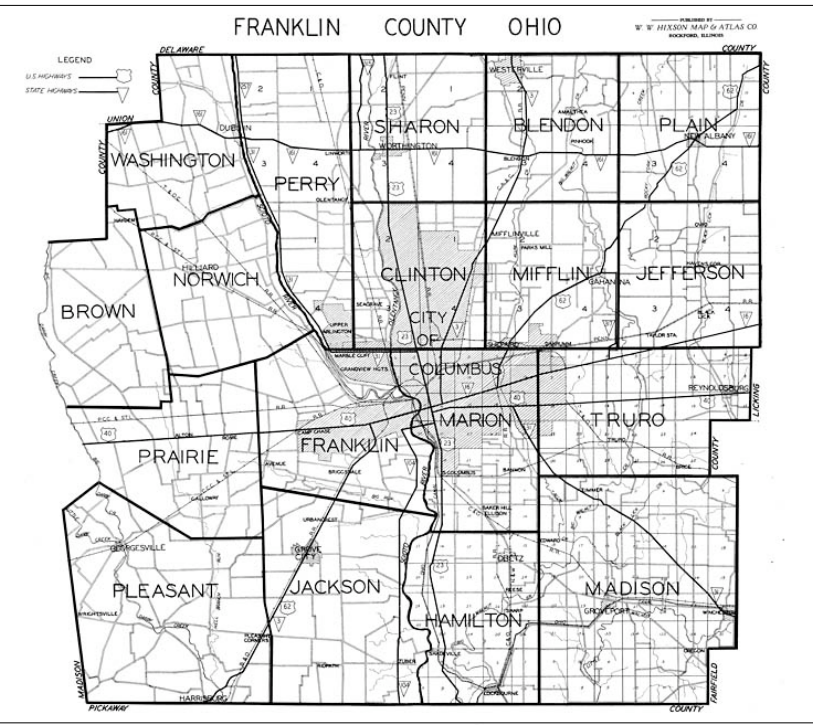
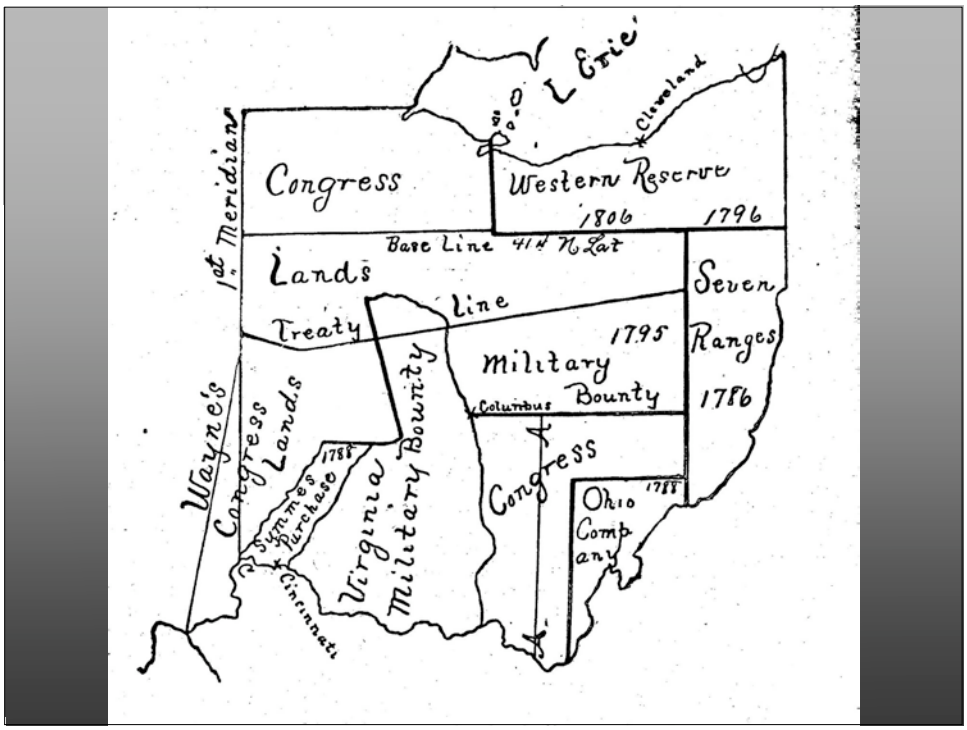
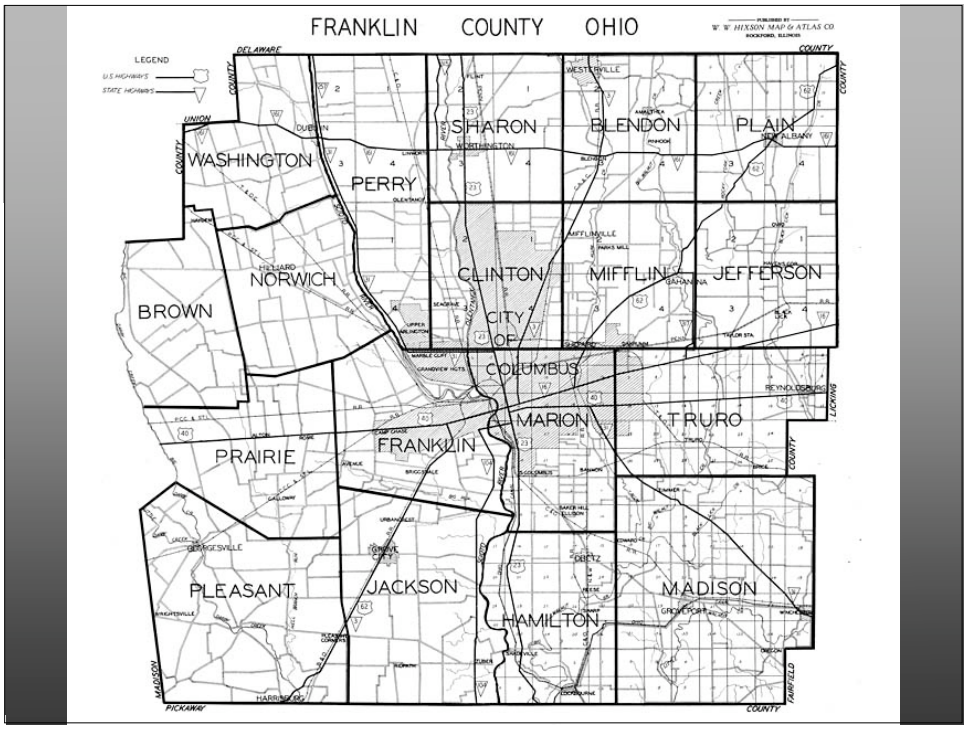
BETWEEN THE MIAMIS
REFUGEE LANDS
CONGRESS LANDS WEST OF MIAMI RIVER
CONGRESS LANDS EAST OF SCIOTO RIVER
DONATION TRACT
VIRGINIA MILITARY DISTRICT
OHIO COMPANY PURCHASE
KENTUCKY
WEST
FRENCH GRANTS
0 10 20
0 10 20 30
SUBDIVISION


