WARREN H. MANNING’S ROLE IN THE DEVELOPMENT OF EARLY SPATIAL ANALYSIS TECHNIQUES

A Thesis
Presented in Partial Fulfillment of the Requirements for
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ABSTRACT

Warren H. Manning (1860-1938) was a landscape architect who has been credited with developing a spatial analysis technique for landscape planning. This method is related to contemporary practices, yet there is no clear picture of how, when, or where it was developed. The thesis clarified Manning’s role in the early development of spatial analysis techniques by studying a cross section of his city and regional plans, and by determining whether there is evidence of other spatial analysis users during Manning’s career. In addition, Manning’s background was studied to provide context for his accomplishments. Data collection was performed through library database searches, the review of a known collection, and with a literature search in the Ohio State University libraries.

The thesis was justified because it addressed significant literature gaps, it focused on a person important to the landscape architecture profession, and the spatial analysis techniques under study are related to contemporary practice. Manning’s manual spatial analysis method is similar to present day GIS overlay analyses. A study of Manning’s work was valuable because it added to knowledge of the historical development of GIS.

The survey of Manning’s plans found that he used spatial analysis on projects other than those he published, and that he tended to use it more toward the end of his career than at the beginning. There is evidence that he used spatial analysis on projects for Michigan’s Upper Peninsula; Birmingham, Alabama; Athens, Georgia; Billerica, Massachusetts; and the United States National Plan. Manning’s A National Plan contained a fully developed spatial analysis model, and was much more detailed in its analysis than any of his city plans.
An overview of landscape architecture planning, and geography revealed that spatial analysis was being used by others during Manning’s career. The evidence found indicated that spatial analysis was probably a commonly used technique during Manning’s career. Others who were using spatial analysis include Charles Eliot, Frank Waugh, John Nolen, Benton MacKaye, the New York State Commission of Housing and Regional Planning, and several geographers. Further study of these individuals is needed to determine the extent of their spatial analysis use.

Manning’s role in the development of early spatial analysis techniques remains large because examples of his work and methods were published in the profession’s sole periodical, Landscape Architecture Quarterly, while others’ were not.
For Helena and K. K.
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CHAPTER 1

INTRODUCTION

Warren H. Manning was one of the founders of the American Society of Landscape Architects, and practiced as a landscape architect for fifty years. He completed estate designs, worker's housing development, park systems and city plans in his native Massachusetts and throughout the United States. His legacy to the profession of landscape architecture includes over 1600 projects in 42 states, over 75 books and articles, and the education of many apprentices.

Manning has been credited with initiating the use of spatial analysis for planning work to the profession of landscape architecture (Steinitz, Parker and Jordan 1976). This analysis technique utilizes a cartographic model, made of several map layers, each depicting a landscape component, and finds the implicit relationships between each component (See Glossary, p. 66).

...a great deal of additional information that is not explicitly recorded (at least not at first) is nonetheless implicit in the spatial and logical relationships among those data that are recorded and in the meanings attributed to them (Tomlin 1990, 4).

Spatial analysis is the process of discovering those relationships among data layers. The relationships are found through a visual comparison, which might be an overlay process, but maps could also be compared side by side. The discovery and knowledge of these implicit relationships can then be used for planning decisions, as seen in Ian McHarg's Design with Nature. Spatial analysis is most applicable when a landscape is complex and the project scope is broad enough to warrant extensive data collection and analysis. It requires that the landscape planner recognize that elements such as vegetation, soil, hydrology, and topography are related and that
the pattern and combinations of their distributions is meaningful and should affect design decisions.

Spatial analysis is still used in landscape architecture practice today, and it is taught as a standard method by landscape architecture educators. It may be computerized as a geographic information system (GIS). However, there is no clear picture of the development or evolution of the spatial analysis. It is not known if the method was invented by an individual and passed on to others through an apprenticeship process, or whether it is a concept that arose naturally and organically to many individuals at one time. The lack of knowledge about the development of spatial analysis represents a large gap in the history of the landscape architecture profession. Currently, Warren Manning is given credit in landscape architecture literature for developing spatial analysis during a planning project for Billerica, Massachusetts.

1.1 Scope

The goal of this thesis is to clarify Warren H. Manning's role in the early development of spatial analysis techniques. The two objectives of the thesis were to investigate how Manning used spatial analysis throughout his career, and to investigate whether Manning's peers were doing similar analysis work. The two objectives were investigated separately. First, several of Manning's large-scale planning projects were examined to understand how Manning used spatial analysis throughout his career. Second, to place Manning's work in context, the results of a literature search described how Manning's peers were or were not using spatial analysis during Manning's career (1888-1938). In addition, the thesis reviewed Manning's life and career to describe the forces that shaped him.

The primary research objectives were defined as two hypotheses. They are:

Hypothesis 1: Manning used overlays as a spatial analysis technique for projects other than Billerica, and this technique was not significantly altered during his career.
Hypothesis 2: Manning was not the first or only person at the time to use overlays as a spatial analysis technique in the United States.

1.2 Methodology

The first hypothesis was investigated by evaluating the landscape planning work of Warren H. Manning for indications of a spatial analysis technique, to determine if Manning made any changes to his analysis method over the course of his career. Several of Manning’s town and regional plans, completed at different times, were compared to determine if and how Manning used spatial analysis throughout his career. The comparisons were done with a visual inspection.

1.2.1 Analysis

As used in the thesis, spatial analysis is what Tomlin described as a “cartographic model” (1990). Tomlin’s definitions were used to define what would indicate spatial analysis in Manning’s plans. The definitions and descriptions of analysis described in Tomlin’s Geographic Information Systems and Cartographic Modeling can be interpreted to apply to manual techniques, such as Manning’s. The justification for this is found in Steinitz, Parker, and Jordan’s article and Lendon’s thesis, both of which describe the influence of manual techniques on contemporary practice (1976, 1994).

Tomlin’s definition of cartographic model applies to both computerized and manual systems (See Glossary for italicized words, page 66). In each case, the cartographic model is a set of map layers depicting landscape components, that contain both explicit and implicit information. The implicit information is retrieved through analysis of “the spatial and logical relationships among those data that are recorded and in the meanings attributed to them” (Tomlin 1990, 4). Each of the map layers depicts the same geographic area, and is drawn at the same scale and projection. Each map layer shows the distribution of a single landscape component such as topography, hydrology, or vegetation.
To assess whether Manning used spatial analysis on a particular project, it was necessary to define how spatial analysis would manifest itself in a completed plan. Completed plans may include preliminary study sheets, a final plan, and/or text. Four questions were developed from the definitions of spatial analysis and cartographic model to indicate the use of spatial analysis on a project. Because each plan studied was not of similar completeness, the requirements for spatial analysis were defined to encompass all possible situations.

Four questions were defined to apply to each plan. A “yes” to any question indicated the use of spatial analysis. The four questions are:

a) Are there multiple map layers?
b) Is there a map showing the combination of several map layers?
c) Is there a plan derived from a) and b)?
d) Is there an explicit reference to spatial analysis in the text?

The first question, a), *Are there multiple map layers?*, was applied when preliminary design, base maps, and data collection sheets were available for study. This question verified the presence of a set of map layers, each mapping the distribution of a different landscape component. Without a separation of map layers, spatial analysis is less likely to have been used.

Question b), *Is there a map showing the combination of several map layers?*, verified that at some point separate map layers were combined and perhaps analyzed. Question b) was intended to be used when analysis sheets were available for study, whether separate map layers were seen or not. The map showing a combination of map layers does not need to include any design or recommendations; it might only depict the combination of several existing components. A positive example of b) would be when a map depicts combinations of landscape components, rather than discrete distributions. For example, a map with discrete areas of woods, cities, and steep slopes would be negative for b). However, a map showing different sets of combinations, such as steep slopes with woods, woods in cities, cities without woods, etc., would be positive for b).

The presence of both a) and b) is much stronger evidence of spatial analysis than either a) or b) alone.
Question c), *Is there a plan derived from a) and b)?*, was intended to be used when no preliminary design or data collection sheets were available for study. It verifies that map layers were analyzed, their spatial relationships were understood, and a plan was derived from that analysis. The plan would include designs or recommendations for future development, and was a product of analysis. The positive presence of c) would indicate that the plan was the result of a prescriptive model.

Question d), *Is there an explicit reference to spatial analysis in the text?*, was used when texts describing a plan existed, whether plans and/or maps were published with it or not.

The second hypothesis was investigated with a literature review to determine what other landscape architects and planners were doing during Manning’s career in terms of spatial analysis. The same four questions were applied to the literature and plans found to determine if spatial analysis was used by others.

1.2.2 Data Collection

Data collection for Manning’s work (Hypothesis 1) was performed in two ways through library database searches and the review of a known collection. First, copies of Manning’s city plans were identified via a WorldCat database search. “Warren Manning” was entered as a subject, keyword, and author search, and all hits were saved. Databases searched included the library catalogs of Ohio State and all other Big 10 universities, WorldCat database, Periodical Abstracts database, AVERY index to architecture, Newspaper Abstracts, Dissertation Abstracts, ART index, and OhioLink. The number of hits was narrowed by eliminating those that did not refer to a city, region, or to planning in the title. Special attention was given to articles that contained a reference to national planning. Other articles were found in the bibliographies of primary source material, and a listing of articles in the ISU collection.

All available copies were obtained through Inter-library Loan at The Ohio State University and photocopied as necessary. Plans that were listed but not available were not pursued further. The plans obtained from Interlibrary Loan were complete – no pages were missing or unreadable.
A study was made of the Warren H. Manning Special Collection at Iowa State University (ISU). Over the course of two days, all materials pertaining to Manning’s landscape planning projects were inspected. In investigating the ISU collection, assumptions were made concerning the type of projects on which Manning would have used spatial analysis. It was assumed that residential projects would not have required complex data collection or spatial analysis. From a catalog of the collection, projects were identified that appeared to be large in scale and scope. Manning’s projects of small areas within cities were not studied. The ISU collection contains working drawings, prints, and final ink drawings from Manning’s office. The condition of the drawings is good; no lines or words were unintelligible. The Iowa State University drawings have no text associated with them, except for the National Plan.

After plans were obtained, they were read and their contents were summarized. If maps or plans were included, they were inspected to determine the extent of spatial analysis used by applying the four questions already discussed. Each of the plans obtained through Interlibrary Loan was photocopied so that they could be studied after the originals were returned. At ISU, the maps and plans were reviewed once each and notes on their contents made. Photocopies were made of plans that were 8 1/2” x 14” or smaller. No method for creating copies of larger plans was available. For the National Plan, photocopies were made of a cross-section of the maps, as well as all text relating to the sections on transportation and water resources, Manning’s final plan, and Manning’s description of the problem.

Data collection for other practitioners (Hypothesis 2) was performed as a literature search in the OSU libraries. The search was limited to OSU to reduce the volume of work. Each practitioner identified in preliminary and subsequent research was the subject of a database search. The practitioners were identified through references in Manning’s work, in literature about Manning, by suggestion, or because they were known to have practiced landscape architecture at that time. All hits that pertained to planning projects or projects that might have used spatial analysis were obtained and examined. No time was allotted to complete additional research on individuals that
were not well represented in the OSU libraries. The purpose of this research was not to produce an exhaustive survey of each individual's career, but to gain an understanding of what the common practices were regarding spatial analysis in landscape architecture, planning, and geography. The research of geographers resulted in little success. The number of sources that should be reviewed for a complete picture of geography was beyond the scope of the thesis, and was not attempted.

A few literature sources for both hypotheses could not be located in the OSU libraries, though the collection’s database listed them as available. No additional work was done to locate alternate copies. These include Comey (1915), Manning (1922), Hans (1933), Spalding (1904), and Tyrwhitt (1950).

1.2.3 Limitations

There were two major limitations on data collection. First, the study of Manning’s contemporaries was limited to persons in the professions of landscape architecture, planning, and geography. Other professions that could have been studied are horticulture and agriculture, as well as a more detailed look at geography. These studies were not made because their inclusion would have made the thesis too broad. The study was also generally limited to Americans, because the available resources focus on Americans and study in foreign languages was not possible. Second, the search for Manning’s plans was limited to plans available from libraries. It is possible that there are many other plans of comparable scope that still exist but are not catalogued in the library databases searched. Searching for and obtaining these plans was beyond the scope of the thesis.

1.3 Justification and Literature Review

The thesis was justified because it addressed significant literature gaps, it focused on a person important to the landscape architecture profession, and the spatial analysis techniques under study are related to contemporary practice. While Manning is credited with developing the
overlay analysis technique, little is known about how he developed it, or whether the credit is deserved. The thesis addressed these gaps in history. There is no complete, thorough examination of Manning’s spatial analysis technique. Only the Billerica and US plans have been described, analyzed, or critiqued in published papers (Steinitz, Parker, and Jordan 1976). In addition, there are few published studies of Manning’s career. The literature review found only one article (Neckar 1989) and one thesis (Conant 1984) that focus in depth on Manning’s career. This thesis addressed these gaps in the coverage of Manning’s career by focusing on his landscape planning work and analysis techniques with the first hypothesis.

