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thesis entitled

THE GREENVILLE TREATY BOUNDARY LINE
AND THE CULTRUAL LANDSCAPE OF
EAST-CENTRAL AND SOUTHEASTERN INDIANA

presented by

BENJAMIN FRANKLIN RICHASON III

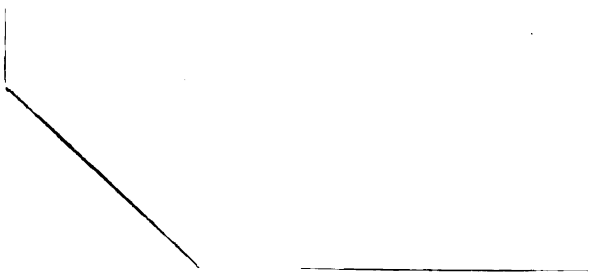
has been accepted towards fulfillment
of the requirements for

Ph.d. degree in Geography

Major professor

Date Nov 17, 1977

O-7639



THE GREENVILLE TREATY BOUNDARY LINE

AND

THE CULTRUAL LANDSCAPE OF EAST-CENTRAL AND SOUTHEASTERN INDIANA

By

Benjamin Franklin Richason III

A DISSERTATION

Submitted to

Michigan State University

in partial fulfillment of the requirements

for the degree of

DOCTOR OF PHILOSOPHY

Department of Geography

1977

ABSTRACT

THE GREENVILLE TREATY BOUNDARY LINE

AND

THE CULTURAL LANDSCAPE OF EAST-CENTRAL AND SOUTHEASTERN INDIANA

By

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In 1795 a treaty was negotiated between the confederated Indian tribes of the Old Northwest and the government of the United States of America, and is known as the Treaty of Greenville. One of the articles of this treaty provided for a boundary line to be demarcated between tribal and American settlements, and was to be run through central Ohio and east-central and southeastern Indiana. The treaty boundary was demarcated by governments surveyors between 1797 and 1800. Eventually this treaty boundary became the dividing line not only between tribal and American lands, but also between the public lands surveyed west from the First Principal Meridian and east from the Second Principal Meridian.

The purpose of this research is to examine the Indiana section of the Greenville Treaty Boundary Line and determine its relationship to the present-day cultural landscape of the area. In this investigation a retrospective approach is utilized which focuses on present landscape conditions, and considers past events and associations as they relate

to this landscape. In addition, certain concepts of boundaries in political geography are also employed. One of these is the terminology developed to help in the classification of boundaries, and the other is the Unified Field Theory which enables the examination of a variety of data as it relates to the transition from political idea to political area. Cultural landscape information was studied in terms of a number of indicators; political lines, survey lines, property lines, roads, field boundaries, and land cover/use patterns. One major hypothesis and four subhypotheses were developed to structure the investigation of the treaty boundary-cultural landscape relationship. The data were examined by studying an area one mile wide on each side of the treaty boundary. This area was divided into 58 grid cells containing four square miles. These grid cells were further subdivided into quarter divisions so that data could be tabulated by rows and columns.

Several conclusions concerning the treaty boundary-cultural landscape relationship can be reached. To begin with, the treaty boundary can be classified as a geometric-antecedent-relic boundary. In addition, the Unified Field Theory provided the structure whereby the Greenville Treaty Boundary Line could be traced from a political idea to the development of a politically organized area. Finally, it was determined through the hypotheses that the treaty boundary is only significant in terms of its function as a dividing line between two survey districts.

For Barbara and Jennifer

ACKNOWLEDGEMENTS

I would like to take this opportunity to thank a number of individuals and institutions that advised and helped in the preparation of this dissertation.

First, I would like to thank Dr. Daniel Jacobson who, as the major professor and chairman of the committee, assisted in the formulation of the research problem and guided it in all of its phases. Without his help and suggestions on theory and research sources, as well as the constant revision work, this dissertation could never have been completed. His time and efforts are greatly appreciated.

I would also like to thank the members of the committee; Dr. Harry Brown, Dr. Ian Matley, and Dr. David Stephenson. Their constructive criticism on the methodology and writing was a great help.

Furthermore, I wish to acknowledge the help and assistance of several offices and institutions including the Ohio Historical Society, the Indiana State Library Archives Section, and the Wayne County Surveyor's Office.

Finally, I wish to express my appreciation to Dr. Benjamin F. Richason, Jr. for his moral support throughout this dissertation. More importantly, however, I would like to thank him for kindling my interest in geography as an undergraduate and developing in me a sense of professionalism.

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INTRODUCTION

A major theme in geographic research has been the study of human imprint patterns on the surface of the earth, that is the study of the cultural landscape. Wagner and Mikesell describe a cultural landscape as the "geographic content of a determined area, or complex of a certain type, in which the choices made and the changes worked by men as members of some cultural community are manifested."[1] Included in this compage of human imprints are patterns which have resulted from various survey methods which have been used to delineate and divide the land. As Thrower has stated;

> Inscribed Upon That Grand Design, the surface of the earth, are the marks of human occupance. Patterns resulting from man's activities, although individually not of the great scale of some natural features, in aggregate give certain areas their most distinctive character. Of all the works of man, one of the most widespread, if not the most important, is the subdivision of Land.[2]

Some European research has been devoted to the study of the subdivision and delineation of the land as shown by the works of Hannerberg[3], Roden and Baker[4], Ulig[5], and Muller-Wille.[6] It should be noted, however,

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1 Wagner, Philip, and Mikesell, Marvin, Readings in Cultural Geography, (Chicago, Ill.: University of Chicago Press, 1971), p. 10.

2 Thrower, Norman, Original Survey and Land Subdivision, (Chicago, Ill.: Rand McNally & Co., 1966), p. 1.

3 Hannerberg, D. "Solskifte and Older Methods of Partitioning", Annale de l'Est, 21, (1959), pp. 245-259.

4 Roden, D. and Baker, A. "Field Systems of the Chiltern Hills", Transactions of the Institute of British Geographers, 38, (1961), pp. 73-76.

5 Uhlig, H. "Old Hamlets With Infield and Cutfield Systems in Western and Central Europe", Geografiska Annaler, 43, (1961), pp. 285-312.

6 Muller-Wille, W. "Langstreifenflur und Drabbel", Deutsches Archivf Landes - und Volksforschung, 8, (1944), p. 9-44.

that the majority of such works concentrate on relict field patterns and land clearings, and not on the method and results of land surveys. To date, few geographic studies in the United States have been made on survey patterns and related features such as field patterns and roads, however, studies made by DeVorsey[7], Hart[8], Marschner[9], Pattison[10], and Thrower[11] have provided significant data concerning these topics. There is a need for further study in this area, Zelinsky stated;

> Only a single serious effort (refering to Hart's work) seems to have been made to examine the geography of field boundaries, in contrast to the popularity of the topic among European scholars; but additional work on field, road, and survey patterns would probably repay the investigator many times over.[12]

There have been a number of land and boundary surveys which have left an imprint on the landscape; such as the survey and demarcation of the Treaty of Greenville boundary line. This boundary line was the result of the treaty negotiations held at Fort Greenville, Ohio in 1795

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7 DeVorsey, Louis, The Indian Boundary in the Southern Colonies, 1763-1775, (Chapel Hill, North Carolina: University of North Carolina Press, 1966).

8 Hart, John F. "Field Patterns in Indiana", Geographical Review, Vol. 58, 1968, pp. 450-471.

9 Marschner, Fredrick, Land Use and Its Patterns in The United States, USDA Handbook No. 153, (Washington, D. C. Government Printing Office, 1959).

10 Pattison, William, American Rectangular Land Survey, 1784-1800. (Columbus, Ohio: Ohio Historical Society, 1970).

11 Thrower, Norman, Original Survey, 1966.

12 Zelinsky, Wilbur, The Cultural Geography of the United States, Foundations of Cultural Geography Series, (Englewood, N. J.: Prentice-Hall Inc., 1973), p. 102.

between the United States and the confederated Indian tribes of the Old Northwest. In effect, this was a peace treaty brought about by General Anthony Wayne's military victory over these tribes at the Battle of Fallen Timbers, Ohio in August of 1794. After much negotiation, General Wayne, Acting as plenipotentiary of the United States, and the Wyandot, Delaware, Shawnee, Ottawa, Potawatomie, Miami, Eel-river, Wea, Kickapoo, Piankashaw, and Kaskaskia Indian tribes signed the Treaty of Greenville. The treaty consisted of 10 articles, Article III contained a provision for a boundary line between these tribes and the United States. The boundary line is located in northeastern and central Ohio and central and southeastern Indiana (Figure 1);

> beginning at the mouth of the Cayahoga, and running thense up the same to the portage between that and the Tuscarawas branch of the Muskingum; thense down that branch to the crossing place above Fort Lawrence; thense westerly to a fork of that branch of the great Miami river running into the Ohio, at or near which fork stood Loromie's store, and where commences the portage between the Miami of the Ohio and St. Mary's river, which is a branch of the Miami, which runs into Lake Erie; thense a westerly course to Fort Recovery, which stands on a branch of the Wabash; then southwesterly in a direct line to the Ohio, so as to intersect that river opposite the mouth of the Kentucke or Cuttawa river.[13]

This boundary line was surveyed by a government surveyor, Israel Ludlow, who began the survey in July 1797 after completing a random line from Loromie's store to the Muskingum River to determine the true magnetic bearing of the line. The survey of the entire line was completed in 1800. Although there were some

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[13] Kappler, Charles J., United State Indian Treaties, 1778-1883, (New York: Interland Publishing Inc., 1972), pp. 39-45.

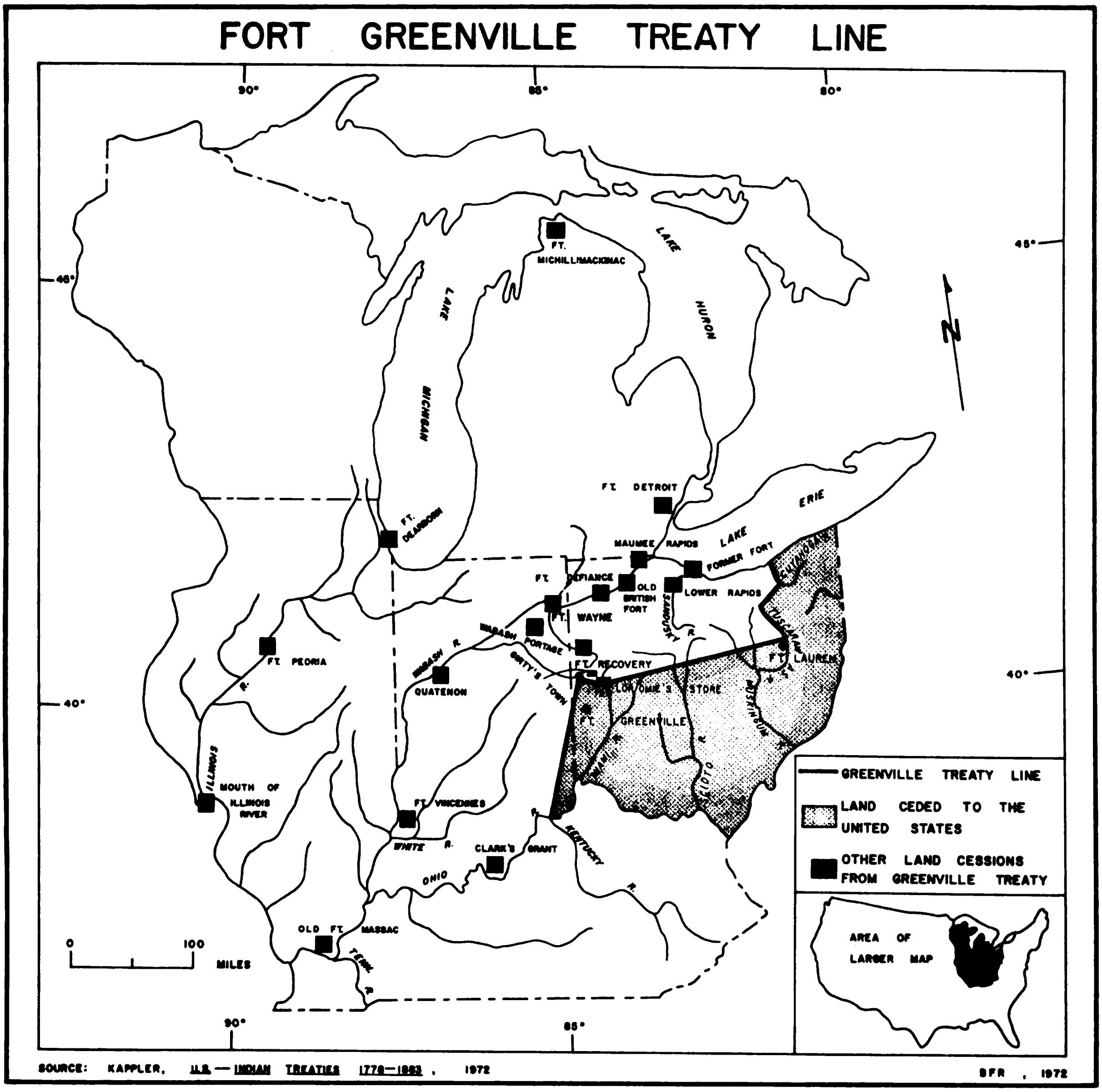
FORT GREENVILLE TREATY LINE
90°
85°
80°
45°
40°
FT. MICHILLIMACKINAC
LAKE HURON
LAKE MICHIGAN
FT. DETROIT
LAKE ERIE
FT. DEARBORN
MAUMEE RAPIDS
FORMER FORT
FT. DEFIANCE
OLD BRITISH FORT
LOWER RAPIDS
SANDUSKY R.
FT. WAYNE
WABASH R.
PORTAGE
FT. RECOVERY
FT. PEORIA
QUATENON
GIRTY'S TOWN
LORAMIE'S STORE
FT. GREENVILLE
FT. LAURENS
MUSKINGUM
SCIOTO R.
ILLINOIS R.
MOUTH OF ILLINOIS RIVER
FT. VINCENNES
WHITE R.
CLARK'S GRANT
OHIO
KENTUCKY R.
OLD FT. MASSAC
TENN. R.
0 100 MILES
GREENVILLE TREATY LINE
LAND CEDED TO THE UNITED STATES
OTHER LAND CESSIONS FROM GREENVILLE TREATY
AREA OF LARGER MAP
SOURCE: KAPPLER, U.S. — INDIAN TREATIES 1778—1883, 1972
SFR, 1972

Figure 1.

errors in the line, the field notes and plats were accepted as the correct boundary. By the provisions of the treaty, all lands south and east of the line were ceded to the United States and surveyed according to the Land Act of 1796 (except such lands as the Virginia Military District which were subdivided by other survey methods). Following the surveys these lands were opened to settlement.

PURPOSE OF THE RESEARCH

The purpose of the research is to examine the Indiana section of the Greenville Treaty Boundary Line and determine its relationship to the present-day cultural landscape of the area. Present-day landscape is used here to denote the cultural landscape which is imaged by the latest aerial photography available to the writer.[14] The Greenville Treaty line was chosen for investigation because of its significance as the first surveyed boundary line between the United States and the Indian tribes in the Old Northwest. Furthermore, the Indiana section of the treaty line is also the boundary between lands surveyed west from the First Principal Meridan -- the present-day border between Ohio and Indiana -- and lands surveyed east from the Second Principal Meridian -- located approximately in the center of the state of Indiana.

Another reason why the Indiana section of the line was chosen for the study is that this section of the line was a departure from

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[14] The lastest aerial photography used in this study was taken in 1971, with the earliest being taken in 1965. All of the photography was acquired by the United States Department of Agriculture, Soil Conservation Service.

the United States negotiations with the Indian tribes of the area because the land between the treaty line and the present-day Ohio-Indiana state line was to serve as a buffer zone between American and Indian settlements. Finally, the Indiana section of the line was selected for study because of its locational convenience and because a small section would allow for intensive investigation -- with the Indiana-Ohio state border providing a convenient division on the boundary line.

Papers which dealt with the Greenville Treaty and its boundary line were written years ago and consisted of temporal approaches with little emphasis on spatial analysis. Spatial analysis is the study of phenomena with respect to their arrangement and location on the surface of the earth. By examining the problem in this context, the boundary line and the adjacent landscape features can be evaluated in terms of their spatial patterns and relationships. Patterns are identified and delineated, followed by an investigation of the processes which operated to generate particular distributions. It is hoped that this research will provide spatial, as well as temporal emphases by studying the boundary line as a component of the cultural landscape.

STUDY AREA

The study area is located in east-central and southeastern Indiana, and includes the nine counties through which it passes or for which it forms the borders: Jay, Randolph, Wayne, Union, Franklin,

Dearborn, Ripley, Ohio, and Switzerland. Although these counties constitute the general study area, another area, one mile on either side of the boundary line, was selected for intensive investigation. (Fig. 2) With the designation of this selected area, the southeastern portions of two additional counties were included in the study; Fayette and Jefferson. Also, because of the mile wide swath on each side of the line, it was necessary to include a small portion of Darke County, Ohio.

The treaty line is located in areas of Wisconsinan and Illinoian glacial till. The former is a gently undulating till plain, while the till on the latter for the most part has been eroded away, resulting in a dissected, rougher topography. The line also passes through five distinct types of farming areas: the Central Grain and Livestock area, the Northwestern General area, the Southeastern Central Corn, Wheat, and Hogs area, the Southeastern General area, and the Southeastern Dairy, Hay, and Tobacco area.

THEORETICAL FRAMEWORK

The theoretical framework of this research is based on Sauer's landscape morphology, with some adaptations and additional emphases.[15] Instead of concentrating solely on the structure and appearance of the boundary line on the landscape, this study focuses on the functions that the line has served over time, as well as on the processes which have operated in the formation and preservation of

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[15] Sauer, Carl, The Morphology of Landscape, Univ. of California Publications in Geography, Vol. 2, No. 2, 1925, pp. 49-54.

the boundary line as a relic in the landscape. As Mikesell emphasizes, "...landscape studies inevitably include considerations of cultural expressions that are invisible."[16] The examination of the form of the boundary line is not neglected in this study, as structure and arrangement are important elements in any investigation of survey patterns. In addition to the examine of the visible, material landscape, the more abstract and less visible factors of the various operations and mechanisms that shaped the formulation and demarcation of the boundary line were also investigated. Thus, the various functions and processes involving the Greenville Treaty Boundary Line were studied to determine the extent of their influence on the form and structure of the cultural landscape of east-central and southeastern Indiana.

In studies of the cultural landscape there is an implied historical dimension. No feature can be thoroughly analyzed unless its origins are investigated to determine their relevance to the present-day landscape. Sauer refered to such features as relicts and defined them as, "... surviving institutions that record formerly dominate, but now old-fashioned conditions."[17] Prince applies an even broader definition when he states that, "All features in the present landscape are relict features, survivals

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[16] Mikesell, Marvin, "Landscape", in English and Mayfield, Man, Space, and Environment, (Oxford: Oxford Univ. Press, 1972), p. 14.

[17] Sauer, Carl, "Forward to Historical Geography", in Leighly, John, Land and Life, (Berkeley: Univ. of California Press, 1967), p. 360.

from some past period."[18] Nevertheless, it seems that it is in landscape investigations that cultural and historical geography mesh in their study of man-environment relationships.[19] In this study the Greenville line will be treated as a relict feature on the present-day landscape.

To accomplish this task a combination of cultural and historical emphases were employed, utilizing a retrospective approach which Jager identifies as being one of the regressive methods in historical geography.[20] A regressive method is one which begins with the observation of various landscape features and proceeds to formulate conclusions concerning previously existing conditions. Basically, there are two approaches to this method, the retrogressive and the retrospective. In the retrogressive approach the investigation is oriented towards the past, and present conditions are considered only to explain earlier landscape associations. The retrospective approach, on the other hand, focuses on present landscape conditions, and considers past events and associations only as they relate to the preservation of former conditions as relicts on the present-day landscape. Because this study is concerned primarily with the condition of the present-day cultural

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[18] Prince, Hugh, "Progress in Historical Geography", in Cooke and Johnson, Trends in Geography, (London: 1969), p. 113.

[19] Smith, C.T., "Historical Geography: Trends and Prospects", in Choley and Haggett (eds.) Frontiers in Geographical Teaching, (London: 1965, pp. 124-125.

[20] Jager, Helmut, "Historical Geography in Germany, Austria, and Switzerland", in Baker, Progress in Historical Geography (London: Wiley-Interscience, 1972), p. 46.

landscape of the treaty boundary line area, the latter approach was used.

In addition to these basic cultural and historical approaches, this study impinges upon the concepts of boundaries in political geography. Because this investigation deals with a boundary line it is important that the concept of the form and functions of boundaries be fully understood.

In this context the first point to be examined is the difference between a frontier and a boundary. In many instances these two terms are used interchangeably, however, they denote different concepts. The term frontier may refer to the political division between two states or the division between the settled and uninhabited parts of one state.[21] Although settlement and political frontiers consist of different elements, they both tend to function as regions or zones of transition, contact, or separation within or between political units.[22] It is into this frontier zone, which lies beyond the integrated region of the political unit, that expansion takes place.[23] A frontier, then, possesses a certain width in space and thus contains area.

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[21] Prescott, J.R.V., The Geography of Frontiers and Boundaries, (Chicago: Aldine Publishing Co., 1967), p. 33.

[22] Kristof, Ladis, "The Nature of Frontiers and Boundaries" Annals, of the Association of American Geographers, Vol. 49, 1959, p. 269.

[23] de Blij, Harm, Systematic Political Geography, (New York: John Wiley & Sons Inc., 1973), p. 127.

A boundary, unlike a frontier, does not possess area, but instead it is a line which delimits or demarcates administrative units.[24] A boundary functions as a line of separation, not as an area of transition, and thus it is an essential interacting component of a state system. The establishment of a boundary line is supported by jural law; making it the "spatial expression of a given legal order", which distinguishes it from a frontier which has no legal status.[25] Furthermore, three basic differences between frontiers and boundaries can be identified.[26] First, frontiers tend to be "outer-oriented" while boundaries tend to be "inner-oriented". Secondly, another difference by which boundaries are distinguished from frontiers is the different type of forces which operate to maintain them. In the case of frontiers continued existence is dependent upon the manifestation of centrifugal forces, while boundaries are dependent upon centripetal forces. Finally, a frontier can be considered to be a factor of integration, while a boundary is a factor of separation. The differences between frontiers and boundaries refer basically to international political units, however, these differences can be applied on a limited basis to internal political units.

Boundaries can be classified into a variety of categories depending on what type of approach is utilized. With one approach

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[24] Kristof, "The Nature of Frontiers and Boundaries", pp. 270-271.

[25] Ibid, p. 275.

[26] Ibid, pp. 271-273.

boundaries can be classified by the static characteristics of their form. Such a classification is termed the morphological approach.[27] This type of boundary classification was first advanced by Boggs when he divided boundaries into physical, anthropological, geometrical and complex.[28] In his discussion of this type of classification, de Blij has substituted intermediate for complex as the fourth type of boundary while retaining the others.[29]

Physical boundaries consist of dividing lines drawn along the crests of mountains or water divides, through deserts, lakes, swamps, or along the banks or in the middle of rivers. These types of boundaries are among the oldest types used because of their relative prominence on the landscape and the ease by which they can be delineated. Boundaries have been classified according to natural and artificial phenomena, with the natural boundaries corresponding to the physical type listed above.

Anthropological boundaries are defined as separating linguistic, religious, ethnic, or economic factors. These types of boundaries were primarily formed after the First World War, however, it became apparent that classification and delineation of such boundaries was a difficult and complicated task. While sharp cultural differences do exist in some areas, in others there are gradual gradations from one cultural phenomena to another. In addition, some cultural

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[27] de Blij, Systematic Political Geography, p. 175.

[28] Boggs, S. Whittmore, International Boundaries, (New York: Columbia Univ. Press, 1940), p. 25.

[29] de Blij, Systematic Political Geography, p. 178.

boundaries may coincide with physical ones, in which case the latter type must also be considered as a possible influence in the boundary formation.

Geometrical boundaries are composed of straight lines, such as meridians of longitude, parallels of latitude, rhumb lines, or arcs of circles. Most geometrical boundaries appear as straight lines on maps, being part of meridians or parallels. These straight line boundaries are drawn primarily because the region through which the line passes is devoid of significant physical features, or because the rapid delineation of a line is necessary.[30]

Intermediate or complex boundaries are the last type of boundary form which can be classified morphologically. Actually, this is not a specific type of boundary classification, but an amalgamation of the other types, or a type which defies genuine classification.

Boundaries can be classified genetically. Such boundaries were established prior to the main thrust of settlement, or during the main settlement phase, or after settlement had developed.[31] The advantage of such an approach to boundary classification lies in the fact that a specific boundary can be analyzed in terms of its "relationship with the cultural landscape at the time of its establishment."[32] This type of categorization

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[30] Ibid.

[31] Ibid, p. 180.

[32] Minghi, Julian, "Boundary Studies in Political Geography", Annals of the Association of American Geographers, Vol. 53, 1963, p. 409.

was first developed by Hartshorne, and while others have modified it, the basic terminology is still his.[33] According to the time of boundary establishment, Hartshorne differentiates between three types of boundaries; antecedent, subsequent, and superimposed. With such a classification, he borrowed from terminology used in physical geography which describes the genetic classification of streams and applied it to the description of boundary establishment.

An antecedent boundary is one which has been demarcated prior to the development of any significant cultural landscape features such as roads, railroads, settlements, or field patterns. It can be argued that the existence of some indigenous native population might contain certain elements of settlement patterns which would alter the landscape. In this case the antecedent boundary can be refined to include what is called a "pioneer boundary"; one that was formed in an absolutely unoccupied region. If a boundary has been established during the development of the cultural landscape, it will tend to conform to certain features on that landscape and is a subsequent boundary. Such a boundary, because it is situated between two evolving state systems, may delineate more than just landscape features; but may also divide different linguistic, religious, or ethnic groups.[34] Finally, if a boundary happens to be formed after a region has been fully settled, yet

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[33] Hartshorne, Richard, "Suggestions on the Terminology of Political Boundaries", Annals of the Association of American Geographers, Vol. 26, 1936, pp. 56-57.

[34] de Blij, Systematic Political Geography, p. 183.

does not conform to any cultural landscape feature, it can be classified as a superimposed boundary. This type of boundary is indicative of truce lines or other dividing lines which have developed out of some sort of confrontation. Such boundaries can be found in former colonial holdings where a boundary was established across a region without considering the native cultural patterns.

A final type of boundary -- which is actually an antecedent type -- is one which is termed a relic boundary. These are boundaries which have ceased to function as dividing lines between two political units. However, while these boundaries may have no legal status, their form in the cultural landscape remains, and can be distinguished by changes in architectural structures, place names, transportation networks, or property lines. In some cases, the boundary may have ceased to operate as an international boundary, but still it functions as an internal boundary.[35]

The classification of boundaries presented above will be applied to the Greenville Treaty Boundary Line in order to more accurately define the nature of this line. Any classification of a boundary must be carefully weighed and analyzed concerning the variety and complexity of factors which went into its formation. Boggs states that "Each boundary is almost unique and therefore many generalizations are of doubtful validity."[36] These classifi-

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[35] Ibid, p. 186.

[36] Boggs, S. Whittmore, "Forward", In Jones, Stephen, Boundary-Making, (Concord, N.H.: Rumford Press, 1945), p. vi.

cation types are used in this study to analyze the Greenville line in terms of the guidelines set down by Prescott when he states that geographical research into boundaries should emphasize;

> the influence of geographical factors on the location of the boundary and the reciprocal influence of the boundary once established, on the development of the landscape through which it is drawn.[37]

With such an emphasis, this investigation attempts to make some generalizations concerning the impact of the definition and demarcation of a boundary line on a cultural landscape.

In addition to examing the functions of the Greenville line as a political boundary, this study employed the Unified Field Theory developed by Jones.[38] The Unified Field Theory states that there is a continuum in studies in political geography which begins with a political idea and progresses through decision, movement, and field, to political area.[39] These interconnected stages begin with any political idea, whether it is the concept of nationalism, the idea of a civil township, or a treaty line. The conceptualization of an idea by an individual or a group of individuals does not take on the form of political significance until it is translated into actions.

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[37] Prescott, The Geography of Frontiers and Boundaries, p. 58.

[38] Jones, Stephen, "A Unified Field Theory in Political Geography", Annals of the Association of American Geographers, Vol. 44, 1954, pp. 111-123.

[39] Ibid, p. 115.

A political idea takes on significance, then, when it is sanctioned through some decision-making process. Without a decision of some sort, the political idea would remain an abstract formulation, but as soon as a judgment is made concerning an idea it can be translated into definite actions. Once a favorable decision has been rendered, processes are set in motion which result in movement. Movement consists of the circulation of people, goods, services, and ideas across space from one point to another.[40] Movement as used in this model is a general term which includes a variety of different types of circulation modes involving interactions between points, lines, and areas.

With the creation of a specific movement pattern a circulation field is established. The term field is used here to denote a specifically defined region of space in which a given intensity of activity exists. The creation of a field of circulation requires more than just the interaction of point or line phenomena, it requires area. For this reason fields are generally considered to be produced with point to area, or area to area movements.[41]

From a field of circulation the last link in the idea-area chain is the political area. In theory, the term is applied to any politically organized area that has been formed for adminis-

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[40] Jones draws on other literature, particularly that of Gottman and uses the terms movement and circulation interchangeably.

[41] Abler, R., Adams, J., and Gould, G. Spatial Organization, (Englewood Cliffs, N.J.: 1971), p. 243.

trative or service purposes. The one similar feature of all such political areas is that they have definite limits to their effectiveness or jurisdiction.[42]

The Unified Field Theory thus conceptualized by Jones, has definite utility in this investigation. Generally speaking, the theory can be thought to have three basic advantages in answering political-geographic questions; (1) a compact description, (2) a clue to explanation, and (3) a tool for better work.[43] It is perhaps the last of these points which has the most use, because as a tool in geographic investigation the theory permits a structuring of data whereby the many elements concerning the Greenville line can be ordered. Specifically, the theory is of great use in the study of boundaries, because as lines located between two fields or political areas, boundaries function as an integral part of the political process. Furthermore, the boundary region is in itself a field in which the dividing line between different political areas, conditions the kind and intensity of circulation.[44]

The field theory is being used in this study, not as a means of demonstrating its applicability to geographic research, but as a tool whereby a large amount of diversified data can be categorized for analysis.

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[42] Jones, "Unified Field Theory", p. 114.

[43] de Blij, Systematic Political Geography, p. 302.

[44] Jones, "Unified Field Theory", p. 117.

HYPOTHESES

To facilitate the investigation of the topic, the study was structured around one major hypothesis and a number of sub-hypotheses. Hypotheses were formulated so that the study would have a goal and direction in order that the research would not deviate into unproductive areas. It has been stated that a hypothesis is a specific type of ascertion which, if proven true, takes on the status of a scientific law.[45] This is a rather strict view of a hypothesis which becomes a law merely by confirmation. This connection assumes that hypotheses are part of some theoretical system and must operate within this system. However, in a broader sense, and for the purposes of this study, a hypothesis is considered to be a "proposition whose truth or falsity is capable of being asserted."[46]

It is not the purpose of this research to develop a set of theoretical concepts relative to the relationship between a survey boundary line and the cultural landscape, or to establish any scientific law governing the function of landscape development. The hypotheses stated here are to serve only as guidelines in the control of the scope of the study. The hypotheses were formulated by reviewing basic information regarding the Greenville line and

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[45] Harvey, David, Explanation in Geography, (New York: St. Martin's Press, 1969), p. 100.

[46] Ibid.

then establishing a series of "probable solutions" to the problem of the treaty boundary and landscape development.[47] Once formulated, the hypotheses can then be verified or rejected on the basis of further examination.

The hypotheses developed for this study have been organized into one major hypothesis and four sub-hypotheses. The major hypothesis serves as the main assumption of the investigation, while the sub-hypotheses are used as testing statements to verify the assumption.

Major Hypothesis - The various processes which operated in the formulation and demarcation of the Greenville Treaty Boundary Line and the functions that the line has served, have had a definite impact on the form of the cultural landscape of east-central and southeastern Indiana.

Sub-Hypotheses

1. The orientation of the boundary line has affected the continuity of major and minor civil and survey divisions (county boundaries, townships, and sections) in the study area.

2. Property lines and field boundaries that abut the treaty boundary line will conform to its configuration.

3. County highway and section line roads (excluding freeways) will exhibit a degree of discontinuity where they cross the boundary line. In addition, there will be some county roads will conform to the orientation of the boundary line itself.

4. The boundary line will be more evident on lands of the Tipton Till Plain than on those of the Dearborn Upland.

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[47] Durrenburger, Robert, Geographical Research and Writing, (New York: Thomas Crowell C., 1971), p. 7.

METHODOLOGY

This research will generally follow the methodological framework used by Hart and Thrower in their studies of survey patterns and field boundaries. Following their example, a variety of landscape features were examined as indicators of the presence and effects of the Greenville line. These indicators include roads, field boundaries, property lines, political lines, and survey lines.

Mapping

Because no specific mapping technique relative to the graphic representation of survey boundary lines was available, one was devised which would provide a maximum amount of relevant information. A one mile wide strip of land was delineated on each side of the treaty line throughout its entire length. This area was divided into 58 grid cells, each being 2 mile square, so that the information within this strip could be easily and intensely studied. (Fig. 2) The grid cells were further divided into quarters, each quarter measuring 1/2 mile by 2 miles, and containing 640 acres. The quarters were labeled A, B, C, and D from left to right. In this manner information concerning the specified landscape features was arrayed in columns and rows. This permitted a cell to be studied as a whole, or all of the quarters of a particular group could be studied as a whole. The maps of the grid cells were drawn at an original scale of 1 : 25,344 or, 1 inch represents 2112 feet on the ground. At this scale each grid cell was 5 inches square, which meant that seven maps containing 58 grid cells were required to cover the entire boundary line. The maps were drawn at a

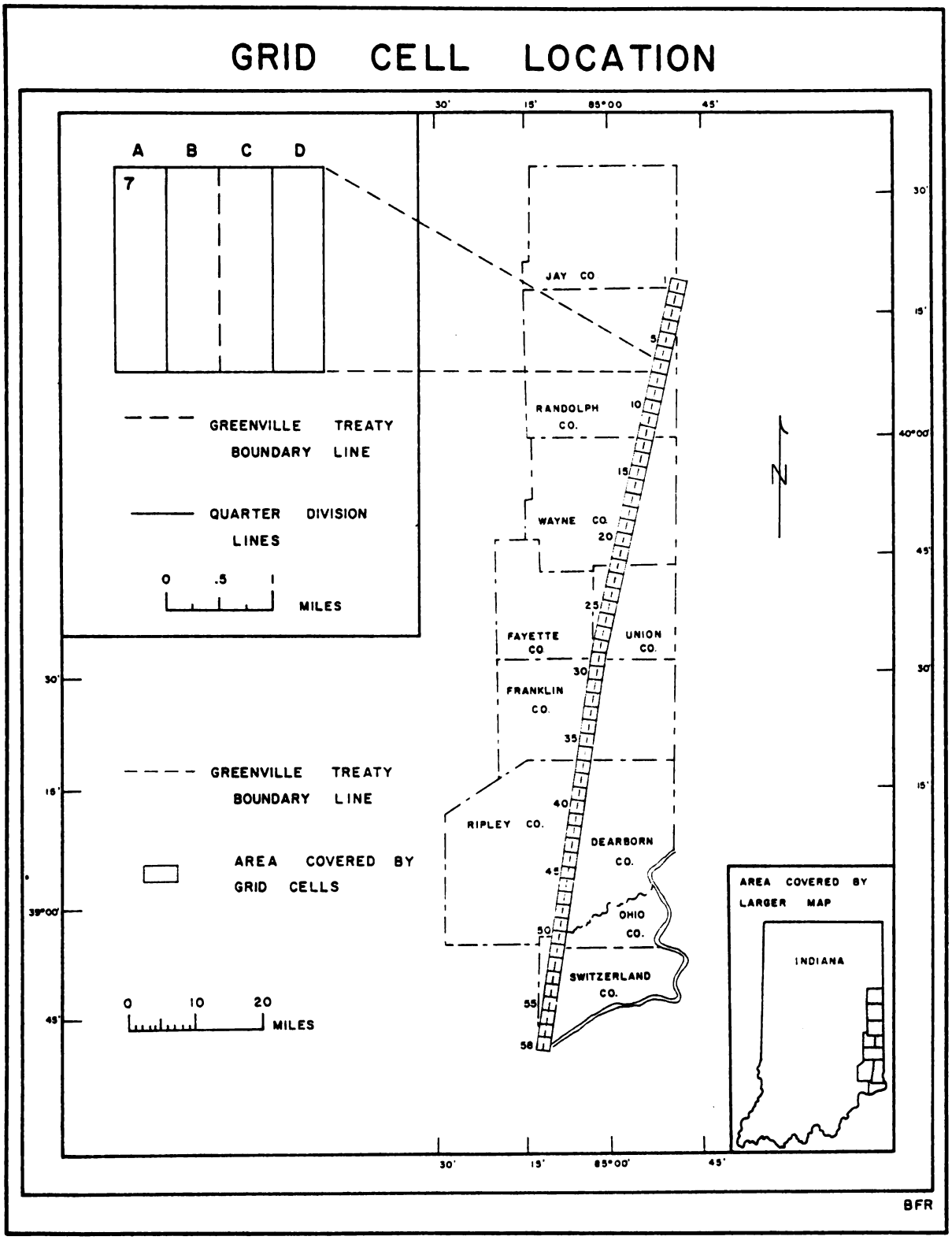
GRID CELL LOCATION
A B C D
7
GREENVILLE TREATY BOUNDARY LINE
QUARTER DIVISION LINES
0 .5
MILES
GREENVILLE TREATY BOUNDARY LINE
AREA COVERED BY GRID CELLS
0 10 20
MILES
JAY CO.
RANDOLPH CO.
WAYNE CO.
FAYETTE CO.
UNION CO.
FRANKLIN CO.
RIPLEY CO.
DEARBORN CO.
OHIO CO.
SWITZERLAND CO.
AREA COVERED BY LARGER MAP
INDIANA
N
30'
15'
85°00
45'
39°00'
40°00'
BFR

Figure 2.

scale of 1 : 25, 344 to adequately and precisely display the fine detail of property and field boundaries.

To illustrate the relationship between the Greenville line and the landscape, 4 sets of grid cell maps were prepared depicting various groupings of information. This information includes data on political lines, survey lines, property lines, roads, field boundaries, and land cover/use. To avoid having to draw an unnecessary number of maps, some of the compatible data was grouped together. In the case of roads, this information was displayed on three different series of maps; one to actually show this data, while on two others the road network was used as a control in location.

The first series of maps contained all of the political and survey lines in the study area. These include Congressional Survey Townships and section lines, as well as state, county, and civil township lines. Where two different categories coincided, the line of highest ranking took precedence and was delineated. For example, if a state line coincided with a county line, the state line was shown. Likewise, if a county line coincided with a township, the county line was shown. This is no way obscured any of the detail and still retained the consistency with the U.S.G.S. maps.

The second series of maps includes information on property lines and roads. The data on property lines was obtained from county plat books for each county in the study area. The detail from these county plat books was transfered to the maps by delineating the grid cells in the plat book. The scales of the plats varied from county to county, but averaged about 1 : 50,000.

Once the grid cells had been delineated on the plats, they were enlarged on a Projecting Map-O-Graph to the proper scale of 1: 25,344, and the detail traced onto maps. The plat book data was traced onto the maps after the roads had been transfered from the U.S.G.S. topographic maps, and thus acted as a controlling framework for the property line data.

A third series of maps was drawn showing all of the field boundaries in the area covered by the grid cells. This type of information was not represented on any maps or plats, therefore vertical black and white aerial photographs were utilized to obtain this data. Sheets of frosted acetate were attached to the photographs and placed on a light table where the field boundaries were traced. In this manner the field boundaries along the entire length of the Greenville line were delineated. The scale of the photography used was 1 : 24,000, but where complete coverage of the study area was not available at this scale, the 1 : 63,360 photo index sheets of the counties were used to complete the interpretation. With the completion of this task, the field boundary data were transfered to maps; once again used the Projecting Map-O-Graph to make slight adjustments in scale.

Finally, a fourth series of maps were drawn showing land cover/use. Like the field boundaries, no comprehensive land cover/use map was available for the entire study area. For this reason it was necessary to gather this information from vertical black and white aerial photographs. The same procedure for these delineations was followed as that used to map the field boundaries.

A nine-part land cover/use classification scheme was used to categorize the aerial photograph information. These categories were: (1) Residential, (2) Commercial, Services, and Institutional, (3) Industrial, (4) Cultivated Cropland and Hay, (5) Permanent Pastures and Herbaceous Vegetation, (6) Brushlands, (7) Forestlands, and (8) Open Water. These categories were taken from the Michigan Land Cover/Use Classification System which is composed of four specific levels of categories, each one more detailed than the other.[48] To a large extent the Michigan scheme was based on the one developed by the U.S.G.S. in Circular 671.[49]

The grid cell map series were the main cartographic contribution in the study; however, other supportive maps were prepared to provide supplementary information ranging from the locations of Indian land cessions to the distribution of glacial landforms. Taken together, the maps in this study represent an accurate and informative visual representation of the data and in themselves make a contribution to knowledge concerning an aspect of the geography of cultural landscapes.

Measurement

Upon completion of the mapping phase, the selected landscape

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[48] "Michigan Land Cover/Use Classification System", Michigan Land Use Classification and Referencing Committee, Department of Natural Resources, July, 1975, pp. 1-60.

[49] Anderson, James and others, A Land-Use Classification System for Use with Remote Sensor Data, Geological Survey Circular 671, (Washington, D. C.: Government Printing Office, 1972), pp. 1-16.

features were measured and the data tabulated by grid cell and quarter grid cell. Again, the division of the cells into quarters made it possible to display the data in columns and rows. These features were measured on the maps with a Pickett Scale calibrated into hundreths of an inch, a Dietzen Map Measurer (1½" diameter), and a dot grid constructed with one dot equaling 6.4 acres. The scale and map measurer were used to measure linear distances of the political, survey, property, and field lines, while the dot grid was used to calculate the areas of the different categories of land cover/use.

These features were categorized by their correspondence to the orientation of the Greenville line. Several types of linear correspondence were noted and measured. First, a particular landscape feature could correspond or coincide with the position and orientation of the treaty boundary line. Any feature which, when checked against the U.S.G.S. 7.5 minute topographic sheets, had the same location and which was in 1-2 degrees each of west of the line was considered to be oriented to the boundary. Likewise, any feature which did not correspond to the position and orientation of the line was termed non-oriented. In addition, some of the features were neither oriented or non-oriented, but instead ran parallel to the line and were so designated. Parallel bars were used to determine if these parallel cultural lineaments deviated more than 1-2 degrees from the orientation of the line. Finally, it is possible for some features to be offset, or discontinuous where they cross the treaty line. This is especially true of survey

lines and county roads which tend to jog as they traverse the line. The degree of these offsets is another important factor to consider in the relationship between the Greenville line and the cultural landscape.

Once a particular lineament feature was classified, the total length of each category feature was measured in miles. A data sheet for each grid cell was prepared and the information recorded by quarter cell, with these quarters being summed for a cell total. In making these arrangements it was possible to have a total mileage length in a certain category which exceeded the actual length of the feature on the landscape. For example, a road might be oriented along the treaty line for the entire length of a grid cell; that is 2 miles. In addition, another road which crosses the oriented road may be offset for a distance of .2 of a mile. Thus a portion of this road was measured twice, with the total number of miles of road measured within the cell exceeding that which actually exists. Such a measuring procedure is legitimate, however, because the totals being used include all measurements made, and not just a total figure for X number of miles of a feature on the landscape. This measurement procedure was consistent throughout the study.

Field Work

In addition, to literary and graphic sources of information, direct measurements and observations in the field were conducted. Field checks in the study area were needed in order to discover any changes in the landscape since the aerial photographs and maps

were made. Field observations were also made to validate interpretations, check for errors, and to gather "ground truth" photographs for further study. Specifically 50 quarter mile square areas on the boundary line were visited, with additional reconnaissance conducted on each side of these areas. These areas were systematically selected at approximately every 2.3 miles on the line, and plotted on the 7.5 minute quadrangles, as well as on the county aerial photograph index sheets. Both the maps and the aerial index sheets were taken into the field. These field checks were selected not for the purpose of performing any statistical sampling, but merely as a means for studying a series of on-site ground observations.

To aid in these field observations, a Brunton compass mounted on a Jacob's Staff was used to measure the orientation of the observed cultural features on the ground. (Photos 1-3) This procedure was done for two reasons. First, angles were measured to be sure that the particular feature being examined actually had a bearing which approximated that of the treaty line. Secondly, the compass was used to set two survey range poles, one situated towards the north and the other along the treaty line, so that the orientation of the observed feature could be distinguished in the "ground truth" photographs. The two range poles were differentiated by attaching a square cardboard target with a large letter "N" on the range pole along the north axis. Sometimes it was necessary to situate these poles with respect to the south axis. In this case no target was used, and the two poles were differentiated verbally

in the photo description. Information relating to each "ground truth" site, such as measured angle, type of feature, position within the township and section, and number and orientation of the ground photographs, was recorded in a survey's notebook for later reference.

DISSERTATION ORGANIZATION

The dissertation has been organized into six chapters, and three appendises. The chapters include Introduction, Physical Setting, Historical Background, Survey and Settlement, and Present-Day Cultural Landscape, and the Conclusion. The appendises contain detailed and supplementary information useful to the study. One appendix includes a complete text of the Treaty of Greenville, so that the document can be studied in its entirety for more insights. The next appendix consists tables of the measurements obtained from the grid cell map series. The last appendix contains aerial and ground photographs of the study area.

CHAPTER II

PHYSICAL SETTING

The study area lies within the Till Plains section of the Central Lowlands Physiographic Province.[1] That part of this section which lies within the study area is underlain by Upper Ordovician rocks, primarily shales and limestones; and Lower and Middle Silurian rocks, mainly limestones, dolomites, sitstones, and shales.[2] (Fig. 3) These formations are located near the axis of the Cincinnati arch, and are situated in a nearly horizontal position with a slight dip to the west and southwest on the western side of the study area.[3]

The Till Plains section can be divided into two minor physiographic units; the Tipton Till Plain and the Dearborn Upland.[4] (Fig. 3) The Tipton Till Plain is a constructional feature which has resulted from continental glaciation. The till plain is a slightly modified ground moraine which is characterized by low relief, few lakes, and a subdued terminal moranic topography. The few irregularities on this otherwise featureless plain are a series of morainic systems

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1 Thornbury, William D., Regional Geomorphology of the United States, (New York: John Wiley & Sons Inc., 1967), p. 228.

2 Tucker, W.M. "Hydrology of Indiana", in Logan, W.M., Handbook of Indiana Geology, (Indianapolis, Ind.: Indiana Department of Conservation, Pt. 3, Publication No. 21, 1922), p. 273.

3 Malott, Clyde, "Physiography of Indiana", in Logan, W.N. Handbook of Indiana Geology, (Indianapolis, Ind.: Indiana Department of Conservation, Pt. 2, No. 21, 1922), p. 155.

4 Wayne, W.J. and Zumberge, J.H., "Ploistocene Geology of Indiana and Michigan", in Wright, H.E. and Frey, D.G. (eds.), The Quaternary of the United States, (Princeton, N.J.: Princeton University Press, 1965), p. 63.

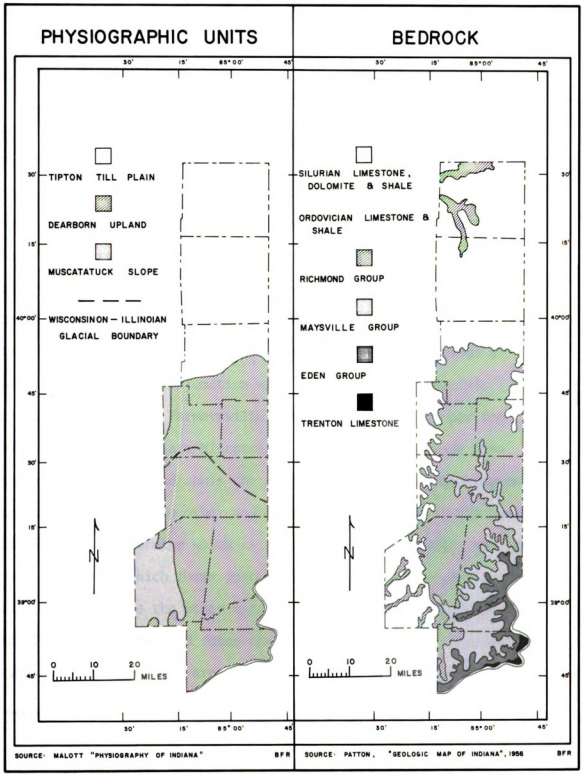
PHYSIOGRAPHIC UNITS
BEDROCK
TIPTON TILL PLAIN
DEARBORN UPLAND
MUSCATATUCK SLOPE
WISCONSINON – ILLINOIAN GLACIAL BOUNDARY
SILURIAN LIMESTONE, DOLOMITE & SHALE
ORDOVICIAN LIMESTONE & SHALE
RICHMOND GROUP
MAYSVILLE GROUP
EDEN GROUP
TRENTON LIMESTONE
N
0 10 20 MILES
SOURCE: MALOTT "PHYSIOGRAPHY OF INDIANA" BFR
SOURCE: PATTON, "GEOLOGIC MAP OF INDIANA", 1956 BFR

Figure 3.

which in some places exhibit a topography consisting of knobs, basins, and ridges.[5] In most places, though, these moraines can be distinguished from the surrounding ground moraine only by a differentiation in soil characteristics.[6]

The area of the Tipton Till Plain contains portions of six terminal morainic systems, five of which are located on the till plain. (Fig. 4) The Mississinewa moraine is situated farthest north in the area, being located in southern Jay and northern Randolph counties. South of this moraine is the Union City moraine, which is situated in central Randolph County. An extensive section of the Bloomington maraic system also is present in the area, and contains a considerable amount of glacial accumulation. While this moraine is a prominent feature here, it still possesses a subdued relief. In conjunction with the Bloomington morainic complex, part of the Farmersville moraine -- which is a portion of the Erie lobe of late Wisconsinan glaciation -- extends into the area from Ohio and abuts the southern part of the Bloomington moraine. Finally, two other end moraines are located in the area; the Shelbyville moraine which is situated in Wayne County, and the Hartwell system which forms another morainic complex extension from Ohio. Unlike the other moraines, the Hartwell is located on the Dearborn Upland, and forms the southern boundary of Wisconsinan glaciation in the study area. In addition to its characteristics

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[5] Malott, "The Physiography of Indiana", p. 106.

[6] Ibid, p. 107.

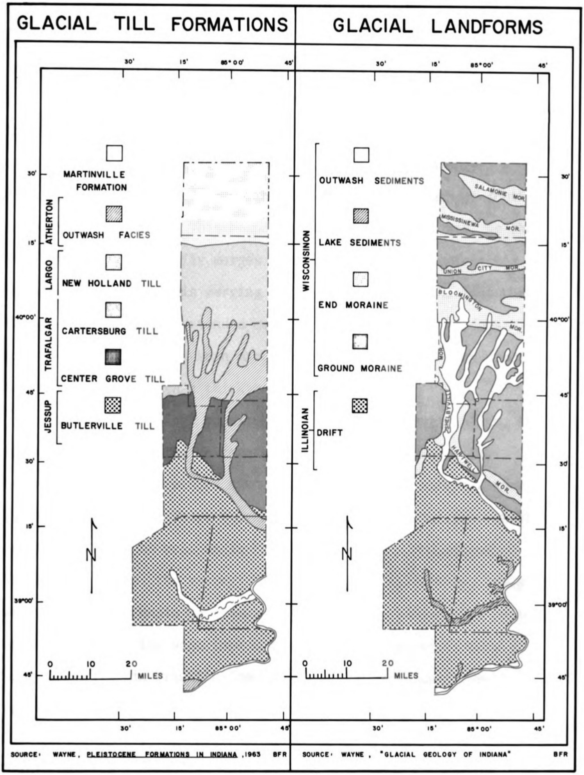
GLACIAL TILL FORMATIONS
MARTINVILLE FORMATION
ATHERTON
OUTWASH FACIES
LARGO
NEW HOLLAND TILL
TRAFALGAR
CARTERSBURG TILL
CENTER GROVE TILL
JESSUP
BUTLERVILLE TILL
0 10 20 MILES
SOURCE: WAYNE, PLEISTOCENE FORMATIONS IN INDIANA, 1963 BFR
GLACIAL LANDFORMS
WISCONSINON
OUTWASH SEDIMENTS
LAKE SEDIMENTS
END MORAINE
GROUND MORAINE
ILLINOIAN
DRIFT
SALAMONIE MOR.
MISSISSINEWA MOR.
UNION CITY MOR.
BLOOMINGTON MOR.
SHELBYVILLE MOR.
HARTWELL MOR.
0 10 20 MILES
SOURCE: WAYNE, "GLACIAL GEOLOGY OF INDIANA" BFR

Figure 4.

of glacial construction, the till plain also displays some features which have resulted from the discharge of glacial meltwaters as the ice retreated. For the most part, however, the till plain in the study area was slightly modified by these meltwaters.

The other minor physiographic unit which is located within the study area, is the Dearborn Upland. This physiographic region, oriented in a southwest to northeast direction, is a deeply dissected upland surface occupying all of the area south of southeastern Wayne County. This boundary is not a distinct one, as the Dearborn Upland gradually merges into the relatively undissected Tipton Till Plain. This merging can be explained by the fact that the upland originally extended much farther north than it does today; however, its northern margin was greatly modified by glaciation and covered with a thick mantle of drift.[7]

The Dearborn Upland consists of a number of stream basins, the largest of which is the Whitewater River drainage basin. The headwaters of this drainage system are located in southern Randolph County (Figure 5). Where the Whitewater River becomes well developed in Wayne County, as well as in the central parts of Union and Franklin counties, the valleys have been deeply entrenched. This entrenched river basin has resulted in areas of considerable relief, especially where the west fork and east fork of the river join near Brookville in Franklin County to form the Whitewater River proper. Between these basins are long, evenly spaced tongues of

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[7] Ibid, p. 158

upland which rise to approximately the same elevation, giving a plateau-like appearance to the region.[8] To the west and north of the dissected region, lies an area which is more characteristic of the flat, undissected Tipton Till Plain.

At one time the entire study area was glaciated. All of the Dearborn Upland is covered by glacial till; except where the drift has been washed away on steep, exposed slopes.[9] This upland tract of low relief is the result of Illinoian age glacial construction. This old Illinoian drift flat located in western Dearborn and eastern Ripley counties has not yet been severely affected by the action of streams, and still retains the characteristics of a ground moraine plain, with only a few areas characterized by the development of ridged drift.[10] With the exception of the Hartwell moraine, no terminal moraines exist in the area of Illinoian glaciation on the Dearborn Upland. The Hartwell moraine marks the southern limit of Wisconsinan glaciation. The Dearborn Upland, therefore, is a region of narrow stream valleys and extensive elevated divides with steep slopes ending in rather rounded spurs. This dissected section is found in the east and southern portions of the upland, with a relatively flat till plain located in the west.

The area covered by Wisconsinan glaciation exhibit landscapes that have resulted from glacial construction; however, south of

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[8] Ibid, p. 86

[9] Leverett, Frank and Taylor, F.V., The Pleistocene of Indiana and Michigan and the History of the Great Lakes, U.S. Geological Survey, Monograph No. 53, 1915, p. 71.

[10] Ibid, p. 57

the Wisconsinan glacial boundary, glacially formed features tend to be interspersed with other topographic features which take their expression from the underlying bedrock.[11] The study area is covered by till formations of two different periods of glaciation.[12] (Figure 4) These two glaciations contain three major till formations; the Jessup Formation, the Trafalgar Formation, and the Largo Formation.[13]

The Largo Formation is the youngest of these formations and contains three till members from a single depositional unit. The main one found in the study area is the New Holland till member which is noted for its high clay content and low sand content.[14] It is found in Jay and the northern portion of Randolph counties.

The Trafalgar Formation underlies the Largo and overlies a paleosole that caps the Jessup Formation. It contains the Center Grove and Cartersburg till members, with the latter being the uppermost in the formation. Three distinct facies are represented in this formation; ground moraine, end moraine, and kame deposits.[15] Generally speaking, the Trafalgar Formation is con-

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[11] Ibid, p. 56.

[12] Wayne and Zumberge, "Pleistocene Geology", p. 63.

[13] Wayne, William, Pleistocene Formations in Indiana, Indiana Geological Survey, Bulletin No. 15, (Bloomington, Ind.: 1963), p. 9

[14] Ibid, p. 44.

[15] Ibid, p. 17.

sidered to be early Wisconsinan in age, and is found between the Wisconsinan-Illinoian glacial boundary and the northern portion of Randolph County.

The Jessup Formation underlies the Trafalgar and is exposed south of the glacial boundary and north of the Ohio River. The base of this formation lies on top of Paleozoic rocks, generally Ordovician limestones and shales. The formation contains two till members, however only the Butlerville member is exposed in the study area. The Jessup Formation is Illinoian in age according to most classification schemes.

Because of the different types of bedrock and glacial landforms, the Greenville line passes over a variety of topographic forms. It enters Indiana in the extreme southeastern part of Jay County on the Mississinewa moraine and passes over the moraine for a distance of some 2.2 miles, after which it crosses the ground moraine of the Tipton Till Plain for approximately 6 miles. The boundary line then passes across the Union City moraine, which is about 1½ miles wide at this point. From here it decends onto the ground moraine for another 6.6 miles. Continuing in a southwesterly direction, the line next encounters the rather extensive Bloomington morainic complex, passing over the outer margin of the moraine for about 2.2 miles, onto 1½ miles of ground moraine, and then back upon the Bloomington moraine for 3.8 miles. From here the boundary line decends into a portion of the East Fork of the Whitewater River Valley in the northern part of Wayne County for about 3.2 miles. From here it ascends to the till plain for the next 15.4 miles in

Wayne County. As the line enters northwestern Union County, it again passes through about 1.3 miles of glacial outwash in the basin of the East Fork of the Whitewater River.

For the next 12 miles the boundary line crosses ground moraines on the Dearborn Upland. The line traverses this ground moraine until it encounters the Hartwell moraine. The Hartwell moraine is approximately 2 miles wide at this point, and it is the last defined end moraine that the line crosses in the study area. From here the boundary crosses onto Illinoian glacial drift where no end moraines have been identified. The line passes over approximately 1.3 miles of glacial outwash located in the basin of the Whitewater River Valley in west-central Franklin County. For the next 52 miles to the Ohio River, the Greenville line traverses the thin veneer of Illinoian drift uninterrupted except for two locations.

One of these interruptions is the border of Ohio and Dearborn counties where the boundary line descends onto the lake sediments of a former Wisconsinan aged glacial lake in what is now the Laughery River basic. The line passes over about 1.1 miles of this lacustrine deposit before ascending to the ground moraine. The other location is where the line descends from the drift covered upland onto the alluvial sediments of the Ohio River Valley for approximately 1.3 miles. It is here that the line terminates. It should be noted, however, that in addition to these two exceptions the line passes over about 17.1 miles of relatively undissected ground moraine of old Illinoian drift in western Dearborn County.

Stream Drainage

The drainage of most of the state of Indiana is tributary to the Wabash River which is itself tributary to the Ohio River. (Fig. 5) In the south-central and southeastern part of the state, however, this drainage is directly tributary to the Ohio.[16] Thus a majority of the streams in the study area flow directly into the Ohio, while a few streams in Jay and Randolph counties flow northward into the Wabash. The boundaries between the various drainage systems are located mainly in glaciated regions and are -- for the most part -- determined by these glacial accumulations.[17] Only in southern Randolph County is the drainage controlled by bedrock formations. Here, elevated geologic formations have influenced the formation of a regional water divide between the headwaters of the White River -- which is tributary to the Wabash -- and those of the Whitewater River -- which is tributary to the Miami River in Ohio. The Whitewater River -- with its each fork -- is the main drainageway in the study area.[18] This drainage system was an important glacial sluiceway during the Wisconsinan Stage carrying a large volume of outwash. Its basin lies entirely within the area of Illinoian glaciation, and contains a large valley train which is over 100 feet thick south of the Wisconsinan

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[16] Leverett and Taylor, Pleistocene, p. 60.

[17] Ibid.

[18] Tucker, "Hydrology of Indiana", p. 309.

