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COPY

AMPHIBIANS AND REPTILES
OF THE
LINCOLN BOYHOOD NATIONAL MEMORIAL
SPENCER COUNTY, INDIANA

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INTRODUCTION

The Lincoln Boyhood National Memorial (LBNM), located in Clay and Carter townships in Spencer County Indiana, is a unit of the National Park Service, United States Department of the Interior. The site commemorates the boyhood home of Abraham Lincoln, the sixteenth President of the United States, during the fourteen-year period he spent in Indiana.

Within the boundaries of LBNM is the farm of Thomas Lincoln, father of Abraham, and the grave site of Nancy Hanks, his mother. This site, from a historical view, dates back to 1816 when the Lincolns moved to Indiana from Kentucky.

The present National Memorial is administered and managed in such a way as to preserve the historical features of the site and to facilitate visitation by the general public. These objectives often require a relatively intensive management of the landscape. However, retention of some natural character is important, both for aesthetics and to retain a hint of the frontier life of Lincoln's early years. Management of this site so that it is aesthetically pleasing, readily accessible to the public, while retaining its historically significant characteristics can be done without undue negative impact on its remaining natural features.

A starting point, of course, is to describe the remaining natural features of this site at the close of the Twentieth Century, nearly two hundred years after initial settlement. To accomplish this goal, efforts have been underway to inventory the extant flora and fauna of LBNM. A part of that effort has been to describe two classes of vertebrates, the amphibians, and reptiles, that currently inhabit this site. The purpose of this report is to describe the results of the study of the herpetofauna of LBNM, comment on their natural history and relative abundance and the status at the site. In addition this report will recommend some management practices that will help to maintain and enhance species diversity and minimize adverse impacts on these animals.

GENERAL SITE DESCRIPTION

The LBNM is approximately 200 acres in size and is generally rectangular in shape, with its longest measure along a north-south axis. The site is bordered on the west by a rail line, light development of the Lincoln City community, and a paved county road. To the north it is bordered by agricultural land that was in row crops at the time of the study. The east is bordered by a graveled county road and light rural residential development including the Heritage Hills High School. The south side is bordered by the curved path of Indiana State Route 162. A state park, managed by the Indiana Department of Natural

Resources, lies immediately south of LBNM. In addition, a north-south paved county road dissects the southern two thirds of the tract. Another paved east to west county road traverses the northern third of the property.

Two rail lines, which intersect just west of the park boundaries in Lincoln City, have rights of way within park boundaries. One of these arcs in a generally northwest-southeasterly direction through the middle of the park and the other splits the northern third of the tract in a northeast-southwesterly direction.

For convenience of reference, six sections of the park have been labeled, each bordered in whole or in part by the above described features. These sections, illustrated in Figure 1 in the Appendix, in clockwise fashion, are West Unit, North 40 West, North 40 East, Lincoln Living Historical Farm, Cemetery Hill, and Visitor Center.

The topography of this site is generally flat to rolling, with limited relief and gentle slopes. Maximum elevation is about 500 feet above sea level near Cemetery Hill, and the lowest elevation is about 425 feet above sea level on the western border of the tract. There are no prominent physiographic features. (See Figure 2, Appendix.)

Aquatic habitat includes a small vernal woodland pool in the Cemetery Hill Unit; several intermittent streams, primarily in the northern and western units of the park; ditches alongside roads and railroad rights of way; numerous

marshy ephemeral wetlands near park borders, forest edge, and along trails throughout the site; and a permanent impoundment (farm pond) a half acre or so in size within a pasture in the West Unit. All but the farm pond are dry by late summer.

Vegetation, vastly different from pre-settlement times, reflects past and present use of the land. Considerable portions of the southern end of the West Unit, the Cemetery Hill Unit, and the Visitors Center Unit are in second growth forest. The most mature trees are found on the crest and slopes of the Cemetery Hill Unit, with some sections of closed canopy. Pasture and old field dominate much of the West Unit and a good deal of the Lincoln Living Historical Farm Unit. Much of the North 40 West and East Units consist of old field in various stages of succession, returning to woodland. Other less significant vegetation types include mowed lawns and roadsides, manicured trail borders, and some horticultural plantings, primarily in and adjacent to the Cemetery Hill and Visitor Center Units.

In keeping with the primary purpose of the National Memorial, there has been considerable development at the site to facilitate visitor access, to maintain historical features (and the living historical farm), and to provide housing for staff and maintenance personnel, equipment, and livestock. The general appearance of the site today is of a pleasing park-like environment with paved roads, paved and

curbed parking areas, maintained foot trails, and picnic tables and convenience facilities. There is a striking sandstone memorial building that serves as a visitor interpretive center and provides office space for staff. (See Figure 3.)

MATERIALS AND METHODS

Field studies for this report were conducted between February and September 1997.

Thirteen visits were made to the site as follows: February 23; March 1, 9, 16, and 28; April 19; May 18 and 25; June 28; July 10; August 10 and 12; and September 14. Field visits were made in both daylight hours and at night during the spring but later visits were during daylight hours only, from mid-morning till dark. Field visits ran from one to six hours in duration, with three hours as an average. During the survey, each species of amphibian and reptile encountered was identified, its location and habitat noted, and some assessment made of status and relative abundance at the site. No animals were collected or removed from the site, with the exception of two salamander larvae that were removed for identification purposes, but later returned alive and released.

Surveys were conducted on foot, by automobile, and to a very limited extent, by canoe. Sampling techniques employed standard methods for assessing herpetological diversity as described by Karns (1986). Most survey work consisted of

walking the site, particularly border areas, forest edge, wetlands and wooded slopes. A long handled (52 inch) four pronged "potato rake" was used to lift logs, stones, discarded material (mats, sheet metal, lumber, trash, etc.) and remove leaf litter to expose hiding animals. All aquatic sites were visually inspected and "bottom raked" with a long-handled (50 inch) one-quarter inch mesh 17x22 inch deep dip net.

Some basking animals were identified with the aid of 9x36 power Bushnell Binoculars. Trails, roadsides, and ponded areas and border areas visited at night were illuminated with a Petzl 6V headlamp and/or a handheld 6V large reflector flashlight.

The single permanent aquatic site was sampled for turtles using a commercially available hoop net (36x48 with two-inch mesh nylon netting) with an underwater throat, and baited with frozen fish and chicken livers. A 17.5 foot fiberglass canoe was used to set and retrieve the turtle trap in the impoundment.

A "drive through" by automobile was done at the beginning and end of each field visit on the north/south and east/west county road traversing the site, and the parking areas. These "drive throughs," which were done both on daylight and night visits, yielded live animals and "DORs" (dead on road) specimens, animals which had been killed by visitor or through traffic.

RESULTS/DISCUSSION

Twenty-three species of amphibians and reptiles were encountered during the time of this study. This is a remarkably rich herpetofauna for such a small, highly developed site, with limited ecological diversity. The following chart, based on a review of the literature (Minton 1972, Minton, List and Lodato 1983; Minton 1997) and the author's field experience, provides some perspective:

	Indiana Statewide	Spencer Co.	LBNM
Amphibians			
Toads/Spadefoots	3	1	1
Frogs/Treefrogs	13	8	6
Salamanders	<u>22</u>	<u>7</u>	<u>4</u>
Subtotal	38	16	11
Reptiles			
Lizards	6	2	2
Turtles	16	6	4
Snakes	<u>36</u>	<u>12</u>	<u>6</u>
Subtotal	58	20	12
Total	96	36	23

Outlined below is an annotated checklist of the amphibians and reptiles encountered at LBNM during this study. Nomenclature follows Collins (1990) and/or Conant and Collins (1991). Plotted localities for each species are to be found on a stylized site map in the Appendix.

Amphibians

I. Amphibians

A. Salamanders

1. Redback salamander - Plethodon cinereus ✓

This small woodland salamander was only recorded once at LBNM, on March 28, from the southern end of the West Unit. It was found hiding under debris in contact with the soil, near the top of a wooded slope. This salamander, common in upland areas east of Spencer County, is rare and local in most of southwest Indiana. Nevertheless, once encountered it is usually seen in numbers, at least during the spring. Its status here is uncertain. The Cemetery Hill Unit provides excellent habitat for it but it was not seen there.

2. Slimy salamander - Plethodon glutinosus ✓

This woodland salamander, considerably larger than the redback, is abundant at LBNM and is distributed throughout the site. All of the individuals encountered were found under logs, leaves, lumber, stones, and other debris, usually on slopes. It is frequently seen in the spring but not during the warmer months. A single individual was found under a log on September 14 in the North 40 East Unit.

3. Smallmouth salamander - Ambystoma texanum ✓

This "mole salamander," as members of this group are known, is moderately common at LBNM. Adults were seen only

at night after rainfall, and with the aid of flashlight or car headlights. They were encountered on foot trails, roadsides and paved county roads from about one hour after dark to about midnight. It is believed all those encountered were migrating away from breeding sites, which are temporary pools near woodlands. Adults were recorded from the Visitor Center Unit, Cemetery Hill Unit, the Lincoln Living Historical Farm Unit, and the North 40 East Unit. Evidence of breeding (egg masses and larvae) were found virtually throughout the site and included nearly every temporary pool and ditch in each of the six site units.

4. Marbled Salamander - Ambystoma opacum✓

This mole salamander, the most colorful on the site, is fossorial and rarely seen outside of the breeding season, which is in the fall of the year. This life cycle makes it unique among the Ambystoma salamanders. Its presence at LBNM could have been overlooked had it not been for large larvae being observed on May 18, floating at the surface of a woodland pool in the northwest corner of the Cemetery Hill Unit. The size of these larvae at this time of the year suggested breeding last fall rather than the current season. Two larvae were collected and maintained in a five gallon aquarium in my home. As they metamorphed they were transferred to plastic shoeboxes and kept on damp paper towels. They fed readily on small slugs and earthworms and

by early July it was clear they were opacum. They were returned to the collection site and released. This site was revisited on September 14 and large adults were found to have returned to the now dry pond, awaiting fall rains and another breeding cycle. All were under logs and embedded in fissures in the earth. This was the only site for this salamander at LBNM and it is likely it is restricted to the wooded slopes in the vicinity of this vernal pool.

B. Toads

1. Fowlers Toad - Bufo woodhousii fowleri ~

This familiar toad appears to be moderately common at LBNM. A surprisingly early sighting was made on March 1 during a nighttime survey following heavy rains. At this time it was seen on the county road at the southern border of the North Units. It was not seen again until May when an individual was observed abroad on the forest floor on the west side of the Cemetery Hill Unit. Two DOR specimens were found in the north-south county road near the main entrance in June and a sub adult was observed in dry open woods in the Cemetery Hill Unit. No breeding sites were located.

C. Frogs and Treefrogs

1. Chorus frog - Pseudacris triseriata ~

This little hylid is undoubtedly heard by spring time visitors, but seldom if ever seen by them. Its well-known call is likened to running one's thumb over a comb. The LBNM chorus frogs are likely an intergrade form between the

western race triseriata and the upland race feriarum. They were heard in full chorus on the first visit in February, on a bright, sunny late winter day. It prefers marshy areas near forest edge and in pastures and old fields. It is particularly abundant in flooded pools in open areas along the borders of LBNM. Egg masses and tadpoles are evident in all but the most shaded sites. An amplexing pair was observed in a ditch along the North 40 West Unit during daylight hours and several individuals were located in parking areas and in roads during rainy nights. This little frog is seldom seen after the spring breeding season ends in April. It has been reduced in numbers and extirpated from some areas where it was once common. LBNM provides a safe haven, particularly within the marginal use areas at the park.

2. Spring Peeper -- Hyla crucifer

The spring peeper is a resident at LBNM, as chorusing males were heard on at least two occasions, and DOR specimens were found on pavement within the site. Its status here is enigmatic, though, as I never heard what I would consider breeding choruses of this little frog at LBNM. On occasions when I was travelling to LBNM from the west, I often heard breeding colonies of peepers in western Spencer county. However, on these same nights I never heard breeding choruses at LBNM. Individuals were heard at the far western side of the West Unit, and I heard a single

individual call from a vernal pool in the Cemetery Hill Unit. A live specimen was found in the road near the southern entrance on March 28, and several were again calling west of LBNM. Interestingly, a large chorus broke out during daylight hours on May 28, a warm humid day. All were tightly concentrated in the sedges and grasses near the margin of a vernal pool in the Cemetery Hill Unit. If Hyla crucifer is not naturally breeding here now, it may well be migrating onto the site for future breeding, from well established colonies to the west. The author has noticed an explosive range expansion of the species in previously unoccupied areas in adjacent Warrick County over the past decade.

3. Southern Gray Treefrog - Hyla chrysocelis ✓

This arboreal treefrog is a common resident at LBNM. Based on the cadence and pitch of the trill, and on geography, these treefrogs have been assigned to the southern race or Cope's Treefrog. These treefrogs are often heard, particularly in or near wooded zones, throughout the tract. A breeding site was located in two small circular excavated areas that had filled with rainwater just south of the storage yard in the West Unit. It was seen in some numbers (at least a dozen) on wet pavement the night of March 28. These animals were apparently migrating to breeding sites.

4. Woodfrog - Rana sylvatica

A single adult woodfrog was found at night on a wet trail in the northeast corner of Cemetery Hill Unit on March 28. No other woodfrogs were seen or heard during the study and no breeding sites were located. This frog is a very early breeder and may have already completed its reproductive cycle prior to the initiation of this study, but that is unlikely. A breeding population may be present here (a likely site is the vernal woodland pool in the Cemetery Hill Unit) but at present its status is unknown. Based on the available record this species must be considered rare at LBNM.

5. Green frog - Rana clamitans melanota

The green frog, superficially similar to the bullfrog in appearance, but smaller in size and with a distinctive dorsolateral ridge, is common at LBNM. It was found during daylight hours and at night, always close to aquatic situations. It was common in open marshy rivulets in the old field and pastures in the West Unit, along intermittent streams in the North 40 East Unit and in the cool shaded pool at the Cemetery Hill Unit. In addition several of these frogs were found on rainy nights on the pavement just north of the southern entrance to the memorial off State Route 162. It doubtless breeds here, but no breeding activity was noted.

6. Southern leopard frog - Rana utricularia

The leopard frog is also common at LBNM. Breeding choruses were frequently heard at night, particularly in the low wet areas of the West Unit. Individual frogs were encountered throughout the site, usually after dark or late in the day. Six were encountered on the night of March 1 after a heavy rain on trails and pavement in or near the Living Historical Farm Unit, northern end of the West Unit and in the North 40 East Unit. After the spring breeding season, several took up residence at the woodland pool in the northwest corner at Cemetery Hill Unit. In September individuals were found at the farm pond in the West Unit. These frogs move during rainy weather and are often seen perched on the pavement after a rain. Several were killed by automobiles.

II. Reptiles

A. Lizards

1. Five lined skink - Eumeces fasciatus ✓

This shy lizard is abundant at LBNM. The juveniles are conspicuous with their bright blue tails and are likely a familiar sight for observant visitors during the warmer months. It prefers to bask in open sunny areas, but when alarmed, or on cool overcast days it seeks shelter beneath logs, slab lumber, sheet metal and in the crevices of out buildings. It was first observed on May 18, a warm and sunny day. It was seen in the open basking on a split rail

fence on the West Unit, on out buildings at the Living Historical Farm, along the trail from Visitor Center Unit to the Historical Farm along the railroad rights of way and in open areas in the southern portion of the West Unit. Several were found under rotted logs, under boards near the maintenance storage area and on various structures. It appears to be rare only in the open expanses of pasture and old field.

