AN HISTORIC RURAL FABRIC AS A FRAMEWORK
FOR DESIGNING A NEW COMMUNITY

by

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ABSTRACT

A new community is developing in central-western Ohio at the administrative and educational facilities of The Way International, a world-wide non-denominational biblical research ministry. Since 1961 this community has grown from only a few families to over 300 persons living either at or near the site. By 1985 this figure is expected to more than double.

This paper shows how the design and planning methods used to date have not been totally successful in dealing with this rapid growth. These methods have resulted in space shortages at times, conflicting use relationships, and unsatisfactory building forms and appearances.

A more systematic approach to site design is examined as an aid to resolving some of these problems. This systematic approach focuses on the issues of density standards, block sizes, building configurations, open space planning, and architectural design, drawing rules and concepts from the patterns found in the historic and traditional rural context. Thus, a coherent, unifying "rural atmosphere" for this growing community is the guiding concept behind this system.

The issue of uncertainty of future growth is handled by first defining likely phases or increments of growth. Next, the derived design system is shown to be able to handle this range of likely growth increments.

Finally, a schematic site plan for developing a portion of the property is designed to demonstrate the use of the system, and to advocate a first step towards preserving the rich rural heritage of this place.

Thesis Supervisor: N. John Habraken
Title: Professor of Architecture
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Chapter One
INTRODUCTION

Description and History of the Site

The site is located in the Northern Midwest and Great Lakes region of the Ohio River basin. It is approximately 85 miles north of Cincinnati, just west of Interstate 75, and no more than 30 miles east of the Indiana border. The site is adjacent to the town of New Knoxville, and in the northwestern-most corner of Shelby County (about 20 acres of the property lies across the county line in Auglaize County). Figure 1 locates the site relative to some of the major cities in Ohio, and Figure 2 shows the immediate vicinity.

The roughly 200 acre site is occupied by the facilities of The Way International. Founded in 1942 by Dr. Victor Paul Wierwille, The Way International is a worldwide non-denominational biblical research, teaching, and fellowship ministry. The Ohio headquarters is one of a number of properties owned and operated by The Way International in the United States, the others being located in Colorado, New Mexico, Kansas, and Indiana. These other locations primarily serve as leadership training and educational centers drawing attendance from all parts of the U.S. and many foreign countries. The Ohio property serves as the administrative headquarters for the entire organization, as well as a training, educational, and research center.
Figure 1. Site location.

Figure 2. Vicinity of site.
The drawing above shows the site as it exists today. The shaded area indicates recently acquired property, the rest being the original Wierwille farm dating from about 1891. The Wierwille family had sailed from Germany in the 1840's, arriving in Ohio by way of New Orleans and the Miami-Erie Canal. Adolph Ernst Wierwille and his wife Kristina farmed the 147 acres together until his death at the age of 45. Kristina continued to run the farm for almost 40 more years, making it a successful enterprise.
When she died in 1920, the farm passed to Ernst Wierwille, her youngest son. Ernst and his wife Emma worked with cattle, horses, hogs, and crops and had six children over a 20-year span. In the German tradition, the Wierwille farm was to be inherited by the three sons. Upon Ernst's death, however, the children agreed to give the property to The Way International for use as a research and teaching center. Dr. Wierwille remembers,

I had vision of a headquarters for research work where I could reach a handful of people, for I wondered if more than 50 would ever respond to my ministry. Then in 1958, Harry [Dr. Wierwille's oldest brother] walked in one night, and said, 'If you want to have the headquarters at our old farm, I will remodel the house and pay for it, and we'll start the work there the best we can'.

In 1961 the remodelling was complete and the center was officially started. Since then the worldwide growth of The Way International has been phenomenal. The Ohio center serves as a resource for all of the local groups providing research materials, leadership training, and hosting special conferences and seminars year-round, and hosts an annual week-long festival every August which brings 15,000 to 20,000 participants from all 50 states and as many foreign countries.