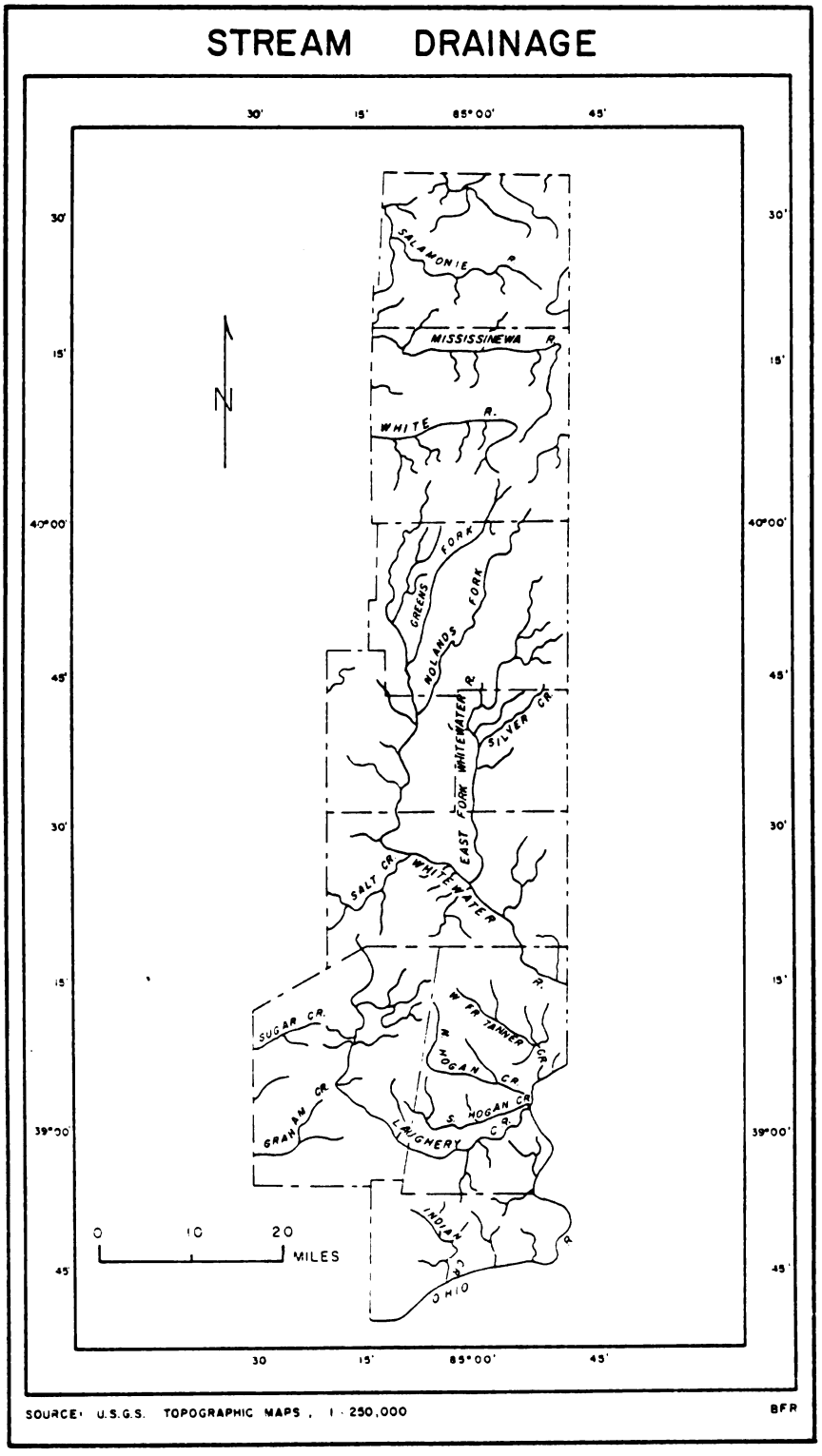
STREAM DRAINAGE
30'
15'
85°00'
45'
40°00'
39°00'
N
SALAMONIE R.
MISSISSINEWA R.
WHITE R.
GREENS FORK
HOLLANDS FORK
SILVER CR.
EAST FORK WHITEWATER R.
SALT CR.
WHITEWATER R.
SUGAR CR.
WEST FORK WHITEWATER R.
TANNER CR.
HOGAN CR.
S. HOGAN CR.
GRAHAM CR.
LAUGHERY CR.
INDIAN CR.
OHIO R.
0 10 20
MILES
SOURCE: U.S.G.S. TOPOGRAPHIC MAPS, 1:250,000
BFR

Figure 5.

glacial boundary.[19] The headwaters of the Whitewater River system are situated north of the glacial boundary on Wisconsinan till.

Two major stream system tributary to the Wabash drain the northern portion of the study area. One of these systems is the Mississinewa River which flows across the extreme northern part of Randolph County, in an east-west direction. Its major tributaries in the study area are Little Mississinewa River, Harshman Creek, and Miller Creek. The other major drainage system in the northern part of the study area is the headwater of the White River which begins in east-central Randolph County and flows in a northwesterly direction before it bends westward and flows out of the study area to the Wabash. The tributaries of this system in the study area are Cabin Creek, Sugar Creek, Salt Creek, and Stony Creek.

The next major drainage system to the south in the study area is the Whitewater River and its east fork, both of which flow in an approximately southerly direction. The main tributaries of the Whitewater River are Duck Creek, Salt Creek, Bear Creek, Wilson Creek, Little Whitewater Creek, Green's Fork, and Noland's Fork. The primary tributaries of the East Fork of the Whitewater River are Lik Creek, Elkhorn Creek, Richland Creek, Silver Creek, and Templeton Creek. Recenlty, the United States Corps of Army Engineers built an earthern dam on the East Fork of the Whitewater River. The dam is 3,004 feet in length and 182 feet high. The dam impounds a resevoir called Brookville Lake.[20] This lake covers

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[19] Ibid.

[20] "Brookville, Lake, Indiana", U.S. Corps of Army Engineers, Data Sheet, F/C 82, p. 3.

approximately 4510 acres, extending about 12.5 miles from just north of Brookville to just north of Dunlapsville in Union County.

Farther south the study area is drained by Little Hogan Creek, South Hogan Creek, Wilson Creek, Grants Creek, and Laughery Creek. These streams are all direct tributaries of the Ohio, flowing in an east-southeast direction. Laughery Creek flows through a narrow lacustrine plain, an area that was formerly a Wisconsinan glacial lake. Because these deposits of calcareous silts and clays were laid down on the Dearborn Upland and not on the adjacent lowland, their areal extent is restricted.[21]

Near the terminus of the boundary line several small streams drain into the Ohio River from the north. Streams such as Indian Creek, Indian-Kentuck Creek, Tucker Run, and Lost Fork Creek drain the extreme southern part of the study area.

Climate and Vegetation

The study area includes either one or two climatic types, depending on the classification scheme used. According to the Koppen-Geiger system, this area falls entirely into the "Cfa" category.[22] The "Cfa" climate is a warm, sub-tropical rainy climate where the mean temperature of the coldest month is between 64.4 F. (18 C.) and 26.6 F. (-3 C); with sufficient

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[21] Thronbury, William, Glacial Sluiceways and Lacustrine Plains of Southern Indiana, Division of Geology, Department of Conservation, Bulletin No. 4, (Bloomington, Ind.: 1950), p. 14.

[22] Strahler, Arthur, Introduction to Physical Geography, (New York: John Wiley & Sons, Inc., 1970), Plate #2.

precipitation throughout the year.[23]

Visher divides the study area into two subdivisions, however, his criteria are more detailed than that of other classification schemes.[24] He differentiates between a northern and southern zone based on a variety of factors.[25] A rather broad transitional zone separates these two climatic subregions, and is located in the northern third of Franklin County and the southern two-thirds of Union County. The northern part of the area has 25 winter days which are continually below freezing, in contrast with 13 days in the southern part. In addition, the northern portion of the study area has 38 days of snow cover, while the southern portion has 20 days os such cover. During the eight cooler months of the year, the northern section receives an average of 25 inches of precipitation and the southern section 30 inches. Visher also distinguishes between amounts of winter rain which totaled two inches in two consecutive days. The southern part of the study area has 12 such days and the norther part 4.

As with climatic types, there is also a variety of vegetation classification schemes of varying degrees of complexity present in the study area. Kuchler classifies the area in subdivisions of the Broadleaf Deciduous category.[26] These two subdivisions are

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[23] Ibid. p.

[24] Visher, Stephen, Climate of Indiana, Indiana University Publications, Science Series No. 13, (Bloomington, Ind.: Indiana University, 1944), p. 457.

[25] Ibid, pp. 457-458.

[26] Kuchler, A.W., "A Physiognomic Classification of Vegetation", Annals of the Association of American Geographers, Vol. 39, 1949, pp. 201-210.

the Beech-Maple subgroup and the Oak-Hickory subgroup. The Oak-Hickory vegetative association occurs in the extreme southeastern portion of the study area and is located entirely on Illinoian glacial tills. The Beech-Maple association lies to the north of the Oak-Hickory subgroup, with the dividing line between the two oriented in a northwest-southeast direction, and passing through Franklin County just south of Brookville.

Braun distinguishes between two major vegetation categories in the study area; the Beech-Maple region and the Western Mesophytic region.[27] The dividing line between these two regions follows the boundary between areas of Wisconsinan and Illinoian glaciation. Only one subgroup of the Western Mesophytic vegetation region is represented in the area, and it is simply termed the Illinoian "Flats". This subgroup contains species classed as hydro-mesophytic because of the flat, wet site location. The remainder of the area of Illinoian glaciation contains xero-mesophytic species because of the more dissected, drier sites. The other vegetative grouping distinguished by Braun -- in the study area -- is the Beech-Maple forest region which is located entirely on Wisconsinan glacial till. In this vegetative region beech and sugar maple are the dominant climax species in the forest canopy, with the area being so uniform that subsection classification is not necessary.[28]

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[27] Braun, E. Lucy, Deciduous Forests of Eastern North America, (New York: Hafner Publishing Co., 1972), pp. 102 & 305.

[28] Ibid, p. 309.

An even more extensive classification of Indiana's vegetative regions was made by Gordon.[29] (Fig. 6) He distinguishes eight categories in his classification scheme based on relationships between major plant associations and physiographic conditions. Of these eight categories, portions of four are located within the study area. These are the Upland Oak Forest, phases of the Northern Swamp Forest, the Beech-Sweet Gum Forest, and the Beech Forest.

The Upland Oak Forest is found on well drained upland areas of xeric environments. This category is situated principally on the morainic ridges of the Tipton Till Plain region where oak and hickory predominate, and on the interfluves of some of the more dissected areas of the Illinoian drift region.

The Northern Swamp Forest is also present in the study area. This association is located primarily in lowland and depressional areas of restricted drainage, usually north of the glacial border near the Indiana-Ohio state line. This category contains elm, black ash, soft maple, and red oak.

Another category classified by Gordon in the study area, is the Beech-Sweet Gum Forest located on the Illinoian drift "flats". Beech, pin oak, red maple, sweet gum, and swamp white oak are the dominate species. Sweet gum and pin oak, however, are replacing beech in many secondary forests.

The last category which is delineated in the study area is the Beech Forest. This association is located -- for the most part -- on the Tipton Till Plain. Where the beech forest occurs

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[29] Gordon, Robert, "A Preliminary Vegetation Map of Indiana", American Midland Naturalist, Vol. 17, 1936, p. 866.

south of the glacial border, sugar maple is interspersed as a co-dominate. Such associations are usually found on well drained alluvial sediments along streams and on some of the upland areas.

In conjunction with the discussion on vegetative types and distributions in the study area, it should be noted that the vegetative associations described refer to potential distributions. Most of the forest cover has been removed from the Tipton Till Plain and Illinoian drift "flats". However, remnants of the associations can still be found on the landscape in the form of woodlots. In addition, many stands remain on moderate slope lands, and in areas of poor soil drainage.

Soils

In a generalized classification, the entire study area is covered by the Udalf suborder of the Alfisol order.[30] Alfisols are found in humid temperate climates and have a concentration of clay in the "Bt", or argillic horizon, which has resulted from the eluviation of initial clay from the "A" horizon, with transport and illuviation in the "B" horizon. Udalfs are a suborder found in moist, temperate to hot climates. These soils have developed under a hardwood deciduous vegetative cover on highly calcareous glacial sediments.

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[30] Foth, H.D. and Turk, L.M. Fundamentals of Soil Science, (New York: John Wiley & Sons, Inc., 1972), p. 259.

While the soils in the study area are of one order, they can be differentiated, to some extent, by such varying properties as kind and arrangement of horizons, color, texture, structure, and consistency into various soils series.[31] There are a total of twelve soil series in the study area. The Indiana Soil Survey has grouped the soils series of the state into distinct regions for a comprehensive description, assigning each region a letter of the alphabet raning from "A" to "P".[32] The study area contains six of these regions, "E", "F", "G", "H", "J", and "K". (Fig. 6)

The first group of soils series that the Greenville line encounters as it enters the state in southeastern Jay County are those of region "F". The soils of this region have developed on timbered, fine textured glacial tills, with gentle to slightly undulating slopes. These soils are deep to medium deep, grayish-brown to very dark grayish-brown in color, and slightly acidic in nature. The soils of region "F" cover 18 miles, or approximately 15.7 per cent of the boundary line.

The treaty boundary next traverses a total of 19.6 miles of an area of soils belonging to the "E" region, which cease being mapped in the study area at about the Wayne County line. The soils in this group are among the most extensive in the state and cover

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31 Buol, S.W., McCraken, R.J., and Hole, F.D., Soils Genesis and Classification, (Ames, Iowa; Iowa State University Press, 1973) p. 214.

32 Bushnell, T.M. A Story of Hoosier Soils, (West Lafayette, Ind.: Peda-Products Co., 1958), p. 26.

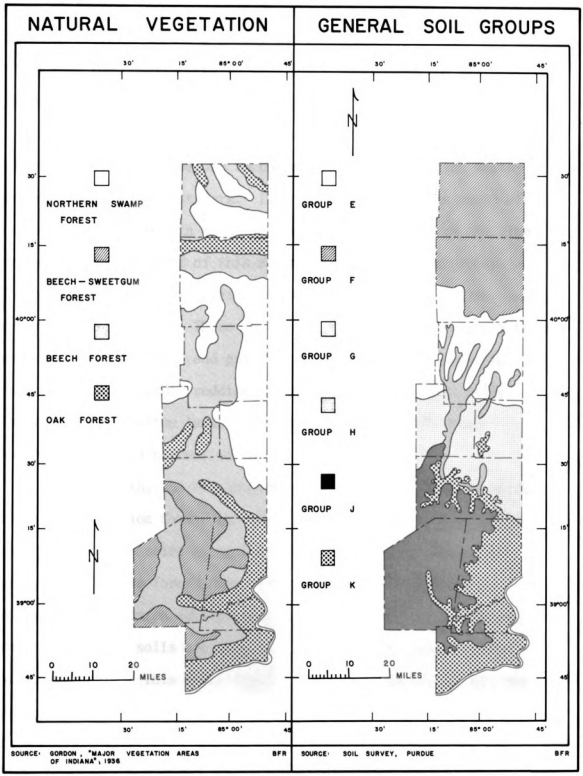
NATURAL VEGETATION
GENERAL SOIL GROUPS
NORTHERN SWAMP FOREST
BEECH – SWEETGUM FOREST
BEECH FOREST
OAK FOREST
GROUP E
GROUP F
GROUP G
GROUP H
GROUP J
GROUP K
N
0 10 20 MILES
SOURCE: GORDON, "MAJOR VEGETATION AREAS OF INDIANA", 1936
SOURCE: SOIL SURVEY, PURDUE
BFR

Figure 6.

17.0 per cent of the line. These soils are deep, grayish-brown to brownish-gray in color, and are neutral to medium acid. They are found on gently undulating plains and shallow swales. Like region "F" soils, these soils have formed from timbered, medium textured glacial tills of recent Wisconsinan origin.

Interspersed with the soils of region "E" are these of region "H" which tend to correspond to the drainage basins of the Whitewater River and its east fork. In the study area the majority of these soils are found in Wayne and Union counties, though the line crosses a small segment of this soils group in Franklin County. The boundary line passes over a total of 13.1 miles of soils comprising region "H". These soils have formed on the stream bottoms and the associated sand and gravel terraces. They are brown in color, though an acidic reddish-brown subsoil is found in soils located on high bottom lands. The soils of region "H" cover approximately 11.4 percent of the boundary line.

Farther south, the line passes through region "G" soils which cover much of Union County and the northeastern third of Franklin County. Like the soils of regions "E", "F", and "H" the soils of region "G" have formed from calcareous Wisconsinan glacial tills, though from an earlier stage, and thus older. Because of their age, these soils are more silty, with a thin cover of wind blown sediments. This soils region is characteristically moderately deep to deep and strongly acidic on the uplands while being neutral in depressional areas. The color varies from grayish-brown to light brown, to brownish-gray depending on topographic location.

A total of 16.6 miles of this soils region is traversed by the treaty line, or approximately 14.4 per cent.

South of region "G", lies region "J" soils which are located south of the glacial border in the southwestern portion of Franklin County, the extreme western part of Dearborn County, all of Ripley County, and the northern part of Switzerland County. The boundary line passes over a total of 28.8 miles of this region, the most extensive in the study area. These soils have formed from timbered, medium textured glacial tills of Illinoian age, and cover about 25.1 per cent of the line. Soils of this region are deep to moderately deep, and strongly to very strongly acidic, with colors ranging from light yellowish-brown to grayish-brown.

Finally, the treaty line passes through soils of region "K". Region "K" soils lie to the southeast of region "J" and cover the majority of Dearborn County and the southern two-thirds of Switzerland County. The boundary line traverse approximately 18.8 miles of this region or 16.4 per cent of the line. The soils of this region have formed on very steep slopes adjacent to the numerous stream courses which traverse the region, and on narrow ridge-top divides. Soils of this region are shallow to deep, and are neutral to strongly acidic. Colors very from brown on the slopes to brownish-gray on the uplands, with a yellowish clay subsoil in some of the more poorly drained sections.

Summary

It has been shown that a number of different natural boundaries and zones lie within the study area. None of these boundaries, however, seem to be oriented to the situation of the Greenville Treaty Boundary Line. While some of the natural boundaries approach a roughly northeast-southwest orientation, none of them run the entire length of the study area and certainly do not conform to the ranges of bearings ascribed to the treaty line.

Aside from a few instances, naturally occuring boundaries are rarely found in straight lines that run for any great distance, most being irregular in nature. The exception here might be an abrupt change caused by faulting, for example, however no geologic fault lines within the study area with this particular orientation. Furthermore, it is recognized in this dissertation that distinct boundaries in the natural environment rarely exist. Instead, associations of physical phenomena tend to gradually grade into one another, thus doing away with the possibility of drawing distinct lines between them. The boundaries, then, that are drawn by researchers between various forms of physical phenomena are merely convenient generalizations for data display, and only rarely do they represent reality.

This is true in the study area of this dissertation and the discussion of natural boundaries carried out in this chapter has been an attempt to acquaint the reader with some idea of the physical environment of the study area, and to illustrate its

relationship to the treaty boundary line. From the information presented in this chapter, it is apparent that the natural phenomena in this area have had little or no effect on the orientation of the Greenville line. This is not to say that the appearance of the boundary line on the landscape has not been influenced by these natural phenomena, but it is in a secondary or indirect manner. Physical phenomena such as soils, climate, and topography have had a direct influence on the type and intensity of land use in the study area, which in turn is directly related to the degree to which the treaty line is apparent on the cultural landscape of east-central and southeastern Indiana.

Thus, in determining that the physical environment of the study area has had only a limited impact on the appearance of the boundary line on the cultural landscape, other factors need to be investigated to ascertain the relationship between the Greenville Treaty Boundary Line and the cultural landscape of the study area.

CHAPTER III

HISTORICAL BACKGROUND

The Greenville Treaty and its boundary line resulted from a long series of policies and events which occurred over a number of years. The provisions of the Treaty of Greenville were really a reaffirmation of two prior treaties; the treaties of Fort Harmar (1789) and Fort McIntosh (1785). The need for such treaties can be traced back to the conflict between two great colonial powers, France and England, for control of the Old Northwest.[1] Control of this area meant securing the allegiance and fidelity of the various indigenous Indian tribes. Thus, for a complete understanding of the treaty, a number of key events and decisions must first be reviewed.

Precedents for a Treaty Boundary Line

Prior to the European occupation of the Old Northwest, much of this region was void of Indian settlements. In time, however, through the enticements of European traders and because of warfare with other tribes in the east a number of Indian tribes settled in Ohio, Indiana, Michigan, and other parts of the area. It was these tribes which became the pawns in the struggle between the French and British and later between the British and Americans.

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[1] The Old Northwest, also referred to as the Northwest Territory, included the lands of the present-day states of Ohio, Indiana, Illinois, Michigan, Wisconsin, and northeast Minnesota.

These tribes included the Wyandot, Delaware, Miami, Shawnee, Potawatomie, Chippewa, Ottawa, Sac, Fox, and Winnebago. In time these tribes realized that their rights to the lands they occupied were not being recognized, especially after the Americans came to power. With this being the case, the tribes decided to form a confederacy to resist further encroachment on their lands. This was known as the Miami Confederacy -- named after one of the more powerful tribes in the area -- and consisted of the tribes listed earlier. It was the tribes of this confederacy which resisted the extension of American influence and presence in the Old Northwest. Out of this conflict came the Treaty of Greenville.

There had always been conflict between the Indian tribes and the colonial powers, but it really was not until after the French and Indian War with the British take-over of this territory, that this resistance became concentrated. The British, unlike the French, held that the ownership of the land was in fee simple, ultimate ownership residing in the crown. This of course included title to all tribal lands, a claim that the French had never made. This British policy was contradictory, for it asserted that the Indians had no right to the title of their own lands, yet their right to hold, enjoy, and use it was recognized.[2] The tribes insisted that they had only given the French tenancy rights on their lands and no more. The British contended otherwise.

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[2] Philbrick, Francis, The Rise of the West, 1754-1830, (New York: Harper & Row Publishers, 1965), p. 23.

As time went on, it became evident that the British government needed a concrete land policy with respect to the Northwest.[3] Unfortunately, the British were not able to construct or implement any policy relative to the disposition of these lands, and thus no firm authority was in control. This seemingly indecisive policy of the British government angered the Indians who were already upset about the details of the Treaty of Paris. For this and other reasons, the tribes decided to join forces to drive the British from their lands. This conflict became known as Pontiac's Rebellion after the Ottawa chief who led this revolt during the summer of 1763.

Pontiac's Rebellion was finally put down. However it forced the British government to formalize a western land policy which would deal with the problems of the Northwest. A royal proclamation was issued by George III known as the Proclamation of 1763. This proclamation restricted settlement beyond the Appalachians, and set this region aside as an Indian reservation. Accompanying this settlement restriction was a boundary line which would separate European and tribal settlement. This boundary line provision is important with respect to the Treaty of Greenville, in that the 1763 proclamation line was the first of its kind to be established.[4]

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[3] Hinsdale, Benjamin, "The Western Land Policy of the British Government:, Quarterly, Ohio Archeological and Historical Society, Vol. 1, 1887, p. 208.

[4] Prucha, Francis Paul, American Indian Policy in the Formative Years, (Lincoln: University of Nebraska Press, 1971), p. 13.

In effect, this boundary line was somewhat of a departure from past policies, for while Indian ownership of certain lands had been recognized, no official statement had ever been made that one section of a particular region was for Indians and another for Europeans. Yet this is exactly what the British did in establishing the proclamation line. Prior to the Proclamation of 1763, such a boundary line was considered unnecessary because of the vastness of North America. However, as settlers began to encroach upon tribal lands in increasing numbers and with greater frequency, some felt that a dividing line between the two was definitely necessary in order to insure peace. Dean Tucker, for example, suggested that an unproductive buffer zone was needed and could be accomplished by; "clearing away the woods and bushes from a tract of land, a mile in breadth, and extending along the back of the colonies".[5] While this scheme was a bit unreasonable at the time, the concept itself was sound. Other ideas for such a dividing line were put forth by Sir William Johnson and George Crogan. In a letter addressed to the Board of Trade Johnson stated that; "a certain line should be run at the back of the Northern Colonies, beyond which no settlement should be made".[6]

It should be realized that the concept of such a boundary line was not a radical departure in policy as precedent for a boundary did exist. This precedent was in the form of the Treaty

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[5] Farrand, Max, "The Indian Boundary Line", American Historical Review, Vol. 10, 1905, p. 783.

[6] Prucha, American Indian Policy, p. 15.

of Easton which set a definite line between Indian and European settlement in 1758. While the British only ratified this treaty to conciliate the Indians, it was one of the first concerted efforts to establish a boundary.[7] There were also further influences upon the formulation of a boundary in the 1763 proclamation, one of which was an article drawn up by Lord Egremont, secretary of state of the Southern Department, entitled "Hints Relative to the Division and Government of the Conquered and Newly Acquired Countries of America".[8] In this document, Egremont stated that "It might also be necessary to fix upon some Line for a Western Boundary to our ancient provinces, beyond which our People should not be permitted to settle...". It should further be noted that this statement preceded that of Johnson and Croghan, and can be considered to be the first detailed proposal for an Indian boundary line located on the western margins of the colonies.[9]

Another document which was prepared prior to the issuing of the Proclamation of 1763 was one written by John Pownall, "Sketch of a Report Concerning the Cessions in Africa and America at the Peace of 1763".[10] Pownall was secretary to the Lords of Trade and felt that the territorial boundaries of the colonies should be

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[7] Alvord, Clarence, The Mississippi Valley in British Politics, (Cleaveland: Arthur H. Clark Co., 1917), Vol. I, p. 163.

[8] Crane, Vernon (ed.), "Hints Relative to the Division and Government of the Conquered and Newly Acquired Countries in America", Mississippi Valley Historical Review, Vol. 8, 1922, p. 371.

[9] Prucha, American Indian Policy, p. 16.

[10] "Mr. Pownall's Sketch of a Report Concerning the Cessions in Africa and America at the Peace of 1763", English Historical Review, Vol. XLIX, 1934, p. 260.

limited. He thought that the best way to accomplish this would be a boundary line running down the ridge of the Appalachian Mountains, with the land between the mountains and the Mississippi River being reserved for the Indian tribes of the region. With such a line the colonies would be restricted and the tribes placated. Unlike the other plans that had been put forther, Pownall's scheme included several exceptions to this line, these being areas where the Six Nations and the tribes of the southeast had land claims to the east of this line, and certain sections in the upper Ohio region where Virginia had made settlements.

With the outbreak of Pontiac's Rebellion, the British government needed an emergency measure to consiliate the Indians at once, and it was thought that an Indian reservation with an accompanying boundary line would be the answer.[11] Because of the necessity of having an easily defined boundary as quickly as possible, Pownall's plan was incorporated into the 1763 proclamation; however, his exceptions to the line were ignored. A well defined and surveyed line could not be improvised immediately, so a boundary line with a general description of one which would be located on the stream divide of the Appalachians was used. This initial line was considered to be temporary, later to be altered through negotiations with the various Indian tribes.[12] In 1764 the Board of Trade issued a plan whereby a more detailed and pre-

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[11] Prucha, American Indian Policy, p. 17.

[12] DeVorsey, Louis, The Indian Boundary in the Southern Colonies, 1763-1775, (Chapel Hill, N.C.: University of North Carolina Press, 1966), p. 39.

cise boundary line could be delineated. Article 42 provided "That proper measures be taken with the consent...of the Indians to ascertain and define the precise and exact boundary and limits of the lands which it may be proper to reserve to them and where no settlement whatever shall be allowed".[13] While this plan was never adopted by Parliment, it still served as a guide whereby Indian agents could negotiate an exact survey boundary with the tribes.

The negotiations were carried out by two agents, Stuart in the south and Johnson in the north. Stuart met with immediate success in his negotiations with the southeastern tribes. In treaties with the Cherokees and Creeks, a boundary was located at the back of the Carolinas, Georgia, East Florida and up behind Virginia to the Ohio River.[14] Johnson had a more difficult time in his negotiations with the Six Nations. He, like Stuart had received instructions to negotiate a continuous line in rough compliance with the proclamation. Trouble arose when the Six Nations insisted upon ceding the land south of the Ohio to the Tennessee River; land which they claimed by right of conquest. Such a departure ran contrary to the instructions given Johnson. He decided nevertheless, to accept this cession rather than jeopardize the negotiations already made.[15] These treaty negotiations were held at Fort Stanwix, New York in 1768, and when they were completed

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[13] Ibid, p. 43.

[14] Farrand, "The Indian Boundary Line", p. 787.

[15] Alvord, The Mississippi Valley in British Politics, p. 71.

a boundary line had been agreed upon. The line ran from the east end of Lake Ontario on a southerly direction to the Delaware River, then westward till it reached the Allegheny River, then down this river to the Ohio and westerly down the Ohio to the mouth of the Tennessee River.[16] The lands south of this line were to be ceded to the British, while lands north of the Ohio were to remain in tribal hands, closed to European settlement. Thus the two negotiated boundary lines, which grew out of the Proclamation of 1763 were not continuous, but instead over-lapped, their connection after a period of time being deemed unadvisable.[17] The lines were supposed to meet at the Kanawha River in Kentucky, but because of Johnson's extension of the line the area of Kentucky had been opened to settlement.[18] The Fort Stanwix Treaty is very important with respect to later Indian negotiations in that it set the Ohio River as the limit of European settlement. It was this treaty line that the tribes claimed was the only legal boundary, a claim which they would hold until the Treaty of Greenville provided for a boundary through central Ohio and southeastern Indiana some twenty-seven years later.

Despite the restrictions of the treaties negotiated by Stuart and Johnson, encroachment upon Indian lands continued. Many settlers, particularly from Virginia, moved through the Cumberland Gap into Kentucky and Tennessee in violation of these agreements. Land speculation played a big part in this settle-

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[16] Ibid.

[17] Farrand, "The Indian Boundary Line", p. 787.

[18] Parish, John, "John Stuart and the Cartography of the Indian Boundary Line", in The Persistence of the Westward Movement, (Berkeley: University of California Press, 1943), p. 137.

ment, and was not only condoned, but participated in by the royal governor of Virginia, Lord Dunmore.[19] Such an influx of settlers greatly distrubed some of the tribes, especially the Shawnee, who considered these lands as their hunting grounds despite whatever claims the Six Nations had made at Fort Stanwix. Speculators, including Lord Dunmore, continued to push for settlement of this region, and in time armed conflict broke out between the settlers and the Shawnee. The war which followed is known as Lord Dunmore's war. It ended with the Shawnee being defeated at the Battle of Point Pleasant in October of 1774. A peace treaty soon followed at Camp Charlotte and with peace Virginia announced that the Ohio River was to be established as the boundary between the colony and the Indians of the Northwest.[20] Thus the Ohio River had once again been used as the boundary between tribal and colonial settlement; a further precedent.

The United Stated and Boundary Lines in the Old Northwest

At the outset of the Revolutionary War, the newly formed Continental Congress realized the importance of gaining and maintaining friendly relations with the tribes of the Northwest. It created, therefore, three Indian departments: the northern, middle, and southern, which were responsible for the various tribes in

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[19] Alvord, The Mississippi Valley in British Politics, Vol. 11, p. 13.

[20] Ibid, p. 192.

their areas. It was the middle department which would have to achieve agreement with the tribes of the Northwest. In one of the first efforts to conciliate the tribes, a conference was held at Fort Pitt with a number of the tribes in 1775. This treaty conference was convened by the Virginia revolutionary government and the Second Continental Congress to negotiate with the Six Nations, the Delaware, and Shawnee to reaffirm the peace treaty ending Dunmore's War.[21] Several provisions were included in this treaty, among them the pledge by the American delegates that the Ohio River was to be the permanent boundary between the Americans and the tribes. This treaty provision was the United States's recognition of the boundary line established by the Fort Stanwix treaty of 1768. It gave the tribes an added precedent in their claim that the Ohio River was the boundary which separated them from American lands.

Following the Revolutionary War, Congress established a congressional committee to formulate a concrete Indian policy. In the committee's report it proposed, among other things, that appropriate boundaries be established between American and Indian settlements. The report stated that it was thought best; 'Establish a boundary line of property for separating and dividing the settlement of the citizens from the Indian villages and hunting grounds....thereby extinguishing as far as possible all occasion

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[21] Downes, Randolph, Council Fires on the Upper Ohio, (Pittsburg: University of Pittsburg Press, 1940), p. 184.

for future animosities, disquiet and contension".[22] Accompanying this report was a specific delineation of the boundary line which was to be established in the Northwest: "Beginning at the mouth of the Great Miami River, which empties into the Ohio, thense along said river Miami to its confluence with the Mad River, thense by a direct line to the Miami fort at the village of that name on the other Miami River (the Maumee River), comprehending all the lands between the above mentioned lines and the state of Pennsylvania on the east, Lake Erie on the north, and the River Ohio on the southeast".[23] Thus, almost all of the present-day state of Ohio was to be ceded to the United States by the various tribes in one treaty. With this boundary line, the Ohio River as a dividing line between Indian and American settlements was to be abandoned, prior commitments being forsaken.

The Indian affairs committee suggested that the boundary be negotiated with the tribes at a single treaty at which time the Indians would cede their lands to the United States at the most economical price possible.[24] The United States government at first did not consider the Indians right of ownership to the lands in question, for it was thought that these tribes were a

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[22] Ford, Worthington, (ed.) Journals of the Continental Congress, 1774-1789, (Washington, D. C.: Government Printing Office, 1922), p. 686.

[23] Ibid, p. 682.

[24] Ibid.

conquered people and had no legal status. As far as the tribes were concerned the lands northwest of the Ohio River were theirs by right of occupancy and sanctioned by the treaties already discussed.

To meet the threat to their lands the confederated tribes of the Northwest decided that all property was to be held in common among all of the tribes and that no one tribe had the right to sell its lands without first consulting the others. When the federal government learned of this strategy, it concluded that one single treaty would not have the satisfactory results needed. It was decided, therefore, that a series of treaties should be made with separate tribes in order to reduce the effectiveness of the combined tribes. This plan was endorsed by the Indian affairs commission when it stated negotiations should be carried on with the tribes; "at different times and places...to discourage every coalition".[25]

The first of these treaties to be negotiated was the Treaty of Fort Stanwix in 1784. The main participants in this treaty were the United States commissioners and representatives of the Six Nations. Delegates from the various western tribes were also present initially, but they were forced to wait too long for the commissioners and departed before the treaty negotiations got under way. When negotiations finally did start, the commissioners read the provisions of the Treaty of Paris which proclaimed American sovereignty in the Northwest. With this statement, the

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[25] Ibid, Vol. 26, p. 152.

commissioners forced the Six Nations to give up any land claims and property rights they had to the lands west of Pennsylvania.[26] The extinguishing of the western land claims of the Six Nations paved the way for negotiations with the tribes of eastern Ohio, the Wyandot and Delaware; some Ottawa were also present. These negotiations were carried out at Fort McIntosh in January of 1785. These Indians were also made aware of the Treaty of Paris of 1783, and were likewised forced to make large cessions of land in Ohio. A boundary line was agreed upon which, as stated in Article III of the treaty was as follows:

> The boundary line between the United States and the Wiandot and Delaware nations, shall begin at the mouth of the Cayahoga, and run thense up said river to the portage between that and the Tuscarawas branch of Meskingum; thense down the said branch to the forks at the crossing place above Ft. Lawrence; thense westerly to the portage of the Big Miami, which runs into the Ohio, at the mouth of which branch the fort stood which was taken by the French in one thousand seven hundred and fifty-two; then along the said portage to the Great Miami or Oms River, and down the south-east side of the same to its mouth; thense along the south shore of Lake Erie, to the mouth of Cayahoga where it began.[27]

In Article VI of the treaty, these tribes gave up all rights to the lands to the south and east of this line. With this treaty the United States had extinguished the land claims of the Six Nations and the eastern Ohio Indians to substantial sections of the Northwest.

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[26] Ibid, Vol. 28, p. 423.

[27] Kappler, Charles, United States Indian Treaties, 1778-1883, (New York: Interland Publishing Inc., 1972), p. 7.

The Indian commissioners next sought to deal with the western tribes in an attempt to secure their ratification of the provisions of the Fort McIntosh treaty. A treaty was held at a newly constructed military post, Fort Finney, which was located at the mouth of the Miami River. Although the Shawnee nation was the only tribe in attendance, the negotiations went forward in January of 1786, with the Americans seeking to gain land cessions similar to the ones granted in the Fort Stanwix and McIntosh treaties. A treaty was negotiated with a number of provisions, one of which was a boundary which was thus described:

> The United States do allot to the Shawnee nation, lands within their territory to live and hunt upon, beginning at the south line of lands alloted to the Wiandot and Delaware nations, at the place where the main branch of the Great Miami, which falls into the Ohio, intersects said line; then down the river Miami to the fork of that river, next below the old fort which was taken by the French in one thousand seven hundred and fifty-two; thense due west to the river de la Panse; then down that river to the river Wabash, beyond which lines none of the citizens of the United States shall settle.[28]

The government thought it had established a precise, continuous boundary line through central Ohio and part of eastern Indiana, south of which was cleared for settlement; especially the Virginia Military Warrant Lands in south-central Ohio. Such, however was not the case.

In general, there was great unrest among the tribes of the Northwest over the several treaties which had been negotiated. There were several reasons for this uneasiness, one of the main

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[28] Ibid, p. 17

ones being that some tribes had ceded lands to the government which belonged to other tribes who did not wish to give them up. In addition, under the provisions of the confederation, no tribe was supposed to cede land until all the tribes rejected the Fort Stanwix, McIntosh, and Finney treaties. Furthermore, the tribes wanted to make it known to the Continental Congress that they were displeased with these treaties and wished to meet with government representatives at one large treaty to decide the problem once and for all. This sentiment was expressed by the confederation with the statement: "You kindled your council fires when you thought proper, without consulting us,...and have entirely neglected our plan of having a general conference with the different nations of the Confederacy."[29]

The wishes of the various tribes were eventually made known to Congress. In January of 1789 another treaty was held with as many of the tribes as would attend at Fort Harmar near the present-day city of Marietta, Ohio. The foundations of this treaty differed from the previous ones because of one of the provisions of the Ordinance of 1787 which stated that "The utmost good faith shall always be observed towards the Indians, their lands and property shall never be taken from them without their consent."[30] The Fort

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29 American State Papers: Documents, Legislative and Executive of the Congress of the United States, (Washington, D.C.: 1832-1861), 38 Vols., Indian Affairs, Vol. I, p. 9.

30 Ford, Journals of the Continental Congress, Vol. 32, p. 340.

Harmar treaty conference was convened with the government commissioners proposing, for the most part, the same provisions as those in the Fort McIntosh treaty. In effect, the Fort Harmar treaty was merely a reaffirmation of the one made at Fort McIntosh, the difference being that with the former, the lands of the Indians were being compensated for with cash and presents. The boundary line which was proposed was identical to the one stated in the Fort McIntosh treaty.[31] The government really could not modify this line because of the various settlements which had already been established north of the Ohio River. Such settlements as those at Marietta and Cincinnati, as well as the lands purchased by the Ohio Company of Associates could not be negated; thus the previous boundary line had to be maintained. In Article III of this treaty, the United States quit claim to all lands lying between the limits of the described boundary, and reserved them to the Indians with the stipulation that the tribes could sell their lands only to the United States government.[32] While the wording of this provision was somewhat of a departure from the previous treaties, the fact still remained that the federal government negotiated from a position of power and forced the tribes into an agreement they did not favor.

From the Fort Stanwix Treaty of 1768 to Dunmore's Peace of 1774

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[31] Kappler, United States Indian Treaties, p. 19.

[32] Ibid.

and its reaffirmation at the Fort Pitt Conference of 1775, the boundary line between European and tribal settlement had been the Ohio River. Now with the Fort Harmar Treaty, the United States claimed ownership of almost half of the present-day state of Ohio along with other strategic land cessions. The more hostile tribes could not accept such an agreement, and supplied with British weapons, once again began warfare.

The Treaty of Greenville

Despite two serious military defeats in 1790 and 1791 in the Northwest, President Washington still hoped that a satisfactory result could be obtained so that his plans for the area might be carried out. Washington desired a steady and peaceful advance of the frontier. With this in mind he urged Congress to take action in conciliating the Indians by passing laws designed to protect their rights. Congress did act by passing a series of laws known as Indian Trade and Intercourse Acts, the first of which was passed on July 22, 1790.[33] Unfortunately, the first act did not solve the immediate problems on the frontier, as hostilities still continued. Washington still hoped, however, that a comprehensive law could be passed which would satisfy the Indians and end their opposition to the peaceful settlement of the region.

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[33] Prucha, American Indian Policy, p. 45.

For this reason he submitted a six-point plan to Congress in 1791. This plan was designed to provide a system of justice which would be structured in such a way as to protect the tribes from the incursion of settlers, while at the same time trying to replace their cultural values with American ones. Washington declared that "It is sincerely to be desired that all need of coercion in future may cease and that an intimate intercourse may succeed, calculated to advance the happiness of the Indians and attach them firmly to the United States."[34] For the tribes of the Northwest, however, such a plan was too late to be of any consequence what with the numerous raids from Kentucky, and the federal military expeditions.

Finally under the direction of General Anthony Wayne, the confederated Indian tribes were defeated in a military action known as the Battle of Fallen Timbers on August 20, 1794. For the Battle of Fallen Timbers to have any significance, the United States government was convinced that it had to be followed with a lasting and binding peace. General Wayne was appointed plenipotentiary of the United States to deal with the various tribes and negotiate provisions for a peace settlement. In regard to a peace settlement, President Washington observed in a message he delivered to Congress:

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[34] Richardson, James (ed.), A Compilation of the Messages and Papers of the Presidents, 1789-1897, (Washington, D. C.: 10 Vols., 1896-1899), Vol. I, pp. 104-105.

> We shall not be unwilling to cement a lasting peace upon terms of candour, equity, and good neighborhood... Towards none of the Indian tribes have overtures of peace been spared.[35]

To this end, Wayne sent out peace messages to all of the tribes and called them to Fort Greenville for a conference.

During the winter of 1794-1795, various representatives of the Northwest tribes came to Fort Greenville to talk with Wayne. The first to come were the Wyandot of Sandusky who, with the influence they held with the other tribes, were very important to the negotiations. A preliminary agreement of the Treaty of Greenville was signed by several of the tribes on January 24, 1795; it stated:

> ...that until articles for a permanent peace shall be adjusted and signed, all hostilities must stop, and the aforesaid sachems and war chiefs for and in behalf of the nations they represent, do agree to meet the above mentioned plenipotentiary of the United States (General Wayne), at Green Ville, on about June 15, 1795, with all the sachems and war chiefs of their nations, then and there to consult and conclude upon such terms of amity and peace as shall be for the interest and satisfaction of both parties.[36]

Wayne never intended this agreement to be a binding peace settlement, but only a temporary measure, as he merely wanted a cessation of hostilities, while giving time for all of the tribes to send representatives to one large peace conference.[37]

After the preliminary agreements had been settled upon, Wayne communicated extensively with Secretary of War Knox and his

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[35] Ibid, p. 167.

[36] Wilson, Frazer, "The Treaty of Greenville", Quarterly, Ohio Archeological and Historical Society, Vol. 12, 1903, p. 129.

[37] Knopf, Richard, Anthony Wayne, (Pittsburg: University of Pittsburg Press, 1960), p. 384.

successor, Timothy Pickering. On April 8, 1795 Pickering sent Wayne a letter in which he outlined the various articles President Washington wanted in the treaty, including a description of the boundary line:

> With respect to the "general" boundary line, that described in the Treaty of Fort Harmar of 9 January 1789, will still be satisfactory to the United States; and you will urge it accordingly.
>
> The reservations of divers pieces of land for trading posts as in the tenth article of the treaty of Fort Harmar and the strip six miles wide from the River Rosine to Lake St. Clair in the 11th Article, as convenient appendage to Detroit, to give room for settlements, it is desireable to have retained those uses. Some of the military posts which are already established, or which you may judge necessary to preserve or complete, a chain of communication from the Ohio to the Miami of the lake (Maumee River), and from the Miami villages to the head of the Wabash, and down the same to the Ohio and from the Miami villages down to the mouth of the Miami River at Lake Erie, it will also be desireable to secure: but all these Cessions are not to be insisted upon; for peace and not the increase of territory has been the object of this expensive War...
>
> All lands North and West of this general boundary line to which, by virtue of former treaties with the Western tribes, the United States have claims, may be relinquished excepting,
>
> 1. The lands which being occupied by the British troops and subjects, and the Indian title to the same being extinguished were ceded by Great Britain in full right to the United States by the treaty of 1783.
> 2. Those detached pieces of land which you have established or think proper to establish military posts to form, or complete a chain of communication between the Miami of the Ohio and the Miami of Lake Erie, and by the latter from the Lake to Fort Wayne and thense to the Wabash and down the same to the Ohio.
> 3. The One hundred and fifty thousand Acres granted to General Clarke for himself and his warriors near the rapids of the Ohio.
> 4. The lands in possession of the French people and other white settlers among them, who hold their lands by the Consent of the United States.
> 5. The military posts now occupied by the Troops of the United States on the Wabash and the Ohio...[38]

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[38] Knopf, Anthony Wayne, pp. 395-396.

The main objective of the federal government was to consolidate through legal accord, the lands ceded by the Treaty of Fort Harmar, 1789. The government still was not sure of its recent victory, and did not wish to push the tribes too hard into making further extensive land cessions. Thus the United States fell back on the Fort Harmar treaty line as one which would be readily acceptable to the Indians. Wayne, however, was not in complete agreement with the government's definition of the boundary line. While he agreed that the Fort Harmar treaty line should be the basis for a general boundary, he also thought that there should be a buffer zone held by the government to separate the American settlers from the Indian tribes. He communicated these plans to Pickering in a letter dated May 15, 1795:

> I have examined your Instructions to me relative to the General Boundary line between the United States & the Western Indian Nations with the most serious attention, & I much fear that it will make the White & Red people too near neighbors, & be productive of constant and mutual distrust, animosity & Murders!...
>
> In addition to this I would beg leave to hazard an Opinion, that a kind of consecreated ground ought to be put between the Savages & white inhabitants, which Congress should make a point of holding in Mort Main, & neither sell or suffer it to be settled upon any occasion or pretext whatever until some distant & future day, when circumstances might render it expedient and proper.[39]

The government did not agree with Wayne; Pickering wrote him a letter on June 29th informing him that the general boundary line would be the one stipulated in Washington's instructions to Wayne in the letter of April 28th. Thus he wrote:

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[39] Ibid, p.

> You express your fears, that the general boundary line described in the instructions sent you relative to the treaty with the Western Indians, 'Will make the white & red people too near neighbors, and be productive of constant & mutual distrust, animosity and Murders! -- But, sir, I view this matter in a very different light. Almost all disputes with the Indian Nations originate in some acts representing their lands: and I do not know what is so likely to be a fruitful source of disputes as an undefined territory, in which neither party can say, 'Here is the certain boundary which marks the extent of my claims'.[40]

Because of a delay in communications, Pickering's letter did not reach Wayne until after the treaty had been negotiated and signed. The tribes arrived at Fort Greenville about the 15th of June. The Miami, however, did not arrive until almost a month later, causing a delay in the peace talks. Wayne told the assembled tribes that the new boundary line would be based on the Fort Harmar treaty line of 1789 with one exception: the line would pass below Loromies's store to Fort Recovery and then in a straight line to the mouth of the Kentucky on the Ohio.[41] The land which was encompassed by this section of the boundary line included some of the best hunting grounds of the Miami tribe, particularly the Whitewater River Valley. This nation's displeasure was voiced by one of their chiefs, Little Turtle, when he made this statement:

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[40] Ibid, p. 431.

[41] Loromies's store or trading post was located on the portage between the Miami River and Lake Erie.

> You pointed out to us the boundary line which crossed a little below Loromies's store and struck Fort Recovery, and ran from there thense to the Ohio, opposite the Kentucky River. Elder Brother; (refering to Wayne) You have told us to speak our minds freely and we now do it. This line takes in the greater and best part of your brother's hunting ground; therefore, your younger brothers are of opinion, you take too much of their lands away, and confine the hunting of our young men within limits too constricted. Your brothers, the Miamis, the proprietors of these lands, and all your younger brothers present, wish you to run the line mentioned, to Fort Recovery, and then to continue it along the road from thense to Fort Hamilton on the Great Miami River.[42]

Wayne remained adamant and the proposed boundary was accepted by the various tribes. He could make such land claims because he possessed certain advantages which enabled him to negotiate from a position of power.

Another source of conflict with the Miami emerged during the negotiations when Wayne asked for a land reservation to be ceded to the United States on the portage between the Wabash and Miami rivers. Again Little Turtle spoke for his tribe when he stated his dissatisfaction over this land cession, saying that neither the French or the British had ever made such a demand and that this land was needed by his people. In the end the Miami yielded on the question. The Treaty of Greenville was finally agreed to by all of the tribes and signed on August 3, 1795. The Indian tribes of the Northwest had ceded some 25,000 square miles of land and sixteen separate additional tracts of land to be used as sites for forts or military reservations as they were called in the treaty. The tribes had thus been pushed back nearly to the divide separating the waters flowing to the Ohio from those running into Lake

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[42] Barce, Elmore, The Land of the Miamis, (Fowler, Indiana: The Benton Review Shop, 1922), p. 243.

Erie.[43] It should be noted that no deliberate attempt was made by either President Washington, Secretary of War Pickering, or General Wayne to draw the boundary through the watershed divide. Indeed, with the amount of knowledge of the location of the various rivers and the quality of the maps at this time, it is doubtful if anyone knew exactly where this divide was located. The treaty boundary line was -- for the most part -- a reaffirmation of the Fort Harmar line which was situated in such a way that the boundary was anchored to natural features on the landscape or military or trading posts -- features which the Indian tribes knew of or could readily locate.

On August 12, 1795, Wayne finally received Pickering's letter of June 29th in which the Secretary of War vetoes Wayne's plan for a buffer zone. Wayne felt he had been justified in negotiating the deviation from the Fort Harmar line and made his views known in a letter to Pickering on September 2nd. He presented his views as follows:

> I would certainly have altered the General Boundary so as to have Quaderated with your ideas, notwithstanding it was Unanimously & Voluntarily approved...
>
> Because they are in possession of the Counter part of the Treaty - & each Nation furnished with a copy; add to this that they are all well acquainted with the Mouth of Kentucky river as well as with the point & water upon which Fort Recovery stands...

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[43] Kent, Charles, "The Treaty of Greenville", Journal, Illinois Historical Society, Vol. 10, No. 1, 1918, p. 574.

> therefore the consequence apprehended from not knowing the General boundary line upon that Quarter, can be easily prevented by opening a wide avenue in a direct line between those two points, which will be nearly North & by East or South & by West, distant about One hundred & thirty miles; & between Fort Recovery & Loromies store (which also a spot well known) situate on the North branch of the Miami, the course nearly East & West, distant about twenty two miles, as you will see by examining the survey made of this Country during the last campaign; the Area contained between this boundary line & the Miami & Ohio rivers will be nearly 1,660,000 Acres is a little more than One Million & a half, which with the reservations, will be a future source of wealth to the Union, on the Conditions mentioned in my letter of the 15th of May 1795. In the interim a Proclamation by the President of the United States, prohibiting that strip of land or any part of it, from being settled upon, improved, located or surveyed, will be necessary to forclose all greedy Land Jobbers from profiting by their iniquitious avidity for Monopolizing that kind of property.[44]

Apparently the federal government thought Wayne's explanation adequate, and considering the fact that the treaty had already been negotiated and signed with copies being exchanged, the buffer zone in southeastern Indiana was accepted along with the rest of the treaty by President Washington. Washington submitted the Treaty of Greenville to the Senate for action on December 9, 1795. In his annual message to Congress (December 8) Washington had stated that in the negotiations with the tribes of the Northwest, "the satisfaction of the Indians was deemed an object worthy no less of the policy, than of liberality of the United States."[45] After its submission to the Senate, The Treaty of Greenville was ratified on December 22, 1795 and became part of the supreme law of the land.

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[44] Knopf, Anthony Wayne, pp. 447-448.

[45] President Washington's speech to Congress, December 8, 1795, American State Papers, p. 89.

As for the Indians, their hopes and fears concerning the treaty were probably best expressed by a Delaware chief named Tarhe when he addressed Wayne:

> Father: Listen to your children, here assembled; he strong, now, and take care of all your little children. See what a number you have suddenly acquired. Be careful of them, and do not suffer them to be imposed upon. Don't show favor to one to the injury of any. An impartial father equally regards all his children as well as those who are ordinary, as those who may be more handsome; therefore, could any of your children come to you crying, and in distress, have pity on them and relieve their wants.[46]

Summary

A great deal of material has been presented to give the reader some understanding of the events and processes which resulted in the establishment of the Greenville Treaty Boundary Line in Indiana. This material, however, needs to be placed in a more structured framework for analysis. As stated in the introductory chapter, this will be accomplished by utilizing the Unified Field Theory, or the idea-area chain as it has become known. The information supplied in this chapter can be put into the framework of the first two links of this chain: idea and decision.

The first link to be studied is that of political idea, in this case the conception and formulation of the idea of a political and survey boundary line to separate European and American land-holdings from those of the various Indian nations. Not much

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[46] Barce, Land of the Miamis, p. 224.

evidence is found of any French attempt at drawing such a boundary. There were, naturally, boundaries laid out in New France to delineate certain agrarian settlements and military and trading posts; there seems, however, to have been no effort on the part of the French government to isolate their landholdings from those of the Indian tribes through the use of any sort of boundary line. The reason for this is undoubtedly two-fold. First, there were never enough settlers in New France to warrant such an action. Second, the settlements in this region were essentially non-agrarian; the main emphasis was on the fur trade as the chief source of economy. This being the case, the last thing the French administrators wanted was to isolate this colony from the tribes.

British settlement of North America was different, with a substantial number of settlements being established as permanent agrarian communities. While it is true that, like the French, the British had an avid interest in the fur trade, their main interest was in the proprietary possession and improvement of the land. Such a philosophy of land rights naturally brought them into conflict with the Indian nations who could neither understand nor care for this type of land tenure. It was conflict over the land question which was, in part, responsible for Pontiac's Rebellion in 1763. It was this war which provided the impetus for the serious consideration by the British crown of a dividing line between European and tribal settlement.

The idea of such a boundary had been conceived of prior to the Pontiac war as evidenced by the schemes of Egremont, Tucker, Johnson and Croghan, and Pownall. Some of these ideas were more sophisticated and detailed than others, some rather unrealistic at that particular time; but what they all show is that during the middle of the eighteenth century, considerable thought was being given to the conception and implementation of a regional boundary line. The boundary which most of these schemes advocated was the crest of the Appalachian Mountains or the watershed divide of streams flowing to the Atlantic Ocean. Such a natural line was easy to locate and delineate and could readily be perceived by both Indian and settler. Precedent for a boundary line did exist with the Treaty of Easton in 1758 whereby all trans-Appalachian lands claimed by Pennsylvania were relinquished; the result being a definite line between the colony and tribal settlement.

Pontiac's Rebellion brought the need for such a boundary into sharp focus for the British crown. The necessity of placating the Indians and controlling settlement in the region required that the abstract idea of a political boundary be transformed into reality. Thus some sort of decision had to be made as to the type, function, and location of a specific boundary line. Because Pownall's suggestion for a dividing line was close at hand, the Board of Trade decided to use it, the result being that the Appalachian Mountain watershed was chosen as a boundary separating

the settlements of the colonies and a specifically designated Indian country. It took a few years of negotiation with the various Indian tribes before a specific line could be agreed upon and preliminary surveying and demaraction carried out. However, when this boundary was finally established, the political idea became reality. The Proclamation of 1763 did not adequately serve as a deterrent to settlement west of the Appalachians, and thus the line never really fulfilled its function as a dividing line between these two settlement areas.

With the Treaty of Fort Stanwix, 1768 the proclamation boundary line was established as running through western New York and Pennsylvania and then down the Ohio River. This decision reinforced the concept of a boundary line and provided the Indians of the Northwest with a precedent for the Ohio River being the dividing line. Negotiated boundary lines became an accepted method in dealing with the problem of land rights on the frontier. This dividing line concept was further reinforced in the negotiated settlement of Lord Dunmore's War in 1774, where the Ohio River was again used as the boundary.

Following the Revolutionary War, conflict again arose over the land question, with warfare resulting between 1790 and 1794. The newly formed government of the United States used the British boundary concept in formulating a land policy of its own. Indian commissioners negotiated four main treaties after the war, the treaties of Fort Stanwix, McIntosh, Finney, and Harmar. In each of

these treaties, some sort of boundary line was set forth to separate tribal and American lands. Unlike the British, the United States government had no intension of honoring the Ohio River as a dividing line, but instead wanted the tribes of the Northwest to relinquish certain lands in southern Ohio. Thus the government wished to retain the idea of a boundary; it was merely its definition and demarcation that was different. A political decision had been made to alter the location of the boundary so that various land grants and military warrants could be made legal in southern Ohio.

Basically the Greenville Treaty Boundary Line was a reaffirmation of the treaty line of the Fort Harmar conference. There was one significant departure in this boundary which is the main emphasis of this study. This departure is that section of the line which is located in east-central and southeastern Indiana. The boundary line there is strictly a geometrical line segment from Fort Recovery to the banks of the Ohio River opposite the mouth of the Kentucky River. The Indiana section of the boundary line was a direct result of the view of General Wayne that there should be a buffer zone, a specifically defined area between tribal and American lands, where no one would be permitted to settle. Although the federal government did not agree with Wayne in respect to a buffer zone, the treaty had already been negotiated and signed before he knew of the government's disapproval. Thus it was Wayne's decision to implement his idea of a political

buffer zone that resulted in the "gore" or triangular shaped piece of land in Indiana as part of the Greenville Treaty cession lands.

The first two links in the chain of the Unified Field Theory -- idea and decision -- have been satisfied. There appears, however, to be two different levels of linkage to be considered here in the study of the Greenville Treaty Boundary Line. First, there are the two primary links of the theory: a general idea of a boundary line to separate tribal from European claimed lands, and the formal decision to implement this boundary concept in the form of surveyed boundaries on the landscape. In addition to these primary linkages, there is a secondary one which consists of General Wayne's idea of a poltical buffer zone to be enforced by military power, and his subsequent decision to negotiate and define this modification in the boundary suggested by the federal government.

With the first two links in the idea-area chain having been considered, the next step is to investigate the results of the flow of this political concept with the examination of the remaining links of movement, field, and area. This will be accomplished in the discussion in the next chapter on the survey of the boundary line and the survey and settlement of the adjoining cession lands.

CHAPTER IV

SURVEY AND SETTLEMENT

The survey of the Greenville Treaty Boundary Line is part of the history of the survey and settlement of the public lands of the Old Northwest; particularly in Ohio and Indiana. It was this boundary line which initially marked the westward extent of the public domain and its subdivision. Thus, the survey and demarcation of the Greenville line must be considered in the context of the public land surveys of the period. The first part of this chapter attempts to do this by explaining the principals and techniques used in surveying the line and adjacent tracts of land, and the difficulties which resulted. With such an understanding, the settlement of these lands can be more properly comprehended. The second part of this chapter will briefly discuss the settlement of the lands adjoining the Greenville line, in an attempt to illustrate the significance of this survey boundary line.

Survey

The term surveying refers to the method of locating positions of points on or near the earth's surface, involving the measurement of distances and angles.[1] There are various types of surveys; such as topographic surveys, control surveys, and construction

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[1] Bouchard, Harry and Moffitt, Francis, Surveying, (Scanton, Pennsylvania: International Textbook Co., 1965), p. 1

surveys. However, it is the cadastral, or boundary, survey which will be the main concern of this study. These types of surveys are also known as land or property surveys. They all perform the function of determining the lengths and directions of boundary lines and the area of the tract bounded by such lines.[2] While it is true that the terms listed above generally describe this method there are more refined definitions which tend to differentiate between them. For example, land surveying is defined as the determination of boundaries of areas of tracts of land.[3] Boundary surveys are described as the location and establishment of lines between political units, while cadastral surveys are defined as the location and subdivision of the public domain. Considering these definitions, this study is concerned with two types of surveys. On the one hand, a boundary survey is being investigated, as the Greenville line was initially a political boundary separating the United States public domain from the lands held by the various Indian nations of the Old Northwest. Once this has been examined, the cadastral survey of the public lands surrounding the treaty line must be studied in order to ascertain the relationship between these two types of surveys.

Generally speaking, most of the United States has been surveyed in one of two ways; by metes and bounds or by the rectilinear

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[2] Ibid.

[3] Brown, Curtis and Eldridge, Winfield, Evidence and Procedures for Boundary Location, (New York, N.Y.: John Wiley & Sons, Inc., 1962), p. 4.

land survey system. Prior to the Revolutionary War, most cadastral surveys were by metes and bounds; that is, land grants were laid out in irregular shapes, with boundaries conforming to various natural or artificial terrain features.[4] Because of the difficulty involved in resurveys and the obliteration or change in property corners, the federal government decided on a new survey system for the public domain. Thus, the United States Public Land Survey System was established by act of Congress on May 20, 1785.[5] This system could not be applied to the eastern states, because of the difficulty which would have resulted from altering so many previously established land descriptions by a far less precise and orderly system.[6]

The survey system adopted by the government was one based on the orderly demarcation on the land, of townships consisting of 36, one mile square sections. These township and section lines were layed-off from an initial point in tiers of townships and ranges in a field of survey. This survey system was not without its problems, however, special interest groups desired changes in all or part of its provisions. One of the main groups that sought an adjustment were the western settlers themselves because they felt

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[4] Davis, R., Foote, F., and Kelley, J., Surveying: Theory and Practice, (New York: McGraw-Hill Co., 1966), p. 582.

[5] Journals of the Continental Congress, Vol. 27, p. 375.

[6] Sturgill, L.G., "Land Surveying in West Virginia - A Metes and Bounds State", Surveying and Mapping, Vol. 32, 1972, p. 212.

that the minimum land tract size available for sale was too large to be economically purchased by the average family.[7] For this and other reasons, periodic revisions were made in the initial land ordinance by a series of land laws passed by Congress. The first of these revisions was passed in 1796, with subsequent land acts being passed in 1800, 1804, 1820, and 1832. In each of these land acts the minimum acreage size was reduced, as well as adjustments being made in the price and provisions for credit and land offices.

It was under this system of public land surveys that the survey of the Greenville Treaty Boundary Line was carried out. It was carried out primarily under the provisions of the Land Act of 1796, while the survey of the surrounding cession lands was carried out under the provisions of the 1800 and 1804 land acts. With the passage of the Land Act of 1796, a new Surveyor General, Rufus Putnam, was directed to supervise the survey of those lands lying to the northwest of the Ohio River and above the mouth of the Kentucky River.[8] As one of his aides, Putnam chose a veteran surveyor named Israel Ludlow to assist in the delineation of the lands under the 1796 land act. Ludlow is of concern to this investigation for he was the federal surveyor who demarcated the Greenville line. Ludlow was born in Morristown, New Jersey in

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[7] Rohrbough, Malcolm, The Land Office Business, (New York: Oxford University Press, 1968), p. 95.

[8] Carter, Territorial Papers, Vol. II, p. 552.

1765 and eventually received a college education.[9] He began his career of surveying in the Old Northwest in 1786 as South Carolina's replacement representative for the survey of the Seven Ranges. During the next two summers Ludlow surveyed the seventh range of townships in this survey tract. By the end of August, 1797 he had completed his work.