The use of overlays for spatial analysis by landscape architects partially shaped the development of geographic information systems (GIS) (Lendon 1994). However, the development of this technique has not been documented or explored, except in the article “Hand-Down Overlays: Their History and Prospective Uses” (Steinitz, Parker, and Jordan 1976). In it, the authors list Manning’s Billerica work as the first known use of spatial analysis. This article has not been contradicted in print, although some questions have been raised about Manning’s role (Mann 1993, Neckar 1989, Miller 1996). The second hypothesis investigated these questions. During a search of the Science Citation Index and the Social Science Citation Index, nine references were found to the 1976 Steinitz, Parker, and Jordan article. Most of these cited the historical content in the article. None of the references explored Manning’s contribution or built upon the history that the authors related. In personal communication, Steinitz stated that he did not research any of Manning’s work other than the Billerica study for the 1976 article (1996). The thesis addressed this gap by placing Manning in the context of his peers and their spatial analysis methods.

As one of the founders of the American Society of Landscape Architects, Warren Manning is an important historical figure. His legacy to the profession includes fifty years of built projects and influential work in the field of landscape planning, including plans for the United States and Billerica, Massachusetts. Several of Manning’s apprentices and employees went on to influence
the profession themselves. Manning's grassroots work with communities is a tradition that continues today with community participatory design.

The type of spatial analysis that was studied for the thesis is related to contemporary practice, particularly in the use of GIS. In Antenucci et al., Roger Tomlinson writes about GIS' importance to the management of the earth and its resources (1991). An interview with Jack Dangermond describes overlay analysis as a tool that later became GIS analysis. The map layers found in an overlay spatial analysis system can also be called thematic maps. In Elements of Cartography, Robinson et al. describe the history of cartography, and state that thematic maps have been used since the late 1600s (1995).

Steinitz, Parker, and Jordan's article documented the history of overlays from 1912-1969 and is the primary reference for this topic (1976). According to the authors, Manning was the first to use overlays for spatial analysis, in his study of Billerica, Massachusetts. There is no description of how Manning developed his technique or whether he used it on other projects.

In the introduction to "Computertechnics in the Landscape", Fabos and Ferris stated that the use of overlay analysis is an "accepted concept" (1975, 102). They also stated that the use of this technique is what made it possible for landscape architects to specialize in landscape planning. Lendon compiled many sources for his history of GIS (1994), and his thesis contained a section entitled "Overlay Analysis" that describes the development of this method. Lendon discussed how the overlay process developed by Manning was influential in early automated GIS, although automated GIS was not directly derived from it. Lendon described the lasting influence of Manning's work: "The basic principles of his work served as the primary mode of landscape analysis until...1960s and 1970s. Manning's work became the basis for...approaches that developed during the early 1960s by...Lewis and McHarg..." (15-16). Simpson's 1989 article also summarized the development of the overlay analysis. He included Manning's contributions, but does not describe how Manning developed the technique. He discussed the limitations of overlays, as well as a justification of their use. Simpson's 1987 article discussed the limitations of
overlays for depicting change, dynamics, and interrelationships. He stated that no innovations in
analysis have occurred since Manning's Billerica study.

Zube's 1986a article discussed how the field of landscape planning evolved, but skipped from
the 1920s to 1969. The author named Manning as the first person to develop an overlay analysis
technique that could be applied to complex ecosystem data. He hypothesized that the gap
between the 1930s and 1960s in terms of the use of spatial analysis happened because there was
little need at the time for landscape planning, and because the introduction of computers made
more complex analyses possible. Zube stated that W.W. II was a cause for the development of
landscape planning in the 1960s, but does not elaborate on this.

The literature review found several gaps in the history of landscape architecture and GIS, and
no explanation of how Manning developed his spatial analysis technique. It also found no
references to the use of spatial analysis by anyone else at the time except Manning.
CHAPTER 2

THE FORCES THAT SHAPED WARREN MANNING'S CAREER

Warren Henry Manning (1860-1938) was born in Reading, Massachusetts to Jacob Warren and Lydia Manning. As the first son of a nurseryman, Manning was exposed to the trade and developed a thorough knowledge of horticulture and the uses of plants in design. These skills introduced Manning to landscape architecture, where he spent most of his professional career and developed a good reputation as a plantsman and naturalistic designer.

Jacob Manning established his nursery in 1854, and Warren, the eldest of five sons, began working there at the age of six (Conant 1984). Warren's duties ranged from aiding with the production of the nursery's catalogue to propagation, transplanting, and other standard nursery work. As he grew up, Manning "...traveled with his father to collect specimen and visit other nurseries" (Conant 1984, 20). Manning's grandfather also owned a greenhouse, and his uncle ran a farm. In addition to working at the nursery, Manning spent time with both of these relatives and also spent free Saturdays at either the Arnold Arboretum or the Harvard Botanic Garden.

Another of Warren Manning's outside activities was as a founder of the Middlesex Institute, where he worked to identify the native plants of Middlesex County, Massachusetts. Manning collected 3,000 specimens of plants in the county, part of which was later included in the Boston Metropolitan Park System. Through Manning's work with the Middlesex Institute and his study at botanic gardens, Manning became known to some of the leading horticulturists in the United States. Manning's reputation as a horticulturist grew as he began judging landscape exhibits in
Rhode Island, presented papers to the American Academy for the Advancement of Science in Montreal, and wrote articles for Ladies Floral Cabinet, Vicks Magazine, and American Garden (Conant 1984).

Through these activities and work at the nursery, Manning learned all aspects of the nursery and landscaping trade, and became known for both his horticultural knowledge and his landscape designs (Conant 1984). Manning did not receive formal training at a university or college. By age 24, Manning was listed in Jacob Manning’s nursery catalogue as a Landscape Gardener, reflecting his already well-developed knowledge of horticulture.

Manning’s four brothers also worked in landscape businesses, with two spending time at the Olmsted firm. In his early 20s, Manning married Henrietta Hamblin Pratt of Reading, and had two sons, Harold Olmsted Manning, who died as a baby, and Warren Harold Manning. Manning’s surviving son later worked in Manning’s office, as a business manager (Conant 1984).

At 27, Manning began working with Frederick Law Olmsted, soon becoming the “Superintendent of Planting” for the Olmsted firm (Conant 1984). At the Olmsted office, Manning worked on over 100 projects with Olmsted himself as well as J. C. Olmsted, Charles Eliot, and others. Manning was involved with some of the firm’s most prestigious projects, including the Columbian Exposition, the Boston Metropolitan Park System, Iroquois Park in Louisville, and the Biltmore estate (Neckar 1989, Conant 1984). With a change in leadership inevitable, Manning left the Olmsted office in late 1896 and began his own practice, in partnership with his brother, J. Woodward Manning.

It is probable that Manning realized that Eliot (had he lived longer), John Charles Olmsted, and the younger Olmsted, Frederick Jr., always would have pre-eminent positions in the firm. Certainly, Eliot had more impressive credentials and stronger family and social ties. John Charles was already a principal in the firm’s work and led many projects. Frederick Jr., regardless of this own ambivalence at this time, was his father’s choice to inherit the future of the firm (Neckar 1989, 82).
Soon after Manning’s departure, F. L. Olmsted ceased work and the Olmsted brothers took over operations. Manning’s brother left their partnership after four years, and Manning continued on his own.

Olmsted and his office had great influence on Manning, affecting his design theory, methods, and ideals about the social aspects of design and democratic design methods for public spaces (Neckar 1989, Conant 1984). At Biltmore, Manning and Olmsted worked together on a daily basis, and Manning recognized the value of the experience. In a letter to his wife, Manning described the results of his work with Olmsted:

“It is and will be by far the most instructive and valuable trip to me I have ever had. Mr. O. is taking me into his consultations in a way that makes it of the greatest value to me. My position here is a much more satisfactory one, than at any other time, for I am recognized as Mr. O’s representative and get about what I want, all the gates open to me, & I have a key to them all the trains wait for me & I have a constantly increasing force at my disposal.” (Conant 1984, 23).

Manning left the Olmsted firm in good standing:

To his surprise, when he did leave, many of his former Olmsted clients requested that he continue his work for them. Olmsted gave Manning permission to continue their projects and also recommended him to several other new clients (Conant 1984, 26).

Two of these initial projects were Cyrus McCormick’s “Walden” estate and Leonard Tufts’ Pinehurst resort in North Carolina. This extra boost from Olmsted probably greatly helped in Manning’s early success, and ultimately aided his work on the National Plan.

Throughout Manning’s career, he straddled two divergent areas of landscape architecture: grassroots, democratic, community design and estate design for wealthy private clients. It appears that the work Manning did for private clients subsidized his work with community groups (Neckar 1989). Some of this grassroots work included Manning’s “Community Days” where local residents would work as a group to create a playground or clean up a public park.

Manning was also involved in several projects that developed workers’ housing. Most other landscape architects of the same time period did not have such diverse practices.
An early project for Harrisburg, Pennsylvania put Manning into contact with J. Horace McFarland, "a nationwide proponent of civic beautification" (Conant 1984, 27). McFarland gave lectures around the United States about the changes to Harrisburg and its parks, giving Manning national exposure. Other prestigious clients of Manning’s include Frank Sieberling, of Goodyear tires, William Mather, of Cleveland Cliffs Iron Company, Frederick Pabst, August and Adolphus Busch, and Joseph Pulitzer.

Manning’s practice also seems unusual in another way. Manning’s background and social class were not prestigious, yet he seems to have worked easily with aristocratic clients. It is possible that Manning’s association with Olmsted and clients like the Vanderbilts elevated Manning’s reputation and social status so that he was later able to retain the wealthy class as clients. However, on the Biltmore project, the Vanderbilts did not treat Manning as a social equal to Olmsted.

While working at Biltmore, Manning stayed at the nearby Kenilworth Inn, away from the activity of the Brick House where Olmsted stayed as one of the Vanderbilts' guests. Manning enjoyed the relative quiet of the Inn and was able to work in the evenings, but when the Vanderbilts were away he moved to the Brick House, sleeping in a room across the hall from Olmsted. In the evening he dined with Olmsted and Gifford Pinchot, the future Governor of Pennsylvania and founder of the United States Forest Service... (Conant 1984, 24-25).

Because Manning was not born to an elite family, he was not privy to a university education and was not raised as part of an elite class. Manning matured before there was a degree program in landscape architecture, yet other landscape architects of the same period held degrees, often in engineering, landscape gardening, or horticulture. It is possible that because he was exposed to this class from an early age, as they would have been customers at the nursery, that Manning developed early the skills to deal with the wealthy class. In addition, his horticultural knowledge would have been extremely useful in estate design. This knowledge may also have led Manning to park design, and from there to city planning. It may be that a university education would not have improved Manning’s career at all. Manning was probably able to finance his "labor of love" projects (Billerica and the National Plan) through his estate design work.

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Manning also continued to work in a collaborative format with architects and engineers throughout his career, a process learned from Olmsted (Neckar 1989). Manning's experience at Olmsted's firm also probably influenced his practice in that he tutored many apprentices over his career, reflecting his own education in landscape architecture.

...he also began, at first in an informal way, the "landscape school" that is mentioned in some of the standard promotional materials about the office. Manning used the lunch hour to have his apprentices busy themselves with landscape duties around the Billerica site. Stephen Hamblin, an employee and later a professor at Harvard University, was named head of the school. The idea of having a "nuts and bolts" school of landscape architecture reflected Manning's own training. The school appears to have been loosely organized, and perhaps it was simply a vehicle for the apprenticeship model that Manning appeared to favor (Neckar 1989, 84).

Manning's career spanned WWI, the stock crash of 1929, the development of airplanes, and the introduction of automobiles into everyday life. His practice encompassed estate design, city planning, worker’s housing, and park design. Manning traveled extensively, keeping close watch on his projects. Much of the information available about his career is taken from letters Manning wrote to his wife while traveling. By 1910 his business was flourishing and Manning began work (sane client) on the largest project of his career, a plan for the United States (Coen 1984).

Toward the end of his life, Manning wrote an autobiography, which was never published. Manning continued to work until his death at age 78.

Throughout his career, Manning maintained many ties with other prominent landscape architects. As a founder of the American Society of Landscape Architects (ASLA), he had contact with the other founders, including Beatrix Farrand, Samuel Parsons, O.C. Simonds, and Downing Vaux (Newton 1971). His membership in ASLA brought Manning into contact with many other landscape architects, and he served as its president in 1914. Manning trained many apprentices, as he was trained by Olmsted, including A. D. Taylor, Fletcher Steele, Wilbur D. Cook Jr., Marjorie Cauley, Helen Bullard, Clarence Combs, and Dan Kilby (Neckar 1989). Some of these relationships can be seen in the timeline, Appendix C (page 75).
Manning was also involved in the formation of the American Park and Outdoor Art Association, later the American Civic Association (ACA). Another founder was J. Horace McFarland, a writer and the publisher of *Suburban Life and Countryside Magazine*, who Manning first met in Harrisburg (Neckar 1989). One of the ACA’s committees included Manning, John Nolen, F. L. Olmsted Jr., Frank A. Waugh, and Harlan F. Kelsey (Manning 1914). The importance of these affiliations is that Manning was constantly in contact with other landscape architects and planners, and had exposure to their ideas and techniques. None of Manning’s projects were created in a vacuum, without outside exposure.

