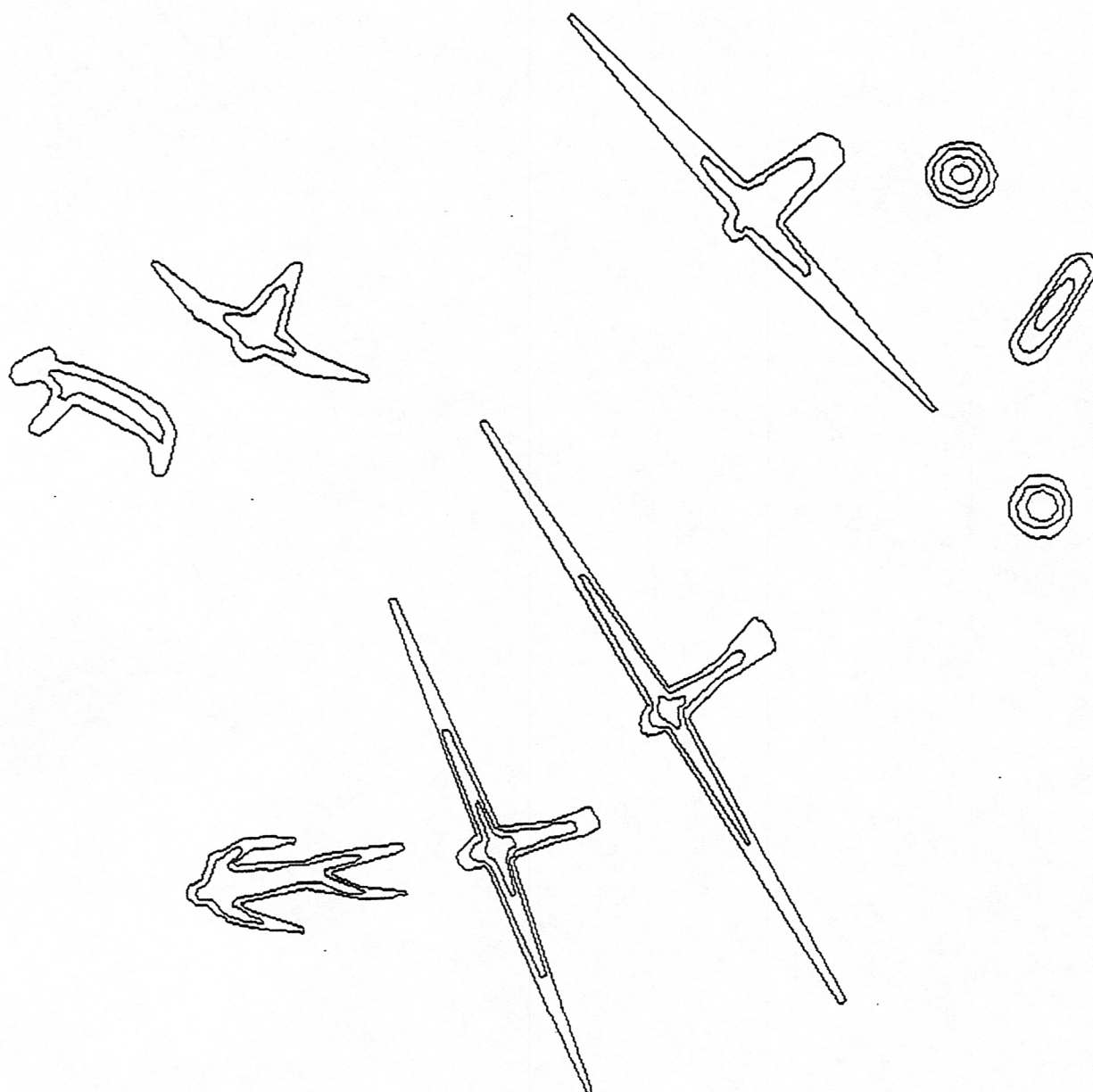


A Gathering of the Eagles
Geometry and Possible Calendar Functions
at
The Ghost Eagle Site
(Richland Country, Wisconsin)



By:
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Madison, Wisconsin
7 October, 1997

This report addresses geometry and possible calendar functions at the effigy mound group located on the north bank of the Wisconsin River, near Muscoda, Wisconsin. In the 1800's this extremely impressive group of eagle mounds was called "The Eagles". Today, we refer to it as the "Ghost Eagle Site". The latter name was coined by Jan Beaver, an artist from New York, who in 1992 became infatuated with this mound group. She devoted more than a year of intense effort on studying this large collection of earth art work. Through her efforts, we were able to merge historical surveys of these mounds, made by T. H. Lewis in 1886, with modern surveys of the few mounds that remain. And by use of historical aerial photos analyzed on a stereoplotter (a precise machine for making maps from aerial photos) we were able to locate the image of a giant eagle mound which, like a ghost, expressed itself in the different rates of ripening oats. These patterns were evidently caused by differences in soil where the mound had once been located. From our precise mapping methods, we could tell that this ancient eagle mound was oriented to the direction of the winter solstice sunset on the shortest day of the year (about 21 December). The body of this mound was oriented directly to the setting sun on the winter solstice, and its long, straight wings at right angles to this direction. Although plowed down by agriculture and not readily recognized in the field even when one is located near the mound, this ancient image appeared like a clear ghost in aerial photos from 1968. Even its beak was clearly indicated, pointing to the northwest in the direction of where the sun will set after the winter solstice.

As with other mound groups, we find geometry in the Ghost Eagle site that is related to setting the solar calendar—a calendar related to the cold and warm seasons of the year. Any agricultural people in this part of the world must have such a functional solar calendar, lest the crops be planted too late and not ripen or be planted too early and freeze in the late frosts of the spring. A solar calendar is set at times we call the solstices or the equinoxes. On the equinoxes (about 21 March and 21 September), the sun is located on the celestial equator and will rise and set directly on an east-west line. On the summer solstice (about 21 June) the sun's declination (angle north or south of the equator) is about 23.5 degrees north, and the sun will rise and set at its extreme position north of an east-west line. Similarly on the winter solstice, when the sun's declination is about 23.5 degrees south, the sun will rise and set at its extreme southern location.

These four times in the solar calendar determine the beginning of what we call spring, summer, fall, and winter. They correspond in graphical form to the four cardinal points of a compass (east, south, west and north). But many ancient cultures also used what we refer to as cross quarter days. Cross quarter days are midway between the equinoxes and solstices, dividing the year into eight parts. In graphical form, they correspond to the other directions on a mariner's compass (N, NE, E, SE, S, SW, W, and NW). We preserve some of the approximate times of these ancient festivals in our modern calendar as Halloween (also All Soul's and All Saint's Day following Halloween), Ground Hog's Day, and May Day. In some ancient cultures, a festival in August (between the summer solstice and the autumnal equinox) was devoted to celebrating the first fruits from the fields. Our Halloween with its skeletons and witches (names for ancient pre-Christian holy women) relate to the Old World festival at the fall cross quarter day when people remembered and honored their departed relatives. A similar honoring was practiced in the pre-Columbian New World on the same cross quarter day. It is still practiced in Mexico as the day or feast of the dead. As in the Old World, there are visits to grave yards and skeleton decorations.