2. Northern fence swift - Sceloporus undulatus
hyacinthinus

The fence swift received its common name from its fondness for basking on split rail fences and for its spectacular burst of speed when alarmed. Split rail fences are a common feature of the landscape at LBNM, but the swift is decidedly uncommon here. This is so because optimum habitat or the swift is non-existent. It prefers open, well drained upland situations, habitats occurring more frequently in areas east of LBNM. A single colony persists at LBNM, in and about the storage yard near the southeastern quarter of the West Unit. Two individuals were seen at this locale, one on May 18 and the second on September 14. They were basking in the open, one on a pile of sandstone block and the other on stacked rail fencing. The second individual, briefly captured, was a large male. No juveniles were observed, but the species undoubtedly breeds here.

B. Turtles

1. Eastern box turtle - Terrapene c. carolina✓

The box turtle appears to be holding its own and doing well at LBNM. It is possibly the only turtle that was native to the Lincoln farm at the time of settlement. A passage from Lincoln (Donald 1995) mentions abusive treatment of turtles by children at the farm in order to get the turtles to come out of their shells. These were undoubtedly box turtles. This animal is essentially a woodland creature, but it adapts well to a variety of habitats, with the exception of intensive agriculture. At LBNM it was seen on May 18 on a wooded slope in the southwest corner of the West Unit. That same day a copulating pair were found in a wet meadow near the woods edge in the northern part of the West Unit. A juvenile was found at forest edge in the Cemetery Hill Unit on May 25 and another in the North 40 East Unit on June 28.

2. Common snapping turtle - Chelydra s. serpentina✓

A single specimen of the common snapping turtle, a large adult, was taken from a turtle trap set in the permanent impoundment at the West Unit. There are likely more snapping turtles at LBNM than the single record indicates, but it is rare and local due to the scarcity of suitable habitat. Besides the impoundment, it likely occurs in some semi-permanent pools of intermittent streams and ditches and low ponded areas on the extreme western portion

of the West Unit. It is a bottom dweller that shuns basking and is easily overlooked.

3. Midland painted turtle - Chrysemys picta /
marginata

A single specimen of the painted turtle, a large female, was taken from the turtle trap on August 12. Additional turtles of this species, much smaller juveniles, were seen basking at the surface of the impoundment at the West Unit at various times. These brightly marked little turtles are restricted to more or less permanent ponded water so their presence at LBNM is restricted to the impoundment at West Unit. They are fond of basking on bright sunny days.

4. Red-eared slider - Trachemys scripta elegans /

The red-eared slider is a large aquatic species at home in larger ponds and lakes, and occasionally in streams with moderate current. It is aggressive in colonizing aquatic habitats, but it does require permanent water. It was collected in the turtle trap set in the permanent impoundment in the West Unit. (The trap was set up on August 10 and checked on August 12.) Surprisingly, twelve adult red-eared sliders were retrieved from the trap, nine female and three males. That such a small impoundment could maintain such a concentration of these turtles was unexpected. While this turtle may be common at this particular site, it is restricted to it as it is the only

available habitat that could support this species. It, like the painted turtle, is a confirmed basker. Basking sites are largely non-existent in the pond, but it was observed (from a distance through binoculars) basking on shore. It is extremely wary and dives back to water at the slightest disturbance. It is not known what food source in this pond would sustain these turtles.

C. Snakes . .

1. Midland banded water snake - Nerodia sipedon ✓
pleuralis

The banded water snake, as its common name suggests, is seldom found far from water. Two were located at LBNM, both from the West Unit, and both were in water when discovered. The first water snake was encountered on May 18. It was a young-of-the-year sub-adult (from the previous season) and was foraging on salamander larvae in a shallow pool on the far west side of the West Unit. The second watersnake, an adult, was observed in the permanent impoundment in the West Unit at the time the turtle trap was being retrieved on August 12. This snake is likely more common than the two records indicate, and can probably be found at one time or another at ponded sites that are not heavily shaded.

2. Eastern garter snake - Thamnophis s. sirtalis ✓

A single eastern garter snake was found May 12 at the margin of woods in the extreme south side of the Visitor Center Unit. This site was not particularly good habitat

for garter snakes, but this snake was seen nowhere else at LBNM. Seemingly ideal habitat occurs in the West Unit and the North 40 East Unit and one would expect it to turn up at other locations within LBNM. It is a forest edge species very tolerant of the semi-developed type environment at LBNM.

3. Midland brown snake - Storeria dekayi✓

. • wrightorum

The small Brown snake, or DeKay's snake, as it is also known, is represented by a single specimen found on June 28. It was coiled in leaf litter in the damp woods south of the Visitor Center building. The snake was particularly large as DeKay's snakes go, perhaps eighteen inches in length. DeKay's snake is well known for its tolerance for developed or disturbed environments. It often thrives in vacant lots and at the margin of urban areas. It is a secretive snake and likely more common at LBNM than the single specimen might indicate. It often shows up in considerable numbers in the fall of the year. Like the watersnake and garter snake above, it produces live young.

4. Southern black racer - Coluber constrictor priapus✓

The black racer is a large, bold, very active diurnal serpent. Its uniform slate black color and rapid movements make it difficult to track with the eye when it seeks cover in undergrowth. A large adult, perhaps four feet in length, was encountered May 18 while foraging near the staff

residence and maintenance building in the southwest corner of the West Unit on May 18. The black racer probably roams on and off the LBNM property, frequenting all but the most wooded sections. A smaller specimen was found DOR immediately west of the North 40 West Unit boundary on April 19.

5. Rat snake - Elaphe obsoleta ✓

The rate snake is potentially the largest snake inhabiting LBNM. Large adults can attain lengths of six feet or more. It is an arboreal species, and it is not unusual to find this snake ascending trees or at some distance off the ground in barns and other out-buildings, which are visited in search of birds and rodents. It is a powerful constrictor. Two rat snakes were found at LBNM. Based on color, pattern, dorsal blotch count and geography, these snakes probably represent an intergrade population between the black rat snake, obsoleta, and the southern form, the gray rat snake, spiloides. It seems to thrive in mixed habitats, but seldom strays far from woodland. The rat snake was first encountered on May 10. A freshly killed (DOR) sub-adult was found just north of the access road to the Visitor Center parking lot. A second was found at the base of a tree near the northern perimeter of the North 40 East Unit on June 28.

6. Rough green snake - Opheodrys aestivus ✓

The rough green snake, which gets its common name from

its grass green color and from the ridge or keel in the center of each dorsal scale, was the most commonly encountered serpent at LBNM. This is surprising in view of its relatively small size, cryptic coloration and present day scarcity over much of its former range. While not listed as endangered or threatened, the Indiana Department of Natural Resources, through its Amphibian and Reptile Non-Game Technical Advisory Committee (of which the author is a member) considers this species to be one of "Special Concern." This designation is used for animals that have shown a precipitous decline in population or that may have disappeared from geographic areas formerly occupied by a species. The rough green snake has declined in population over much of its Indiana range due, it is believed, to the widespread use of pesticides and herbicides associated with intensive, modern day agriculture. It is a forest edge species, and seems to thrive in the mixed habitats and wood margins common in the Western and Northern Units of LBNM. Six rough green snakes were seen during the course of this study, all between May 18 and September 14.

ADDITIONAL SPECIES POSSIBLY OCCURRING
IN LINCOLN BOYHOOD NATIONAL MEMORIAL

A. Amphibians

1. Bullfrog - Rana catesbeiana ✓

The bullfrog was "conspicuously absent" from LBNM. It requires permanent water and its appearance at the West Unit should be anticipated.

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2. Cricket frog - Acris crepitans blanchardi ✓

The cricket frog was heard calling on May 18 in a roadside ditch a short distance southwest of the LBNM. It prefers exposed, shallow water habitats and often thrives in disturbed or manmade aquatic situations. The West Unit provides good habitat for this little frog, as does exposed sections of intermittent streams in other units.

3. Spotted salamander - Ambystoma maculatum ✓

Another of the mole salamanders, this one breeds somewhat later than the smallmouth. Suitable habitat is available in the Cemetery Hill Unit and adjacent areas.

4. Cave salamander - Eurycea lucifuga ✓

This secretive species has been recorded from elsewhere in Spencer County. It is restricted to locations with subterranean drainage. It is listed here because the spring and surrounding area on the west side of the tract provides potential habitat.

B. Reptiles

1. Black king snake - Lampropeltis getulus niger ✓

A juvenile black king snake was found DOR on State Route 162 a short distance west of LBNM.

2. Midwest worm snake - Carphophis amoenus helenae ✓

This small fossorial species normally only appears at the surface in May and September. It is not uncommon in similar situations in adjoining counties and should be looked for in forested areas in LBNM.

3. Hognose snake - Heterodon platirhinos ✓

During the course of this study a hognose snake was observed to the south within the state park boundary. It is a possibility for LBNM.

CONSERVATION AND MANAGEMENT

Many of the amphibians and reptiles inhabiting the LBNM will persist with a "benign neglect" style of site management. However, even with a passive approach there will be impacts on resident populations of amphibians and reptiles. For example, plant succession, underway in the northern sections of the tract, will have a negative impact on some species and positive on others. The key to maintaining species diversity will be to keep intact as much as possible the present mixture of habitats, particularly transition zones and edge habitats. A balance in land management will provide the foundation for a healthy diverse population of amphibians and reptiles. Beyond that, sound operational practices of the property can enhance the stability of extant populations of these animals. Outlined

below are some practices that the author believes will be beneficial. Some of these may be practices that are already being observed. In any case, the intent is to identify simple procedures that can benefit the native herpetofauna but will not conflict with the primary mission of LBNM.

1. In marginal use areas, particularly the northern portion and west border of the West Unit and perhaps border areas of the North 40 West and East Unit, prescribed burning would help to maintain transitional and edge communities. In order to have the least impact on active animals this should be done in mid- to late fall. This time of year is normally the driest season and is more likely to produce effective burning.

2. In areas where burning is not practical for aesthetic reasons or where it is a risk to structures (buildings, storage facilities, split rail fences, etc.) periodic mowing or "bushhogging" is the next best alternative. In border areas, along fences, etc., this should be kept to a minimum (in terms of frequency) or avoided altogether in the warmer months (April 15 through September 15). As much as possible during this time the interior of old field and pastures should be left in the "rough."

3. In marginal use areas, fallen trees, old logs and used lumber, accumulations of leaf litter, etc., should be left in place to naturally decompose. These micro-habitats

provide essential cover for amphibians and reptiles throughout the year.

4. Refrain from any additional artificial drainage of seasonally wet areas except in areas where such conditions would unduly inconvenience visitors.

5. It is not known to what extent pesticides or herbicides are presently used at LBNM. However, many ~~species of amphibians and reptiles are susceptible to these~~ chemical agents. Amphibians are particularly vulnerable, both during the aquatic phases of their life cycle and as adults because substances can be readily absorbed through their skins. In addition, many of the native amphibians and reptiles are insectivorous and can easily ingest toxic substances while feeding on contaminated prey. Accordingly, chemical agents to control undesirable insects and noxious weeds should be used prudently. While some localized use in and around buildings, housing, and other structures may be necessary, great care should be taken to keep these chemicals and their runoff out of basins and seasonally wet areas. Generalized spraying should be avoided.

6. It is in keeping with Park Service or National Memorial Policy, consideration should be given to posting of small, low profile, informational signs that would inform the visitor that all plants and animals on the site are protected. The text of the sign could be complemented with a drawing of a box turtle and/or a wildflower. These could

be placed at trailheads near the two parking areas. Such information signs serve to heighten visitor awareness that wildlife does inhabit the area and may serve to discourage unauthorized collecting or occasional killing by a visitor. Also, mortality from traffic on roads traversing the site can at times be considerable. While little can be done to change this, awareness on the part of the visitor may cause some to "yield" or avoid animals in the road until they have made safe passage.

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APPENDIX

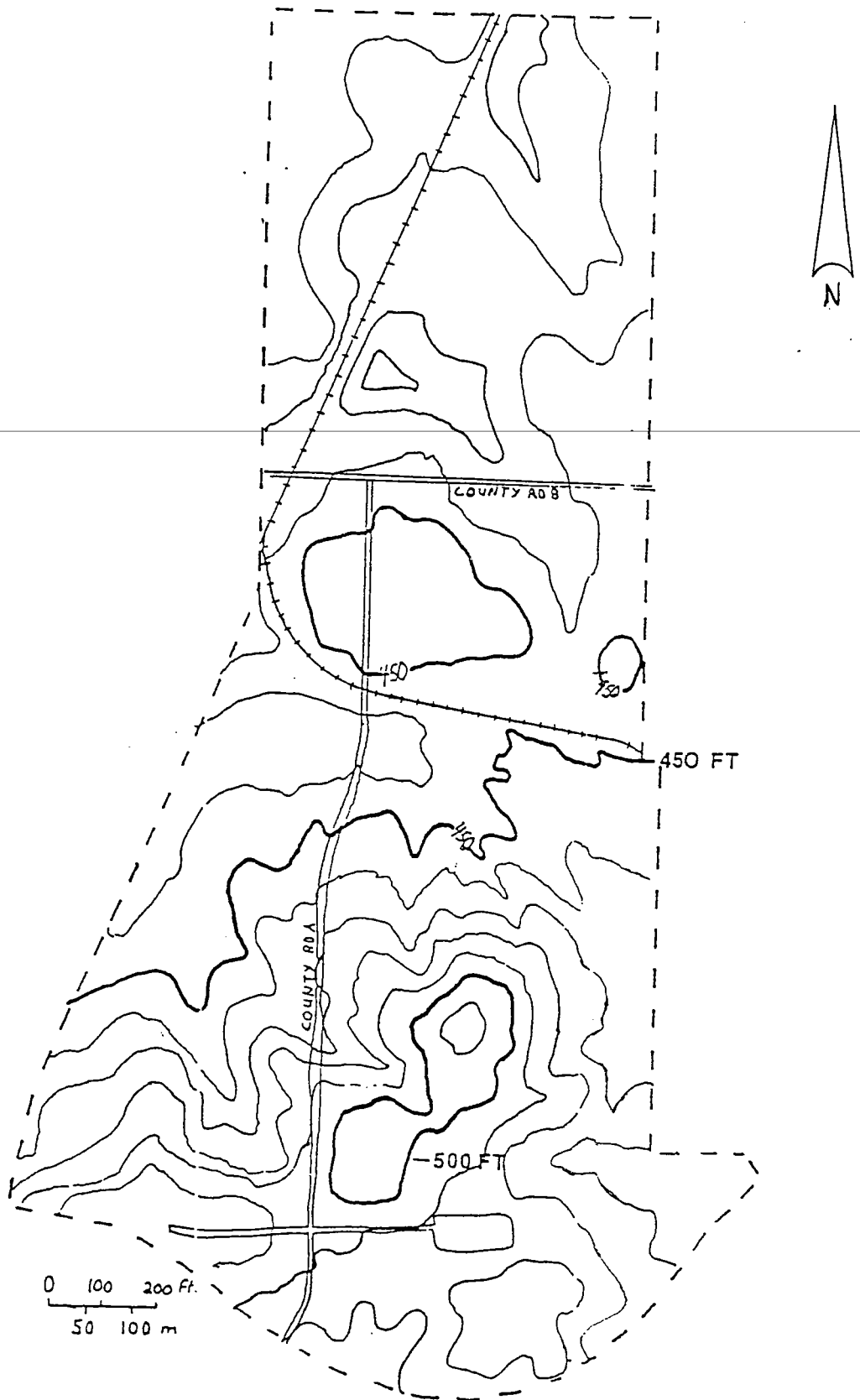


Figure 1 - Topographic Map of Lincoln Boyhood National Memorial
Contour Interval 10 Feet - Map courtesy G. Wagner -- NPS