Following his task in the Seven Ranges, Ludlow became very active in the survey of other Ohio lands. In the fall of 1788 he assisted in the demarcation of the boundary of the Ohio Company lands and afterwards became the principal surveyor of the lands incorporated within the Miami Purchase.[10] He not only supervised the running of the two master control lines, but he was responsible for the boundary location of the purchase which he began in 1790.[11] In addition to these efforts, Ludlow was one of the co-founders of the town of Cincinnati, Ohio, and he was responsible for its survey, which he started in December of 1788.[12]

With the surveys in the Miami Purchase Ludlow encountered difficulties. These surveys were not very accurate, with no coordination between the delineation of interior survey lines, within the purchase, and private lot lines. Ludlow

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9 Teetor, Henry, "Israel Ludlow and the Naming of Cincinnati", Magazine of Western History, Vol. I, 1885, p. 252.

10 Ernst, Compasss and Chain, p. 116.

11 Ibid. p. 151.

12 Pattison, American Rectangular Land Survey, p. 151.

also became quite interested in land speculation at this time. In the process, however, he ignored proper surveying procedures and laws by surveying lands outside of the Miami Purchase. Apparently he had plans to conduct surveys throughout the Northwestern Territory to the Mississippi River, locating lands for individuals who possessed military land warrants.[13] To counter such moves by Ludlow, the Acting Governor of the territory, Winthrop Sargent, declared in a statement directed toward Ludlow that he had no legal basis for making such surveys and could not do so without special authority.[14] This declaration did not deter Ludlow and some of his associates from buying and surveying two townships outside of the Miami Purchase and proceeding to lay out the town of Dayton, Ohio.[15] Ludlow's days as a private surveyor for Judge Symmes ended in 1796 with his appointment by Putnam as a federal deputy surveyor to survey the lands under the Land Act of 1796.

The proprietory rights to these lands had been obtained by the Treaty of Greenville. Thus before any of the tracts could be surveyed into townships and sections, the treaty boundary line had to be demarcated in order that tribal lands would not be violated. Putnam pointed this out to the Secretary of the Treasury:

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[13] Ernst, Compass and Chain, p. 154.

[14] Carter, Territorial Papers, p. 431.

[15] Ernst, Compass and Chain, p. 156.

> I beg leave to suggest, that in my opinion it will be proper to have the boundary lines between these lands & the present Indian claims ascertained as soon as may be to prevent all danger of our encroaching on the Indian lands ...because any location near them before the boundary lines are surveyed would probably occasion jealousies in the minds of the Indian.[16]

In addition to the immediate survey of the Greenville Treaty Boundary Line, Putnam also expressed a desire to have several important Indian chiefs present at the boundary demarcation and to have a "conspicuous vestige of some feet in width" be cut along the entire length of the line.[17] Such a boundary vestige would be of value as it would serve as a visible landscape feature to prevent any settlement encroaching upon tribal lands.

Putnam utilized the period between his appointment and the beginning of the surveying season of 1797 to plan the execution of the survey of the tracts and to hire a number of qualified surveyors. Since Ludlow himself was one of the most experienced of these federal surveyors, Putnam offered him the opportunity of demarcating the boundary line.[18] Ludlow delayed his response, however, so that by early May, Putnam was still not sure whether or not he would undertake the survey.[19] The proper instructions and authority had been forwarded to Ludlow

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[16] Carter, Territorial Papers, p. 589.

[17] Ibid.

[18] Ibid, p. 602.

[19] Ibid, p. 605.

who was to prcceed to Fort Recovery and survey the line from this fort to Loromie's Store and then to the Muskingum River. Putnam was also having difficulty securing any assurance from the Indian tribes that they would be present at the running of the line or obtaining an adequate military escort which would also assume the task of cutting the boundary vestige. General Wilkinson, who was in charge of the troops, initially showed no interest in supplying such an escort. He finally notified Putnam that he had invited the Indians to rendezvous with the surveying party at Fort Greenville on the 20th of June. Such an action on Wilkinson's part meant that there would be an additional delay because of the distance of Fort Greenville from the beginning point of the survey.

Putnam finally received word from Ludlow that he would carry out the survey of the Greenville Treaty Boundary Line, starting with that part of the line which was to run from Fort Recovery to Loromie's Store and then to the Muskingum River.[20] According to Putnam's instructions, Ludlow was to proceed to the Muskingum by estimated courses to the best of his ability

> to have each course measured with great exactness as well as run with much care, that his (Ludlow's) calculations for the true courses may be as correct as possible, and having erected a very conspicuous monument at the point or station assigned by the Treaty, he will run the true course back setting a post at the end of every Mile and blaizing the line in the usual manner.[21]

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[20] Ibid, p. 606.

[21] Ibid.

In surveying procedure this meant that before any permanent demarcation of the boundary line could be carried out, the true course of the line had to be ascertained. This task was accomplished by first running what is called a random line from Loromie's Store to the Muskingum. The practice of running a random line stems from the need, especially in public land surveying, of running a line from point X to some nonvisible point Y at either a known or intermediate distance away.[22] Once the random line had been surveyed, the distance this trail line missed the original point was measured as well as its angle. With the accomplishment of this task the true bearing of the line XY was determined and subsequently run out.

After his acceptance of the contract to delineate the boundary line, Ludlow gathered his provisions, equipment, and assistants near Loromies's store, where he awaited the arrival of his military escort and the Indians before beginning the survey of the random line. He notified Putnam on June 15, 1797, that the escort and the Indians had not yet arrived, and that he would wait three more days before starting the survey.[23] He further notified the Surveyor General that he had only five men in his party to cut out a vestige, that because of the time and expense involved, he would proceed to mark the course of the line by blazing

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[22] Brinker, Elementary Surveying, p. 198.

[23] Carter, Territorial Papers, Vol. II, p. 609.

landmarks and that a "road", as he called the vestige, could be cut at a later date. On June 17 Ludlow commenced the survey of the random line east towards the Tuscarawas and Muskingum rivers from a sycamore tree four feet in diameter standing at the fork of the Great Miami River near Loromie's Store.[24] He surveyed due east from this point of beginning for a distance 131 miles and 50 chains, (3300'), until he came to the Muskingum River. Ludlow traveled north along the river for 4 miles, 56 chains, and 50 links (396") until he reached the Tuscarawas River, up which he ran his line to Fort Laurens. He then crossed the river and proceeded upstream for a distance of approximately 2 miles until he struck the "crossing place" on the river above the old fort.[25] It will be remembered that this was the point stipulated in the Treaty of Greenville from which the boundary line was to run to the Great Miami River.

While Ludlow was running this trial straight line, Putnam had also traveled east in a supervisory capacity and arrived at the "crossing place" above Fort Laurens on July 2 to assist Ludlow.[26] Upon his arrival Putnam could find no evidence of the surveying party as Ludlow was still some miles distant, running the line.

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[24] Hanna, "Indian Boundary Line", Ohio Archeological and Historical Society, Vol. 14, 1905, p. 162.

[25] Ibid.

[26] Carter, Territorial Papers, Vol. II, p. 615.

Putnam proceeded to mark the place for erecting the boundary agreeable to the treaty.[27] After leaving a letter for Ludlow, he returned to the Moravian settlement of Gnadehutten. Two days later on July 4, he made contact with Ludlow's party near the settlement. With the completion of the random line, Ludlow's calculations were some 20 miles south of the crossing above Fort Laurens. He made his northing to the established point, calculated his distances and angles, and determined that the true course of the Greenville treaty line was S 78°50' W from the "crossing place" to the fork of the north branch of the Great Miami River near Loromie's.[28]

On July 9, 1797 Ludlow began the actual demarcation of the boundary line. He notched three marks on the northward side of an oak tree near the beginning point and wrote the inscription; "Surveyed according to Treaty by Gen. Wayne, a line to Loromie's S 78°50' W".[29] He ran this segment of the line for a distance of 119 miles and 59 chains (3894') in this direction, when he established a point and laid off a southerly offset line for a distance of 480 chains (6 miles) until he struck his random line. This line served as a check on the course of the boundary line which he found to be in error by 10 degrees, whereupon he re-occupied his point on the treaty line and proceeded with the survey

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[27] Ibid.

[28] Hanna, "Indian Boundary Line", p. 162.

[29] Ibid, p. 163.

at a corrected bearing of S 88°50' W.[30] Ludlow completed the survey of this line segment on August 29 having run a line 153 miles in length. Unfortunately, he again missed his point of beginning near Loromie's by a distance of 23 chains 50 links to the north (1518' 396").[31] Putnam, and Ludlow as well, were rather disturbed by this error as it fell to the north of the intended boundary line instead of to the south, thus depriving the Indian tribes of a specific parcel of land. Ludlow expressed his regret at the inaccuracy when he communicated to the Surveyor General; "which error I was very sorry to find; as the Indians are an Ignorant and jelous people & it is very improper to give them the least cause to suspect that any advantage would be taken of them; on that account I would have wished the error was on the other hand."[32] No boundary vestige was cut along this line, Ludlow did, however; "cut the brush and marked it (the line) in a conspicuous manner."

Oliver Wolcott, the Secretary of the Treasury, was also disappointed that the survey error fell to the north of the boundary. In correspondence with Putnam he said that consideration might be given "whether a new line ought not to be run westward... until it arrives so near the line marked by Mr. Ludlow as to be easily

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30 Ibid.

31 Carter, Territorial Papers, Vol. II, p. 625.

32 Ibid.

connected with it."[33] Furthermore, he thought that, no matter what action was taken, the tribal chiefs should be notified of the error to prevent any trouble. Wolcott was also somewhat displeased that no boundary vestige had been cut to mark the line in a "durable and proper manner." Apparently the cutting of a vestige was deemed very important by those individuals connected with the survey of the Greenville Treaty Boundary Line, yet no sustained effort ever seems to have been made to cut one.

After the completion of this segment of the boundary line, Ludlow did not do any more work on it until the surveying season of 1799. In the meantime, he began the work of delineating the townships in the Military Tract and in the area west of the Great Miami River. He carried out surveys in the Military Reserve lands during 1797. Putnam had divided this tract into five separate surveying districts, with Ludlow being assigned the westernmost of these.[34] This survey, which entailed the delineation and platting of some 50 townships was completed by Ludlow during this surveying season.[35] After the completion of this work he began work on the delineation of the lands lying to the west of the Great Miami River and above the mouth of the Kentucky.

Putnam indicated his plans for the survey of this tract in March of 1798 in a letter to Wolcott:

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[33] Ibid. p. 628.

[34] Ibid. p. 607.

[35] Ibid. p. 643.

> I propose to survey in the course of the present year that tract of land lying below the Great Miami River and above the mouth of the Kentucky river extending West toward the Indian boundary as far as shall be judged prudent without giving cause to Alarm...[36]

The Surveyor General wanted to begin delineating the lands of this field of survey, which was the most remote of the tracts to be surveyed at this time, as soon as possible. At the same time he did not want to upset the various Indian tribes of the region who might become concerned at any rapid survey into lands so close to their own. It must be remembered that the boundary line for this survey tract on the west, the Greenville Treaty Boundary Line, had not yet been demarcated by Ludlow. Putnam had taken this factor into account when he stated in the same letter:

> ...at the same time by running out one or two Ranges of Townships on the west side of the great Miami extending as far North as Fort Recovery, and the fork of Loromie's Creek I shall be able to ascertain the true course of the Indian boundary without the expense of running a random line, as we were obliged to do at the Northward.[37]

Putnam hoped that by this action the ordeal involved in laying out another random line and the possibility of accruing an error such as the one that had taken place with Ludlow's running of the previous random line could be avoided. By running out a few ranges of townships to Fort Recovery, surveying, which

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[36] Ibid, p. 644.

[37] Ibid.

had to be done could also serve the purpose of acting as a control. With the aid of such control lines, the true bearing of the remaining line segments of the treaty boundary line could be calculated and established. Such a procedure would also save the federal government a good deal of money. With the completion of these line segments, Putnam then intended to "complete as soon as may be the survey of the whole tract of land west of the Great Miami included within those boundary lines."[38]

Thus the task of beginning the survey of this tract fell to Ludlow. He first laid off a north-south line from the mouth of the Great Miami River in 1798, which was to serve as the guide meridian for lands to be surveyed to the east and to the west of it. This line became known as the First Principal Meridian and is located $84^{o}51'$ west of Greenwich and is the present-day state boundary between Ohio and Indiana.[39] More important, the principal meridian governed the first independent organization of a federal surveying district since the running of the Geographer's Line in 1785.[40] When Ludlow had proceeded far enough with the running of the ranges west of the Great Miami, he notified Putnam in March of 1799 that he was ready to commence with the survey of the last two line segments of the Greenville Treaty Boundary Line.[41]

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[38] Ibid.

[39] Wilson, George, "Early Indiana Trails and Surveys", Indiana Historical Society Publications, Vol. 6, 1919, p. 404.

[40] Pattison, American Rectangular Land Survey, p. 203.

[41] Carter, Territorial Papers, Vol. III, p. 18.

The first of these straight line segments was to be run from that point on Loromie's Creek, where the line had previously ended, to Fort Recovery. The second line segment was to be run from this fort to the north bank of the Ohio River opposite the mouth of the Kentucky River.

In a letter to Wolcott, Putnam also argued in favor of having a wide boundary vestige cut along the line. He relayed to Wolcott communications that Ludlow had had from various tribes expressing "a desire to have a great road cut that it may prevent the White people from Settling on their hunting grounds."[42] Ludlow had indicated that he needed ten to twelve ax-men to cut the vestige as fast as he surveyed the line. There was a definite need for such an operation because for two years no vestige had yet been cut on that segment of the line lying between the Tuscarawas and Loromie's Creek.[43] Putnam agreed with Ludlow's assessment and noted with some displeasure, the lack of a boundary vestige when he stated:

> I believe Major Ludlow's opinion is well founded & the only mode that can be adoped to make such a road or opening on the Line as will give the Indians Satisfaction and due information to the White people, in running the line from the crossing place above Fort Laurence to the Fork of Loromie's Creek a detachment of Troops was depended on to open the line but they effected nothing & of course that line is no more conspicuous than any otherline of Survey in the woods what the Indians want is a line so opened that a person will not be likely to pass without seeing it.[44]

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[42] Ibid.

[43] Ernst, Compass and Chain, p. 178.

[44] Carter, Territorial Papers, Vol. III, p. 18.

Wolcott was also in agreement with this view, and informed Putnam that the Secretary of War had notified Governor St. Clair of the urgency of informing the Indians of the remaining survey and the proper demarcation of the boundary line.[45]

When Ludlow undertook to carry out the survey of the remaining line segments, he again ran into difficulties. There was, to begin with, the same problem of gathering a sufficient number of influential Indians to help supervise the demarcation. Ludlow had hoped to begin the survey on June 1, 1799; unfortunately none of the tribes were notified until after April 20, and the demarcation could not be started on time.[46] This problem resulted from the delay in communications between the Secretary of War and Governor St. Clair, which in turn resulted in Putnam's instructing Ludlow not to begin the survey until St. Clair had made the appropriate arrangements. By the middle of July, the Indians had still not made an appearance as they were scheduled to do on the 10th of that month. Ludlow notified Putnam from Loromie's Creek explaining that the Indians offered as their reason for not coming their fear of attack from some of the southern tribes, especially the Chickasaw.[47] He felt that this was not the real reason, but whatever it was, he said that he could not wait much longer to commence the demarcation because of the lack of funds.

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[45] Ibid, p. 19.

[46] Ibid, p. 23.

[47] Ibid, p. 59.

Besides the lack of Indian support, there was also the problem of an adequate military escort to cut the boundary vestige. Wolcott had told Putnam in May that he would have the commanding officer in the Northwest Territory notified of this need.[48] Putnam later received word that Colonel Hamtramck had instructed the commanding officer at Fort Washington to supply the surveyors with an escort of an officer, if available, one non-commissioned officer and twelve or fifteen privates.[49] Ludlow began his survey without the escort, though they finally caught up with the surveyors and accompanied them for at least part of the distance in the line demarcation. No evidence has been found, to indicate any cutting of a boundary vestige.

The tribes were openly hostile to the survey. The military escort, commanded by Lieutenant Stall, was threatened by Indians at Greenville who threaten to kill the soldiers if they went any farther.[50] After this incident, some horses and provisions were stolen from the escort. Putnam was of the opinion that, "it was the intension of the Indians to prevent running the boundary line if it was in their power to effect a delay without employing actual force on the occation."[51]

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[48] Ibid, p. 25.

[49] Ibid, p. 60.

[50] Ibid, p. 68.

[51] Ibid, p. 69.

This may well have been true, for while the confederated tribes had been defeated four years earlier at Fallen Timbers, they were still suspicious and resentful of the settlement of the Greenville Treaty lands.

Ludlow was fully aware of these problems, but in his mind he had no choice but to complete his survey. He finally commenced the survey of the remaining line segments on August 3, 1799, starting out from Loromie's Creek to Fort Recovery with a line bearing N 81°10' W.[52] He ran this segment of the treaty line for a distance of 22 miles 51 chains 50 links to the fort, where he set a turning point stake.[53] Following the establishment of this turning point, Ludlow set off on the survey of the final line segment, which was to run in a straight line from the point at Fort Recovery to a point on the north bank of the Ohio River opposite the mouth of the Kentucky River. This part of the survey started on Thursday August 6, 1799 at ten o'clock in the morning, with a line bearing S 11°35' W.[54]

Ludlow began running this last segment in a southwesterly direction and marking its course by blazing convenient trees.

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[52] Hanna, "Indian Boundary Line", p. 163.

[53] This surveyor's stake is on display at the Fort Recovery Museum, being excavated on that historic site in 1934. The site of this stake is now marked by a stone marker set in a cement walled hole.

[54] Ludlow, Israel, Survey Notes of the Greenville Treaty Boundary Line, Bureau of Land Management, U.S. Department of the Interior, Vol. 44J, Michigan Case, p. 39.

At the end of each mile he would either set a stake or marked a tree with that particular mile number and make a record in his field notes. Following instructions, he not only recorded the bearints and chain lengths of the line, but also made observations concerning the nature of the land over which he was surveying. These observations included the nature and type of the various tree species, the general topography, soils, prominent water courses, substantial areas of wetlands, and some general comments concerning what type of agricultural land use might be best suited for the land being described. An example of a typical section of these field notes can be seen in the description of the first few miles surveyed on this southwesterly course;

S 11° 35'W		On 1 st Mile Southwardly
55		
10.00	(660')	A Water course descends W.
16.50	(1056' 396")	A Wh. Ash 20 in. diam.
35.45	(2310' 356")	A Buckeye 16 in. diam.
47.18	(3102' 143")	A Sugar 14 in. diam.
59.91	(3894' 721")	A Beech 18 in. diam.
74.00	(4884')	A Do. 18 in. diam.
80.00	(5280')	A Wh. Ash near the line marked and numbered with M. 1
		Land, on this mile affords good situations for cultivation the soil proper for small grains. Timer, Wh. Ash, Hickory, Wh. and Red Oak, Elm Beech and Sugar.

S 11° 35' W — On 2nd Mile Southwardly

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[55] The figures in this column refer to the distances on the line measured in chains and links.

3.30	(198'	238")	An Elm 18 in. diam.
18.50	(1188'	396")	A Water course descends W.
20.31	(1320'	246")	A Hickory 16. in. diam.
22.00	(1452')		Crossed a water course descends N.W.
31.14	(2046'	111")	A Sugar 14 in. diam.
58.12	(3828'	95")	A Hickory 12 in. diam.
66.93	(4356'	737")	A Wh. Ash 22 in. diam.
80.00	(5280')		Marked and numbered a Beech in the line with M. 2 Land, along this mile is high quality and natural growth similar to the preceeding mile.
S 11° 35' W			On 3rd Mile
6.48	(396'	380")	On Elm 19 in. diam.
7.56	(462'	444")	A Creek 15 lks. wide runs S.W.
14.00	(924')		A Sugar 20 in. diam.
31.85	(2046'	673")	A Wh. Ash 18 in. diam.
56.89	(3696'	705")	A Hickory 22 in. diam.
80.00	(5280')		Marked and Numb. a Beech in this line with M. 3 Land, on this mile affords good farming similar in quality to last Mile.[56]

These examples illustrate the content and organization of Ludlow's notes. While these descriptions were brief because of the need for a rapid survey, they still contain many interesting details concerning the nature of the land on which the Greenville Treaty Boundary Line was situated. In addition, the field notes appear to contain relatively accurate information when compared with the U.S.G.S., 1 : 24,000 scale topographic sheets. The description of mile 8 in the notes, for example, identifies the two main topographic features of the mile, accurately locating the Mississinewa Moraine and the Mississinewa River. In comparison with

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[56] Ludlow, Survey Notes, pp. 39-40.

the adjacent lower land, the morainic area is described as being high and well situated, while the Mississinewa River is described as being 6 links (48") with a course bearing S 20° E and measured 2508 from the start of the mile.[57]

Ludlow continued the southerly survey of the treaty line from Fort Recovery for a distance of 19 miles at which time he discontinued the measure. The 19th mile was measured and recorded in the usual manner with a beech tree being marked and numbered with the mile designation. At the end of the mile description is the notation, "Surveyed by Israel Ludlow, Dep. Sur." which is underlined with the rest of the page being left blank.[58] Thus ended, in early fall, the survey of the Greenville line for this season, with Ludlow probably continuing his work on the delineation of the township and range lines between the Miami River and the boundary line.

There appears to be an inconsistency in Ludlow's report to Putnam concerning the Greenville Line demarcation. In a letter written to the Surveyor General on September 2, 1799, he announced that he had completed the survey of the entire Greenville Treaty Boundary Line from Fort Recovery to the banks of the Ohio. Putnam in turn notified the Secretary of the Treasury of this fact in a letter dated September 18, 1799 stating that:

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[57] Ibid, p. 42.

[58] Ibid, p. 46.

> the Survey of the Indian boundary line is at length completed - Major Ludlow the 2nd instant writes me thus 'would wish to make you acquainted of my having returned from the woods; have Surveyed and marked the Indian boundary line from Loromie's to Fort Recovery and from there to the Ohio opposite the mouth of the Kentucky. - The business has been done without one single Indian being present.'[59]

Nevertheless, Ludlow's own notes show that in 1799 he had only surveyed 19 miles of this line segment.

Ludlow returned to finish the demarcation of the boundary line in the survey season of 1800. Instead of beginning the survey from the point at which the measure had been terminated the year before, he began on September 17 the delineation at the southern most point of the line on the banks of the Ohio River. His field notes continued in the same format as before with this heading:

> Field Notes of the West Boundary Line of the Indian cession by the Treaty of Greenville, of August 3, 1795. Commencing on the North Bank of the Ohio River, at a point opposite the mouth of the Kentucky River.[60]

In the survey of the line the previous year, Ludlow had used a bearing of S 11° 35' W. When he surveyed north from the Ohio River a reverse bearing of N 11° 35'E should have been employed in order for the segments of the line to meet. Instead, the line was surveyed with a bearing of N 5° 25' E, a difference of 6°10'.

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[59] Carter, Territorial Papers, Vol. III, p. 68.

[60] Ludlow, "Survey Notes", p. 1.

This would mean that the two parts of the line segment would not intersect at the termination point on the first line.[61] Whatever the reasons were for using the new bearing, it was employed for the entire length of the survey of this portion of the treaty line.

The survey starting from the banks of the Ohio, immediately ran through the very rugged topography of the bluffs of the Ohio, and then into the maturely dissected Dearborn Upland area. Consider, for example, the field note entries for the first few miles of this part of the survey:

N 5° 25' E		On 1st Mile.
27.44	(1782' 348")	A Sugar 14 in. diam.
30.00	(1980')	Begin to asend the hill, Ash & Walnut timber Sugar, Ash, Oak, Walnut, and Blackberry
50.00	(3300')	Asend the hill, Ash & Walnut timber
51.00	(3366')	Begin to descend hill
55.00	(3630')	Several small hollows or water courses
57.00	(3762')	Begin to asend steep hill

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[61] Ludlow's reasoning for changing this bearing might have been in the magnetic declination of this area. While no mention of such declination is made in the field notes of the survey, it is noted in the field notes and plats for the survey of the adjacent township and range lines. The variance of magnetic declination thus noted was 5°10' from true north. There is no doubt that Ludlow was aware of this variance in that his own plats for these township lines make note of the magnetic declination. With this being the case, he may have lessened his original bearing by this amount, subtracting another degree as a safety measure, in hopes that the two parts of the line would meet evenly. Such a change would have been a legitimate surveying procedure.

80.00	(5380')	Set a post & Numbered trees with No. 1 - Land, ...rich but hilly. Timber Wh. & Blue Ash, Wlanut & Sugar, with Spice undergrowth.

N 5°25' E		On 2nd Mile.
5.00	(330')	Desend hill
6.00	(396')	Begin to Asend high hill
25.00	(1650')	Rose the hill, rich land, Ash & Walnut
32.00	(2112')	Crossed a ridge, with Ash & Walnut timber. Several small water courses running S.E.
50.00	(3300')	Two small water courses running N.W. & then rose a ridge with continues to post
80.00	(5280')	Set a post and No. tree with M. 2. Land, over rich soil, producing large Ash, Walnut and Sugar - A Walnut 10 in. diam. bears --- 10 lks. dist. from post.

N 5°25' E		On 3rd Mile.
27.00	(1782')	A small water course runs N.E.
28.00	(1848')	Begin to ascend steep hill
39.00	(2574')	Rose the hill, Ash & Wh. Oak Timber
40.00	(2640')	Begin to descend a hill
45.00	(2970')	Descended to a small water course runs N.W.
46.00	(3036')	Begin to ascend a high hill
51.00	(3366')	Rose the hill & begin to descend
61.00	(4026')	Descended to a Small water course running N.W. thense begin to ascend
80.00	(5280')	Set a post and marked No. on tree with mile 3 Land similar in quality and natural growth to proceeding mile.[62]

The survey of the treaty line over such broken and uneven terrain was a difficult task, especially when it was necessary to

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[62] Ludlow, "Field Notes", p. 1

break the chain in measuring distances while ascending and descending slopes. This task became somewhat easier as the surveyors left the dissected upland for a time and ran the line across the old Illinoian Drift Flats. This fact is illustrated by the notes on the 35th mile of the line:

N 5° 25' E	On 35th Mile.
.20 (158")	A spring branch runs S.E.
21.45 (1386' 356")	A bl. Oak 18 in. diam.
80.00 (5280')	A post from which a wh. Oak 10 in. diam. bears N 55', W. 12 lks. dist. & a Wh. gum 16 in. diam. East 28 lks. dist. Over level land and will timbered with bl. Oak and Poplar.[63]

Note the lack of stream courses and the absence of any references to the ascent or descent of hills or ridges as well as the over all lack of descriptions of any other prominent features, except for marker trees. The survey proceeded over this relatively level topography until the Whitewater River valley was encountered some 52 miles along the survey route north from the Ohio. An excellent account of the demarcation through the valley is afforded in the descriptions recorded for the 52nd and 53rd miles, which read;

N 5°25' E	On 52nd Mile.
8.00 (528')	Begin to descend a hill
20.00 (1320')	Crossed a deep hollow and water course runs North west

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[63] Ibid, p. 13.

26.50	(1716'	396") Descended the hill a water course 20 lks. wide runs N.E. enter richest quality of bottom. Bl. Walnut, Sugar, Buckeye and blackberry timber.
43.53	(2838'	420") A black berry 16 in. diam.
71.50	(4686'	396") To the bk. of the West fork of Whitewater 350 lks. wide runs East appears navigable
80.00	(5280')	Set a post from which A Bl. Walnut 16 in. diam. bears S49W. 19 lks. dist. A Wh. Oak 6 in. diam. bears S82E 21 lks. dist. Land, the last 3/4 of this mile is rich bottom land, the remainder similar to the preceeding mile.

N 5° 25' E		On 53rd Mile.
20.00	(1320')	On the east side of the bottom, hill rising E.
26.00	(1716')	Rose a small eminence soil of good quality, with much undergrowth.
37.00	(2442')	A deep hollow and water course descending East, a small spring on the east line.
40.00	(2640')	Ascending a steep hill
56.00	(3696')	Rose the hill
60.00	(3960')	On the hill which descends West
80.00	(5280')	Set a post from which An Ironwood 10 in. diam. bears W 28½ W. 25 lks. & A wh. Ash 14 in. diam. bears N 39½ S 3 lks. dist. Over land generally composed of hills and much broken to admit of cultivation.[64]

The description for these two miles accurately notes the surveyor's descent from the steep hills south of the Whitewater River, across McCarthy's Run, and onto the fertile bottom lands. The traverse of the bottoms is described, as well as the width measurement of the Whitewater River, with the setting of a post on the other

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[64] Ibid, p. 17.

side. The notes of the next mile report on the demarcation of the treaty line as it crossed the water course in a deep ravine north of the river and up the slopes to the crest of Boundary Hill on which a post was set.

The survey of the Greenville line continued over the dissected terrain of the land adjacent to the Whitewater River valley until it came onto the relatively level Tipton Till Plain. The description in the survey notes for these last miles indicates the change in the nature of the topography.

Again another selection from the notes shows the change from a well drained, dissected upland to an imperfectly drained, level till plain. The notes from the 100th mile of the survey give an excellent description of the nature of the till plain prior to settlement;

N 5°25' E	On 100th Mile.
43.00 (2838')	To a swamp principally to the West of line part of it covered with water. A Beaver dam on the East side of it where the outlet is-- Encamped Saturday the 28th of Sept. Cont. the 100th Mile
80.00 (5280')	Set a post, from which A Red Oak 24 in. diam. bears N 50½ W. 15 lks. dist. A Beech 12 in. diam. bears N 83 E. W 26 lks. dist. Land, interspersed with wet-ground and Swamps, but much good land. Timber large Wh. Oak, Beech, Sugar - Poplar.[65]

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[65] Ibid, p. 37.

This excerpt from Ludlow's notes for an area now in Randolph County is typical of many of the mile descriptions in the northern section of the treaty line. This account illustrates a landscape with a small degree of integrated surface drainage, as witnessed by references to many wetlands and swamps in the area. The flat nature of the till plain also can be inferred by the absence of any references to the ascent or descent of hills or ridges for the length of the mile.

Ludlow continued the survey of the boundary line from the post set at the end of mile 100 for a distance of two more miles at which distance he intersected the line he had surveyed south from Fort Recovery the year before. The notation for this final mile reads;

N 5° 25' E	On 102nd Mile.
4.00 (264')	A Small Swamp principally the W. of line
9.50 (564' 396")	To the road leading to Greenville, to the Delaware Towns on White River bears W.
41.00 (2706')	A Beech 22 in. diam.
46.00 (3036')	A water course descends N.E.
60.10 (3960' 79")	To a Hickory 18 in. diam. on the Old or Random line numbered M. 20 from Fort Recovery - thense measured to the end of the mile.
74.11 (4884' 87")	A Wh. Ash 14 in. diam.
80.00 (5282')	Set a post from which A Beech 16 in. diam. bears West 25 lks. dist. Land, excellent for small grains or Indian corn - A Swamp on the East of this mile from 500 to 1,000 lks. distant. here discontinued the measure Saturday 28th day of Sept. 1800 Israel Ludlow D.S.[66]

66 Ibid, p. 38.

With the end of the survey of this part of the line segment between Fort Recovery and the north bank of the Ohio River, certain inconsistencies in the field notes stand out. To begin with, in his survey south from Fort Recovery the year before, Ludlow terminated his measurement after the 19th mile according to his notes. However, in the survey of the line north from the Ohio, the survey stated that he terminated his measure after the 102nd mile at which time he intersected what he called his "old or random line." He states that this intersection took place on mile 20 south from Fort Recovery and not mile 19, which was the termination of his first line. Ludlow wrote that the marker tree for the end of mile 20 was a "hickory tree 12 inches in diameter", while the end of mile 19 of the previous survey was marked on a beech tree. This would seem to indicate two different mile units. We are left with a question: was there a gap of one mile in the demarcation of the Greenville Line, or is the discrepancy an error in recording?

In addition to the apparent error in the intersection of these two lines, the orientation of the two lines at the point of intersection is questionable. According to the provisions of the Treaty of Greenville this section of the boundary line was to run in a straight line between Fort Recovery and the Ohio River. In reality, however surveying a straight line for a distance of some 120 miles over rather difficult terrain, as the field notes indicate, is an almost impossible task. For

this reason the treaty line does contain a few minor deviations from the true course, but these are noticeable only on the large scale, 7.5 minute U.S.G.S. topographic sheets; the deviations are mostly in the southern part of the survey. One major deviation occurs in the treaty line, but not at the intersection of the two line segments as might be expected. Considering the distance surveyed, the instruments used, and the terrain traversed, it seems unlikely that these two lines would intersect as precisely as the field notes indicate. Yet, no evidence can be found on any of the U.S.G.S. maps which would indicate deviations of the line in this area. Instead, a major positional inconsistency in the boundary is found some 40 miles to the south near the Union-Franklin County Line. This line deviation resembles an outward angular bulge in the treaty line which resulted in approximately 47,360 more acres being incorporated into the public domain than normally would have been the case if the boundary had been run in a straight line.[67]

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[67] Without more information, the reason for this deviation in the line is unclear, although two possible explanations can be advanced. One explanation may be that Ludlow attempted to correct this error either by resetting points on the ground or in the positions indicated on the survey plats. No evidence can be found to support this claim, for while the plats are not available, the written field notes which were turned over to the Surveyor General make no reference to any deviation in the bearing of the line at this point. The other explanation may be that an error occurred when the township and range lines were run out by the various deputy surveyors. These township lines adjacent to the boundary had to be tied into the line to make their western borders complete. Because of the way the Greenville line was marked and the difficulty involved in laying-out the township lines on this sort of terrain, an error could have occurred here.

Survey of the Adjacent Public Lands

Following the completion of the survey of the Greenville Treaty Boundary Line, the remaining cession lands to the east of it could be surveyed into townships. (Fig. 7) Ludlow had begun the survey of these lands west of the Miami River in 1798, but could not complete this work until the Greenville boundary had been demarcated so that the township and range lines could be tied into it. Ludlow, however, was not the only deputy surveyor to delineate townships adjacent to the treaty line. He surveyed townships 14-16 in Range I and townships 10-13 in Range II.[68] These were delineated in October and November of 1800 after he had finished the demarcation of the boundary line. Three other surveyors were also in the field that surveying season surveying the township lines -- Daniel Cooper, William Ludlow, and Benjamin Chambers. Cooper surveyed townships 17 and 18 in Range I, William Ludlow delineated township 9 in Range II and townships 7-9 in Range III, while Chambers laid out townships 1-6 in Range III.[69] William Ludlow and Cooper did their work during October and November of 1800. Chambers also laid out a number of townships during these two months, but he remained in the field longer than the others and laid out additional townships during December of 1800 and February of 1801.

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[68] Survey Plats, State of Indiana, Indiana State Library, Archives Division, Vol. I, Microfilm, Reel 1419.

[69] Ibid.

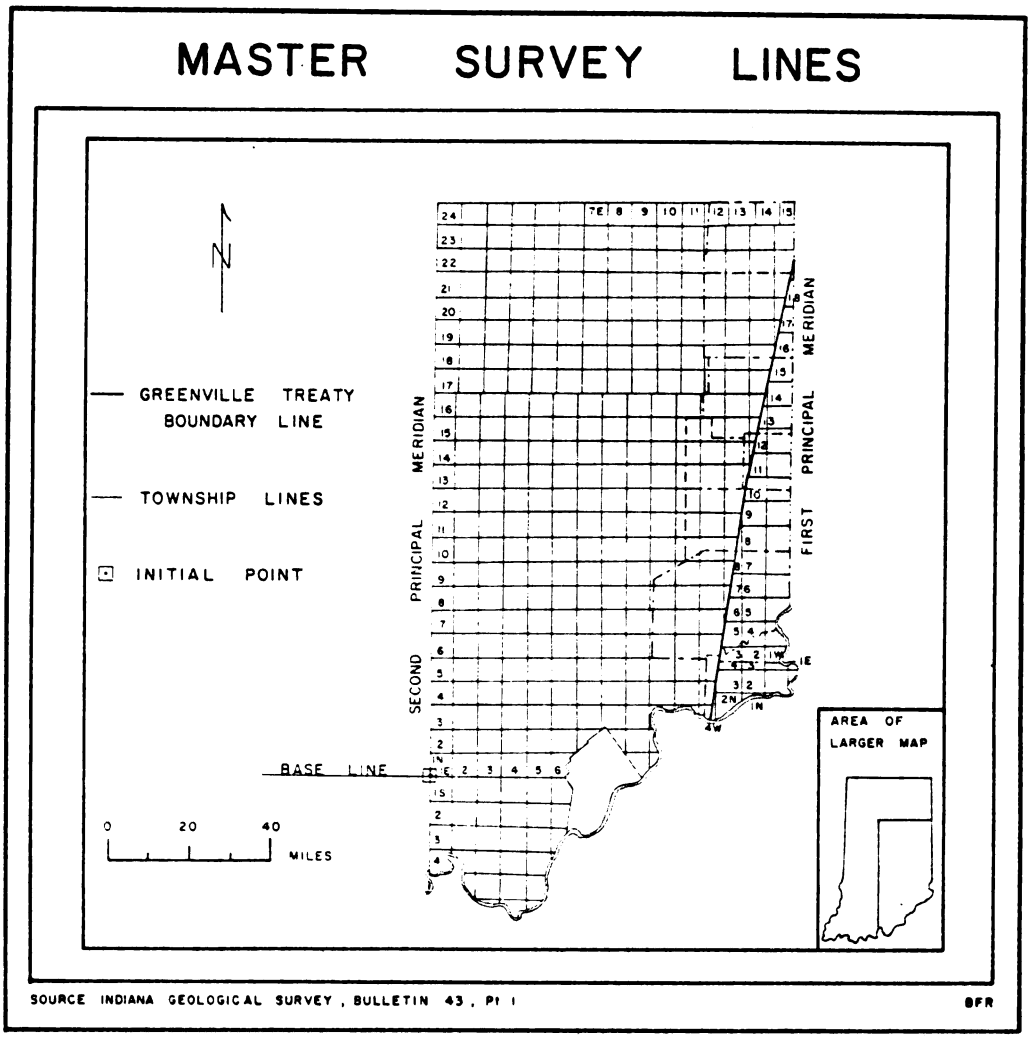
MASTER SURVEY LINES
GREENVILLE TREATY BOUNDARY LINE
TOWNSHIP LINES
INITIAL POINT
BASE LINE
SECOND PRINCIPAL MERIDIAN
FIRST PRINCIPAL MERIDIAN
AREA OF LARGER MAP
0 20 40 MILES
SOURCE INDIANA GEOLOGICAL SURVEY, BULLETIN 43, Pt I
BFR

Figure 7.

By the end of the surveying season of 1801, the Greenville cession lands had been surveyed, and while future land laws would require the further division of these townships into quarter sections and quarter-quarter sections, the cession lands were ready for public sale. Two factors, however, made the designation of these townships somewhat complicated. First of all, because of the angular nature of the boundary line, there could be no complete township lying immediately adjacent to it. Instead, only fractional townships could be laid out, some containing most of their sections, such as T 15 N, R I W, while others consisted of only a couple of fractional sections, such as T 10 N, R III W. With such fractional townships where the western boundaries were angular and not always in a straight line, care had to be taken with property descriptions and delineations.

Secondly, like previous surveys for the Ohio Company land townships in the cession lands were numbered north from the Ohio River. While a principal meridian, the 1st Principal Meridian, had been run out in order to exert some control in the survey of the lands west of the Miami River, no corresponding base line had been established to guide the east-west lines. For this reason the Ohio River had to be used as a beginning point for the designation of the township tiers. The problem with using the river as a beginning of township numbering lay in the fact that the Ohio exhibits a certain degree of meandering in this area. It trends in a northeast to southwest manner as the southern

boundary of Switzerland County, and bends sharply north to form the eastern borders of both Switzerland and Ohio counties.

Because of this meandering and the need to tie township lines to the river's north bank, it was necessary to adjust the numbering system. Starting in the southeastern portion of Switzerland County, the fractional township was designated as T 1 N, R I W of the First Principal Meridian, and contained one fractional section; number 6. From here 18 townships were numbered north in Range I until this range terminated at the intersection of the Greenville Treaty Boundary Line with the Ohio-Indiana state line. The township designated as T 1 N, R 2 W contains a larger area and consists of 8 fractional sections and two complete ones. This increase in area apparently resulted from the fact that the northern border of the township is a constant east-west line, while the southern border trends in a much more southwesterly manner as it follows the Ohio River. The alteration in numbering, however begins with the tier of townships in R 3 W. Again the northern border has a constant east-west orientation, but the Ohio River continues its course southwesterly below what would be considered the sourthern east-west boundary of T 1 N. This fact coupled with the practice of numbering from the river, made it necessary to designate two fractional townships in R 3 W and R 4 W as T 1 N. This resulted in inconsistency in township numbering. The eastern border of T 2 N, R 3 W became the same as the western boundary of T 1 N, R 2 W. This uneven numbering extended north

along the dividing line between ranges 2 and 3 west until it intersected the Greenville Treaty Boundary Line near Brookville.

William Henry Harrison's series of treaties in the early 1800's provided for the clearing of the Indian title to a large amount of land, thus making it ready for federal survey. With such a vast extent of land opened up for settlement, it was necessary to revise surveying methods and procedures to assure a greater degree of accuracy in the delineation of the public lands. In 1804 legislation was enacted which modified surveying procedures, and reorganized sale of the public domain. One of the provisions of this legislation established the office of deputy surveyor.[70] In addition to the land act modification, the nature of the delineation of the public lands was changed with the appointment, in 1803, of a new Surveyor General to replace Rufus Putnam. The new Surveyor General was Jared Mansfield, who brought the surveying of the public domain under strict controls, especially in respect to the adherence of line being laid out according to the true meridian.[71]

Upon assuming his post, Mansfield thought that his main duty would be the supervision of the completion of surveys already in progress.[72] But, with the new land acquired by the Harrison

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[70] U.S. Statutes at Large, Vol. II, p. 74.

[71] Pattison, American Rectangular Land Survey, p. 210.

[72] Ernst, Compass and Chain, p. 220.

treaties, the scope of his work was increased. In contemplating his expanded duties, Mansfield took into consideration the fact that the rectangular system of survey would be extending into vast new territories to the west.[73] With this in mind, he thought it necessary that a method of organization be adopted which would supply consistency, not only to the surveys to be run out in Indiana, but also in the new territories.

To accomplish this goal, Mansfield envisioned a master framework of principal meridians and base lines which would supply the control to the survey of an entire territory. Up to that time each field of survey was independent of any other which compounded errors on a territorial basis. Even in those areas of survey, such as Ludlow's survey west of the Miami River, where a principal meridian was used, no satisfactory base line was laid out to supplement it. Townships still were numbered north from some southern boundary. In a letter to the new Secretary of the Treasury, Albert Gallatin, who replaced Wolcott, Mansfield made known his suggestions for change.[74] He thought that what was needed was a "general and uniform system" and to this end he proposed:

> A meridian which I conceived to be a proper distance from the one, which forms the Western Boundary of the State of Ohio, & which lies near the Eastern extremity of the Tract (the Greenville Treaty Boundary Line) as a Directrix from which the Ranges on each side of it may be counted.[75]

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[73] Pattison, American Rectangular Land Survey, p. 215.

[74] Carter, Territorial Papers, Vol. IV, p. 231.

[75] Ibid, p. 232.

Mansfield considered the establishment of this new meridian to be very important, for while the First Principal Meridian would have been a sufficient control had the surveys been extended west in an orderly progression, unfortunately they were not. With township and range lines being terminated on the Greenville line, and Indian title was being cleared for other Indiana lands farther west, there was no way the surveys would be able to conform. Mansfield further thought that it would be impossible, especially with the information that he had at that time, to determine the exact position of the new Indiana lands in relation to the older survey tracts and to make any estimation of the intermediate range lines.[76]

In conjunction with the new principal meridian, Mansfield also proposed to locate a base line at a right angle to it, thus dividing the survey tract into quadrants:

> The territory between this and the Ohio in the Opinion of every one a most excellent and valuable tract, may be surveyed by merely extending the lines of our present survey to the River. The Townships would not then, as heretofore, be numbered from the Ohio, but from the Base Line, which I have caused to be run for the purpose of surveying here. This I account an advantage, as it would preserve on uniformity of numbers in the adjacent Townships of different ranges and the mind would at once devine from the general plan a correct idea of their position, as well as of the meanders of the River.[77]

With the adoption of thus surveying procedure, the Second Principal

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[76] Ibid, p. 233.

[77] Ibid.

Meridian was established from an initial point located in the south-central part of Indiana in Orange County, coinciding with 86° 28' W. longitude. (Fig. 7) A corresponding base line surveyed at right angles to this meridian is situated at 38° 28' 20" N. latitude.[78] After these two master lines were located, ranges were laid out and numbered east and west from the meridian. At the same time township tiers were numbered north and south from the base line. Utilizing this method, four independent quadrants of townships were established outward from the initial point. By abandoning the procedure of numbering townships northward from the Ohio River, the confusion resulting from unevenly numbered township divisions was averted.

Another problem which these master lines helped to alleviate was that of convergence. Convergency relates to the fact that all true meridians converge toward the terrestial poles and therefore, are non-parallel. According to the Land Ordinance of 1785, these true meridians were to form the eastern and western boundaries of townships; although the delineated townships were to be of constant width. This is an obvious contradiction. By converging towards the poles the meridians were not parallel in their orientation, and townships of a constant width became a mathematical impossibility.[79] While this problem was alleviated in the ordinance by the statement that cardinal direction could

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[78] Wilson, "Trails and Surveys", p. 404.

[79] Pattison, American Rectangular Land Survey, p. 210.

be run "as near as may be", the restriction of equal-width meridians still was implicit. Obviously, there is no one perfect solution to this problem; however, Mansfield's master lines and subsequent adjustments to them aided in reducing this error.

This problem was resolved by the establishment of supplemental survey lines known as standard correction parallels and guide meridians. Once the principal meridian and base line were established through an initial point, secondary parallels and meridians were marked off in each direction at 24 mile distances to form quadrangles.[80] After the establishment of the standard parallels, guide meridians were located at right angles to the new line. By maintaining a constant distance of 24 miles on each new standard parallel, the meridians of one quadrangle will never meet those of another.[81] Instead there will be a series of offset corners along the standard line with the offset occurring away from the principal meridian north of the base line and towards the meridian south of the base line. The result of the laying down of these correction lines, is that the convergency error is "boxed in" within the individual quadrangle, thus partially eliminating the consistent error which would have resulted in uncontrolled convergency. In Mansfield's initial scheme only the guide meridians were employed and the use of standard correction parallels evolved in later surveys.[82]

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[80] Davis and Foote, Surveying, p. 600.

[81] Brinker, Elementary Surveying, pp. 428-429.

[82] Pattison, American Rectangular Land Survey, p. 212.

The survey of the new lands ceded in Harrison's treaties was carried out soon after their cession. The survey records for the lands immediately west of the Greenville line may be cited in support of this statement. The first treaty which affected lands adjacent to the line was the Treaty of Grouseland in 1805. The adjacent lands ceded in this treaty were surveyed entirely by Stephen Ludlow during 1807. This surveyor specifically delineated townships 3 to 6 in R 12 E of the Second Principal Meridian and townships 6 to 10 in R 13 E.[83] The lands in the next cession under the Treaty of Fort Wayne, 1809, were delineated by a number of deputy surveyors during the season of 1811. Township 13 in R 13 E was surveyed by both Stephen and William Ludlow in 1811, with township 12 being laid out by William alone. In 1811 in R 14 E township 14 was surveyed by Emmanuel Vantrees, townships 15 to 17 by John Maccan, and township 18 by Henry Bryan.[84] The remainder of the Fort Wayne cession lands adjacent to the boundary line were located in R 15 E, with township 18 being delineated by Bryan and townships 19 to 21 surveyed by Jacob Fowler. Thus by 1811 the Greenville Treaty Boundary Line and all of the public lands adjacent to it on either side had been demarcated.

Like the township and range lines to the west of the First Principal Meridian, those to the east of the Second Principal Meridian had to be tied into the Greenville line to complete their boundaries. In examining a map showing survey lines, however,

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[83] Survey Plats, State of Indiana, Vol. I, Microfilm, Reel 1419.

[84] Ibid.

one observes that in no instances do any of the township lines from either meridian coincide. Actually no attempt was ever made to have these lines coincide, for as Mansfield had already stated, this would have been an impossible task. Thus all along the Greenville Treaty Boundary Line, the township and section lines are offset in varying degrees. Once these lines had been surveyed and recorded they could not be altered or resurveyed. The treaty line was thus the dividing line between two master survey lines. In relation to the development of the cultural landscape, this factor may be the most important. Ernst has made this statement:

> In fact the only permanent significance of this first line (the Greenville Treaty Boundary Line) was that it placed a small gore of Indiana lands within the surveying pattern of Ohio rather than in the Indiana system which was established a few years later.[85]

Whether or not this is the "only permanent significance" of the treaty line may be open to speculation; nevertheless, it is definitely an essential concern in the relationship of the boundary to the cultural landscape. With the delineation of the treaty line and the adjacent public lands, the way was finally open for the settlement of these cession lands.

Settlement

Prior to Wayne's victory at Fallen Timbers, there were settlements in what is now the state of Indiana. The majority of these, of course,

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[85] Ernst, Compass and Chain, p. 180.

were Indian settlements, particularly of the Miami, Wea, Piancashaw, and Potawatomie tribes. Most of the tribal settlements were located within the fertile valleys of the Wabash, White, Whitewater, and Maumee rivers. There were a few European settlements in the region as well, notably the French enclaves at Vincennes and ouiatenon. During this time period, however, there were no permanent, organized American settlements except at Clarksville, which was the main center of settlement of Clark's Grant located in Clark County, Indiana. Emigration was moving in this direction, with major settlements at such places as Marietta, Columbia, Losantsville, Gallipolis, and Manchester. The real impetus for migration into southern Ohio and southeastern Indiana was the negation of the Indian power following their defeat at Fallen Timbers. Before Wayne's victory, settlement in the Northwest Territory, especially in this region, had been restricted because of the threat of Indian attack.[86] With the removal of this threat, settlements began to increase.

The question which immediately arose with the influx of these settlers was where were they going to reside. It will be remembered that the government did not propose to offer lands at public sale until they had first been delineated in the rectilinear manner and legally entered in survey plats. Although the survey of these public lands proceeded as quickly as possible after the Indian title had been extinguished, many people did not want to wait for such a

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[86] Barnhart and Riker, Indiana to 1816, p. 306.

formality and simply chose the land they desired and settled on it. Such individuals were known as "squatters", a term which merely signified that they were illegally establishing themselves on land to which they had no claim.

With the resurgency of settlement in the Northwest following Fallen Timbers, the problem of illegal settlers also grew, especially in those areas where there were valuable agricultural lands. Such a problem existed in the area west of the Miami rivers. Government officials were concerned over these incursions, Winthrop Sargent, for example, wrote the Secretary of State that he was alarmed over

> the great Increase of Intruders upon the Lands of the United States who are lessening the value thereof by a waste of Timber - and may soon become formidable from their numbers - Immediately over the great miami report makes them nearly two hundred families.[87]

Such intrusions presented a definite problem to the federal government by undermining its policy of survey prior to settlement. Sargent proposed that the squatters be forcibly removed before their numbers increased to the point where more extensive and expensive measures would be required.[88] While a few families might be removed, the influx of illegal settlers into the region was too great to prevent the increase of squatting. The problem remained, with Putnam writing to the Secretary of Treasury almost a year later that

> many persons have Set down on the Lands of the United States Northwest of Ohio; particularly on that tract Westerly

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[87] Carter, Territorial Papers, Vol. III, p. 497.

[88] Ibid.

> of the Ohio and the big Miami Rivers & above the mouth of the Kentucky River in which the Title of the Indian Tribes have been extinguished...It is Supposed these intrusive settlers in these two districts amount to three hundred Families; it is said they are chiefly imigrants from Kentucky & that they are daily increasing.[89]

Despite the illegal settlers, the survey of the Greenville cession lands proceeded, plats were prepared and the land offered for sale at public auction. Under the Land Act of 1800, four regional land offices were established to facilitate the sale of lands in the Northwest. Each office had a specific district for which it was responsible.[90] The Greenville Treaty lands in Indiana were part of the Cincinnati Land Office District, which included all lands west of the Little Miami River and the Virginia Military District and south of the Greenville Treaty line in Ohio.[91] The treaty line also formed the western boundary of the land district except for a strip of land twelve miles wide to the west and adjacent to the northern part of the boundary in Indiana. This twelve mile swath was the result of a treaty cession which will be discussed later. The Land Act of 1800 also set the dates for the first sales at the new land offices. At the Cincinnati Land Office the first sale of lands in sections and half-sections was to be held on the first Monday of April, 1801.[92]

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[89] Ibid.

[90] U.S. Statutes at Large, Vol. II, p. 74.

[91] Rohrbough, Malcolm, The Land Office Business, (New York, N.Y.: Oxford University Press, 1968), p. 24.

[92] U.S. Statutes at Large, Vol. II, p. 74.

With the completion of the surveys and the public sales, legitimate settlers began to take up residence in the Greenville cession lands. The cession lands in Indiana, the "gore" section, did not immediately receive a large number of land entries, the main thrust of settlement still being in the Ohio lands west of the Great Miami River. Even after the first entry in this part of the Cincinnati Land District was made, it was several years before the area attracted large numbers of settlers.[93] The reasons for this initial lack of interest lie in the fact that this was still essentially a hostile area and unattractive to settlers from the east. While this may have been a factor at first, the population of this region did increase, especially in the sourthern part of the gore lands. The main focus of settlement was the fertile alluvial lands of the Whitewater River Valley situated in what is now Franklin, Fayette, Union, Wayne, and part of Dearborn counties. The first land entry in the valley was made in Franklin County in May, 1803; the second was made in January of 1804 in the same county.[94] The next year a group of settlers from South Carolina located on the East Fork, Whitewater River in northern Franklin and southern Union counties, blazing a trail to this area from Ohio known as the Carolina Trace.[95]

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[93] Waters, Margret, Indiana Land Entries, Vol. I, Cincinnati Land District - 1801-1840, (Indianapolis: Indiana State Historical Society, 1948), p. iii.

[94] Lawlis, Chelsea, "Settlement of the Whitewater Valley, 1790-1810," Indiana Magazine of History, Vol. 43, 1947, p. 30.

[95] Ibid.

In succeeding years settlers pushed up the Whitewater Valley in greater numbers, with the lower and central portion of the area attracting many of them. In 1805 the first land purchases were made in Union County, land being entered in Center and Union townships. Wayne County also had its first land entry during this year, with two settlers establishing themselves near what is now the city of Richmond.[96] While a few land entries were made in the northern part of the Greenville cession lands, the lower sections of the valley attracted the most emigrants for several years. In time, however, this northern area of the cession lands in Wayne and Randolph counties began to receive an increasing number of settlers. One group to settle in this area after 1806 were Quakers from the Carolinas, many of whom took up residence in Wayne County.[97]

The settlement of the Greenville cession lands was not limited to the Whitewater River Valley. While the valley was being settled Switzerland, Ohio, And Dearborn counties were also receiving a substantial number of emigrants. The first land entry for the entire cession lands was recorded in Ohio County in 1801. Lawrenceburg, on the Ohio River, was a major settlement in this part of the cession lands, and served as the county seat of Dearborn County when it was first established. This portion of the cession lands is located,

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[96] Young, Andrew, History of Wayne County, Indiana, (Chicago, Ill.: Interstate Publishing Co., 1884), Vol. I, pp. 354-355.

[97] Lawlis, "Settlement of the Whitewater Valley", pp. 30, 32.

for the most part, on the maturely dissected Dearborn Upland, where it was difficult to clear the land and farm. In 1804 a group of Swiss emigrants settled in the southeastern part of Switzerland County, where they proposed to utilize the ample water supply and steep slopes of this hilly area for vineyards.[98] The town of Vevay was founded in 1813 to accomodate these settlers.

With the increasing population of the Old Northwest Territory, came a demand by its inhabitants for a division of the territory for the purpose of more efficient government. On May 7, 1800, Congress passed a law dividing the Northwest into two territories providing

> That from and after the fourth day of July next, all that part of the Territory of the United States Northwest of the Ohio river, which lies to the westward of a line beginning at the Ohio, opposite the mouth of the Kentucky river, and running thense to Fort Recovery, and thense north until it shall intersect the territorial line between the United States and Canada, shall, for the purposes of temporary government, constitute a separate territory, and be called the Indiana Territory.[99]

The Indiana portion of the Greenville Treaty Boundary Line formed the southeastern part of the designated eastern territorial dividing line. This territorial boundary was only intended to be a temporary line, with the law stipulating that

> whenever that part of the Territory of the United States which lies to the eastward of a line beginning at the mouth of the Great Miami River, and running thense due north to the territorial line between the United States and Canada, shall be erected into an independent state...said line shall become

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[98] Brown, Historical Geography, p. 240.

[99] Annals of Congress, Vol. III, Appendix, p. 1496.

and remain permanently the boundary line between such State and Indiana Territory.[100]

During the next two years migration to the eastern division of the Northwest Territory increased to such a degree that the formation of a separate state could be considered. In May, 1802 an enabling act was passed which authorized the holding of a constitutional convention to form a state government.[101] Two sections of this act related to boundaries. In section 2, the boundaries of the proposed state were established, with the western border being located in a line due north from the mouth of the Miami River as previously stipulated by law. Section 3 formerly attached the gore portion of the Greenville Treaty cession lands to Indiana Territory.[102] The attachment of the gore to Indiana Territory did not please many people in the western district of the proposed state of Ohio because of the relatively well developed settlement on the fertile river bottoms in the cession lands.[103] Some settlers in the gore area also wanted to be under the jurisdiction of Ohio and so applied to Congress in the form of a petition in 1805, but no action was taken.[104]

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[100] Ibid, p. 1499.

[101] U.S. Statutes at Large, Vol. II, pp. 173-175.

[102] Ibid., p. 174

[103] Pense, George and Armstrong, Nellie, Indiana Boundaries: Territory, State and County, Vol. 19, Indiana Historical Collections, (Indianapolis, Ind.: Indiana Historical Society, 1933), p. 4.

[104] Annals of Congress, 9, 1st Session, pp. 294, 467.

As the area of settlement in Indiana Territory increased, territorial officials, especially the territorial governor, William Henry Harrison, considered it imperative to clear title to additional tribal lands. Harrison pressed the region's various tribes for land cessions to facilitate the expansion of settlement. Between 1803 and 1809 the governor negotiated eight traties with accompanying land cessions. However, only two of these treaties -- the Treaty of Grouseland (1805) and the Treaty of Fort Wayne (1809) -- are important to this study. (Fig. 8) Their importance lies in the fact that they extinguished the tribal land claims to the lands west of, and adjacent to the Greenville Treaty Boundary Line.

The first of these treaties negotiated was held near Vincennes with the Delaware, Potawatomie, Miami, Eel River, and Wea. Article II stipulated that the Miami Eel River, and Wea cede and relinguish all claims to land which

> lies to the sourth of a line to be drawn from the northeast corner of the tract ceded by the treaty of fort wayne (an earlier treaty held in 1803), so as to strike the general boundary line (the Greenville Treaty Boundary Line), running from a point opposite the mouth of the Kentucky river, to fort Recovery, at the distance of fifty miles from its commencement on the Ohio River.[105]

This ceded area is located to the southwest of the Greenville line and north of Clark's Grant, and included Ripley, Jefferson, Scott, and Clark counties, as well as portions of Jennings, Jackson, Washington, Orange, Harrison, Floyd, Switzerland, Franklin, and

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[105] Kappler, U.S. Indian Treaties, pp. 80-81.

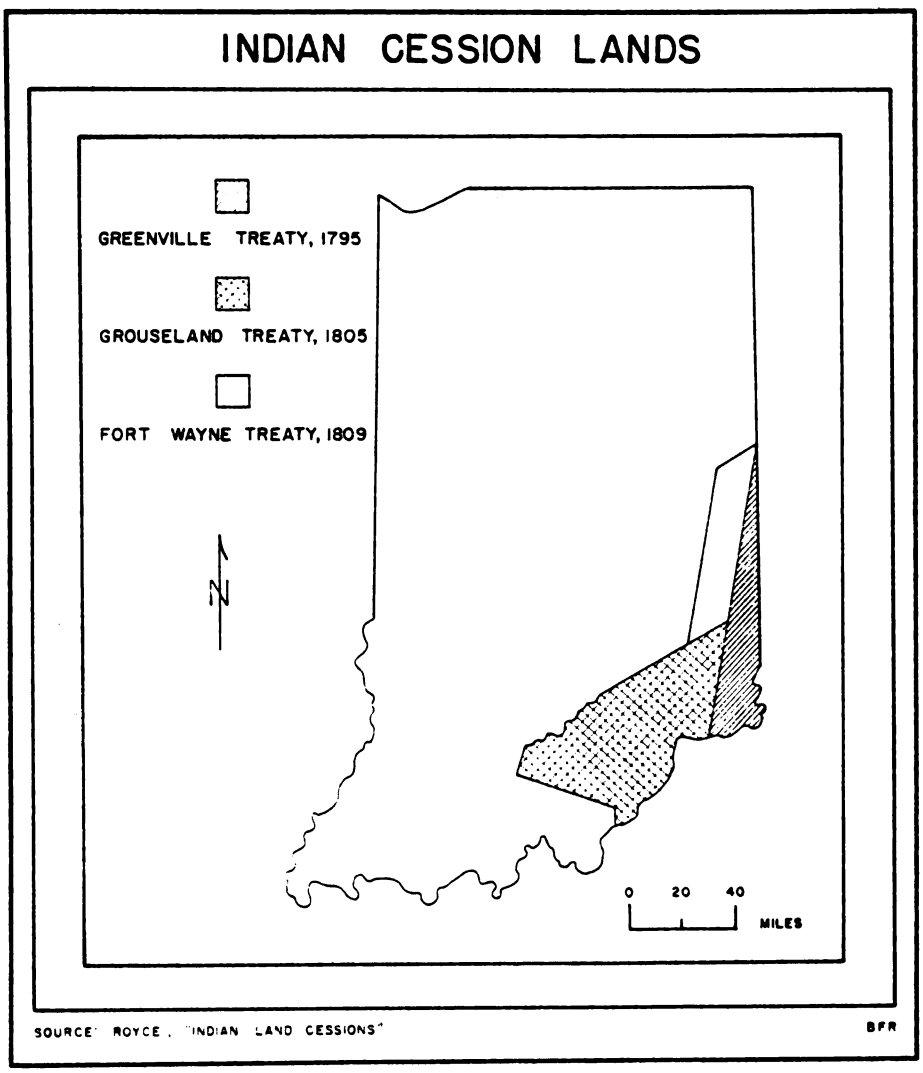
INDIAN CESSION LANDS
GREENVILLE TREATY, 1795
GROUSELAND TREATY, 1805
FORT WAYNE TREATY, 1809
N
0 20 40
MILES
SOURCE: ROYCE, "INDIAN LAND CESSIONS"
BFR

Figure 8.