Manning practiced during the Progressive Era, and was probably affected by the theme of reform associated with Theodore Roosevelt. Other social movements of the time include the Country Life and conservation movements. Manning’s Community Days and workers’ housing projects show the influence of Progressivism on his practice. More research is needed to place Manning’s work within this context. Manning believed in an active citizenry, as seen in his comments in the Birmingham and National Plans (see p. 35, 41).

A survey of landscape architecture history textbooks illustrates how Manning is perceived today. In *Design on the Land*, Newton focused on Manning as having initiated the idea of the ASLA, but did not discuss Manning’s city planning work. Mann, in *Landscape Architecture*, briefly described the breadth of Manning’s work, including the National Plan, and the use of spatial analysis (1993). Manning is not mentioned in *The Landscape of Man* (Jellicoe and Jellicoe 1995), nor in *The City in History’s* extensive bibliography (Mumford 1961). *Pioneers of American Landscape Architecture* contains both a short summary of Manning’s career and a bibliography of materials by and about Manning (Bimbaum 1993). The biographical material highlights Manning’s influence on environmental planning, including the development of “...resource-based planning and developed sophisticated inventory systems utilizing grids and overlays” (82).

Two sources include complete biographical information on Manning: *Democracy by Design* by Stephen Conant (1984) and “Developing landscape architecture for the Twentieth Century” by
Lance Neckar (1989). Conant’s thesis included a fairly detailed biography and concentrated on how Manning involved citizens in a democratic design process. It described Manning’s Community Days and how this contrasted with the popular City Beautiful movement. Neckar presented Manning as a practitioner who took landscape architecture from Progressivism to Modernism. He stated that Manning was a pioneer in “resource-based design and planning” (80), and stated that Manning’s National Plan influenced the National Resources Planning Board.

Neckar discussed the Harrisbury plan as “...a foretaste of modern environmentally based planning” (83), and also discussed the plan for Birmingham, Alabama. Many of the other articles found about Manning focus on his estate designs, particularly the Gwinn Estate and Stan Hywet Hall, both in northeast Ohio.

The major influences on Manning’s theory and methods were his knowledge of plants, begun at his father’s nursery, and the influence of other practitioners, through professional contact and affiliations. His contact with other landscape architects and his constant travels ensured that Manning continually saw new things and this enabled his design philosophy and techniques to evolve. Manning’s horticultural knowledge got him in the door at the Olmsted office, where he established a solid reputation as a designer. When he left the Olmsted office, Olmsted sent clients with him, establishing Manning’s reputation and status (Conant 1984). These early clients allowed Manning’s business to prosper, allowing him the luxury of time for things like the Billerica plan, the US plan, and his activities with ASLA and ACA. These activities gave him further contact with other designers, keeping his outlook fresh. His practice differed from others’ of the time in the breadth of project types, encompassing estate design for wealthy families and community projects and city plans for citizen groups.
CHAPTER 3

OVERVIEW OF SPATIAL ANALYSIS USE DURING MANNING'S CAREER

To place Manning's contributions to the development of spatial analysis into context, a survey was made of other practitioners who might have been using spatial analysis at the same time (1888-1938). The survey focused on persons practicing landscape architecture, but also includes geography. The initial thesis research identified geography as a field that potentially had many opportunities to use spatial analysis during this time period.

The survey focused on practitioners of Manning's era for two reasons. First, Manning's contemporaries could have affected his methods, through exposure to their ideas and methods. Chapter Two established that Manning was in contact with many other landscape architects. Second, a survey of these contemporaries allowed the thesis to investigate what general practices were for spatial analysis at that time. The timeline (Appendix C) was created to illustrate how Manning's life fit in with the others' studied as well as with major developments in history.

To determine if spatial analysis was used on a project, four questions were applied. They are:

a) Is there a separation of data layers?
b) Is there a plan showing the combination of several separate data layers?
c) Is there a plan derived from a and b?
d) Is there an explicit reference to spatial analysis in the text?

These are explained in more detail in Methodology (see p. 3). A positive answer to any of the four questions indicated that Manning was using spatial analysis on that project. Chapter Three is organized into two parts, landscape architecture and geography.
3.1 Spatial Analysis in Landscape Architecture

Although not a contemporary of Manning's, Humphry Repton (1752-1818) was studied because his use of overlays was identified during preliminary research (Carpenter 1996). Repton used a type of overlay system to show landscape scenes in his Red Books. It is not known if these overlays were primarily for display or for analysis and design. Jellicoe describes the overlays as "...before and (lift the flap) after drawings..." (1995, 246). In Design on the Land, Newton states that Repton kept a Red Book for each project, and they contained "...an ingenious kind of hinged flap overlay, showing the difference between what existed and what he proposed" (1971, 217). Repton's work may be the earliest example of an overlay, but it does not seem to be an example of spatial analysis.

Charles Eliot (1859-1897) was the son of Harvard's president and later attended the university, studying agriculture and horticulture. Eliot traveled extensively in Europe, worked off and on in the Olmsted office from 1883-1897, and is best known for his work with Boston's Metropolitan Park System (Birnbaum and Fix 1995). He began this work at the Olmsted office, and Manning was also involved with the project. Part of the Metropolitan Park System work may be the first documented use of an overlay system for spatial analysis. In Charles Eliot, Landscape Architect, written by Charles Eliot Sr., a report is included that described the use of an overlay system in 1894:

Upon one sheet of tracing-cloth was drawn the boundaries, the roads and paths, and the lettering (of the Blue Hills map, for example); on another sheet was drawn the streams, ponds, and swamps; and on a third the hill shading was roughly indicated by pen and pencil. Gray sun-prints obtained from the three sheets superimposed in the printing frame, when mounted on cloth, served very well for all purposes of study. (Eliot 1903, 496)

Eliot's phrase "for all purposes of study" indicates that the map layers were used for more than a drafting convenience. Questions a) and d) are positive for Eliot's work.

Three paragraphs after this description, Manning is mentioned: "To the investigation of the vegetation detail we early assigned Mr. Warren H. Manning of our office..." (497). This indicates that Manning was exposed to a spatial analysis technique several years before he seems to have
used it on his own projects. After Eliot's death, the leadership of the Olmsted office went to the Olmsted brothers. It is not known to what extent the Olmsted brothers utilized spatial analysis in their subsequent work. While it is not known to what degree spatial analysis was used by Eliot, this project can certainly be seen as the first step in the development of a spatial analysis method.

In contrast to Eliot's work, a very clear example of a spatial analysis system is found in a 1926 New York State Commission of Housing and Regional Planning (CHRP) report. At the time of the report, Clarence S. Stein was chairman of the commission. Stein, with architect Henry Wright, designed the landmark subdivisions of Sunnyside Gardens, Queens, NY (1924-28), and Radburn, NJ (1927). Also involved with both projects was Marjorie Sewell Cautley, an employee of Manning's (Newton 1971, Necker 1989).

The CHRP report was the final result of a "...study of the relation of the resources of the State to its economic history..." (Report of the Commission... 1926, 11). The report included sections that described natural resources and the history of development in New York, described forces shaping future development, and set forth a justification for a state-wide planning effort. At the end of the report was a series of maps that illustrated what a plan for New York might include. This included maps of geological formation, soil formation, rainfall, water supply reservations, a composite of favorable use areas, a composite of favorable reservation areas, and a future plan. The two composite maps and the future plan represented an entire spatial analysis process, from individual map layers to a plan derived from their combination (See Figures 3.1, 3.2). Questions a), b), and c) were positive for this project. Research did not uncover any direct ties between Stein and Manning, but it is assumed that they knew of each other. The existence of this public report suggests that spatial analysis may have been a common practice during Manning's career.

John Nolen (1869-1937) spent much of his landscape architecture career focused on town planning. Educated at the University of Pennsylvania in philosophy, economics, and public administration, Nolen spent time there as a professor before attending Harvard for its landscape architecture program (Birnbaum and Fix 1995). Like Manning, Nolen trained many apprentices in
his office, and was involved in several professional organizations. Nolen completed plans for over 50 towns and consulted to 17 government agencies (Birnbaum and Fix 1995). Several city plans, including those for Flint, Michigan; Little Rock, Arkansas; Roanoke, Virginia; Lancaster, Pennsylvania; and Akron, Ohio were studied for the thesis to get a general idea of Nolen's design process.

The City Plan of Flint, Michigan, 1920, contained sixteen maps, including maps of topography, existing conditions, utilities, population, and plan elements. The City Plan for Akron, 1919, contained a similar range of maps. Each plan was accompanied by a description of the existing conditions, the problems identified, and an explanation of the plan with regard to that aspect.

In the Flint plan, the Public Utilities section contains two references similar to what Manning wrote in the Billerica article and the maps contained in the plan for Athens, GA (see Chapter Four, p. 35):

A comparison of the diagrams showing Public Utilities with that showing Range in Land Values will make clear at once the close interrelation between values on the one hand and pavers, sewer and car lines on the other. (Nolen and Arnold 1928, 18)

Another passage compares the Public Utilities map with the Building Distribution map (See Figures 33, 34). A similar reference is found in the Akron plan.

By comparing the Land Value Map with the Public Utilities diagram, it will be observed that this residential area coincides very closely with the area supplied with water and other services. (Nolen 1919, 23)

The other plans studied do not include any references to spatial analysis.

These two textual references indicate that Nolen was using spatial analysis to a similar extent as Manning. Questions a), c), and d) were positive for Nolen's work. The contents of the Flint and Akron plans are similar to Manning's work for Athens, GA, where there are many maps, and each shows a plan element against a different existing condition (see Appendix A, p. 69). Because Manning and Nolen had such different educational backgrounds, this suggests that spatial analysis might have been commonly used.
Emile Benton MacKaye (1879-1975) is best known for his work on the Appalachian Trail, which runs between Maine and north Georgia, covering 2100 miles. MacKaye was born in Connecticut, studied at Harvard, and in 1905 joined the U. S. Forest Service. In 1918 he transferred to the Department of Labor, and later worked for the TVA and the Rural Electrification Association. MacKaye was a founder and President of the Wilderness Society (Appalachian Trail Conference 1997). MacKaye was also associated with Charles Whitaker, editor of the Journal of the American Institute of Architects, where his idea for the Appalachian Trail was first published. MacKaye’s concept behind the trail was that the dedicated open space would form a barrier to control the urban sprawl of the eastern seaboard (MacKaye 1928).

MacKaye, with Lewis Mumford, wrote a definition of regional planning for the 1929 Encyclopedia Brittanica. MacKaye and Mumford defined regions as large areas encompassing many towns and cities within a region, excluding Manning’s town planning work from the definition. The definition does not mention spatial analysis techniques, but does refer to the complexity of information that should be addressed in planning:

Briefly, regional planning deals with the ecology of the human community. Just as plant ecology treats of the climate, soil, the plant and insect partnerships necessary to the existence of a species of plants, so regional planning deals with the climate, vegetation, minerals, power resources, landscape, economic and social institutions necessary to a flourishing human community. (Encyclopedia Brittanica, 14th ed., s. v. “Regional Planning”).

MacKaye and Mumford also referred to the 1926 CHRP report, but not to its spatial analysis, and mentioned Sir Patrick Geddes as a founder of the modern planning movement. The inclusion of Geddes and the CHRP report ensured that they were known to a wide public audience.

In The New Exploration, MacKaye advocated establishing parks and reservations around city edges to contain growth and limit sprawl (1928). The book contained a series of three maps of Massachusetts illustrating this concept. The first map, Metropolitan Streams, depicted cities in Massachusetts and the routes between them. The second map, Openways or Leveses showed MacKaye’s proposed open space network. The third map, Control of Streams by Leveses, is an
overlay of the first two, although the openways have been classified and rendered differently. This map depicted "The openways crossing and flanking the motor ways: the system of levees interlocking with the system of metropolitan streams" (194). This map is an example of a simple spatial analysis product, showing the relationships between the first two maps (See Figure 3.5). Questions a) and c) are positive for MacKaye's project. Written after Manning's National Plan work, neither the definition of regional planning nor The New Exploration can be said to have influenced much of Manning's work.

Along with Benton MacKaye, Sir Patrick Geddes (1854-1932) was a well-known pioneer of regional planning. Geddes was a sociologist and planner who advocated a planning method that focused on social issues. In Patrick Geddes, Meller described the elements Geddes thought should be surveyed as part of the planning process, as outlined by Geddes in a series of three articles for Garden Cities and Town Planning in 1911 (Meller 1990). The elements listed included topography, geology, soils, vegetation, climate, means of communication, industries, manufactures, commerce, population, historical and recent town conditions, local government areas, and town planning suggestions and designs. Geddes' intent was "... to publicise the importance of survey work before planning..." (Meller 1990, 179). Geddes stated that the survey results should be reviewed in a public exhibit, drawing citizens into the planning process. Meller explains Geddes' influence:

This was the technique which Geddes brought to the Town-Planning Movement. This was the way he introduced a breadth of vision into an activity which, in the hands of architects, engineers, and surveyors...threatened to be concerned exclusively with a simple ordering of the physical environment (181).

Meller also stated that Geddes had an influence on Patrick Abercrombie, who with Thomas Johnson produced a regional plan in 1922 that is listed in Steinitz, Parker, and Jordan's history of overlays (1976). Geddes' list of survey items can be seen as a list of map layers that comprise a spatial analysis model. It is not known whether Geddes actually did this, or whether he had any direct influence on Manning. Geddes' biggest influence on Manning may have been his work.
with the town-planning movement in general, which contributed to the social environment Manning lived in.