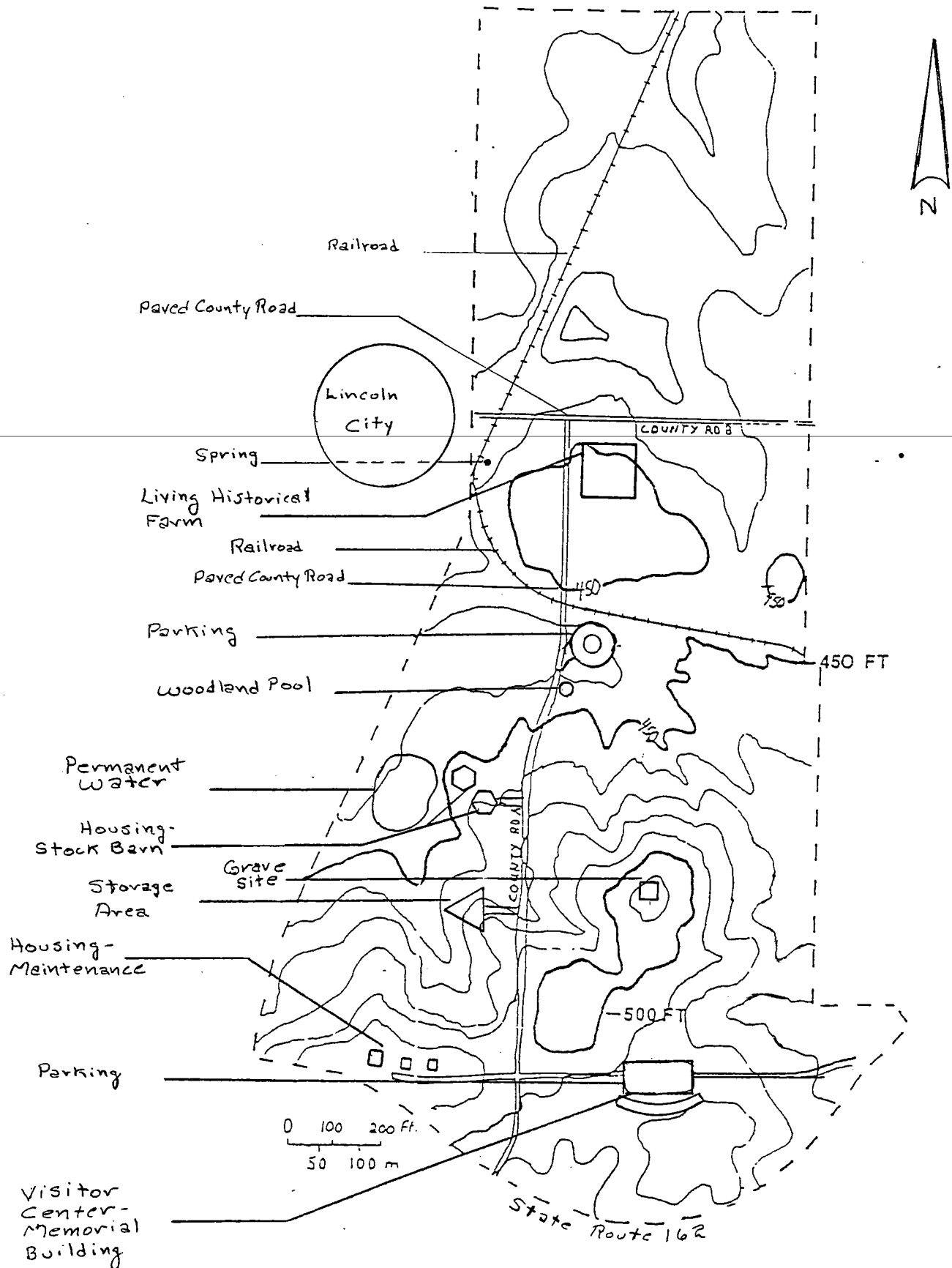


Figure 3 - Significant Features--Lincoln Boyhood National Memorial
Modified and Adapted from NPS Map