Lawrence counties. The Grouseland cession opened up a vast area of settlement in the southeastern part of the territory and at the same time pushed the Indian border back from the Ohio River.

The Treaty of Fort Wayne was with the Delaware, Potawatomie, Miami, and Eel River tribes.[106] It provided for two major cessions of land by the Indians -- one tract northeast of the Vincennes tract and the other adjacent to the Greenville line. The boundaries of the latter were thus set forth:

> Beginning at Fort Recovery, thense along the general boundary line established by the treaty of Greenville, to its intersection with the boundary line established by the treaty of Grouseland, thense along said line to a point from which a line drawn parallel to the first mentioned line will be twelve miles distant from the same, and along said parallel line to its intersection with a line to be drawn from Fort Recovery, parallel to the line established by the said treaty of Grouseland.[107]

This tract later became known as the Twelve Mile Purchase; it was shaped in the form of a parallelogram, with its north and west borders running parallel to the Grouseland and Greenville lines respectively. This strip included poritions of Jay, Randolph, Wayne, Fayette, and Franklin counties.

With increasing population and land acquisition in the territory and then the state of Indiana, it became important to have some sort of government on the local level. To this end various counties were established. At first the county boundaries frequently

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106 Ibid, pp. 101-102.

107 Ibid, p. 101

followed water courses and undefined or unmapped lines.[108] When more of the state was surveyed, these lines were used to a greater extent in describing county boundaries.

Initially, Indiana had only one super-county, Knox County, which covered the entire state. In time this one large county was divided, with Hamilton County in Ohio being extended to the Greenville Treaty Boundary Line. With the statehood of Ohio, the Greenville cession lands were attached to Indiana. The settlers in this gore area felt they needed an administrative center nearer to them, therefore Dearborn County was formed in 1803 and included all that area east of the treaty boundary in Indiana. The county boundary was described as,

> Beginning at the mouth of the great Miami; thense north along the line separating Indiana Territory from the State of Ohio, to the Intersection thereof with the Indian Boundary line running from a point opposite the mouth of the Kentucky thense along the last mentioned line to the Ohio River and up the said river to the place of beginning.[109]

During the next few years additional counties were created out of Dearborn County, as well as other large counties to the west of the treaty line. Following the creation of Dearborn County, Franklin and Wayne counties were formed in 1810, Switzerland County in 1814, Ripley County in 1816, Randolph and Fayette counties in 1818, Union County in 1821, and Jay County in 1835. Once a county

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[108] Pense, Indiana Boundaries, p. 20

[109] Ibid, p. 308.

was formed, however, this did not mean that its borders were finalized. With the formation of new counties and minor adjustments in others, these county lines were in a continuous state of flux. Some counties such as Wayne County went through seven separate boundary modifications. With the finalization of the Dearborn County line in 1845, the county boundaries in the study area were in final form. In addition, their descriptions had also changed from being defined by natural features such as the Ohio River or old treaty cession lines such as the Greenville line, to boundaries described by fundamental survey lines. The final boundary adjustment of Franklin County in 1826 is an example of such a reliance on survey lines. The boundary adjustment between Franklin and Union counties is described as beginning:

> at the south west corner of section thirty-six in township 13, range 13 each of the second principal meridian; thense east with the section line, to the south east corner of section 13, town 10, in range one west of the first principal meridian...[110]

As an aid to understanding the settlement of the Greenville cession lands, as well as those of the Gouseland and Fort Wayne treaties, it might be useful to consider the records of some selected township sites within the Cincinnati Land District. (Fig. 9) To facilitate this investigation, the land office entries were reviewed and, beginning with the southern most townships adjacent to either side of the boundary line and those farthest away from it, the entries in approximately every third township were examined.

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110 Ibid, p. 362.

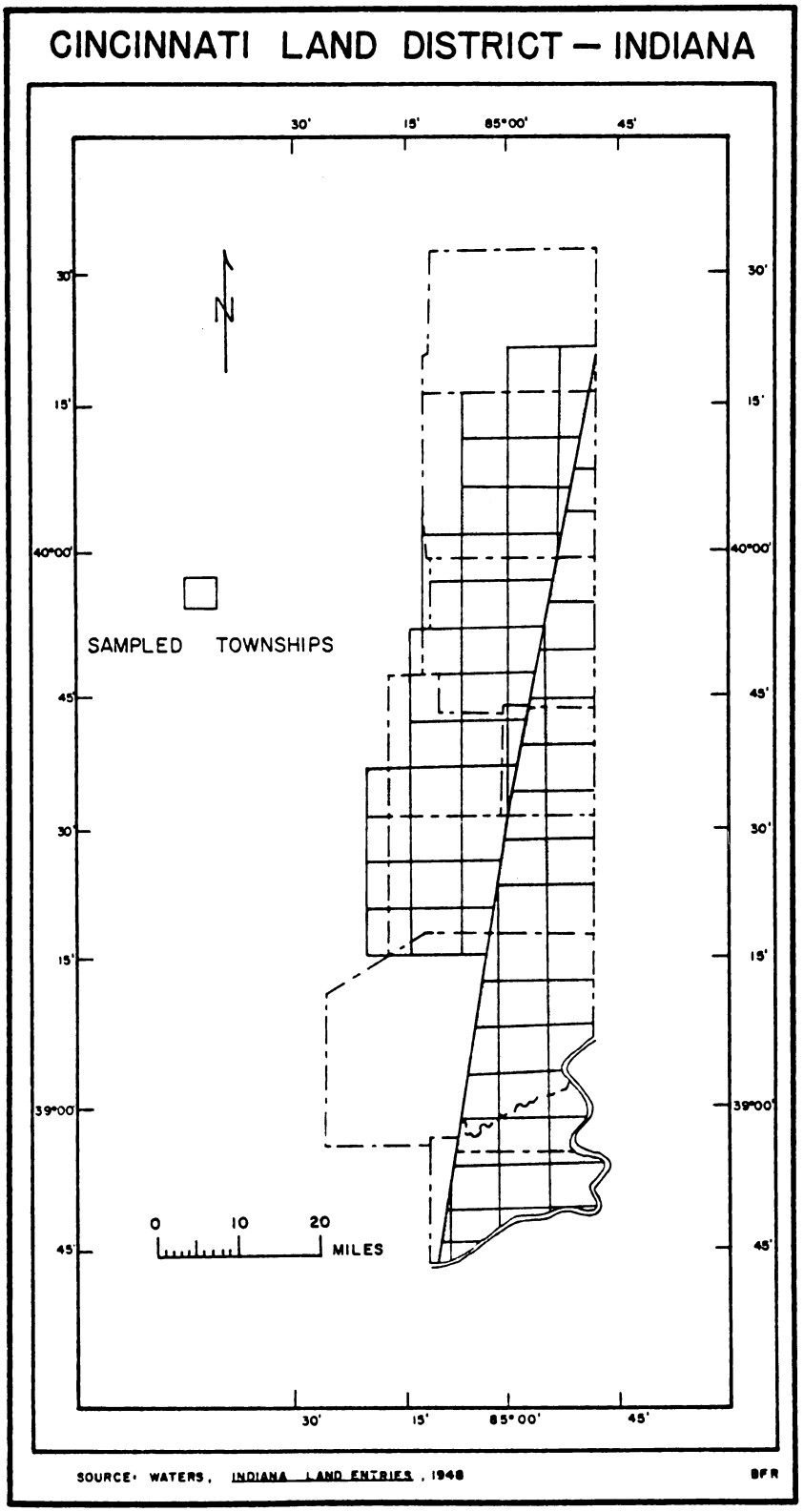
CINCINNATI LAND DISTRICT — INDIANA
30'
15'
85°00'
45'
N
SAMPLED TOWNSHIPS
40°00'
39°00'
0 10 20
MILES
SOURCE: WATERS, INDIANA LAND ENTRIES, 1948
BFR

Figure 9.

These townships were then checked individually by adding together all of the dates of entry and then obtaining an average of the summed figures. In this way an average entry date was found which was assumed to be respresentative of the date of settlement for that particular township. The purpose of this procedure was not to perform any sort of statistical analysis of land entries in the study area. Instead, it was done to illustrate the general path and times of the trust of settlement in these treaty cession lands.

The Cincinnati Land Office District in Indiana contained 82 whole or fractional townships, of which 22 townships -- or approximately 27% of the total -- were examined. Ideally it would have been preferable to have had this township entry data represented in four separate tiers or columns for comparison. Unfortunately, with the diagonal orientation of the treaty line, this was not feasible. Even so, the entry data should provide insights into the settlement of these cession lands.

A study of the data listed for the selected townships indicates that settlement of these lands in Indiana started in the southereastern portions and advanced in a north, northwesterly direction. This settlement pattern was undoubtedly the result of the accessibility of this part of the study area from the Ohio River and up the Whitewater River Valley. The settlement of the cession lands of any significant "leap-frog" effect where a number of more northerly townships are settled before those to south of them. A review of the average settlement dates also suggests that the Greenville Treaty

Boundary Line did not act as any sort of a barrier to settlement. It must also be remembered that prior to most of the settlement dates listed the Indian title to lands immediately to the west of the boundary line had been cleared by the treaties of Grouseland and Fort Wayne. With the rapid delineation of these lands into townships and sections, the Greenville line never really had time to become a settlement barrier or restricting line. Only T 1 N, R 1 W of the First Principal Meridian had an average settlement date prior to the Fort Wayne Treaty; and a year later only two more of these townships -- T 1 N, R 4 W and T 3 N, R 1 W -- were settled. This apparent lack of settlement might have been the result of the settling of the Ohio portion of the cession lands first, as well as Indian problems in Indiana immediately preceding and during the War of 1812.

While the average settlement dates of the individually selected townships cover a 31 year span, computed figures actually show a much more rapid settlement of the Greenville cession lands and those of the Twelve Mile Purchase. By 1818 -- 17 years after they were opened for sale -- 73.3% of the Greenville cession lands had passed into private ownership, an average annual sale rate of 4%.[111] This figure was even higher in the gore area, with 86.3% of the cession lands in Indiana being sold by 1818. In addition, 59.4% of the lands in the Twelve Mile Purchase had been sold by this date, having been

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[111] Before the Indian Claims Commission, U.S. Court of Claims, Docket N. 67, September 17, 1956, p. 4 370.

put on the market in 1811, and represented an average annual sale rate of 7.3%.[112] Land sales increased substantially between 1811 and 1820, with 59.4% of the available unsold acreage in the cession lands being disposed of at an annual rate 9.4%.

This rate of settlement can also be illustrated in the figures for the population density of the region. In 1800, when the Greenville cession lands were opened for sale, the population density in the western part of Ohio was somewhat less than 3 persons per square mile, and in southeastern Indiana at this time, there was practically no American settlement at all.[113] With the opening up of the Twelve Mile Purchase in 1811, the density of population in western Ohio was 5.7 persons per square mile, and 1.3 persons for Indiana; the density of the Greenville lands, however, was 13.5 per square mile.[114] As more and more land was alienated from the tribes and opened up for settlement, the density of population increased accordingly, so that by 1820, Ohio averaged 14.7 persons per square mile, Indiana 6.4 per square mile, and the Greenville lands 27.7 persons per square mile.[115]

While the War of 1812 and the depression of 1819 tended to slow settlement of the study area, it did not stop it completely. The

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112 Ibid.

113 Ibid, p. 4 368

114 Ibid.

115 Ibid.

rate of growth was slower than it had been prior to 1819, but the steady influx of settlers into the area continued. The clearing of tribal title to lands in eastern Indiana made it possible for those settlers already on the land to move westward, while new immigrants took over their land.[116] With the gradual removal of the tribes, greater number of settlers felt secure in moving to this part of the county.

The extent of this population growth is shown by the increase of inhabitants in the Whitewater Valley. In 1809 there were approximately 6,000 people living in the valley, by 1820 there were about 29,000 -- an increase of almost 79%.[117] The majority of these emigrants came, as had earlier ones, from North Carolina, Virginia, Kentucky, Ohio, and Pennsylvania, along the main trails and water routes. More improved routes were being established during this period, with the National Road passing through Richmond in 1828. Even with roads coming in from the east through Ohio, the main direction of settlement was still from the southeast, and up the Whitewater Valley.

The heaviest concentration of settlement in the area was still in lower regions of the Whitewater Valley; some of the more central portions of this valley, however, were also heavily populated in

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116 Lawlis, Chelsea, "Migration to the Whitewater Valley, 1820-1830", Indiana Magazine of History, Vol. 43, 1947, p. 238.

117 Ibid, p. 225.

comparison with other, more northerly areas. Brookville, a major focal point of the settlement in the middle valley area, had by 1826 a number of businesses, mills, blacksmiths, and a post office.[118] To the north, Union County was also attracting large numbers of emigrants. Although this county did not possess the commercial or industrial development of the counties to the south, its land was of a better quality for general farming. By 1826 there were 6,000 residents in the county, mostly concentrated in the northeast and southeast sections. The town of Liberty, laid out in 1822, became the county seat the following year with a population of about 200.[119] Wayne County also experienced a rapid growth throughout the 1820's and 1830's, with some eight towns being laid out. The main area of settlement was still around Richmond, which had a population of 648 by 1826, while the whole county had about 17,000 inhabitants.

Throughout the decades of the 1850's, 60's, and 70's the rate of settlement in the southern counties was declining.[120] While in 1850 the densest concentration of population was still in the river towns on the Ohio, their rate of growth was decreasing. Greater numbers of people were beginning to settle in the central and

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118 Ibid, p. 232.

119 Ibid, p. 233.

120 Thornbrough, Emma, Indiana in the Civil War Era, 1850-1880, (Indianapolis, Ind.: Indiana Historical Society, 1965), p. 1.

northern parts of the state, especially on the Tipton Till Plain, where land was more fertile and slopes less steep than on the Dearborn Upland to the south. By 1850, population in the southern part of the state was a little greater than in the central, and throughout this decade beoth sections remained relatively unchanged, each increasing its population by about 25%.[121]

During the decade of the 60's, the central third of the state overtook the southern third in population. Some counties in the study area such as Switzerland, Dearborn, and Franklin either remained stable or began to lose population by 1880.[122] By 1888 the counties in the study area had been effectively formed and settled with all the land having passed from the public domain to private ownership. Towns had been laid out and the road network throughout each county had already been established -- primarily on the surveyed section lines. In short, aside from continuing adjustments and modifications, the framework of the present-day cultural landscape of the study area had been formed.

Summary

At the end of the last chapter, the first two links of the

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[121] Ibid, p. 538.

[122] Ibid, p. 363.

Unified Field Theory, idea and decision, were discussed in terms of the information presented. With the additional information presented in this chapter, the remaining links of circulation, field, and political area can be examined.

Following decision, the next link in the chain is movement or circulation. As stated in the first chapter, there are various types of movements which result from a single political decision. In the case of the Greenville Treaty Boundary Line, an initial movement was generated by the signing of the treaty and the cession the land by the Indian tribes. This initial circulation was the movement of surveyors and soldiers into the cession lands to demarcate the boundary line and then to delineate and lay-out the township and range lines west from the First Principal Meridian to the demarcated boundary line. Strickly speaking, the Greenville Treaty did not initiate the survey of the public domain in the Northwest Territory, for a great deal of surveying had already been performed prior to the treaty, and some fields of survey were being carried out on private tracts not affected by the treaty. What the Greenville Treaty did do, however, was to set a limit, through its boundary line, on the extent of surveying. Thus, the treaty set up a barrier to the circulation of the surveyors in this region by setting a limit on those lands belonging to the United States which were ready for survey.

Another movement, on a far greater scale, was also generated by the Greenville Treaty. This circulation involved the movement of

people and goods into the cession lands for the purpose of settling on these lands after purchase from the government. With the clearing of tribal ownership of the land, as stipulated in the treaty, the way had been opened for the movement of people from other parts of the county into the cession lands. The circulation of the settlers was somewhat restricted by the Greenville Treaty, again by the boundary line. Circulation was limited in the same sense that legal purchases of land were restricted to the east of the treaty line. Here again, the boundary functioned as a barrier to authorized settlement. The boundary line only operated as a barrier within an abstract legal basis; it was not a physical barrier which hindered unauthorized settlement on the western side of the line. This unauthorized settlement was in the form of squatters who illegally settled on a piece of lance without purchasing it from the district land office. Squatters were a continual problem on the frontier, and in the case of the Greenville cession lands, they were almost impossible to control. Thus individuals were capable of circulation throughout the cession lands and beyond. The movement that was regulated by the treaty line, however, was the legal purchase of these public lands.

While the Greenville Treaty resulted in movement, the type of movement varied. In the case of the federal surveys, the type of circulation throughout the cession lands was one of a continuous point-line movement. With the surveyors who demarcated the boundary line itself, a point was initially established at Fort Recovery

and a survey was started on a straight line bearing to the southwest. This line was not finished that year, but during the next year it was completed by starting at a specifically defined point on the north bank of the Ohio River. Again this movement was point-line circulation, with a point being established on the boundary line at mile intervals and a line run-out between them. Point-line circulation was also involved in the actual public land survey of the Greenville, and later the Harrison Purchase cession lands in Indiana. Here survey lines were run-out to the west from the township corner points on the First Principal Meridian. Movement through these cession lands was in a grid-like manner, with the surveyor establishing township, section, and quarter-section corner points and then advancing on line to the next point.

The more intense circulation was with the advance of settlers into these lands. Depending on the way this settlement is viewed, several different types of circulation modes resulted from the delineation and sale of the Greenville cession lands. To begin with, if only the migration of a single family is looked at, then the circulation pattern is point to point. Again, scale is a relative factor here, but generally speaking, the movement of families from one piece of land in Pennsylvania, for example, to a piece of land in the cession lands becomes point to point movement. With a change in scale, if all families from Pennsylvania that moved to the cession lands are considered, than this circulation becomes area to area. By changing the emphasis of the circulation being studied, another

circulation pattern emerges. Strictly speaking, a family did not go directly from a farm from Pennsylvania to one in southeastern Indiana -- at least a family planning to make a legal residence. Instead, some member of the family first had to be present at the district land office in Cincinnati to file on a particular piece of land. Taken in this context, the circulation pattern becomes point to area if all such families are studied from the standpoint of their dispersal from Cincinnati to the cession lands.

The definition of point, line, and area are relative terms. For example, a farm obviously occupies a sepcific area, but can be considered as a point in studying point to point circulation patterns. It merely depends on the scale and emphasis of the study. Whatever the type of circulation mode, the main factor to keep in mind is that as a direct result of the negotiation of the Greenville Treaty and the demarcation of the boundary line, and the delineation and sale of adjacent cession lands, movement was initiated. While it is true that other treaties such as the Fort McIntosh and the Treaty of Fort Harmar had been negotiated and land cessions made, the Indian tribes still held the balance of power in the Old Northwest. With their defeat at Fallen Timbers, the power of the tribes was, in effect, negated. This meant that the Treaty of Greenville generated a series of movement patterns which were, in turn, somewhat restricted by the barrier of a legally demarcated boundary line.

With the generation of movement caused by the Greenville Treaty, a circulation field was gradually established. This is to say that a

zone of interaction eventually evolved as a result of the movement of individuals into the area of the cession lands. This does not mean that this region was void of any military, economic, or cultural interactions prior to the Treaty of Greenville. The treaty did, however, stimulate alter existing fields of interaction, and initiated others. For example, prior to the treaty various tribes had established fields of circulation in east-central and southeastern Indiana for the purposes of hunting. There was an economic interaction here, not only among the tribes, but also between the tribes and the British fur traders. Following the Treaty of Greenville this circulation field was altered to an extent because of the boundary line. While tribal hunting privileges south and east of the line were maintained by provisions of the treaty, with the influx of settlers into the area, interactions were initiated which resulted in the alteration of the landscape and the disturbance of the game. This in turn resulted in the continual shift of the tribal circulation field or zone of interaction to the north and west of the boundary line.

Not only did the movement of settlers alter existing fields of circulation, it also established new ones. It is difficult to say exactly at what point a specifically defined field of circulation is formed. In the case of the settlement of the cession lands, this was certainly accomplished with the first clearing of the land for farms and the subsequent establishment of small village and town centers of service. This field of interaction was first limited to

the southern portions of the study area, but as movement expanded to the north and west, the size of the circulation field likewise increased. This field of interaction was varied as it not only included the economic concerns of agricultural production, but also the movement of military patrols, as well as the circulation of religious sects such as the Quakers.

For a circulation field to function, it requires area, and thus involves area type movement patterns. Movements such as area to area or point to area are needed to facilitate these spatial interactions. The space in which the field operates, however, is not an organized unit such as a county or state. The only requirement is an experssion of a particular extent of space, without which interaction cannot take place. The land ceded under the provisions of the Greenville Treaty were located in a politically organized area -- the Northwest Territory as established by the Ordinance of 1787.

CHAPTER V

THE PRESENT-DAY CULTURAL LANDSCAPE

With the survey of the Greenville Treaty Boundary Line and the subsequent survey and settlement of the treaty cession lands, a distinctive cultural landscape began to evolve in this area. Over a period of time some cultural features were modified or were obliterated, while others remained and entrenched themselves in the landscape. These entrenched features serve as relics in illustrating past patterns and relationships.

To examine the landscape form and function in the study area, several cultural landscape features were selected for intensive investigation. These features serve as indicators of the nature of this landscape-survey line relationship. The features selected as being most important in this examination are political lines (state, county, and civil township), survey lines (Government Land Office township and sections), property lines, roads, field boundaries, and land cover/use patterns. Each of these sets of features were studied as to whether they are oriented to the bearing of the treaty boundary, not oriented to the boundary, offset along the line, or situated in a course parallel to the Greenville Treaty Boundary Line. The extent of the features used as indicators in the study area has been measured with respect to the number of miles each occupied in all of the grid cells. In this way various patterns of distribution can be discerned that

enables not only a cell by cell comparison, but also a comparison between various sets of phenomena.

Political and Survey Lines

Because of their close relationship and ease in representation, political and survey boundary lines have been mapped together. (Figs. 10-16) Five categories have been chosen, three political and two survey. The three types of political boundaries examined are state, county, and civil township lines. Civil townships are minor civil divisions within a county, being created for certain administrative purposes on a more local level.[1] These minor political subdivisions, however, should not be confused with survey townships for they both serve two entirely different functions. In many cases -- usually for ease in subdivision -- the boundaries of civil townships will coincide with the boundaries of survey townships. However, there is no legal requirement that the two types of townships must have similar boundaries.[2] There are instances where a particular civil township boundary will conform to some physical feature -- such as a stream -- , but most tend to conform to fundamental survey lines.

The two survey units examined are the Government Land Office (GLO) township and the township section. The pattern of GLO township lines in the study area is readily apparent in studying the mileage figures for these lines. Because the treaty line is

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[1] Thrower, Original Survey and Land Subdivision, p. 48.

[2] Ibid, p. 49.

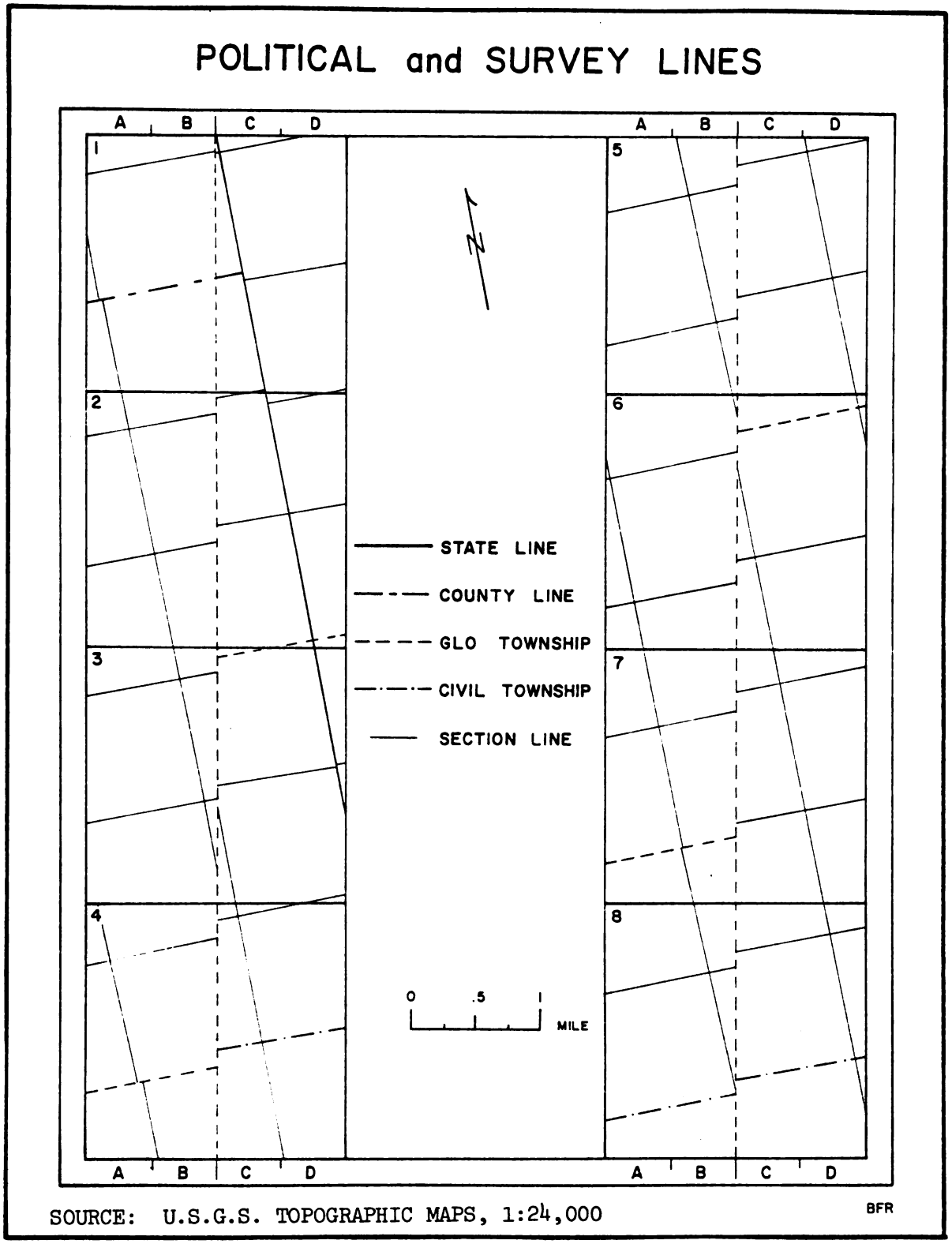
POLITICAL and SURVEY LINES
A B C D
1
2
3
4
5
6
7
8
N
STATE LINE
COUNTY LINE
GLO TOWNSHIP
CIVIL TOWNSHIP
SECTION LINE
0 .5 1
MILE
SOURCE: U.S.G.S. TOPOGRAPHIC MAPS, 1:24,000
BFR

Figure 10.

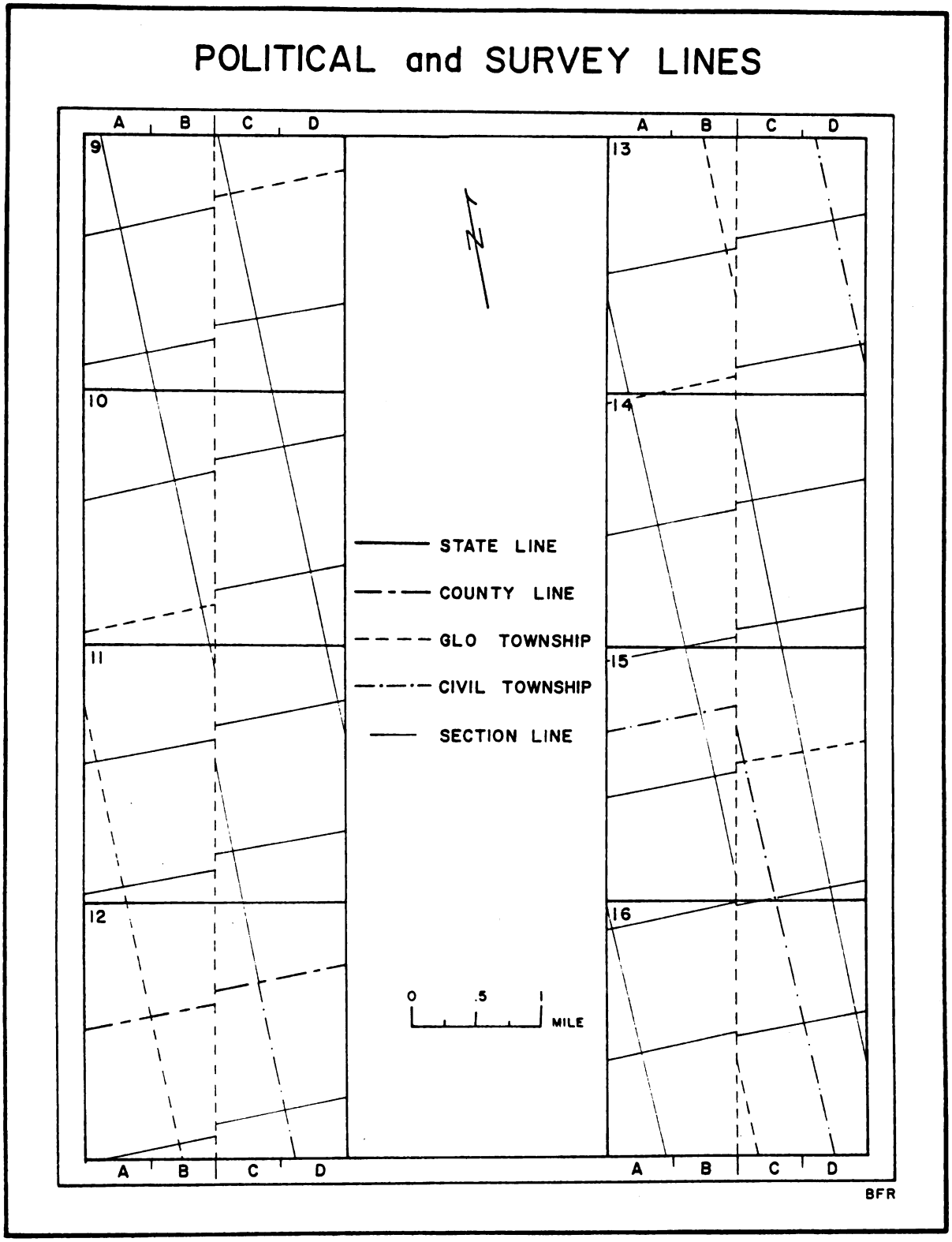
POLITICAL and SURVEY LINES
A B C D
9
10
11
12
13
14
15
16
N
STATE LINE
COUNTY LINE
GLO TOWNSHIP
CIVIL TOWNSHIP
SECTION LINE
0 .5 1
MILE
BFR

Figure 11.

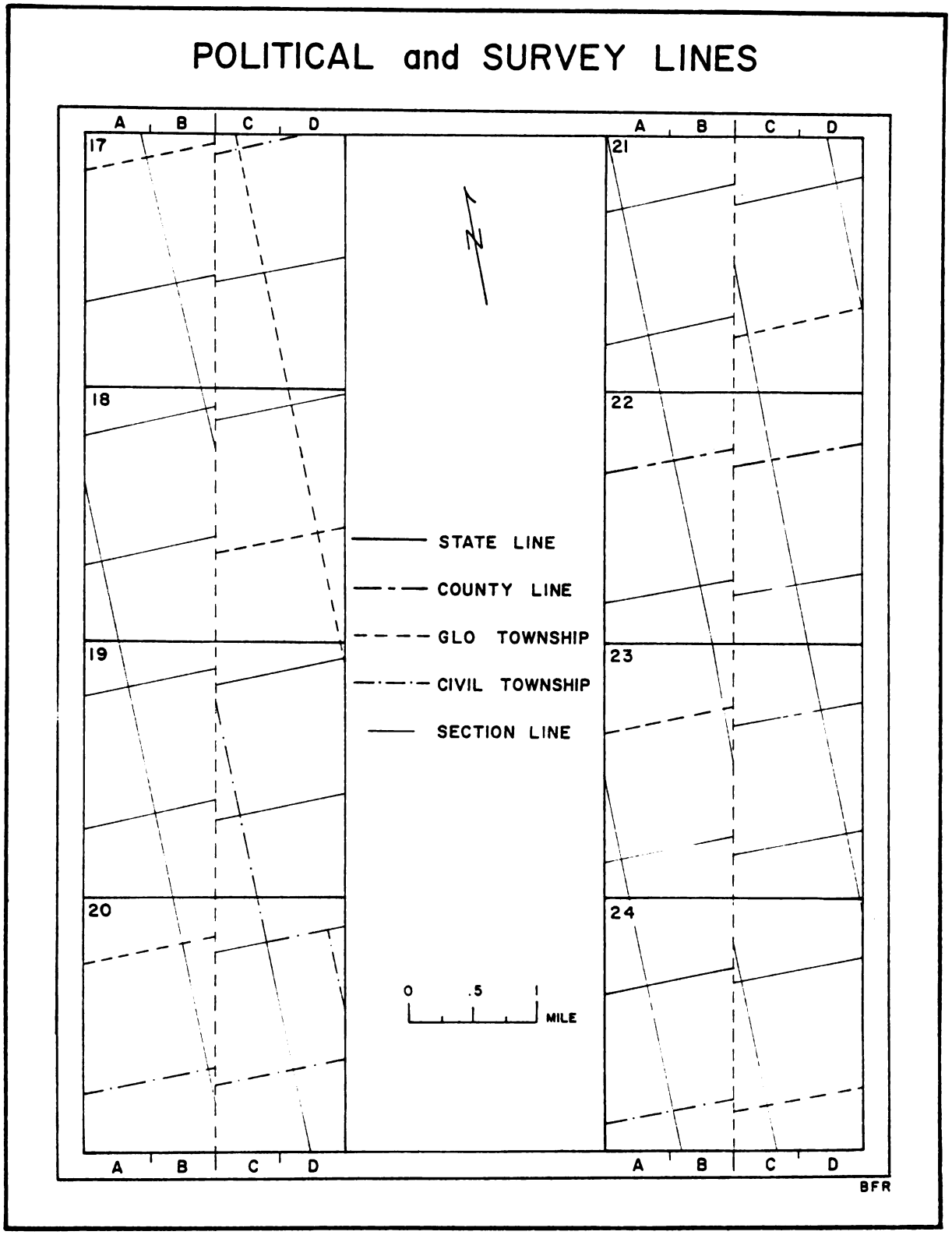
POLITICAL and SURVEY LINES
A B C D
17
18
19
20
21
22
23
24
STATE LINE
COUNTY LINE
GLO TOWNSHIP
CIVIL TOWNSHIP
SECTION LINE
0 .5 1
MILE
BFR

Figure 12.

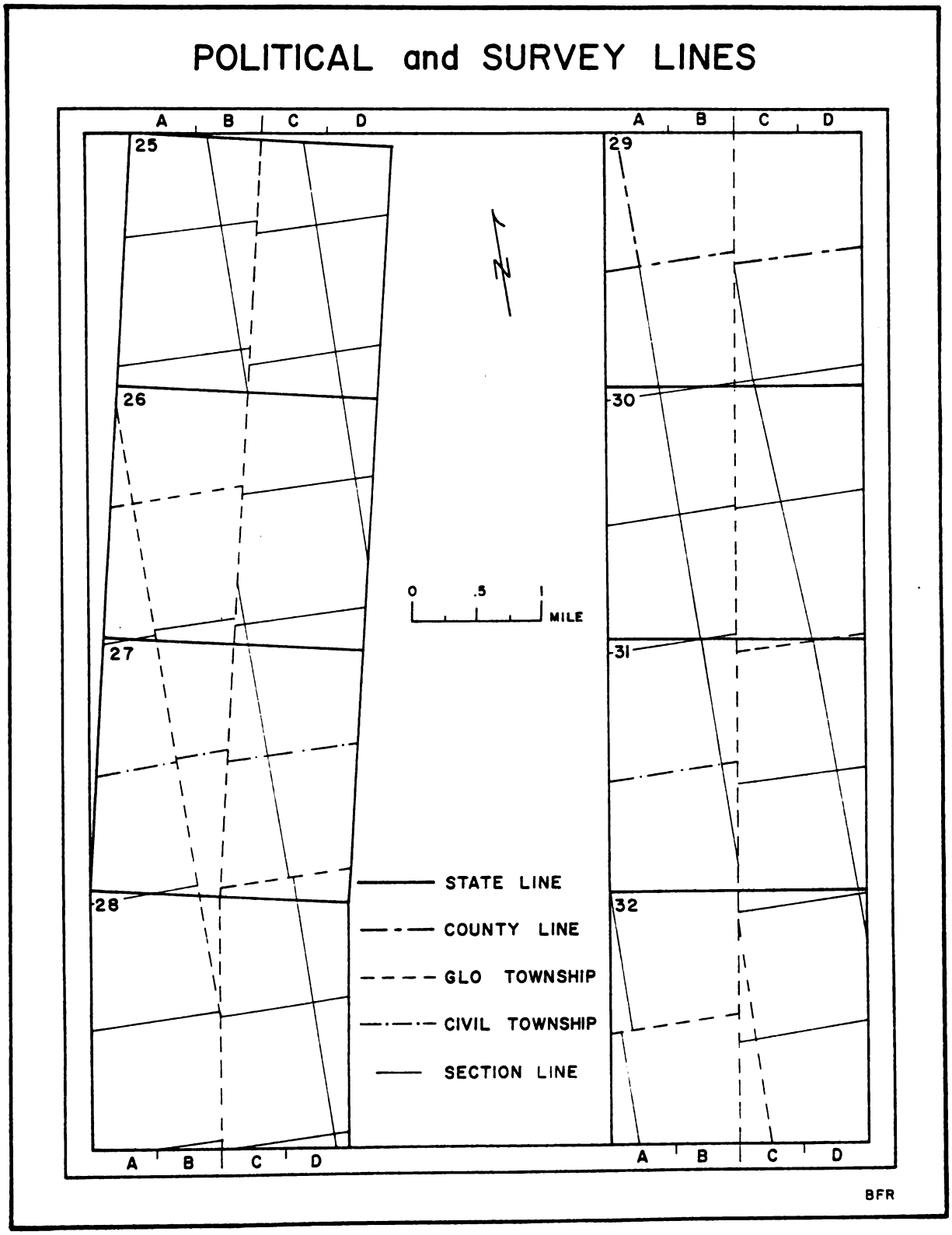
POLITICAL and SURVEY LINES
A B C D
25
26
27
28
29
30
31
32
N
0 .5
MILE
STATE LINE
COUNTY LINE
GLO TOWNSHIP
CIVIL TOWNSHIP
SECTION LINE
BFR

Figure 13.

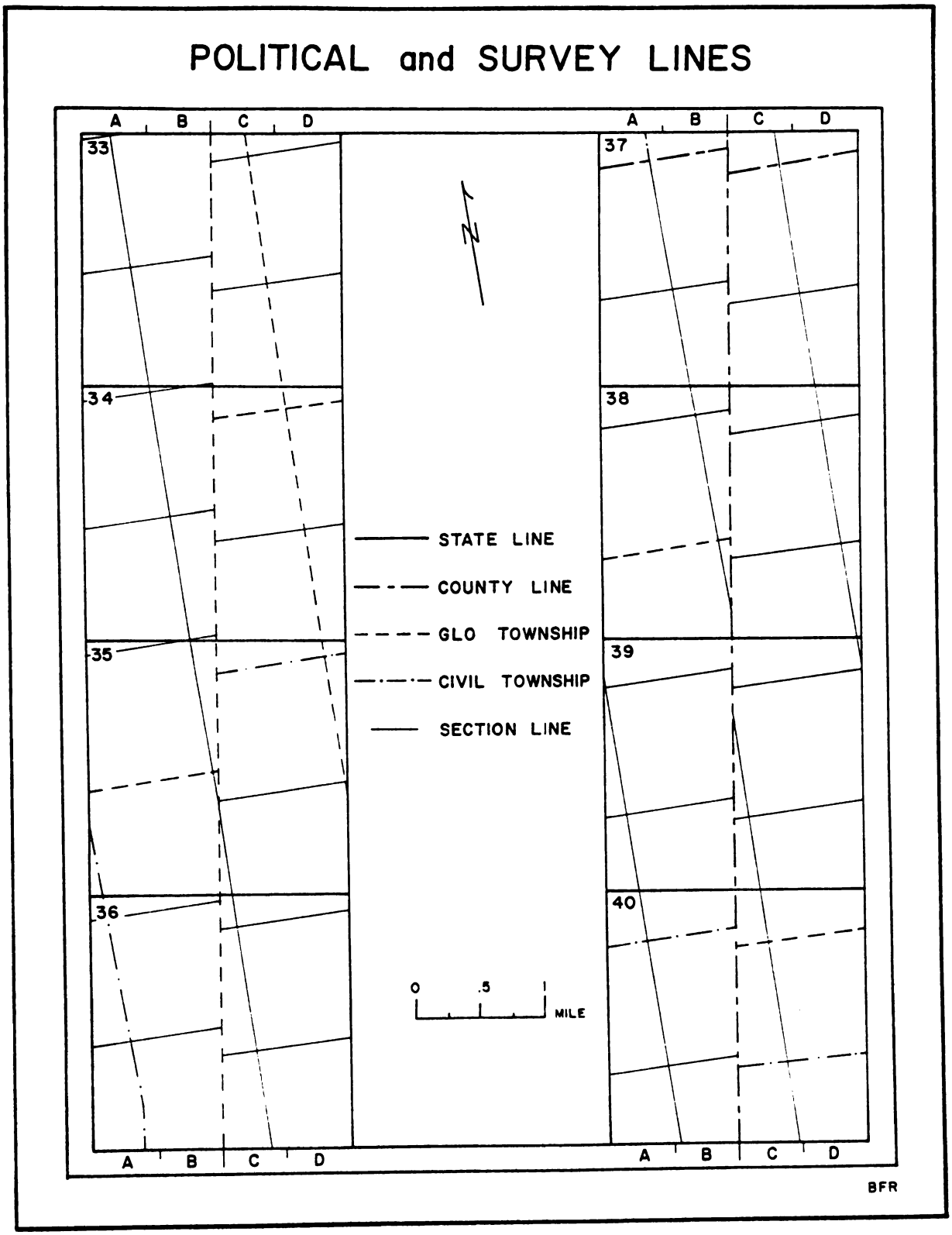
POLITICAL and SURVEY LINES
A B C D
33
34
35
36
37
38
39
40
STATE LINE
COUNTY LINE
GLO TOWNSHIP
CIVIL TOWNSHIP
SECTION LINE
0 .5
MILE
BFR

Figure 14.

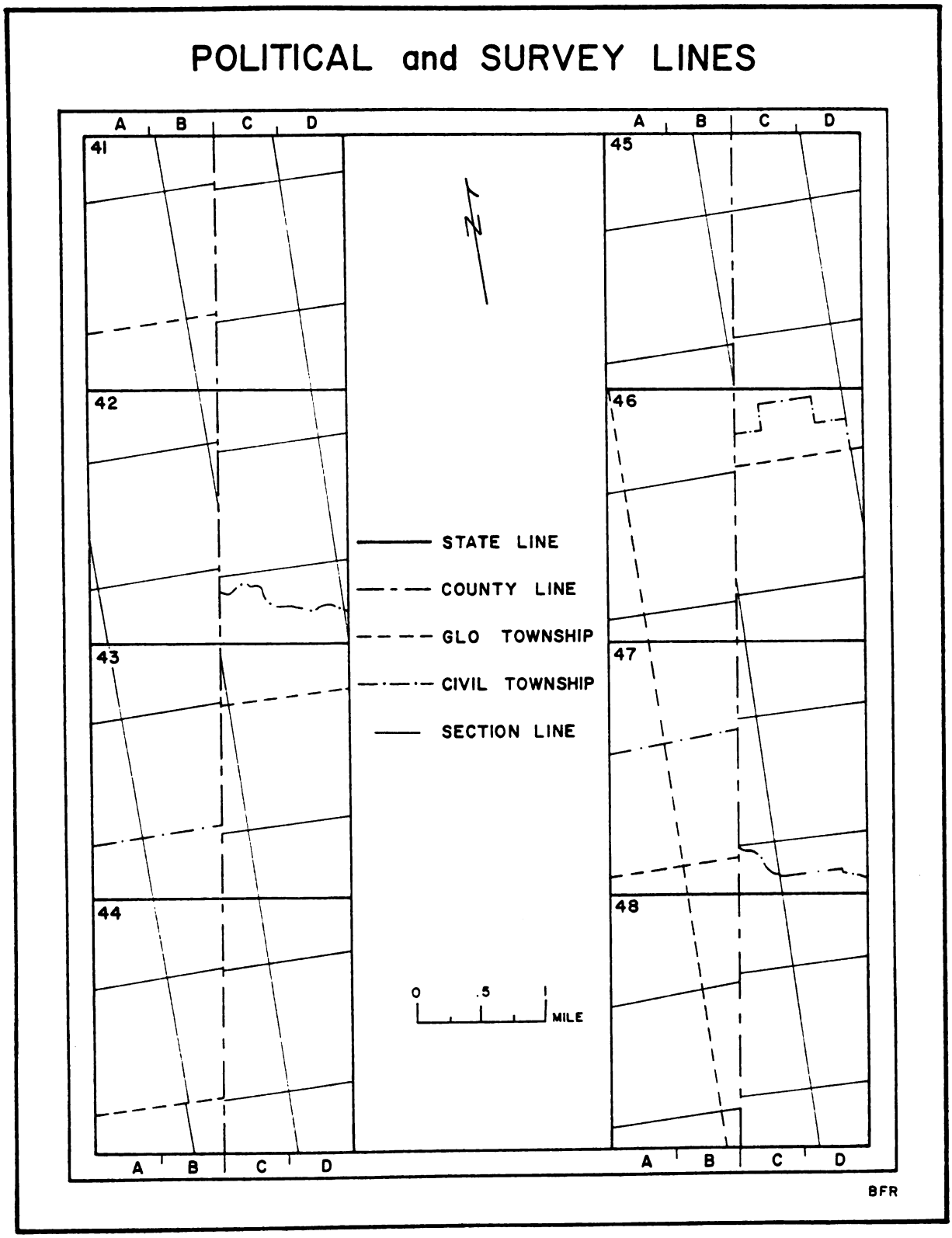
POLITICAL and SURVEY LINES
A B C D
41
42
43
44
45
46
47
48
STATE LINE
COUNTY LINE
GLO TOWNSHIP
CIVIL TOWNSHIP
SECTION LINE
0 .5
MILE
BFR

Figure 15.

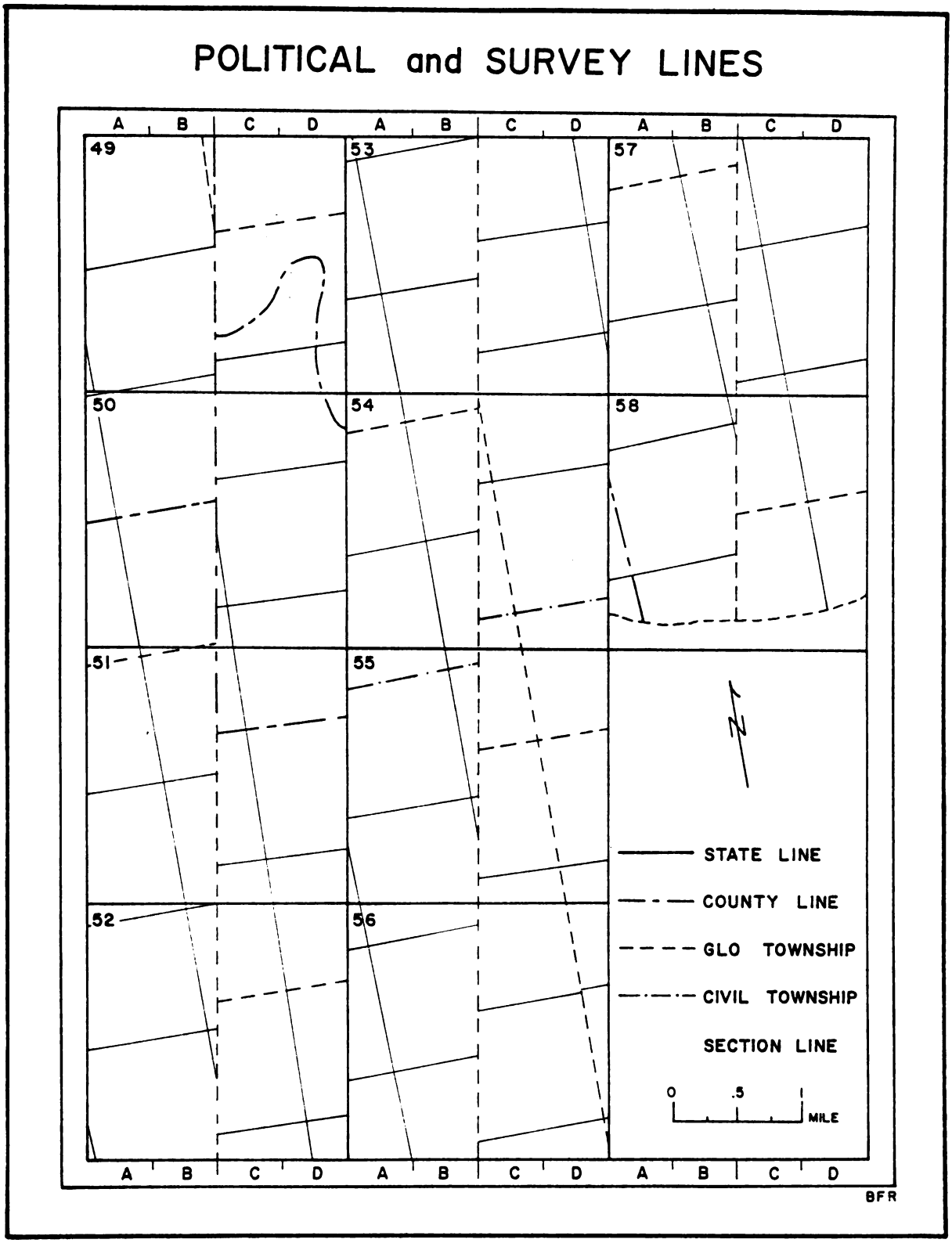
POLITICAL and SURVEY LINES
A B C D A B C D A B C D
49
53
57
50
54
58
51
55
52
56
A B C D A B C D A B C D
STATE LINE
COUNTY LINE
GLO TOWNSHIP
CIVIL TOWNSHIP
SECTION LINE
0 .5
MILE
BFR

Figure 16.

the boundary between lands surveyed from the two principal meridians, every grid cell has 2.00 miles of oriented GLO township lines, as the treaty line serves as a township line. The average figures for GLO townships can be summarized, along with the number of cells in which they occur in parentheses.

GLO Township Averages (In miles)

Oriented	Non-Oriented	Offset
4.0 (c. 58)	1.33 (c. 39)	.28 (c. 3)

In addition to the oriented township mileage, there are also a number of miles of township lines which are not oriented to the position of the treaty line. Because of the layout of the township and range system, township lines are oriented east-west, north-south within the cells. Furthermore, because of the distance between township lines and their offset positioning, not every cell has the same mileage figure. In some grid cells there is no non-oriented mileage whatsoever. To illustrate the GLO township pattern some representative cell figures are listed.

Selected GLO Township Cell Figures (In miles)

Cell #	Oriented	Non-Oriented	Offset
(4) A.	-	.50	-
B.	2.00	.50	-
C.	2.00	-	-
D.	-	-	-
(5) A.	-	-	-
B.	2.00	-	-
C.	2.00	-	-
D.	-	-	-

Cell #	Oriented	Non-Oriented	Offset
(6) A.	-	-	-
B.	2.00	-	-
C.	2.00	.50	-
D.	-	-	-
(7) A.	-	.50	-
B.	2.00	.50	-
C.	2.00	-	-
D.	-	-	-
(8) A.	-	-	-
B.	2.00	-	-
C.	2.00	-	-
D.	-	-	-
(9) A.	-	-	-
B.	2.00	-	-
C.	2.00	.50	-
D.	-	.50	-
(11) A.	-	1.60	-
B.	2.00	-	-
C.	2.00	-	-
D.	-	-	-
(12) A.	-	.83	-
B.	2.00	1.18	-
C.	2.00	.50	-
D.	-	.50	-
(34) A.	-	-	-
B.	2.00	-	-
C.	2.00	-	-
D.	-	2.58	-

The pattern of the non-oriented mileage of GLO township lines becomes apparent in the first few grid cells. The alternating pattern between quarter divisions is present throughout the study

area, and consists of township lines running east-west from the principal meridians. This pattern is evident in cells 4-9. However, there are also present in the study area, north-south trending GLO township lines. These non-oriented lines tend to run the length of many grid cells and thus serve to increase the mileage figures in these cells. Cells 11 and 12 are examples of this type of distribution. This increase in non-oriented mileage figures in some cells is compounded by the intersection of township lines. This is the case in cell 34, for example, where both a north-south and an east-west line pass through quarter division D. Such an occurrence does not take place in many cells, but where it does there is a distinct increase in these figures.

Basically this type of pattern exhibited by GLO township lines is also found when examining section lines in the study area. Because they are subdivisions of townships, section lines also tend to exhibit some of the same characteristics, particularly in the mileage figure increase with intersecting section lines. With section lines being subdivisions of townships, they also share a common boundary, meaning that each grid cell will have 4.00 miles of oriented lines. Also, there are more section lines located within each cell resulting -- in the case of non-oriented mileage figures -- in more miles of these lines than the townships. Again, this pattern can be seen in a few selected cell examples.

Selected Section Line Cell Figures (In miles)

Cell #	Oriented	Non-Oriented	Offset
(2) A.	-	2.13	-
B.	2.00	1.92	.24
C.	2.00	1.53	.24
D.	-	2.77	-
(3) A.	-	1.41	-
B.	2.00	2.83	.21
C.	2.00	.58	.21
D.	-	1.90	-
(4) A.	-	3.20	-
B.	2.00	1.00	-
C.	2.00	2.98	-
D.	-	.70	-
(5) A.	-	1.00	-
B.	2.00	3.02	.32
C.	2.00	1.00	.32
D.	-	3.00	-
(6) A.	-	2.60	-
B.	2.00	1.00	.32
C.	2.00	2.52	.32
D.	-	1.36	-
(13) A.	-	1.85	-
B.	2.00	2.23	.14
C.	2.00	1.00	.14
D.	-	2.98	-
(46) A.	-	3.00	-
B.	2.00	1.00	.08
C.	2.00	1.64	.08
D.	-	2.16	-
(58) A.	-	2.80	-
B.	2.00	2.05	.45
C.	2.00	2.13	.45
D.	-	3.08	-

This pattern is easily seen -- like the GLO townships -- in the first few grid cells. Because the treaty boundary is at an angle to the orientation of the section lines, there tends to be a variation from cell to cell in the amount of non-oriented mileage in each quarter division. This variation is the result of the location of the intersection of the section lines within the grid cells. In examining cells 2-6 an alternating pattern is observed between quarters A and C, and B and D for the reason. It is this basic pattern of non-oriented section lines which repeats itself throughout the study area. There are, of course, some fluctuations in individual cells. Generally speaking, however, the pattern just described is most representative of the relationship between the section lines in the study area, and the treaty boundary.

The last category of section lines classified was that of portions of lines which could be considered to be offset along the boundary. None of the section lines are offset to any great extent, mileage figures being very low for individual cells. However, because section lines do not meet on the treaty boundary, there is a consistent pattern of line offsets. It is this pattern of offsets throughout the entire study area which provides some idea of how the Greenville Treaty line functions as a dividing line between the two survey districts. The consistency of offset mileage can be seen in cells 2-6, as well as in cells 46 and 58 showing the extent of the pattern throughout the study area.

With the establishment of these fundamental survey lines,

various political boundaries began to conform to them as settlement in the area increased. Three of these political lines -- state, county, and civil township -- have been mapped in the study area. First, a portion of the present-day state boundary between Indiana and Ohio passes through the study area. This takes place in grid cells 1-3 for a total of 5.30 miles. All of this mileage is non-oriented because this state line corresponds to the First Principal Meridian, and as such is a true north-south line.

In addition to this state line, a number of county lines are also located in the study area. Most of these lines are not oriented to the course of the treaty line, usually being situated east-west in the grid cells. This orientation is a result of these lines being situated along fundamental survey lines. Such a pattern is illustrated in the following sample cells.

Selected County Line Cell Figures (In miles)

Cell #	Oriented	Non-Oriented	Offset
(1) A.	-	.50	-
B.	-	.50	-
C.	-	2.00	-
D.	-	-	-
(12) A.	-	.50	-
B.	-	.50	.10
C.	-	.50	.10
D.	-	.50	-
(22) A.	-	.50	-
B.	-	.50	.15
C.	-	.50	.15
D.	-	.50	-

Cell #	Oriented	Non-Oriented	Offset
(29) A.	-	1.58	-
B.	-	.50	.08
C.	-	.50	.08
D.	-	.50	-
(38) A.	-	-	-
B.	2.00	-	-
C.	2.00	-	-
D.	-	-	-
(39) A.	-	-	-
B.	2.00	-	-
C.	2.00	-	-
D.	-	-	-
(40) A.	-	-	-
B.	2.00	-	-
C.	2.00	.50	-
D.	-	.50	-
(49) A.	-	-	-
B.	2.00	-	-
C.	2.00	.85	-
D.	-	1.70	-
(50) A.	-	.50	-
B.	2.00	.50	-
C.	2.00	-	-
D.	-	-	-
(51) A.	-	-	-
B.	.66	-	-
C.	.66	.50	-
D.	-	.50	-

Two county line patterns are present in the study area. The first of these is displayed in cells 1, 12, 22, and 29. The line

mileage in these cells is non-oriented, along east-west trending survey lines, resulting in .50 mile in each quarter division. In addition, some of these cells display offset lines for a short distance. Again this is the result of survey line correspondence, and the fact that many survey lines do not meet on the treaty boundary. Some cells in the study area also display more non-oriented mileage than might be expected. This is the case in cells 1 and 29, for example. The unusual amount of mileage in the quarters of these cells is the result of not only a certain extent of non-oriented east-west county lines, but also the presence of north-south corresponding lines, both of which when taken together account for this higher amount of mileage.

County Line Averages

Oriented	Non-Oriented	Offset
3.69 (c. 17)	1.61 (c. 14)	.26 (c. 4)

A second pattern of county lines evident in the study area is that of lines which are oriented along the course and bearing of the Greenville Treaty line. Examples of this pattern can be seen in grid cells 38-40 and 49-51. In each of these example cells a maximum of 4.00 miles of oriented county lines are found. The exception is cell 51 with .66 mile, but this is the result of termination of these oriented lines in this cell. The oriented mileage in this part of the study area exists because of the presence of the Ripley-Dearborn, Ripley-Ohio, and Ripley-Swit-

zerland county lines. Even in these oriented cells, however, there is a certain amount of non-oriented mileage as in grid cells 40, and 49-51. Grid cell 49 is a complex one in terms of county line delineation because of the number present. There are 2.00 miles of the Ripley-Ohio and Ripley-Dearborn county lines, as well as 2.85 miles of non-oriented lines. The non-oriented line is the Dearborn-Ohio County Line, and is the only one in the study area that has a border which does not conform to a fundamental survey line. Instead this particular county line follows the course of Laughery Creek, which accounts for the rather high mileage figures in quarter divisions C and D.