In “The Advance of Ecology,” Zube described how ecological ideas were incorporated into the profession of landscape architecture during the early 1900s (1966b). He named three causes for this incorporation – the increased interest in and use of native plants, the development of new park and open space systems, and the development of overlay analysis. Zube lists O.C. Simonds, Jens Jensen, Frank Waugh, H.W.S. Cleveland, Charles Eliot, F. L. Olmsted, and Manning as some of the most influential landscape architects in this regard. Each of these individuals was examined to see how their work related to Manning’s and indications of spatial analysis.

Frederick Law Olmsted (1822-1903) was Manning’s primary teacher and mentor. He is best known for his work with Calvert Vaux on New York City’s Central Park and Riverside, Illinois. These two projects were, in part, motivated by a Progressive theory that the poor, who lived in filthy cities, should have the opportunity to live in or experience the healthy, clean countryside. Olmsted does not appear to have used a spatial analysis technique similar to Manning’s. Indeed, in a critique of overlay usage by landscape architects, Simpson cites Olmsted as an example of an landscape architect who used a more intuitive approach to analysis, gained from “…a detailed understanding of the site gained through firsthand experience…” (1987, 124). Olmsted’s projects tended to be oriented more toward design than planning, and may not have required much depth of analysis.

H.W.S. Cleveland (1814-1900) practiced landscape architecture in the late 1800s, mostly before Manning’s career. Born in Massachusetts, his family lived in Cuba when he was a boy. Cleveland later moved to Chicago, and then to Minneapolis (Rinnaaham and Fix 1995). Two of Cleveland’s best known projects are Sleepy Hollow Cemetery, Concord, MA, executed with Robert Morris Copeland, and the Minneapolis Park System. Cleveland “…corresponded extensively with colleagues such as Frederick Law Olmsted, Sr., resulting in an active cross-
pollination of ideas” (Birenbaum and Fix 1995, 33). Cleveland’s office burned in 1871, destroying his library and papers.

The only work of Cleveland’s available for study was Landscape Architecture, as applied to the Wants of the West, published in 1873. The book focused on Cleveland’s theory of town planning but does not contain diagrams or maps. Cleveland repeatedly decried the gridded road system, advocating instead a road layout that responded to natural topography. Cleveland did not describe any analysis techniques, but it seems that some sort of spatial analysis would be necessary to determine a proper road layout:

How can the streets be best adapted to the natural shape of the ground, so as to economize cost of construction, and attain ease of grade and facility of drainage; by taking advantage of the opportunities offered by nature to save expense of cutting and filling, while preserving the most desirable building sites in the best positions relative to the roads? (Cleveland 1873, 34)

Cleveland’s work may have provided a background for Manning’s ideas. It is known that Cleveland and Olmsted corresponded, and perhaps Olmsted passed Cleveland’s theories on to Manning.

Frank A. Waugh’s (1869-1943) background was in horticulture, and he founded the landscape gardening program at the Massachusetts Agricultural College (Zube 1986b). Waugh’s interests were in native plants, natural landscapes, and roadside plantings. In 1894, Waugh completed a master’s thesis that studied horticultural improvements to a college campus:

In it Waugh analyzed the grounds of the college starting with its physiographic conditions, such as soil, climate, and topography. He made recommendations for development of buildings, sewerage, drives, walks, lawns, and plantings and produced a plan drawing.

Waugh’s thesis resembles a typical landscape architecture problem solving technique, by today’s standards, of inventory, analysis, and design. (Dins 1997, 3-4).

It appears that Waugh was studying the same types of existing conditions that Manning would later publish as separate maps in his Billerica article, and that Eliot mapped in the same year (1894). Questions a) and c) are positive for Waugh’s work. The similarities are significant because while Waugh had a university education, Manning received only direct training; yet they
both appear to have used similar analysis methods. The similarities may have stemmed from
their mutual interests in ecology and native plants. Waugh and Manning both practiced in
Massachusetts, and were professionally affiliated through the ACA, though it is not known when
they met or how well they knew each other. In Land Planning in the United States for the City, State,
and Nation, Harloean James, secretary of the ACA and the Federated Societies on Planning and
Parks, mentions Waugh’s work in conjunction with Manning and others on the Town Sites on
Government Reclamation Projects report.

O.C. Simonds (1885-1931) was a landscape architect who practiced in the Midwest. Simonds
completed a civil engineering degree at the University of Michigan, and later initiated the
landscape design program there. He was one of the founders of ASLA and served as its president
in 1913. His projects included parks, cemeteries, estates, and campus design (Birnbaum and
Crowder 1993). Simonds’ work is similar to Olmsted’s in that he focused on design rather than
planning. There was no evidence found that Simonds used a spatial analysis method similar to
Manning’s. Simonds and Manning were both involved with ACA and ASLA, and shared an
interest in native plants, though they came from different regions and had different educations.

The last of the landscape architects named by Zube, Jens Jensen (1860-1953) was born in
Denmark and emigrated to the U. S. in 1884. He established his private practice in 1900, and is
best known for his prairie-style gardens and parks in the Midwest. There is no indication that
Jensen used any analysis techniques similar to Manning’s, and Jensen’s projects were generally
much smaller in scope that the planning work Manning was involved with. Manning and Jensen
did share an interest in the use of native plants.

Karl Loebmann, a professor of landscape architecture at the University of Illinois, published
Regional Planning in 1937. In the chapter titled “Planning in the States” he described the CHRP
report, a project by Manning, and the Michigan land economic survey (Manning’s project is
described in Chapter 4, p. 35; the Michigan survey is described in Geography, p.27). Copies of the
CHRP illustrations were included but there is no explanation of the methods. It is the only
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example of spatial analysis in the book, out of over 75 illustrations. In the chapter titled "Planning in the Nation" Lohmann mentions Manning's work but did not elaborate about it. He also described a project for the planning of St. Louis, and how the boundaries for that project were set:

In connection with that study, a radius of 35 miles was decided upon to fix the boundaries of the region, after taking into consideration the various regional territories, the areas fixed by the census, the postal service 2-cent rate area, the 5-cent telephone rate area, and the electricity rate area, all of which were plotted. (Lohmann 1927, 133).

No date or source was listed for this project, but it described the use of spatial analysis.

3.2 Spatial Analysis in Geography

The use of spatial analysis in the field of geography was studied because geographers study landscape components that are similar to what landscape architects study, including soil, slope, and vegetative cover. The difference between the professions is the purpose of the studies. Landscape architects typically study these components to make decisions about future development (a prescriptive model). Geographers study to understand why a place takes its current form (a descriptive model). An example of this similarity is found in Richard Hartshorne's "Location as a Factor in Geography." Hartshorne wrote about the locations of industry and manufacturing and correlated where things ought to go to go to where things naturally are (1927). He listed several factors that affect location that are similar to what could be map layers of a spatial analysis model. These factors are raw material, power and fuel, marketing, and labor.

Another example of the similarity between geography and landscape architecture is found in Carl Sauer's "The Morphology of Landscape." This essay is primarily concerned with defining a method to describe landscapes. Sauer described the components that comprise natural and cultural landscapes. These components also are similar to what would be found in a spatial analysis model, and include climate, land, sea and cost, vegetation, population, housing, production, and communication. Sauer stated: "The phenomena that make up an area are not
simply asserted but are associated, or interdependent” (Sauer 1925, 318). This interdependence is easily found with spatial analysis.

Several examples of spatial analysis in geography for the study’s time period (1888-1938) were identified during the preliminary literature review. Upon investigation, the original sources for these projects did not always produce evidence of spatial analysis, but were not studied further so that research time could be concentrated on landscape architects. Each project is described in this section, and include a land classification study of Michigan, the delineation of new boundaries after WWI, and TVA mapping. Original sources for each project were reviewed for details of spatial analysis use.

The land classification study is described in Barnes’ “Land Resource Inventory in Michigan”. The purpose of the survey was “...recording every fact that may have a bearing upon the utilization of the land...” but did not produce a plan or development recommendations (Barnes 1929, 24). The information studied for the survey included soils, topography, crops, base map information, land use, wildlife, surface geology, and a water power inventory. One of the article’s illustrations, a map of the natural districts of Kalkaska county (See Figure 3.6). “...is a composite of the soils, lay of the land, and cover maps made in the field, with the more closely associated types combined” (29). Question b) is positive for this project. This indicates that geographers were using spatial analysis.

The second project described in All Possible Worlds was the delineation of new boundaries following WWI. A group of geographers and other specialists was established to conceptualize new boundaries for the Peace Conference in late 1918.

...the principal subjects studied comprised political and diplomatic history, international law (including the geographical interpretation of problems of territorial waters, frontiers, and the like), economics with respect to both international and regional problems, economic and political geography, physiography in relation to strategic frontiers and topographic barriers, cartography, education (in colonial possessions, backward states, and regions of oppressed minorities), and irrigation. The cartographic work necessitated the preparation of ‘maps to illustrate every kind of distribution (emphasis mine)that bears on peace problems.’ (Wright 1952, 200).
It is possible that spatial analysis was used here, as multiple factors were considered in tandem and mapped in different combinations. Questions a), b) and d) are positive for this project.

The third geography project dealt with mapping by the Tennessee Valley Authority (TVA). The primary source for this project does not describe the mapping or analysis techniques used by the TVA.
Figure 3.1 Favorable Use Areas, New York
Epoch III
The possible state of the future in which each part serves its logical function in support of wholesome activity and good living.

Figure 3.2: Plan, New York
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Figure 3.4: Range in Land Values, Flint, Michigan
Figure 3.5: Plan of Reservation System, Massachusetts

Figure 3.6: Natural districts of Kankakee County, Michigan
CHAPTER 4

SURVEY OF MANNING'S PLANS

The thesis studied eleven of Manning's landscape planning projects. Appendix A lists each project, its client, date, the materials examined, and the present location of the materials. This chapter describes the scope of Manning's work for each project and describes the extent of spatial analysis. To determine if Manning used spatial analysis on a project, four questions were applied. They are:

a) Is there a separation of data layers?
b) Is there a plan showing the combination of several separate data layers?
c) Is there a plan derived from a and b?
d) Is there an explicit reference to spatial analysis in the text?

These are explained in more detail in Methodology (see p. 3). A positive answer to any of the four questions indicated that Manning was using spatial analysis on that project. A summary chart is found in Appendix D. This chapter is divided into three sections: City and Regional Plans, The National Plan, and Other Examples. A summary chart of Chapter Four's findings is Appendix D, page 78.

4.1 City and Regional Plans

The earliest plan studied was for Harrisburg, Pennsylvania, where Manning recommended establishing parks along the river front. In addition, he advised creating several playgrounds and a large rural park, and connecting park elements with a "pleasure road system" (Manning 1901, 3). The Harrisburg report goes on to discuss cost, legal provisions for parks, planting, and
implementation. The report is an early example of Manning's native planting recommendations. There are no maps or plans with this report, and Manning does not discuss his methods in the text. There is no evidence of spatial analysis in the Harrisburg plan.

Manning worked on a plan for Ithaca, New York from 1906-1907, and again in 1917. Among drawings in the ISU collection are regional scale plans showing the area around Cayuga Lake and small studies of in-town improvements. The regional-scale plans deal with proposed parks and a transportation system and denote streets, buildings, rivers, and railroads. The final products of this project appear to be a system of park reservations, roads, and trails, and a design for the Cayuga inlet within town. In the Ithaca project, there is no evidence of spatial analysis.

The Improvement of Madison, N. J. described Manning's work for that town in 1909. In it, Manning described the purpose of planning:

A town should have a comprehensive plan, not for complete realization at once, but in order that each step may be taken with intelligent reference to the end in view.

It costs little to get a good design or map, and acceptance of it involves no special outlay. It simply gives assurance that all the money that would normally be spent each year for improvements will now be spent with far sighted wisdom...We shall not have beautiful cities and towns until we realize that we must employ expert advice in planning them. They can be so planned that economy, convenience, comfort, healthfulness and beauty shall go hand in hand. (Manning 1909, 2)

The plan for Madison developed a park system that included two large reservations, a river shore line reservation, and a set of connecting parkway alternatives (See Figure 4.1). Manning recommended that roads follow topography, instead of a strict grid plan. He mentioned the benefits of a park system on property values, stated that parks should be controlled by non-politicians, and commented on sidewalk standards, street trees, street widths, and entrance improvements. There are no textual references to spatial analysis.

The Madison report included a plan that designated the proposed park system elements, topography (100’ c. 1), major streets, property owners, the Passaic River, and the railroad. Because there is only one plan, there is no separation of map layers, and it does not appear that the plan was derived from an overlay process. It is possible that some level of spatial analysis
occurred, because topography and existing infrastructure were considered, with parkways located along waterways and away from urban developments. However, this could have been done without spatial analysis.

In 1911, Manning prepared a plan of Bangor, Maine that addressed how the town should rebuild itself after a fire destroyed 55 acres of land (Steele 1911). The plan is summarized in 10 short recommendations, dealing with transportation, property acquisition, relocation of buildings, and construction of a dam. The recommendations are described in full after a description of Bangor. Following this are short sections on tax-free lands, the city plan, street terminals, street grades, and sewers. Included with the report is a bird's eye sketch of Bangor that depicts the central part of town.