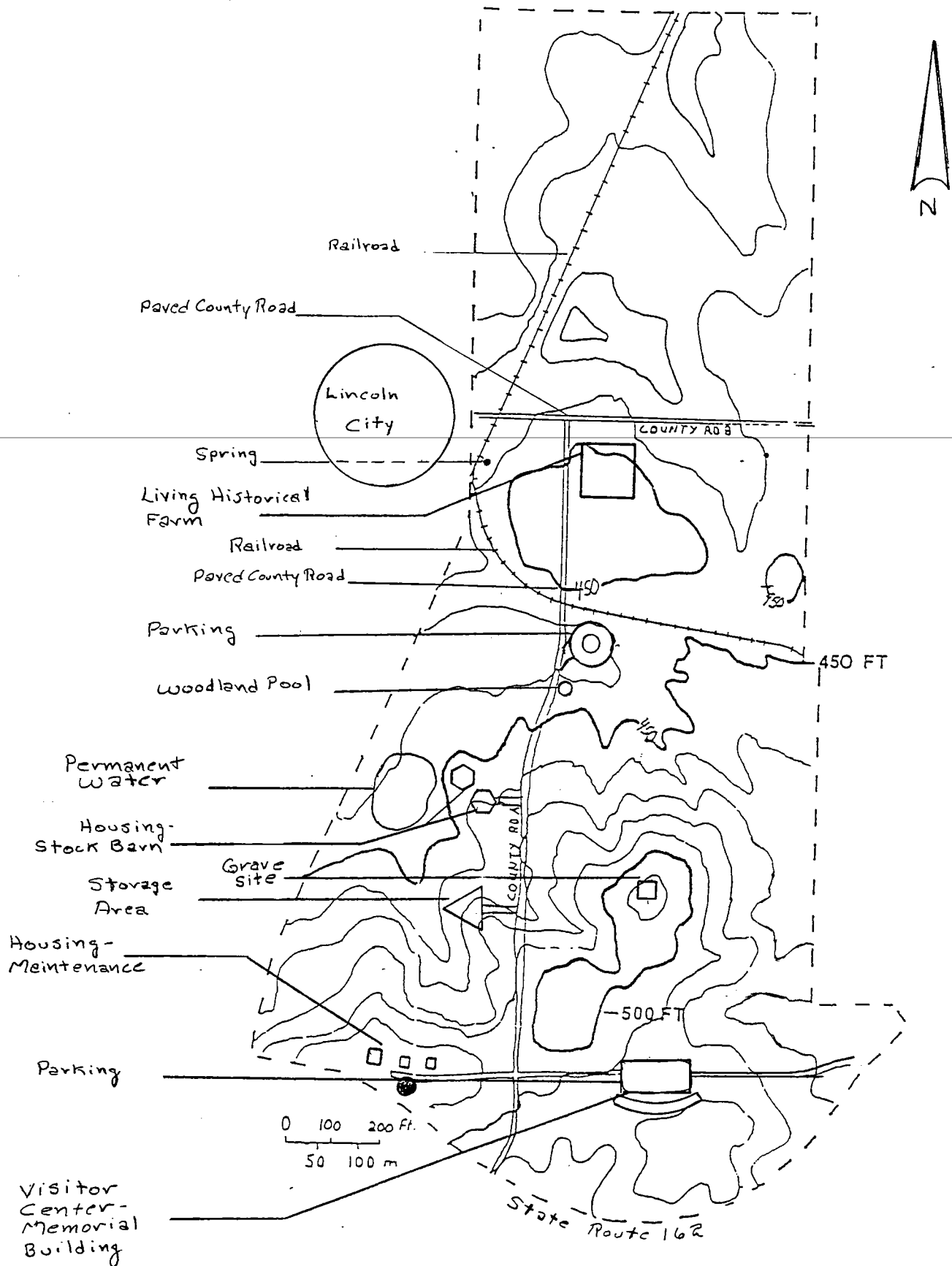


Figure 4 - Locality Record for the Redback Salamander
Plethodon cinereus

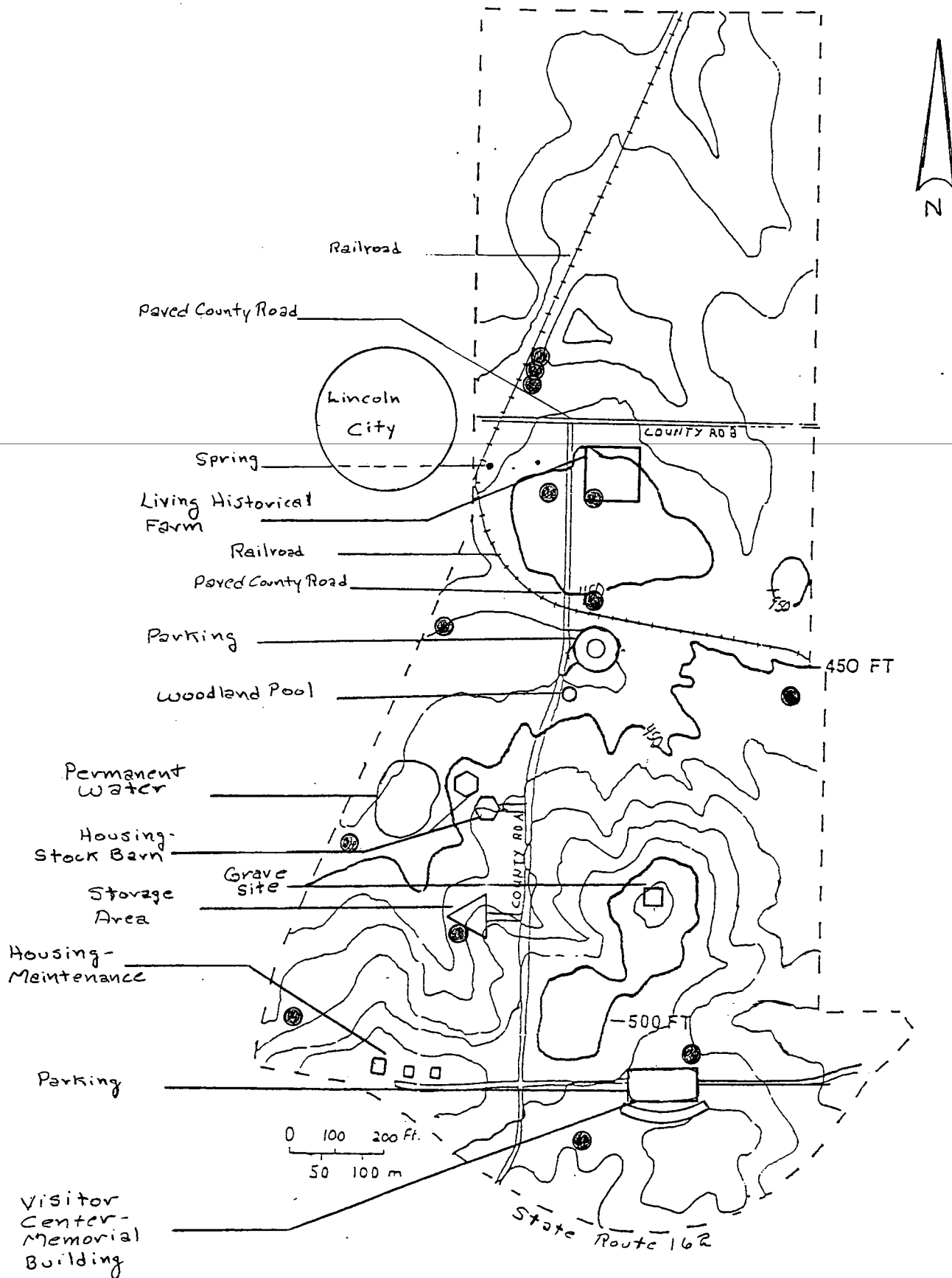


Figure 5 - Locality Record for the Slimy Salamander
Plethodon glutinosus

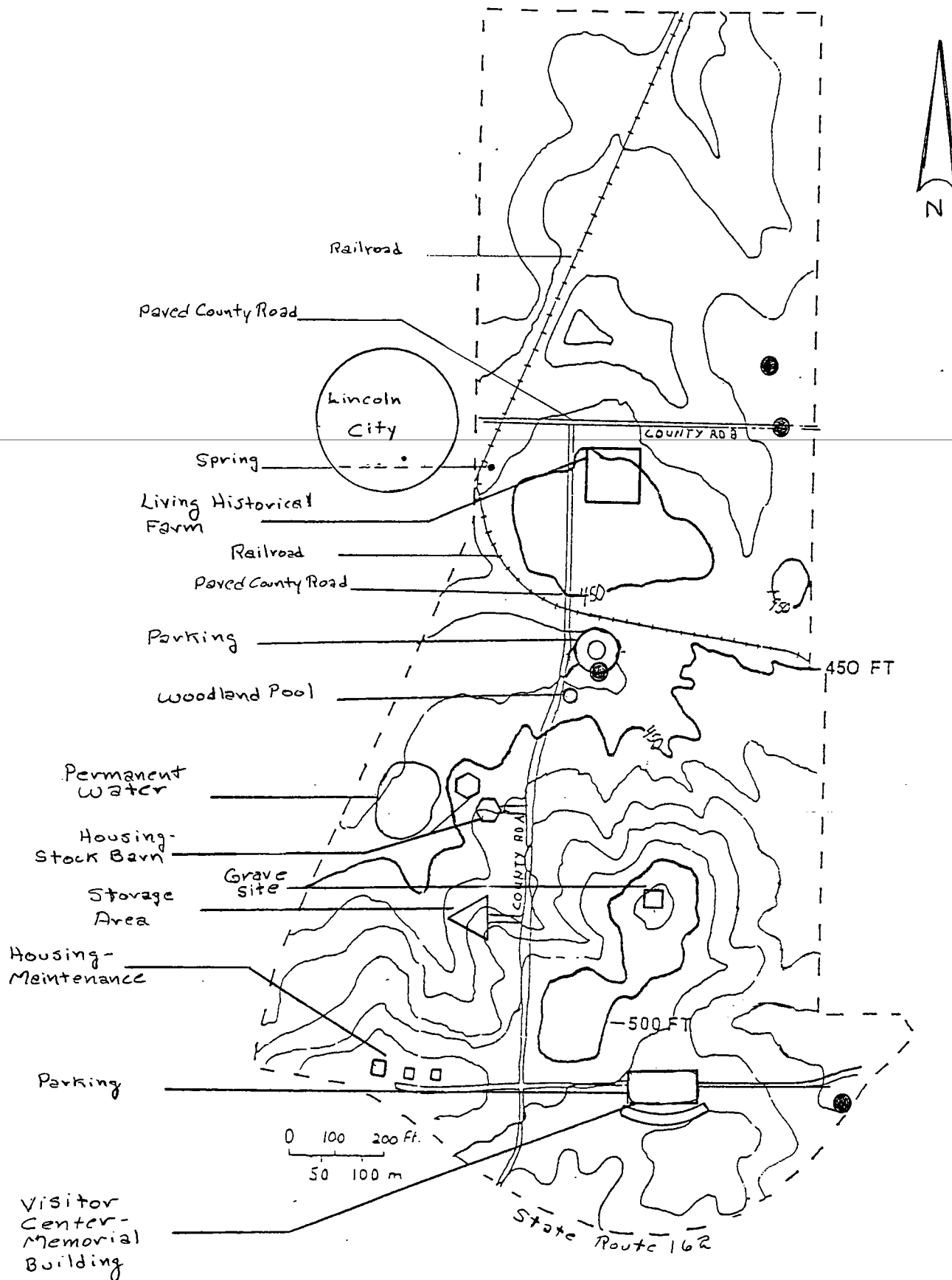


Figure 6 - Locality Record for the Smallmouth Salamander
Ambystoma texanum

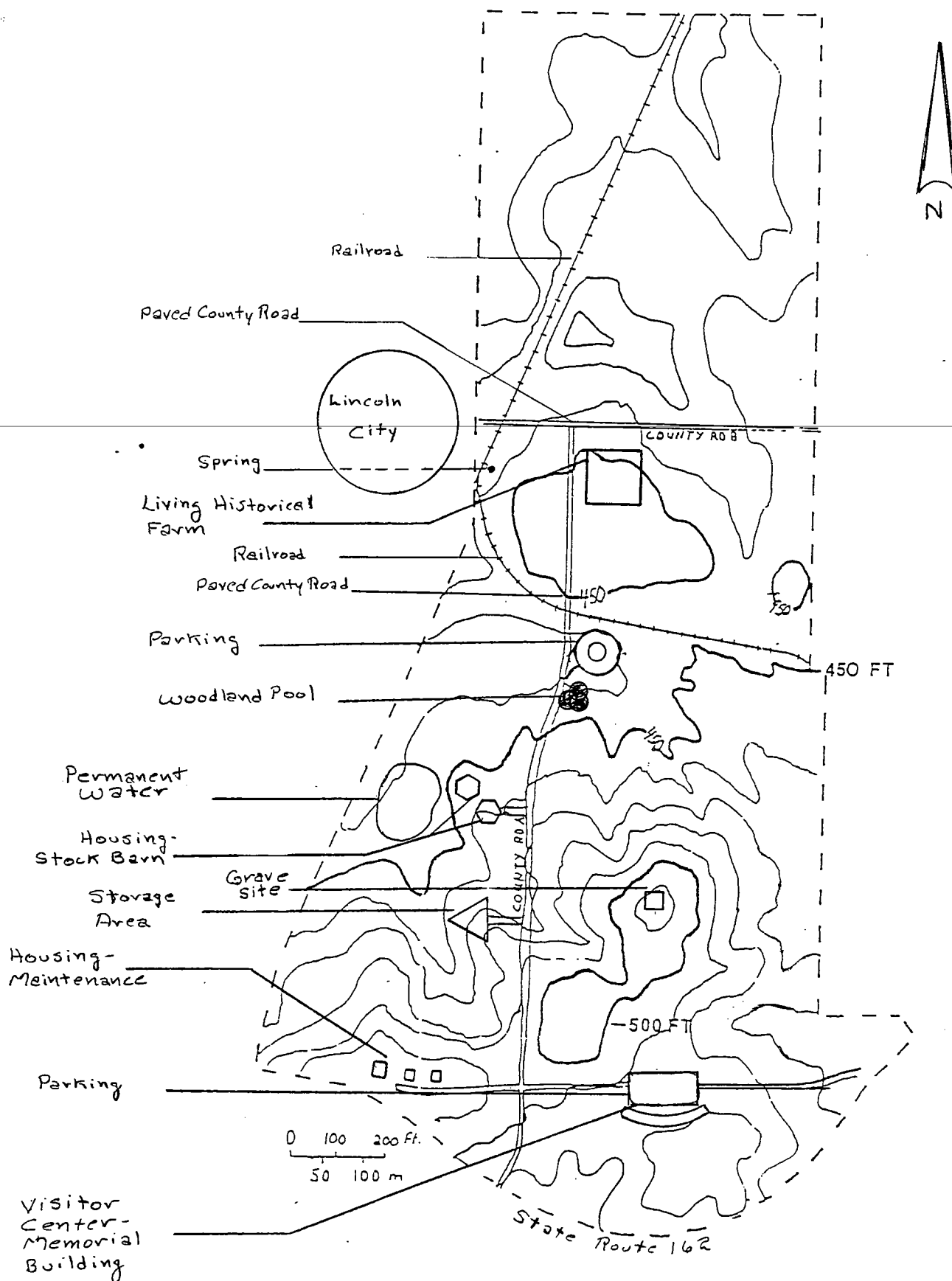


Figure 7 - Locality Records for the Marbled Salamander
Ambystoma opacum

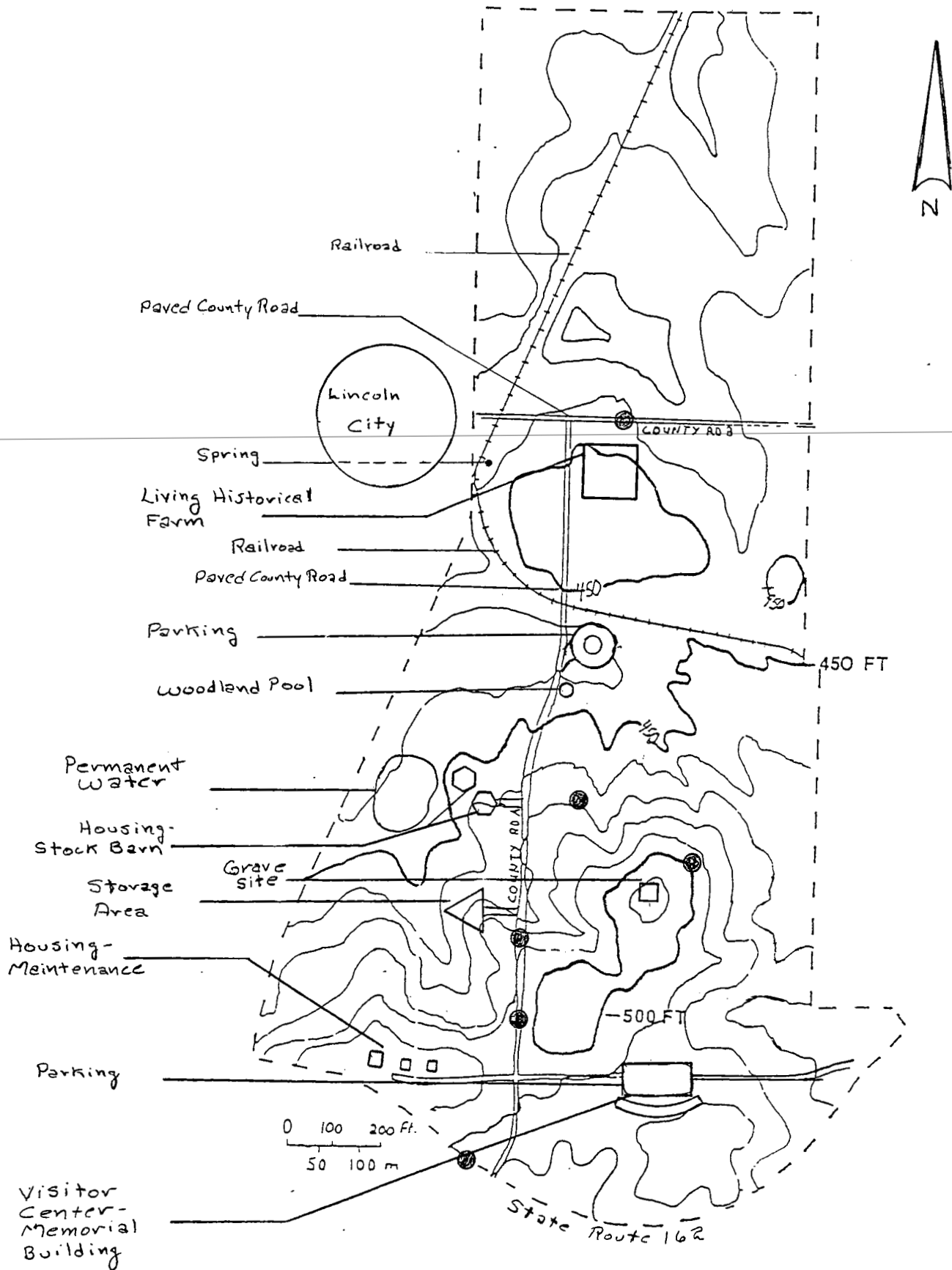