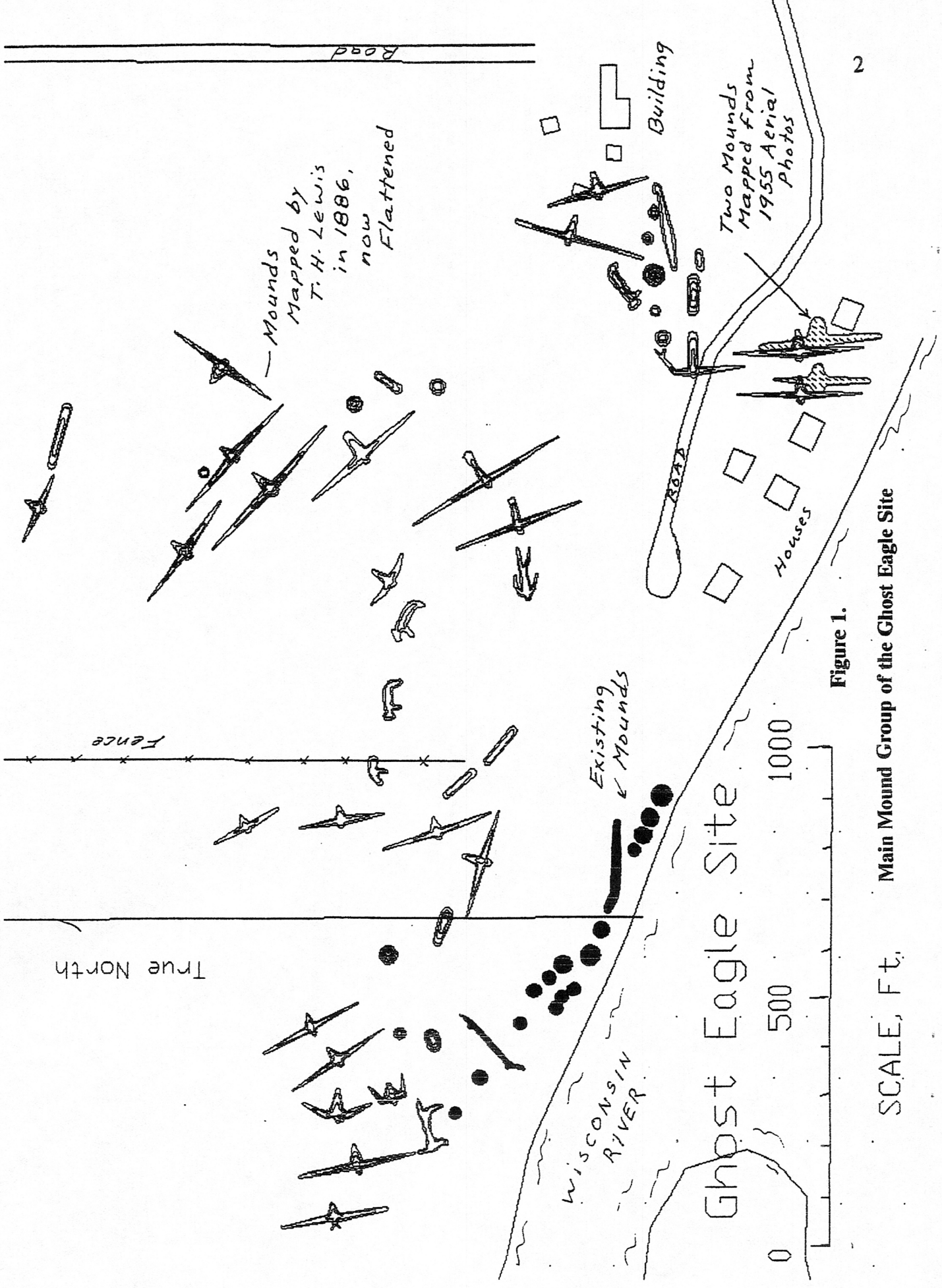


Figure 1. Main Mound Group of the Ghost Eagle Site

Similar to other mound groups we have analyzed, we see alignments at the Ghost Eagle Site that suggest a calendar devoted to equinoxes, solstices, and ceremonies between these times, some at the cross quarter days and some a month before or after the equinox.

The Main Mound Group

Figure 1 shows the main group of mounds of what is today called the Ghost Eagle Site. There were about two dozen bird or eagle mounds once associated with this group. After the Blackhawk War (1832), European settlers began to purchase land in Wisconsin. The first federal land office for sale of land in this region was located at Muscoda, just across the river from this mound group. Most of the immigrant settlers were not much interested in the unique effigy mounds of this area. But some of the early land surveyors in Muscoda were quite interested and attempted to survey some of the mound groups before they were plowed flat by agriculture. The mound group across the river from Muscoda was known as The Eagles, and the township in which they were located was called Eagle Township. And there is an Eagle School, Eagle Corners, etc., in honor of the impressive eagle effigy mounds that once decorated the fields.

By 1992, all of the eagle mounds of the group shown in Figure 1 had been flattened by agriculture or development. But in the woodlot of Frank Shadewald, there were a few remaining mounds of this once large group. These were surveyed by modern methods where the maps were oriented to true north (from which we can determine possible calendar functions of the mound alignments). The mounds that remain are shown as dark in Figure 1. Since the same mounds had also been surveyed by T. H. Lewis in 1886, using the magnetic compass, we could overlay Lewis's maps on our modern maps, obtain the magnetic declination in 1886, and also determine the position of the mounds that had since been plowed flat. Mounds surveyed by Lewis in 1886 are also shown in Figure 1.

On historical aerial photos taken in 1955, we could see and map with a stereoplotter the location of the two southern-most bird mounds of this group, which had not been flattened at that time. These are also shown in Figure 1. Given the relative accuracy of the field methods used by T. H. Lewis and the limiting accuracy of mapping from historical aerial photos, there is a reasonable match between the Lewis surveys and what we got from aerial photos. Unfortunately, these two eagle mounds which were intact in 1955 have subsequently been flattened by modern landscaping. But from the maps of Lewis, we know what they once looked like and their approximate location.

The Ghost Eagle

While working with historical photos to support the mapping efforts of Jan Beaver in 1992 and 1993, we saw on aerial photos taken in 1968, a clear image of a large bird effigy mound in a field north of the main mound group. The body of the bird pointed to the direction of the winter solstice sunset, and its wings were at right angles to this direction, making what we call an indirect alignment to the setting sun on the winter solstice. A copy of the original aerial photos used to locate this bird mound is shown in a previous report called Eagle Mounds in Eagle Township (Richland County, Wisconsin), An Overview and an Update, by Jan Beaver and James Scherz, October 21, 1993. The Ghost Eagle, originally seen on the 1968 photos, is shown in Figure 2 along with mounds on some nearby hills.

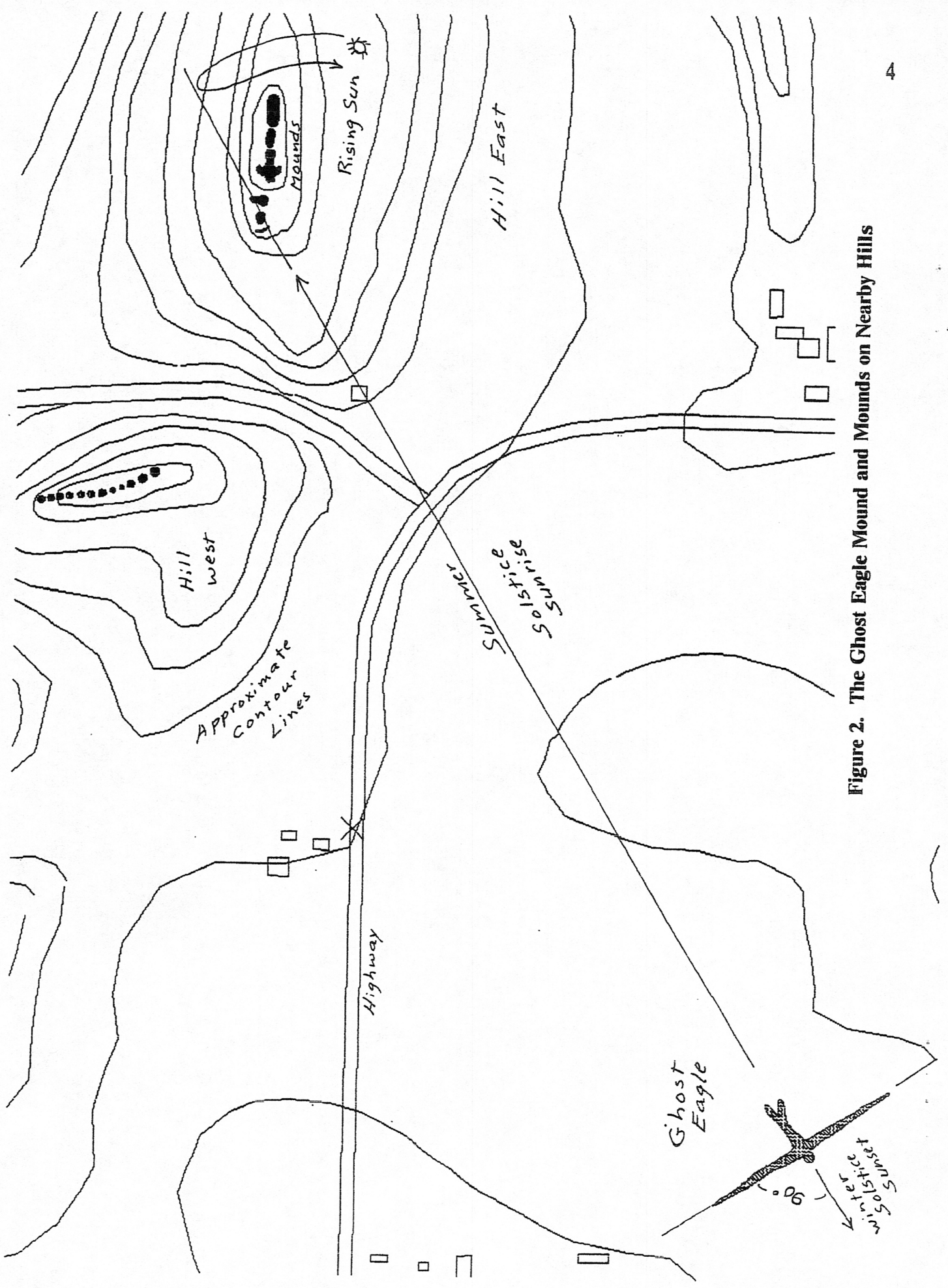


Figure 2. The Ghost Eagle Mound and Mounds on Nearby Hills

The image of this Ghost Eagle on the 1968 photos was converted on a stereoplotter to a base map, oriented to state plane coordinates. From the resulting coordinates, we could also direct surveyors to a precise location at the center of the body of this image, as well as to the ends of the tail and wings. Once so located, we indeed could discern the slight raises in the earth and the different colors of the soil indicating where this mound had once risen from the landscape before it was flattened by plowing. And from the center of this Ghost Eagle, we could witness that the sun rose on the summer solstice directly over the western-most mound on the top of a prominent hill to the north east, which we will call "Hill East". See Figure 2. This summer solstice sunrise direction is significant because as we can determine the shortest day of the year by the a sunset in the direction that the Ghost Eagle is heading, so also we can determine the longest day of the year (the summer solstice) by where the sun rises on the prominent and dominating ridge to the northeast. An observer located on the center of this single mound could therefore determine both of the solstices by observing were the sun set or rose.