The Bangor plan was profiled by Fletcher Steele in Landscape Architecture in October 1911. This article outlined the fire, town, and plan, and described how the Civic Improvement Commission got Manning's plan approved by Bangor citizens. It also included photographs, two plan drawings of existing and proposed conditions, the sketch from Manning's report, and a sketch of streetscape. The existing conditions map showed topography (10' c. i.), streets, the Kenduskeag stream, and major buildings (See Figure 4.2). The proposed conditions map showed new and old streets, new building locations, and a new bridge (See Figure 4.3). Steele's article stated that the plan was presented only 24 days after the fire. There are no references in either text to spatial analysis, nor do the drawings and sketches indicate that any took place. Given the urgency of the project, there probably was no time for extensive data collection or mapping. In addition, the plan's recommendations deal only with the town center, not the larger region surrounding Bangor.

Billerica, Massachusetts was the location of one of two "labor of love" projects of Manning's, the second being the National Plan. Neither appear to have had a paying client. Billerica was the location of the Manning Manse, Warren Manning's ancestral home. Manning began restoring the house in 1899, and later used it to display the collections of "artifacts, personal papers, and other
items important to the family genealogy" collected by the Manning Family Association (Conant 1984, 29). Manning aided in the establishment of the Billerica Improvement Association in 1902, and in 1914 worked on the Billerica Garden Suburb, a model of workers' housing (Conant 1984). Manning later completed similar projects for Goodyear Tire and Rubber Company and the Cleveland Cliffs Iron Works Company.

The Billerica project was purposely not paternalistic and was used as a model by the Massachusetts Homestead Commission... when it developed the first public housing project in the United States in Lowell in 1917 (Conant 1984, 33).

Manning began working on a plan for Billerica, Massachusetts probably around 1906 (date estimated from project number), and The Billerica Town Plan was published in 1913. This article first described the existing condition of Billerica, and then the legal conditions for planning and construction. In the conclusion, Manning described how the Billerica magazine was established, and how plans such as this one could be presented to the public for approval. The Billerica plan is the first example of what is considered to be Manning’s analysis technique. There clearly is a separation of map layers, as well as a textual reference to spatial analysis:

An examination of the soil map, in conjunction with the topography, will show that only the wet, black-soil sections have boundaries that are easily recognized, and such areas are indicated on the soil map. (Manning 1913, 112)

There is no map combining the separate existing conditions maps, but the plan with proposed changes does take the different data layers into consideration (See Figures 4.4, 4.5, and 4.6). Suggested parks and parkways generally fall into areas with poor soils—areas that are not suitable for crops. Questions a), c), and d) are positive for Billerica.

About the time Manning published the Billerica study, he was also working on a project for Mackinaw Island, Michigan. The ISU collection contains three drawings from this project, but there is no indication of the scope of the project. The three drawings each show the entire island and some combination of existing conditions. These drawings do not represent a separation of map layers, and there is no plan of proposed conditions, nor any text associated with this project. No spatial analysis is seen for Mackinaw Island (See Figure 4.7).
Six years after Billerica and Mackinaw Island, Manning completed a plan for Birmingham, Alabama, and published it as a book. The book "...resembled the books produced by the various arts and crafts presses in this country" (Neckar 1989). Both Conant and Neckar cite the Birmingham plan as one of Manning's finest plans. In Neckar's words: "Fundamentally, the plan was the fully-conceived idea of an inventory of existing resources on a regional scale out of which would grow recommendations for a better community" (86). Conant points to Manning's final sentence as expressing his planning philosophy: "The conception and execution of this city plan must come largely through the generosity and public spiritedness of the people" (Manning 1919, 47). Manning went on to prepare detailed site plans for at least one development in Birmingham (Morris 1997).

In Warren H. Manning's City Plan of Birmingham, Manning first described Birmingham, its location, population, and government, and how it related to other U. S. cities. Following this were several sections where Manning described the present and future conditions of various resources. Manning used graphs and maps to describe the information and compare Birmingham to other cities. The book also contained articles written by local community leaders, several sheets of plans, and an aerial perspective of Manning's final recommendations.

The text does not include references to spatial analysis, but there is a separation of data layers and a plan that is derived from the combination of data layers (See Figures 4.8 4.9). Questions a) and c) are positive for this project. Birmingham was typical of Manning's work because it illustrated Manning's concern for natural systems. He recommended reservations along waterway edges and does not prepare an arbitrary city form that was imposed on the land. Instead, Manning worked with natural topography and fitted new developments into the land.

The next project studied was the Hudson-Mohawk Regional Planning project, completed around 1917. The ISU collection contains two sets of drawings, each illustrating existing conditions, but there is no indication of the scope of this project. One set of drawings denotes topography and the river edge, and the other set denotes streams, railroad lines, topographic
hachures, and towns. There is no separation of map layers and no indication of spatial analysis on this project.

An article Manning wrote about the Hudson-Mohawk thoroughfare shed light on the purpose of this project (Manning 1917). Manning proposed a highway and reservation plan in the Hudson and Mohawk valleys, to connect New York City with Albany and Buffalo. He described the need for such a thoroughfare, encompassing auto roads, railroads, canals, and airports, and noted the importance of industry on trunk lines. He argued for attractive buildings, good views, and fewer billboards. Manning concluded by illustrating and describing the architectural beauty of industrial buildings. The article did not include plans, except a small map of New York, and did not mention spatial analysis. Manning did not discuss how to locate the thoroughfare.

Manning worked on a plan for Athens, Georgia from 1924-1925. The ISU collection contains almost 200 drawings from this project, ranging from data collection to final plans. Eighteen final drawings were studied for the thesis. The project developed zoning (use districts), roads, parkways, trails, and recreation areas for Athens. Next to Birmingham, Athens is the most comprehensive plan that was studied. Each of the eighteen final sheets for Athens had the title block and base map information printed on the back side of the linen. Each sheet represented a different combination of existing and proposed elements. Manning probably used the different combinations to illustrate the relationships between the existing conditions and his design recommendations. There is no text associated with this project. The drawings do not represent a separation of map layers, but it is clear from the sheet titles that there were separate layers at one time, that they were combined, and that spatial analysis was used to complete the plan (See Appendix A, p. 69). Questions a), b), and c) were positive for Athens.

The final regional plan examined was for Michigan's Upper Peninsula. In 1930-31, Manning prepared thirteen maps of the peninsula as part of a land use study, each depicting a landscape component (See Figures 4.10, 4.11). None of the thirteen sheets included plans or recommendations developed by Manning. In "Michigan as a Field for Large-Scale State
planning," Manning wrote of the importance of Michigan with respect to cross-continental travel (1929). Manning emphasized the need to set aside land along highways for scenic and environmental values. He mentioned the Upper Peninsula as being centrally located on the continent, and therefore very important. This article was written before the project was completed, so there is no reference in the text to this project. The sheets examined are an example of separate map layers, but there is no plan derived from the data. Question a) is positive for the Upper Peninsula project.

4.2 The National Plan

The largest plan Manning worked on was his plan for the United States, completed between 1910 and 1923. Comprehensive in scope, Manning’s work on this project proceeded without a client, and also coincided with a world war and a subsequent downturn in the economy. The late 1910s and early 1920s were the worst years financially for Manning’s firm, causing him to lay off employees, incorporate the firm, and move his office from Billerica to Cambridge (Conant 1984).

Manning’s 578 page plan was never published, but several articles about the plan were printed in major newspapers and magazines. The most comprehensive of these is “A National Plan Study Brief,” published in Landscape Architecture. The national plan was one of Manning’s greatest achievements, and he treated it accordingly:

In the late spring (of 1917) he wrote his wife that he was embarking on a “flying trip…to gain data to carry out a long-thought-out plan that I hope may be accepted as the most important thing I have done in my life” (Conant 1984, 35).

Conant describes how the plan was received by the federal government:

Secretary of the Interior Franklin K. Lane received a copy of the plan and promptly appointed a committee to study and report back to him on it. The committee, though not favorable to many of Manning’s recommendations in the plan, did find the work worthy of investigation. One reviewer disagreed with a suggestion for changing state boundaries to conform with watershed boundaries; while another, the head of the United States Geological Survey, found the plan too similar to what John Wesley Powell had done when surveying the geology of the western United States in the nineteenth century. (1984, 35).
An article Manning wrote for *The New York Times* described all of the data that should be assembled and analyzed for good national planning and transportation design. These data include:

...topography, climate, water, forest, soil, air, transportation, all underground and above ground conditions, creative and human resources, in order that we may co-ordinate and more intelligently deal with this dominant problem of transportation and other problems inter-related. Then with such knowledge assembled, we can classify all our lands and resources, estimate their ultimate yields, plan major transportation lines to care for the yields, acquire right-of-way holdings for such lines to be developed as they are needed, and undertake wisely regional and city planning so as to provide the necessary feed lines from district and town to the main lines (Manning 1921, 4xx). This also set forth the need for some kind of spatial analysis – simply to handle the massive amounts of data needed for good national planning.

Manning also wrote a series of three articles for the *Chicago Daily News* in December of 1921 and January of 1922. In the first article, “To Help a City Grow,” Manning focused on the need for a national plan. He stated his vision of a world-wide transportation system (complete with the ability to “...carry passengers...under the channel to England...”), and the effects this would have on Chicago. He described two objectives of a national plan: locating highways along the paths of least resistance, and establishing the boundaries of lands with special conditions. The second article, “Chicago and Illinois,” focused on the state and Chicago’s role in it. This article also contained some unusual ideas:

...it is quite feasible to divert the Mississippi river to the lakes and to distribute in this manner its flood waters over much of that great Mississippi valley territory that lies enough below the great lakes to make it possible to irrigate it by gravity from Lake Michigan. This is no bigger dream than was the Panama Canal or the St. Lawrence waterway. (Manning 1921c, 8)

Manning also proposed a canal from Chicago east to Lake Erie. The third article, “Chicago as the Hub,” discussed the need for a plan of Chicago to deal with traffic congestion.

“A National Plan Study Brief,” published in 1923, described the United States’ resources and the issues facing them. After describing the status of elements such as forest, minerals, power, and transportation, Manning discussed the maps that should be created for a national planning effort.
There are maps of climate, fauna, flora, crops, population, transportation, soils, mines, fuels, telegraph, telephone, finance, industries, and many other factors that must be assembled to take their place in the study to determine the relation of each to the other, and to lay down the big dominant units that will be the main factors in the continental subdivision uses and inter-communication plans. (Manning 1923, 19-20)

The phrase "to determine the relation of each to the other" suggests that Manning was using spatial analysis.

Manning's *A National Pan* covers all the material of the brief, but in more detail. Much of the 378 page plan was descriptive, detailing the status of resources including land, forest, minerals, power, water, air, population, and scenic and recreation resources. Manning advocated more detailed and complete map coverage for the country in the following areas: topography, soils, minerals, surface water, ground water, vegetation, rainfall, humidity, temperature, air movements (Manning n.d., 22). He described the land units that should be mapped:

...deserts, bad lands, dry farming lands, irrigated or irrigable (sic) lands, fresh water swamps, salt water marshes, basins where water can best be stored for domestic (sic) use, irrigation, power, or for its beauty in scenery; grazing lands, areas suitable for such big field crops as corn, wheat, and cotton; for orchards and for market gardens; for permanent and temporary forests and for the scenic and historic areas to be held for their interest and beauty in public reservations; land for new towns and the extension of towns; for bird and game sanctuaries and especially for transportation lines to serve all these areas adequately.

*The new investigations should include a record of the modifications in the physical condition of our land...*(Manning n.d., 25)

Manning criticized short-sighted planning and advocated a larger, regional-scale outlook.

...the early plans considered the city merely as a unit in itself and its problems only as limited to certain streets or districts, rather than as a part in the growth of the whole region round about and related to other cities and towns of that part of the state.

*There must come first the classification of the land into the larger areas best suited to different uses that I am advocating for the nation.* (Manning n.d., 60)

He criticized L'Enfant's plan of DC: "It was not a plan made to fit the land, but it assumed that the land would be made to fit the plan" (Manning n.d., 257). This echoed Olmsted's thoughts on the same subject:

*In relating Olmsted's criticism of an early plan for Washington, DC, Manning emphasized in his journal that Olmsted found "No great plan of the whole & of course no connection between the various parts."* (Conant 1984, 25).
Manning concluded *A National Plan* with a map of new state boundaries, and plans for each of the new states, recommending locations of industries, agricultural crops, and recreation areas.

In the introduction, Manning summarized his work:

Three Maps Sum Up This National Plan Study.

**CROP REGIONS**

showing the horticultural regions of our whole country according to soil character and crops grown.

**TRANSPORTATION AND RECREATION MAP**

The Re-creation districts include the greatest Scenic and Re-creation values.

The Re-creation Ways follow the direct lines of greatest beauty through the most distinctive landscapes.

Within the Urban Areas conditions are most favorable for industries, trade and traffic and the greatest population centers.

The Rural Areas are the big land units that will give the greatest crop yields in all lands of the East and in irrigated lands of the West.