The final political boundary type examined is the civil township. Within each county the civil townships -- for the most part -- coincide with fundamental survey lines and tend to be rectangular in shape. Because the grid cell maps tend to obscure this pattern, a general map showing the boundaries of all of the civil townships in every county has been provided. (Fig. 17)

Civil Township Averages

Oriented	Non-Oriented	Offset
3.33 (c. 20)	1.94 (c. 27)	.28 (c. 12)

There are exceptions to the basic orientation and shape of these townships in the study area, with most of the deviations occuring in Dearborn and Ohio counties; again probably due to their early formation. Because they are situated on survey lines and

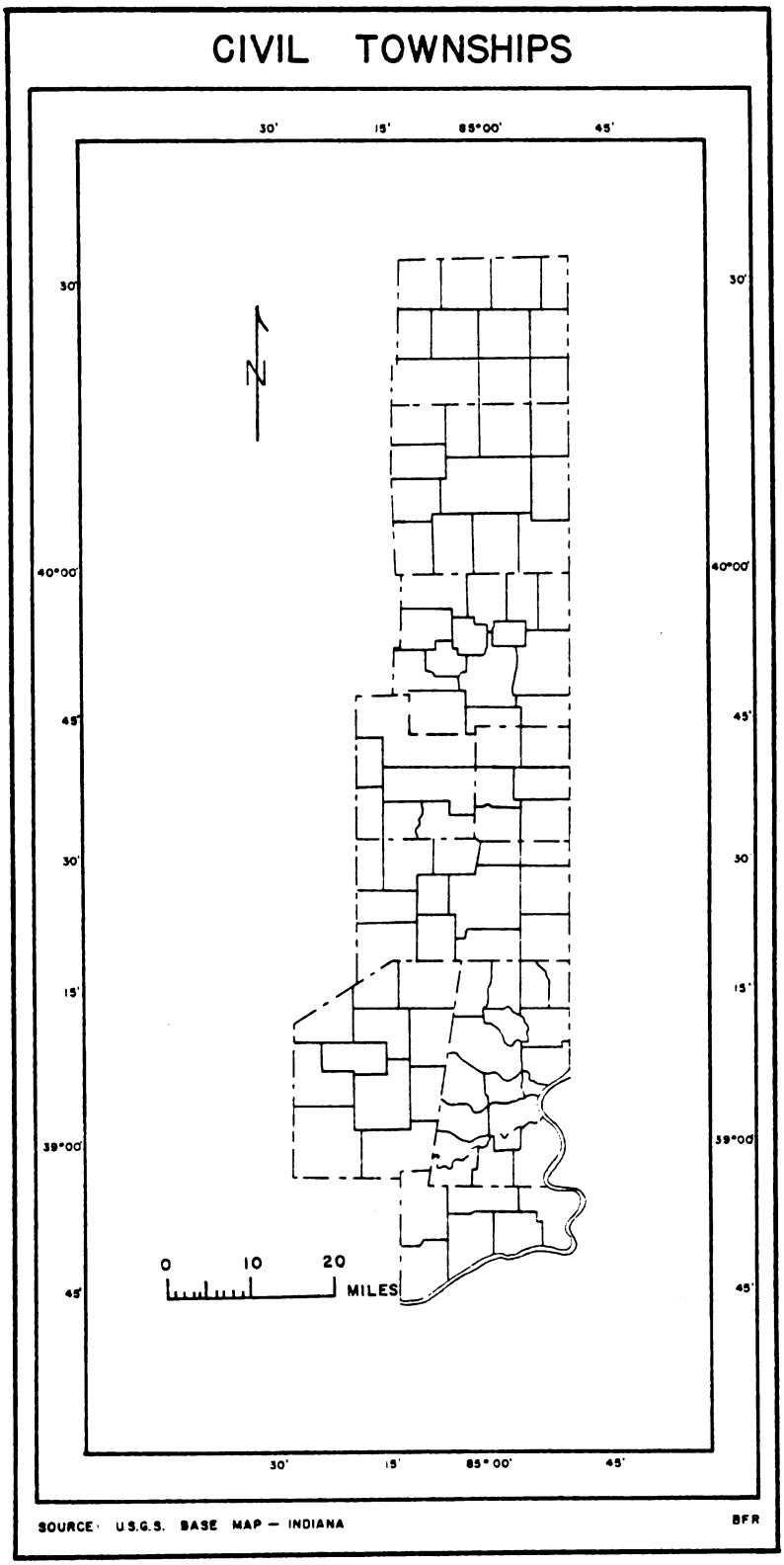
CIVIL TOWNSHIPS
30'
15'
85°00'
45'
40°00'
39°00'
N
0 10 20
MILES
SOURCE: U.S.G.S. BASE MAP — INDIANA
BFR

Figure 17.

are subdivisions of counties, civil townships reflect many of their properties of distribution.

Selected Civil Township Cell Figures (In miles)

Cell #	Oriented	Non-Oriented	Offset
(1) A.	-	.50	-
B.	-	.50	-
C.	-	2.20	-
D.	-	-	-
(4) A.	-	.50	-
B.	-	.50	.14
C.	-	.50	.14
D.	-	.50	-
(8) A.	-	.50	-
B.	-	.50	.18
C.	-	.50	.18
D.	-	.50	-
(29) A.	-	1.58	-
B.	.96	.50	.08
C.	.96	.50	.08
D.	-	.50	-
(31) A.	-	1.17	-
B.	.97	.50	.30
C.	.97	.50	.30
D.	-	.34	-
(38) A.	-	-	-
B.	2.00	-	-
C.	2.00	-	-
D.	-	-	-
(39) A.	-	-	-
B.	2.00	-	-
C.	2.00	-	-
D.	-	-	-

Cell #	Oriented	Non-Oriented	Offset
(40) A.	-	.50	-
B.	2.00	.50	-
C.	2.00	.50	-
D.	-	.50	-

Grid cells 1, 4, and 8 illustrate this point, showing the mileage as non-oriented in an east-west manner. The high non-oriented mileage in quarter C in cell 1 is the result of the presence of the Indiana-Ohio state border and the Jay-Randolph County Line. Civil township lines in other grid cells also exhibit patterns characteristic of survey lines. As in cell 4 a civil township line traverses the cell east-west along section lines for the maximum distance of 2.00 miles. In following these section lines, the civil township line is offset for a distance of .14 mile where it crosses the treaty boundary.

There are also present in the study area, civil township lines which are oriented along the Greenville Treaty line. Such an oriented line is found in cell 29, starting from the Union-Franklin County Line and proceeding southwest for a distance of .96 of a mile. It continues through cell 30 and terminates in cell 31. The positioning of this line is not controlled by any other political boundary. However, other civil township lines to the south are. These lines are controlled by the position of the Ripley-Dearborn, Ohio-Dearborn, and Ohio-Switzerland county lines. This is shown in the mileage distributions of cells 38-40. This distribution actually extends from cell 37 to cell 51.

Property Lines

The term property line is used here to denote "boundaries of contiguous plots of land under the same ownership".[3] There is a basic distinction between an ownership unit and an operating unit, with the ownership unit being the one described by legal title to a specified section of land. An operating unit, on the other hand, contains all of the physical aspects of the farm such as the farmstead structures and equipment, as well as the fields and woodlots. The boundaries of operating units are rather transitory, however, while those of ownership units are much more permanent because of the involved legal procedures and costs involved in transfering a deed of ownership.[4] The permanence of ownership or property lines is readily apparent in the examination of the same property units over a period of time.[5]

Much of this property line stability -- at least in areas of systematic rectilinear surveys -- lies in the relationship between these lines and fundamental survey lines. Thus survey lines formed a framework into which property ownership lines are fit.[6] Over a period of time there have been some alterations in the positions

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[3] Thrower, Original Land Subdivision, p. 51.

[4] Hart, Look of the Land, p. 72.

[5] Thrower, Original Land Subdivision, p. 64.

[6] Ibid, p. 55.

of these property lines, however, the basic form of GLO township and section line control remains the same, resulting in a more or less rectilinear form of property units in the study area. Where property lines do not correspond to survey lines, this had usually been the result of these lines conforming to some physical obstruction on the landscape such as a stream or drainage ditch.

The situation of property lines within the study area was ascertained from the plat books of each of the counties. (Figs. 18-24) Even with these plat books, however, accurate delineations of property lines is very difficult. Because of the constant alteration of ownership boundaries and the continuous revisions of county records, it is practically impossible to obtain precise cartographic representation of these lines.[7] This fact has even been noted by the plat books themselves when they state that:

> Due to continual sales and transfers of property it is impossible to guarantee 100% accuracy. We do however, guarantee the accuracy to be 95% or better as compared to the official county records.[8]

Thus while a totally accurate record is rarely available in graphic form, the accuracy is sufficient to examine these property line patterns in relation to other features on the landscape.

The property lines within the study area do not seem to be influenced to any great extent by physical irregularities in the landscape. Instead, the majority of these lines are oriented to

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[7] Hart, Look of the Land, p. 85-86.

[8] Triennial Atlas and Plat Book: Union County, Indiana, (Rockford, Illinois: Rockford Map Publishers Inc., 1971), p. 1.

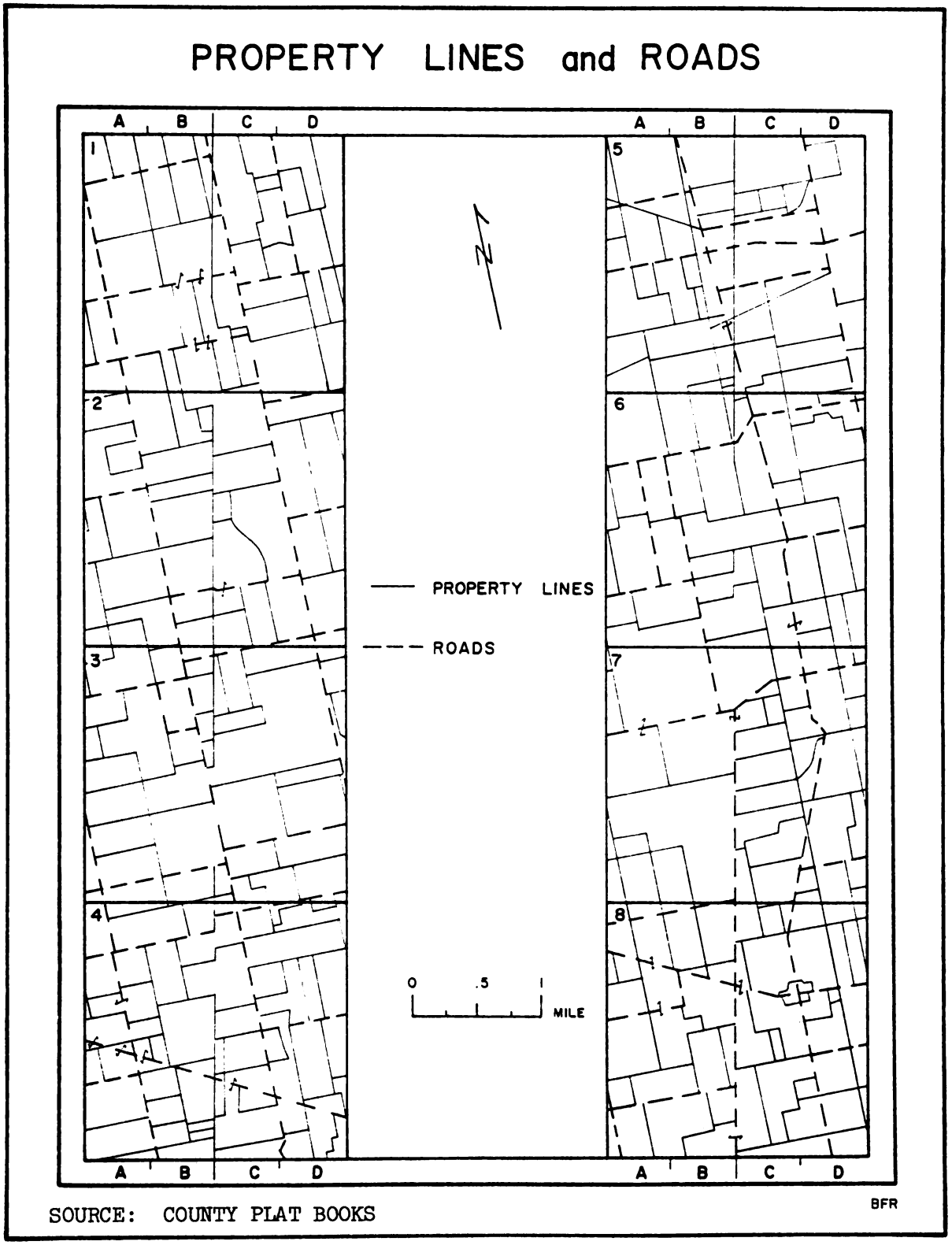
PROPERTY LINES and ROADS
A B C D
1
2
3
4
5
6
7
8
PROPERTY LINES
ROADS
0 .5 1
MILE
SOURCE: COUNTY PLAT BOOKS
BFR

Figure 18.

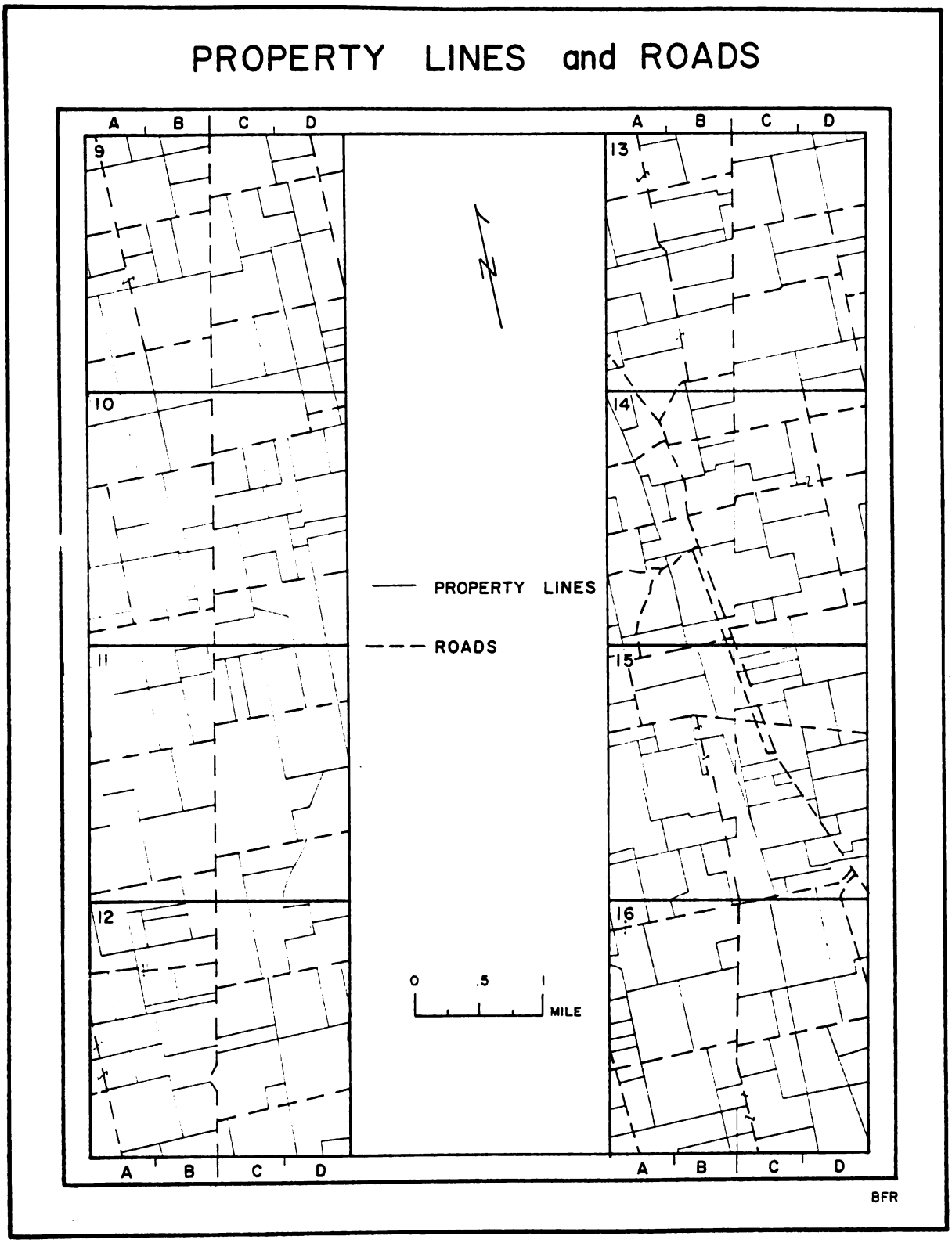
PROPERTY LINES and ROADS
A B C D
9
10
11
12
13
14
15
16
N
PROPERTY LINES
ROADS
0 .5 1
MILE
BFR

Figure 19.

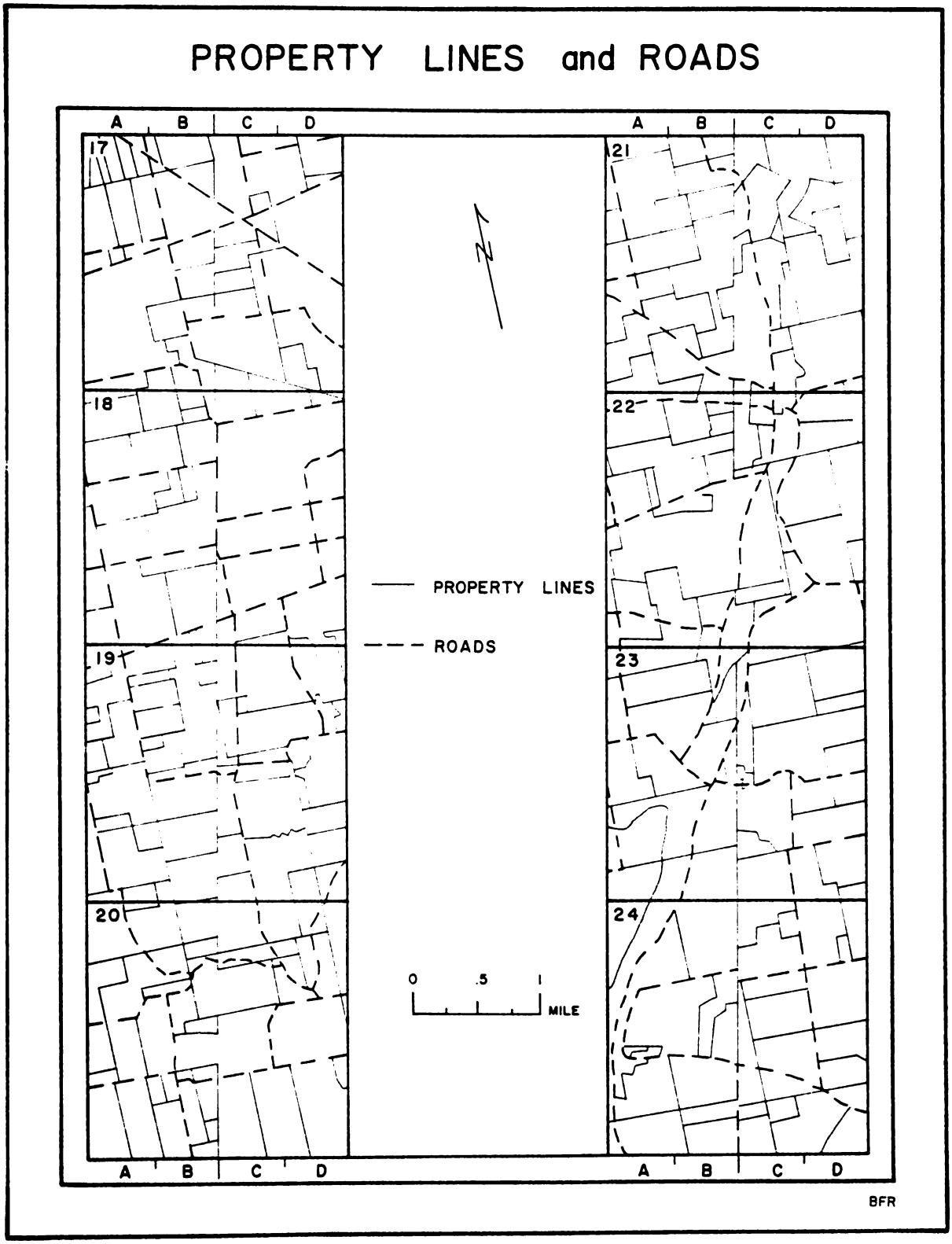
PROPERTY LINES and ROADS
A B C D
17
18
19
20
21
22
23
24
PROPERTY LINES
ROADS
0 .5 1
MILE
BFR

Figure 20.

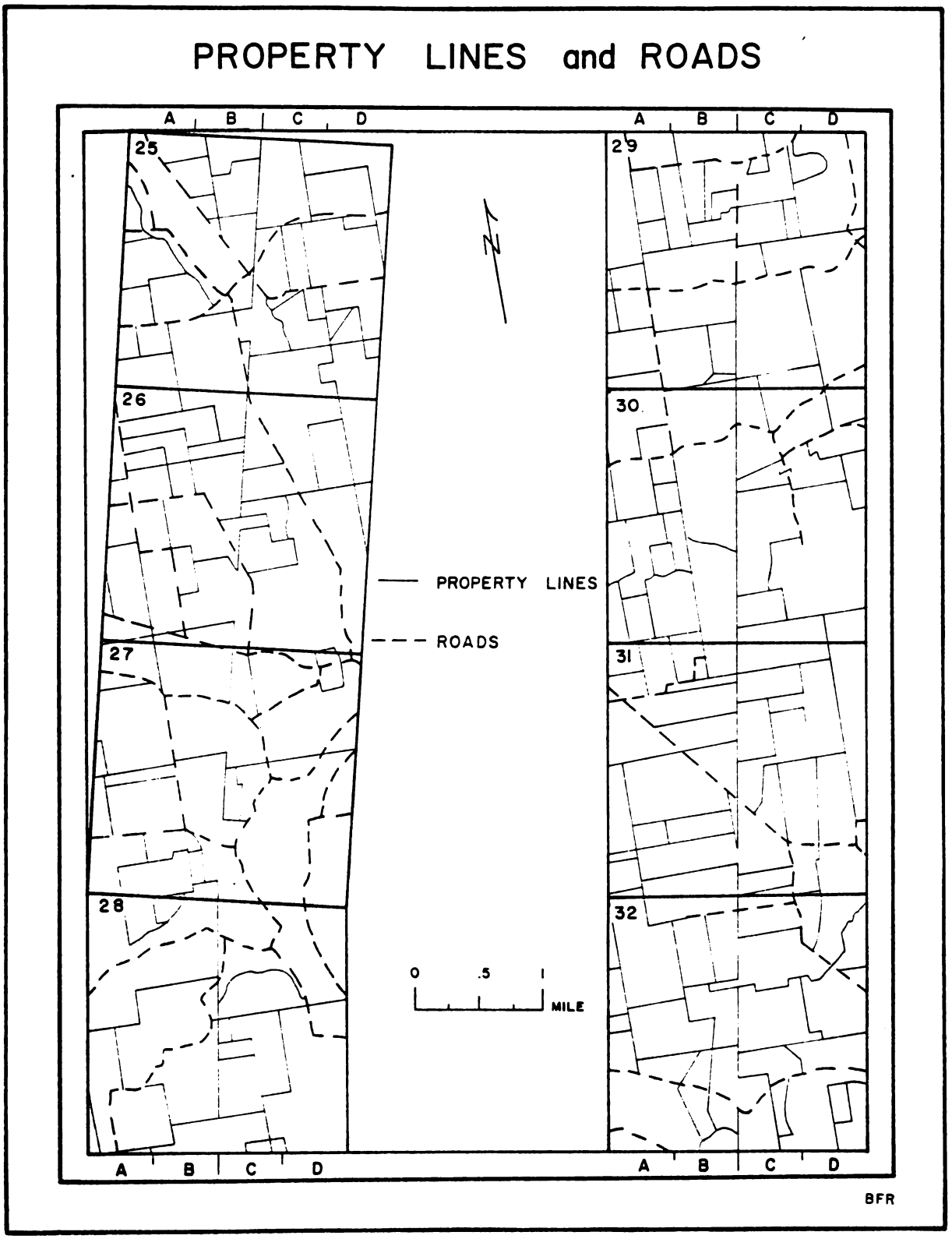
PROPERTY LINES and ROADS
A B C D
25
26
27
28
29
30
31
32
N
PROPERTY LINES
ROADS
0 .5 1
MILE
BFR

Figure 21.

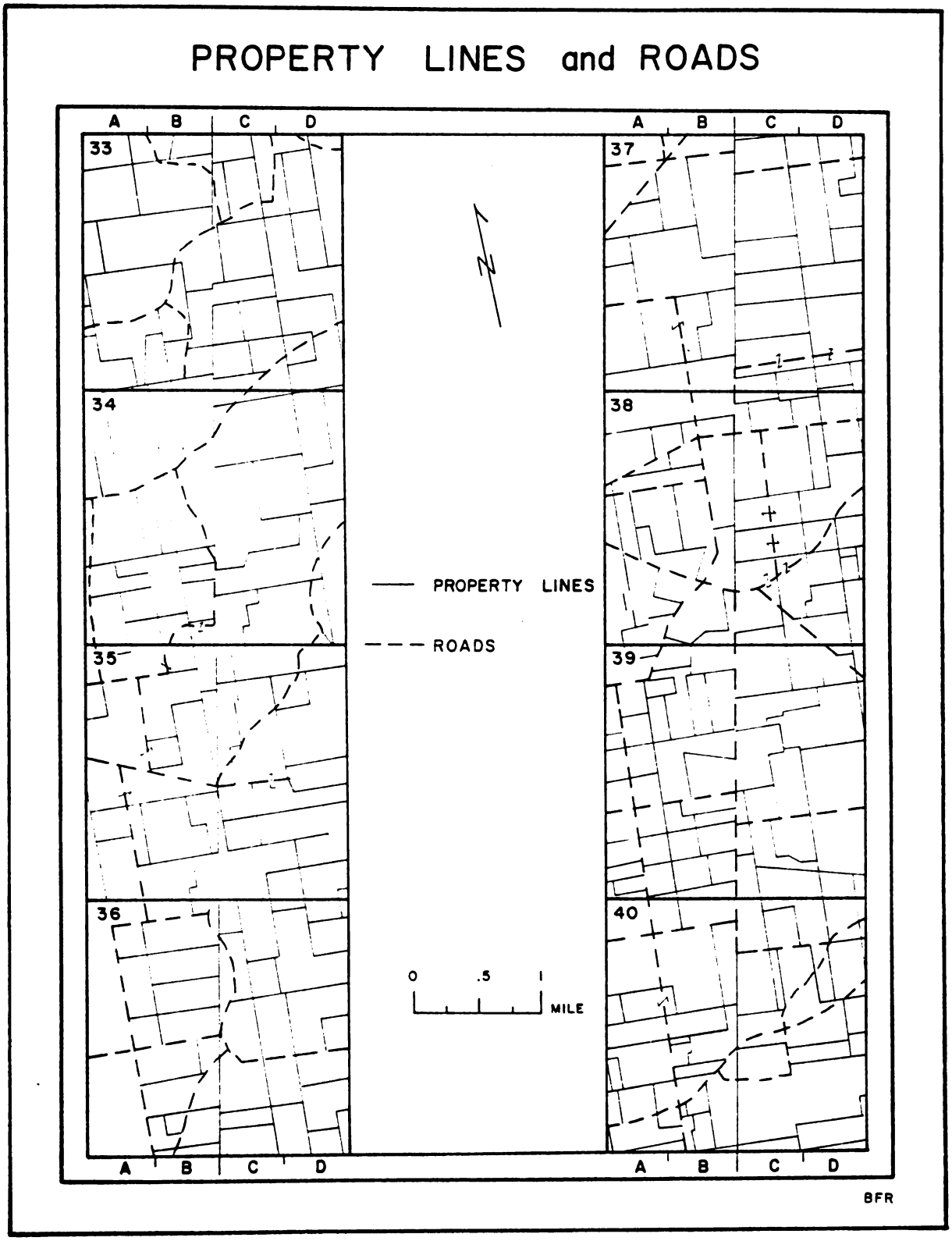
PROPERTY LINES and ROADS
A B C D
33
34
35
36
37
38
39
40
PROPERTY LINES
ROADS
0 .5 1
MILE
BFR

Figure 22.

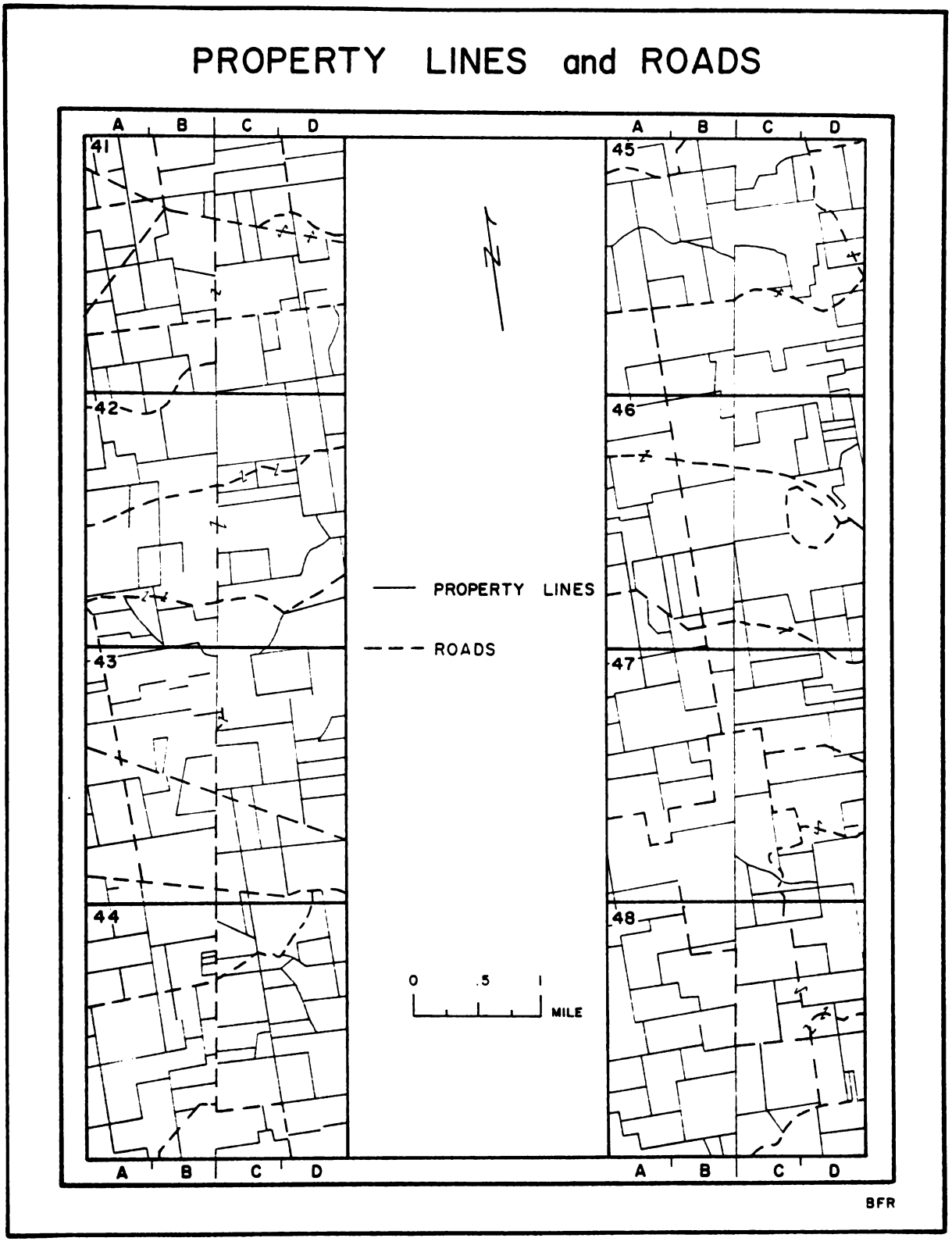
PROPERTY LINES and ROADS
A B C D
41
42
43
44
45
46
47
48
N
PROPERTY LINES
ROADS
0 .5 1
MILE
BFR

Figure 23.

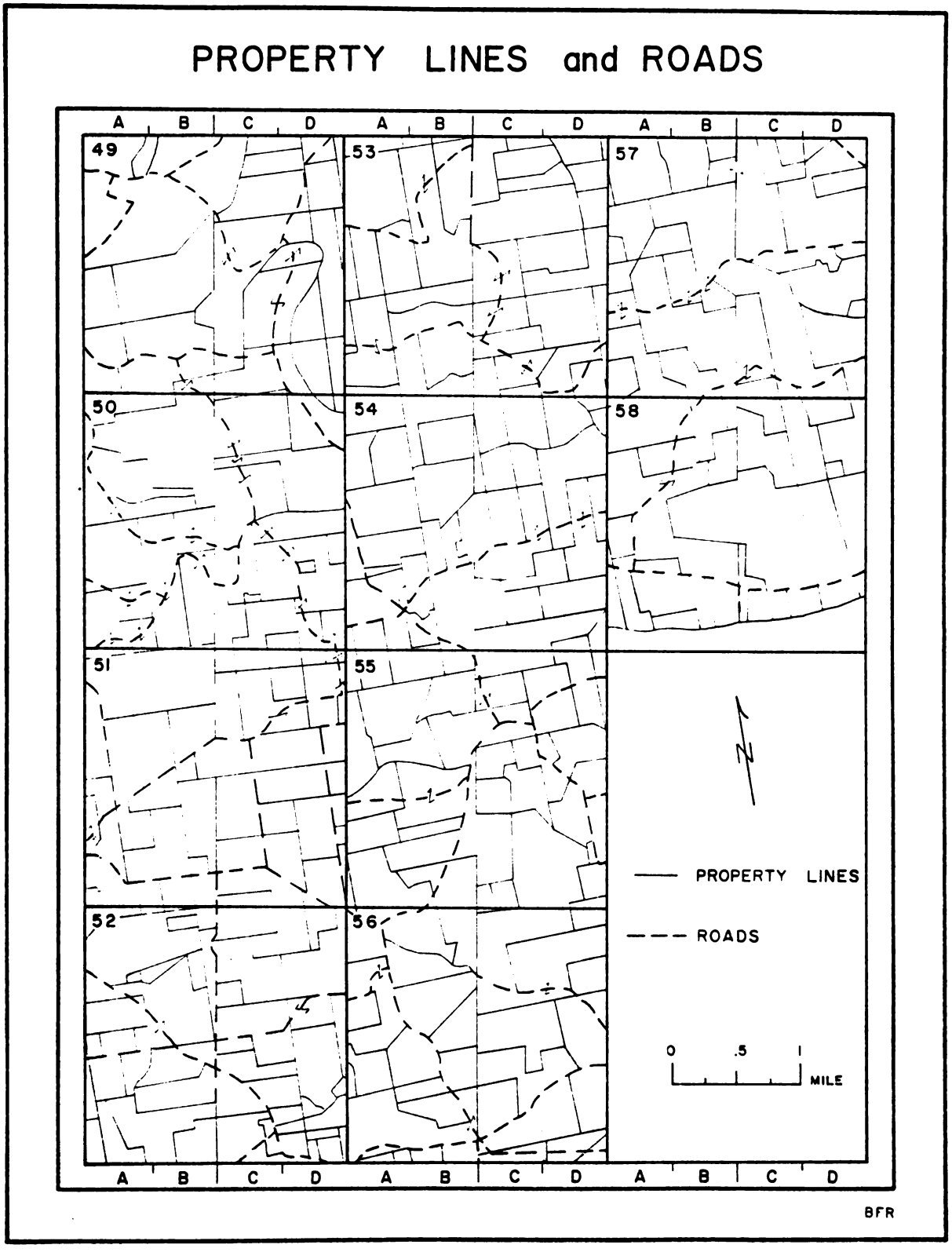
PROPERTY LINES and ROADS
A B C D A B C D A B C D
49
53
57
50
54
58
51
55
52
56
A B C D A B C D A B C D
PROPERTY LINES
ROADS
0 .5 1
MILE
BFR

Figure 24.

the cardinal directions of the compass. Again, this is to be expected because of the framework created by the township survey system in the area.

Property lines were classified as either being oriented, non-oriented, or parallel to the course of the Greenville line. Because of their situation, the non-oriented category contains the highest mileage figures with a total of 1217.57 miles of such lines. This figure can be further divided with 636.95 miles of non-oriented lines being found on the Tipton Till Plain, and 580.62 miles on the Dearborn Upland area. This is not a great difference when it is considered that the upland area consists of three whole grid cells less than the till plain. When these figures are averaged out, the difference is minimal. A cell on the till plain averages 20.78 miles, while the upland averages 20.74 miles. For the most part, those property lines which are not oriented to the bearing of the treaty line are situated to the cardinal directions of the compass. There are some cases where a property line has been influenced by some physical irregularity, however this seems to be the exception rather than the rule. The averages for all categories as a whole can be seen in the following table.

Property Line Averages (In miles)

Oriented	Non-Oriented	Parallel
3.47 (c. 58)	20.99 (c. 58)	.68 (c. 15)

Selected Property Line Cell Figures (In miles)

Cell #	Oriented	Non-Oriented	Parallel
(1) A.	-	5.07	-
B.	1.30	5.75	-
C.	1.30	6.10	-
D.	-	6.10	-
(2) A.	-	5.20	-
B.	1.90	5.80	-
C.	1.90	3.80	-
D.	-	5.65	-
(3) A.	-	5.15	-
B.	1.20	5.20	-
C.	1.20	4.85	-
D.	-	5.47	-
(4) A.	-	5.87	-
B.	1.65	5.40	-
C.	1.65	5.47	.90
D.	-	6.27	-
(7) A.	-	4.05	-
B.	1.35	2.40	-
C.	1.35	6.40	-
D.	-	6.30	-
(8) A.	-	5.20	-
B.	1.70	4.95	-
C.	1.70	5.80	-
D.	-	8.00	-
(9) A.	-	4.80	-
B.	2.00	3.95	-
C.	2.00	3.70	-
D.	-	6.95	-
(10) A.	-	6.05	-
B.	2.00	5.20	-
C.	2.00	4.95	-
D.	-	6.15	-

Cell #	Oriented	Non-Oriented	Parallel
(11) A.	-	5.60	-
B.	2.00	4.55	-
C.	2.00	4.30	-
D.	-	4.40	-
(18) A.	-	5.47	-
B.	2.00	5.90	-
C.	2.00	2.80	-
D.	-	3.40	-
(28) A.	-	4.50	-
B.	1.75	3.90	-
C.	1.75	5.20	-
D.	-	3.20	-
(38) A.	-	5.35	-
B.	2.00	6.15	-
C.	2.00	5.05	-
D.	-	7.35	-
(39) A.	-	7.90	-
B.	2.00	6.15	.27
C.	2.00	5.00	-
D.	-	5.20	-
(40) A.	-	5.87	-
B.	2.00	6.00	-
C.	2.00	5.80	-
D.	-	5.75	-

The mileage figures for non-oriented property lines in the study area tend to alternate between cells which have constant figures and those which fluctuate. The figures for the first few grid cells illustrate the consistency of mileage in a series of cells. While there may be some variance between the quarter divisions in a particu-

lar cell, the overall cell figure does not vary to a great deal from adjacent cells. Again, most of these property lines are oriented in a north-south east-west fashion, though there are some exceptions. Cell 2 contains such an exception in quarter C where a line is situated along the course of the Mitchell drainage ditch.

Other groups of cells, however, show no strong similarities in mileage figure distributions. Such a group of cells is found between cells 7-11. No single reason can be said to account for this fluctuation in figures. Instead, a variety of factors such as type of farming operation, soils, landforms, and personal preferences all act together to account for this fluctuating pattern. For example cell 7 shows some rather large land holdings, especially in quarter B, while cell 8 contains some very small holdings as shown in quarter D. Some of these fluctuations can be explained by the presence of some phenomena not usually found in other cells. Grid cell 18 is an example, with a decrease in mileage to 17.57 miles. This decrease, particularly in quarters C and D is the result of a portion of the City of Richmond being located in this cell. Individual lots are not shown in the plat books, thus resulting in an area void of property lines in a cell. This holds true for all parts of any city or town located in the study area. Another example of a sharp decrease away from the non-oriented cell average figure occurs in cell 28. In this cell the total cell mileage figure decreases to 16.80 miles. Again, this reduction is the result of large land holdings in the cell, but not of the usual kind. In

this cell, and adjacent ones, the reduction is the result of a large acreage of land belonging to the federal government, and being so designated in the Union and Franklin county plat books. This large acquisition of land by the government was for the dam which was built on the East Fork, Whitewater River just above Brookville. To the south of these cells the mileage figures for the grid cells increase to around the average, though some fluctuation is present.

In examining the non-oriented property line patterns on the cell maps and their associated mileage figures, it is apparent that generally speaking, there is a relatively even form and distribution throughout the study area. This is due primarily to the framework of the township and range system and the method of initial land sales. This strict adherence by property lines to the cardinal directions of the compass is most pronounced on the level Tipton Till Plain. Even in the more dissected Dearborn Upland area, property lines still basically conform to fundamental survey lines. However, there does seem to be more instances of properties also being oriented in other directions as the result of various physical irregularities in the landscape or merely through personal preferences or economy.

In addition to non-oriented property lines, there are these boundaries of land holdings which are oriented along the Greenville Treaty line. Because quarter divisions B and C share the same boundary, there is a possibility of 232 miles of oriented property lines in the study area. In measurement on the maps, it was found that of the possible 232 miles, 201.54 or 87% actually did conform

to the bearing of the treaty boundary line.

Within each cell there is the possibility of a maximum of 4.00 miles of oriented property lines, however in the first few cells this is not the case. These mileage figures tend to fluctuate, for much the same reasons as the non-oriented figures fluctuated. The reduction in oriented in mileage in a particular cell indicates that the same person or persons own a parcel of land which has a boundary that crosses the treaty boundary. This phenomena is more prevalent in some cells than others, and may indicate a consolidation of land in the same family or an expansion of a particular farm by purchasing the land of another.

Like the non-oriented mileage, there are also instances of a series of grid cells which show a consistency of the maximum of oriented mileage. This is the case, for example, in cells 9-11. In these cells there is a maximum total of 4.00 miles of oriented property lines, meaning that there are different owners on each side of the line for its entire length through the cell. In some cases, there are some factors which contribute to this correspondence, as is the case with cells 9-11. These, and adjacent grid cells, are traversed by an oriented road, Boundary Line Road, which tends to act as a barrier -- to some extent -- in farm enlargement and expansion. With the termination of this road, the pattern of fluctuating mileage figures begins again. The total correspondence of oriented property lines in some cells can also be affected by other influences. This is the case in cell 38-40. In these cells

the maximum oriented mileage figures are -- in part -- the result of the control exerted by the oriented Ripley-Dearborn County Line. As in the case of Boundary Line Road, this county line also tends to act as a barrier to the expansion of land holdings. It acts as a barrier in terms of the problems of differences in the tax base between counties, municipal services, etc. It should be noted, however, that this is not the case in all cells through which this county line passes, with some cells containing properties that cross the treaty and county lines into both counties. Apparently the property owners in these cells do not view the county line as a barrier, and have been willing to increase their land holdings across the boundary. This also may not be a recent occurance, but instead may have been evident for a long period of time. Again as with the termination of the Boundary Line Road, with the termination of the oriented county lines, the mileage figures began to fluctuate once more.

The last category considered is that of property lines which are oriented parallel to the Greenville Treaty line. Property lines in this category contain only 10.23 miles of .7 % of the total. No single explanation can be found for this phenomena, though it might be speculated that such property lines have been established over a period of time as a matter of convenience or economy to keep these lines as symmetrical as possible to avoid irregular shaped land holdings. A particular property line was not considered to be parallel to the treaty line unless it was approximately within $\pm$ 1 of the bearing of the treaty line.

Roads

The study area exhibits a well defined road network which consists mainly of rural secondary roads which primarily serve farms and non-urban residences. Roads are essential in the study of any cultural landscape, in that they serve as indicators of two factors.[9] They indicate whether or not a strong boundary exists between two areas or whether they serve as a network to unite circulation. More important to this study, road networks are related to the fundamental survey lines which have been established in an area. In the case of the American Midwest -- where the township and range system predominates -- the majority of rural roads are laid down on section lines.[10] While many roads do conform to survey lines on relatively level, well drained lands, other roads do not. This lack of correspondence is usually the result of irregular topography and stream drainage, so that even in an area which has been surveyed under a systematic system the road network will tend to conform to the physical landscape as a practical concern. It is technically and economically easier to conform to difficult terrain features rather than trying to traverse them. Some roads will, of course, still follow survey lines in rough terrain, however, in many cases this can be a very uneconomical pattern.[11]

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[9] Hart, The Look of the Land, p. 75.

[10] Ibid, p. 76.

[11] Thrower, Original Land Subdivision, p. 101.

No matter in what way a particular road system does or does not conform to the physical landscape, it is probably true that by the early part of the 20th century that the rural road system had already been formed with very few subsequent changes.[12] In the case of the Midwest -- including the study area -- the rural road pattern was probably set even earlier. In fact, roads and trails were present in the study area prior to survey and demarcation of the Greenville Treaty Boundary Line. In his survey notes Ludlow made note of two roads already present in the area. At the 32nd mile of the second part of the survey, 28 chains, 50 links (1848' 366") into the mile he noted, "A road leading to Vincennes N 60 E."[13] The road Ludlow identified was known as Kibbey's road which had been blazed by Captain Ephrain Kibbey between 1799 and 1800. This was the first road to cross Indiana from the east to the west, starting at Cincinnati and ending at Vincennes on the Wabash River.[14] The second route encountered was a trail in the last mile of the second part of the survey. On the 102nd mile, Ludlow noted at 9 chains 50 links (594' 366") "a road leading to Greenville, to the Delaware Towns on White River, bears W."[15]

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[12] Hart, The Look of the Land, p. 76.

[13] Ludlow, Survey Notes, p.

[14] Wilson, George, "Early Indiana Trails and Surveys", Indiana Hisotrical Society Publications, Vol. 6, 1919, p. 332.

[15] Ludlow, "Survey Notes", p. 38.

The road network of the present-day cultural landscape in the study area was examined with close attention being given to the classification of the road mileage into the basic categories. A total of 476.10 miles of roads were classified, with 404.44 miles being non-oriented, 66.30 miles being oriented, and 4.36 miles being offset. To be classified as offset, the mileage had to be part of the same road whose course was disrupted as it crossed the boundary line resulting in a displacement.

The greatest amount of road mileage is in the non-oriented category. This is to be expected considering that wherever possible roads will be situated along fundamental survey lines. While the Greenville Treaty Boundary Line also serves as a township line along its entire length, it also cuts across the matrix of the overall township and range line pattern.

Road Averages (In miles)

Oriented	Non-Oriented	Offset
2.05 (c. 30)	6.99 (c. 58)	.29 (c. 15)

The non-oriented mileage figures for the first few grid cells do not vary to any great degree, while illustrating how the road mileage in individual cells alternates between quarter divisions. This alternating pattern is the same one which was encountered in the distribution of the fundamental survey lines. This correspondence between the patterns of the survey lines and the roads shows how rural roads tend to conform to survey lines where possible. Thus

where roads conform solely to survey lines -- such as in cells 1-4 -- alternating quarter divisions will contain the highest and lowest figures because of the situation of the treaty boundary. Where the mileage in a particular quarter seems unusually high, this is because of the presence of not only an east-west section line road, but also a north-south one as well. Increased mileage in some cases also may be the result of the location of roads on half-section lines as well as on the regular sections.

Selected Road Cell Figures (In miles)

Cell #	Oriented	Non-Oriented	Offset
(1) A.	-	2.77	-
B.	-	1.55	-
C.	-	2.82	-
D.	-	1.65	-
(2) A.	-	1.17	-
B.	-	1.31	.02
C.	-	.63	.02
D.	-	2.02	-
(3) A.	-	1.48	-
B.	-	3.04	-
C.	-	1.10	-
D.	-	1.95	-
(4) A.	-	3.75	-
B.	-	1.20	-
C.	-	3.16	-
D.	-	1.20	-
(8) A.	-	2.59	-
B.	2.00	1.76	-
C.	2.00	.95	-
D.	-	1.98	-

Cell #	Oriented	Non-Oriented	Offset
(9) A.	-	2.90	-
B.	2.00	1.00	.19
C.	2.00	1.00	.19
D.	-	2.03	-
(10) A.	-	1.00	-
B.	2.00	1.00	.25
C.	2.00	1.00	.25
D.	-	1.14	-
(18) A.	-	4.38	-
B.	1.14	3.04	.12
C.	1.14	3.29	.12
D.	-	3.75	-
(21) A.	-	2.61	-
B.	-	1.61	-
C.	-	2.96	-
D.	-	1.14	-
(29) A.	-	1.74	-
B.	.83	1.04	.08
C.	.83	.95	.08
D.	-	.32	-
(39) A.	-	2.92	-
B.	2.00	.50	.16
C.	2.00	.50	.16
D.	-	1.17	-
(40) A.	-	2.62	-
B.	.45	1.74	.15
C.	.45	2.16	.15
D.	-	1.70	-
(41) A.	-	3.07	-
B.	1.14	2.40	.07
C.	1.14	1.27	.07
D.	-	2.08	-

Decreases or other adjustments in the basic pattern are also apparent in some cells. For some reason -- either because of the settlement pattern or a physical irregularity -- no roads are located on survey lines. Also there is the factor of newer highways and freeways traversing the study area without regard to any surveyed line. These newer roads have been built for convenience and economy between major centers of population and not to service rural populations. Another factor which contributes to mileage figures which deviate from the average, is the presence of a town or city in the cell. Such a case is found in cell 18 which contains a portion of the city of Richmond, which accounts for the unusually high total of 14.40 miles of non-oriented roads. This high figure is the result of the greater number of roads and highways servicing this urban center. It should be noted that only section lines and major service roads were measured and not individual city streets which would have greatly increased the total mileage figure.

A change in the road pattern begins to occur in cell 21 and continues for the next few grid cells. These cells are examples of ones which contain roads which are not oriented to the basic township and range lines. Instead of consisting of a grid-like form, the roads in these cells have a wavy, linear pattern resulting from the road network conforming to landscape irregularities. In grid cell 21 the Greenville line begins to traverse the upper reaches of the East Fork, Whitewater River Valley, and because of this fact the roads tend to follow the course of this valley.

This pattern is repeated in a number of the following cells, to cell 28 where the treaty line encounters more level -- though still dissected -- terrain.

In cell 29 the road pattern changes from a predominately north-south one, to one which is more oriented east-west. This pattern is still associated with stream drainage, but is related to the east-west flowing tributaries emptying into the Whitewater River. The non-oriented road average in these cells decreases as a result of the shorter extent of the situation of these roads. This pattern continues until cell 36 where the treaty boundary begins to traverse the more level area of the old Illinoian glacial drift. Grid cells 39-41 show a pattern similar to the alternating one found in the first few cells on the Tipton Till Plain. It should be noted, however, that even though the basic pattern is grid-like, a greater amount of mileage in these cells does not correspond to survey lines as was found on the till plain. The reason for this is the fact that while this area is relatively flat, there is still enough surface irregularity in some places to cause a slight alteration in the grid-like correspondence. South of the area of old drift, the road pattern and the associated mileage figures become more irregular once more as a result of the increased dissection of the landscape to the Ohio River. Many of these roads are oriented in a northwest to southeast manner because of the numerous tributary streams to the Ohio and Great Miami rivers. This is a part of the Dearborn Upland which has been severely eroded by these streams causing a

greater number of roads to follow their courses. In this portion of the study area there is little or no evidence of any relationship between roads and survey lines.

It should be noted that while there is a definite variation in the road pattern between level and steep areas, the total mileage of non-oriented roads in each cell does not greatly vary. This fact is illustrated by the fact that north of the Illinoian-Wisconsian glacial boundary cells average 7.25 miles while south of it they average 6.71 miles. The reason for these close averages probably lies in the fact that on level land the grid-like road pattern predominates, with east-west roads traversing the quarter divisions for .50 of a mile at regular intervals. On the more dissected topography, on the other hand, roads are oriented in a more or less northwest to southeast direction without these east-west roads. Thus the mileage of the more numerous roads on level land is offset by the generally greater road length in areas of rougher topography.

In addition to non-oriented roads are those roads which are actually oriented to the situation of the treaty boundary line. In the study area there are 66.30 miles of these roads. Cells 8-10 are examples of ones which contain oriented road mileage. The total correspondence of roads in these and the adjacent cells is the result of the presence of Boundary Line Road. Other roads which are oriented to the treaty boundary for some distance are found in the southern portion of the study area. Such correspondence is the

the result of the presence of the oriented county lines in this area which aid in the location of roads along the same course.

While some roads are oriented to the course of the Greenville Treaty line for some distance, others only follow it for a short distance. These short oriented roads take on several forms. One such form is found in cell 18. In this cell a section line road running east-west comes to the treaty line and then bends to conform to the boundary for a short distance before proceeding due west once more. Another form of short distance oriented road occurs where a road runs along the treaty boundary from a major east-west or northwest-southeast road and then terminates. This phenomena occurs at intervals throughout the study area, and is classified as an oriented road because it serves more than three residences. Other oriented roads connect two east-west roads, again usually for only a short distance. Because of the variety of these different short distance roads, there is a corresponding variance for the cells in which these roads are located.

The last type of road classified are those which are offset, that is roads -- usually section line roads -- which come to the treaty line and then jog along it until another road is reached. Because these offsets -- for the most part -- occur on section line roads, most are found on the Tipton Till Plain area where many county roads follow survey lines. Of the 4.36 miles of roads classified as being offset, 3.22 or about 76% are found in cells located north of glacial boundary, with 2.22 miles being found north of cell 17.

These offsets do not possess a large amount of mileage, with the most miles in any one cell being .60 mile.

In addition to the offsets found on the level till plain, the remainder of this mileage is found on the relatively flat old Illinoian drift area. This pattern is seen in cells 39-41, with cell 41 being the farthest one south in the study area to contain roads so classified.

Field Boundaries

Another important indicator of the relationship between the Greenville Treaty Boundary Line and the cultural landscape of the study area, are field boundaries. Field boundaries are merely the borders of parcels of land which have been subdivided within a particular farm operating unit. This subdivision is never quite the same for any two operating units because of physical irregularities and the personal choice of individual farmers. In most cases the pattern of field subdivision will be similar in areas of similar agricultural practices. Still, there is always an element of variation present.

The orientation of field boundaries are closely related to the situation of property lines, which are themselves primarily the result of the predominate survey system in the area. Thus -- for all practical purposes -- the layout of field boundaries is controlled by this system of survey subdivision.[16] Like property

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[16] Hart, John F. "Field Patterns in Indiana", Geographical Review, Vol. 58, 1968, p. 451.

lines, field boundaries tend to fit into a framework established by the regional survey system. Whatever the predominate system--with its corresponding property sales--a farm operator will tend to subdivide his property in accordance with this system. Such a subdivision is not only a matter of convenience, but also of economy.

Even though there tends to be a definite correspondence between survey systems and field subdivisions, there are still subtle variations in patterns within similarly surveyed areas. Where there is some deviation from this survey framework, it is usually the result of an irregularity in the landscape. Such topographic irregularities as marshes, drainage ditches, or steep hills can result in a particular field boundary being oriented to the physical irregularity rather than to the survey pattern.

While major field boundaries are shown on the more recent U.S.G.S. topographic sheets, the entire network of field patterns is not. No graphic record is available which shows either present-day field boundaries or those which have existed in the past.[17] For this reason it was necessary to use vertical aerial photographs to identify and delineate field boundaries in the study area. (Figs. 25-31)

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[17] Thrower, Original Land Subdivision, p. 83.

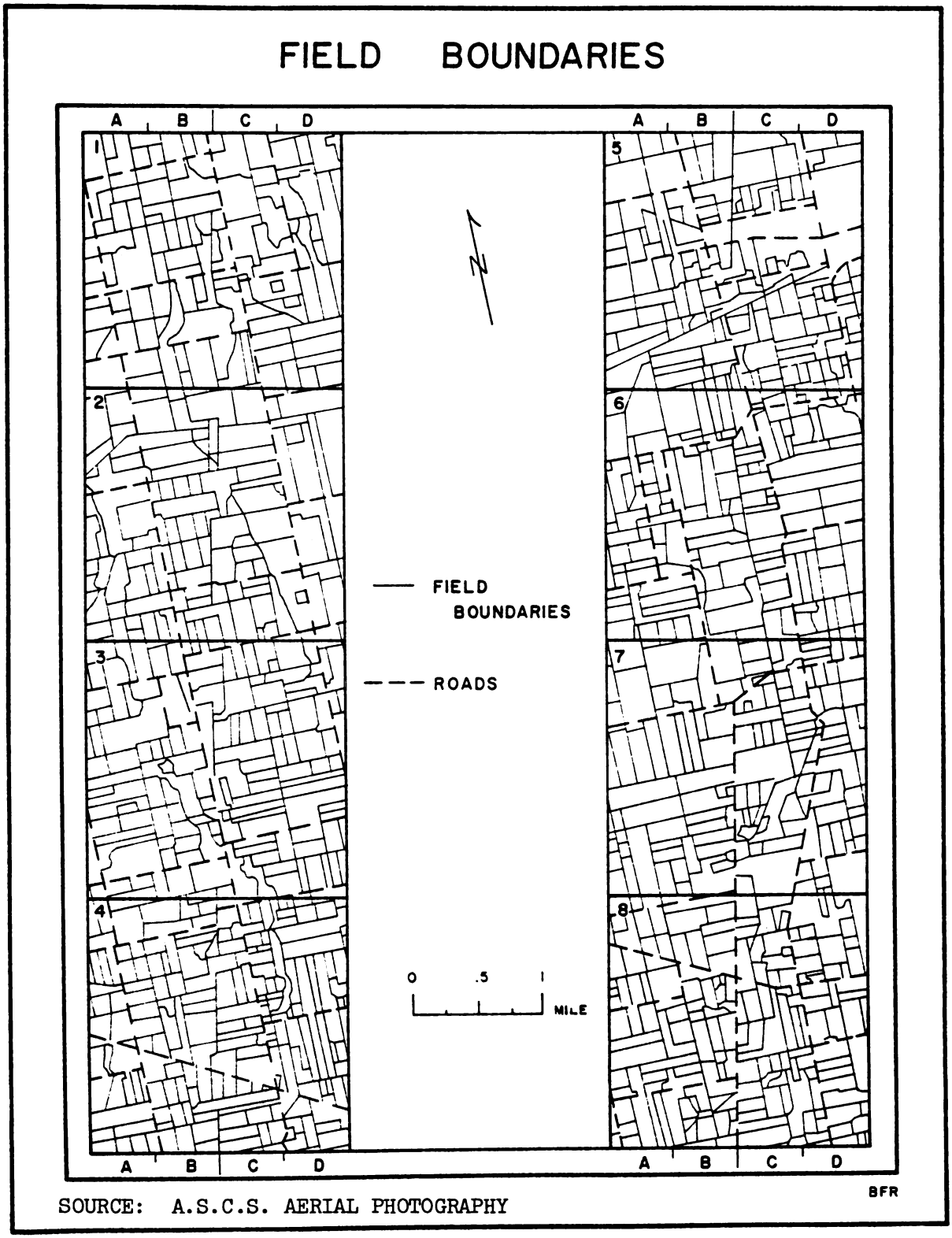

FIELD BOUNDARIES
A B C D
1
2
3
4
5
6
7
8
N
FIELD BOUNDARIES
ROADS
0 .5 1
MILE
BFR
SOURCE: A.S.C.S. AERIAL PHOTOGRAPHY

Figure 25.