Hill East

Figure 3 shows a map from modern surveys of the mounds atop of what we call Hill East. The most prominent mound in this group of five mounds is a bird effigy. The highest part of the hill is on the tail of this bird mound. It has small and swept back wings, but is clearly a bird. The narrow ridge on top of the hill would have prevented construction of the longer straight-winged bird mounds of the type found in the lowlands. The mounds atop this ridge are impressive to anyone who cares to make the climb. But because of the domination of this hill over the lowlands below, they can also be seen from the surrounding countryside as prominent bumps on this dominating hill. From an observer in the center of the Ghost Eagle, as the summer solstice approaches, the sun will rise first over the mounds on the eastern part of the hill. Then, day by day, the sun will appear to rise north (as viewed from the Ghost Eagle) until on the summer solstice it rises over the western-most mound shown in Figure 3. Although the extreme declination of the sun today is a bit less than at the time that the mounds were constructed (about quarter sun's diameter), the same general scene can be seen today as a thousand years ago.

Hill West

Besides Hill East, there is another nearby hill, which we call Hill West. Hill West also has a series of mounds on its crest. These are very clearly seen from atop Hill East, as well as from the lowlands in the surrounding area. There are twelve round mounds atop of Hill West. The number symbolically suggests a solar calendar where there are twelve full lunations in a solar year. Figure 4 shows the mounds atop of Hill West.

Summer Calendar Between Hill East and Hill West

If we stand on the highest part of the mounds on Hill East, on the tail of the bird mound, we have a functional solar calendar to the setting sun in line with the mounds atop of Hill West. This calendar would function from about the end of April (near May Day) to the summer solstice and then until about 15 August in the fall when the setting sun moves to the south and no longer sets over these mounds. This period from late April to mid August covers the time from planting of crops to the first harvests. See Figure 5.

Legend:

⊙ = Mound with
Approximate
1 ft. Form
Lines

⊗ = Pit

Hill East

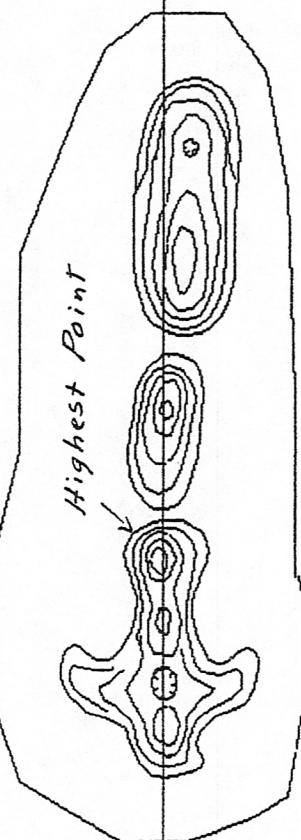
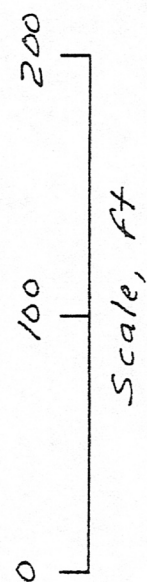