Figure 8 - Locality Records for the Fowlers Toad
Bufo woodhousii fowleri

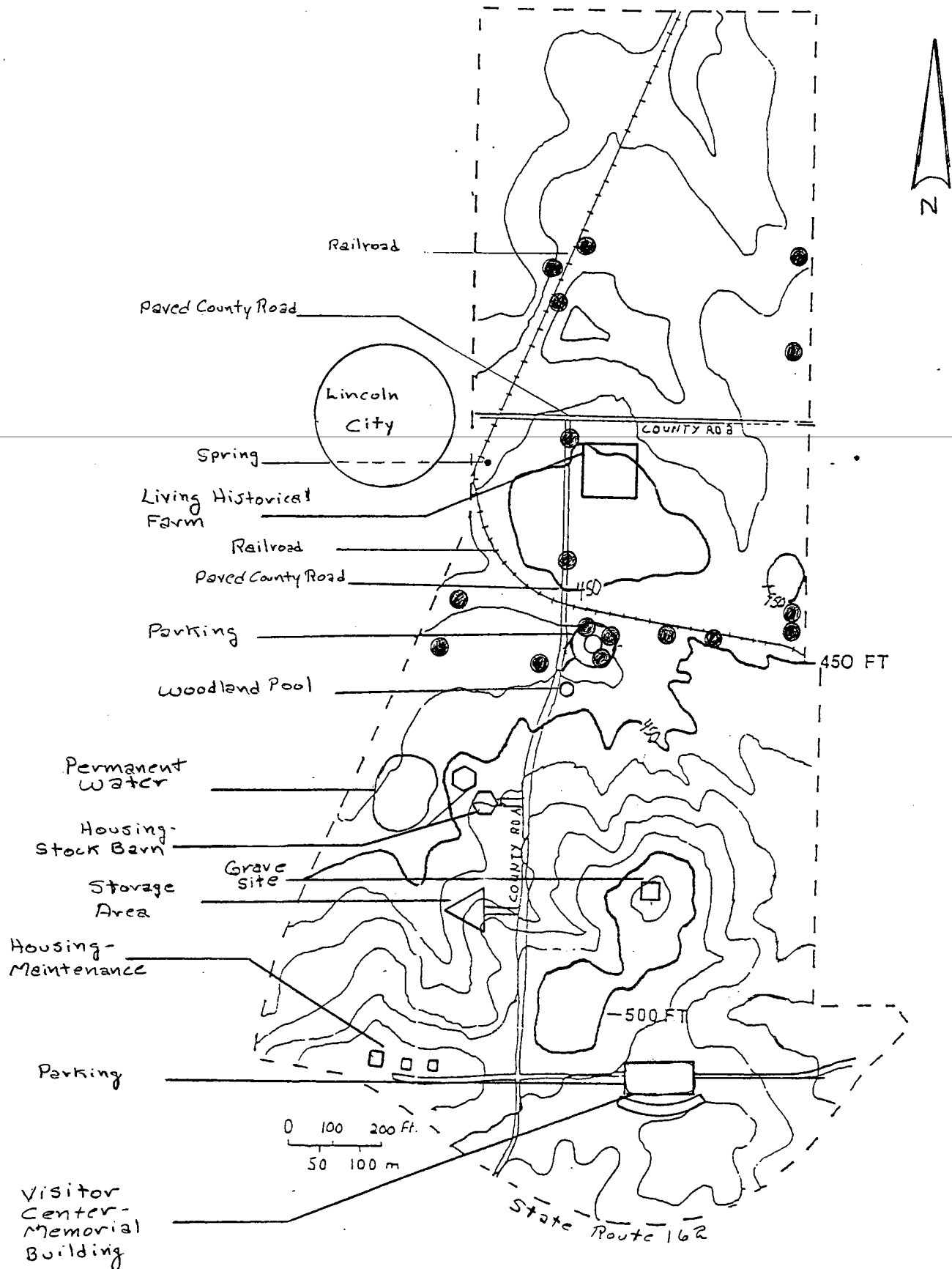


Figure 9 - Locality Records for the Chorus Frog
Pseudacris triseriata

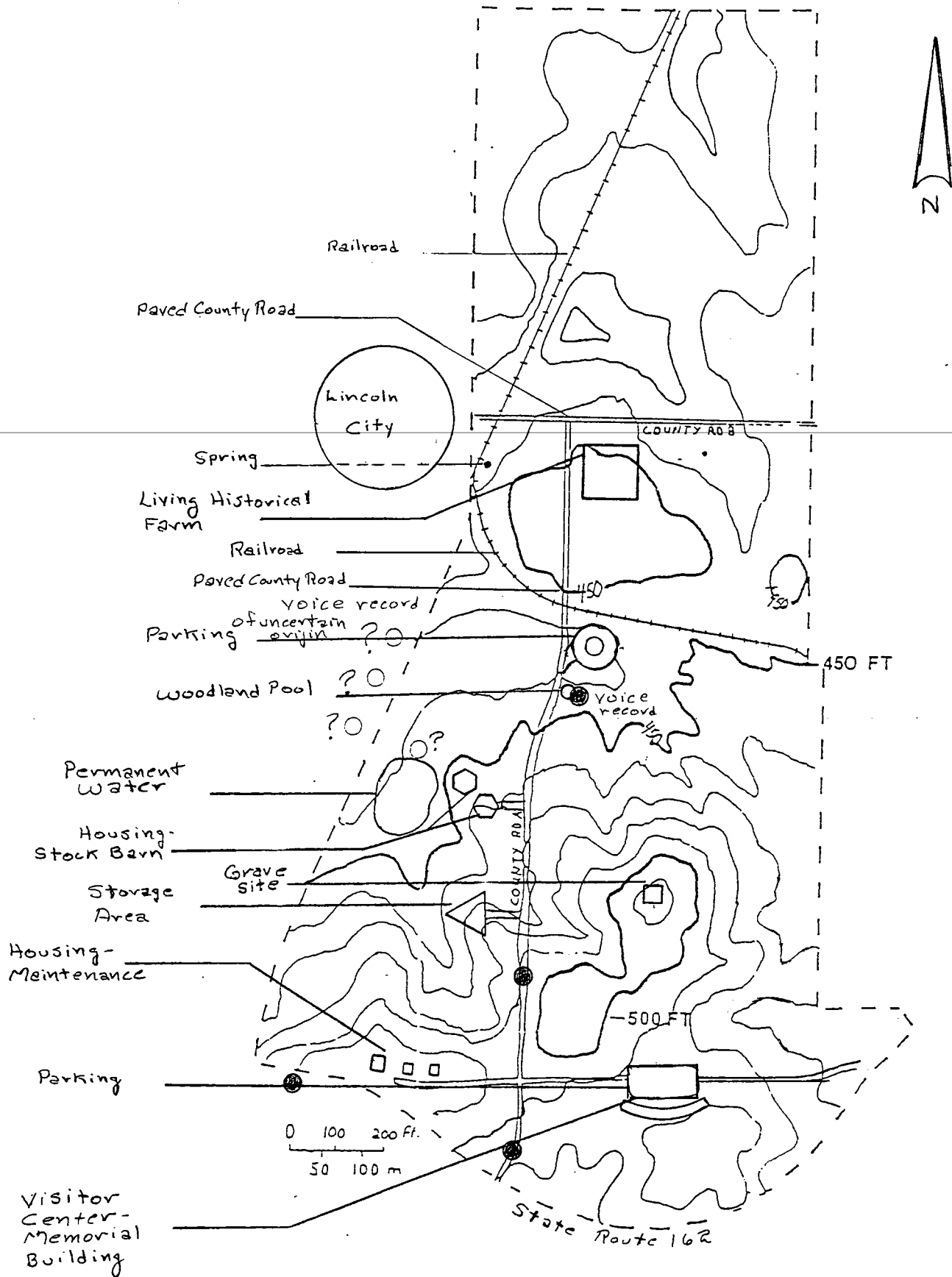


Figure 10 - Locality Records for the Spring Peeper
Hyla crucifer

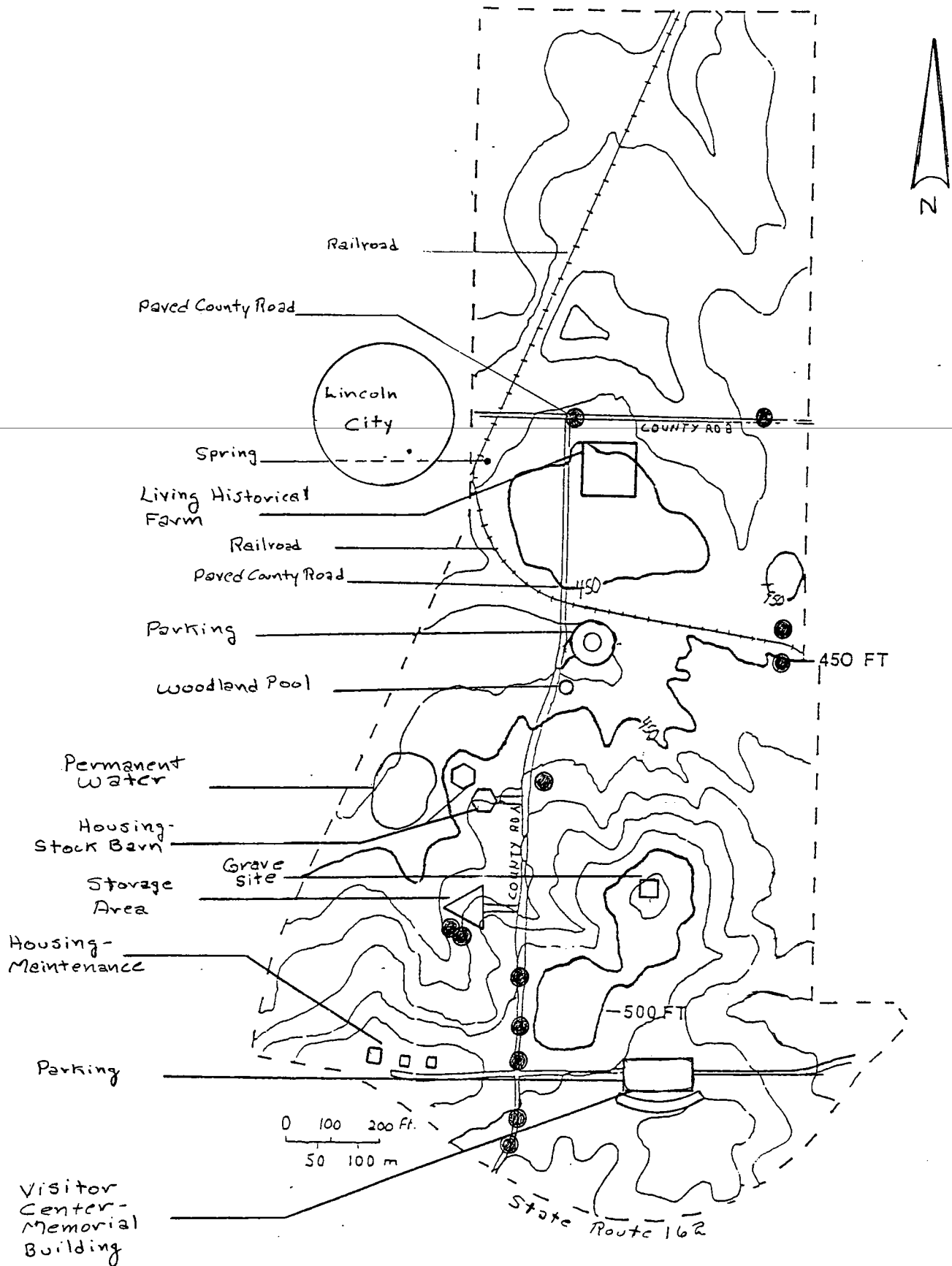


Figure 11 - Locality Records for the Gray Treefrog
Hyla chrysocelis

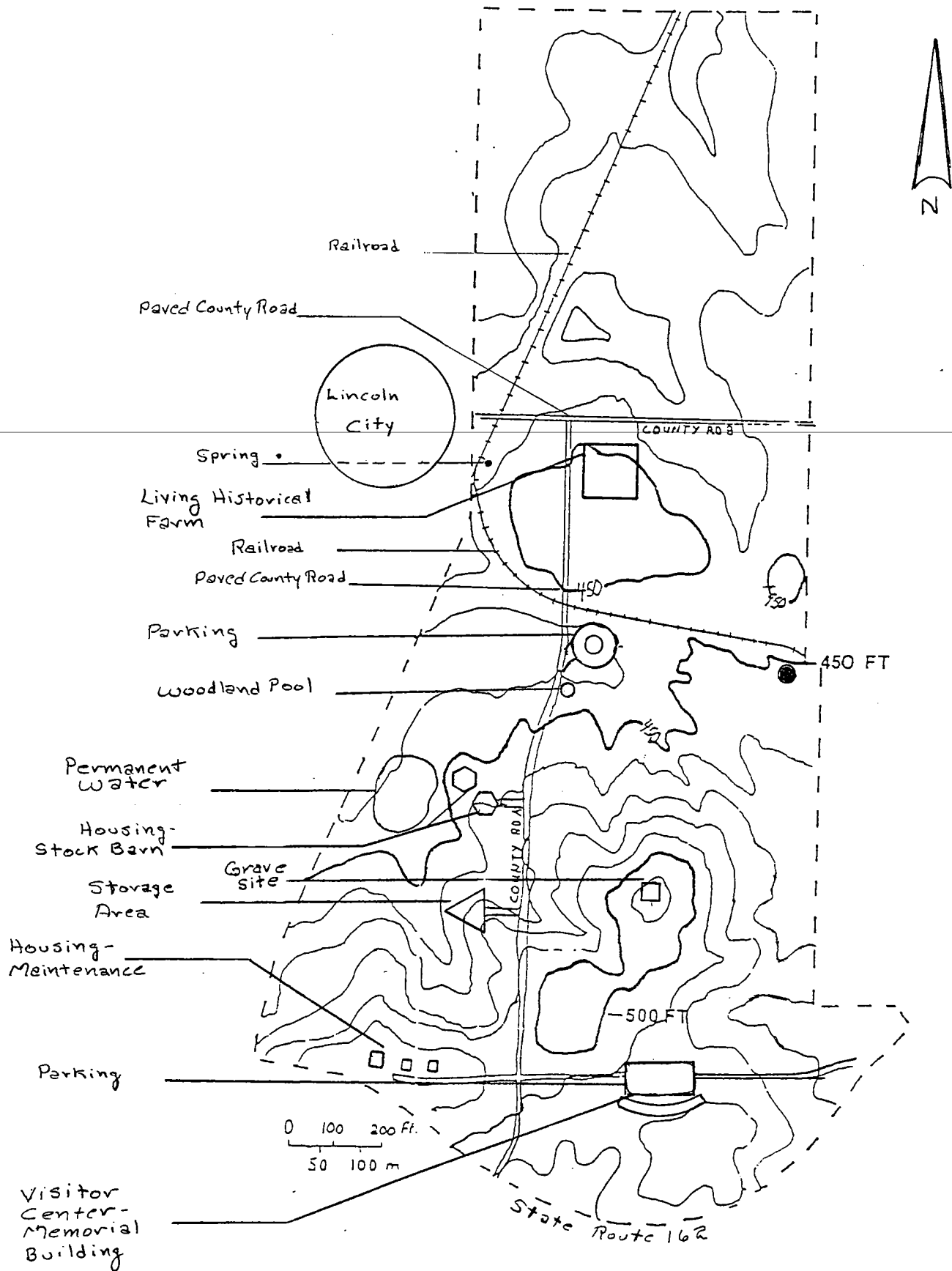


Figure 12 - Locality Record for the Wood Frog