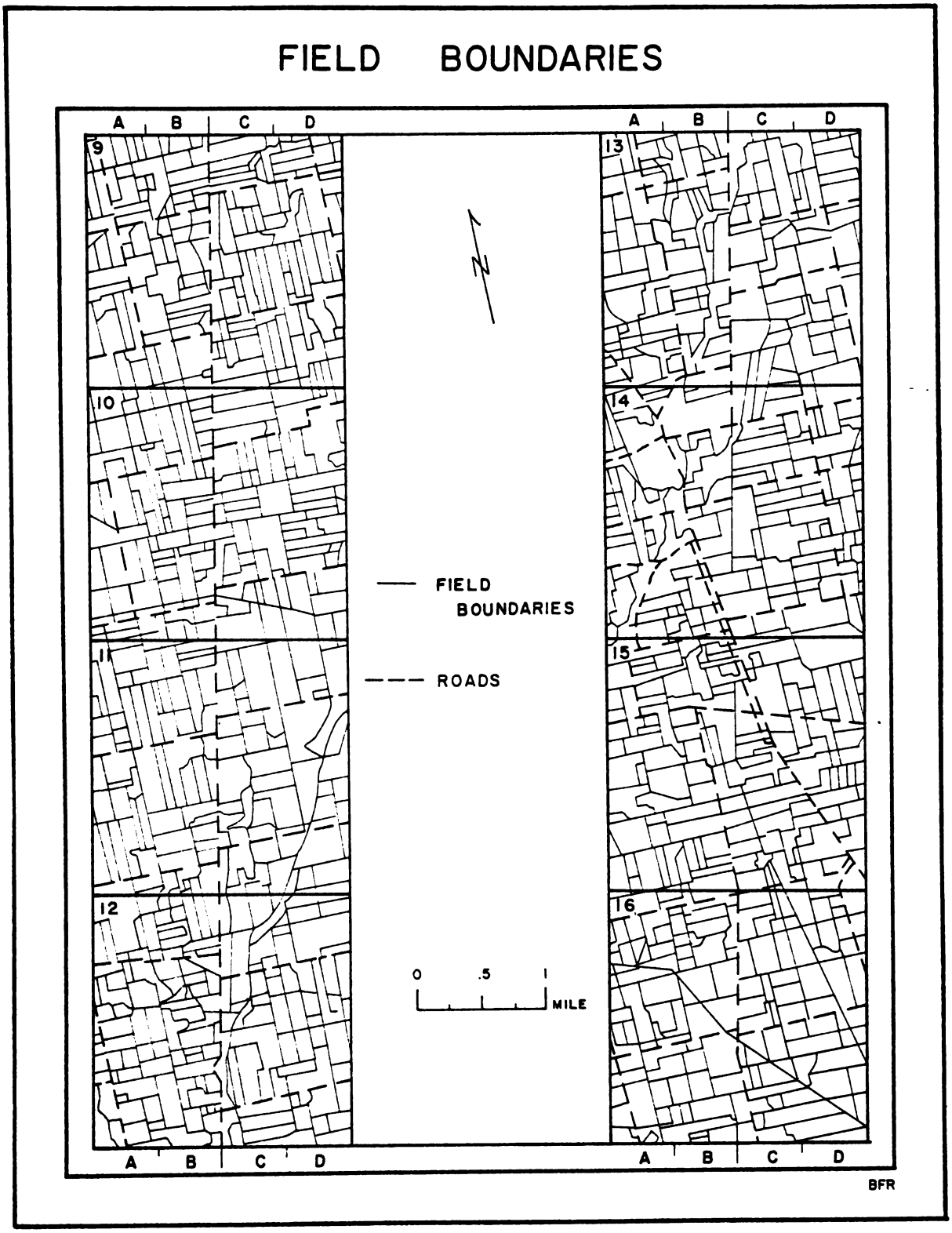
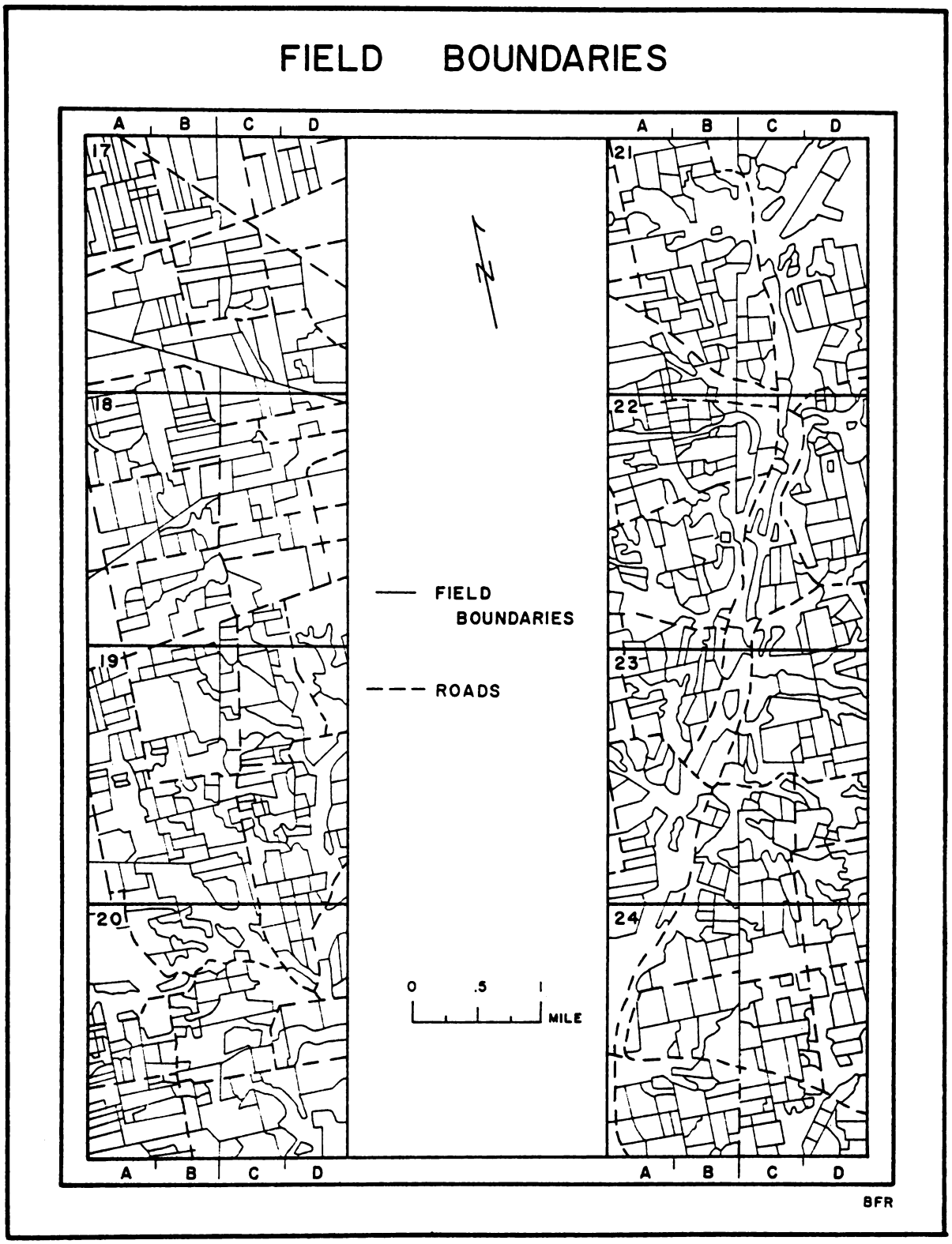

FIELD BOUNDARIES
A B C D
9
10
11
12
13
14
15
16
N
FIELD BOUNDARIES
ROADS
0 .5 1
MILE
BFR

Figure 26.


FIELD BOUNDARIES
A B C D
17
18
19
20
21
22
23
24
FIELD BOUNDARIES
ROADS
0 .5 1
MILE
BFR

Fiugre 27.

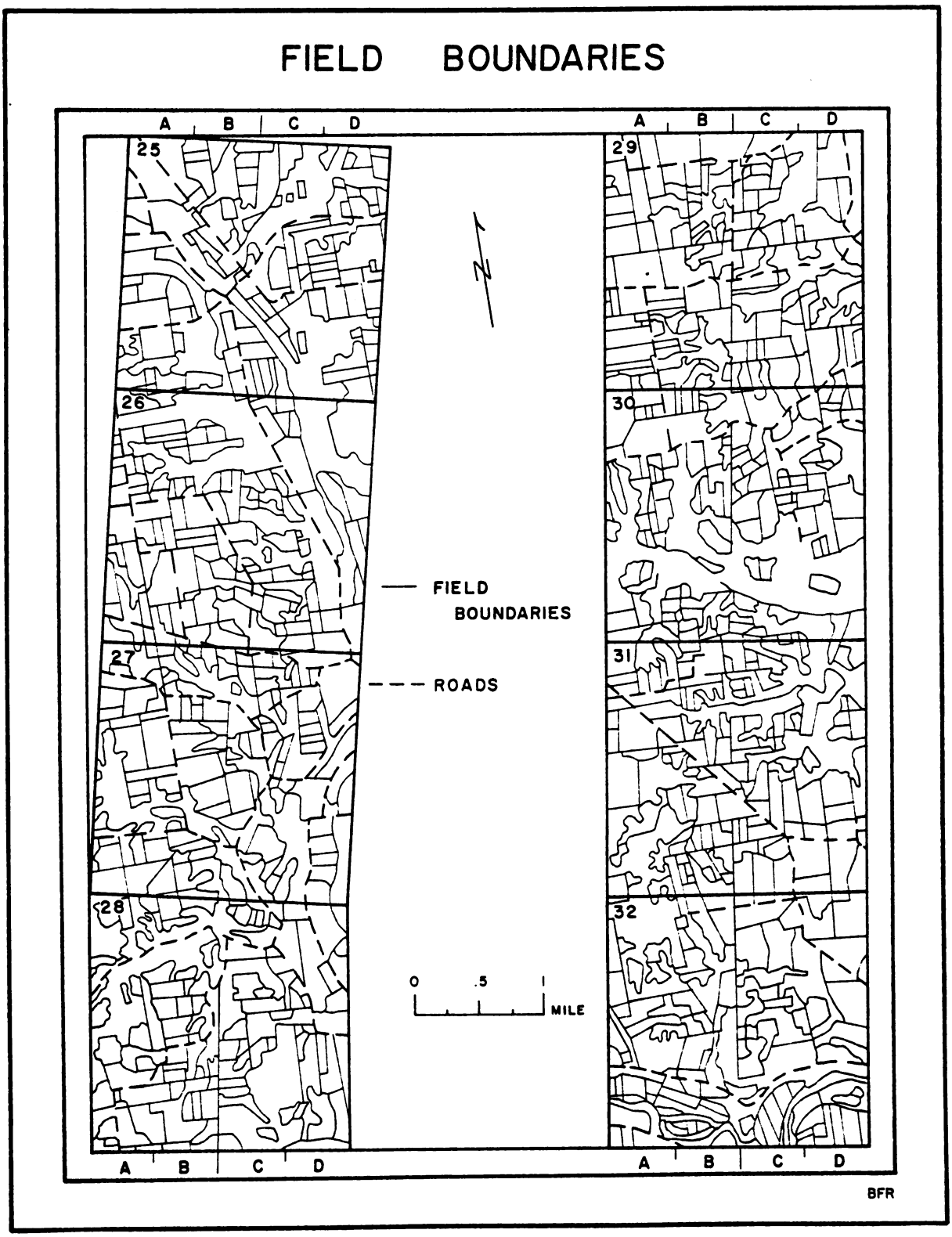

FIELD BOUNDARIES
A B C D
25
26
27
28
29
30
31
32
N
FIELD BOUNDARIES
ROADS
0 .5 1
MILE
BFR

Figure 28.

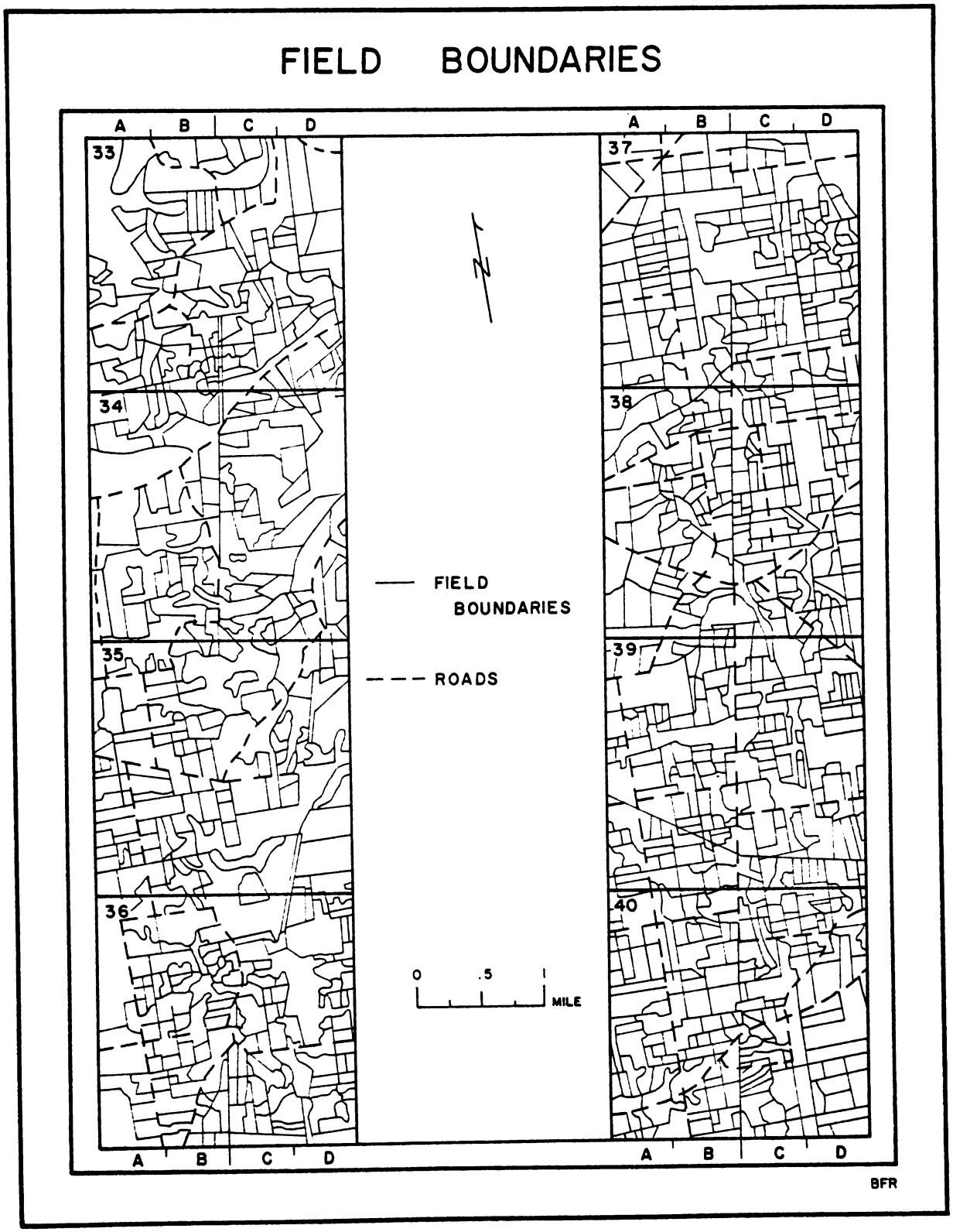

FIELD BOUNDARIES
A B C D
33
34
35
36
37
38
39
40
N
FIELD BOUNDARIES
ROADS
0 .5 1
MILE
BFR

Figure 29.

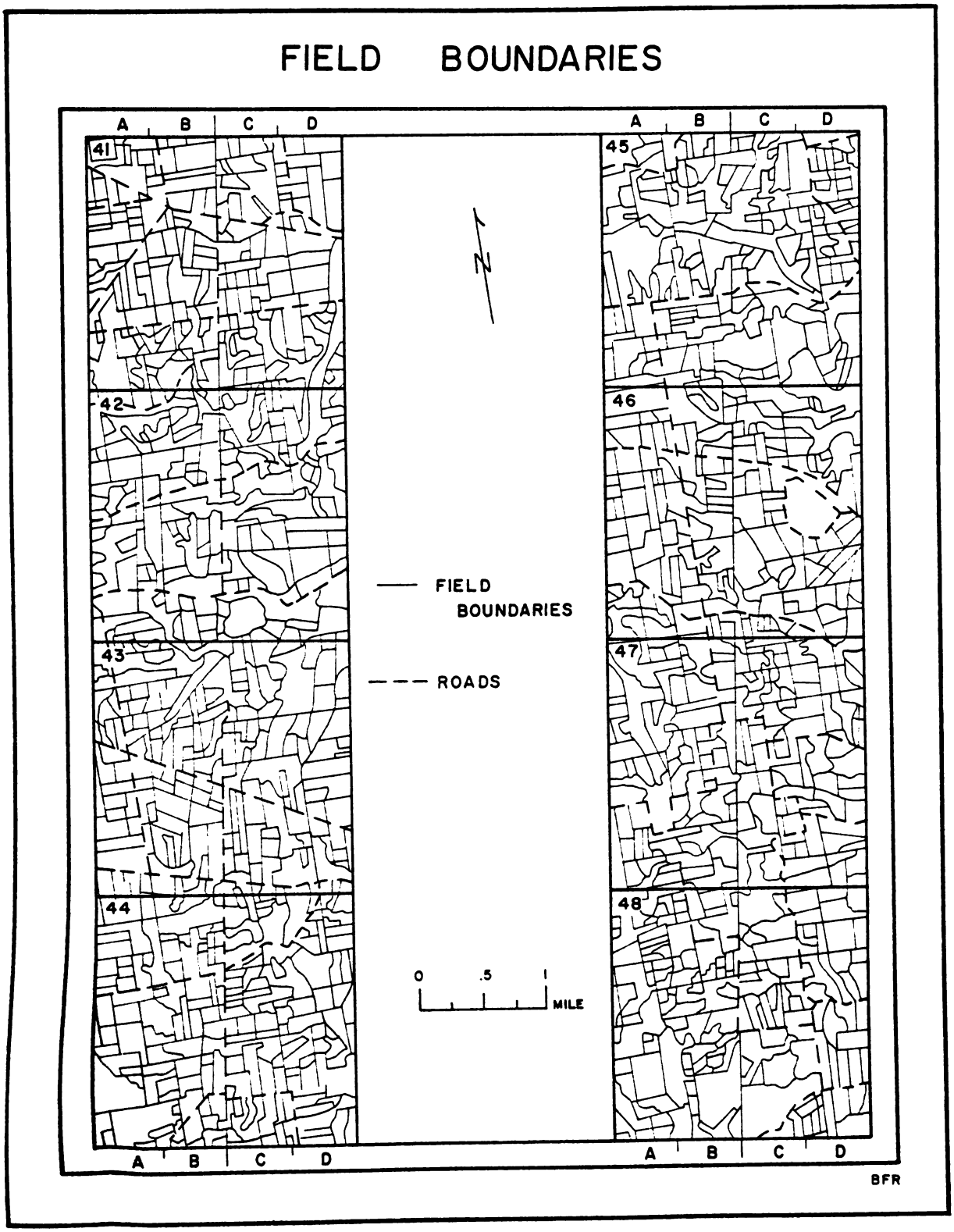

FIELD BOUNDARIES
A B C D
41
42
43
44
45
46
47
48
N
FIELD BOUNDARIES
ROADS
0 .5 1
MILE
BFR

Figure 30.

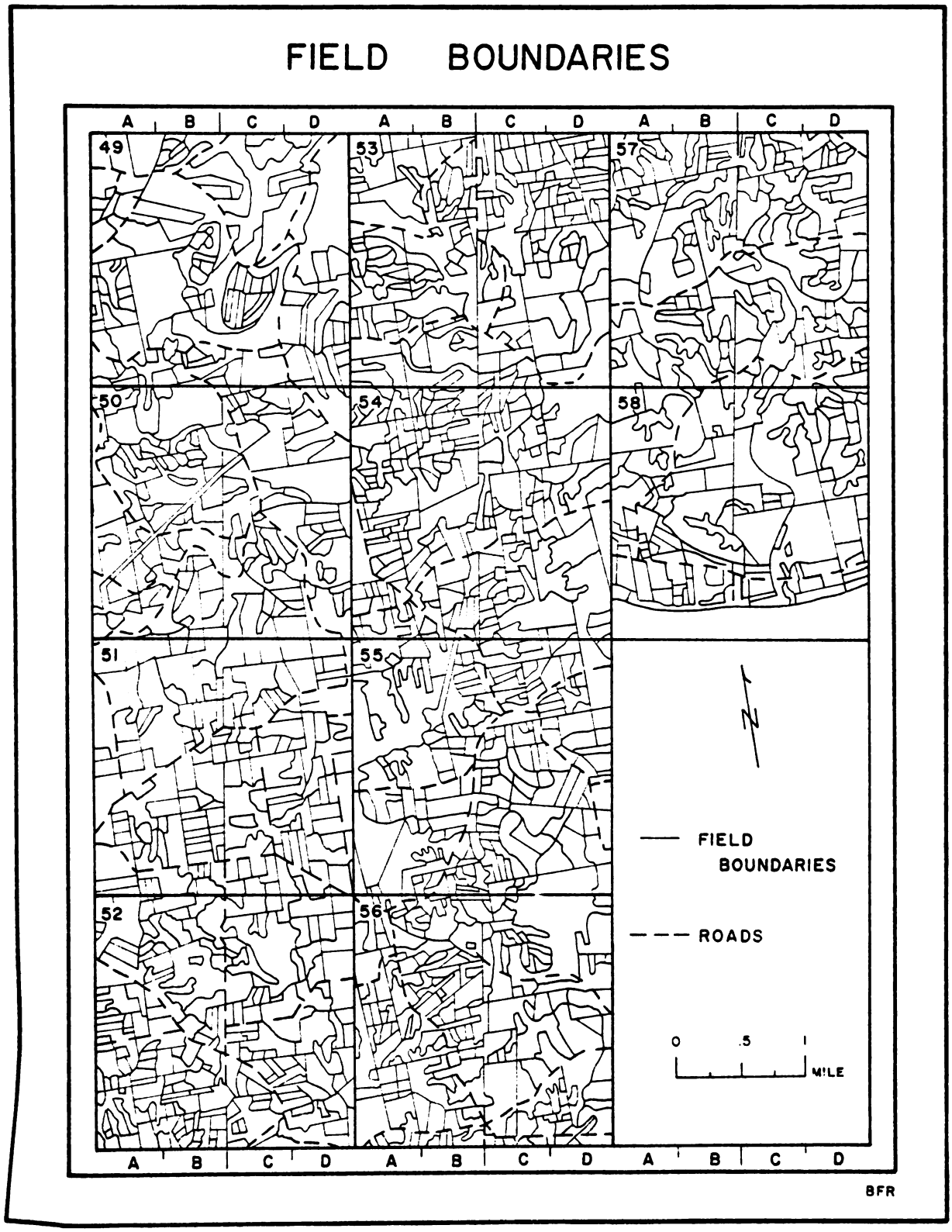

FIELD BOUNDARIES
A B C D A B C D A B C D
49
53
57
50
54
58
51
55
52
56
A B C D A B C D A B C D
N
FIELD BOUNDARIES
ROADS
0 .5 1
MILE
BFR

Figure 31.

Field Boundary Averages (In miles)

Oriented	Non-Oriented	Parallel
2.63 (c. 57)	40.87 (c. 58)	1.66 (c. 56)

Because of the number of small, intricate subdivisions of the land into fields, this particular landscape form possesses the highest amount of boundary mileage of all the phenomena examined in the study. In the entire study area there is a total of 2615.05 miles of all types of field boundaries. The non-oriented category contains the largest amount of this mileage, a total of 2370.43 miles. Of this total figure, 1204.29 miles are located north of the Illinoian-Wisconsinan glacial border and 1666.14 miles are south of it. This breaks down to 51% and 49% of the total respectively.

Selected Field Boundary Cell Figures (In miles)

Cell #	Oriented	Non-Oriented	Parallel
(1) A.	-	9.60	-
B.	.60	10.20	-
C.	.60	9.40	-
D.	-	10.60	-
(2) A.	-	9.87	-
B.	1.00	10.35	-
C.	1.00	9.47	.90
D.	-	8.20	-
(3) A.	-	9.50	-
B.	.70	9.25	-
C.	.70	9.75	1.07
D.	-	11.60	-

Cell #		Oriented	Non-Oriented	Parallel
(4)	A.	-	10.85	-
	B.	1.20	9.90	.70
	C.	1.20	11.81	.80
	D.	-	14.60	-
(8)	A.	-	10.35	-
	B.	2.00	11.30	.55
	C.	2.00	10.80	.45
	D.	-	11.07	.10
(9)	A.	-	11.00	-
	B.	2.00	9.20	.67
	C.	2.00	12.95	.40
	D.	-	12.80	-
(10)	A.	-	11.00	-
	B.	2.00	10.95	.45
	C.	2.00	10.27	.60
	D.	-	9.15	-
(20)	A.	-	9.35	-
	B.	.55	10.00	-
	C.	.55	8.15	.80
	D.	-	6.90	-
(33)	A.	-	8.20	-
	B.	.90	9.87	1.90
	C.	.90	11.47	-
	D.	-	11.80	-
(38)	A.	-	9.40	-
	B.	2.00	12.40	.27
	C.	2.00	13.00	1.30
	D.	-	11.20	-
(39)	A.	-	10.85	-
	B.	2.00	11.00	.80
	C.	2.00	12.00	1.07
	D.	-	12.80	-

Cell #	Oriented	Non-Oriented	Parallel
(40) A.	-	12.40	-
B.	2.00	12.20	.10
C.	2.00	10.85	.40
D.	-	11.25	-
(49) A.	-	10.40	-
B.	.10	9.40	.27
C.	.10	9.87	.15
D.	-	9.00	-
(54) A.	-	12.70	-
B.	1.40	12.95	.55
C.	1.40	12.67	-
D.	-	9.40	-

In examining individual cell totals, no set pattern seems to emerge. There is obviously a certain degree of fluctuation between cells, however these cell differences are small. No particular reason can be found for this slight variation other than the conformance to physical landscape irregularities or the personal preference of farmers for slightly larger or small fields. It should be noted that -- for the most part -- field patterns do not represent a layout by the current operator, but instead are evidence of past agricultural practices and operator decisions.

The pattern of fields in the first few grid cells most nearly shows the influences of the survey system in the regions. These fields are arranged in either square or rectangular shapes, following the township and range survey system. The size of the fields vary, but the shapes are more or less the same. There are deviations from the north-south, east-west orientation. These deviations seem

to be primarily the result of field boundaries corresponding to stream courses, drainage ditches, and roads.

The first sustained deviation from these regular shaped fields occurs in cell 20 and the subsequent cells which follow. This cell contains part of the beginnings of the East Fork, Whitewater River, with a larger amount of land in woodlots than previously found in cells to the north. This increased woodlot acreage -- in some cases -- tends to reduce the number of fields. This appears to be the case in cell 20, which has a definite mileage figure reduction. With the dissection of the area by the river, a greater number of field boundaries become oriented along the river bottom lands and its tributaries. This marks a significant departure of the number of field boundaries being influenced by the survey system.

The influence of the Whitewater River Valley is seen in cell figures and field patterns as far south as cells 33 and 34 just south of Brookville. The increase in non-oriented mileage in these cells is the result of a wider river bottom area with the presence of a greater number of fields being located on these bottom area. A fluctuating pattern resumes south of the Whitewater River as the treaty line passes over an area of uneven terrain. However, when the treaty boundary encounters the old glacial drift "flats" beginning in cells 37 and 38, the number of fields once again increases. These cells also display constant cell total figures of around 46.00 miles with a definite correspondence to the systematic survey system.

Following this drift "flat" area, the fluctuating pattern returns until the line terminates on the Ohio. There are mileage increases in cells which contain relatively level stream bottoms and upland interfluves. Decreases also occur where there is a large amount of stream dissection as found in cell 49, for example. Other cells show non-oriented mileage increases where none were expected. This is the case in cells such as cell 54. This demonstrates an interesting point regarding the number of fields in areas of uneven terrain. It would be expected that in areas where there is a relatively large amount of land in forested slopes, that there would be a reduction in the field boundary mileage. In several cells this is the case, however this reduction in mileage is not as great as might be expected. This is basically the result of two factors. First, even though a particular area may possess a rather irregular terrain, fields may still be established at the base of the slopes where land is not as steep, and also along the more level ridge crests. In addition, other fields may be randomly situated in the midst of the forest growth, depending on the advantages of the site. Secondly, while an area may contain a large amount of forested slope land, in many cases there is some sort of dividing line -- such as a fence -- to either separate it from adjacent properties or from other fields. Again, if a particular forested area was enclosed by some kind of boundary it was classified as a field. This demarcation may not always be visible on the ground, but it is evident on vertical aerial photographs.

In either case, the result is that the total non-oriented field boundary mileage per cell is not decreased to any great extent.

Another category of field boundary classified is that of boundaries which are oriented along the Greenville Line. Like the non-oriented mileage, no specific pattern of mileage distribution can be ascertained, however, certain associations of cells seem to exhibit similar figures. As with other phenomena which are oriented to the treaty line, the maximum figure is 4.00 miles, considering the common boundary between quarters B and C as being separate. Oriented field boundary mileage fluctuates in the first few cells -- cells 1-4 being examples -- similar to the fluctuation for the non-oriented mileage figures. Lack of correspondence of field boundary orientation in the till plain area again is the result of a variety of factors, both physical and cultural. An additional explanation here might be the expansion of ownership units across the treaty line, with the resulting removal of the field boundary.

Cells 8-10 show the effects that an oriented road has on field boundaries. Obviously, fields cannot be situated over roads and thus a road will fix the field boundary in that position. This is the case in these and adjacent grid cells where Boundary Line Road runs their entire lengths. Thus each of these cells will have a total of 4.00 miles of oriented field boundaries, until the line terminates in cell 14. On the other hand, where there is no such reinforcement as oriented roads, and where the landscape

becomes rather dissected through stream erosion, the oriented mileage decreases. Grid cells 25-27 or cell 33 are examples of such a decrease. In these cells most of the fields are situated to the course of the streams or ridge crests, and to survey lines where the stream bottoms are wide enough.

The influence of the treaty line once again becomes apparent in relation to oriented field boundaries on the old drift "flats". Cells 38-40 show this effect with maximum mileage figures, and generally reflect the level nature of this land. Part of this adherence by field boundaries to the treaty line may be explained by the presence of some oriented roads as well as the location of the Ripley-Dearborn County Line in these cells. Again, this would have the tendency to reinforce the field boundary orientation.

With the resumption of the uneven terrain south of the drift "flats", the fluctuating pattern resumes. Cell 49 -- like cell 33 was farther north -- is an example of the decrease in oriented mileage as a result of stream dissection. This cell contains Laughery Creek and adjacent alluvial bottom lands. Fields in this cell also tend to correspond to the channel of the creek, with a lack of any correspondence on the heavily wooded slopes.

The final category of field boundaries to be considered, is that of boundaries whose situation parallels that of the treaty line. No overall set pattern can be discerned, however, on a cell basis, the largest mileage concentrations appear to be located in quarter divisions B and C in each cell. While no specific data is

available for analysis on this question, a general assumption might be that some field patterns run parallel to the treaty line because of operating techniques. Farmers tend to layout their fields in either squares or rectangles -- where feasible -- so as to make preparations by machinery easier and more economical. Ideally, then, if the boundary of one side of a field is controlled by the treaty line, then the opposite boundary of the same field should parallel it. The layout of fields is a decision made by each farmer and thus there will be a wide variety of field shapes in any given area. This will also be true in the study area, and accounts for the fact that all fields do not run parallel to the treaty boundary. In addition, the overall control on field boundaries in the area is the township and range system. Because of this fact, fields paralleling the treaty line are in opposition to this prevailing control, and are thus at a minimum. Fields classified as paralleling the treaty line are usually contained within section line roads on either side of the line, thus controlling the location of these deviating field patterns.

Within the study area, there are a total of 93.04 miles of field boundaries which can be classified as running parallel to the treaty line. Of this total, 48.61 miles are located north of the glacial boundary and 44.58 miles are situated south of it. These figures indicate that parallel boundaries are rather evenly spread over the area. It is true that there tends to be more of a concentration in certain series of cells than others, but generally this parallel field mileage forms a fluctuating pattern throughout the

entire study area.

While there is a fluctuation in the overall cell distribution, the mileage distribution within individual cells tends to be similar. The main concentration is in quarter divisions B and C. The concentration in these cells is largely the result of field boundaries being influenced by the treaty line. This effect is at a minimum in the outer quarters -- A and D -- where there is more control by fundamental survey lines.

Land Cover/Use

The Greenville line is situated on land of various covers and uses. Most of these uses, however, are of a non-urban nature. By this it is meant that the line passes over land which is predominately not used for residential, commercial, institutional, or industrial sites. Only 2% of the land in the study area is used for these purposes.

The majority of the study area is in rural uses, mainly agricultural. Agricultural uses account for approxmately 67% of this area. Generally speaking, the area is composed of five distinct farming types.[18] (Fig. 32) These types are (a) the Central Grain and Livestock area, (b) the Northwestern General area, (c) the Southeastern Central Corn, Wheat, and Hog area, (d) the Southeastern

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[18] Robertson, Lynn; Hicks, J. W.; and Young, E. C., "Types of Farming in Indiana", Purdue University, Agricultural Experiment Station, Station Bulletin, No. 628, December, 1955, p. 1.

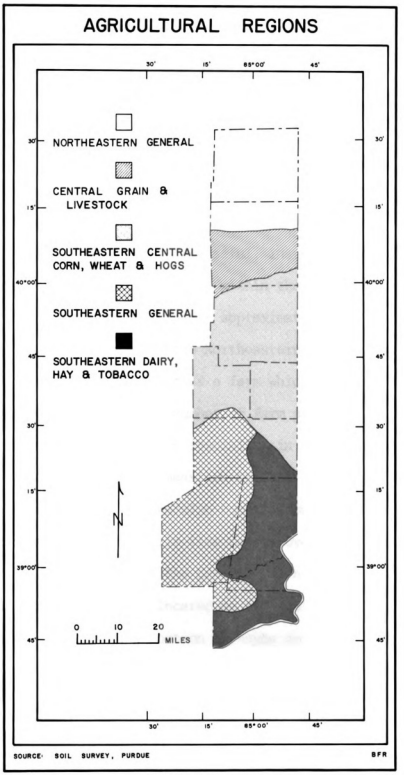
AGRICULTURAL REGIONS
30'
15'
85°00'
45'
NORTHEASTERN GENERAL
CENTRAL GRAIN & LIVESTOCK
SOUTHEASTERN CENTRAL CORN, WHEAT & HOGS
SOUTHEASTERN GENERAL
SOUTHEASTERN DAIRY, HAY & TOBACCO
40°00'
39°00'
N
0 10 20
MILES
SOURCE: SOIL SURVEY, PURDUE
BFR

Figure 32.

General area, and (e) the Southeastern Dairy, Hay, and Tobacco area. It should be noted that these farming type classifications are generalizations formulated to delineate certain areas which -- for the most part -- share similar operating systems. The differences between each of the classification types is the result in differences in averages of farm production from one place to another.[19] However, within each of these areas, there are variances in production systems which might vary more than the average between classification types. Still, these types are useful, in that they provide a general overview of farming systems within the study area.

The boundary line passes through approximately 14.10 miles of land classified as belonging to the Northeastern General type. General farming as used here denotes a farm which produces a variety of crops, and markets a number of farm products. This differs it from other farms which specialize in one or two agricultural crops or products.[20] This Northeastern General type is located in Jay and the northern part of Randolph counties on Region "F" soils.

To the south, the Greenville line passes over 8.60 miles of lands considered to be part of the Central Grain and Livestock farming region. This farming type is located in the southern half of Randolph and the extreme northwestern portion of Wayne counties. It is situated on both soils of Region "F" and Region "E".

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[19] Ibid, p. 25.

[20] Ibid, p. 23.

The next farm type region encountered in the study area is the Southeastern Central Corn, Wheat, and Hog area. This region is located in Wayne, Union, and northeastern Franklin counties on soils of Region "E" in the northern part and Region "G" in the southern part. The treaty boundary traverses approximately 42.30 miles of this farm type, the greatest areal extent of any type in the study area.

South of the above region, lies the Southeastern Dairy, Hay, and Tobacco region, with the boundary line traversing about 19.60 miles of this area. This farm type is located on soils of Region "K" in southwestern Franklin, through Dearborn, Ripley, Ohio, and Switzerland counties. This area intertongues with the Southeastern General area along the Ripley-Dearborn County Line and in northwestern Switzerland County.

The last farming type located in the study area is the Southeastern General area which is found in northwestern Switzerland, western Dearborn, and all of Ripley counties. The boundary line crosses a total of 29.40 miles of this farming type, and situated on soils of Region "J".

From aerial photography specific land cover/use categories were identified to obtain some sort of data concerning the study area. (Figs. 33-39) Eight categories were classified, these being: (a) Cropland and Hay (C & H), (b) Permanent Pasture and Other Grasslands (pas.), (c) Residential (Res.), (d) Commercial, Service, and Institutional (C, S, & I), (e) Industrial (Ind.), (f) Brushland (Br.), (g) Forestland (For.), (h) Open Water (O.W.).

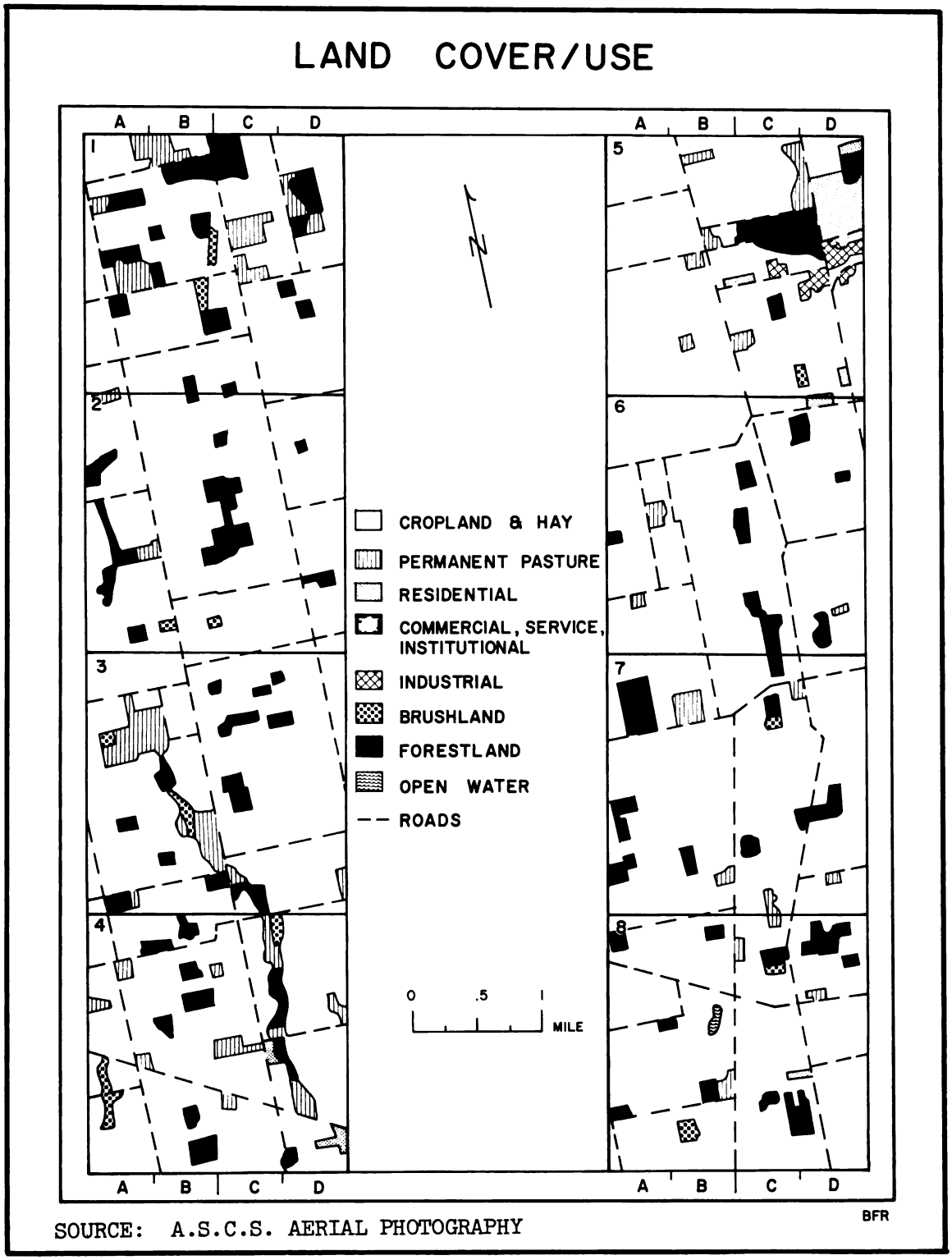

LAND COVER/USE
A B C D
1
2
3
4
5
6
7
8
CROPLAND & HAY
PERMANENT PASTURE
RESIDENTIAL
COMMERCIAL, SERVICE, INSTITUTIONAL
INDUSTRIAL
BRUSHLAND
FORESTLAND
OPEN WATER
ROADS
0 .5 1
MILE
SOURCE: A.S.C.S. AERIAL PHOTOGRAPHY
BFR

Figure 33.

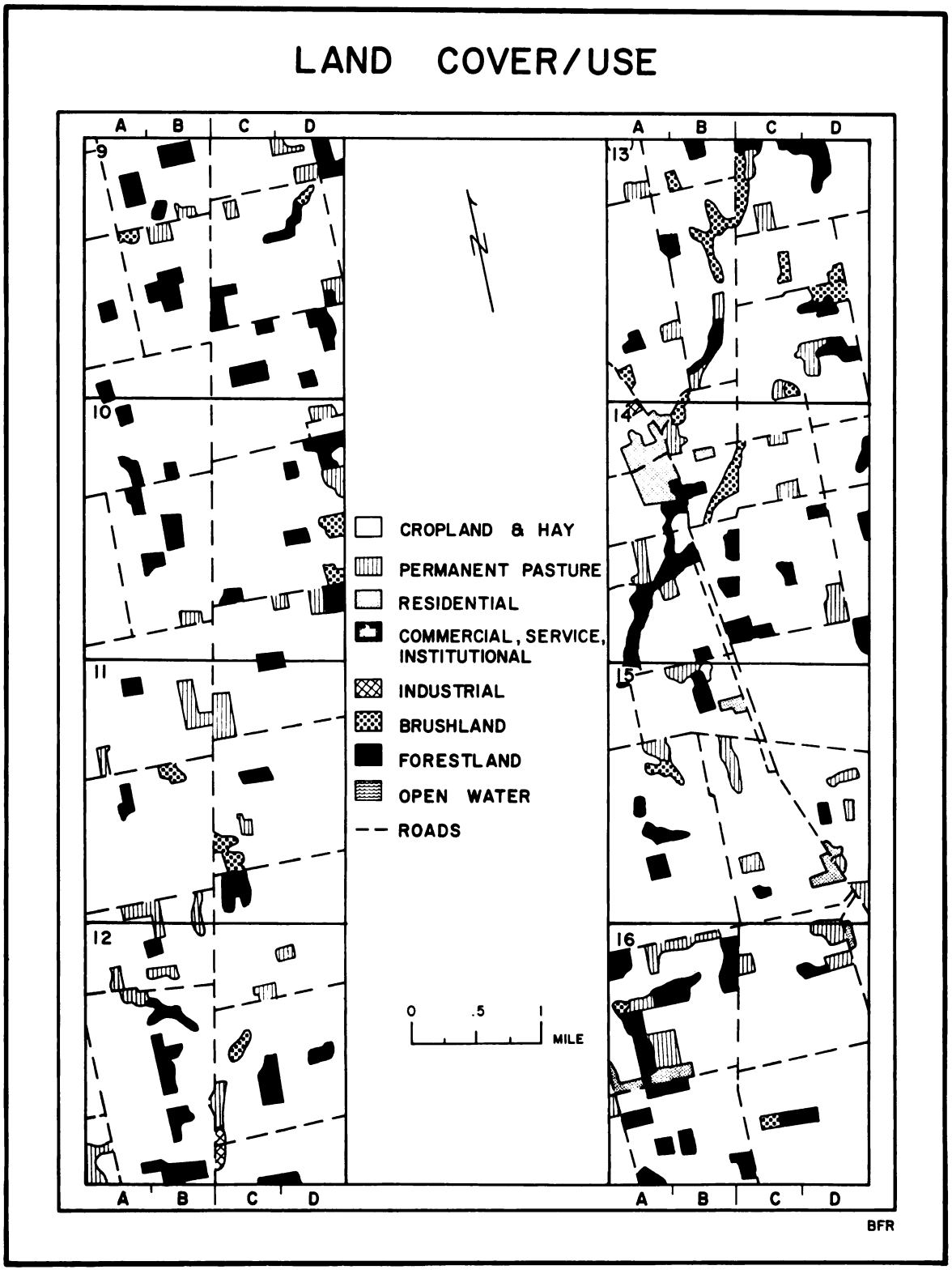

LAND COVER/USE
A B C D
9
10
11
12
13
14
15
16
CROPLAND & HAY
PERMANENT PASTURE
RESIDENTIAL
COMMERCIAL, SERVICE, INSTITUTIONAL
INDUSTRIAL
BRUSHLAND
FORESTLAND
OPEN WATER
ROADS
0 .5 1
MILE
BFR

Figure 34.


LAND COVER/USE
A B C D
17
18
19
20
21
22
23
24
N
CROPLAND & HAY
PERMANENT PASTURE
RESIDENTIAL
COMMERCIAL, SERVICE INSTITUTIONAL
INDUSTRIAL
BRUSHLAND
FORESTLAND
OPEN WATER
ROADS
0 .5 1
MILE
BFR

Figure 35.

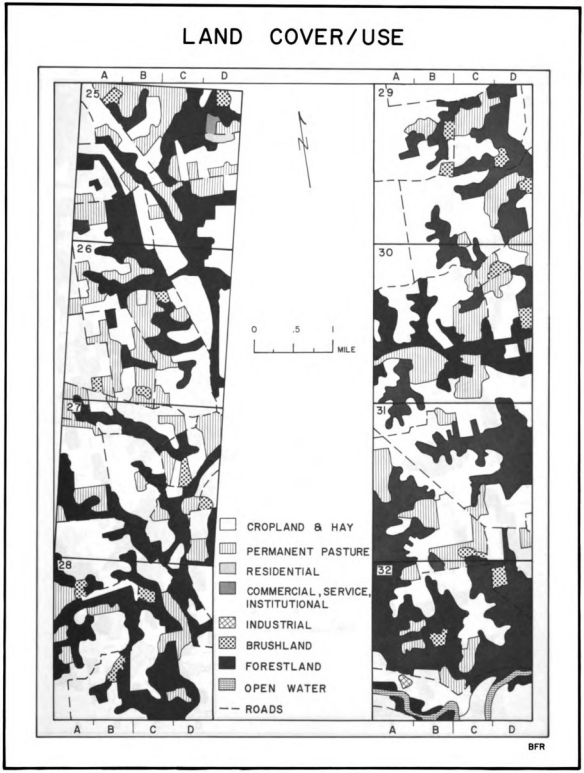

LAND COVER/USE
A B C D
25
26
27
28
29
30
31
32
0 .5 1
MILE
CROPLAND & HAY
PERMANENT PASTURE
RESIDENTIAL
COMMERCIAL, SERVICE, INSTITUTIONAL
INDUSTRIAL
BRUSHLAND
FORESTLAND
OPEN WATER
ROADS
BFR

Figure 36.

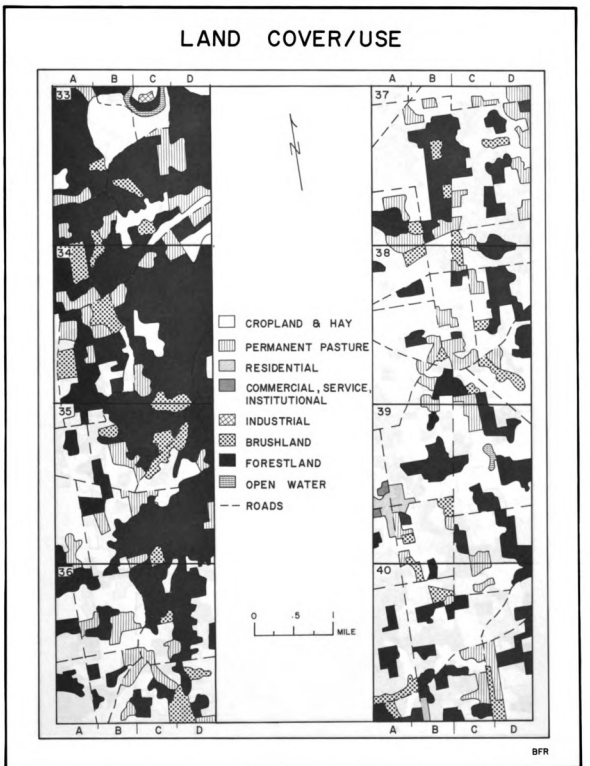

LAND COVER/USE
A B C D
33
34
35
36
37
38
39
40
N
CROPLAND & HAY
PERMANENT PASTURE
RESIDENTIAL
COMMERCIAL, SERVICE, INSTITUTIONAL
INDUSTRIAL
BRUSHLAND
FORESTLAND
OPEN WATER
ROADS
0 .5 1
MILE
BFR

Figure 37.

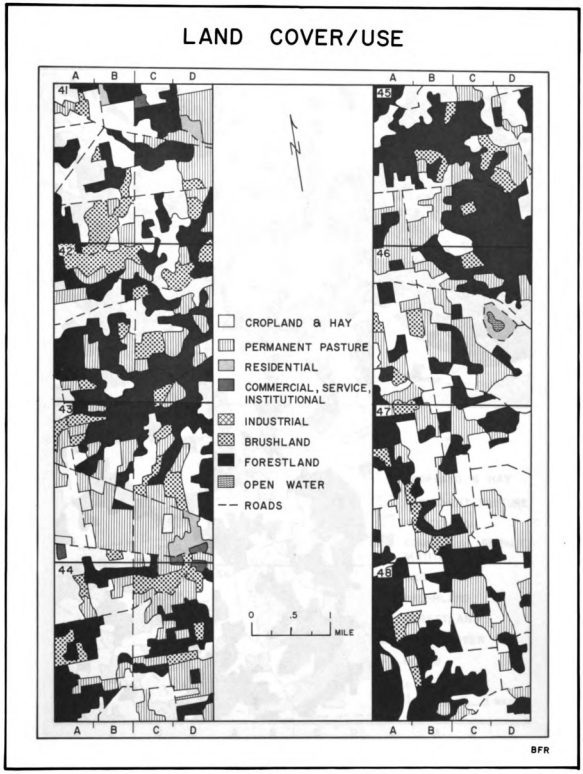

LAND COVER/USE
A B C D
41
43
46
47
44
48
CROPLAND & HAY
PERMANENT PASTURE
RESIDENTIAL
COMMERCIAL, SERVICE, INSTITUTIONAL
INDUSTRIAL
BRUSHLAND
FORESTLAND
OPEN WATER
ROADS
0 .5 1
MILE
BFR

Figure 38.

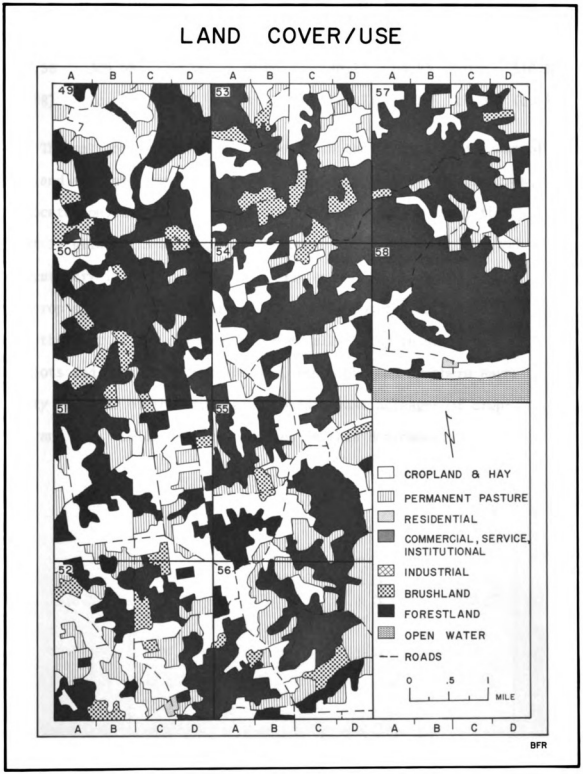

LAND COVER/USE
A B C D A B C D A B C D
49
53
57
50
54
58
51
55
52
56
A B C D A B C D A B C D
CROPLAND & HAY
PERMANENT PASTURE
RESIDENTIAL
COMMERCIAL, SERVICE, INSTITUTIONAL
INDUSTRIAL
BRUSHLAND
FORESTLAND
OPEN WATER
ROADS
0 .5 1
MILE
BFR

Figure 39.

Land Cover/Use Averages (In acres)

C & H	Pas.	Res.	C,S, & I	Ind.	Br.	For.	O.W.
1394.58	309.68	96.00	49.06	40.23	84.83	720.67	110.87
(c. 58)	(c. 58)	c. 17)	(c. 12)	(c. 7)	(c.55)	(c. 58)	(c. 5)

The category with the most acreage in the study area is that of cropland and hay. More than half of this acreage, 54,970.60 acres, is located on the Tipton Till Plain. As shown on the maps, the first 17 grid cells all exhibit the dominance of the cropland and hay category in this part of the study area. For these cells, the crop acreage averages around 2200 acres for the entire cell, with the rest of the acreage in these cells being in scattered woodlots and pasture. Thus the Jay, Randolph, and northern Wayne county portions of the study area contain vast acreages of cropland and hay. Cells 2-4 are examples of this dominance.

Selected Land Cover/Use Cell Figures (In acres)

Cell #		C&H	Pas.	Res.	C,S,&I	Ind.	Br.	For.	O.W.
(1)	A.	524.8	64	-	-	-	-	51.2	-
	B.	505.6	32	-	-	-	-	83.2	-
	C.	518.4	64	-	-	-	19.2	57.6	-
	D.	544.0	32	-	-	-	-	64.0	-
(2)	A.	550.4	19.2	-	-	-	-	70.4	-
	B.	614.4	-	-	-	-	6.4	19.2	-
	C.	563.2	-	-	-	-	-	76.8	-
	D.	620.8	-	-	-	-	-	19.2	-
(3)	A.	524.8	89.6	-	-	-	6.4	19.2	-
	B.	563.2	44.8	-	-	-	12.8	19.2	-
	C.	550.4	6.4	-	-	-	-	83.2	-
	D.	627.2	6.4	-	-	-	-	6.4	-
(4)	A.	576.0	25.6	-	-	-	32	6.4	-
	B.	531.2	-	-	-	-	-	108.8	-
	C.	537.6	51.2	6.4	-	-	12.8	32.0	-
	D.	563.2	44.8	6.4	12.8	-	-	12.8	-
(18)	A.	390.4	32.0	44.8	-	32.0	70.4	70.4	-
	B.	396.8	76.8	51.2	-	6.4	-	108.9	-
	C.	403.2	38.4	134.4	64.0	-	-	-	-
	D.	153.6	51.2	249.6	179.2	6.4	-	-	-

Cell #	C&H	Pas.	Res.	C,S,&I	Ind.	Br.	For.	O.W.
(21) A.	320.0	96.0	-	-	-	12.8	211.2	-
B.	224.0	153.6	-	-	-	12.8	249.6	-
C.	217.6	83.2	-	-	-	19.2	320.0	-
D.	416.0	19.6	-	-	-	32.0	172.8	-
(33) A.	76.8	70.8	-	-	-	6.4	473.6	12.8
B.	307.2	25.6	-	-	-	51.2	230.4	25.6
C.	204.4	83.2	-	-	12.8	25.6	313.6	-
D.	76.8	140.8	-	-	-	-	422.4	-
(34) A.	44.8	121.6	-	-	-	70.4	403.2	-
B.	83.2	64.0	-	-	-	19.2	473.6	-
C.	76.8	83.2	-	-	-	19.2	460.8	-
D.	19.2	19.2	-	-	-	12.8	588.8	-
(38) A.	582.4	-	-	-	-	12.8	44.8	-
B.	409.6	131.4	-	-	-	25.6	70.4	-
C.	384.0	115.2	-	-	-	64.0	76.8	-
D.	371.2	12.8	-	-	-	38.4	217.6	-
(39) A.	460.8	32.0	70.4	19.2	-	19.2	38.4	-
B.	467.2	19.2	-	-	-	19.2	134.4	-
C.	422.4	64.0	-	-	-	-	140.8	12.8
D.	416.0	-	-	-	-	-	217.6	6.4
(40) A.	454.4	-	-	-	-	64.0	102.4	-
B.	403.2	6.4	-	-	-	44.8	185.6	-
C.	403.2	128.0	-	-	-	25.6	83.2	-
D.	454.4	25.6	-	-	-	19.2	140.8	-

Cell #	C&H	Pas.	Res.	C,S,&I	Ind.	Br.	For.	O.W.
(42) A.	153.6	102.4	-	-	-	89.6	102.4	-
B.	179.2	128.0	-	-	-	102.4	230.4	-
C.	166.4	70.4	-	-	-	121.6	281.6	-
D.	89.6	179.2	-	-	-	83.2	288.0	-
(51) A.	243.2	51.2	-	-	-	-	345.6	-
B.	192.0	147.2	-	-	-	12.8	288.6	-
C.	364.8	134.4	-	-	-	25.6	115.2	-
D.	326.4	128.0	-	-	-	25.6	160.0	-

The dominance of cropland is also seen in cells 38-40 which are located on the old Illinoian drift flats. The cropland acreage in these cells is not as great as that found on the till plain because though the drift flats are relatively level, they are older in age, with a certain degree of stream dissection present. This means a reduced cropland acreage, and more land in pasture and woodlots.

Various reductions in cropland acreage occur in different sections of the study area. Such a reduction is found in cell 18, for example. In this cell total crop acreage decreases to 1344 acres, primarily as a result of the location of the city of Richmond in this cell. Similar reductions occur in other cells where cities and towns are found. Other decreases in crop acreage occur elsewhere in the study area, though for different reasons. In cells 21 and 33 the decrease is accounted for by the Greenville line traversing the valley of the East Fork and the Whitewater River, and its associated steep sides. The majority of the cropland found in such cells is usually located on the bottom lands adjacent to the river. Crop reductions such as these occur throughout the study area in cells where steep slope predominate; these being found primarily south of the glacial boundary where land is rather dissected by stream action. There are some exceptions, such as occur in cell 51. In this grid cell crop acreage increases because of the presence of more level upland areas or small stream valleys.

The next largest category is that of forestland. Altogether

the study area contains 41,799 acres in this category. Of this acreage figure, 12,744.2 acres lie north of the glacial border on the Tipton Till Plain. This forestland acreage is situated mainly in regular shaped woodlots on land which is generally not suited for crop production. The acreage in woodlots in the northern part of the study area is relatively small when compared with the large amount of land in cropland and hay fields. Note cells 1-4. Grid cell 1 contains an unusually large amount of forestland because of the presence of the more undulating Mississinewa moraine. The next few cells, however, illustrate a more characteristic distribution.

The amount of land in forests increases south of Richmond as the Greenville line traverses the Whitewater River Valley and its tributaries. This is a pattern which is repeated throughout the study area. It is a fluctuating pattern, that as cropland decreases or increases, forestlands respond in the opposite manner. Urban land uses also have this influence, as seen in cell 18. While there tends to be this fluctuating pattern between a series of cells, the overall distribution shows a limited forestland acreage north of the glacial border, that gradually increases south of this border with a correspondong decrease in cropland and urban uses. Basically this is the result of the increased irregularity in the landscape.

South of the glacial border, the amount of land in forest increases, with the entire area containing 28,704.8 acres in this

category. This increase is not the result of a large increase in a few individual cells, for while some cells do contain large amounts of forested land, the overall acreages in the cells seem to be evenly distributed. Instead, this increased acreage is the result of the increase in the amount of slope land present in this part of the study area. Forest acreage was rather limited on the Tipton Till Plain. It was not until the Greenville line began to traverse the Whitewater River area that this acreage really began to increase, accounting for approximately 80% of the total forest acreage north of the glacial border.

With the increase of cropland on the old drift "flats" area, there is a corresponding decrease in forestlands. However, for the most part, forest acreage is relatively constant south of the glacial border. The principal exceptions, again, occur in cells which contain slightly more level upland areas and stream bottoms.

The third largest land cover/use category is that of permanent pasture and grassland, which account for 17,982 acres in the study area. Like the forestland located on the Tipton Till Plain, the acreage in this category is rather limited in comparison to cropland. The majority of this acreage on the till plain is found on the moraines or in imperfectly drained areas where it is not economically feasible to cultivate crops. The first few grid cells are examples of this distribution. The amount of acreage in cell 1 is the result of the presence of the Mississinewa moraine, while acreage in cell 3 and 4 is situated next to woodlots or adjacent to drains flowing into the Mississinewa River.

Following the distribution patterns of the other categories, the acreage in pasture changes dramatically as the treaty line begins to traverse the East Fork, Whitewater River. This effect is seen in the figures for cell 21. As with forestland, in many cases it is more feasible and economical to put this type of slope land into pasture rather than cultivating it. Where slopes become too steep, however, pastureland acreage decreases as do other agricultural land uses because of the problems in operation.

When the treaty boundary line encounters the old drift "flats" there is a decrease in the amount of land in permanent pasture as the cropland acreage increases. The figures for cells 38-40 illustrate this fact. With the termination of the drift "flats", the variable distribution of pasture once again resumes. Where large acreages of pasture are found south of the area of old drift, they can be explained by cells having moderate enough slopes where pasture and grasslands would not be in competition with cropland.

Brushland is the next ranking category in acreage. The study area contains 4665.6 acres of land classified as brush, with 1132.8 acres being located north of the glacial boundary. Acreages in this category per cell are relatively low, averaging about 15 acres. Most land so classified is situated primarily next to woodlots and stream courses. Again this fact is shown in the first four grid cells. Following the trend of other land cover/use categories, there is a change in cells containing the beginnings of the Whitewater River Valley as seen in cell 21.

Similar to the forestland acreage, the land in brush is greater south of the glacial border, containing 3532.8 acres or 76% of the study area total. Also like the forest acreage, most of the brushlands north of the glacial border is located just over that border on the slopes along the stream courses of the Whitewater River and its tributaries. There is somewhat of a break in brushland acreage as the Greenville Treaty line traverses the area of Illinoian drift "flats". This break is not as sharp as in other categories because this area being older, is more dissected than the younger till plain to the north. Consequently, there is more land in brush in this cropland area than there is to the north.

There is also a limited amount of acreage in the three urban land use categories, with the majority of these being found north of the glacial border. In this part of the study area the Greenville line passes near three relatively large urban centers -- Union City in Randolph County, and Fountain City and Richmond in Wayne County. Grid cell 18 is an example of the effects of the presence of an urban area. This cell contains a portion of the city of Richmond with large acreages in residential, commercial, and industrial uses. Even with the large amount of urban uses, though, there is still large acreages of cropland, pasture, and forestlands present. No where in the study area is there an urban area which completely dominates an individual cell. Other urban uses found in the study area do not approach the amount of acreage associated with Richmond.

While most urban uses are found north of the glacial border, some urban acreage is found south of it. In some cases, such as cell 33, only industrial uses are found in a cell. Such a distribution results from the presence of sand and gravel excavation sites which are so classified. In other cases urban categories result from the presence of small towns and rural subdivisions like the one found in cell 46.

CHAPTER VI

CONCLUSIONS

Several conclusions can be drawn concerning the relationship between the cultural landscape of east-central and southeastern Indiana and the Greenville Treaty Boundary Line. These conclusions can be grouped into three main categories of information. First, there are certain conclusions which can be made concerning the classification of the treaty line as a specific boundary type. In the second place, some conclusions can be drawn about the utility of the Unified Field Theory in studies of boundary line landscapes. Finally, the nature of the present-day cultural landscape of the study area can be analyzed by relating the grid cell data to the hypotheses presented in the introduction.

The Greenville Treaty line can be classified according to its morphological and genetic properties. Morphologically the treaty line is complex; possessing both physical and geometric properties. The Greenville Treaty line commences at the mouth of the Cuyahoga River. From here it follows the river to the portage of the Tuscarawas River, and on to Fort Laurens. This portion of the treaty line conforms to certain physical features on the landscape, and can be classified as a physical boundary. From Fort Laurens to its termination on the north bank of the Ohio River, the treaty line is demarcated by three separate straight line segments. These line segments do not correspond to any natural

landscape features, but instead were delineated as a matter of convenience. At the time of the treaty negotiations much of the land in these sections of Ohio and Indiana had not been extensively traveled or settled by Americans. These straight line segments traversed relatively unknown land in which they were the easiest and most convenient form of line to delineate. In addition, there was a need to have the treaty line delineated and demarcated as expeditiously as possible to prevent further hostilities between the tribes and the settlers. Because of the need for a quick survey, straight line segments were used to facilitate the demarcation of the line. These can be classified as geometrical boundaries. Because of the combination of these two boundary forms, the entire Greenville Treaty Boundary Line in Ohio and Indiana is classified as a complex boundary type. Specifically, however, that portion of the treaty line which has been examined in the study is a geometrical form line. It is geometrical in that it does not conform to any physical or anthropological features, but instead is a straight line segment between Fort Recovery and the north bank of the Ohio River.