Figure 3. Mounds atop Hill East



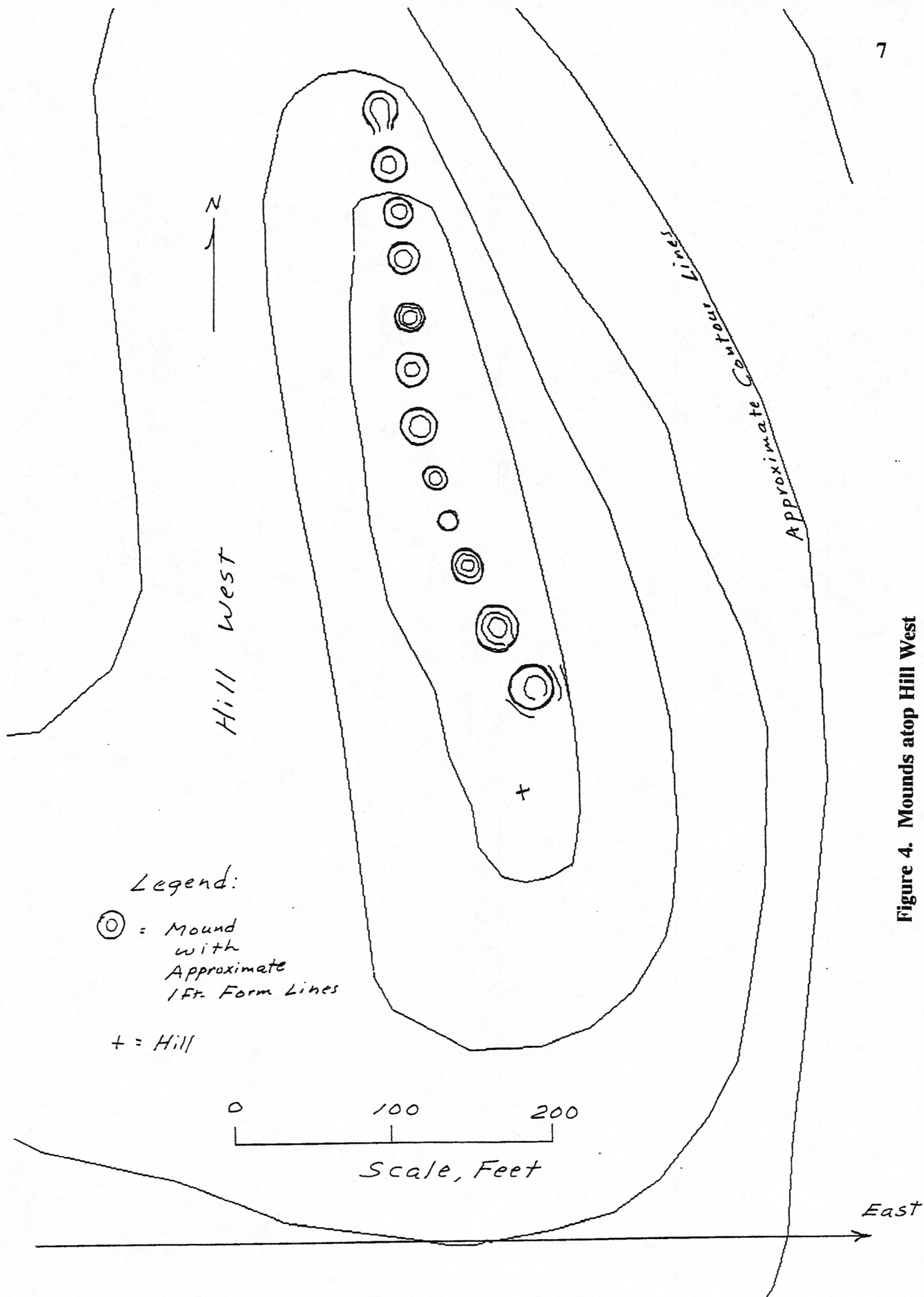


Figure 4. Mounds atop Hill West

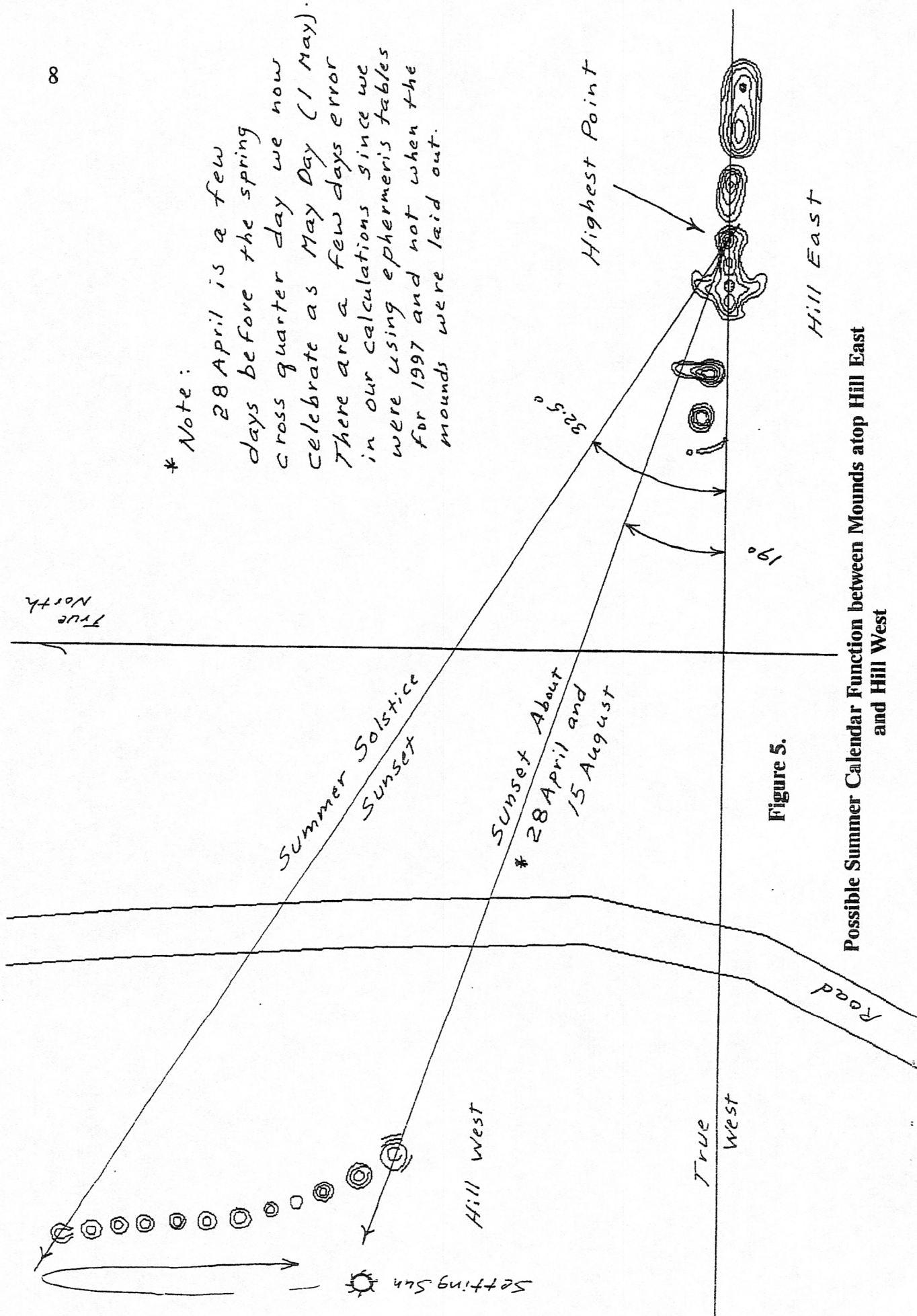


Figure 5.

Possible Summer Calendar Function between Mounds atop Hill East and Hill West

* Note:

28 April is a few days before the spring cross quarter day we now celebrate as May Day (1 May). There are a few days error in our calculations since we were using ephemeris tables for 1997 and not when the mounds were laid out.

Hill West and Geometry to the Main Mound Group--A True North-South Base Line

Key to laying out the effigy mounds would have been a true north-south base line. This would have been determined in ancient times (as today) from observing the heavenly bodies. The task could have been most accurately and easily accomplished by observing the center of rotation of the northern stars during clear nights. Although it would seem that there was some secrecy involved with the ancient surveys (as with ancient secret priest guilds the world over) and some encoding and hiding of the most important information, nevertheless we would expect somewhere in the mound group to have true north-south and/or east-west base lines encoded into the geometry. A line through the center of the wings of the eastern-most bird mound in the main group intersects the centerline of the pipe mound. The western-most mounds atop Hill West lie directly north of this intersection point. Therefore, from this intersection point, we have an accurate true north direction to a clearly seen point on a prominent hill, provided we knew we had to first create this intersection point. This north-south base line also sets the eastern limits of the earthwork for the main mound group. See Figure 6.

The DNR Eagle Mound, a Pit, and an East-West Base Line

Figure 7 shows a map from the surveys of T. H. Lewis of a mound group located about 4000 feet east of the main mound group. Although many of the mounds in this group have been destroyed, the bird mound has been preserved and is on DNR land next to the river. A line from the center of this DNR bird mound to the two southern-most bird mounds in the main mound group is a true east-west line, over which the sun will cross as it sets on the equinoxes. See Figure 8.

Although not surveyed by T. H. Lewis, there is also what appears to be an ancient pit near the road next to the DNR bird mound. This is also shown in Figure 7. This pit is on slightly higher ground than the bird mound and would have made a better observation station. Some of the geometry of the main mound group seems to radiate from this pit. See Figures 9 and 10. The orientation of the northern-most linear mound in the main mound group aligns perfectly with a line radiating from this pit (Line A). This alignment creates a direction to the setting sun about one month after the spring equinox (about 18/19 April) and one month before the autumnal equinox (about 21 August). Also an alignment from this pit to a bent linear mound correlates perfectly with the orientation of the main body of this mound. This is Line B in Figures 9 and 10.

One will note that an observer near the DNR eagle mound could readily determine whether the equinox had occurred or not by observing where the sun sets to the west. If in the spring, the setting sun has moved north of the southern-most bird mounds of the main group, then spring has arrived. Similarly in the autumn, if the sun sets south of these southern-most bird mounds, then the autumnal equinox has passed and fall has begun. When the land was prairie, when the line of sight was not obscured by trees and houses, it would have been possible to make such observations, for the line of sight would have been over the open river or low land along the banks. Similarly, an observer from the pit near the DNR eagle mound could observe in the western direction. When the sun in the fall sets over the southern-most bird mound, the equinox has passed, etc.

*Mounds atop
Hill West*

Our Native American Teacher, who was interested in our maps of the Ghost Eagle Site, pointed out that the strange shaped mound to the lower right was a 'Pipe Mound'. He also said that the four small mounds and one large mound near it represent the four fingers and thumb to hold the pipe.

He also said the finger from the bent wing bird mound also pointed to a very special spot.

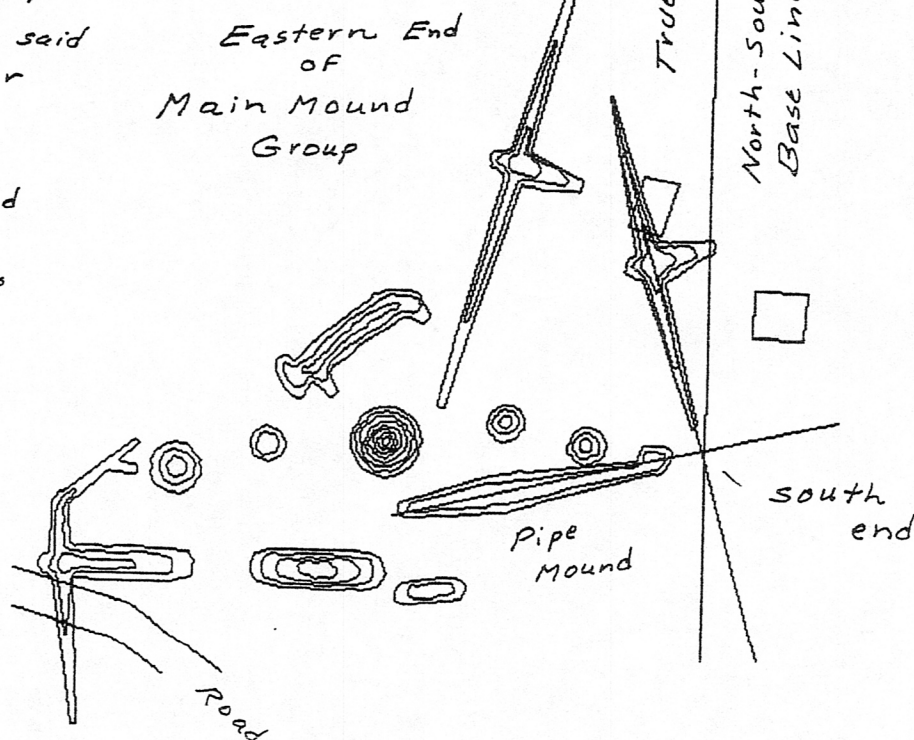


Figure 6. A True North-South Base Line.

The southern end is the intersection of lines down the wings of the eastern-most bird mound in the main group and the pipe mound. The north end is the eastern-most mound atop of Hill West. This line also corresponds to the eastern limits of the earthworks at the main group.