Rana sylvatica

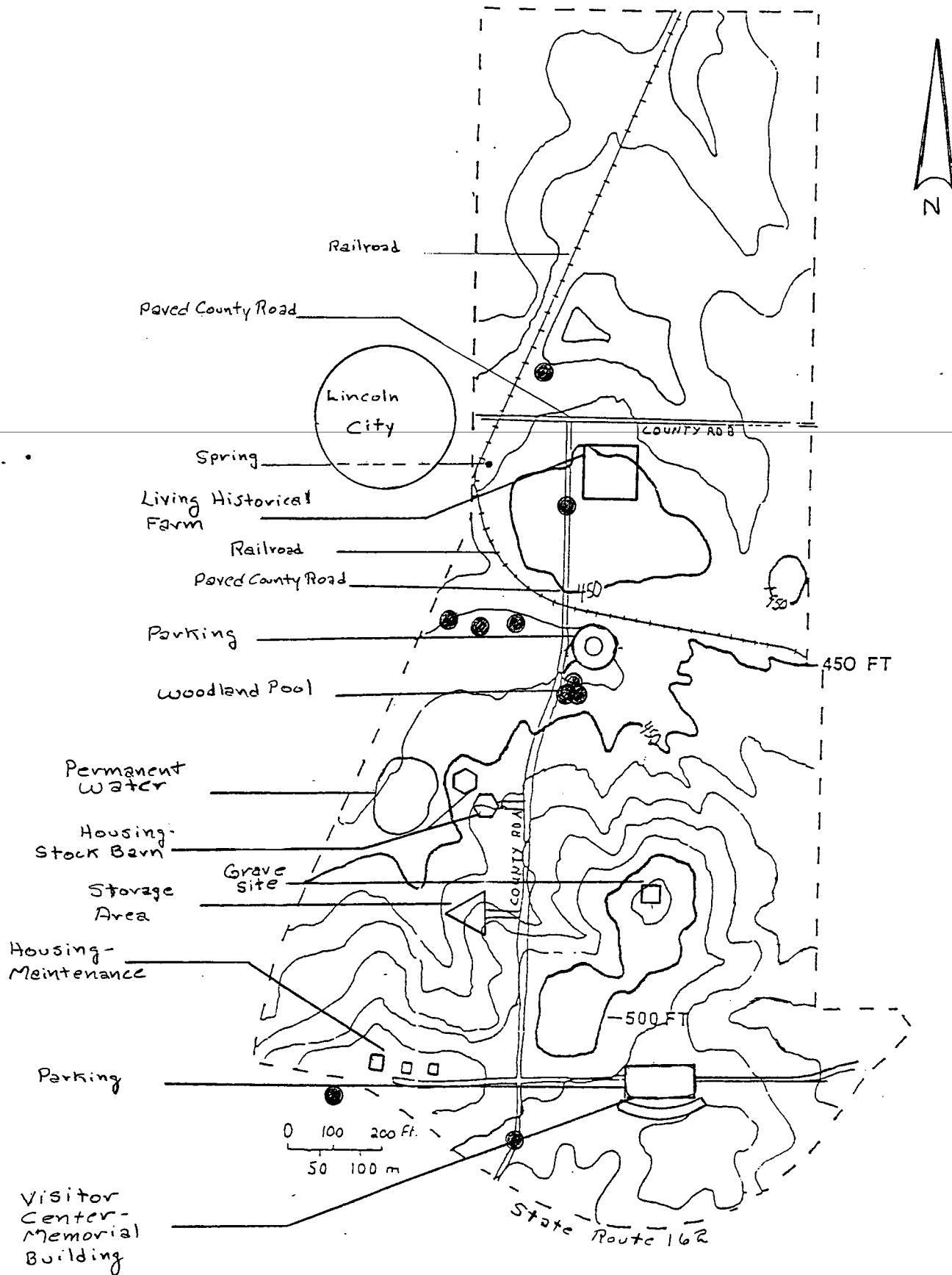


Figure 13 - Locality Records for the Green Frog
Rana melanota clamitans

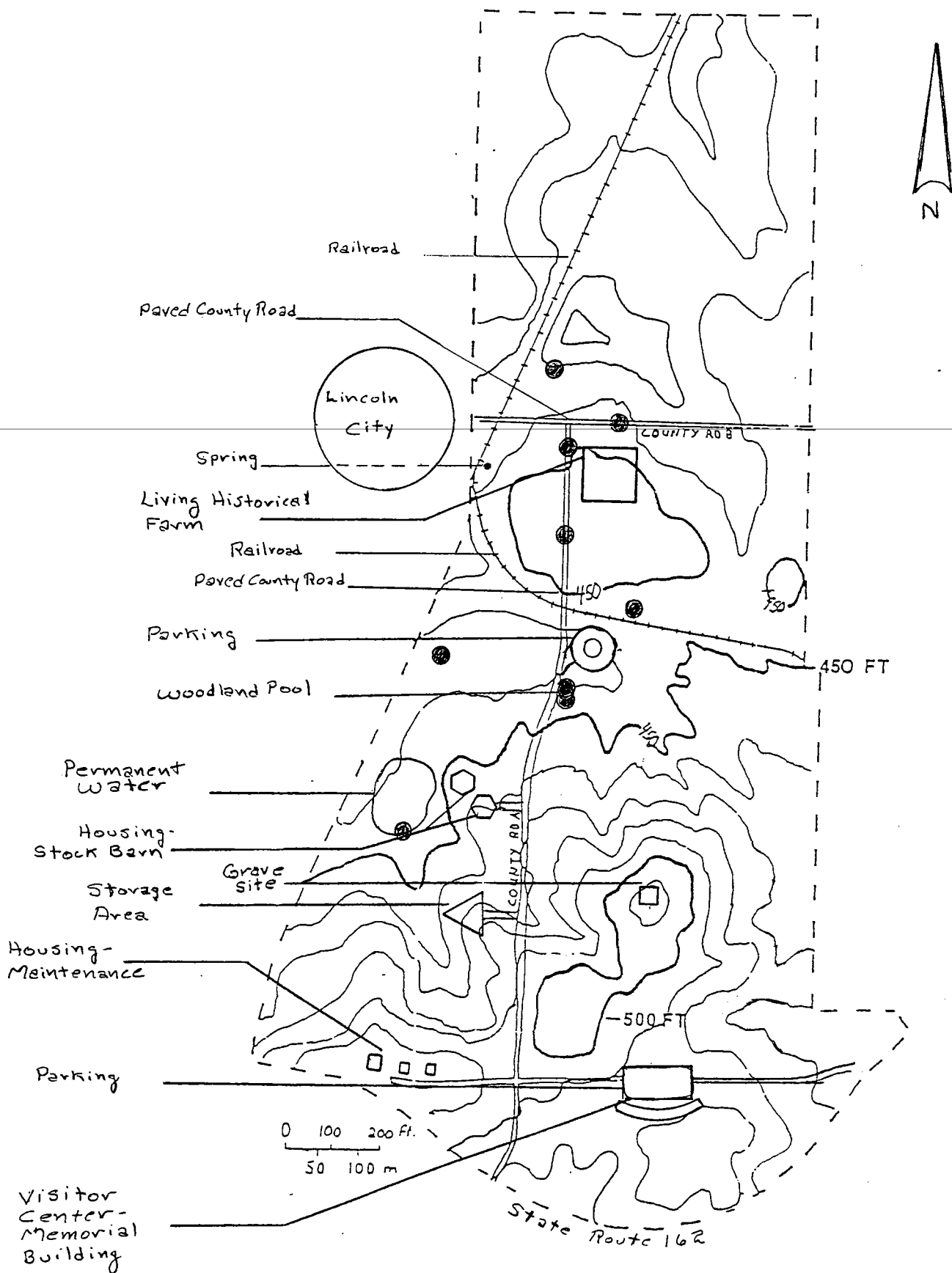


Figure 14 - Locality Records for the Leopard Frog
Rana utricularia

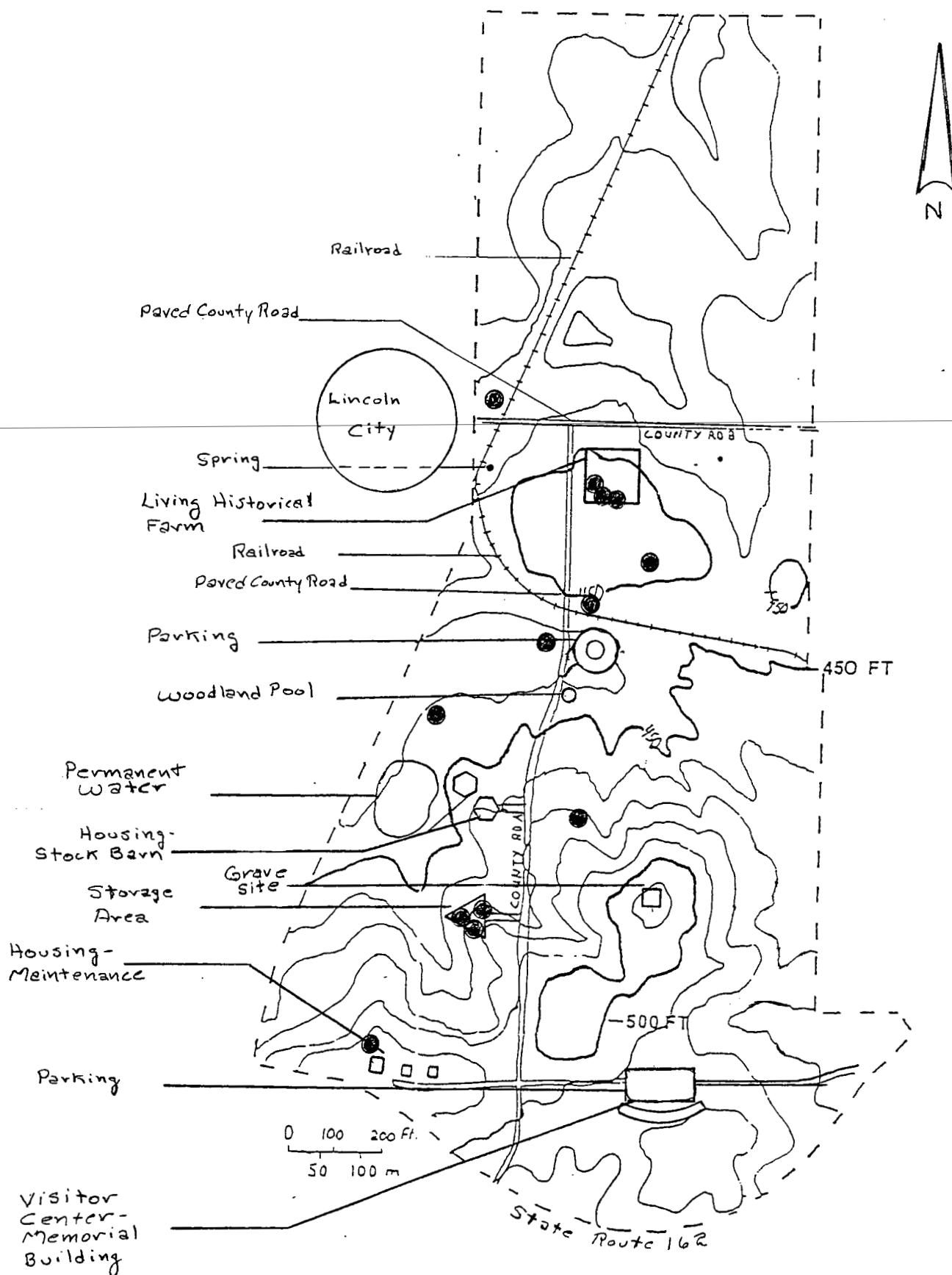


Figure 15 - Locality Records for the Five-lined Skink
Eumeces fasciatus

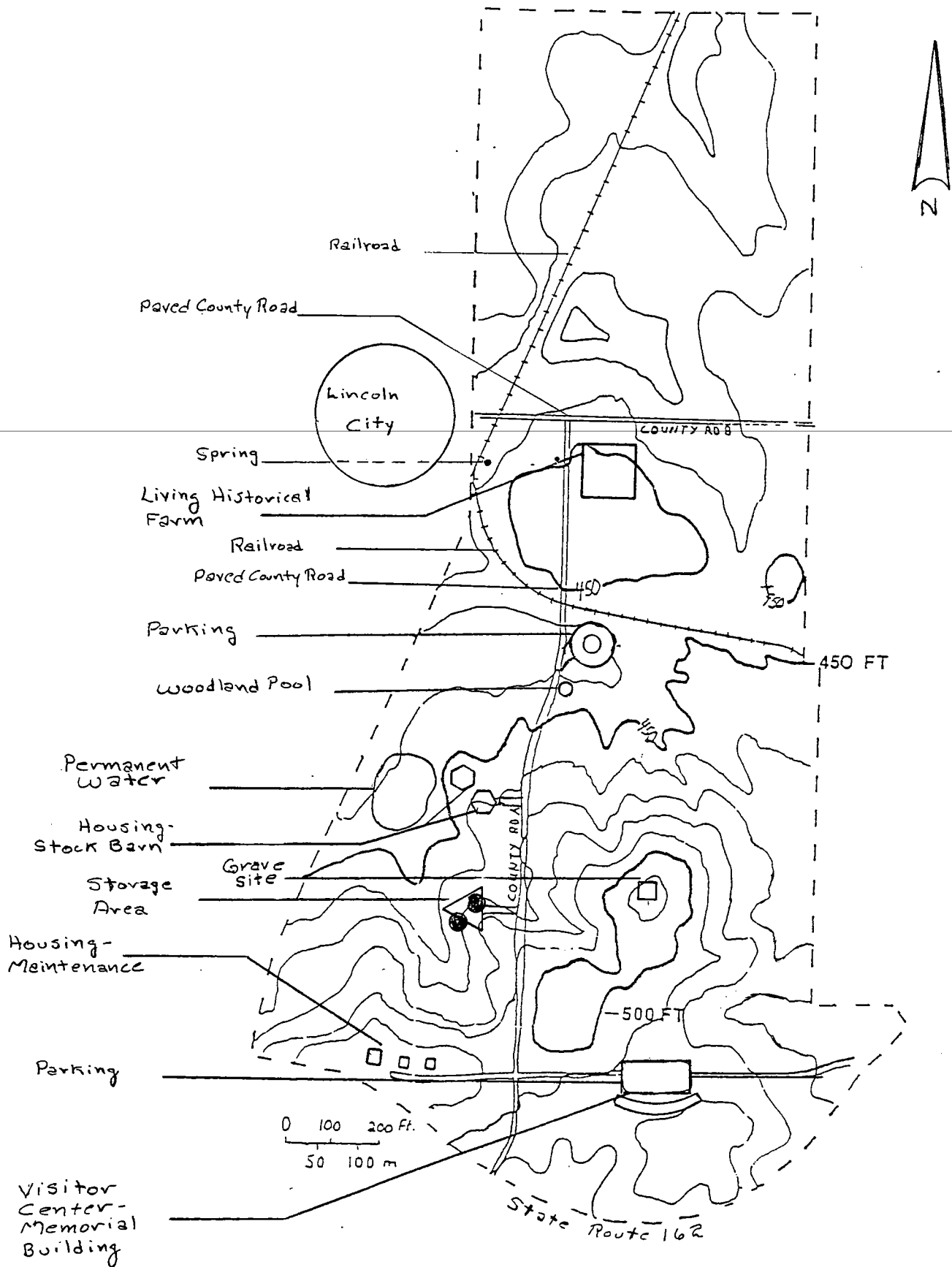


Figure 16 - Locality Records for the Fence Swift
Sceloporus undulatus hyacinthinus