Another method of boundary line classification is genetic. A variety of categories can be formed by classifying a boundary line according to when it was demarcated on the landscape. While many sections of Indiana and Ohio did contain various tribal and European settlements, for the most part, this region was devoid of any areas of extensive American settlement. For this reason the

Greenville line can be classified genetically as a antecedent boundary because it was delineated and demarcated prior to major settlement and development of the main elements of the cultural landscape. In addition, throughout its various stages of evolution the line has lost much of its significance as a boundary unit. There is, however, evidence of the position of the treaty line as indicated by present-day cultural landscape features. Therefore, the Greenville line can be classified as a relic boundary.

The entire Greenville Treaty Boundary Line can be classified as a complex-antecedent boundary. The term relic is not used here because no specific study was done to attest to the evidence of relic cultural landscape forms outside of the study area. Within the study area, the Greenville line can be classified as a geometric-antecedent-relic boundary. This indicates a boundary line established for convenience over relatively unknown, unmapped land. Furthermore, it indicates a boundary line demarcated prior to extensive settlement. With the establishment of the cultural landscape, a correspondence of present-day cultural elements to this boundary is still maintained even though it no longer has political significance.

In relation to its form and development, the Greenville line has served a number of functions during its existence. This boundary first operated as a quasi internal-international line because it divided the settlements of the Indian tribes from those of the Americans. With increased settlement in the region and extinguishing

of the various land claims, the treaty line's function changed to that of a territorial boundary. When Ohio achieved statehood and the "gore" section was transfered to Indiana, this function, too, was abandoned. For a number of years the treaty line served as a county line, however, this function was gradually modified as an increasing number of counties were situated along fundamental survey lines. The Greenville line still functions as a county boundary in the southern part of the study area. In addition, the treaty line also forms the boundary of several civil township units.

Furthermore, the Greenville Treaty line functions as a boundary between two different surveys which were controlled by the First and Second Principal Meridians. This is a function that has not changed since the first survey of the township and section lines, and will not change unless the entire region is resurveyed under another system; which is extremely unlikely. This particular function is probably the most significant. The treaty line in the study area serves as a township boundary line and a section boundary line. This must remain the case for consistency and order in the survey system to be maintained.

As an antecedent boundary, the Greenville line became less significant as settlement increased in the study area. This functional change has been the result of the extension of various political boundaries across the treaty line, and a reliance on township and section lines oriented to the cardinal directions of the compass. This is especially true in the northern part of the study area. The

treaty line, however, still functions as a political boundary in the sourthern portion of the study area where these functions were initially established.

Finally, the Greenville line was not inner-oriented, but was instead controlled by centripetal forces. The difference between a frontier and a boundary is that a frontier is oriented toward outward expansion, while a boundary attempts to enclose a specific political area and thus is oriented inward. The Greenville Treaty line did not serve this function, and apparently it was not demarcated for this purpose. Instead, the treaty line was only a temporary boundary to an increasing westward movement of settlers. In reality the attention of the Greenville line was focused outward towards new lands west of the boundary.

Other conclusions which can be reached, deal with the applicability and usefulness of the Unified Field Theory in studies -- like this one -- on the relationship between a negotiated boundary line and the cultural landscape. This study was not specifically structured around the idea-area chain of the field theory and furthermore was not carried out with the primary aim of illustrating its usefulness. Instead, the Unified Field Theory was utilized in the research in order to provide a logical and orderly manner for examination and analysis. Certain observations, however, can be made concerning the theory's relative merits.

The field theory proved useful in linking the different stages of development of a political landscape, the Greenville Treaty

Boundary Line. This is especially true of the first two links of idea and decision. The field theory concept aided in bridging the gap between the development of the idea of a political boundary line and the decision to actually implement it. Initially a variety of ideas were conceived, with most of them involving some derivation of a line along the crest of the Appalachians or the watershed of the Atlantic Ocean. Pontiac's Uprising illustrated for the British government the need for a boundary line, with Pownall's boundary being chosen for use.

Events had taken place in the evolution of a tribal-colonial boundary which moved it from the realm of a formulated political idea to the reality of governmental policy, establishing a precedent for other such lines. After the Revolutionary War the American government also utilized the idea of a political boundary with its decision to separate tribal and American settlements. The Greenville line was one of the boundary lines which resulted from this decision-making process. In addition, to the government's decision to negotiate a boundary line, was the personal decision by General Wayne to alter the form of the line he had received in his instructions. The result of this alteration was the straight line segment located in Indiana.

These facts illustrate the flexibility of the Unified Field Theory. The field theory permits an analysis of a problem on a number of levels. Generally, on one level there is the conception of the idea of a boundary and secondary decisions by various

governments to implement it. Specifically, other ideas and decisions which relate to the main concept can also be studied. These include such sublevels as Wayne's idea and decision for the creation of a buffer zone, the decision by the tribes to agree to the treaty provisions -- thus resulting in movement away from the line -- or Mansfield's decision to have two survey districts on both sides of the treaty line.

In this way, the field theory can be thought of as operating like a large river system. The main trunk stream is analogous to the main flow of the idea-area chain. All along the main stream course, numerous tributary streams feed into it. The analogy can be applied to the main flow of the idea-area chain. All along its course secondary ideas and decisions, as well as other movements and fields, feed into it at different intervals; all being related to the formulation of a specific politically organized area. Such a system is valuable in that it permits various digressions from the main research theme if necessary, yet still related to the main flow from idea to area. The negotiation and delineation of the Greenville Treaty Boundary Line cannot be fully understood by the use of the field theory unless the sublevels are considered. The amount of detail included in a study utilizing this approach depends on how far these tributary levels are pursued. Once the flow from idea to area has been established, selected portions of the chain such as decision or field can be chosen for intensive study. This can be done as long as it is remembered that this intensive study is part of a continuum.

Political ideas and decisions -- in most cases -- are relatively easy to trace, especially if they result in the establishment of laws such as the ratification of treaties. A certain amount of written material -- correspondence and records of laws -- are usually available for examination. As events proceed from decisions to movements in field theory, written records explaining these events may become scarce, but they are still present. Such records as journals and diaries, or the records of the land offices enable certain patterns of movement to be investigated.

Field theory first becomes of interest to the goegrapher when patterns of circulation or movement are considered. For the most part, ideas and decisions are mainly the concern of political scientists and historians, and of importance to geographers when such facts relate to man-land relationships. To be worthy of geographic analysis, political ideas and decisions must lead to the formation of some pattern of circulation, and preferably culminate in the establishment of an identifiable area.

The signing of the Greenville Treaty initiated a series of movements, some of which were widespread. The most significant movement generated by the treaty was that of settlers who purchased portions of the cession lands and occupied them. Depending on how it is viewed, this movement can either be thought of as point to point, area to area, or point to area. Whatever the circulation pattern, it involved the movement of people and goods from one place to another, and was tied to the decsions-making process.

In terms of studies of political boundaries, movement must be analyzed in relation to the boundary line and how it affects this circulation. Specifically, it has to be determined whether or not the delineation and demarcation in any way function as a barrier to movement and in what form. Because of the nature of a boundary and the reasons for its existence, this barrier function must be one of the main ones emphasized in field theory analysis. This is perhaps the primary service of the field theory in boundary studies. In the case of the Greenville Treaty line, the boundary served as a barrier to circulation only in a legal sense. The line marked the farthest advance of survey lines. It delineated areas of settlement, as well. In reality, however, in terms of physical movement -- legal or otherwise -- the boundary line was not an actual barrier.

The last two links of field and area can be considered together in that both delineate the same regions and contain some form of interaction. A political area, however, contains a greater degree of cohesiveness and organization. In the idea-area chain, the initial formulation of the political idea, the resulting decision-making process, and the initial movement pattern are all set, however, fields of interaction and political area are much more subject to change and modification. It is also a difficult task, in many cases, to identify exactly when a field of interaction begins to form, especially when in field theory the flow can go directly from movement to area. In addition, there is also

the question of what constitutes an organized area. In the case of the Greenville line, movement was first initiated into a region which was -- technically speaking -- a politically organized area, that is the Northwest Territory and later Indiana. However, while the region was organized on a vast territorial basis, the area was not -- for all practical purposes -- organized on a significant level. Thus a case can be made that movement did proceed through a definite field of interaction prior to the significant political organization of the region on a local level.

Not only does a region move from field to area, with political organization, but also with the establishment of a cultural landscape. With increased settlement and expanding administrative organization on the county and township level, a specific landscape began to develop. Fundamental survey lines were already set, and in time state, county, and civil township lines also became established in a finalized form. It must be remembered, however, that while survey lines are -- practically speaking -- not subject to change, political lines are. Thus, an organized area which was initially established as the result of a particular idea-decision-movement process, is subject to subsequent change which may alter its form enough as to obscure this former process. For the most part, this has not occured in the study area. However, this appears to be a potential weakness in the idea-area chain in terms of tracing the initial formation of a cultural landscape from a set of decisions and movements.

The main focus of the geographer in field theory should be on the nature of the function of the politically organized area. Emphasis should be placed on deciding whether a distinctive pattern of cultural elements has formed on the landscape as the result of the flow from a political idea, or whether this cultural landscape would have come into being in any case. Specifically, it appears that in using field theory to examine the relationship of a boundary line and the landscape, it is the boundary itself which should be studied, along with resulting discontinuities. Concentrating on the adjacent landscape area will reveal little concerning the boundary itself because other factors have contributed to its formation. Relationships between the boundary and the surrounding area diminishes rather quickly with increasing distance from the Greenville line included in this study. The principal connection between the demarcation of a boundary and the cultural landscape along the line, either in the form of oriented features or in ones that are offset. Much like a geologic fault line, the main focus of attention in the investigation of political or cultural boundaries should be along these lines themselves.

The main advantage of the Unified Field Theory is that it puts a series of interrelated events in perspective. This perspective permits a systems approach in studying the continuity of flow in the formation and organization of a particular boundary line, and its changes in form and function over a period of time.

Further conclusions can be drawn concerning the relationship between the boundary line and the cultural landscape by examining the grid cell data as they relate to the hypotheses. These hypotheses have not been presented as theoretical concepts relative to the study. Instead, the hypotheses served as guidelines -- like the Unified Field Theory -- for the investigation so that limits could be set on the amount of material covered. These hypotheses do not function as the basis for any in-depth quantitative testing, but provide a framework whereby "probable solutions" can be formed to explain the nature of the relationship.

The supportive hypotheses are reviewed first in order to logically develop the main hypothesis. The first sub-hypothesis states that:

1. The orientation of the boundary line has affected the continuity of major and minor civil and survey divisions (county boundaries, townships, and sections) in the study area.

In determining the importance of the treaty line on the present-day cultural landscape, perhaps the most revealing method of examination is that of measuring the number of miles -- in individual cells and along the entire line -- that each of the cultural indicators studied, is oriented to the boundary line. By studying this orientation, the amount of correspondence of these features can be examined and conclusions reached concerning their significance to the treaty line.

In terms of such correspondence, the most important element measured and mapped was that of survey lines. Townships and sections

were the only features which showed total correspondence to the treaty line along its entire course. There is little doubt that the orientation of the Greenville line has had a definite influence on the positioning of township and section survey lines. Because it is the dividing line between lands surveyed from two principal meridians, the treaty boundary automatically functions as both a township and section line border. Once demarcated, survey lines tend to be permanently positioned. The treaty line, therefore, becomes significant in that as a survey dividing line, all township and section lines must be oriented to the bearing of the treaty line along its entire length.

Offsets are also present along the entire length of the line at more or less regular intervals; again because of the survey boundary function of the line. The treaty line has had no effect on survey lines in the remainder of the study area, because of their orientation to the cardinal directions of the compass. Only on the treaty line itself is there any relationship between the boundary and survey lines.

The treaty line also has affected the positioning of various political lines in the study area, although not to the extent as survey lines. In the case of the Indiana-Ohio state line which passes through parts of three grid cells, there is no correspondence at all. While the treaty line functioned as a territorial boundary, the state line is situated along a true north-south axis.

County lines in the study area show some correspondence to the

line, especially in the southern part of the study area. This orientation is particularly evident in the south because this part of the area contains remnants of the old Dearborn County line. With increasing population and continuous county formations, more reliance was placed on township and section lines rather than on the treaty line. There is a correspondence in the remnant areas, for example the Ripley-Dearborn County line falls into this category. There is also a relationship in the newer counties in the form of various offsets in their borders. This is particularly true in the cases of Wayne, Union, and Franklin counties.

Civil townships display the same patterns of conformance in the southern part of the study area and as offsets in the northern part. Again, the conformance of the civil townships in the southern part is the result of the oriented county lines there. Other oriented civil township lines are found in that part of Franklin County which is located in the study area. The conformance in this county is probably the result of relic civil township boundaries being preserved after the Franklin County line was modified so that it no longer was oriented along the treaty line.

Other than the township offsets which are mostly in the north, there appears to be no other relationships between the treaty boundary and political lines. There is no evidence of any political line, especially county or civil township, which parallels the treaty line. Other than the exceptions noted, these political lines are oriented along fundamental survey lines. Where these

political lines deviate from survey lines, they follow some physical landscape feature such as a stream course and are not affected by the Greenville Treaty line at all.

In the second hypothesis it was stated that:

2. Property lines and field boundaries that abut the treaty line will conform to its configuration.

Property boundaries are also indicators of the processes which have affected the formation of the cultural landscape. Property lines exhibit a definite correlation to the bearing of the treaty line because they are closely related to the dominate survey pattern in an area. With the expansion of ownership units, there is -- in some cases -- a continuation of property lines across the treaty boundary. Of the 232 possible miles of oriented property lines, 195.39 mile actually conform to the bearing of the Greenville line. This represents 84% of the total.

The amount of property line mileage along the portion of the treaty line studied which is not oriented to its bearing is not concentrated in any one section. Instead, there is a fluctuation all along the line, alternating between sections of the treaty boundary which conform and sections which do not. This lack of concentration is illustrated by the even distribution of property lines throughout the study area, without regard to any physical irregularities in the landscape. Such a distribution shows the interrelationship between fundamental survey lines and the sale and orientation of property lines. Where some deviations are present, it is the result of a subsequent ownership unit enlargement.

Field boundary patterns are also related to the Greenville Treaty Boundary Line. A close relationship exists between the situation of fields and property and survey lines. Many property lines correspond to the Greenville boundary. Fields which are subdivisions of these ownership units tend to correspond to the treaty line. Like property lines, however, there is not an absolute correspondence. In the study area, there are 150.18 miles of oriented fields, or 65% of the total miles possible. When compared with property lines, there are approximately 45 fewer miles of field boundaries.

The disparity between the treaty line and field boundary correspondence can be understood when two factors are considered. First, field boundaries do not totally correspond to the treaty line because some ownership units cross it; sometimes resulting in field boundaries crossing it without any effect. Secondly, where there is property line correspondence to the treaty line, there might not be a similar field boundary correspondence because of irregular topography. This is especially true in areas of heavily wooded slopes and stream bottoms where fields tend to be oriented to the course of the stream.

As in the case of property lines, field boundaries do not exhibit any set pattern of areas which do or do not correspond to the treaty line. Instead, the correspondence to the bearing of the Greenville Treaty line seems to be evenly distributed. Oriented fields, however, are not necessarily restricted to areas of

level topography. While it is true that a large amount of mileage in oriented fields is found on relatively level land, such boundaries are also located on slope lands and stream bottoms. Surprisingly, some of the strongest correspondence occurs on heavily wooded, steep slopes adjacent to the Ohio River. Correspondence in this area is probably the result of stable ownership lines, or relic displays of former lines. In these areas it does not appear to be economically feasible to enlarge farm units. Where enlargement does occur, it is probably not worth the time and money to remove the old boundary because of the amount of forest growth along the old property line.

In addition to the oriented field boundaries, there are those boundaries which are situated parallel to the bearing of the treaty line. These field boundaries are largely the result of decisions by farm operators to maintain regular field shapes for ease and economy in cultivation. This is illustrated by the fact that the majority of the mileage found in fields which parallel the treaty line are found in quarter divisions B and C which are adjacent to the line. The mileage in this category is primarily limited to level land.

As with the other cultural landscape elements previously investigated, there appears to be a definite relationship to the survey boundary function of the Greenville Treaty line. This relationship, however, is indirect in that the real positioning of property lines is dependent on the survey form and method

of sale in an area. Furthermore, field boundaries are subdivisions of property ownership units, therefore they also exhibit a correspondence to the treaty line. Because of the close relationship between the treaty line and survey lines, and between survey lines and property lines and field boundaries, the positioning of the lines is all intricately linked together. Because the relationship is indirect, it explains why property lines and field boundaries do not entirely correspond along the entire length of the treaty boundary.

The third hypothesis states that:

> 3. County highway and section line roads (excluding freeways) will exhibit a degree of discontinuity where they cross the boundary line. In addition, there will be some county roads that will conform to the orientation of the treaty line.

Like property lines, most rural roads follow the orientation of the predominate survey pattern in an area. In the study area, rural roads primarily follow the east-west, north-south orientation of the township and range survey, however, in some cases roads tend to conform to the landscape irregularities and stream courses. This is the case in the dissected Dearborn Upland and in the Whitewater Valley. Because the Greenville line also functions as a survey line there are stretches of some rural roads which conform to the orientation of the treaty boundary rather than to the regular township and section lines. The largest single stretch of oriented roads occurs in Randolph and Wayne counties along Boundary Line Road. For the most part, oriented roads in the study area appear to be dependent on the bearing of the treaty line in relatively level areas. The lack of total correspondence of roads to the

treaty line is a result of uneven terrain and the fact that the study area is well serviced by the dominate north-south, east-west road orientation.

Offset roads also occur in the study area. While there is not a large mileage in this category -- 4.36 miles -- there are a number of individual roads which exhibit offset properties when crossing the treaty line. These offset roads result from a correspondence to survey lines which do not meet on the treaty line.

Finally, the last sub-hypothesis states that:

> 4. The Greenville Treaty line will be more evident on lands of the Tipton Till Plain than those of the Dearborn Upland.

It was discovered that this sub-hypothesis does not completely hold true. First of all, because the visible components of the cultural landscape are being considered here, much of this sub-hypothesis depends on the land cover/use of a particular section of the study area. Land cover/use was the final indicator examined in studying the treaty line-landscape relationship. It is also the first of the indicators which does not illustrate a close relationship to the treaty boundary. The most important category classified was that of cropland and hay. As would be expected, various types of land cover/uses are related to variations in topography and soils. The acreage in cropland and hay is found on the relatively level, well drained lands in the study area. Thus the majority of this type of land use is found on the Tipton Till Plain and on the old drift flats to the south.

Generally speaking, the glacial boundary is the major break in this cropland distribution, with 54,970.60 acres, or approximately 68%, being located north of this border. With the increased dissection of the landscape south of the glacial line, the amount of cropland acreage decreases. In examining the amount of acreage in forestland this distribution is reversed. A large amount of this acreage is found south of the glacial border. Most of the acreage found north of this border is located in the valley of the East Fork, Whitewater River. The remainder of the forestland acreage is confined to various sized woodlots on the Tipton Till Plain.

The pasture-grassland and the brushland categories display the same distribution characteristics as the forestland acreage; with the majority of the acreage in these two categories being located south of the glacial border. Approximately 60% of the pasture-grassland acreage and 76% of the brushland acreage are situated in this manner. As with forestland acreage, the majority of the acreage in these two categories is located in these areas because level topography and better crop producing qualities are found north of the glacial border. There are other factors such as market conditions and individual operator preferences which control the type of land cover/use in a particular area. This study, however, does not attempt to explain the location of land cover/use distributions in the study area. The

investigation treated two of the more important factors and tried to relate them to the orientation of the Greenville Treaty line.

Thus, in terms of the Illinoian-Wisconsinan glacial boundary there appears to be a definite relationship between the different categories of land cover/use. Given the factors of topography and soils in the study area, and the economic realities of agricultural production, this general type of land cover/use could be expected; with crops and hay on the level lands, and less productive cover/uses on steep sloped and less well drained areas.

It was thought that given this type of land cover/use distribution the treaty line would be more evident in terms of the material cultural landscape indicators of field boundaries and roads on the more level Tipton Till Plain. This does not appear to be the case. Instead, there is a rather even distribution of oriented field boundaries and roads on either side of the glacial border. This even distribution in field boundaries is apparent when examining oriented fields, with 74.55 miles being situated north of the glacial border and 75.63 miles being situated south of it. Such a pattern is the result of the fact that even on areas of non-agricultural land cover/uses, boundaries between operating units are still visible -- primarily on aerial photography. Even in areas possessing the greatest relief near the Ohio River, field boundaries could be clearly delineated. While it may be easier to identify field boundaries in level areas where fields are under cultivation, these boundaries are also visible in forested and brush areas, as well, It appears that field boundary delineation

is more dependent on property and survey lines than on any physical lnadscape forms. In terms of parallel field boundaries, while most of this mileage is concentrated in quarter divisions B and C near the treaty line, there is no corresponding concentration on either side of the glacial border. There are 48.46 miles of these field boundaries north of the border and 44.58 miles south of it.

Roads tend to display a little more correspondence to the area north of the glacial border. The area north of the border contains 35.24 miles of oriented roads and 26.11 miles of oriented roads to the south. These figures become even more revealing when the amount of oriented roads located on the level lands of the Tipton Till Plain and the old drift flats are considered. Of the 61.35 miles of roads being recorded as oriented to the Greenville Treaty line, 45.83 miles, or 75% are found in those cells located on level areas. The remaining mileage is found on other, less extensive, level areas such as in some stream bottoms or upland divides. Clearly, most oriented roads are found on relatively level land where correspondence to survey lines is more practical. Because substantial amounts of level lands are found on both sides of the glacial border, there is not a great degree of distinction in the distribution of oriented roads, however, landforms are definitely a factor in road orientation; with survey lines being followed wherever possible.

Because of their nature, the other indicators used in this study do not display any variation as the result of the presence of the glacial border. This is especially true of survey lines

and the political lines. Property lines likewise show little effect from the glacial border, with 97.59 miles of oriented property lines found north of it and 97.80 miles of such property lines being found south of it. Again, survey lines are not -- for the most part -- affected by landscape irregularities. The same holds true for other cultural landscape features which are dependent on them.

With the evaluation of these sub-hypotheses, a final conclusion can be made concerning the major hypothesis, which states that:

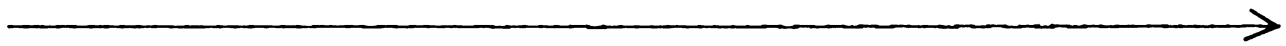
> The various processes which operated in the formulation and demarcation of the Greenville Treaty Boundary Line and the functions that the line has served, have had a definite impact on the form of the cultural landscape of east-central and southeastern Indiana.

When the facts relative to the study area are examined as a whole, it can be seen that there is a clear relationship between the treaty boundary and the cultural landscape. With the exception of the fourth hypothesis, each of the other sub-hypotheses, to a greater or lesser extent, illustrate this point. Even in the fourth sub-hypothesis, however, there is an indirect relationship in certain instances between physical features found along the different aged glacial formations and the treaty line.

The strongest relationship and perhaps that of the greatest significance, is that of the survey line function of the treaty boundary. This is the only one of the indicators studies which totally conforms to the boundary. Property lines and field boundaries are next in significance, followed by political lines,

roads, and patterns of land cover/use. There is a decreasing relationship with the treaty boundary as the various indicators become less dependent on the survey line function of the treaty boundary. This relationship can be seen in the following diagram:

Greatest					Least
Survey Lines	Property Lines	Field Boundaries	Political Lines	Roads	Land Cover/ Use



Decreasing Relationship With the Treaty Boundary

The Greenville Treaty line is only significant in terms of its function as a survey boundary line. This survey function is the result of the non-related ideas and decisions of two men; General Wayne's decision to negotiate a buffer zone and Jared Mansfield's decision to use the Greenville Treaty line as the boundary between two survey districts. Without this function, the pattern of the present-day cultural landscape indicators used in this study would be altered. This alteration would be in the form of a greatly reduced correspondence -- oriented, offset, and parallel -- to the treaty boundary. Several of these indicators, however, survive as relic features on the landscape and illustrate the strong relationship between the Greenville Treaty Boundary Line and the cultural landscape of east-central and southeastern Indiana.

APPENDIX A

Text of the Treaty of Greenville, 1795

TREATY WITH THE WYANDOT, ETC., 1795

A treaty of peace between the United States of America and the Tribes of Indians called the Wyandots, Delawares, Shawnoes, Ottawas, Chipewas, Putawatimies, Miamis, Eel-river, Weas, Kickapoos, Piankashaws, and Kaskaskias.

To put an end to a destructive war, to settle all controversies, and to restore harmony and a friendly intercourse between the said United States, and Indian Tribes; Anthony Wayne, major-general, commanding the army of the United States, and sole commissioner for the good purposes above-mentioned, and the said tribes of Indians, by their Sachems, chiefs and warriors, met together at Greenville, the headquarters of the said army, have agreed on the following articles which, when ratified by the President, with the advice and consent of the Senate of the United States, shall be binding on them and the said Indian tribes.

ARTICLE I.

Henceforth all hostilities shall cause; peace is hereby established, and shall be perpetual; and a friendly intercourse shall take place, between the said United States and Indian tribes.

ARTICLE II.

All prisoners shall on both sides be restored. The Indians, prisoners to the United States, shall be immediately set at liberty. The people of the United States, still remaining prisoners among the Indians, shall be delivered up in ninety days from the date hereof, to the general or commanding officer at Greenville, Fort Wayne or Fort Defiance; and ten chiefs of the said tribes shall remain at Greenville as hostages, until the delivery of the prisoners shall be effected.

ARTICLE III

The general boundary line between the lands of the United States, and the lands of the said Indian Tribes, shall begin at the mouth of Cayahoga river, and run thence up the same to the portage between that and the Tuscarawas branch of the Muskingun;

thence down that branch to the crossing place above Fort Lawrence; thence westerly to a fork of that branch of the great Miami river running into the Ohio, at or near which fork stook Loromie's store, and where commences the portage between the Miami of the Ohio, and St. Mary's river, which is a branch of the Miami, which runs into Lake Erie; thence a westerly course to Fort Recovery, which stands on a branch of the Wabash; then south-westerly in a direct line to the Ohio, so as to intersect that river opposite the mouth of Kentucke or Cuttawa river. And in consideration of the peace now established; of the goods formerly received from the United Stated; of those now to be delivered, and of the yearly delivery of goods now stimulated to be made hereafter, and to indemnify the United States for the injuries and expenses they have sustained during the war; the said Indians tribes do hereby cede and relinquish forever, all their claims to the lands lying eastwardly and southwardly of the general boundary line now described; and these lands, or any part of them, shall never hereafter be made a cause or pretence, on the part of the said tribes or any of them, of war or injury to the United States, or any of the people thereof.

And for the same considerations, and as an evidence of the returning friendship of the said Indian tribes, of their confidence in the United States, and desire to provide for their accommodation, and for that convenient intercourse which will be beneficial to both parties, the said Indian tribes do also cede to the United States the following pieces of land; to-wit. (1.) One piece of land six miles square at or near Loromie's Store before mentioned. (2.) One piece two miles square at the head of the navigable water or landing on the St. Mary's river, near Girty's town. (3.) One piece six miles square at the head of the navigable water of the Au-Glaize river. (4.) One piece six miles square at the confluence of the Au-Glaize and Miami rivers, where Fort Defiance now stands. (5.) One piece six miles square at or near the confluence of the rivers St. Mary's and St. Joseph's, where Fort Wayne now stands, or near it. (6.) One piece two miles square on the Wabash river at the end of the portage from the Miami of the lake, and about eight miles westward from Fort Wayne. (7.) One piece six miles square at the Ouatanon or old Weea towns on the Wabash river. (8.) One piece twelve miles square at the British fort on the Miami of the lake at the foot of the rapids. (9.) One piece six miles square at the mouth of the said river where it empties into the Lake. (10.) One piece six miles square upon Sandusky lake, where a fort formerly stood. (11.) One piece two miles square at the lower rapids of Sandusky river. (12.) The post of Detroit and all the land to the north, the west and the south of it, of which the Indian title has been extinguished by gifts or grants to the French or English governments; and

so much more land to be annexed to the district of Detroit as shall be comprehended between the river Rosine on the south, lake St. Clair on the north, and a line, the general course whereof shall be six miles distant from the west end of lake Erie, and Detroit river. (13.) The post of Michillimachinac, and all the land on the island, on which that post stands, and the main land adjacent, of which the Indian title has been extinguished by gifts or grants to the French or English governments; and a piece of land on the main to the north of the island, to measure six miles on lake Huron, or the strait between lakes Huron and Michigan, and to extend three miles back from the water of the lake or strait, and also the island De Bois Blanc, being an extra and voluntary gift of the Chipewa nation. (14.) One piece of land six miles square at the mouth of Chikago river, emptying into the south-west end of Lake Michigan, where a fort formerly stood. (15.) One piece twelve miles square at or near the mouth of the Illinois river, emptying into the Mississippi. (16.) One piece six miles square at the old Piorias fort and village, near the south end of the Illinois lake on said Illinois river: And whenever the United States shall think proper to survey and mark the boundaries of the lands hereby ceded to them, they shall give timely notice thereof to the said tribes of Indians, that they may appoint some of their wise chiefs to attend and see that the lines are run according to the terms of this treaty.

And the said Indian tribes will allow to the people of the United States a free passage by land and by water, as one and the other shall be found convenient, through their country, along the chain of posts herein before mentioned; that is to say, from the commencement of the portage aforesaid at or near Loromie's store, thence along said portage to the St. Mary's, and down the same to Fort Wayne, and then down the Miami to lake Erie: again from the commencement of the portage at or near Loromie's store along the portage from thence to the river Au-Glaize, and down the same to its junction with the Miami at Fort Defiance: again from the commencement of the portage aforesaid, to Sandusky river, and down the same to Sandusky bay and lake Erie, and from Sandusky to the post which shall be taken at or near the foot of the rapids of the Miami of the lake: and from thence to Detroit. Again from the mouth of Chikago, to the commencement of the portage, between that river and the Illinois, and down the Illinois river to the Mississippi, also from Fort Wayne along the portage aforesaid which leads to the Wabash, and then down the Wabash to the Ohio. And the said Indian tribes will also allow to the people of the United States the free use of the harbors and mouths of rivers along the lakes adjoining the Indian lands, for sheltering vessels and boats, and liberty to land their cargoes where necessary for their safety.

ARTICLE IV.

In consideration of the peace now established and of the cessions and relinquishments of lands made in the prceding article by the said tribes of Indians, and to manifest the liberality of the United States as the great means of rendering this peace strong and perpetual; the United States relinquish their chains to all other Indian lands northward of the river Ohio, eastward of the Mississippi, and westward and southward of the Great Lakes and the waters uniting them, according to the boundary line agreed on by the United States and the king of Great-Britain, in the treaty of peace made between them in the year 1783. But from this relinquishment by the United States, the following tracts of land, are explicitly excepted. 1st. The tract of one hundred and fifty thousand acres near the rapids of the river Ohio, which has been assigned to General Clark, for the use of himself and his warriors. 2d. The post of St. Vincennes on the river Wabash, and the lands adjacent, of which the Indian title has been extinguished. 3d. The lands at all other places in possession of the French people and other white settlers among them, of which the Indian title has been extinguished as mentioned in the 3d article; and 4th. The post of fort Massac towards the mouth of the Ohio. To which several parcels of land so excepted, the said tribes relinquish all the title and claim which they or any of them may have.

And for the same considerations and with the same views as above mentioned, the United States now deliver to the said Indian tribes a quantity of goods to the value of twenty thousand dollars, the receipt whereof they do hereby acknowledge; and henceforward every year forever the United States will deliver at some convenient place northward of the river Ohio, like useful goods, suited to the circumstances of the Indians, of the value of nine thousand five hundred dollars; reckoning that value at the first cost of the goods in the city or place in the United States, where they shall be procured. The tribes to which these goods are to be annually delivered, are the following.

1st. To the Wyandots, the amount of one thousand dollars. 2d. To the Delawares, the amount of one thousand dollars. 3d. To the Shawanese, the amount of one thousand dollars. 4th. To the Miamis, the amount of one thousand dollars. 5th. To the Ottawas, the amount of one thousand dollars. 6th. To the Chippewas, the amount of one thousand dollars. 7th. To the Putawatimes, the amount of one thousand dollars. 8th. And to the Kickapoo, Weea, Eel-river, Piankashaw and Kaskaskias tribes the amount of five hundred dollars each.

Provided, That if either of the said tribes shall hereafter at an annual delivery of their share of the goods aforesaid,

desire that a part of their annuity should be furnished in domestic animals, implements of husbandry, and other utensils convenient for them, and in compensation to useful artificers who may reside with or near them and be employed for their benefit, the same shall at the subsequent annual deliveries be furnished accordingly.

ARTICLE V.

To prevent any misunderstanding about the Indian lands relinquished by the United States in the fourth article, it is now explicitly declared, that the meaning of that relinquishment is this: The Indian tribes who have a right to those lands, are quietly to enjoy the, hunting, planting, and dwelling thereon so long as they please, without any molestation from the United States; but when those tribes, or any of them, shall be disposed to sell their lands, or any part of them, they are to be sold only to the United States; and until such sale, the United States will protect all the said Indian tribes in the quiet enjoyment of their lands against all citizens of the United States, and against all other white persons who intrude upon the same. And the said Indian tribes again acknowledge themselves to be under the protection of the said United States and no other power whatever.

ARTICLE VI.

If any citizen of the United States, or any other white person or persons, shall presume to settle upon the lands now relinquished by the United States, such citizen or otherperson shall be out of the protection of the United States; and the Indian tribe, on whose land the settlement shall be made, may drive off the settler, or punish him in such manner as they shall think fit; and because such settlements made without the consent of the United States, will be injurious to them as well as to the Indians, the United States shall be at liberty to break them up, and remove and punish the settlers as they shall think proper, and so effect that protection of the Indian lands herein before stipulated.

ARTICLE VII.

The said tribes of Indians, parties to this treaty, shall be at liberty to hunt within the territory and lands which they have now ceded to the United States, without hindrance or molestation, so long as they demean themselves peaceably, and offer no injury to the people of the United States.

ARTICLE VIII.

Trade shall be opened with the said Indian tribes; and they do hereby respectively engage to afford protection to such persons, with their property, as shall be duly licensed to reside among them for the purpose of trade, and to their agents and servants; but no persons shall be permitted to reside at any of their towns or hunting camps as a trader; who is not furnished with a license for that purpose, under the hand and seal of the superintendent of the department north-west of the Ohio, or such other persons as the President of the United States shall authorize to grant such licenses; to the end, that the said Indians may not be imposed on in their trade. And if any licensed trader shall abuse his privilege by unfair dealing, upon complaint and proof thereof, his license shall be taken from him, and he shall be further punished according to the laws of the United States. And if any persons shall intrude himself as a trader, without such license, the said Indians shall take and bring him before the superintendent or his deputy, to be dealt with according to law. And to prevent impositions by forged licenses, the said Indians shall at least once a year give information to the superintendent or his deputies, of the names of the traders residing among them.

ARTICLE IX.

Lest the firm peace and friendship now established should be interrupted by the misconduct of individuals, the United States, and the said Indian tribes agree, that for injuries done by individuals on either side, no private revenge or retaliation shall take place; but instead thereof, complaint shall be made by the party injured, to the other: By the said Indian tribes, or any of them, to the President of the United States, or the superintendent by him appointed;

and by the superintendent or other persons appointed by the President, to the principal chiefs of the said Indian tribes, or of the tribe to which the offender belongs; and such prudent measures shall then be pursued as shall be necessary to preserve the said peace and friendship unbroken, until the Legislature (or Great Council) of the United States, shall make other equitable provision in the case, to the satisfaction of both parties. Should any Indian tribes meditate a war against the United States or either of them, and the same shall come to the knowledge of the before-mentioned tribes, or either of them, they do hereby engage to give immediate notice thereof to the general or officer commanding the troops of the United States, at the nearest post. And should any tribe, with hostile intentions against the United States, or either of them, attempt to pass through their country, they will endeavor to prevent the same, and in like manner give information of such attempt, to the general or officer commanding, as soon as possible, that all causes of mistrust and suspicion may be avoided between them and the United States. In like manner the United States shall give notice to the said Indian tribes of any harm that may be meditated against them, or either of them, that shall come to their knowledge; and do all in their power to hinder and prevent the same, that the friendship between them may be uninterrupted.

ARTICLE X.

All other treaties heretofore made between the United States and the said Indian tribes, or any of them, since the treaty of 1783, between the United States and Great Britain, that come within the purview of this treaty, shall henceforth cease and become void.

In testimony whereof, the said Anthony Wayne, and the sachems and war chiefs of the beforementioned nations and tribes of Indians, have hereunto set their hands and affixed their seals.

Done at Greenville, in the territory of the United States northwest of the river Ohio, on the third day of August, one thousand seven hundred and ninety-five.

APPENDIX B

Grid Cell Figure Tabulations

APPENDIX B GRID CELL FIGURES

GLO Townships

Cell #		Oriented	Non-Oriented	Offset
(1)	A.	-	.50	-
	B.	2.00	.50	-
	C.	2.00	.20	-
	D.	-	-	-
(2)	A.	-	-	-
	B.	2.00	.64	-
	C.	2.00	-	-
	D.	-	.50	-
(3)	A.	-	-	-
	B.	2.00	-	-
	C.	2.00	.45	-
	D.	-	1.14	-
(4)	A.	-	.50	-
	B.	2.00	.50	-
	C.	2.00	-	-
	D.	-	-	-
(5)	A.	-	-	-
	B.	2.00	-	-
	C.	2.00	-	-
	D.	-	-	-
(6)	A.	-	-	-
	B.	2.00	-	-
	C.	2.00	.50	-
	D.	-	.50	-
(7)	A.	-	.50	-
	B.	2.00	.50	-
	C.	2.00	-	-
	D.	-	-	-

Cell #		Oriented	Non-Oriented	Offset
(8)	A.	-	-	-
	B.	2.00	-	-
	C.	2.00	-	-
	D.	-	-	-
(9)	A.	-	-	-
	B.	2.00	-	-
	C.	2.00	.50	-
	D.	-	.50	-
(10)	A.	-	.50	-
	B.	2.00	.50	-
	C.	2.00	-	-
	D.	-	-	-
(11)	A.	-	1.60	-
	B.	2.00	-	-
	C.	2.00	-	-
	D.	-	-	-
(12)	A.	-	.83	-
	B.	2.00	1.18	-
	C.	2.00	.50	-
	D.	-	.50	-
(13)	A.	-	.10	-
	B.	2.00	1.12	-
	C.	2.00	-	-
	D.	-	-	-
(14)	A.	-	.39	-
	B.	2.00	-	-
	C.	2.00	-	-
	D.	-	-	-
(15)	A.	-	-	-
	B.	2.00	-	-
	C.	2.00	.50	-
	D.	-	.50	-

Cell #	Oriented	Non-Oriented	Offset
(16) A.	-	-	-
B.	2.00	-	-
C.	2.00	.79	-
D.	-	-	-
(17) A.	-	1.00	-
B.	2.00	1.00	-
C.	2.00	2.05	-
D.	-	.31	-
(18) A.	-	-	-
B.	2.00	-	-
C.	2.00	1.00	-
D.	-	1.00	-
(19) A.	-	-	-
B.	2.00	-	-
C.	2.00	-	-
D.	-	-	-
(20) A.	-	.50	-
B.	2.00	.50	-
C.	2.00	-	-
D.	-	-	-
(21) A.	-	-	-
B.	2.00	-	-
C.	2.00	.50	-
D.	-	.50	-
(22) A.	-	-	-
B.	2.00	-	-
C.	2.00	-	-
D.	-	-	-
(23) A.	-	.50	-
B.	2.00	.50	-
C.	2.00	-	-
D.	-	-	-

Cell #	Oriented	Non-Oriented	Offset
(24) A.	-	-	-
B.	2.00	-	-
C.	2.00	.50	-
D.	-	.50	-
(25) A.	-	-	-
B.	2.00	-	-
C.	2.00	-	-
D.	-	-	-
(26) A.	-	.50	-
B.	2.00	.50	-
C.	2.00	-	-
D.	-	-	-
(27) A.	-	-	-
B.	2.00	-	-
C.	2.00	.50	-
D.	-	.50	-
(28) A.	-	-	-
B.	2.00	-	-
C.	2.00	-	-
D.	-	-	-
(29) A.	-	.50	-
B.	2.00	.50	-
C.	2.00	-	-
D.	-	-	-
(30) A.	-	-	-
B.	2.00	-	-
C.	2.00	-	-
D.	-	.16	-
(31) A.	-	-	-
B.	2.00	-	-
C.	2.00	.50	-
D.	-	.34	-
(32) A.	-	.50	-
B.	2.00	.50	-
C.	2.00	1.79	-
D.	-	-	-
(33) A.	-	-	-
B.	2.00	-	-
C.	2.00	1.74	-
D.	-	.27	-

Cell #	Oriented	Non-Oriented	Offset
(34) A.	-	-	-
B.	2.00	-	-
C.	2.00	.50	-
D.	-	2.58	-
(35) A.	-	.50	-
B.	2.00	.50	-
C.	2.00	-	-
D.	-	1.27	-
(36) A.	-	-	-
B.	2.00	-	-
C.	2.00	-	-
D.	-	-	-
(37) A.	-	-	-
B.	2.00	-	-
C.	2.00	-	-
D.	-	-	-
(38) A.	-	.50	-
B.	2.00	.50	-
C.	2.00	-	-
D.	-	-	-
(39) A.	-	-	-
B.	2.00	-	-
C.	2.00	-	-
D.	-	-	-
(40) A.	-	-	-
B.	2.00	-	-
C.	2.00	-	-
D.	-	-	-
(41) A.	-	.50	-
B.	2.00	.50	-
C.	2.00	-	-
D.	-	-	-
(42) A.	-	-	-
B.	2.00	-	-
C.	2.00	-	-
D.	-	-	-
(42) A.	-	-	-
B.	2.00	-	-
C.	2.00	.50	-
D.	-	.50	-

Cell #	Oriented	Non-Oriented	Offset
(43) A.	-	-	-
B.	2.00	-	-
C.	2.00	.50	-
D.	-	.50	-
(44) A.	-	-	-
B.	2.00	-	-
C.	2.00	.50	-
D.	-	-	-
(45) A.	-	-	-
B.	2.00	-	-
C.	2.00	-	-
D.	-	-	-
(46) A.	-	-	-
B.	2.00	-	-
C.	2.00	-	-
D.	-	-	-
(47) A.	-	-	-
B.	2.00	-	-
C.	2.00	-	-
D.	-	-	-
(48) A.	-	-	-
B.	2.00	-	-
C.	2.00	-	-
D.	-	-	-
(49) A.	-	-	-
B.	2.00	-	-
C.	2.00	-	-
D.	-	-	-
(50) A.	-	-	-
B.	2.00	.37	-
C.	2.00	-	-
D.	-	-	-
(51) A.	-	-	-
B.	2.00	-	-
C.	2.00	-	-
D.	-	-	-
(52) A.	-	-	-
B.	2.00	-	-
C.	2.00	.50	-
D.	-	.50	-

Cell #	Oriented	Non-Oriented	Offset
(53) A.	-	-	-
B.	2.00	-	-
C.	2.00	-	-
D.	-	-	-
(54) A.	-	.50	-
B.	2.00	.50	-
C.	2.00	-	-
D.	-	-	-
(55) A.	-	-	-
B.	2.00	-	-
C.	2.00	.50	-
D.	-	.50	-
(56) A.	-	-	-
B.	2.00	-	-
C.	2.00	-	-
D.	-	-	-
(57) A.	-	.50	-
B.	2.00	.50	-
C.	2.00	-	-
D.	-	-	-
(58) A.	-	-	-
B.	2.00	-	-
C.	2.00	-	-
D.	-	-	-

Section Lines (In Miles)

Cell #		Oriented	Non-Oriented	Offset
(1)	A.	-	2.26	-
	B.	2.00	1.03	-
	C.	2.00	.77	-
	D.	-	-	-
(2)	A.	-	-	-
	B.	2.00	.64	-
	C.	2.00	-	-
	D.	-	.51	-
(3)	A.	-	-	-
	B.	2.00	-	.21
	C.	2.00	.45	.21
	D.	-	1.14	-
(4)	A.	-	3.20	-
	B.	2.00	1.00	-
	C.	2.00	2.98	-
	D.	-	.70	-
(5)	A.	-	1.00	-
	B.	2.00	3.02	-
	C.	2.00	1.00	-
	D.	-	3.00	-
(6)	A.	-	2.60	-
	B.	2.00	1.00	.32
	C.	2.00	2.52	.32
	D.	-	1.36	-
(7)	A.	-	2.23	-
	B.	2.00	1.84	.26
	C.	2.00	2.18	.26
	D.	-	2.27	-
(8)	A.	-	1.58	-
	B.	2.00	2.50	.18
	C.	2.00	1.10	.18
	D.	-	2.70	-
(9)	A.	-	2.95	-
	B.	2.00	1.06	.19
	C.	2.00	3.03	.19
	D.	-	2.03	-
(10)	A.	-	1.00	-
	B.	2.00	3.02	.25
	C.	2.00	1.24	.25
	D.	-	3.02	-

Cell #		Oriented	Non-Oriented	Offset
(11)	A.	-	2.61	-
	B.	2.00	1.28	.23
	C.	2.00	2.08	.23
	D.	-	1.78	-
(12)	A.	-	1.71	-
	B.	2.00	2.20	.22
	C.	2.00	2.25	.22
	D.	-	1.00	-
(13)	A.	-	1.85	-
	B.	2.00	2.23	.14
	C.	2.00	1.00	.14
	D.	-	2.98	-
(14)	A.	-	2.09	-
	B.	2.00	1.85	-
	C.	2.00	2.91	-
	D.	-	1.00	-
(15)	A.	-	1.00	-
	B.	2.00	2.52	.07
	C.	2.00	1.42	.07
	D.	-	2.45	-
(16)	A.	-	3.14	-
	B.	2.00	1.00	.03
	C.	2.00	1.30	.03
	D.	-	1.71	-
(17)	A.	-	1.00	-
	B.	2.00	1.00	.11
	C.	2.00	2.94	.11
	D.	-	1.32	-
(18)	A.	-	2.30	-
	B.	2.00	1.47	.22
	C.	2.00	1.00	.22
	D.	-	3.02	-
(19)	A.	-	2.23	-
	B.	2.00	1.81	.30
	C.	2.00	2.76	.30
	D.	-	1.00	-
(20)	A.	-	1.00	-
	B.	2.00	2.75	.29
	C.	2.00	1.00	.29
	D.	-	2.08	-

Cell #	Oriented	Non-Oriented	Offset
(21) A.	-	3.21	-
B.	2.00	1.00	.32
C.	2.00	1.46	.32
D.	-	2.37	-
(22) A.	-	1.32	-
B.	2.00	2.76	.27
C.	2.00	2.75	.27
D.	-	1.00	-
(23) A.	-	1.98	-
B.	2.00	2.06	.31
C.	2.00	1.00	.31
D.	-	3.03	-
(24) A.	-	2.59	-
B.	2.00	1.45	.22
C.	2.00	1.93	.22
D.	-	1.17	-
(25) A.	-	-	-
B.	2.00	-	-
C.	2.00	1.92	-
D.	-	2.10	-
(26) A.	-	2.95	-
B.	2.00	1.00	.21
C.	2.00	1.04	.21
D.	-	2.27	-
(27) A.	-	1.45	-
B.	2.00	2.61	.16
C.	2.00	2.78	.16
D.	-	1.00	-
(28) A.	-	1.94	-
B.	2.00	2.61	.16
C.	2.00	2.78	.16
D.	-	1.00	-
(29) A.	-	2.05	-
B.	2.00	1.00	-
C.	2.00	1.96	-
D.	-	1.78	-
(30) A.	-	1.55	-
B.	2.00	1.83	.07
C.	2.00	2.12	.07
D.	-	1.11	-

Cell #	Oriented	Non-Oriented	Offset
(31) A.	-	1.17	-
B.	2.00	2.74	.30
C.	2.00	1.00	.30
D.	-	2.86	-
(32) A.	-	3.00	-
B.	2.00	3.03	.50
C.	2.00	2.80	.50
D.	-	1.49	-
(33) A.	-	2.23	-
B.	2.00	.77	-
C.	2.00	2.75	-
D.	-	1.28	-
(34) A.	-	1.00	-
B.	2.00	2.92	.54
C.	2.00	1.00	.54
D.	-	3.09	-
(35) A.	-	1.62	-
B.	2.00	2.19	.48
C.	2.00	1.63	.48
D.	-	2.28	-
(36) A.	-	3.02	-
B.	2.00	1.00	.46
C.	2.00	3.02	.46
D.	-	1.00	-
(37) A.	-	1.63	-
B.	2.00	2.15	.38
C.	2.00	2.02	.38
D.	-	2.02	-
(38) A.	-	1.00	-
B.	2.00	2.94	.35
C.	2.00	1.00	.35
D.	-	3.02	-
(39) A.	-	2.87	-
B.	2.00	1.00	.30
C.	2.00	2.39	.30
D.	-	2.02	-
(40) A.	-	2.64	-
B.	2.00	1.39	.27
C.	2.00	3.02	.27
D.	-	1.00	-

Cell #	Oriented	Non-Oriented	Offset
(41) A.	-	1.00	-
B.	2.00	3.02	.14
C.	2.00	1.27	.14
D.	-	2.76	-
(42) A.	-	1.86	-
B.	2.00	2.02	.13
C.	2.00	1.00	.13
D.	-	3.00	-
(43) A.	-	2.99	-
B.	2.00	1.00	.09
C.	2.00	2.87	.09
D.	-	1.00	-
(44) A.	-	1.48	-
B.	2.00	2.53	.02
C.	2.00	2.80	.02
D.	-	1.22	-
(45) A.	-	1.00	-
B.	2.00	2.92	.04
C.	2.00	1.00	.04
D.	-	3.00	-
(46) A.	-	3.00	-
B.	2.00	1.00	.08
C.	2.00	1.64	.08
D.	-	2.16	-
(47) A.	-	2.28	-
B.	2.00	1.73	.20
C.	2.00	2.87	.20
D.	-	1.00	-
(48) A.	-	1.00	-
B.	2.00	3.00	.34
C.	2.00	1.00	.34
D.	-	2.07	-
(49) A.	-	2.58	-
B.	2.00	1.00	.55
C.	2.00	1.00	.55
D.	-	2.35	-
(50) A.	-	2.67	-
B.	2.00	1.00	.63
C.	2.00	1.88	.63
D.	-	1.08	-

Cell #	Oriented	Non-Oriented	Offset
(51) A.	-	1.00	-
B.	2.00	3.02	.43
C.	2.00	3.02	.43
D.	-	1.00	-
(52) A.	-	1.50	-
B.	2.00	2.08	.42
C.	2.00	1.67	.42
D.	-	2.33	-
(53) A.	-	3.02	-
B.	2.00	1.00	.59
C.	2.00	1.00	.59
D.	-	2.99	-
(54) A.	-	1.67	-
B.	2.00	1.00	.59
C.	2.00	2.90	.59
D.	-	1.00	-
(55) A.	-	1.00	-
B.	2.00	2.54	.54
C.	2.00	2.12	.54
D.	-	1.92	-
(56) A.	-	3.02	-
B.	2.00	1.00	.51
C.	2.00	1.11	.51
D.	-	2.83	-
(57) A.	-	1.00	-
B.	2.00	3.06	.70
C.	2.00	3.02	.70
D.	-	1.00	-
(58) A.	-	2.80	-
B.	2.00	2.05	.45
C.	2.00	2.13	.45
D.	-	3.08	-

County Lines (In Miles)

Cell #		Oriented	Non-Oriented	Offset
(1)	A.	-	.50	-
	B.	-	.50	-
	C.	-	2.00	-
	D.	-	-	-
(2)	A.	-	-	-
	B.	-	-	-
	C.	-	.60	-
	D.	-	1.40	-
(3)	A.	-	-	-
	B.	-	-	-
	C.	-	-	-
	D.	-	1.30	-
(4)	A.	-	-	-
	B.	-	-	-
	C.	-	-	-
	D.	-	-	-
(5)	A.	-	-	-
	B.	-	-	-
	C.	-	-	-
	D.	-	-	-
(6)	A.	-	-	-
	B.	-	-	-
	C.	-	-	-
	D.	-	-	-
(7)	A.	-	-	-
	B.	-	-	-
	C.	-	-	-
	D.	-	-	-
(8)	A.	-	-	-
	B.	-	-	-
	C.	-	-	-
	D.	-	-	-
(9)	A.	-	-	-
	B.	-	-	-
	C.	-	-	-
	D.	-	-	-

Cell #	Oriented	Non-Oriented	Offset
(10) A.	-	-	-
B.	-	-	-
C.	-	-	-
D.	-	-	-
(11) A.	-	-	-
B.	-	-	-
C.	-	-	-
D.	-	-	-
(12) A.	-	.50	-
B.	-	.50	.10
C.	-	.50	.10
D.	-	.50	-
(13) A.	-	-	-
B.	-	-	-
C.	-	-	-
D.	-	-	-
(14) A.	-	-	-
B.	-	-	-
C.	-	-	-
D.	-	-	-
(15) A.	-	-	-
B.	-	-	-
C.	-	-	-
D.	-	-	-
(16) A.	-	-	-
B.	-	-	-
C.	-	-	-
D.	-	-	-
(17) A.	-	-	-
B.	-	-	-
C.	-	-	-
D.	-	-	-
(18) A.	-	-	-
B.	-	-	-
C.	-	-	-
D.	-	-	-
(19) A.	-	-	-
B.	-	-	-
C.	-	-	-
D.	-	-	-

Cell #	Oriented	Non-Oriented	Offset
(20) A.	-	-	-
B.	-	-	-
C.	-	-	-
D.	-	-	-
(21) A.	-	-	-
B.	-	-	-
C.	-	-	-
D.	-	-	-
(22) A.	-	.50	-
B.	-	.50	.15
C.	-	.50	.15
D.	-	.50	.15
(23) A.	-	-	-
B.	-	-	-
C.	-	-	-
D.	-	-	-
(24) A.	-	-	-
B.	-	-	-
C.	-	-	-
D.	-	-	-
(25) A.	-	-	-
B.	-	-	-
C.	-	-	-
D.	-	-	-
(26) A.	-	-	-
B.	-	-	-
C.	-	-	-
D.	-	-	-
(27) A.	-	-	-
B.	-	-	-
C.	-	-	-
D.	-	-	-
(28) A.	-	-	-
B.	-	-	-
C.	-	-	-
D.	-	-	-
(29) A.	-	.58	-
B.	-	.50	.08
C.	-	.50	.08
D.	-	.50	-

Cell #	Oriented	Non-Oriented	Offset
(30) A.	-	-	-
B.	-	-	-
C.	-	-	-
D.	-	-	-
(31) A.	-	-	-
B.	-	-	-
C.	-	-	-
D.	-	-	-
(32) A.	-	-	-
B.	-	-	-
C.	-	-	-
D.	-	-	-
(33) A.	-	-	-
B.	-	-	-
C.	-	-	-
D.	-	-	-
(34) A.	-	-	-
B.	-	-	-
C.	-	-	-
D.	-	-	-
(35) A.	-	-	-
B.	-	-	-
C.	-	-	-
D.	-	-	-
(36) A.	-	-	-
B.	-	-	-
C.	-	-	-
D.	-	-	-
(37) A.	-	.50	-
B.	1.89	.50	.19
C.	1.89	.50	.19
D.	-	.50	-
(38) A.	-	-	-
B.	2.00	-	-
C.	2.00	-	-
D.	-	-	-
(39) A.	-	-	-
B.	2.00	-	-
C.	2.00	-	-
D.	-	-	-

Cell #	Oriented	Non-Oriented	Offset
(40) A.	-	-	-
B.	2.00	-	-
C.	2.00	.50	-
D.	-	.50	-
(41) A.	-	-	-
B.	2.00	-	-
C.	2.00	-	-
D.	-	-	-
(42) A.	-	-	-
B.	2.00	-	-
C.	2.00	-	-
D.	-	-	-
(43) A.	-	-	-
B.	2.00	-	-
C.	2.00	-	-
D.	-	-	-
(44) A.	-	-	-
B.	2.00	-	-
C.	2.00	-	-
D.	-	-	-
(45) A.	-	-	-
B.	2.00	-	-
C.	2.00	-	-
D.	-	-	-
(46) A.	-	-	-
B.	2.00	-	-
C.	2.00	.50	-
D.	-	.50	-
(47) A.	-	.50	-
B.	2.00	.50	-
C.	2.00	-	-
D.	-	-	-
(48) A.	-	-	-
B.	2.00	-	-
C.	2.00	-	-
D.	-	-	-
(49) A.	-	-	-
B.	2.00	-	-
C.	2.00	.85	-
D.	-	1.70	-

Cell #	Oriented	Non-Oriented	Offset
(50) A.	-	.50	-
B.	2.00	.50	-
C.	2.00	-	-
D.	-	-	-
(51) A.	-	-	-
B.	.66	-	-
C.	.66	.50	-
D.	-	.50	-
(52) A.	-	-	-
B.	-	-	-
C.	-	-	-
D.	-	-	-
(53) A.	-	-	-
B.	-	-	-
C.	-	-	-
D.	-	-	-
(54) A.	-	-	-
B.	-	-	-
C.	-	-	-
D.	-	-	-
(55) A.	-	-	-
B.	-	-	-
C.	-	-	-
D.	-	-	-
(56) A.	-	-	-
B.	-	-	-
C.	-	-	-
D.	-	-	-
(57) A.	-	-	-
B.	-	-	-
C.	-	-	-
D.	-	-	-
(58) A.	-	-	-
B.	-	-	-
C.	-	-	-
D.	-	-	-

Civil Townships (In Miles)

Cell #		Oriented	Non-Oriented	Offset
(1)	A.	-	.50	-
	B.	-	.50	-
	C.	-	2.20	-
	D.	-	-	-
(2)	A.	-	-	-
	B.	-	-	-
	C.	-	.60	-
	D.	-	1.40	-
(3)	A.	-	-	-
	B.	-	-	-
	C.	-	-	-
	D.	-	1.30	-
(4)	A.	-	.50	-
	B.	-	.50	.14
	C.	-	.50	.14
	D.	-	-	-
(5)	A.	-	-	-
	B.	-	-	-
	C.	-	-	-
	D.	-	-	-
(6)	A.	-	-	-
	B.	-	-	-
	C.	-	-	-
	D.	-	-	-
(7)	A.	-	-	-
	B.	-	-	-
	C.	-	-	-
	D.	-	-	-
(8)	A.	-	.50	-
	B.	-	.50	.18
	C.	-	.50	.18
	D.	-	.50	-
(9)	A.	-	-	-
	B.	-	-	-
	C.	-	-	-
	D.	-	-	-

Cell #	Oriented	Non-Oriented	Offset
(10) A.	-	-	-
B.	-	-	-
C.	-	-	-
D.	-	-	-
(11) A.	-	-	-
B.	-	-	-
C.	-	-	-
D.	-	-	-
(12) A.	-	.50	-
B.	-	.50	.10
C.	-	.50	.10
D.	-	.50	-
(13) A.	-	-	-
B.	-	-	-
C.	-	-	-
D.	-	-	-
(14) A.	-	-	-
B.	-	-	-
C.	-	-	-
D.	-	-	-
(15) A.	-	.50	-
B.	-	.50	.20
C.	-	1.35	.20
D.	-	-	-
(16) A.	-	-	-
B.	-	-	-
C.	-	1.15	-
D.	-	.88	-
(17) A.	-	.50	-
B.	-	.50	.08
C.	-	.50	.08
D.	-	-	-
(18) A.	-	-	-
B.	-	-	-
C.	-	-	-
D.	-	-	-
(19) A.	-	-	-
B.	-	-	-
C.	-	-	-
D.	-	-	-

Cell #	Oriented	Non-Oriented	Offset
(20) A.	-	.50	-
B.	-	.50	.14
C.	-	.50	.14
D.	-	.50	-
(21) A.	-	-	-
B.	-	-	-
C.	-	-	-
D.	-	-	-
(22) A.	-	.50	-
B.	-	.50	.15
C.	-	.50	.15
D.	-	-	-
(23) A.	-	-	-
B.	-	-	-
C.	-	-	-
D.	-	-	-
(24) A.	-	.50	-
B.	-	.50	.10
C.	-	.50	.10
D.	-	.50	-
(25) A.	-	-	-
B.	-	-	-
C.	-	-	-
D.	-	-	-
(26) A.	-	-	-
B.	-	-	-
C.	-	-	-
D.	-	-	-
(27) A.	-	.50	-
B.	-	.50	.08
C.	-	.50	.08
D.	-	.50	-
(28) A.	-	-	-
B.	-	-	-
C.	-	-	-
D.	-	-	-
(29) A.	-	1.58	-
B.	.96	.50	.08
C.	.96	.50	.08
D.	-	.50	-

Cell #	Oriented	Non-Oriented	Offset
(30) A.	-	-	-
B.	-	-	-
C.	-	-	-
D.	-	-	-
(31) A.	-	.50	-
B.	.97	.50	-
C.	.97	.50	-
D.	-	.34	-
(32) A.	-	-	-
B.	-	-	-
C.	-	-	-
D.	-	-	-
(33) A.	-	-	-
B.	-	-	-
C.	-	-	-
D.	-	-	-
(34) A.	-	-	-
B.	-	-	-
C.	-	-	-
D.	-	-	-
(35) A.	-	.50	-
B.	.76	.50	-
C.	.76	.50	-
D.	-	.50	-
(36) A.	-	-	-
B.	-	-	-
C.	-	-	-
D.	-	-	-
(37) A.	-	.50	-
B.	1.89	.50	.19
C.	1.89	.50	.19
D.	-	.50	-
(38) A.	-	-	-
B.	2.00	-	-
C.	2.00	-	-
D.	-	-	-
(39) A.	-	-	-
B.	2.00	-	-
C.	2.00	-	-
D.	-	-	-