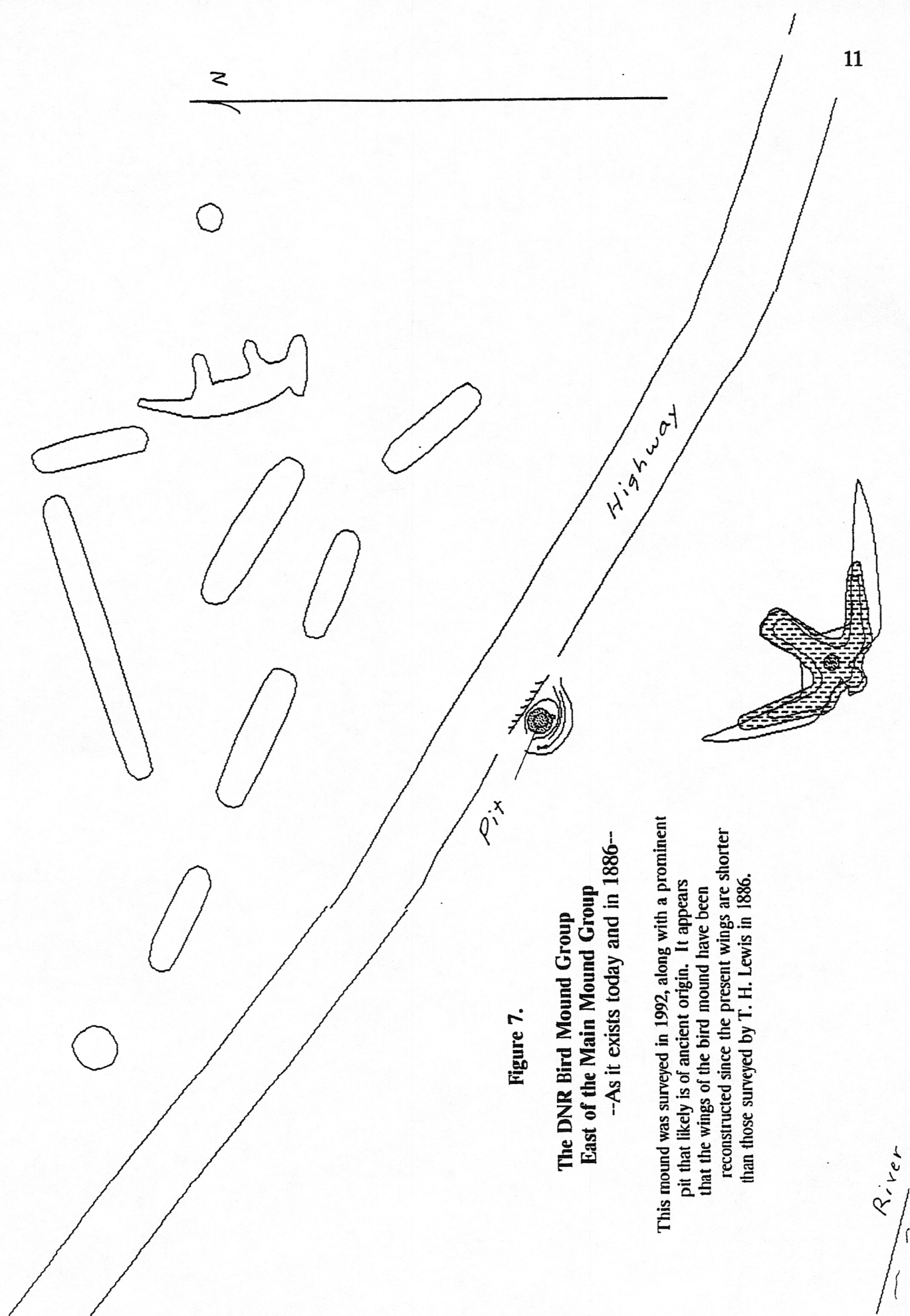


Figure 7.

**The DNR Bird Mound Group
East of the Main Mound Group**

--As it exists today and in 1886--

This mound was surveyed in 1992, along with a prominent pit that likely is of ancient origin. It appears that the wings of the bird mound have been reconstructed since the present wings are shorter than those surveyed by T. H. Lewis in 1886.

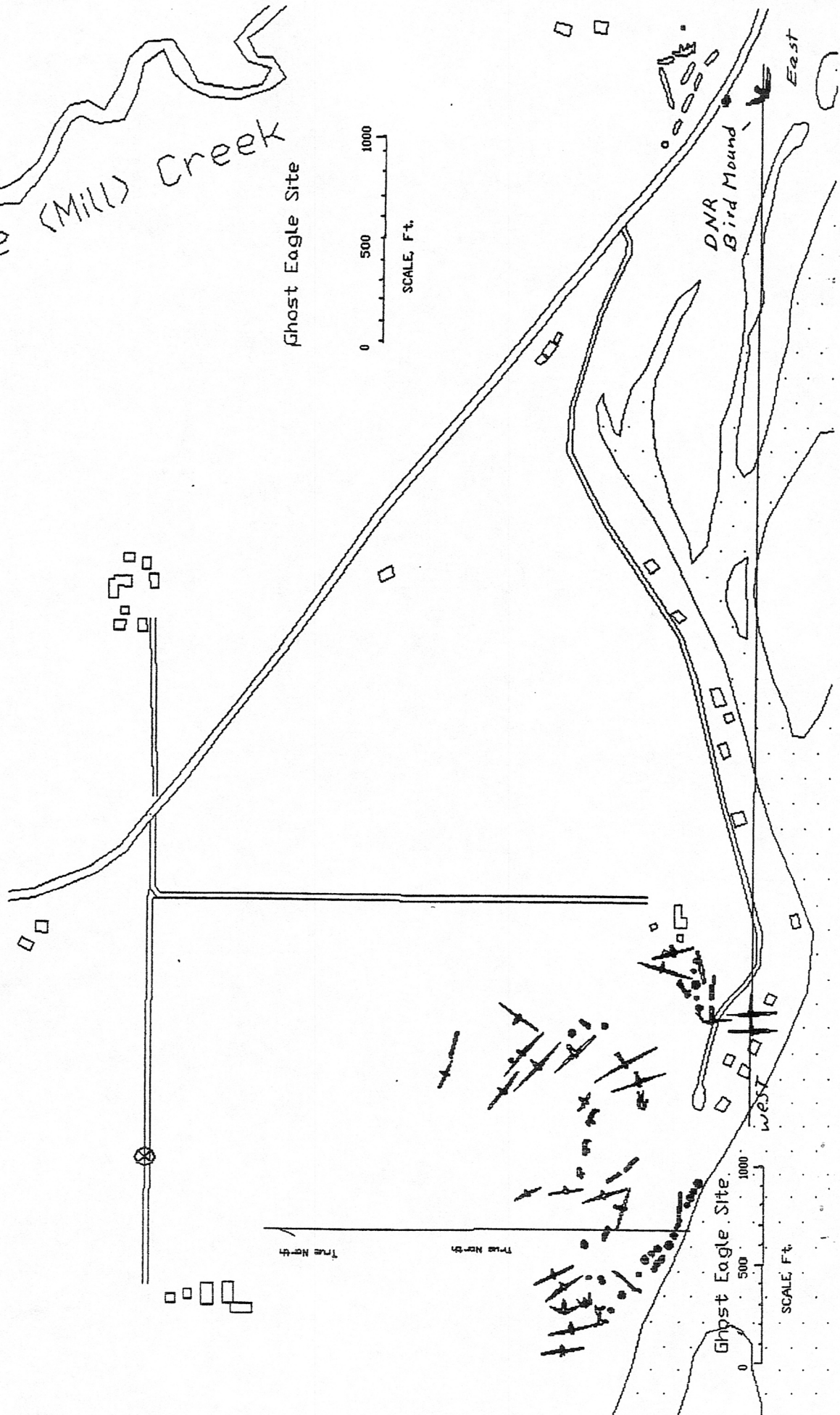
River

Eagle (Mill) Creek

Ghost Eagle Site

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Figure 8. A True East-West Base Line From the Center of the DNR Bird Mound to the Two Southern-Most Mounds in The Main Mound Group