The Transportation Tracks are the direct transcontinental lines of least resistance between traffic centers and terminals.

**NEW BOUNDARIES FOR STATES**

This study includes within States complete stream basins to control the waters, reservoirs, and resources thereof. (Manning n.d., 4).

(See Figures 4.12, 4.13, and 4.14)

The third map, “New Boundaries for States,” (Figure 4.14) depicted Manning’s idea to redraw state lines so that each state would control its own water:

No title to streams, or soil covered by them, was conferred to the Federal Government. It therefore rests in each state. Each state can with-hold and use the waters within its boundaries to the injury of those states below; the state that contains the upper part of a river has the advantage over those below. Interstate streams are thus controlled by civil state bounds. This is illogical and unjust, and greatly retards the modern uses of streams for irrigation, drainage, waterpower, and domestic supply. Further, a state has no redress if the streams enter the state polluted. The boundaries of an interstate stream should be natural not civil. From source to mouth there should be one jurisdiction either state or federal. (Manning n.d., 273)

In the National Plan, there is a separation of map layers, as seen in both the brief and the complete plan (Question a). Manning completed over 100 maps as part of the plan (See Figures 4.15, 4.16). The crop regions map represents a map that was derived from several separate maps (Question b). The transportation/recreation and new boundaries maps are designed plans that
could not have been produced without spatial analysis (Question c). There are also textual references to spatial analysis in both the brief and the complete plan (Question d).

We need to determine the land, the industries, and the citizens that can be associated to produce the best results (Manning n.d., 21)

The National Plan represents the most comprehensive use of spatial analysis by Manning.

Near the end of the plan, Manning stated the usefulness of the plan:

So the National Plan at present considers the best development of our resources of soil, water, minerals and landscapes that we may make the best use of them today and still save them for the future; mark off on our land the areas best suited to every human need from food to scenery, providing these for our increasing population; and planning traffic ways of all kinds to link these areas together for their best development. These plans and notes then are but a beginning, showing how we must start, how the work must be undertaken by all of us together, rather than leave all in the hands of our changing executive officers, however wise they be.

Since we all of us rule the nation we must know what we need, and study ways of getting it, that we may direct our Government. Our President has no policy save to carry out the will of the people To will we must know. (Manning n.d., 289)

4.3 Other Examples of Manning’s Work

In 1906 Manning designed the new town of Gwinn, Michigan for Cleveland Cliffs Iron Company. It is an example of a workers’ housing project (Neckar 1989).

In 1906, he was commissioned to lay out Gwinn, the first planned community on the Marquette Iron Range of Michigan, and the first in a series of town plans executed by Manning which emphasized industrial housing in the context of environmental planning. The simple gridiron plan executed for a town in the northwoods of Michigan belies the extensive inventory of site characteristics undertaken by Manning and his firm. Careful attention was devoted to infrastructure and community facilities planning, and over eight percent of the construction budget was devoted to open space improvements (Neckar 1989, 83).

Additional sources for Gwinn were not located. Neckar’s description indicates that spatial analysis was used. If so, this would be the earliest example of spatial analysis in Manning’s work.

Karl Lohmann’s Regional Planning textbook was published in 1937, and its contents are described in Chapter Three (see page 18). A project by Manning is included as an example of state planning, and is described thus:

As early as 1914 the results of a comprehensive state regional study by Warren H. Manning were displayed in the agricultural building of the Panama Pacific Exhibition in San Francisco. The display took the form largely of two models — one a portrait of the state of
Massachusetts as it was and the other a portrait of the state as it might be. The second was intended as a guide to the more complete development of the state's resources. It showed by comparison with the first model how unscientifically affairs were being conducted, how woods were allowed to grow on soils that should have been tilled or pastured, how the possibilities of swamps were being ignored, how water was being allowed to flow away instead of being controlled for energy and irrigation, and how transportation by highway and rail might be better systematized (Lobban 1957, 120).

There is no citation for this description. Manning describes the same project within A National Plan:

The first state plans were made by my office for the Massachusetts Panama Pacific Exhibit in several departments on two relief maps and several flat maps showing existing surface conditions, vegetation, transportation, asylums, and large land holdings. One plan outlined the big natural land subdivisions with recommendation for a plan and economic data and diagrams (Manning n.d., 266).

Additional sources for this project were not located. From the two descriptions, it appears that there were sparse map layers (a) and a plan derived from them (c).

A quick survey was made of other towns, similar in size to Billerica, that Manning did planning work for. These included Dedham, Chelmsford, and Reading, MA, and Reading, PA.

Calls to the Planning Boards and Historians: Commissions of these towns did not result in any useful information. Plans exist for a project on Jamestown Island, VA, but they could not be obtained. A description of these plans is:

There is also a study, 1907, for road and monument locations on Jamestown Island, prepared for the Association for the Preservation of Virginia Antiquities by Warren H. Manning. Also include a plan, 1900, for excavation and revetment of the island; drawing, ca. 1903, of building foundations discovered on the “third ridge” of the island; overfly, n.d. of Count de Rochambeau’s 1781 map of the Jamestown vicinity... (WorldCat 1999)

Transactions of the American Society of Landscape Architects contains plans Manning prepared for a Jamestown Exposition (1906). These include small drawings of ten different American city exhibitions at the same scale, for use in comparison to Jamestown.

In The History of Village Improvement, Manning described how attitudes toward landscape amenities have changed since the earliest colonial settlements. He described trends to establish street trees, parks, school gardens, and improve home sites, and wrote the report to advocate public activity. Manning did not discuss spatial analysis as a design tool, but did comment on the
gridded road system in the western United States: "...were then and are now destroying great beauty at unnecessary cost" (Manning 1914, 6). This echoed Cleveland's thoughts in Landscape architecture as applied to the wants of the west. Implicit in this statement was the need for an analysis method that could consider factors such as topography, hydrology, vegetation, and scenic values in tandem.

Town Sites on Government Reclamation Projects, completed with several others, was a report produced for the ACA. The committee's final recommendations included looking at local topography and vernacular styles, and stated the need for good data collection and analysis to plan new towns. "...we feel that no one can give sound detailed advice without a personal acquaintance with the local conditions and with the individual requirements of each problem." (Manning 1914, 118). The general recommendations were: business center on the main lines of transportation; park for business center inadvisable; park for social and administration center advisable; continuity of travel lines; neighborhood playground reservations and school sites; width of streets; lot lines; outlying roads; and individuality of towns:

...every suggestion and excuse for local differentiation should be welcomed and followed so far as possible...without regard to the purely theoretical and esthetic aspects which the conception of standardized patterns presents to many minds...urge the great importance of laying out a convenient system of country roads that is not necessarily made to conform to section lines (Manning 1914, 122).
Figure 4.2: Plan of Bangor, Maine, before 1911 fire

Figure 4.3: Plan of Bangor, Maine
Figure 4.4: Soil Map, Billerica, Massachusetts

Figure 4.5: Topography Map, Billerica, Massachusetts
Figure 4.6: Suggested Reservation and Road Extension System, Billerica, Massachusetts.
Figure 4.8: Business and Residential Districts, Birmingham, Alabama
Figure 4.10: Wild Land and Cleared Land, Upper Peninsula, Michigan

Figure 4.11: Highway and Trail Map, Upper Peninsula, Michigan
Figure 4.12 Crop Regions, United States

Figure 4.13 Transportation and Recreation Plan, United States.
Figure 4.14: New Boundaries for States, United States

Figure 4.15: Soils in Relation to Agriculture, United States
Figure 4.16: Density of Forests in 1880, United States
CHAPTER 5

DISCUSSION AND CONCLUSIONS

Chapter Two, "The Forces that Shaped Warren Manning's Career," revealed that Warren Manning received his education through experiences at his father's nursery and during his employment with Frederick Law Olmsted. Manning was interested in horticulture from an early age and became an expert plantsman. The major influences on Manning's theory and methods were his knowledge of plants and a constant exposure to other practitioners through collaborations and professional organizations. His frequent travels to projects and his activities with the American Society of Landscape Architects and the American Civic Association ensured that Manning was constantly exposed to other people and new ideas. Manning had personal and professional ties to many past and future leaders of the landscape architecture profession. When Manning left Olmsted's office, Olmsted helped set up Manning's business, establishing Manning's reputation and status. Manning's practice differed from others' of that era because he completed a wide breadth of project types, encompassing estate design for wealthy families as well as community projects and city plans for citizen groups. Manning's estate design work was successful enough to allow him to work pro bono on projects for Billerica, Massachusetts and a plan for the United States.

Chapter Three, "Overview of Spatial Analysis Use During Manning's Career," found evidence that spatial analysis was being used by other landscape architects and planners during Manning's career. The survey of other users also further established the ties between Manning and others who were at the forefront of landscape architecture. Charles Eliot may have used
spatial analysis during his work with the Boston Metropolitan Park System in 1984. In the same year, Frank Waugh completed a master’s thesis that may also have used spatial analysis. John Nolte’s work for Akron, Ohio and Flint, Michigan in 1919-20 contains spatial analysis similar to Manning’s. Multiple geography projects in 1918-1929 utilized spatial analysis. The New York State Commission of Housing and Regional Planning (CHR) published a clear example of spatial analysis for the state of New York in 1926. Finally, Benton MacKaye used a simple form of overlay analysis on a project for Massachusetts in 1928. There were other notable landscape architects who did not appear to use spatial analysis. The research did not uncover evidence that Humphry Repton, Sir Patrick Geddes, Frederick L. Olmsted, H. W. S. Cleveland, Jens Jensen, or O. C. Simonds were using this spatial analysis technique.

Chapter Four, “Survey of Manning’s Plans”, found evidence that Manning used spatial analysis on projects other than those he published, and that he tended to use it more toward the end of his career than at the beginning. A summary chart of Chapter Four’s findings is located in Appendix D (p. 76). No spatial analysis was found for Manning’s projects for Harrisburg, Pennsylvania, 1901; Ithaca, New York, 1906-8; Madison, New Jersey, 1909; Bangor, Maine, 1911; Mackinaw Island, Michigan, 1913; or Hudson-Mohawk, New York, 1917. Manning’s work for Billerica, Massachusetts, completed between 1906-13, showed evidence of a separation of map layers, a plan derived from their combination, and a textual reference to spatial analysis. A project for Birmingham, Alabama, 1919, showed evidence of a separation of map layers and a plan derived from their combination. A National Plan, completed between 1910-23, showed evidence of a separation of map layers, a combination map, a plan derived from the combination of separate map layers, and textual references to spatial analysis. A project for Athens, Georgia, 1924-25, contained evidence of a separation of map layers, a combination map, and a plan derived from the combination of separate map layers. Finally, a project for Michigan’s Upper Peninsula, 1930-31, showed a separation of map layers.
General trends can be identified based on the survey of Manning's work. First, Manning's analysis got progressively more complex as he became more experienced. Projects near the end of Manning's career have detailed analysis, while his work for Harrisburg is relatively simple. Complexity increased in terms of amount of text, scope of work, and number of map layers produced. This may indicate that Manning relied less on direct observation to gather data as his career progressed. It may also be that Manning received more complex commissions as time went on. Another trend identified is that WWI does not seem to have affected Manning's analysis techniques, because there are no significant changes before and after 1920. Third, Manning's analysis technique and design style did not change with geography. Manning's basic recommendations are similar for all projects, regardless of the site, climate, or geographic location. There were no differences seen between northern and southern towns. Comparisons between urban and rural sites could not be made because most of the towns studied were rural in nature at that time. Finally, when compared to the town plans, A National Plan contained a much more detailed study of agriculture, and was more detailed in all respects. A National Plan does not appear to be typical of Manning's analysis technique.

5.1 Discussion

Both hypotheses were found to be true. Hypothesis 1, that Manning used overlays as a spatial analysis technique for projects other than Billerica and the United States, and this technique was not significantly altered during his career, was found to be true, based on the survey of Manning's plans. There is evidence that Manning used spatial analysis on the projects for Michigan's Upper Peninsula, Birmingham, AL, and Athens, GA as well as Billerica and the National Plan. There does not appear to be any changes in Manning's methods over time, except that his work for the U.S. National Plan was the most comprehensive project completed.

Hypothesis 2, that others were also using the technique at the same time, was also found to be true, based on a preliminary survey of other practitioners. The most compelling evidence was the
work of the New York State CHRP in 1926, thirteen years after Manning’s Billerica article was
published. All of these examples were easily found, suggesting that spatial analysis was
commonly used in the profession at that time, and that other examples probably exist. However,
research did not uncover any written descriptions of spatial analysis or how to perform it. It is
possible that many people already had knowledge of this spatial analysis technique, or they were
not impressed when they saw examples of it. Spatial analysis was used by landscape architects
who were educated both at universities and through an apprenticeship process. This indicated
that spatial analysis could have been a commonly used practice. Alternatively, it could be that
whoever developed this method of analysis never documented it. It is also possible that spatial
analysis was not used by anyone but those surveyed here. Because the research relied on an
incomplete historical record, it is not possible to determine exactly how this spatial analysis
technique evolved.