Cell #		Oriented	Non-Oriented	Offset
(40)	A.	-	.50	-
	B.	2.00	.50	-
	C.	2.00	.50	-
	D.	-	.50	-
(41)	A.	-	-	-
	B.	2.00	-	-
	C.	2.00	-	-
	D.	-	-	-
(42)	A.	-	-	-
	B.	2.00	-	-
	C.	2.00	.63	-
	D.	-	.52	-
(43)	A.	-	.50	-
	B.	2.00	.50	-
	C.	2.00	-	-
	D.	-	-	-
(44)	A.	-	-	-
	B.	2.00	-	-
	C.	2.00	-	-
	D.	-	-	-
(45)	A.	-	-	-
	B.	2.00	-	-
	C.	2.00	-	-
	D.	-	-	-
(46)	A.	-	-	-
	B.	2.00	-	-
	C.	2.00	.76	-
	D.	-	.95	-
(47)	A.	-	.50	-
	B.	2.00	.50	-
	C.	2.00	.63	-
	D.	-	.52	-
(48)	A.	-	-	-
	B.	2.00	-	-
	C.	2.00	-	-
	D.	-	-	-
(49)	A.	-	-	-
	B.	2.00	-	-
	C.	2.00	.85	-
	D.	-	1.70	-

Cell #	Oriented	Non-Oriented	Offset
(50) A.	-	.50	-
B.	2.00	.50	-
C.	2.00	-	-
D.	-	-	-
(51) A.	-	-	-
B.	.70	-	-
C.	.70	.50	-
D.	-	.50	-
(52) A.	-	-	-
B.	-	-	-
C.	-	-	-
D.	-	-	-
(53) A.	-	-	-
B.	-	-	-
C.	-	-	-
D.	-	-	-
(54) A.	-	-	-
B.	-	-	-
C.	-	-	-
D.	-	-	-
(55) A.	-	.50	-
B.	-	.50	.36
C.	-	.50	.36
D.	-	.50	-
(56) A.	-	-	-
B.	-	-	-
C.	-	-	-
D.	-	-	-
(57) A.	-	-	-
B.	-	-	-
C.	-	-	-
D.	-	-	-
(58) A.	-	-	-
B.	-	-	-
C.	-	-	-
D.	-	-	-

Property Lines (In Miles)

Cell #		Oriented	Non-Oriented	Parallel
(1)	A.	-	5.07	-
	B.	1.30	5.75	-
	C.	1.30	6.10	-
	D.	-	6.10	-
(2)	A.	-	5.20	-
	B.	1.90	5.80	-
	C.	1.90	3.80	-
	D.	-	5.65	-
(3)	A.	-	5.15	-
	B.	1.20	5.20	-
	C.	1.20	4.85	-
	D.	-	5.65	-
(4)	A.	-	5.87	-
	B.	1.65	5.40	-
	C.	1.65	5.47	.90
	D.	-	6.27	-
(5)	A.	-	5.30	-
	B.	1.75	7.20	-
	C.	1.75	6.40	-
	D.	-	5.65	-
(6)	A.	-	5.50	-
	B.	.90	5.45	-
	C.	.90	6.27	-
	D.	-	6.30	-
(7)	A.	-	4.05	-
	B.	1.35	2.40	-
	C.	1.35	6.40	-
	D.	-	6.30	-
(8)	A.	-	5.20	-
	B.	1.70	4.95	-
	C.	1.70	5.80	-
	D.	-	8.00	-
(9)	A.	-	4.80	-
	B.	2.00	3.95	-
	C.	2.00	3.70	-
	D.	-	6.45	-
(10)	A.	-	6.05	-
	B.	2.00	5.20	-
	C.	2.00	4.95	-
	D.	-	6.15	-

Cell #	Oriented	Non-Oriented	Parallel
(21) A.	-	6.20	-
B.	1.55	6.45	-
C.	1.55	6.40	-
D.	-	4.20	-
(22) A.	-	6.50	-
B.	.80	4.55	-
C.	.80	6.85	-
D.	-	4.20	-
(23) A.	-	4.30	-
B.	2.00	5.75	-
C.	2.00	4.67	-
D.	-	5.10	-
(24) A.	-	5.07	-
B.	2.00	5.20	-
C.	2.00	6.00	-
D.	-	4.30	-
(25) A.	-	6.05	-
B.	1.75	6.15	-
C.	1.75	4.67	-
D.	-	5.30	-
(26) A.	-	7.15	-
B.	1.55	5.55	-
C.	1.55	4.10	-
D.	-	3.80	-
(27) A.	-	4.35	-
B.	1.20	4.44	-
C.	1.20	4.70	-
D.	-	4.60	-
(28) A.	-	4.50	-
B.	1.75	3.90	-
C.	1.75	5.20	-
D.	-	3.20	-
(29) A.	-	5.60	-
B.	1.50	4.85	-
C.	1.50	4.70	-
D.	-	3.60	-
(30) A.	-	6.70	-
B.	2.00	3.40	-
C.	2.00	3.95	-
D.	-	4.05	-

Cell #	Oriented	Non-Oriented	Parallel
(31) A.	-	5.87	-
B.	1.80	5.20	-
C.	1.80	4.88	-
D.	-	4.55	-
(32) A.	-	4.20	-
B.	1.65	5.05	-
C.	1.65	4.70	.85
D.	-	4.20	-
(33) A.	-	5.07	.35
B.	1.40	5.15	.20
C.	1.40	6.70	-
D.	-	5.30	-
(34) A.	-	5.35	-
B.	1.80	6.35	-
C.	1.80	3.45	-
D.	-	6.40	.27
(35) A.	-	5.07	-
B.	1.65	4.10	-
C.	1.65	5.20	-
D.	-	5.47	-
(36) A.	-	6.55	-
B.	2.00	5.60	-
C.	2.00	6.20	-
D.	-	5.60	-
(37) A.	-	5.30	-
B.	2.00	3.20	-
C.	2.00	4.50	-
D.	-	5.95	-
(38) A.	-	5.35	-
B.	2.00	6.15	-
C.	2.00	5.05	-
D.	-	7.35	-
(39) A.	-	7.90	-
B.	2.00	6.15	.27
C.	2.00	5.00	-
D.	-	5.20	-
(40) A.	-	5.87	-
B.	2.00	6.00	-
C.	2.00	5.80	-
D.	-	5.75	-

Cell #		Oriented	Non-Oriented	Parallel
(41)	A.	-	8.45	.20
	B.	1.66	6.30	-
	C.	1.66	5.35	-
	D.	-	6.27	-
(42)	A.	-	4.93	1.35
	B.	1.65	4.10	1.07
	C.	1.65	3.80	.27
	D.	-	5.40	-
(43)	A.	-	7.80	-
	B.	2.00	3.20	.90
	C.	2.00	5.40	-
	D.	-	5.80	-
(44)	A.	-	5.75	-
	B.	1.75	5.70	.20
	C.	1.75	5.50	.30
	D.	-	6.05	-
(45)	A.	-	5.20	-
	B.	1.66	4.75	.20
	C.	1.66	4.15	-
	D.	-	6.40	-
(46)	A.	-	5.80	-
	B.	2.00	5.20	.20
	C.	2.00	4.35	-
	D.	-	6.60	-
(47)	A.	-	5.50	-
	B.	2.00	4.40	-
	C.	2.00	5.80	-
	D.	-	5.35	-
(48)	A.	-	5.30	-
	B.	2.00	5.25	-
	C.	2.00	5.20	-
	D.	-	6.20	-
(49)	A.	-	3.70	-
	B.	1.20	4.05	.15
	C.	1.20	2.40	.67
	D.	-	3.80	-
(50)	A.	-	5.07	-
	B.	2.00	3.30	-
	C.	2.00	4.80	-
	D.	-	5.30	-

Cell #	Oriented	Non-Oriented	Parallel
(51) A.	-	6.30	-
B.	1.80	4.20	-
C.	1.80	5.30	-
D.	-	6.60	-
(52) A.	-	6.50	-
B.	1.80	5.10	-
C.	1.80	5.50	-
D.	-	6.80	-
(53) A.	-	5.95	-
B.	2.00	4.50	-
C.	2.00	5.60	-
D.	-	5.30	-
(54) A.	-	6.15	-
B.	1.55	5.65	-
C.	1.55	5.35	-
D.	-	5.20	-
(55) A.	-	5.65	-
B.	1.30	5.47	-
C.	1.30	4.90	.75
D.	-	6.05	-
(56) A.	-	5.80	-
B.	2.00	5.15	-
C.	2.00	3.80	.75
D.	-	4.60	-
(57) A.	-	5.00	-
B.	1.55	3.67	-
C.	1.55	4.20	-
D.	-	5.60	-
(58) A.	-	4.45	-
B.	1.25	4.60	.20
C.	1.25	3.20	.70
D.	-	3.47	-

Cell #		Roads (in miles) Oriented	Non-Oriented	Offset
(1)	A.	-	2.77	-
	B.	-	1.55	-
	C.	-	2.82	-
	D.	-	1.65	-
(2)	A.	-	1.17	-
	B.	-	1.31	.02
	C.	-	.63	.02
	D.	-	2.02	-
(3)	A.	-	1.48	-
	B.	-	3.04	-
	C.	-	1.10	-
	D.	-	1.95	-
(4)	A.	-	3.75	-
	B.	-	1.20	.11
	C.	-	3.16	.11
	D.	-	1.20	-
(5)	A.	-	1.02	-
	B.	-	1.34	-
	C.	-	1.99	-
	D.	-	3.06	-
(6)	A.	-	2.02	-
	B.	-	2.04	-
	C.	-	2.71	-
	D.	-	1.45	-
(7)	A.	-	.51	-
	B.	1.52	2.02	-
	C.	1.52	.81	-
	D.	-	3.03	-
(8)	A.	-	2.59	-
	B.	2.00	1.76	-
	C.	2.00	.95	-
	D.	-	1.98	-
(9)	A.	-	2.90	-
	B.	2.00	1.00	.19
	C.	2.00	.95	.19
	D.	-	2.03	-
(10)	A.	-	1.00	-
	B.	2.00	1.00	.25
	C.	2.00	1.00	.25
	D.	-	1.14	-

Cell #	Oriented	Non-Oriented	Parallel
(11) A.	-	5.60	-
B.	2.00	4.55	-
C.	2.00	4.30	-
D.	-	6.15	-
(12) A.	-	6.50	-
B.	1.80	5.40	-
C.	1.80	4.20	-
D.	-	4.85	-
(13) A.	-	5.10	-
B.	2.00	5.40	-
C.	2.00	3.50	-
D.	-	6.40	-
(14) A.	-	7.00	-
B.	1.50	6.60	-
C.	1.50	5.47	-
D.	-	4.30	-
(15) A.	-	5.15	-
B.	1.20	5.60	-
C.	1.20	8.30	-
D.	-	6.40	-
(16) A.	-	6.80	-
B.	1.65	4.85	-
C.	1.65	4.40	-
D.	-	5.40	-
(17) A.	-	4.90	-
B.	1.25	6.45	-
C.	1.25	5.00	-
D.	-	3.87	-
(18) A.	-	5.47	-
B.	2.00	5.90	-
C.	2.00	2.80	-
D.	-	3.40	-
(19) A.	-	7.50	-
B.	1.80	6.00	-
C.	1.80	5.60	-
D.	-	5.80	-
(20) A.	-	5.55	-
B.	1.47	6.20	-
C.	1.47	4.85	-
D.	-	4.67	-

Cell #	Oriented	Non-Oriented	Parallel
(21) A.	-	6.20	-
B.	1.55	6.45	-
C.	1.55	6.40	-
D.	-	4.20	-
(22) A.	-	6.50	-
B.	.80	4.55	-
C.	.80	6.85	-
D.	-	4.20	-
(23) A.	-	4.30	-
B.	2.00	5.75	-
C.	2.00	4.67	-
D.	-	5.10	-
(24) A.	-	5.07	-
B.	2.00	5.20	-
C.	2.00	6.00	-
D.	-	4.30	-
(25) A.	-	6.05	-
B.	1.75	6.15	-
C.	1.75	4.67	-
D.	-	5.30	-
(26) A.	-	7.15	-
B.	1.55	5.55	-
C.	1.55	4.10	-
D.	-	3.80	-
(27) A.	-	4.35	-
B.	1.20	4.44	-
C.	1.20	4.70	-
D.	-	4.60	-
(28) A.	-	4.50	-
B.	1.75	3.90	-
C.	1.75	5.20	-
D.	-	3.20	-
(29) A.	-	5.60	-
B.	1.50	4.85	-
C.	1.50	4.70	-
D.	-	3.60	-
(30) A.	-	6.70	-
B.	2.00	3.40	-
C.	2.00	3.95	-
D.	-	4.05	-

Cell #	Oriented	Non-Oriented	Parallel
(31) A.	-	5.87	-
B.	1.80	5.20	-
C.	1.80	4.88	-
D.	-	4.55	-
(32) A.	-	4.20	-
B.	1.65	5.05	-
C.	1.65	4.70	.85
D.	-	4.20	-
(33) A.	-	5.07	.35
B.	1.40	5.15	.20
C.	1.40	6.70	-
D.	-	5.30	-
(34) A.	-	5.35	-
B.	1.80	6.35	-
C.	1.80	3.45	-
D.	-	6.40	.27
(35) A.	-	5.07	-
B.	1.65	4.10	-
C.	1.65	5.20	-
D.	-	5.47	-
(36) A.	-	6.55	-
B.	2.00	5.60	-
C.	2.00	6.20	-
D.	-	5.60	-
(37) A.	-	5.30	-
B.	2.00	3.20	-
C.	2.00	4.50	-
D.	-	5.95	-
(38) A.	-	5.35	-
B.	2.00	6.15	-
C.	2.00	5.05	-
D.	-	7.35	-
(39) A.	-	7.90	-
B.	2.00	6.15	.27
C.	2.00	5.00	-
D.	-	5.20	-
(40) A.	-	5.87	-
B.	2.00	6.00	-
C.	2.00	5.80	-
D.	-	5.75	-

Cell #	Oriented	Non-Oriented	Parallel
(41) A.	-	8.45	.20
B.	1.66	6.30	-
C.	1.66	5.35	-
D.	-	6.27	-
(42) A.	-	4.93	1.35
B.	1.65	4.10	1.07
C.	1.65	3.80	.27
D.	-	5.40	-
(43) A.	-	7.80	-
B.	2.00	3.20	.90
C.	2.00	5.40	-
D.	-	5.80	-
(44) A.	-	5.75	-
B.	1.75	5.70	.20
C.	1.75	5.50	.30
D.	-	6.05	-
(45) A.	-	5.20	-
B.	1.66	4.75	.20
C.	1.66	4.15	-
D.	-	6.40	-
(46) A.	-	5.80	-
B.	2.00	5.20	.20
C.	2.00	4.35	-
D.	-	6.60	-
(47) A.	-	5.50	-
B.	2.00	4.40	-
C.	2.00	5.80	-
D.	-	5.35	-
(48) A.	-	5.30	-
B.	2.00	5.25	-
C.	2.00	5.20	-
D.	-	6.20	-
(49) A.	-	3.70	-
B.	1.20	4.05	.15
C.	1.20	2.40	.67
D.	-	3.80	-
(50) A.	-	5.07	-
B.	2.00	3.30	-
C.	2.00	4.80	-
D.	-	5.30	-

Cell #	Oriented	Non-Oriented	Parallel
(51) A.	-	6.30	-
B.	1.80	4.20	-
C.	1.80	5.30	-
D.	-	6.60	-
(52) A.	-	6.50	-
B.	1.80	5.10	-
C.	1.80	5.50	-
D.	-	6.80	-
(53) A.	-	5.95	-
B.	2.00	4.50	-
C.	2.00	5.60	-
D.	-	5.30	-
(54) A.	-	6.15	-
B.	1.55	5.65	-
C.	1.55	5.35	-
D.	-	5.20	-
(55) A.	-	5.65	-
B.	1.30	5.47	-
C.	1.30	4.90	.75
D.	-	6.05	-
(56) A.	-	5.80	-
B.	2.00	5.15	-
C.	2.00	3.80	.75
D.	-	4.60	-
(57) A.	-	5.00	-
B.	1.55	3.67	-
C.	1.55	4.20	-
D.	-	5.60	-
(58) A.	-	4.45	-
B.	1.25	4.60	.20
C.	1.25	3.20	.70
D.	-	3.47	-

Cell #		Roads (in miles) Oriented	Non-Oriented	Offset
(1)	A.	-	2.77	-
	B.	-	1.55	-
	C.	-	2.82	-
	D.	-	1.65	-
(2)	A.	-	1.17	-
	B.	-	1.31	.02
	C.	-	.63	.02
	D.	-	2.02	-
(3)	A.	-	1.48	-
	B.	-	3.04	-
	C.	-	1.10	-
	D.	-	1.95	-
(4)	A.	-	3.75	-
	B.	-	1.20	.11
	C.	-	3.16	.11
	D.	-	1.20	-
(5)	A.	-	1.02	-
	B.	-	1.34	-
	C.	-	1.99	-
	D.	-	3.06	-
(6)	A.	-	2.02	-
	B.	-	2.04	-
	C.	-	2.71	-
	D.	-	1.45	-
(7)	A.	-	.51	-
	B.	1.52	2.02	-
	C.	1.52	.81	-
	D.	-	3.03	-
(8)	A.	-	2.59	-
	B.	2.00	1.76	-
	C.	2.00	.95	-
	D.	-	1.98	-
(9)	A.	-	2.90	-
	B.	2.00	1.00	.19
	C.	2.00	.95	.19
	D.	-	2.03	-
(10)	A.	-	1.00	-
	B.	2.00	1.00	.25
	C.	2.00	1.00	.25
	D.	-	1.14	-

Cell #		Oriented	Non-Oriented	Offset
(11)	A.	-	1.00	-
	B.	2.00	1.00	.23
	C.	2.00	1.00	.23
	D.	-	1.00	-
(12)	A.	-	1.92	-
	B.	1.98	.50	.22
	C.	1.98	1.20	.22
	D.	-	1.00	-
(13)	A.	-	1.65	-
	B.	2.00	1.83	-
	C.	2.00	1.05	-
	D.	-	2.34	-
(14)	A.	-	2.82	-
	B.	.32	3.53	.06
	C.	.32	1.52	.06
	D.	-	3.25	-
(15)	A.	-	1.47	-
	B.	-	2.00	-
	C.	-	3.26	-
	D.	-	2.51	-
(16)	A.	-	2.73	-
	B.	1.22	1.00	.03
	C.	1.22	1.86	.03
	D.	-	1.91	.03
(17)	A.	-	3.28	-
	B.	-	3.67	-
	C.	-	2.72	-
	D.	-	2.80	-
(18)	A.	-	4.38	-
	B.	1.14	3.04	.12
	C.	1.14	3.29	.12
	D.	-	3.75	-
(19)	A.	-	2.75	-
	B.	-	.50	-
	C.	-	2.49	-
	D.	-	1.80	-
(20)	A.	-	1.94	-
	B.	-	2.65	-
	C.	-	3.14	-
	D.	-	2.04	-

Cell #	Oriented	Non-Oriented	Offset
(21) A.	-	2.61	-
B.	-	1.61	-
C.	-	2.96	-
D.	-	1.14	-
(22) A.	-	2.64	-
B.	-	2.07	-
C.	-	3.50	-
D.	-	1.18	-
(23) A.	-	2.04	-
B.	-	2.70	-
C.	-	2.08	-
D.	-	1.03	-
(24) A.	-	3.35	-
B.	.61	1.08	.30
C.	.61	1.19	.30
D.	-	1.98	-
(25) A.	-	1.00	-
B.	-	1.87	-
C.	-	1.42	-
D.	-	1.03	-
(26) A.	-	2.46	-
B.	-	1.75	-
C.	-	1.89	-
D.	-	1.14	-
(27) A.	-	1.08	-
B.	-	2.07	-
C.	-	1.94	-
D.	-	2.37	-
(28) A.	-	.94	-
B.	.61	.76	-
C.	.61	.57	-
D.	-	.57	-
(29) A.	-	1.74	-
B.	.83	1.04	.08
C.	.83	.95	.08
D.	-	.32	-
(30) A.	-	1.52	-
B.	-	.66	-
C.	-	1.61	-
D.	-	.84	-

Cell #	Oriented	Non-Oriented	Offset
(31) A.	-	1.23	-
B.	-	1.70	-
C.	-	1.42	-
D.	-	1.00	-
(32) A.	-	1.23	-
B.	-	1.14	-
C.	-	1.14	-
D.	-	1.23	-
(33) A.	-	.90	-
B.	.42	2.32	-
C.	.42	1.00	-
D.	-	1.04	-
(34) A.	-	.95	-
B.	.43	2.08	-
C.	.43	.63	-
D.	-	1.89	-
(35) A.	-	3.11	-
B.	-	.83	-
C.	-	1.33	-
D.	-	.47	-
(36) A.	-	2.97	-
B.	-	2.91	-
C.	-	1.77	-
D.	-	.95	-
(37) A.	-	1.46	-
B.	.35	1.52	.19
C.	.35	1.00	.19
D.	-	2.23	-
(38) A.	-	1.33	-
B	.78	3.13	-
C.	.78	2.68	-
D.	-	1.55	-
(39) A.	-	2.92	-
B.	2.00	.50	.16
C.	2.00	.50	.16
D.	-	1.17	-
(40) A.	-	2.62	-
B.	.42	1.74	.15
C.	.42	2.16	.15
D.	-	1.70	-

Cell #	Oriented	Non-Oriented	Offset
(41) A.	-	3.07	-
B.	1.14	2.40	.07
C.	1.14	1.27	.07
D.	-	2.08	-
(42) A.	-	2.27	-
B.	.69	1.66	-
C.	.69	1.23	-
D.	-	1.33	-
(43) A.	-	3.41	-
B.	1.25	1.09	-
C.	1.25	1.23	-
D.	-	3.46	-
(44) A.	-	.63	-
B.	1.65	1.63	-
C.	1.65	1.70	-
D.	-	1.09	-
(45) A.	-	1.77	-
B.	-	.80	-
C.	-	.52	-
D.	-	3.08	-
(46) A.	-	.80	-
B.	-	2.25	-
C.	-	1.70	-
D.	-	1.52	-
(47) A.	-	.66	-
B.	-	2.91	-
C.	-	1.89	-
D.	-	.89	-
(48) A.	-	1.25	-
B.	.52	2.70	-
C.	.52	2.23	-
D.	-	2.65	-
(49) A.	-	1.88	-
B.	-	2.29	-
C.	-	2.23	-
D.	-	2.56	-
(50) A.	-	2.60	-
B.	-	1.67	-
C.	-	2.50	-
D.	-	2.50	-

Cell #	Oriented	Non-Oriented	Offset
(51) A.	-	3.44	-
B.	.31	1.25	-
C.	.31	2.29	-
D.	-	2.92	-
(52) A.	-	1.77	-
B.	1.56	1.25	-
C.	1.56	2.23	-
D.	-	2.08	-
(53) A.	-	1.09	-
B.	.75	1.66	-
C.	.75	1.66	-
D.	-	1.89	-
(54) A.	-	2.12	-
B.	-	1.64	-
C.	-	1.09	-
D.	-	.57	-
(55) A.	-	.38	-
B.	-	1.52	-
C.	-	1.56	-
D.	-	1.77	-
(56) A.	-	2.79	-
B.	.27	1.61	-
C.	.27	1.23	-
D.	-	1.52	-
(57) A.	-	.76	-
B.	.36	.95	-
C.	.36	1.09	-
D.	-	1.56	-
(58) A.	-	1.39	-
B.	.30	1.70	-
C.	.30	.80	-
D.	-	.57	-

Field Boundaries (in miles)

Cell #		Oriented	Non-Oriented	Parallel
(1)	A.	-	9.60	-
	B.	.60	10.20	-
	C.	.60	9.40	-
	D.	-	10.60	-
(2)	A.	-	9.87	-
	B.	1.00	10.35	-
	C.	1.00	9.47	.90
	D.	-	8.20	-
(3)	A.	-	9.50	-
	B.	.70	9.25	-
	C.	.70	9.75	1.07
	D.	-	11.60	-
(4)	A.	-	10.85	-
	B.	1.20	9.90	.70
	C.	1.20	11.81	.80
	D.	-	14.60	-
(5)	A.	-	9.15	-
	B.	1.10	10.80	.45
	C.	1.10	11.07	.20
	D.	-	11.00	.10
(6)	A.	-	10.90	.40
	B.	-	8.00	-
	C.	-	11.95	-
	D.	-	10.55	-
(7)	A.	-	9.60	-
	B.	1.50	9.15	.40
	C.	1.50	8.90	.80
	D.	-	12.40	-
(8)	A.	-	10.35	-
	B.	2.00	11.30	.55
	C.	2.00	.0.80	.45
	D.	-	11.07	.10
(9)	A.	-	11.00	-
	B.	2.00	9.20	.67
	C.	2.00	12.95	.40
	D.	-	12.80	-

Cell #		Oriented	Non-Oriented	Parallel
(10)	A.	-	11.00	-
	B.	2.00	10.95	.45
	C.	2.00	10.27	.60
	D.	-	9.15	-
(11)	A.	-	10.80	-
	B.	2.00	10.10	.15
	C.	2.00	9.55	.40
	D.	-	9.25	-
(12)	A.	-	11.20	-
	B.	2.00	11.40	.20
	C.	2.00	9.80	.95
	D.	-	9.50	-
(13)	A.	-	10.40	-
	B.	2.00	10.15	.70
	C.	2.00	9.00	-
	D.	-	10.80	-
(14)	A.	-	9.25	.15
	B.	1.50	8.80	-
	C.	1.50	10.45	-
	D.	-	11.15	-
(15)	A.	-	10.75	-
	B.	.60	9.60	-
	C.	.60	9.55	-
	D.	-	9.90	.70
(16)	A.	-	10.55	-
	B.	1.52	10.45	-
	C.	1.52	11.10	.20
	D.	-	8.55	-
(17)	A.	-	11.40	-
	B.	1.00	10.55	-
	C.	1.00	9.90	-
	D.	-	7.95	.20
(18)	A.	-	9.75	-
	B.	1.40	9.30	.45
	C.	1.40	7.55	.40
	D.	-	5.87	-
(19)	A.	-	10.90	.20
	B.	1.00	9.10	.25
	C.	1.00	9.65	.85
	D.	-	8.90	.30

Cell #	Oriented	Non-Oriented	Parallel
(20) A.	-	9.35	-
B.	.55	10.00	-
C.	.55	8.15	.80
D.	-	6.90	-
(21) A.	-	8.85	-
B.	1.20	10.27	.30
C.	1.20	10.05	.40
D.	-	8.27	-
(22) A.	-	10.55	-
B.	.95	10.85	.80
C.	.95	9.81	.85
D.	-	10.05	.27
(23) A.	-	10.75	-
B.	1.20	9.00	1.07
C.	1.20	9.40	.60
D.	-	10.10	-
(24) A.	-	7.87	-
B.	2.00	10.40	.67
C.	2.00	9.65	.45
D.	-	10.15	.20
(25) A.	-	8.90	-
B.	.55	9.15	.10
C.	.55	8.80	-
D.	-	9.47	-
(26) A.	-	9.20	-
B.	.85	8.75	.55
C.	.85	9.35	.90
D.	-	5.87	-
(27) A.	-	9.47	.10
B.	.80	9.10	.60
C.	.80	9.50	-
D.	-	9.00	-
(28) A.	-	10.60	-
B.	1.60	10.27	1.30
C.	1.60	8.90	1.65
D.	-	9.20	.45
(29) A.	-	10.60	-
B.	1.60	10.27	1.30
C.	1.60	8.90	1.65
D.	-	9.20	.45

Cell #	Oriented	Non-Oriented	Parallel
(30) A.	-	10.00	.27
B.	1.20	9.20	.24
C.	1.20	9.87	-
D.	-	9.20	-
(31) A.	-	9.20	.70
B.	1.10	10.80	.40
C.	1.10	9.70	2.00
D.	-	9.80	-
(32) A.	-	10.40	-
B.	1.50	11.70	.27
C.	1.50	10.35	.55
D.	-	10.00	-
(33) A.	-	8.20	-
B.	.90	9.87	1.90
C.	.90	11.47	-
D.	-	11.80	-
(34) A.	-	10.05	-
B.	1.90	8.10	.40
C.	1.90	10.20	-
D.	-	9.07	-
(35) A.	-	11.87	-
B.	.10	11.47	-
C.	.10	9.50	.20
D.	-	9.65	-
(36) A.	-	9.94	-
B.	.80	10.55	.40
C.	.80	9.40	1.45
D.	-	10.85	.40
(37) A.	-	10.20	-
B.	1.07	9.60	-
C.	1.07	9.90	1.00
D.	-	10.80	-
(38) A.	-	9.40	-
B.	2.00	12.40	.27
C.	2.00	13.00	1.30
D.	-	11.20	-
(39) A.	-	10.85	-
B.	2.00	11.00	.80
C.	2.00	12.00	1.07
D.	-	12.80	-

Cell #	Oriented	Non-Oriented	Parallel
(40) A.	-	12.40	-
B.	1.50	12.20	.10
C.	1.50	10.85	.40
D.	-	11.25	-
(41) A.	-	12.20	-
B.	2.00	9.20	1.10
C.	2.00	13.20	1.80
D.	-	11.55	-
(42) A.	-	9.95	1.47
B.	1.60	9.60	2.67
C.	1.60	10.55	.67
D.	-	10.80	-
(43) A.	-	12.20	-
B.	1.25	10.80	1.75
C.	1.25	11.35	1.15
D.	-	10.30	-
(44) A.	-	11.40	-
B.	2.00	11.10	.95
C.	2.00	12.05	1.10
D.	-	12.30	-
(45) A.	-	11.20	-
B.	.60	11.10	.45
C.	.60	12.05	1.10
D.	-	12.30	-
(46) A.	-	9.65	-
B.	1.40	11.00	1.47
C.	1.40	10.40	.95
D.	-	10.60	.27
(47) A.	-	10.00	-
B.	1.95	11.30	.20
C.	1.95	11.87	.60
D.	-	9.75	.27
(48) A.	-	10.80	-
B.	1.80	10.50	1.00
C.	1.80	9.70	.70
D.	-	10.45	.40
(49) A.	-	10.40	-
B.	.10	9.40	.27
C.	.10	9.87	.15
D.	-	9.00	-

Cell #	Oriented	Non-Oriented	Parallel
(50) A.	-	10.85	-
B.	1.60	9.00	-
C.	1.60	11.00	-
D.	-	8.20	-
(51) A.	-	10.20	-
B.	1.55	10.27	.90
C.	1.55	9.95	.10
D.	-	10.50	-
(52) A.	-	12.60	-
B.	1.56	10.15	1.47
C.	1.56	10.60	.90
D.	-	8.40	.40
(53) A.	-	10.85	-
B.	2.00	11.25	.85
C.	2.00	11.35	1.47
D.	-	11.40	-
(54) A.	-	12.70	-
B.	1.40	12.95	.55
C.	1.40	12.67	-
D.	-	9.40	-
(55) A.	-	9.65	-
B.	.45	12.05	.55
C.	.45	12.60	-
D.	-	10.15	-
(56) A.	-	11.47	-
B.	1.47	11.55	.67
C.	1.47	10.30	1.35
D.	-	8.80	-
(57) A.	-	8.60	-
B.	1.55	9.10	.40
C.	1.55	9.55	.60
D.	-	10.80	-
(58) A.	-	9.65	-
B.	1.47	8.00	-
C.	1.47	8.10	.70
D.	-	9.20	-

Land Cover/Use (In Acres)

Cell #		C&H	Pas.	Res.	C,S,&I	Ind.	Br.	For.	O.W.
(1)	A.	524.8	64.0	-	-	-	-	51.2	-
	B.	505.6	32.0	-	-	-	-	83.2	-
	C.	518.4	64.0	-	-	-	19.2	57.6	-
	D.	544.0	32.0	-	-	-	-	64.0	-
(2)	A.	550.4	19.2	-	-	-	-	70.4	-
	B.	614.4	-	-	-	-	6.4	19.2	-
	C.	563.2	-	-	-	-	-	76.8	-
	D.	620.8	-	-	-	-	-	19.2	-
(3)	A.	524.8	89.6	-	-	-	6.4	19.2	-
	B.	563.2	44.8	-	-	-	12.8	19.2	-
	C.	550.4	6.4	-	-	-	-	83.2	-
	D.	627.2	6.4	-	-	-	-	6.4	-
(4)	A.	576.0	25.6	-	-	-	32.0	6.4	-
	B.	531.2	-	-	-	-	-	108.8	-
	C.	537.6	51.2	6.4	-	-	12.8	32.0	-
	D.	563.2	44.8	6.4	12.8	-	-	12.8	-
(5)	A.	640.0	-	-	-	-	-	-	-
	B.	595.2	44.8	-	-	-	-	-	-
	C.	512.0	32.0	-	76.8	6.4	-	12.8	-
	D.	364.8	25.6	147.2	25.6	70.4	6.4	-	-
(6)	A.	601.6	32.0	-	-	-	-	6.4	-
	B.	640.0	-	-	-	-	-	-	-
	C.	556.8	-	-	-	-	-	83.2	-
	D.	614.4	6.4	-	-	-	-	19.2	-
(7)	A.	595.2	-	-	-	-	12.8	32.0	-
	B.	582.4	49.8	-	-	-	-	12.8	-
	C.	582.4	19.2	-	-	-	-	38.4	-
	D.	601.6	6.4	-	-	-	-	32.0	-

Cell #		C&H	Pas.	Res.	C,S,&I	Ind.	Br.	For.	O.W.
(8)	A.	608.0	-	-	-	-	-	32.0	-
	B.	563.2	19.2	-	-	-	-	44.8	12.8
	C.	576.0	19.2	-	-	-	12.8	32.0	-
	D.	569.6	12.8	-	-	-	-	57.6	-
(9)	A.	588.8	-	-	-	-	12.8	38.4	-
	B.	544.0	32.0	-	-	-	-	64.0	-
	C.	550.4	12.8	-	-	-	-	76.8	-
	D.	492.8	44.8	-	-	-	-	96.0	-
(10)	A.	588.8	-	-	-	-	-	51.2	-
	B.	588.8	12.8	-	-	-	-	38.4	-
	C.	601.6	6.4	-	-	-	-	32.0	-
	D.	505.6	64.0	-	-	-	-	70.4	-
(11)	A.	576.0	38.4	-	-	-	-	25.6	-
	B.	563.2	64.0	-	-	-	12.8	-	-
	C.	524.8	38.4	-	-	-	19.2	57.6	-
	D.	640.0	-	-	-	-	-	-	-
(12)	A.	569.6	57.6	-	-	-	-	12.8	-
	B.	492.8	25.6	-	-	-	-	121.6	-
	C.	531.2	38.4	-	-	-	19.2	51.2	-
	D.	608.0	6.4	-	-	-	-	25.6	-
(13)	A.	563.2	38.4	-	-	-	12.8	25.6	-
	B.	524.8	32.0	-	-	-	51.2	32.0	-
	C.	524.8	51.2	-	-	-	38.4	25.6	-
	D.	531.2	25.6	-	-	-	25.6	57.6	-
(14)	A.	364.8	32.0	134.4	-	19.2	-	89.6	-
	B.	537.6	12.8	6.4	25.6	-	25.6	32.0	-
	C.	537.6	25.6	-	25.6	-	19.2	32.0	-
	D.	563.2	19.2	-	-	-	-	57.6	-

Cell #	C&H	Pas.	Res.	C,S,&I	Ind.	Br.	For.	O.W.
(15) A.	550.4	25.6	-	-	-	12.8	51.2	-
B.	563.2	32.0	6.4	-	-	12.8	25.6	-
C.	614.4	12.8	6.4	-	-	-	6.4	-
D.	576.0	25.6	32.0	-	-	-	6.4	-
(16) A.	403.2	89.6	38.4	-	-	6.4	102.4	-
B.	531.2	25.6	12.8	-	-	-	70.2	-
C.	588.8	-	12.8	-	-	6.4	32.0	-
D.	556.8	32.0	12.8	-	-	-	38.4	-
(17) A.	595.2	6.4	6.4	-	-	6.4	25.6	-
B.	550.4	44.8	12.8	-	6.4	-	25.6	-
C.	460.4	83.6	12.8	-	57.6	6.4	19.2	-
D.	569.6	-	38.4	-	19.2	-	6.4	-
(18) A.	390.4	32.0	44.8	-	32.0	70.4	70.4	-
B.	396.8	76.8	51.2	-	6.4	-	108.8	-
C.	403.2	38.4	134.4	64.0	-	-	-	-
D.	153.6	51.2	249.6	179.2	6.4	-	-	-
(19) A.	172.8	249.6	51.2	19.2	25.6	-	121.6	-
B.	128.0	179.2	19.2	-	6.4	-	307.2	-
C.	428.8	76.8	25.6	-	-	12.8	96.0	-
D.	204.8	47.6	172.8	-	-	19.2	185.6	-
(20) A.	268.8	96.0	-	-	-	-	275.2	-
B.	416.0	102.4	-	-	-	-	89.6	-
C.	396.8	70.4	-	-	-	-	172.8	-
D.	275.2	134.4	-	-	-	-	230.4	-
(21) A.	320.0	96.0	-	-	-	12.8	211.2	-
B.	224.0	153.6	-	-	-	12.8	249.6	-
C.	217.6	83.2	-	-	-	19.2	320.0	-
D.	416.0	19.2	-	-	-	32.0	172.8	-

Cell #		C&H	Pas.	Res.	C,S,&I	Ind.	Br.	For.	O.W.
(22)	A.	294.4	76.8	-	-	-	-	268.8	-
	B.	320.0	153.6	-	-	-	-	166.4	-
	C.	320.0	38.4	19.2	12.8	-	25.6	224.0	-
	D.	364.8	89.6	-	-	-	-	185.6	-
(23)	A.	384.0	96.0	-	-	-	51.2	108.8	-
	B.	249.6	115.2	-	-	-	44.8	230.4	-
	C.	364.8	38.4	-	-	-	51.2	185.6	-
	D.	422.4	19.2	-	-	-	51.2	147.2	-
(24)	A.	153.6	185.6	-	-	-	-	300.8	-
	B.	384.0	166.6	-	-	-	-	89.6	-
	C.	364.8	198.4	-	-	-	-	76.8	-
	D.	262.4	140.8	-	-	-	19.2	217.6	-
(25)	A.	352.0	134.4	-	-	-	19.2	134.4	-
	B.	275.2	140.8	-	-	-	-	224.0	-
	C.	96.0	160.0	-	-	-	-	384.0	-
	D.	307.2	108.8	38.4	19.2	-	-	166.4	-
(26)	A.	428.8	147.2	-	-	-	25.6	38.4	-
	B.	179.2	262.4	-	-	-	6.4	192.0	-
	C.	236.8	140.8	-	-	-	19.2	243.2	-
	D.	435.2	-	-	-	-	-	204.8	-
(27)	A.	403.2	76.8	-	-	-	-	160.0	-
	B.	428.8	32.0	-	-	-	-	179.2	-
	C.	313.6	76.8	-	-	-	-	249.6	-
	D.	288.0	134.4	-	-	-	12.8	204.8	-
(28)	A.	320.0	102.4	-	-	-	25.6	192.0	-
	B.	403.2	25.6	-	-	-	25.6	185.6	-
	C.	211.2	64.0	-	-	-	32.0	332.8	-
	D.	320.0	96.0	-	-	-	-	224.0	-

Cell #		C&H	Pas.	Res.	C,S,&I	Ind.	Br.	For.	O.W.
(29)	A.	614.4	6.4	-	-	-	-	19.2	-
	B.	435.2	44.8	-	-	-	38.4	121.6	-
	C.	364.8	115.2	-	-	-	-	160.0	-
	D.	198.4	89.6	-	-	-	38.4	313.6	-
(30)	A.	384.0	25.6	-	-	-	-	230.4	-
	B.	332.8	89.6	-	-	-	-	217.6	-
	C.	172.8	275.2	-	-	-	-	192.0	-
	D.	313.6	76.8	-	-	-	51.2	198.4	-
(31)	A.	204.8	83.2	-	-	-	38.4	313.6	-
	B.	409.6	121.6	-	-	-	-	108.8	-
	C.	409.6	70.4	-	-	-	19.2	140.8	-
	D.	332.8	12.8	-	-	-	-	294.4	-
(32)	A.	160.0	38.4	12.8	-	-	-	396.8	32.0
	B.	224.0	44.8	-	-	-	25.6	320.0	25.6
	C.	192.0	76.8	-	-	-	-	326.4	44.8
	D.	179.2	-	-	-	-	25.6	409.6	25.6
(33)	A.	76.8	70.4	-	-	-	6.4	473.6	12.8
	B.	307.2	25.6	-	-	-	51.2	230.4	25.6
	C.	204.4	83.2	-	-	12.8	25.6	313.6	-
	D.	76.8	140.8	-	-	-	-	422.4	-
(34)	A.	44.8	121.6	-	-	-	70.4	403.2	-
	B.	83.2	64.0	-	-	-	19.2	473.6	-
	C.	76.8	83.2	-	-	-	19.2	460.8	-
	D.	19.2	19.2	-	-	-	12.8	588.8	-
(35)	A.	563.2	38.4	-	-	-	-	38.4	-
	B.	313.6	89.6	-	-	-	19.2	217.6	-
	C.	108.8	70.4	-	-	-	102.4	358.4	-
	D.	44.8	76.8	-	-	-	51.2	467.2	-

Cell #		C&H	Pas.	Res.	C,S,&I	Ind.	Br.	For.	O.W.
(36)	A.	435.2	32.0	-	-	-	-	172.8	-
	B.	448.0	115.2	-	-	-	-	76.8	-
	C.	243.2	64.0	-	-	-	25.6	307.2	-
	D.	249.6	19.2	-	-	-	70.4	300.8	-
(37)	A.	480.0	83.2	-	-	-	-	76.8	-
	B.	307.2	32.0	-	-	-	51.2	249.6	-
	C.	460.8	44.8	-	-	-	19.2	115.2	-
	D.	339.2	160.0	-	-	-	19.2	121.6	-
(38)	A.	582.4	-	-	-	-	12.8	44.8	-
	B.	409.6	134.4	-	-	-	25.6	70.4	-
	C.	384.0	115.2	-	-	-	64.0	76.8	-
	D.	371.2	12.8	-	-	-	38.4	217.6	-
(39)	A.	460.8	32.0	70.4	19.2	-	19.2	38.4	-
	B.	467.2	19.2	-	-	-	19.2	134.4	-
	C.	422.4	64.0	-	-	-	-	140.8	12.8
	D.	416.0	-	-	-	-	-	217.6	6.8
(40)	A.	454.4	-	19.2	-	-	64.0	102.4	-
	B.	403.2	6.4	-	-	-	44.8	185.6	-
	C.	403.2	128.0	-	-	-	25.6	83.6	-
	D.	454.4	25.6	-	-	-	19.2	140.8	-
(41)	A.	396.8	38.4	-	-	-	44.8	160.0	-
	B.	294.4	51.2	-	-	-	134.4	147.2	-
	C.	320.0	25.6	-	-	-	-	268.8	-
	D.	179.2	275.2	-	-	-	-	147.2	-
(42)	A.	153.6	102.4	-	-	-	89.6	294.4	-
	B.	179.2	128.0	-	-	-	102.4	230.4	-
	C.	166.4	70.4	-	-	-	121.6	281.6	-
	D.	89.6	179.2	-	-	-	83.2	288.0	-

Cell #	C&H	Pas.	Res.	C,S,&I	Ind.	Br.	For.	O.W.
(43) A.	390.4	128.0	12.8	12.8	-	51.2	44.8	-
B.	102.4	352.0	-	-	-	38.4	147.2	-
C.	115.2	339.2	6.4	6.4	-	32.0	140.8	-
D.	166.4	70.4	76.8	44.8	-	32.0	249.6	-
(44) A.	198.4	128.0	-	-	-	76.8	236.8	-
B.	512.0	76.8	-	-	-	-	51.2	-
C.	102.4	172.8	-	-	-	70.4	294.4	-
D.	128.0	243.2	-	-	-	102.4	166.4	-
(45) A.	211.2	102.4	-	-	-	-	326.4	-
B.	217.6	140.8	-	-	-	64.0	217.6	-
C.	102.4	51.2	-	-	-	57.6	428.8	-
D.	185.6	115.2	-	-	-	25.6	313.6	-
(46) A.	320.0	172.8	-	-	-	57.6	89.6	-
B.	332.8	179.2	-	-	-	19.2	108.8	-
C.	153.6	140.8	-	-	-	25.6	307.2	12.8
D.	89.6	70.4	-	-	-	-	409.6	12.8
(47) A.	230.4	128.0	-	-	-	38.4	243.2	-
B.	294.4	140.8	-	-	-	44.8	160.0	-
C.	307.2	211.2	-	-	-	-	121.6	-
D.	448.0	83.2	-	-	-	-	108.8	-
(48) A.	96.0	51.2	-	-	-	38.4	454.4	-
B.	249.6	44.8	-	-	-	25.6	320.0	-
C.	300.8	134.4	-	-	-	-	204.8	-
D.	409.6	128.0	-	-	-	-	102.4	-
(49) A.	224.0	108.8	-	-	-	83.2	224.0	-
B.	262.4	179.2	-	-	-	-	198.4	-
C.	204.8	44.8	-	-	-	12.8	377.6	-
D.	169.2	96.0	-	-	-	25.6	339.2	-

Cell #		C&H	Pas.	Res.	C,S,&I	Ind.	Br.	For.	O.W.
(50)	A.	115.2	172.8	-	-	-	70.4	281.6	-
	B.	51.2	44.8	-	-	-	108.8	416.0	-
	C.	25.6	96.0	-	-	-	6.4	512.0	-
	D.	76.8	51.2	-	-	-	12.8	499.2	-
(51)	A.	243.2	51.2	-	-	-	-	345.6	-
	B.	192.0	147.2	-	-	-	12.8	288.0	-
	C.	364.8	134.4	-	-	-	25.6	115.2	-
	D.	326.4	128.0	-	-	-	25.6	160.0	-
(52)	A.	236.8	147.2	-	-	-	44.8	211.2	-
	B.	307.2	102.4	-	-	-	38.4	192.0	-
	C.	256.0	96.0	19.2	-	-	102.4	166.4	-
	D.	230.4	147.2	-	-	-	-	262.4	-
(53)	A.	89.6	32.0	-	-	-	64.0	454.4	-
	B.	83.2	89.6	-	-	-	115.2	352.0	-
	C.	128.0	96.0	-	-	-	57.6	358.4	-
	D.	134.4	140.8	-	-	-	51.2	313.6	-
(54)	A.	217.6	121.6	-	-	-	-	300.8	-
	B.	249.6	64.0	-	-	-	-	326.4	-
	C.	172.8	134.4	-	-	-	32.0	300.8	-
	D.	198.4	83.2	-	-	-	-	358.4	-
(55)	A.	198.4	76.8	-	-	-	-	369.4	-
	B.	140.8	96.0	-	-	-	51.2	352.0	-
	C.	166.4	134.4	-	-	-	-	229.2	-
	D.	115.2	224.0	-	-	-	25.6	275.2	-
(56)	A.	288.0	12.8	-	-	-	32.0	307.2	-
	B.	179.2	236.8	-	-	-	19.2	204.8	-
	C.	153.6	115.2	-	-	-	57.6	313.6	-
	D.	128.0	294.4	-	-	-	32.0	185.6	-

Cell #		C&H	Pas.	Res.	C,S,&I	Ind.	Br.	For.	O.W.
(57)	A.	89.6	-	-	-	-	25.6	524.8	-
	B.	102.4	64.0	-	-	-	-	473.6	-
	C.	147.2	108.8	-	-	-	12.8	371.2	-
	D.	115.2	236.8	-	-	-	19.2	268.8	-
(58)	A.	268.8	-	-	-	-	-	243.2	128.0
	B.	102.4	-	-	-	-	-	441.6	96.0
	C.	89.6	25.6	-	-	-	-	428.8	96.0
	D.	83.2	51.2	-	-	-	-	384.0	121.6

APPENDIX C

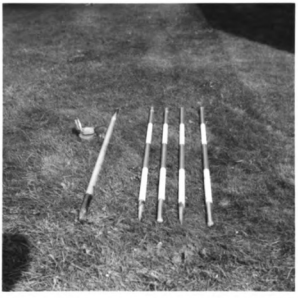
Ground and Aerial Photographs

Photograph #1

The equipment used in the field portion of the study. This equipment consists of , from left to right, a Brunton Compass, a Jacob's Staff, and four range poles. The Brunton compass was mounted on the Jacob's staff and used to sight on the range poles.

Photograph #2

An example of how the Brunton compass was mounted on the Jacob's staff. Measurements were made by sighting along the compass arm to the range poles. Angles would then be turned between them to determine the orientation of a particular landscape feature.



Photograph #1

Photograph #2

Photograph #3

An illustration of the arrangement of the equipment in the field. One of the range poles was fixed with a removable target with a large letter "N" on it. This range pole would always be placed on line in a due north position. From this position the angle was measured with the Brunton compass to the other range pole which had been aligned along the particular landscape feature beign investigated. In measuring some of these features, the poles had been oriented in a southerly direction. In such a case the target was removed from the one range pole, and the field assistant would hold the pole on line due south for the measurement.

Photograph #4

A representative landscape scene on the Tipton Till Plain in Grid Cell #2. In this scene the level nature of the land can be seen, as well as the large amount of land in crops and hay. This particular field in the background is in corn. Note the isolated, regular shaped woodlots on the horizon.

Photograph #3

Photograph #4

Photograph #5

The area just south of Richmond looking towards the East Fork, Whitewater River in Cell #19. This scene shows an increased amount of relief from the work of stream erosion. A greater amount of land in this area is in pasture and other grasslands as seen in the foreground.

Photograph #6

A scene in Cell #21 showing an example of the river bottom lands located in the valley of the East Fork, Whitewater River. Most of these fields are in corn or soybeans. The boundaries of these fields are oriented to the course of the streams and not to fundamental survey lines.

Photograph #5

Photograph #6

Photograph #7

Lake Brookville just above the town of Brookville in Franklin County. This lake is the result of a recent Army Corps of Engineers project which flooded a portion of the Greenville Treaty Boundary Line.

Photograph #8

The Whitewater River Valley above Brookville looking towards the southeast. This scene shows an example of the increased relief looking towards the Dearborn Upland.

Photograph #7

Photograph #8

Photograph #9

A scene on the old drift flats area of Illinoian glacial deposits in Cell #36. This area is more level than surrounding areas in the Dearborn Upland which possesses more relief as a result of stream dissection. Still, some stream dissection is present in the drift flats, and this area is not as productive as the till plain. Much of the agricultural activity in the area is devoted to pasture and livestock production as can be seen in the foreground. Also note the greater amount of forestland in the area than was found on the till plain.

Photograph #10

An example of the large amount of relief found in the southern portions of the Dearborn Upland. This scene is located in Cell#58 near the Ohio River. Note the steep, wooded slopes and the amount of land in brush and pasture.

Photograph #9

Photograph #10

Photograph #11

An example of a field boundary oriented to the cardinal directions of fundamental survey lines. The range pole with the north target has been situated in line with this field boundary indicating its north-south alignment. The boundary is located in the SE¼, NW¼, Sec. 23, T19N, R15E.

Photograph #12

This field boundary is oriented to the bearing of the Greenville Treaty Boundary Line in the NW¼, SE¼, Sec. 27, T21N, R15E. The unmarked range pole is on line with the treaty boundary, while the target range pole is on line with the north axis. This range pole arrangement illustrates the degree to which the treaty boundary deviates from north.

Photograph #11

Photograph #12

Photograph #13

An oriented field boundary located at the terminus of Boundary Line Road. The range pole being held by the field assistant is on line due south, while the unmanned range pole is oriented along the bearing of the treaty boundary. Note the even alignment of the hedgerow along the oriented field boundary. Most field boundaries were easy to locate because of the presence of such aligned vegetation, even where fences were not able to be distinguished.

Photograph #14

An oriented property line between a private residence and a cemetery located in Cell #22, Fractional Sec. 3, T12N, R2W. Even in some town and village sites, the treaty boundary can still be seen because of the presence of property fence lines corresponding to the boundary, as seen in this scene in the town of Abington in Union County.

Photograph #13

Photograph #14

Photograph #15

An oriented field boundary in the area of the valley of the East Fork, Whitewater River in the SW¼,SW¼, Sec. 1, T13N, R1W. The unmanned range pole is aligned to the treaty line, while the field assistant is holding the other range pole on line due south.

Photograph #16

An oriented field boundary on slope land in the Dearborn Upland in the NW¼, SW¼, Sec. 2, T1N, R4W. Field lines are distinguishable, even in areas of uneven terrain as found in this scene. The unmanned range pole is fixed on the treaty boundary, while the pole held by the field assistant is on line due south. The fog shrouded Ohio River lies down-slope in the background.

Photograph #15

Photograph #16

Photograph #17

An example of a field which does not show any affects of the treaty boundary. This field is situated across the the treaty boundary. The unmanned range pole is aligned along the treaty line, while the field assistant is holding the other pole due south. Thsi is an example of one of a number of fields which lie astride of the treaty boundary showing no alignment to it whatsoever.

Photograph #18

This scene shows an example of a road oriented north-south to the cardinal directions of the compass on fundamental survey lines. This particualr road is found in Cell #2 on the Tipton Till Plain, and is typical fo roads found in this level region of the study area. The road in this scene, as indicated by the target range pole, is oriented north-south.

Photograph #17

Photograph #18

Photograph #19

Boundary Line Road in the NW¼, NE¼, Sec. 9, T16N, R1W. This road is oriented to the bearing of the Greenville Treaty line. The field assistant is holding one range pole on the center of the road, while the target pole is situated to the left and on line due north.

Photograph #20

Another scene along Boundary Line Road where it intersects Greenville Pike in the SW¼, NE¼, Sec. 7, T3N, R1W. This is the longest oriented road in the study area, being visible even on satellite imagery. Once again, the field assistant is holding the range pole oriented to the course of the road which corresponds to the treaty line, while the target pole is aligned due north to show the deviation of the road.

Photograph #19

Photograph #20

Photograph #21

An oriented road on the Dearborn Upland area in Franklin County in the SE¼, NW¼, Sec. 1, T12N, R13E. Most oriented roads in this area are either found on level stream bottoms or, as in this case, on relatively level upland divides.

Photograph #22

An example of an oriented road that functions as a county line road between Ripley and Dearborn counties. The field assistant is holding one of the range poles aligned with the orientation of the road, while the unmarked pole to the left is on line due south. This road is one of several road segments in this part of the study area that is oriented to the bearing of the Greenville Treaty line.

Photograph #21

Photograph #22

Photograph #23

An oriented street in the town of Lamb, on the banks of the Ohio River, in Switzerland County. This small town is the only one located on the treaty line, in the NW¼, SW¼, Sec. 2, T1N, R4W. The field assistant is holding the unmarked range pole aligned to the treaty line, while the target range pole is on line due north. In the background is an oriented private farm lane.

Photograph #24

An example of a road offset on Cliffton Road in Union County in the NE¼, SE¼, Sec. 5, T14N, R14E. Ûch road offsets are the result of roads following east-west survey section lines which do not meet on the treaty boundary. Consequently, these roads must jog along the treaty boundary to be continuous. In this scene the two range poles -- one inthe foreground and the other in the background to the right of the car -- have been aligned along the treaty line to illustrate the oriented nature of these road offsets.

Photograph #23

Photograph #24

Photograph #25

A variety of historical monuments mark the Greenville Treaty Boundary Line in the study area. This particular marker is located in Richmond in Wayne County in the SW¼, NW¼, Sec. 1, T13N, R2W. The historical monument in this scene notes the point where the National Road crosses the boundary line.

Photograph #26

Another historical marker noting the intersection of Kibbey's Road -- the one recorded in Ludlow's survey field notes on the 32nd mile north -- with the Greenville Treaty line in Dearborn County.

Photograph #25

Photograph #26

Photograph #27

A marker on the treaty line in the NW¼, NW¼. Sec. 14, T7N, R3W. This particular marker notes the county line function that the Greenville line serves in this part of the study area. The marker is located on the Ripley-Dearborn County line. The hedgerow of trees in the background on the right side of the photograph is oriented along the treaty boundary and is the county line.

Photograph #28

As this photograph indicates, some cultural features in the study area take their name from the Greenville Treaty Boundary Line. These signs are advertisements for two businesses located in Union County.

Photograph #27

Photograph #28

Photograph #29

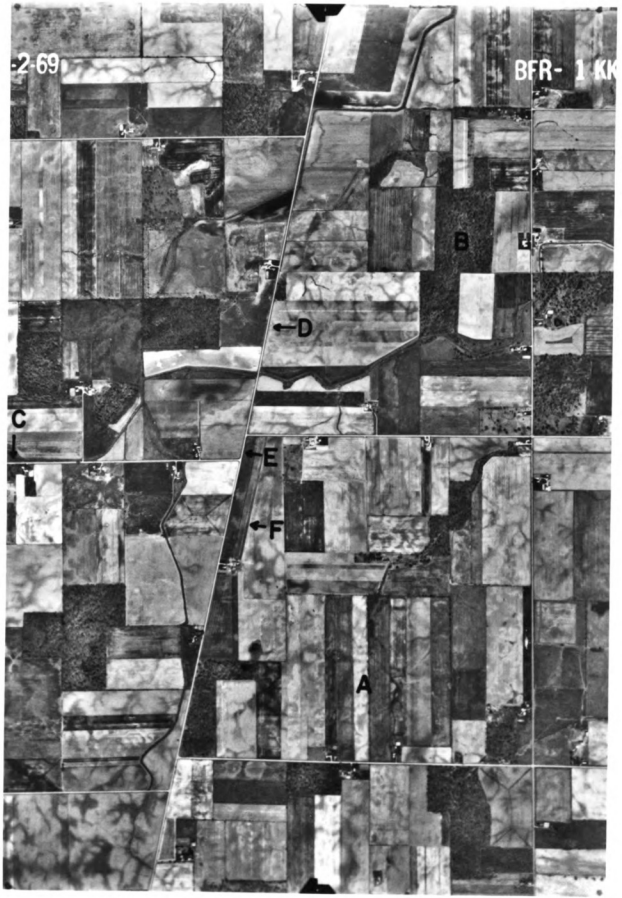
Another example of the names of various cultural features which have taken the name of the treaty boundary. This farm is located near Lamb, at the southern terminus of the treaty line. It is the last farm that is adjacent to the treaty boundary before it ends on the north bank of the Onio River in Switzerland County.

Photograph #29

Aerial Photograph #1

Randolph County, Indiana; BFR - 1KK - 73, 5/2/69, 1:24,000, Top of photograph is north.

This aerial photograph shows a representative landscape scene on the Tipton Till Plain. The photograph indicates that most of the land is under cultivation in cropland and hayfields (Point A). What forestland is present, is confined to regular shaped woodlots (Point B), and stream courses and drainage ditches. There is little relief displayed in the photo indicating a rather level landscape. Most roads conform to fundamental survey lines (Point C). A major oriented road, Boundary Line Road, is present on the photograph (Point D), and shows the orientation of the Greenville Treaty Boundary Line. An example of a road offset caused by section line roads not meeting on the treaty line can also be seen (Point E). Examples of field boundaries paralleling the alignment of the treaty boundary can be distinguished (Point F).



Aerial Photograph # 1

Aerial Photograph #2

Union County, Indiana: FH - 2KK - 176, 6/4/69, 1:24,000
Top of photograph is north.

This aerial photograph shows an example of the type of landscape found in the East Fork, Whitewater River Valley. Agricultural land is still present, but a greater degree of forestland, brushland, and grassland is becoming more apparent, with increased stream dissection. Where the dissection is greatest, fields (Point A) and roads (Point B) tend to conform more to the physical landscape irregularities rather than to survey lines. Where areas of more level land predominate, the treaty boundary-cultural landscape relationship can once again be seen in oriented fields (Point C) and oriented roads and farm lanes (Point D).

Aerial Photograph # 2

Aerial Photograph #3

Ripley and Dearborn counties, RN - 1GG - 146, 5/31/66, 1:24,000, Top of photograph is north

On this aerial photograph a representative landscape in the Old Illinoian Drift Flats area is shown. Because of the relatively level nature of the drift flats, roads and field patterns once again conform to the cardinal directions of fundamental survey lines. The Greenville Treaty line also appears to a greater degree in this area, with oriented fields (Point A) and oriented roads (Point B). Still, for whatever reason, some fields do not show any influence by the presence the the treaty boundary at all (Point C). A greater amount of cropland and hay is found in this area than on adjacnet lands of the Dearborn Upland. However, the drift flats are somewhat more dissected than the till plain, and with perhaps more areas of soils which are not as agriculturally productive; substantial amounts of forest and grasslands are found.

Aerial Photograph # 3

Aerial Photograph #4

Switzerland County, Indiana; RP - 1GG - 226, 7/20/66, 1:24,000, Top of photograph is north.

This aerial photograph shows the termination of the Greenville Treaty Boundary Line on the north bank of the Ohio River (Point A). This photograph also shows the great amount of relief present in the Dearborn Upland area north of the Ohio. Agricultural land is limited to the river bottoms and and upland interfluves. The majority of the land is in forest and brushlands situated on moderate to steep slopes. Fields, and especially roads (Point B) are influenced by the irregular nature of the physical landscape. Even in such an area, however, the treaty boundary can still be seen in the orientation of some field boundaries (PointC).

Aerial Photograph # 4

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Brookville	-	1956
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Carrollton	-	1939-67
Cosmos	-	1960
Cross Plains	-	1959
Dillsboro	-	1958
Everton	-	1956-72
Fairfield	-	1946-60
Fountain City	-	1960
Liberty	-	1960
Lynn	-	1960
Milan	-	1943-61
Richmond	-	1960
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Sunman	-	1956
Union City	-	1960
Winchester	-	1960

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