FRANKLIN COUNTY OHIO
LEGEND
U.S. HIGHWAYS
STATE HIGHWAYS
DELAWARE COUNTY
UNION COUNTY
MADISON COUNTY
PICKAWAY COUNTY
FAIRFIELD COUNTY
LICKING COUNTY
WASHINGTON
PERRY
SHARON
BLENDON
PLAIN
NORWICH
CLINTON
MIFFLIN
JEFFERSON
BROWN
CITY OF COLUMBUS
MARION
TRURO
PRAIRIE
FRANKLIN
PLEASANT
JACKSON
HAMILTON
MADISON


L. Erie
Cleveland
1st Meridians
Congress
Western Reserve
1806
1796
Base Line 41° N Lat
Lands
Seven
Treaty
Line
1795
Ranges
Military
Bounty
1786
Columbus
Wayne's
Congress Lands
Symmes Purchase
1788
Virginia Military Bounty
Congress
Ohio Company
1788
Cincinnati


FRANKLIN COUNTY OHIO
LEGEND
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UNION COUNTY
MADISON COUNTY
PICKAWAY COUNTY
FAIRFIELD COUNTY
LICKING COUNTY
WESTERVILLE
SHARON
BLENDON
PLAIN
WASHINGTON
PERRY
NEW ALBANY
NORWICH
CLINTON
MIFFLIN
JEFFERSON
BROWN
CITY OF COLUMBUS
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Give an Inch, Take a Mile

A Kit Kat Club Essay
January 20, 2009
Columbus Club, Columbus, Ohio
by Bob Loversidge