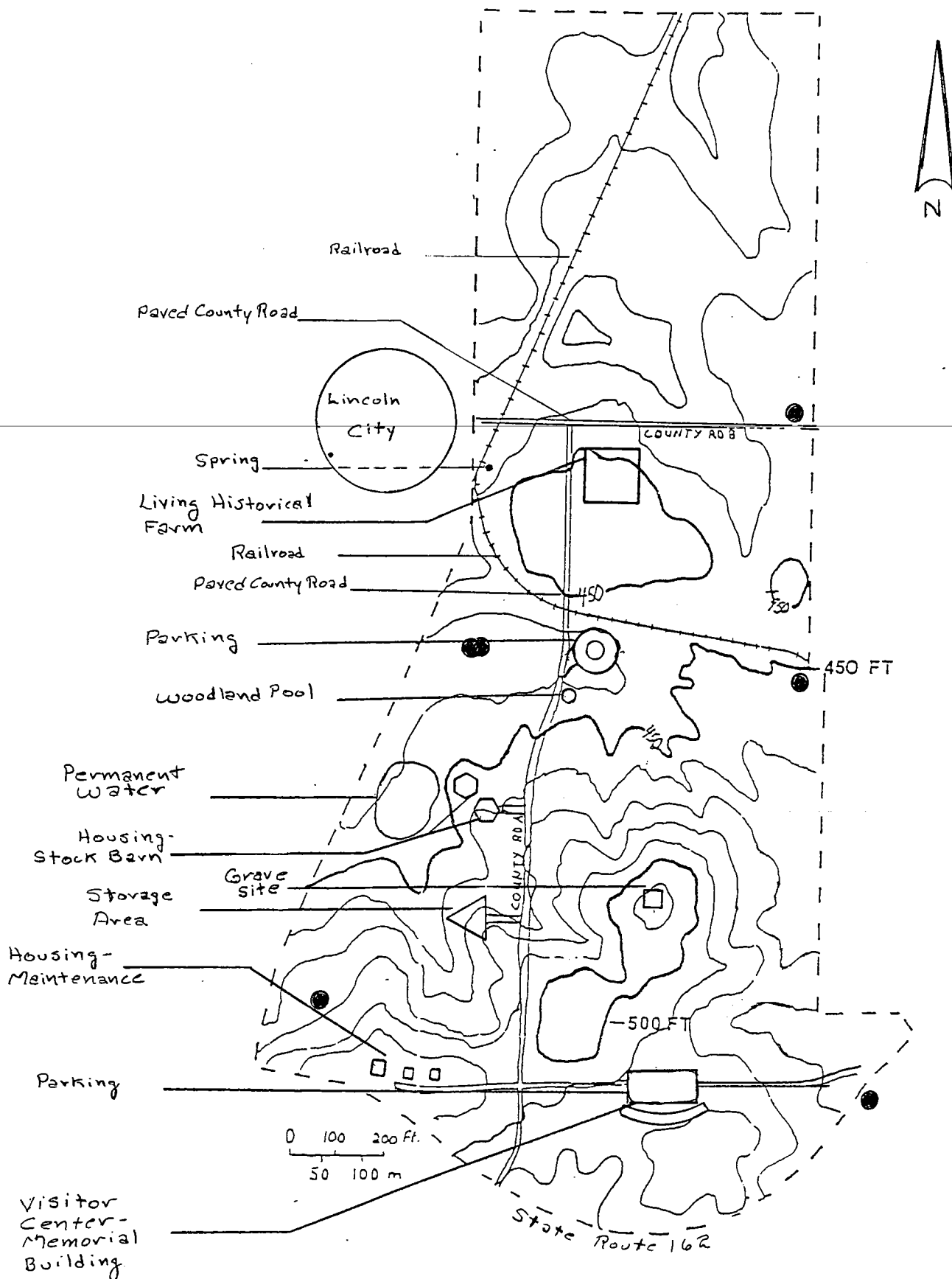


Figure 17 - Locality Records for the Eastern Box Turtle
Terrapene c. carolina

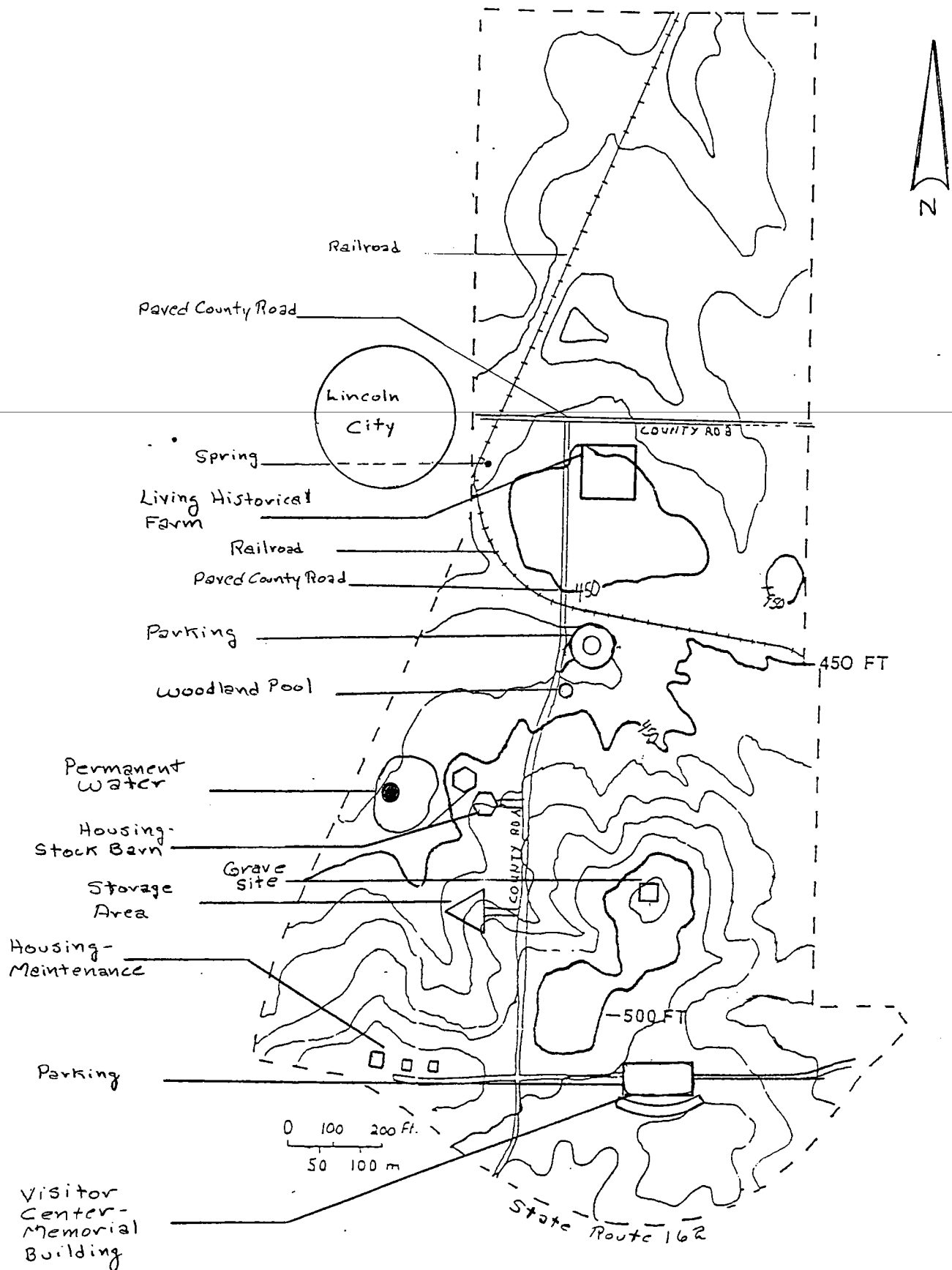


Figure 18 - Locality Record for the Common Snapping Turtle
Chelydra s. serpentina

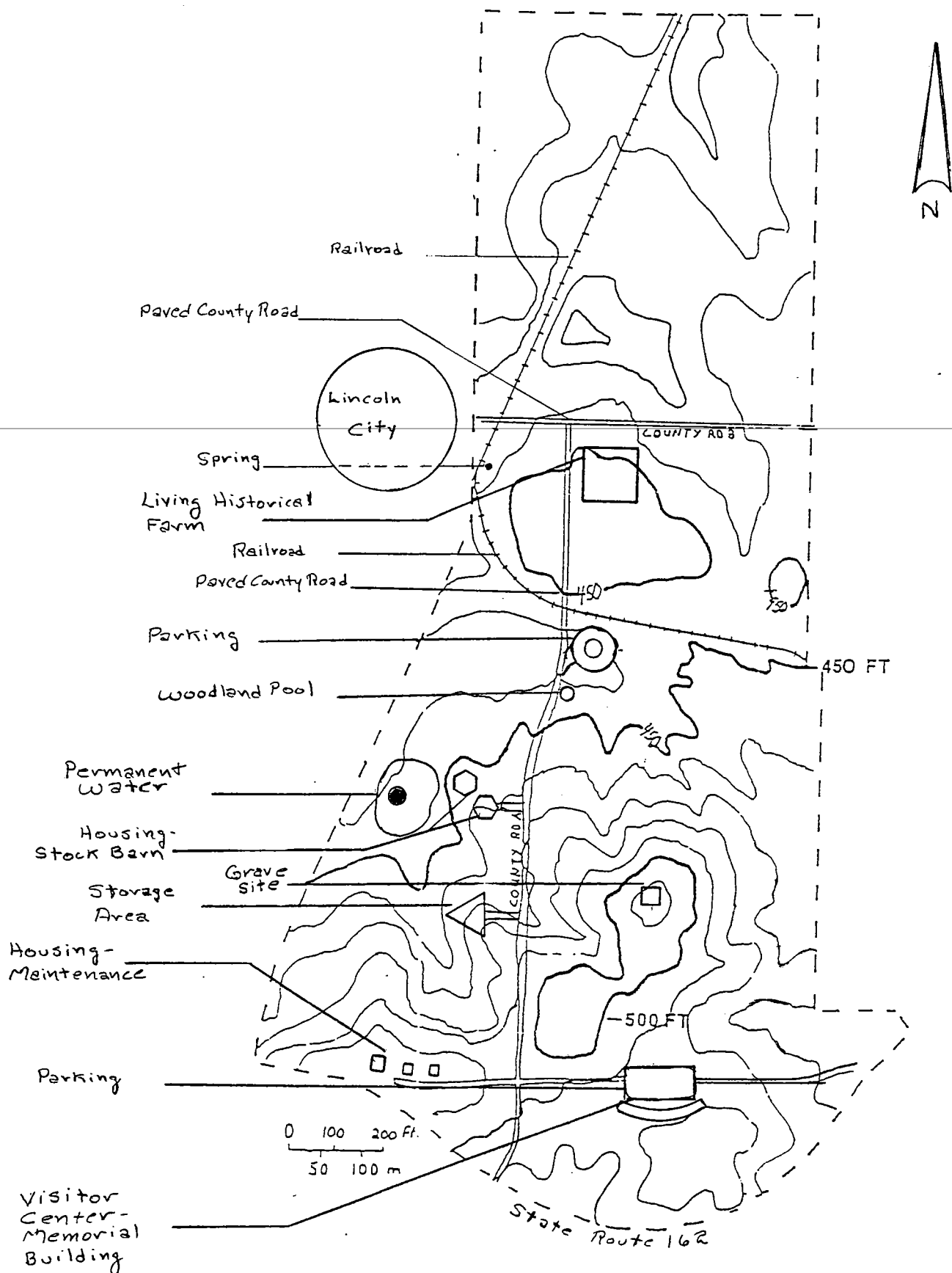


Figure 19 - Locality Record for the Midland Painted Turtle
Chrysemys picta marginata

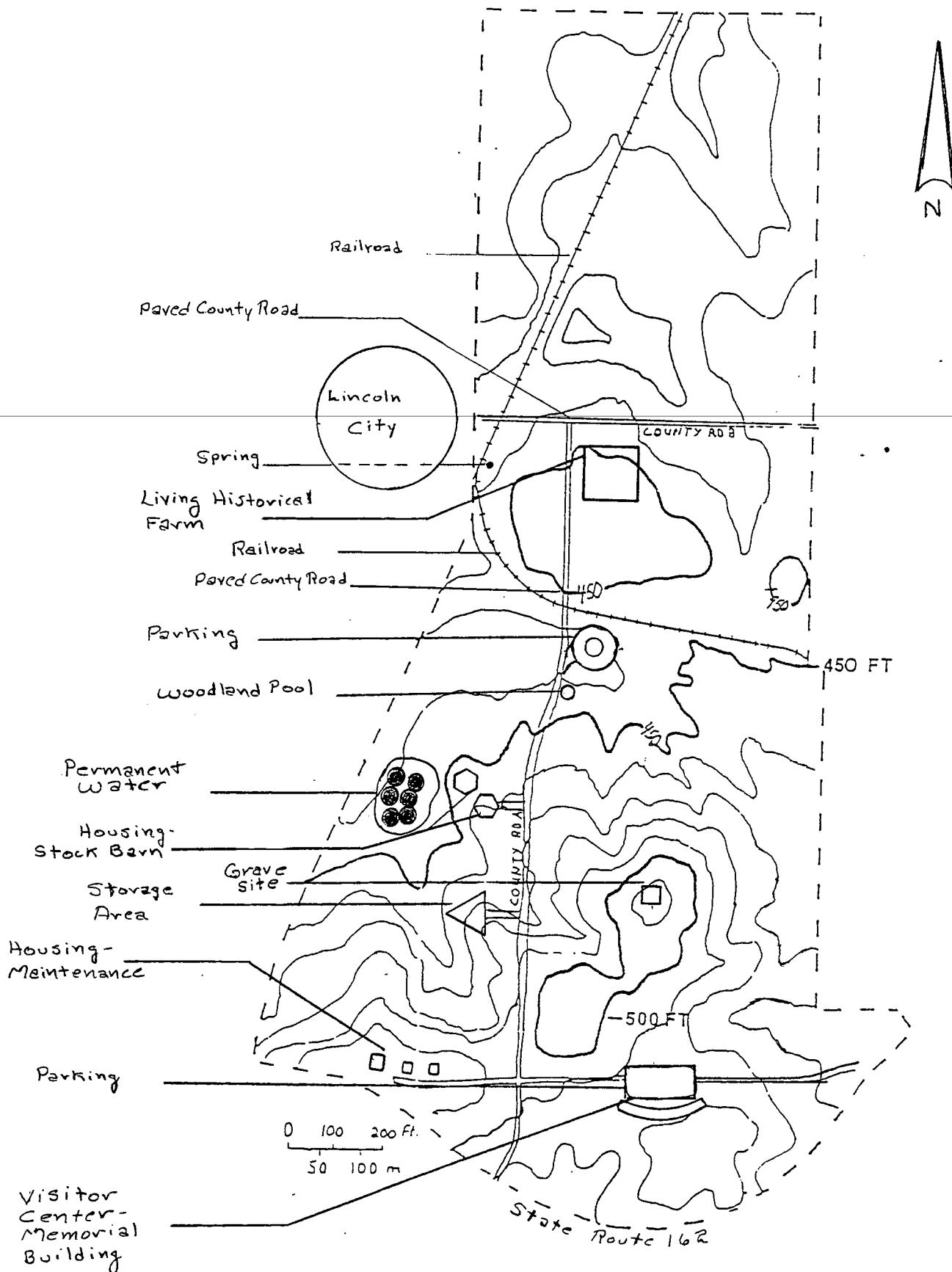


Figure 20 - Locality Records for the Red-eared Slider
Trachemys scripta elegans

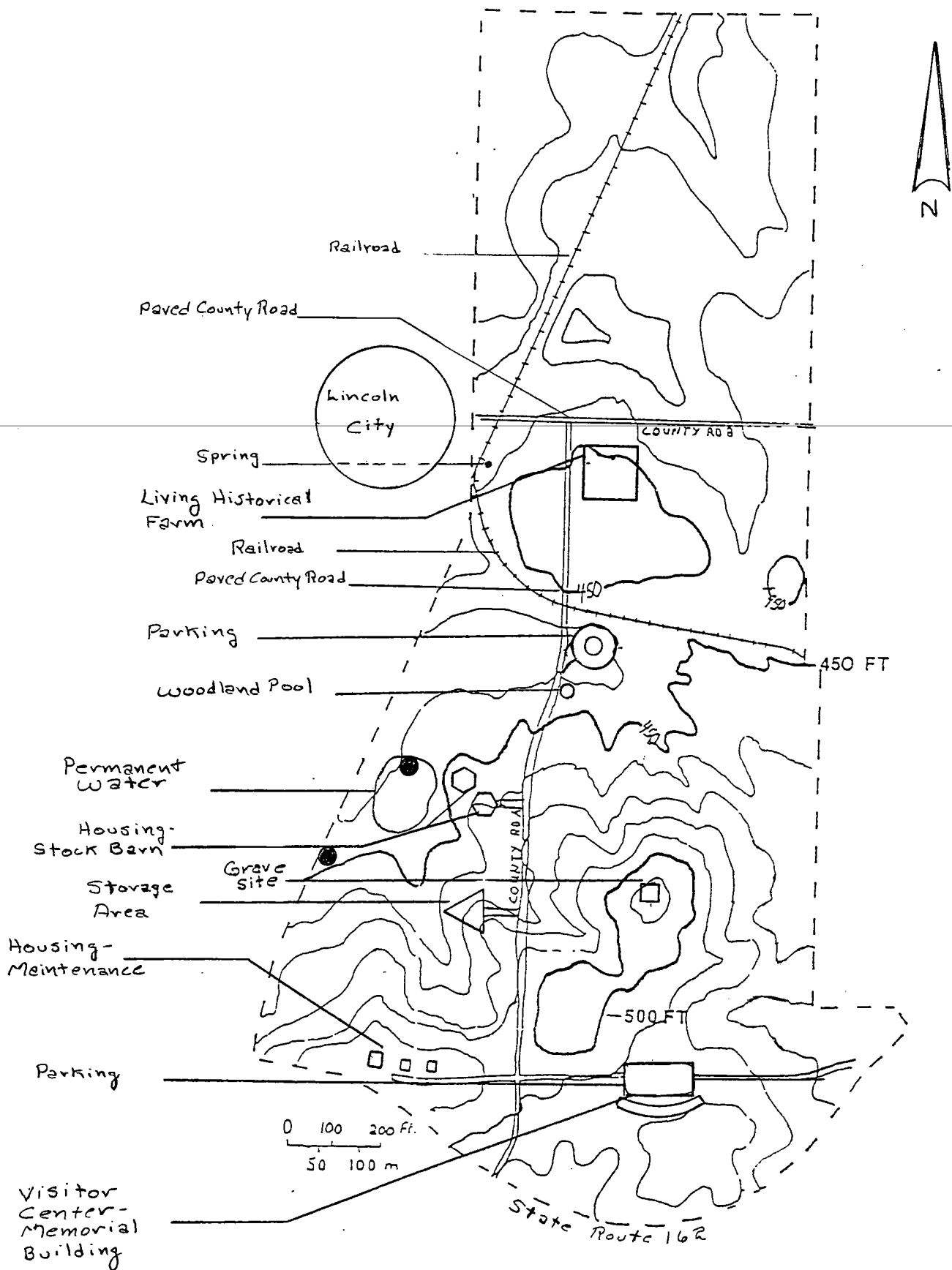
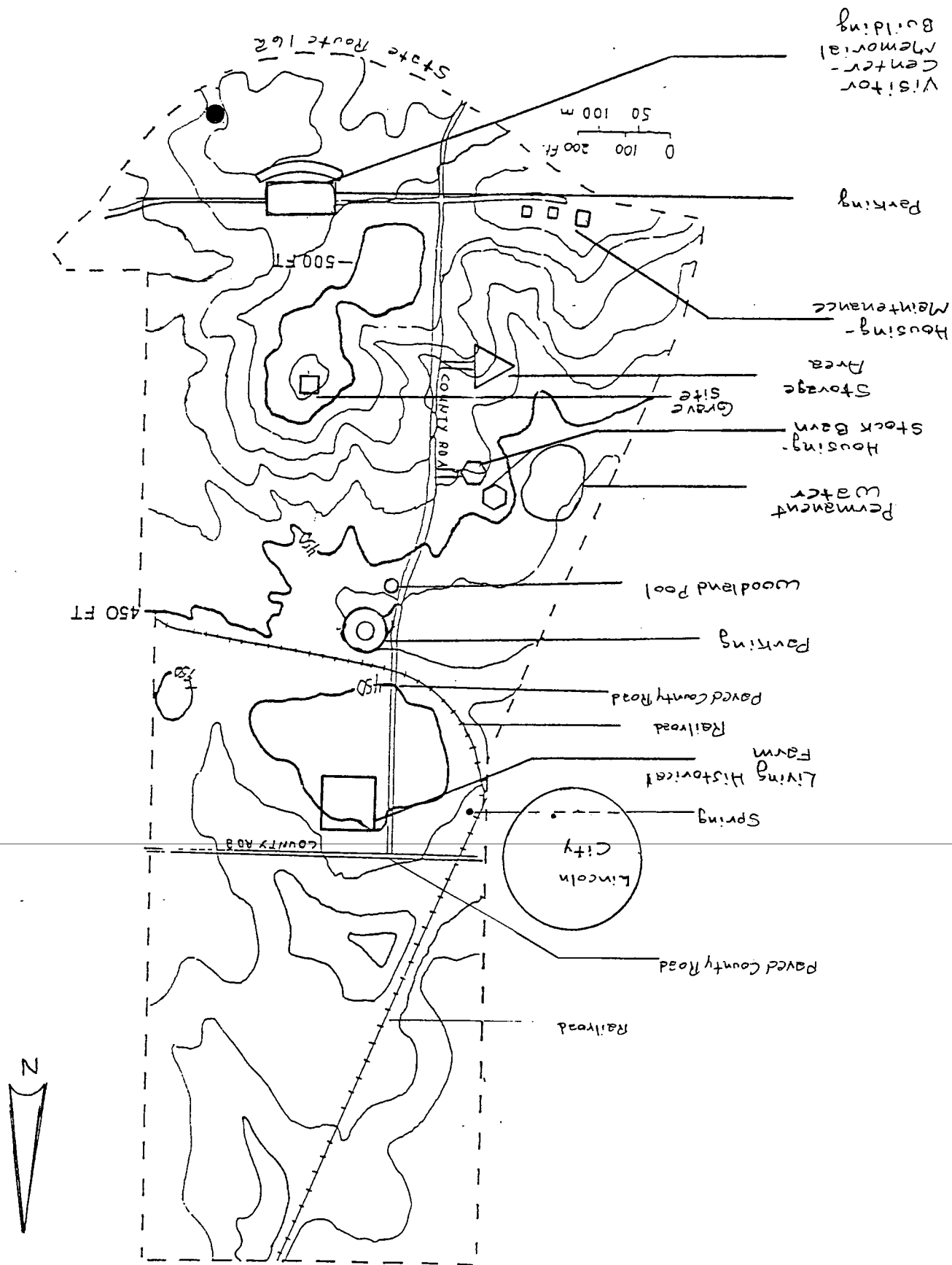