The research did not establish who initially developed this spatial analysis method that
continues to be used today. Manning’s role in the development of early spatial analysis
techniques remains large because examples of his work and methods were published in the
profession’s sole periodical, Landscape Architecture Quarterly. The work of other landscape
architects was not accessible to other designers of the time or to historians today. Without further
research, Manning’s role remains the same as established by Steinitz, Parker, and Jordan in 1976.
Manning’s work for Billerica, MA is the first documented use of spatial analysis, although there
seems to be evidence that Eliot and/or Waugh’s spatial analysis work may have predated
Manning’s.

Part of the significance of the study to contemporary practice is that it demonstrated the
lasting influence of published articles. Manning’s legacy occurred solely because of the work he
published in Landscape Architecture Quarterly. The study also demonstrated the benefits of
communicating with one’s peers. Manning and his peers were able to share their thoughts and
ideas, learning from each other, yet still prosper professionally. Finally, the thesis underscored
the link between today's environmental tradition and our design methodology, as described in Zube 1986b. Manning is known both for his analysis method and his interest in native plants and ecology, and it is likely that the two interests influenced each other. It is possible that Manning's study of plants and natural ecology systems taught him also about the relationships between topography, vegetation, hydrology, and habitats. If Manning understood these relationships to begin with, perhaps he used the graphic analysis as a method of teaching others about them, or to find the relationships when he had to rely on maps as a data source.

5.2 Self-evaluation

The primary criticism of the thesis is that it studied too few projects to make a reliable judgment. The number of Manning's projects studied was determined solely by their availability. A total of eleven plans were obtained. From a complete client list in the ISU collection, a list of Manning's planning projects was compiled (Appendix B). This list included all clients that were listed as a town or region name, rather than an individual's name. It is not known what the scope of work was for each of these clients, and could have ranged from a park design to a comprehensive plan. Sixty clients are listed, and the projects that were studied represent 18% of this total. The results of the thesis are affected by the small sample size. Without a review of the other plans, no conclusions can be drawn about how the results are affected. In addition, the projects studied were not necessarily of a large enough scale and scope to have warranted intensive data collection spatial analysis.

Another criticism deals with the methodology. It may not be possible to tell from looking at a plan whether Manning used spatial analysis. On many projects, Manning located park reservations along existing waterways. This may be the result of an analysis of the landscape components, but it also may not be derived from any analysis. Even though a park may coincide with poor soil and forests, and parkways follow cleared areas, these relationships weren't necessarily found through spatial analysis. Manning could have believed that parks should
follow waterways universally. However, because of Manning's comments in *A National Plan, The History of Village Improvement*, and "Town Sites on Government Reclamation Projects," this does not seem to be true. In these documents, Manning advocated site-specific analyses for every project and did not believe in applying design recommendations universally.

If the thesis were to be repeated, the major change would occur in data collection. Research of the University of Massachusetts at Lowell collection of Manning's papers would be added to see if Manning referred to spatial analysis or the reviewed projects in his personal writings. This research would also include looking at any drawings in the collection, including original plans for Billerica. Additionally, more effort would be made to get copies of the large drawings at ISU.

The thesis has several benefits. First, it began to clarify the historical record with regard to the beginnings of GIS and landscape planning, and adds more detail for the time period studied. It also focused attention on Manning, who is underrepresented in landscape architecture literature. The thesis provided additional knowledge of landscape planning techniques. While technology may be different, the techniques are still useful for projects in contemporary practice. Finally, the thesis identified three areas of potential future research:

1. Investigate Elliot and Waugh's work from 1894 and the other examples of Manning's work identified in Chapter Four. A more detailed study of the Boston Metropolitan Park System plans and Waugh's master's thesis may yield evidence that Elliot and/or Waugh were using spatial analysis several years before Manning's Billerica project. This is important because it would document these early examples. This thesis only identified the possibility that these projects might contain spatial analysis. This research could also include study of all projects that Manning and Elliot worked on together, to investigate whether there is a pattern of use for analysis. Research of Manning's projects for Gwinn, Michigan, the state of Massachusetts, and Jamestown Island, Virginia would complete study of all of Manning's projects known to still exist.

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2. A study of the links between the professions of agriculture, horticulture, geography, and landscape architecture. What is the extent of the 'cross-fertilization' that might have occurred as the landscape architecture profession was beginning, and how did it occur? Because there was no program in landscape architecture until 1900, many early landscape architects were initially trained in one of these other disciplines. The roots of the spatial analysis technique may be in one of these related fields. This future research would also help to clarify what the origins of landscape architecture's body of knowledge are. Specifically, which ideas and theories came from these other fields and which were new inventions of landscape architects?

3. After historical research like this thesis, it may be useful to look forward and speculate on future trends. Today, society has caught up with some of Manning's innovative ideas, including the automobile route underneath the English Channel. Can landscape architects go forward from Manning's work in terms of analysis techniques? Is Manning's spatial analysis technique still adequate for planning projects? If not, how should our analysis techniques change? How will the increased amount of information available to all people, and the increased technical expertise of younger generations on computers, affect design methodologies? Will new methods be adaptations of Manning's technique, or different methods altogether? Will the public continue to be satisfied with what landscape architects can create with GIS? If anyone in the world can download public maps, a satellite image, and a GIS program, and do their own site analysis, what will landscape architects offer that justifies their professional services? In addition, there does not appear to be a wide use of GIS today by landscape architects. If true, then how are they accomplishing site analysis and spatial analysis?
GLOSSARY

Cartographic Model: A set of map layers depicting landscape components, that contain both explicit and implicit information. The implicit information is retrieved through analysis of "the spatial and logical relationships among those data that are recorded and in the meanings attributed to them" (Tomlin 1990, 4). Each map layer is drawn to the same scale and projection and covers the same geographic area.

Contour: a line connecting points of equal elevation (Burrough 1986).

Descriptive model: A model that will "...attempt to describe in geographic terms 'what is' or perhaps 'what should be'" (Tomlin 1990, 168). In the thesis, the work of geographers is seen as descriptive modeling.

Environmental Planning: Planning for the intelligent management and use of land areas to assure proper habitat for people, plants, animals, and the resources upon which they depend (Morrow 1987).

Geographic Information System: A digital, or computerized, cartographic model.

Hydrology: The system of rivers, lakes, streams, and other waterways in an area.

Landscape Components: The set of elements that, together, comprise a landscape. The components may include, but are not limited to, topography, hydrology, existing buildings, vegetation, land use, transportation networks, and population and demographics.

Landscape Planning: A continuing process that strives to make the best use for mankind of the limited areas of the earth's surface while conserving its productivity and beauty. Adapted from the International Union for Conservation of Nature and Natural Resources (Vanicek 1974).
Regional planning and ecological planning were equated with landscape planning for the thesis.

Map, Map Layer: A single sheet showing the existing or potential conditions (i.e. landscape components) of a given geographic area. One of a set of map layers that make up a cartographic model. A map layer shows the distribution of a single variable or landscape component across a geographic area.

Overlay Analysis: A process where map layers are created on transparent paper, and are overlaid upon each other for analysis. A tool, such as a pinbar, may be used to keep the sheets in constant relation to one another. When the map layers are overlaid, a landscape planner can find areas where multiple landscape components coincide, repeatedly, without having to draw new maps for each combination of variables.

The least complex level of this type of overlay analysis is to let one variable dominate over the others. For example, letting roads dominate over water, in the case where they intersect. More complex analyses include combinations of potential conditions, giving additional weight to certain variables, and studies of proximity to a specific place or resource. Overlays can also be used as a drafting convenience, without analysis. Separate map layers keep each layer neater and cleaner than if all landscape components were mapped on a single sheet. Separate map layers also enable the use of color printing. Each map layer can be printed in a different color, resulting in a multi-colored final product.

Plan: A product of spatial analysis; also, the product of a prescriptive model. A plan is derived from analysis of map layers and depicts the author's recommendations for future development. A plan may include maps, drawings, and/or text.

Prescriptive model: A model that attempts to discern "...what should be," moving from the descriptive to a more prescriptive intent" (Tomlin 1990, 168).

Scale: The relation between the size of an object on a map and its size in the real world (Burrough 1986).
Spatial Analysis: A broad term for overlay analysis. Spatial analysis implies that map layers do not have to be physically overlaid for analysis of a cartographic model to occur.

Topography: The detailed mapping or charting of the features of a relatively small area, district or locality; the relief features or surface configuration of an area (Random House Dictionary of the English Language. 1987. 2d ed., s. v. "topography"). Topography may include slopes, valleys, ridges, and knolls, and may be caused by geology, erosion, or drainage patterns. It is the pattern of landforms of an area.

WorldCat: WorldCat is produced by OCLC Online Computer Library Center, Inc. WorldCat consists of over 35 million records that cite material owned by libraries around the world. Books, magazines, recordings; virtually any type of material cataloged by OCLC member libraries is included. WorldCat is updated daily (On-line description, November 1996).
APPENDIX A

PROJECT INFORMATION

Location: Hertelburg, Pennsylvania
Client: Hertelburg League for Municipal Improvements
Date: September 10, 1901
Obtained from: University of Minnesota
Project #: N/A

Contents: Report on a Park System for Hertelburg, Pennsylvania. The copy is a carbon copy of a typed original and is bound with The Awakening of Hertelburg by J. Herse McFarland. Manning's report is 72 pages, with a 1/3 page cost estimate of recommended land purchases and construction.

Titles of sheets: There are no maps or diagrams with this report.

Location: Ithaca, New York
Client: unknown
Date: 1906-1908 (large studies), and 1917 (final proposed improvements)
Obtained from: Iowa State University
Project #: 646
Contents: SU has over 80 drawings

Titles of sheets: Survey sheets existing conditions
Final plans for Cayuga Inlet
Street planting plans
A study showing the relation of a proposed Ithaca Road and reservation system to the Glen Region of Cayuga and Seneca Lakes with suggested reservations and road extensions
A study for a road and path reservation to include and make accessible pine groves, falls, steep wooded slopes, and shores, too steep for agricultural or building purposes, but having great natural beauty.

Location: Madison, New Jersey
Client: Highway, Park, and Playground Committee of the Madison Civic Association
Date: 1946
Obtained from: University of Michigan
Project #: 777


Plans studied: One plan of town, showing proposed reservations and parkways
<table>
<thead>
<tr>
<th>Location:</th>
<th>Bangor, Maine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Client:</td>
<td>Civic Improvement Committee</td>
</tr>
<tr>
<td>Date:</td>
<td>May 1951</td>
</tr>
<tr>
<td>Obtained from:</td>
<td>Maine State Library</td>
</tr>
<tr>
<td>Project #:</td>
<td>900</td>
</tr>
</tbody>
</table>
| Contents:                | Bangor City Plan - The Burned District, 16 printed pages  
                          | "An Emergency Report for Bangor, Maine," by Fletcher Steele. |
| Plans studied:           | One bird's eye perspective is included; no other plans are in the report.  
                          | Steele's article includes:  
                          | Existing Conditions before April 30, 1911 fire  
                          | Proposed Conditions  
                          | Bird's eye sketch  
                          | Norumbega Hall - view of proposed public walk through the old post office area  
                          | Norumbega hall site from Kenduskeag bridge |

<table>
<thead>
<tr>
<th>Location:</th>
<th>Billerica, Massachusetts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Client:</td>
<td>none</td>
</tr>
<tr>
<td>Date:</td>
<td>April 1913; work was probably begun around 1906</td>
</tr>
<tr>
<td>Obtained from:</td>
<td>Landscape Architecture</td>
</tr>
<tr>
<td>Project #:</td>
<td>540</td>
</tr>
<tr>
<td>Contents:</td>
<td>The Billerica Town Plan</td>
</tr>
</tbody>
</table>
| Plans studied:           | Map of Billerica, with Local Names  
                          | Map indicating Topography  
                          | Map showing Recent Subdivisions...and also Showing the Suggested Reservation  
                          | and Road Extension System and the Existing Public Reservation  
                          | General Soil Map  
                          | Forest Map |

<table>
<thead>
<tr>
<th>Location:</th>
<th>Mackinaw Island, Michigan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Client:</td>
<td>Mackinaw Island State Park Commission</td>
</tr>
<tr>
<td>Date:</td>
<td>1913</td>
</tr>
<tr>
<td>Obtained from:</td>
<td>Iowa State University</td>
</tr>
<tr>
<td>Project #:</td>
<td>1028</td>
</tr>
<tr>
<td>Contents:</td>
<td>Three drawings in the ISU collection: blueprints and buff originals.</td>
</tr>
</tbody>
</table>
| Plans studied:           | Base of topography  
                          | Base of topography, roads, etc.  
                          | Base of topography, with existing conditions: vegetation, roads, and boundaries. |
Location: Birmingham, Alabama

Client: City of Birmingham (unlisted in report)

Date: 1919

Obtained from: available from several libraries

Project #: 1027

Contents: Warren H. Manning's City Plans of Birmingham, a 47 page book

Plans studied:
- Gas, Electric, and Steam services, also city growth
- Business and Residential Districts with their probable future extension
- Water areas. Includes rivers, creeks, reservoirs, locks, water service areas
- The Railroads of Birmingham, Alabama
- Sewer and Water Service
- The Future Greater Birmingham District. Aerial perspective. No scale. Recommends: preserve valley, upland residential districts, extend canal, canal and riverbank residential districts, several roads.
- Railroads of the Birmingham District
- The Circuit Roads
- Grade Crossings and Separations
- Study for Through Roads and Reservations
- In addition to other plans such as:
  - City silhouettes
  - Mineral resources of the Birmingham district
  - Alabama main and trunk railroads
  - Water sheds of Alabama's rivers

Location: Hudson Mohawk valleys, New York

Client: unknown

Date: estimated between 1915 and 1924

Obtained from: Iowa State University

Project #: 1407

Contents: Nine sheets, including full originals and blueprints

Plans studied: Plans of railroad system between Rochester and Syracuse. The data on these sheets includes streams, railroad lines, topographic features, and towns.
Plans studied:

A National Plan contains over 90 maps, plus a plan of each state (65). These state plans include crop regions, water resources, soil regions, mining, and transportation. From A National Plan Study Brief:

- Crop Regions
- Forest Areas
- Present Forest Areas
- Rainfall Map
- Land - Improved and Unimproved
- Soils in Relation to Agriculture
- Facory Centers
- Underground Fuel Deposits
- Minimum Potential Water Power by States
- Railroads
- Commercial & Recreation Areas and Connecting Ways
- Rural Population per Square Mile
- National and State Reservations

Location: Athens, Georgia
Client: City of Athens
Date: 1924-1925
Obtained from: Iowa State University

Project #: 149

Contents: The 185 collection includes 185 + drawings ranging from preliminary data collection to final plans. The eighteen 1/4"=80' scale final ink & line drawings list below.