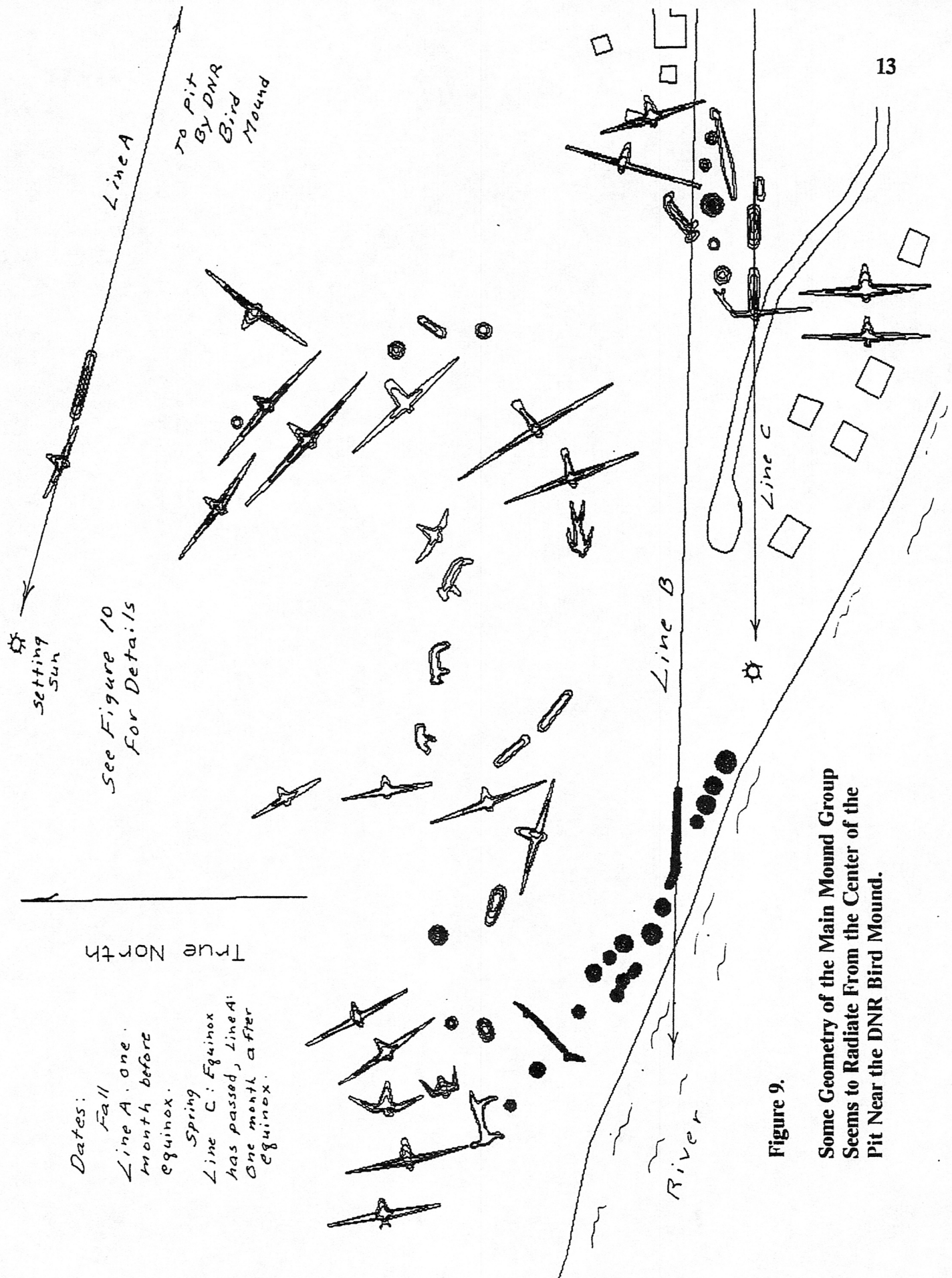
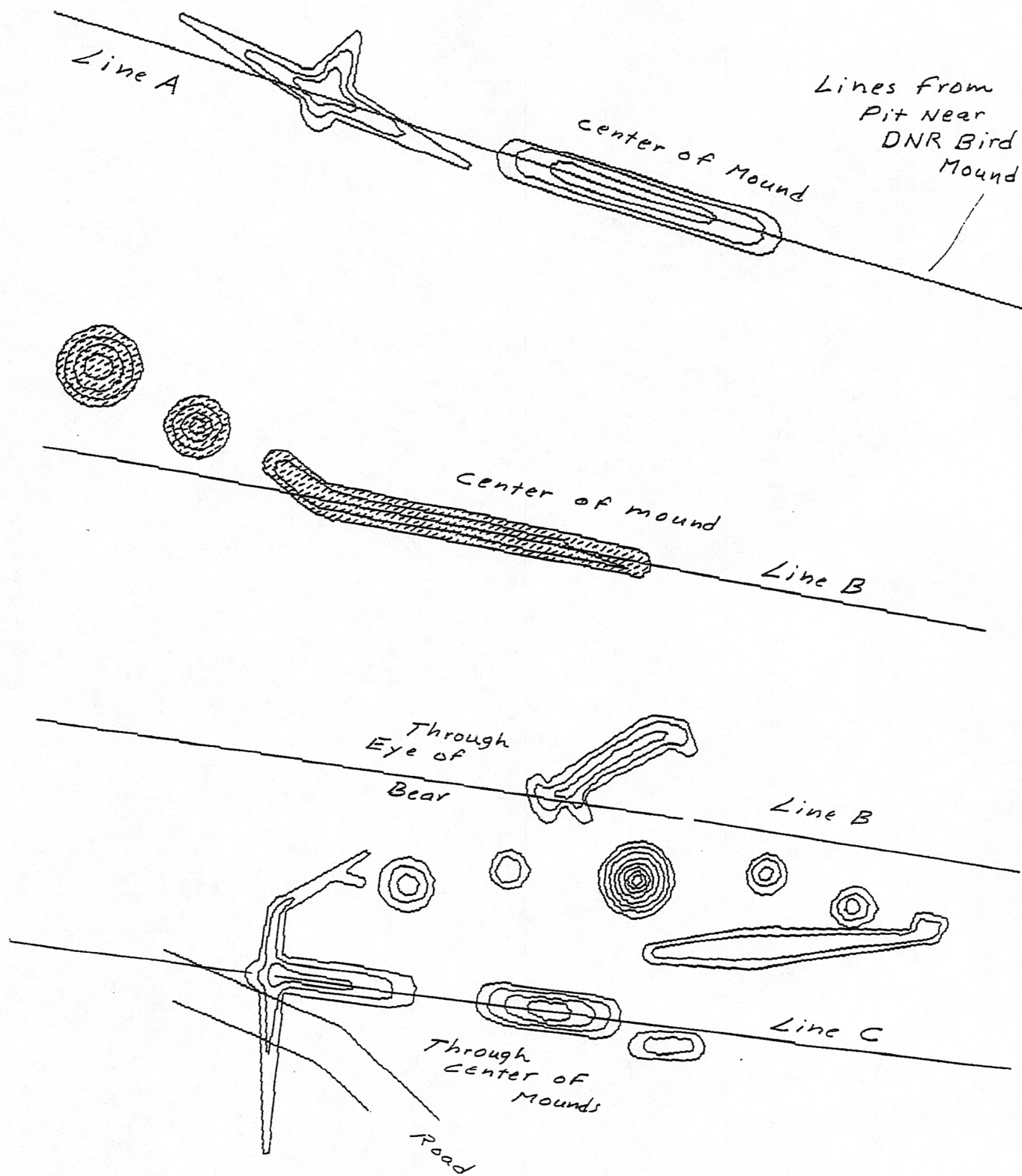


Figure 9.

Some Geometry of the Main Mound Group Seems to Radiate From the Center of the Pit Near the DNR Bird Mound.



Also See Figure 9

Figure 10.
Details From Figure 9 of Lines Radiating from the Pit near the DNR Bird Mound

Two Other Bird Mounds

Preserved in wooded land east of highway 60 are remnants of two large eagle mounds. See Figure 11. Both are on land purchased by the Ho-Chunk Nation. The northern mound is intact, although modern bulldozing debris abuts to its head. But the mound itself is essentially not damaged. There is a pit in its center, but apparent ancient pits have been noted at the heart of other mounds, such as the man mound at Baraboo, Wisc., the Cross Mound at Tarlton, Ohio, the DNR bird mound, etc. And we can assume that ancient pits were a purposeful part of the original planning of some mound groups. Experts in soil science can determine whether a pit is ancient or modern. Such experts have aided us in our studies of some such pits, including the pit in the center of the Cross Mound in Tarlton, Ohio.

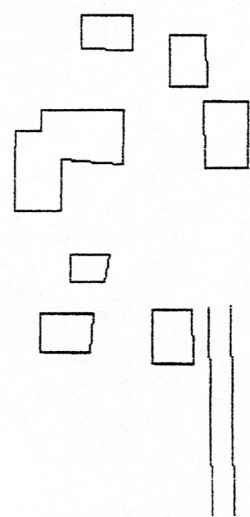
Located directly south of the mound described above are remains of another large bird mound. Although the body and the eastern wing are intact, the western wing has been damaged by the construction related to highway 60. Figure 12 shows what remains and Figure 13 shows the probable original mound. The topography is such that it would have been possible to see on an open prairie from this mound towards the main mound group, although it is not yet clear whether these sightings could have been directly to the mounds or to a smoke signal on top of the western mounds.

Alignments can be drawn from these two bird mounds to earthworks in the main mound group. See Figure 14. An important possible alignment is to the head of the owl or bat effigy mound that seems to be leading the group of moving effigies in the main group.¹ This alignment corresponds to a sunset in the first part of November, about a week after our Halloween. There is another alignment that corresponds to a sunset on about 21 Oct (one month after the autumnal equinox).

The Head of The Owl or Bat Mound and Hill East

As the wings of the Ghost Eagle are indirect alignments to the setting sun at the winter solstice, so also the line from the head of the owl mound (the western mound of the main group) to the eastern mound of Hill East is an indirect alignment to the rising sun at the winter solstice or to the setting sun at the summer solstice. See Figure 15. An indirect alignment is where one would have to lay out 90 degrees from a line to observe the sunset or sunrise. This represents deeper encoding of key knowledge but is also useful in areas where there might be a few trees. If a tree grows on a direct alignment line (as along the body of a bird mound), we cannot see through it. But along an indirect alignment, we can almost always find a spot to construct a 90 degree angle and set stakes to observe the rising or setting sun. Indirect alignments at the winter solstice sunrise are also found, for example, at the Necedah Mound Group, at Eagle Heights in Madison, etc.

¹ The symbolism is also interesting. The image of a owl or a bat seems to be leading the group of mounds. The bat and the owl can see at night, when other birds cannot. The idea of something not seen easily seen or discerned by other people comes to mind.