Figure 21 - Locality Records for the Midland Banded Watersnake
Nerodia sipedon pleuralis

Figure 22 - Locality Record for the Eastern Garter Snake
Thamnophis s. sirtalis



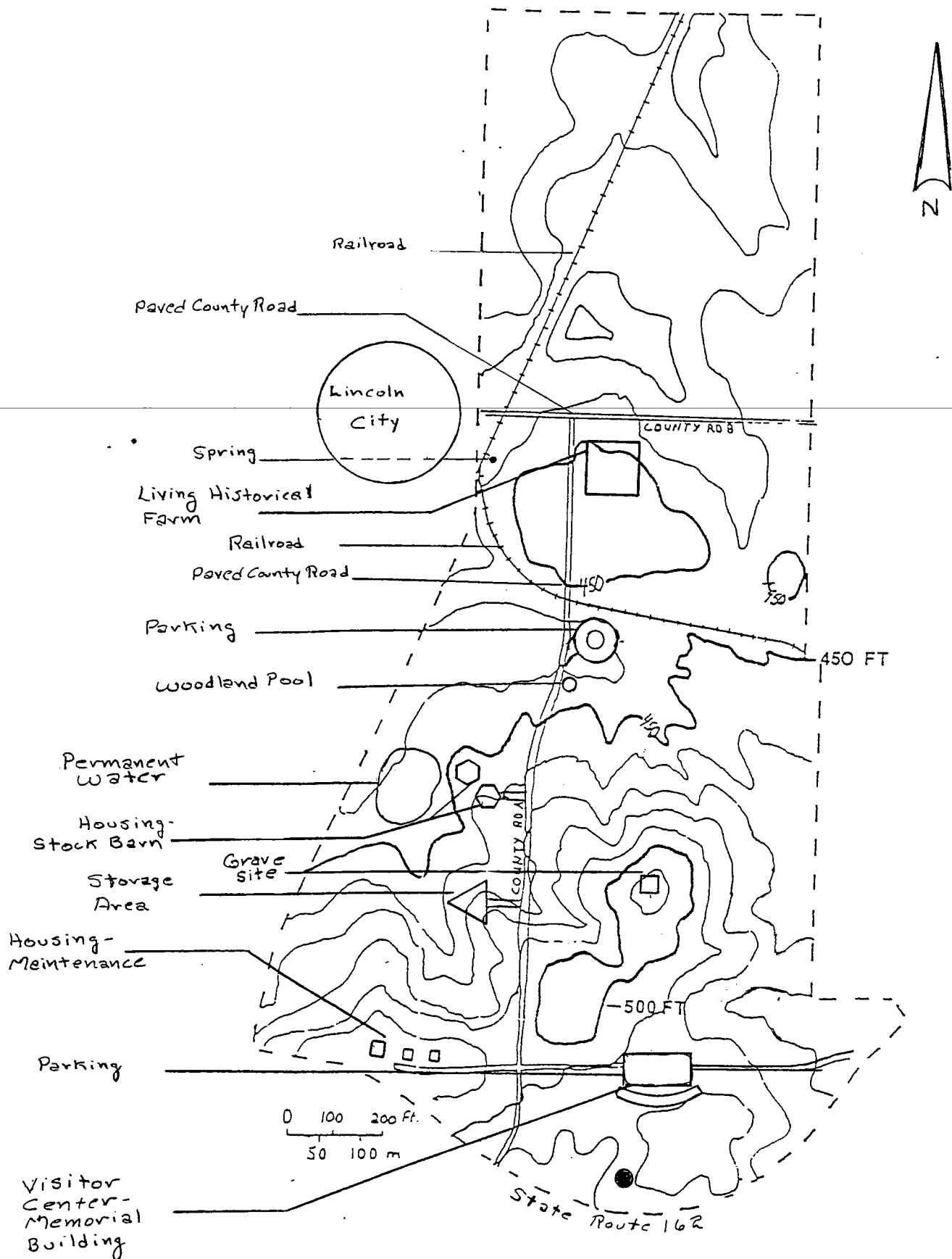


Figure 23 - Locality Record for the Midland Brown Snake
Storeria dekayi wrightorum

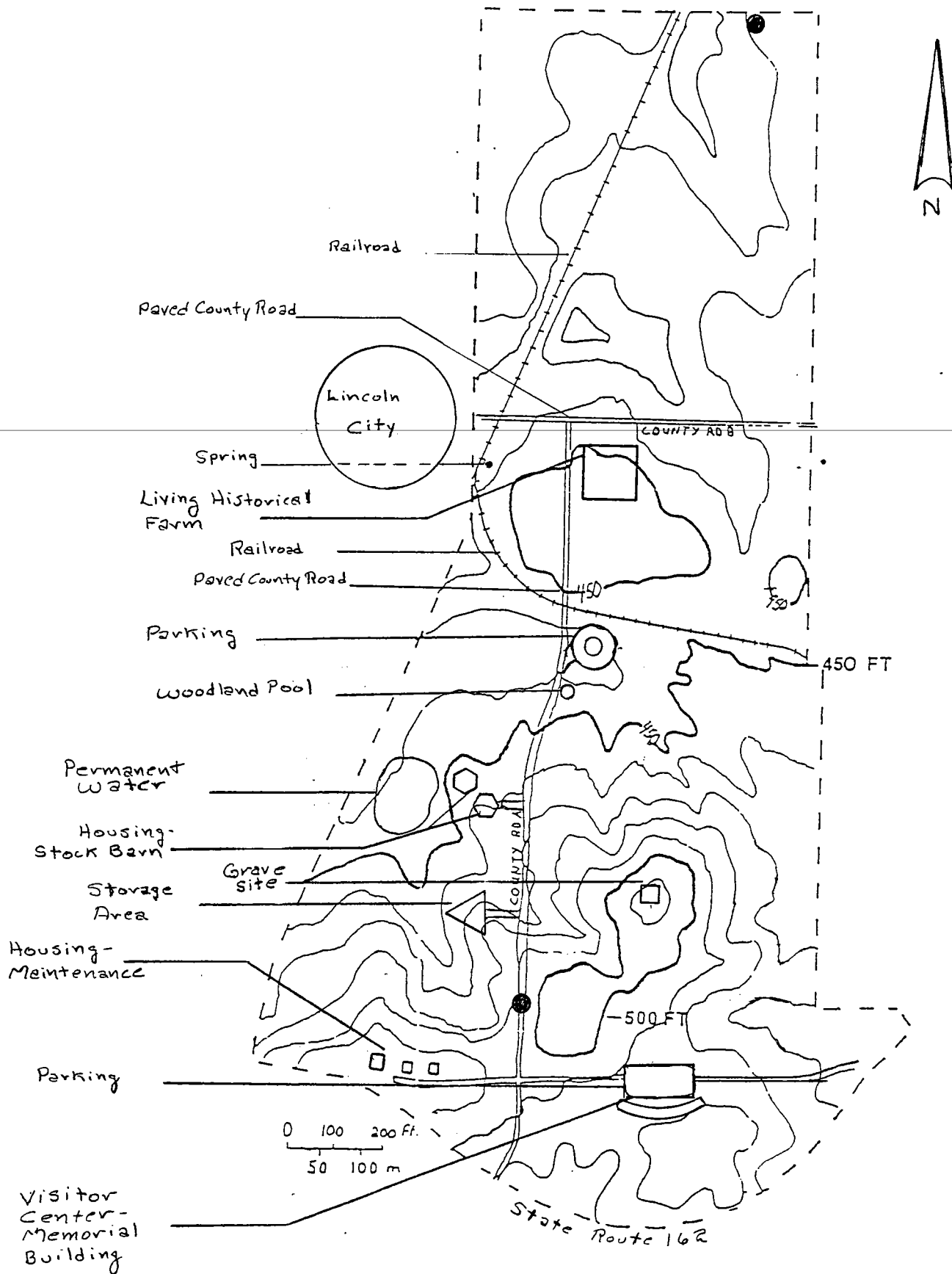


Figure 25 - Locality Records for the Rat Snake
Elaphe obsoleta

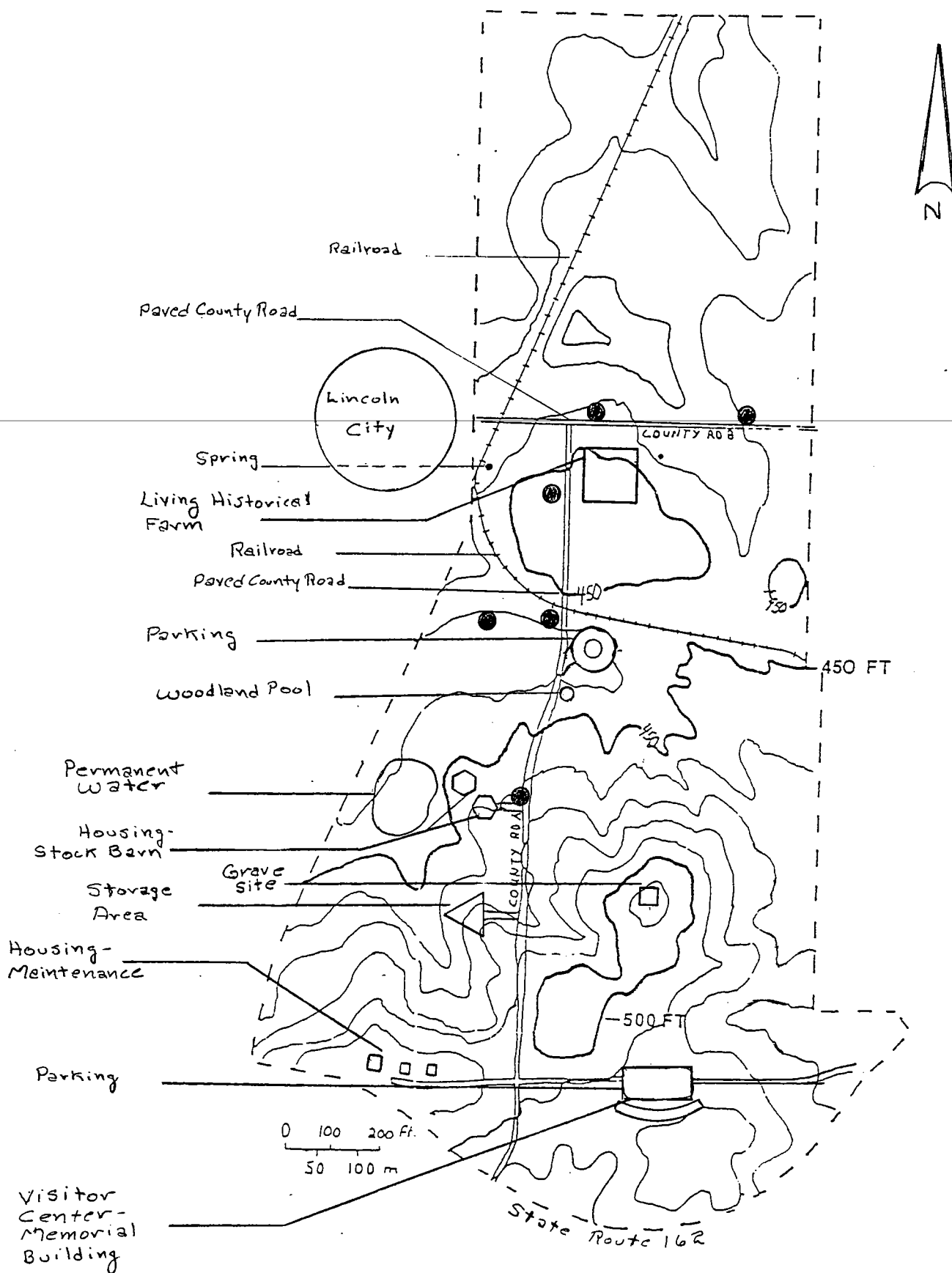


Figure 26 - Locality Records for the Rough Green Snake
Opheodrys aestivus