Plans studied:

- Map, showing buildings
- Topographic survey (10' x 10')
- Map, showing road, rail, and power ways in and about the city
- Street map, study for parkways, rail, and trafficways
- Street map and notes, showing sewer and water lines
- Preliminary street map
- Map, study of zoning (includes residential, commerce, industrial, schools, and churches)
- Street map, showing proposed use districts
- Map, study for parkways, trails, and recreation areas
- Street map, revision of existing buildings to proposed use districts
- Street map, revision of present to proposed use districts
- Topographic survey, relation of trafficways to topography
- Street map, relation of trafficways to existing buildings
- Street map, relation of trafficways to present use districts
- Street map, revision of trafficways to parkways and recreation areas
- Topographic survey, relation of parkways, trails, and recreation areas to topography
- Map, relation of parkways, trails, and recreation areas to topography
- Map, relation of parkways, trails, and recreation areas to buildings

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Locations of Manning's work:

Iowa State University
403 Parks Library
Warren H. Manning Special Collection
Ames, IA 50011-2140
bjordan@iastate.edu
Includes glass lantern slides, papers, drawings, and A National Plan.

University of Massachusetts, Lowell
Center for Lowell History
Warren H. Manning Collection
(508)-934-4997
Includes papers, office records, some drawings, and Manning's autobiography.

Bentley Historical Library
1150 Beal Avenue
Ann Arbor, MI 48109-2113
(734)-764-3482
bentley.re@umich.edu
The University of Michigan holds a copy of the Michigan Upper Peninsula Plan.

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APPENDIX B

PARTIAL CLIENT LIST WITH PROJECT NUMBERS

This list represents Manning’s town and regional planning clients. It was compiled from a complete client list in the ESU collection, and includes all projects that were listed as a town name, rather than a person’s name. There are 60 potential clients listed, and are organized chronologically. Clients marked with an * are reviewed in the thesis. Other plans were not located during thesis research.

<table>
<thead>
<tr>
<th>Client</th>
<th>Project #</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milwaukee Parks</td>
<td>46</td>
</tr>
<tr>
<td>Louisville Parks</td>
<td>49</td>
</tr>
<tr>
<td>Southampton</td>
<td>184</td>
</tr>
<tr>
<td>Cincinnati Parks</td>
<td>189</td>
</tr>
<tr>
<td>Colonial Park</td>
<td>260</td>
</tr>
<tr>
<td>Columbia Park</td>
<td>282</td>
</tr>
<tr>
<td>Providence Parks</td>
<td>299</td>
</tr>
<tr>
<td>Belvidere</td>
<td>306</td>
</tr>
<tr>
<td>North Andover</td>
<td>354</td>
</tr>
<tr>
<td>Carlisle Pines</td>
<td>352</td>
</tr>
<tr>
<td>Nye’s Point</td>
<td>353</td>
</tr>
<tr>
<td>Bellefontaine</td>
<td>362</td>
</tr>
<tr>
<td>Topeka Park, KS</td>
<td>525</td>
</tr>
<tr>
<td>City of New Bedford</td>
<td>527</td>
</tr>
<tr>
<td>New Bedford, PA</td>
<td>532</td>
</tr>
<tr>
<td>Wilkes-Barre, PA</td>
<td>538</td>
</tr>
<tr>
<td>Minneapolis Parks</td>
<td>550</td>
</tr>
<tr>
<td>Olean Parks</td>
<td>599</td>
</tr>
<tr>
<td>Burlington Parks</td>
<td>661</td>
</tr>
<tr>
<td>Canandaigua</td>
<td>664</td>
</tr>
<tr>
<td>Warren, AZ</td>
<td>670</td>
</tr>
<tr>
<td>Client</td>
<td>Project #</td>
</tr>
<tr>
<td>-------------------------------------------</td>
<td>-----------</td>
</tr>
<tr>
<td>Flint, M.</td>
<td>681</td>
</tr>
<tr>
<td>Cayuga Heights, NY</td>
<td>682</td>
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<tr>
<td>*Ithaca, NY</td>
<td>685</td>
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<tr>
<td>Steelton Park System</td>
<td>694</td>
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<td>Easton, PA</td>
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<td>Montgomery, AL</td>
<td>714</td>
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<td>Rock City</td>
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<td>Jamestown Island, VA</td>
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<td>Philadelphia Metropolitan Parks</td>
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<tr>
<td>*Fiques Island</td>
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<td>Scranton, PA</td>
<td>797</td>
</tr>
<tr>
<td>Boston, 1915</td>
<td>832</td>
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<tr>
<td>Lawrence</td>
<td>852</td>
</tr>
<tr>
<td>*Bangor, ME</td>
<td>900</td>
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<tr>
<td>Arizona town Plan</td>
<td>911</td>
</tr>
<tr>
<td>Bowmansville, QNT</td>
<td>961</td>
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<tr>
<td>Batemah Village</td>
<td>990</td>
</tr>
<tr>
<td>*Mackinaw Island, MI</td>
<td>1028</td>
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<tr>
<td>City of Tiffin</td>
<td>1031</td>
</tr>
<tr>
<td>City of Halifax</td>
<td>1034</td>
</tr>
<tr>
<td>*Birmingham, AL</td>
<td>1057</td>
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<tr>
<td>Mackinaw City, MI</td>
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<tr>
<td>Richmond, VA</td>
<td>1077</td>
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<td>Taunton City Planning Board</td>
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<td>Town of Dedham</td>
<td>1128</td>
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<tr>
<td>Calumet, MI</td>
<td>1168</td>
</tr>
<tr>
<td>Town of Reading, MA</td>
<td>1199</td>
</tr>
<tr>
<td>*Hudson-Mohawk, NY</td>
<td>1407</td>
</tr>
<tr>
<td>NYC Parks</td>
<td>1424</td>
</tr>
<tr>
<td>*Athens, GA</td>
<td>1428</td>
</tr>
<tr>
<td>Town of Lookout Mountain</td>
<td>1473</td>
</tr>
<tr>
<td>City of Watervilet</td>
<td>1529</td>
</tr>
<tr>
<td>Town of Chelmsford, Town Common, MA</td>
<td>1574</td>
</tr>
<tr>
<td>*Upper Peninsula, MI</td>
<td>1589</td>
</tr>
<tr>
<td>Town of North Reading, MA</td>
<td>1621</td>
</tr>
<tr>
<td>*Billerica, MA</td>
<td>390, 540</td>
</tr>
<tr>
<td>Reading, PA</td>
<td>790, 877</td>
</tr>
<tr>
<td>*Harrisburg, PA</td>
<td>multiple</td>
</tr>
</tbody>
</table>

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APPENDIX C

TIMELINE

The timeline was compiled from several sources, including Birnbaum and Crowder (1993), Birnbaum and Fix (1995), Fabos, Milde and Weinnayr (1998), Fein (1972), Mann (1993), Neckar (1989), Conant (1984), and Norton et al. (1986). Hudak (1952) was the source for the Olmsted firm names, printed in italic.

1814. H. W. S. Cleveland born in Massachusetts
1822. F. L. Olmsted born
1852. J. C. Olmsted born
1854. P. Geddes born
1855. O. C. Simonds born in Michigan
1857. F. L. Olmsted marries his widowed sister in law
1859. C. Eliot born
1860. W. Manning born, Massachusetts
1869. J. Jensen born in Denmark
1869. J. Nolen born
1870. F. L. Olmsted Jr. born - named Henry Perkins Olmsted (charged 1877)
1872. Yellowstone designated a National Park
1875. J. C. Olmsted begins apprenticeship
1873. United States Geological Survey is established
1879. B. MacKay born
1883. C. Eliot interns with F. L. Olmsted Sr., until 1885
1884. J. Jensen emigrates to United States
1887. F. L. & J. C. Olmsted
1888. Eliot begins his private practice
1888. Manning begins working with F. L. Olmsted
1889. F. L. Olmsted & Co.
1892. F. L. Olmsted moves to hospital
1893. Columbian Exposition in Chicago

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March 1, Eliot re-joins Olmsted firm
Olmsted, Olmsted, and Eliot
1896...Manning establishes his own firm
1897...Eliot submits Forest Survey to Metropolitan Park Commission (with possible overlays)
1898...Eliot dies
1898...Olmsted Brothers
1899...ASLA is formed
1899...J. C. Olmsted is ASLA president
1900...F. L. Olmsted Jr. is hired by C. Eliot Sr. to develop a landscape architecture program at Harvard
1901...H. W. S. Cleveland dies
1901...Manning’s Harrisburg, PA plan
1902...Theodore Roosevelt becomes president, until 1908
1903...F. L. Olmsted Sr. dies
1903...Nolen studies under F. L. Olmsted Jr.
1903...Wright Brothers’ first flight
1904...Nolen opens his own office
1905...J. C. Olmsted is ASLA president
1906...Assembly line is developed at Ford Motors
1907...Manning’s Ithaca, NY study
1908...F. L. Olmsted Jr. ASLA president
1909...NAACP founded
1911...Manning’s Madison, NJ plan
1913...Manning’s ‘The Billerica Town Plan’ is published
1914...Manning’s Mackinaw Island, MI study
1914...O. C. Simonds is ASLA president
1914...World War begins
1915...Manning is ASLA president
1916...Town Sites on Government Reclamation Projects, by Manning, Nolen, Waugh, and others
1918...WWI study of boundaries, including work by geographers
1919...Manning’s Birmingham, AL plan
1919...F. L. Olmsted Jr. is ASLA president
1920...Prohibition begins
1920...J. C. Olmsted dies
1923...19th Amendment is ratified, giving women the right to vote
1923...Manning’s ‘A National Flan Study Brief’ is published
1924...Manning’s Athens, GA plan
1929...Stock market crash
1935...O. C. Simonds dies
1930-31...Manning’s Upper Peninsula, PA plan
1932...Geddes dies
1933...Prohibition is repealed
1937...Nolen dies
1938...World War II begins
1943...Waugh dies
1951...Jensen dies
1975...MacKay dies
### APPENDIX D

### CHART OF SPATIAL ANALYSIS IN MANNING’S PLANS

<table>
<thead>
<tr>
<th>Project</th>
<th>Date</th>
<th>a</th>
<th>b</th>
<th>c</th>
<th>d</th>
</tr>
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<tbody>
<tr>
<td>Harrisburg</td>
<td>1901</td>
<td></td>
<td></td>
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<tr>
<td>Ithaca</td>
<td>1906-7</td>
<td></td>
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<tr>
<td>Madison</td>
<td>1909</td>
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<td>Bangor</td>
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<td>Billerica</td>
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<td>Birmingham</td>
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<td></td>
<td>✓</td>
</tr>
<tr>
<td>Hudson-Mohawk</td>
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<td></td>
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<tr>
<td>National Plan</td>
<td>1910-23</td>
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<td>✓</td>
<td>✓</td>
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<tr>
<td>Athens</td>
<td>1924-25</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Upper Peninsula</td>
<td>1930-31</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

This chart summarizes the findings of spatial analysis in Manning’s plans. A check-mark indicates a positive finding for that question (either a, b, c, or d). The four questions are:

a) Are there multiple map layers?

b) Is there a map showing the combination of several map layers?

c) Is there a plan derived from a and b?

d) Is there an explicit reference to spatial analysis in the text?

These are explained in more detail in Methodology (p. 3).
LIST OF REFERENCES


Boston Society of Landscape Architects' Yearbook for 1929. 1929. Boston: BSLA.


Cleveland, H. W. S. 1873. Landscape Architecture, as applied to the Wants of the West, with an essay on Forest Planting on the Great Plains. Chicago: Jansen, McClurg & Co.


79


James, Harlean. 1926. Land Planning in the United States for the City, State, and Nation. New York: Macmillan Co


80


81


Manning, Warren H. and the Civic Improvement Committee. 1911. Bangor City Plan: The Burned District. Bangor: by the authors.


Steinitz, Carl. 1996. Personal communication with author, 30 October. Electronic mail.


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