North

Ghost Eagle Site

0 500

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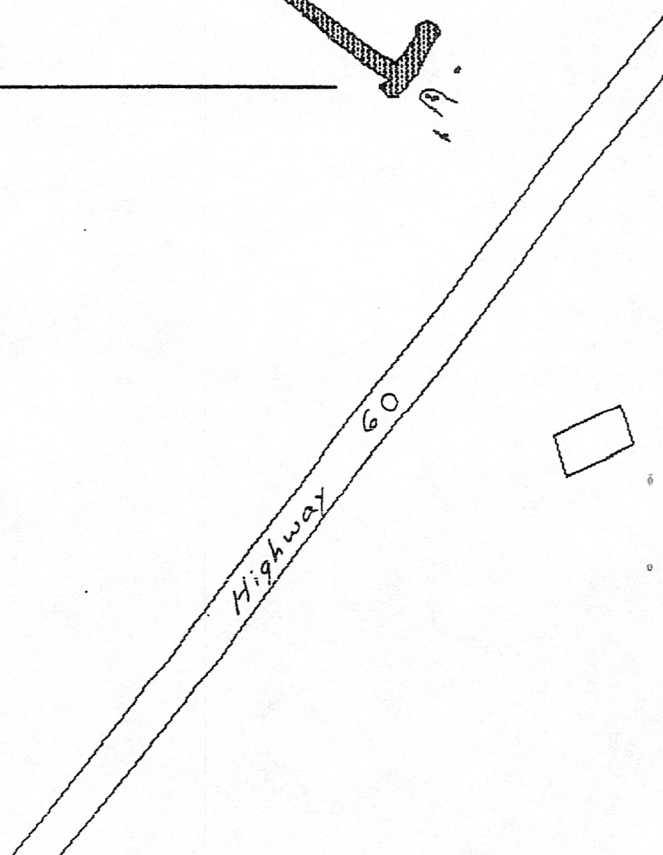
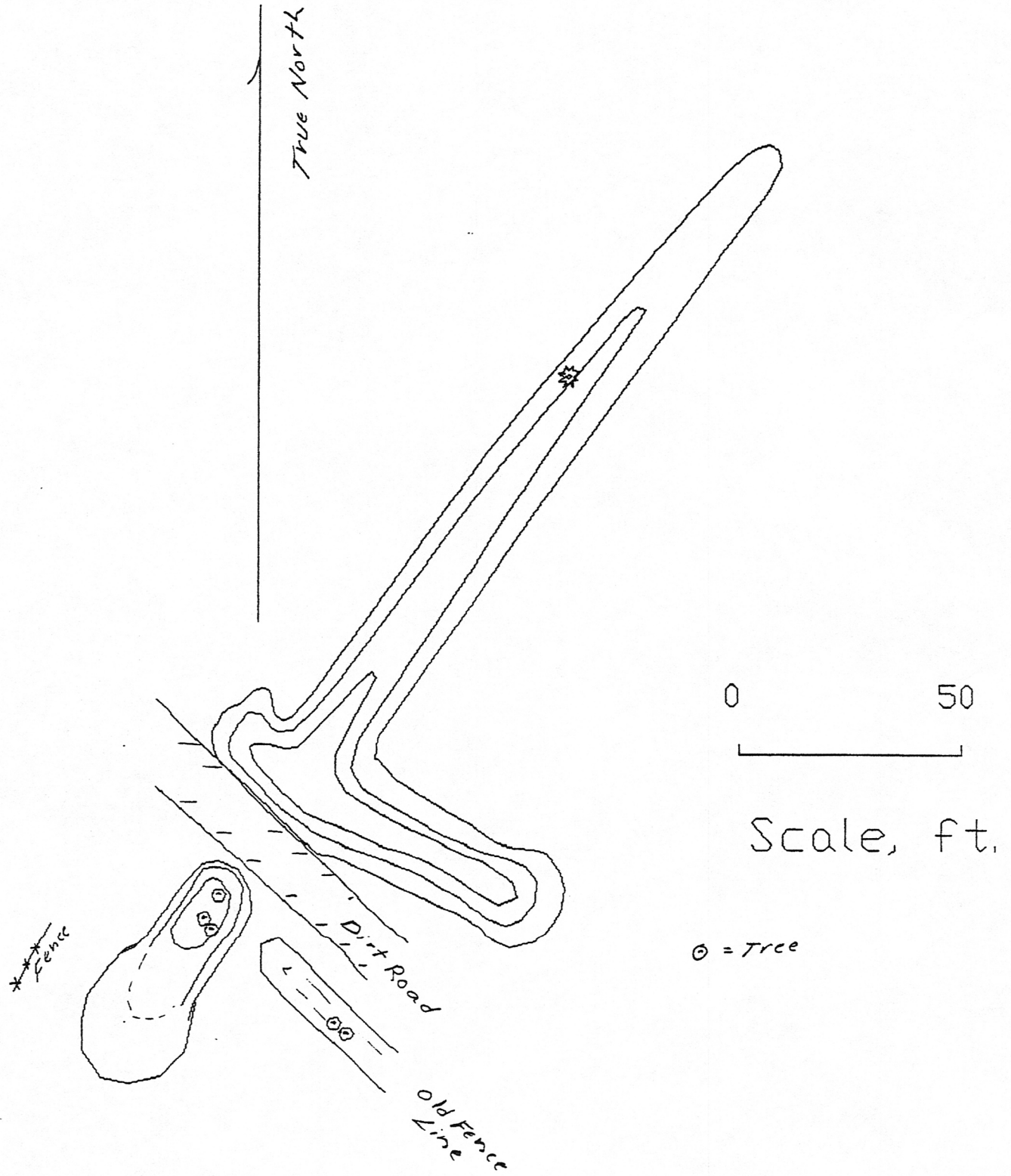


Figure 11. Two Other Bird Mounds

Figure 12. The Southern Bird Mound in Figure 10, as it Exists Today



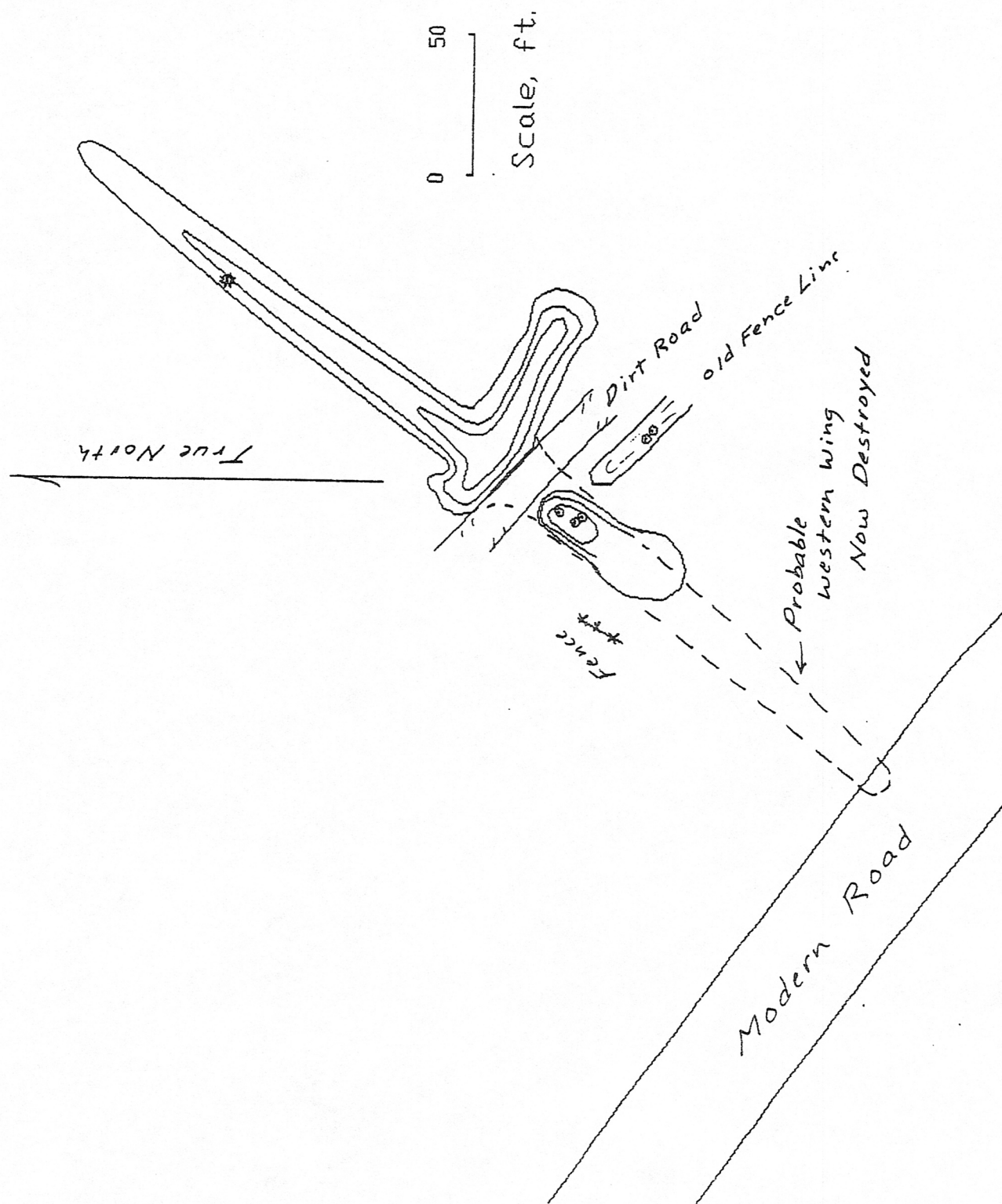
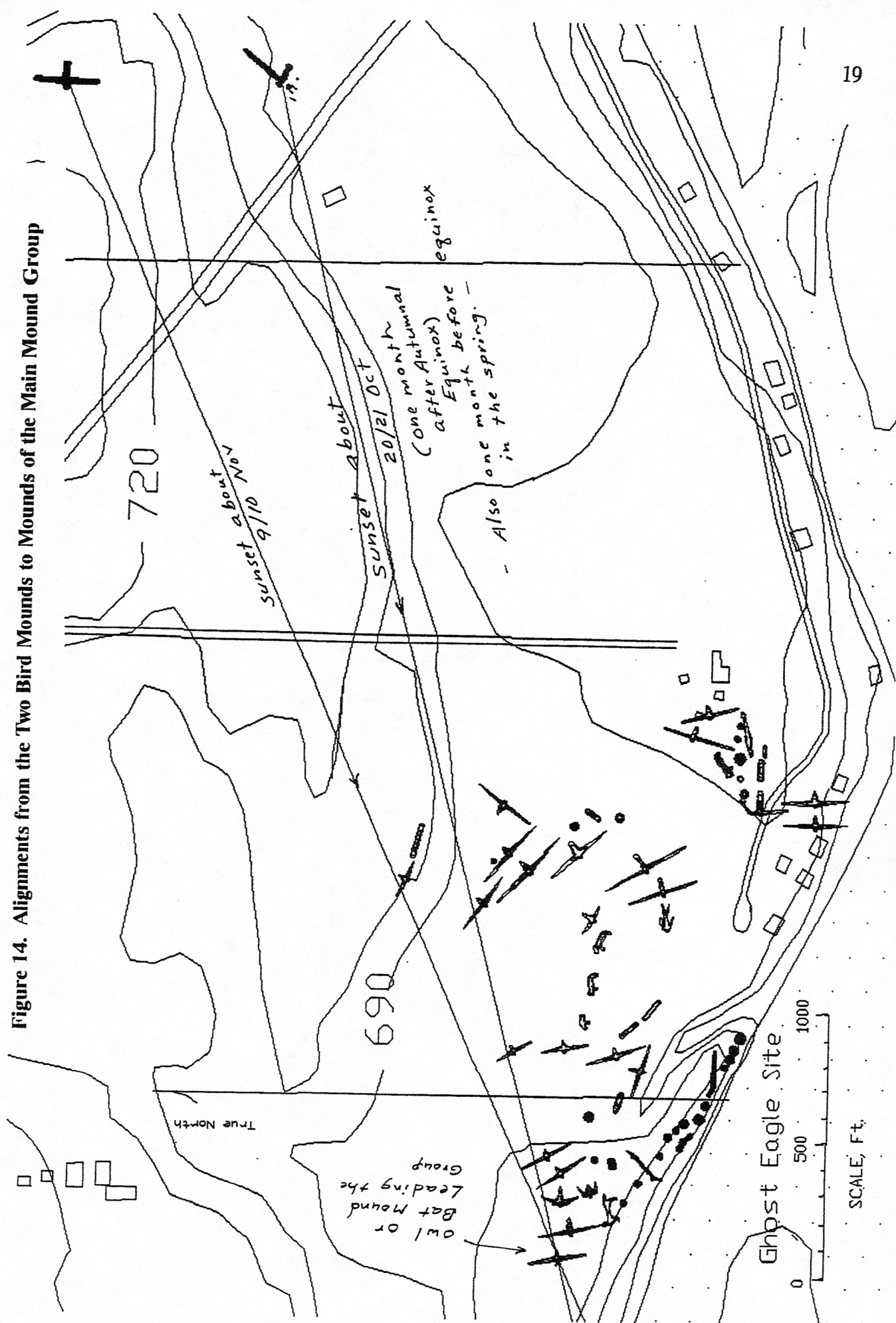


Figure 13. The Southern Bird Mound as it Likely Existed before Road Construction

Figure 14. Alignments from the Two Bird Mounds to Mounds of the Main Mound Group

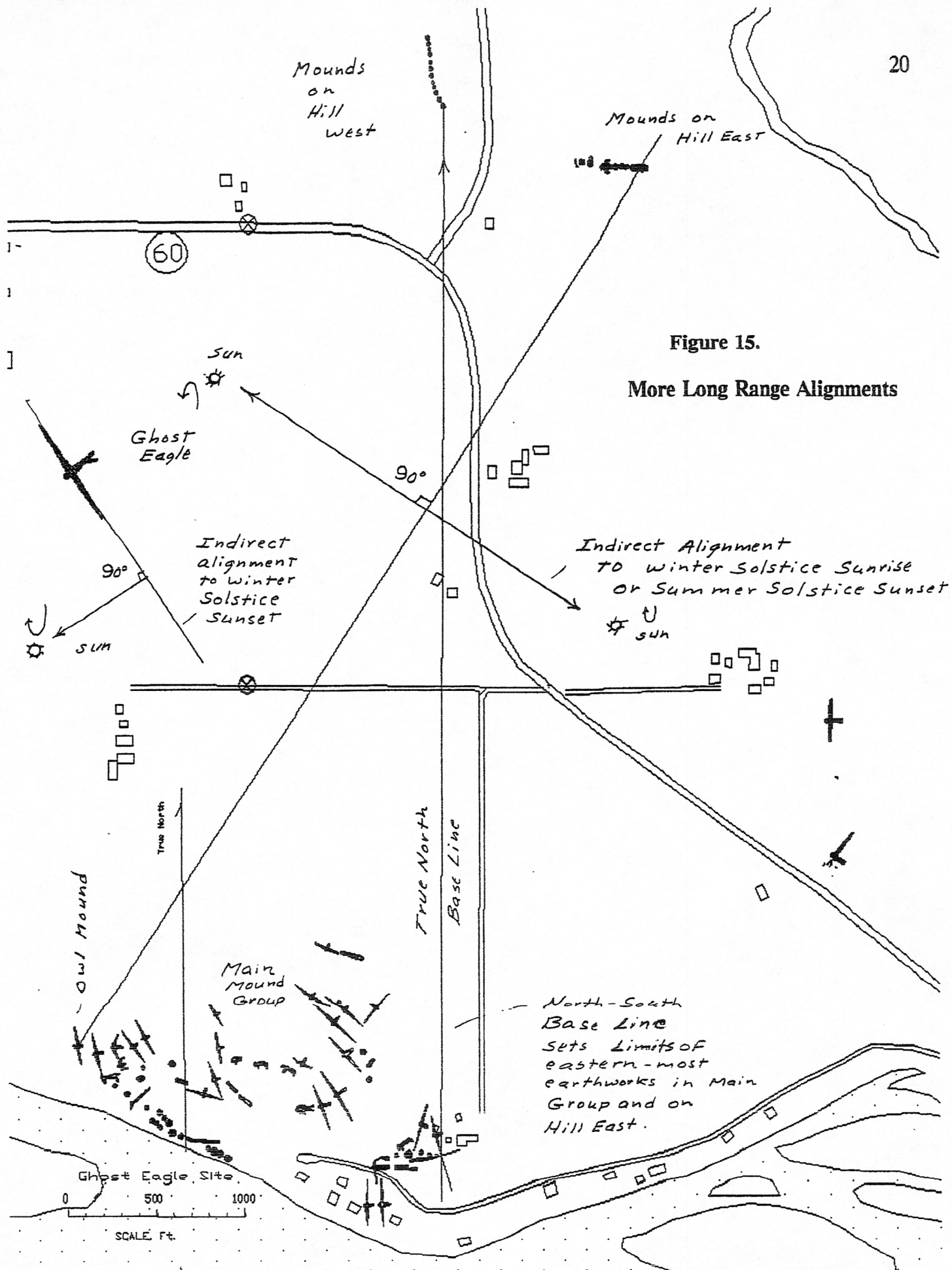


Mounds
on
Hill
West

Mounds on
Hill East

Figure 15.

More Long Range Alignments



Conclusion:

The effigy mound group across from Muscoda was known as "The Eagles". Although the name survives in Eagle Township, Eagle Corners, Eagle School, etc., it appeared to us in 1992 that all of the eagle mounds which gave rise to the name had been flattened. But if the DNR bird mound and the two mounds east of highway 60 and the bird mound atop of Hill East are really part of the once long-range geometry of the group, then the famous eagles are not completely gone.

The long range geometry that they contain and the long distance alignments to the rising or setting sun (the most accurate alignments) clearly correlate to a calendar function where the year was broken into the four parts punctuated by the equinoxes and solstices. But there are other dates between the equinoxes and solstices, including times near the cross quarter days and one month (one lunation) before or after the equinoxes.

The possibility that these correlations are all random and lucky accidents is remote. And when we see similar correlations and similar days at other mound groups, the possibility of random accident becomes even more remote. Rather, it would seem that the people who laid out the effigy mound groups were very proficient in determining the true cardinal directions (true north, south, east and west) and in using alignments from these directions to set a solar calendar. In this regard, it would appear to me that they were more aware of harmonies of geometry and movement of the heavenly bodies and how they correlate to our warm and cold seasons than most of us today.

In Dedication:

To Jan Beaver from New York City, a young professor of art, who in 1992 with her husband Adrian Frost, decided to devote a year to studying roots of her Native American heritage. Her grandmother was a Cherokee from Ohio. In preparation for her year's adventure, she did a fast and vision quest, as in ancient times. On a hilltop in upstate New York, she fasted until she saw visions of what she called ghost hawks flying in the sky, wing tip to wing tip. As related by Adrian, who met her as she came down from the hill after her fast, she interpreted the vision as a message from the ancestors--a good sign.

They immediately headed west, the American southwest being their final destination. But when traveling the back roads through Wisconsin, north of Muscoda, she noted the name of a road called Effigy Mound Drive. This is the road leading to the main mound group at the Ghost Eagle Site. She could find no effigy mounds that still remained and inquired with local people about how the road got that name. She chanced to find Frank Shadewald, who showed her a map by T. H. Lewis of the effigy mounds that once existed on his land. There on the map were eagles or hawks flying wing tip to wing tip as she had described in her vision a few days earlier. In absolute excitement, she explained "There they are! That's what I saw in my vision quest!"

Their trip west was interrupted as Jan learned to make maps and find the position on the ground where the ghost hawks or ghost eagle mounds had once been. The location of a few eagle mounds were staked out on the ground and shown to the Ho-Chunk elders. The Ho-Chunk Nation decided to purchase the land, but a few months before the deal was closed, Jan and Adrian were again on the road on their trip to the southwest. In a snowstorm near Council Bluffs, Iowa, their car ran off the road and Jan was killed instantly. The date was 4 January, 1994.