Over the last almost 20 years a number of facilities have been built at the Ohio site to handle these different functions. Below is a list of the major construction projects with their approximate dates of completion:
Table 1: Building Projects Since 1961

<table>
<thead>
<tr>
<th>Date</th>
<th>Facility</th>
</tr>
</thead>
<tbody>
<tr>
<td>1961</td>
<td>Wierwille Home (remodeled)</td>
</tr>
<tr>
<td></td>
<td>Biblical Research Center</td>
</tr>
<tr>
<td>1964</td>
<td>Biblical Research Center Addition</td>
</tr>
<tr>
<td>1965</td>
<td>Owens Residence</td>
</tr>
<tr>
<td>1966</td>
<td>Allen Residence</td>
</tr>
<tr>
<td></td>
<td>Randall Residence</td>
</tr>
<tr>
<td></td>
<td>Staff Residence (mobile home)</td>
</tr>
<tr>
<td>1970</td>
<td>2 Student Residences (mobile homes)</td>
</tr>
<tr>
<td></td>
<td>Library (mobile home)</td>
</tr>
<tr>
<td></td>
<td>Administrative Office (mobile home)</td>
</tr>
<tr>
<td>1971</td>
<td>Executive Office Building</td>
</tr>
<tr>
<td>1973</td>
<td>26 Staff and Student Residences (mobile homes)</td>
</tr>
<tr>
<td>1974</td>
<td>Maintenance Building (workshops and storage)</td>
</tr>
<tr>
<td></td>
<td>Log Cabin</td>
</tr>
<tr>
<td>1975</td>
<td>Reahard Residence</td>
</tr>
<tr>
<td>1976</td>
<td>Executive Office Building Addition</td>
</tr>
<tr>
<td>1978</td>
<td>Custom Coach Service Center (vehicle storage and maintenance)</td>
</tr>
<tr>
<td></td>
<td>Covered Bridge</td>
</tr>
<tr>
<td></td>
<td>Festival Grounds (utilities and roads)</td>
</tr>
<tr>
<td>1980</td>
<td>Outreach Services Center (offices and warehouse)</td>
</tr>
<tr>
<td>1982</td>
<td>Way Corps Chalet (staff residence and guest house)</td>
</tr>
</tbody>
</table>

Most of the funds for these building projects have come from donations and gifts of the members. Also, much of the labor has been supplied by the staff and by volunteer help.

Figure 4 shows an aerial view of the east end of the site and Figure 5 shows an aerial view of the site during the annual summer festival. Figure 6 shows the front view of the Outreach Services Center at the west end of the property.
Figure 4. East end of site.

The Way International
New Knoxville, Ohio

Figure 5. Annual summer festival.
Building Space Inventory and Existing Densities

The inventory of existing and planned built space at the site is a starting point in finding clues about how to plan for future growth. The table below shows the rough total square footages now existing at the site broken down into use categories and that which is projected for the near future. Also shown is the percentage each category represents of the total.

Table 2: Inventory of Existing and Planned Building Space

<table>
<thead>
<tr>
<th>Use</th>
<th>Existing Sq. Ft.</th>
<th>% of Total</th>
<th>Planned by 1985 Sq. Ft.</th>
<th>% of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>49,700</td>
<td>22</td>
<td>109,330</td>
<td>30</td>
</tr>
<tr>
<td>Office</td>
<td>58,050</td>
<td>25</td>
<td>80,000</td>
<td>22</td>
</tr>
<tr>
<td>Educational</td>
<td>30,000</td>
<td>13</td>
<td>60,000</td>
<td>16</td>
</tr>
<tr>
<td>Warehouse</td>
<td>60,000</td>
<td>26</td>
<td>90,000</td>
<td>24</td>
</tr>
<tr>
<td>Maintenance</td>
<td>30,850</td>
<td>14</td>
<td>30,850</td>
<td>8</td>
</tr>
<tr>
<td>Total</td>
<td>228,600</td>
<td>100</td>
<td>370,180</td>
<td>100</td>
</tr>
</tbody>
</table>
Over the next three years the total amount of built space is expected to increase by 141,580 square feet, or 62%.

Another important clue is existing density. Figure 7 shows the existing built up area at the east end of the site. The outlined area comprises approximately 862,700 square feet, or about 20 acres. The built square footage within this area is roughly 112,300. Therefore, the FAR (floor area ratio) is about 0.13.
Figure 8 shows the existing built up area at the west end of the site. The total enclosed area comprises about 160,000 square feet, or about 7.6 acres. The built area is about 160,000 square feet. This gives an FAR of about 0.50.

These two FAR levels will serve as references in evaluating future proposals, though by itself an FAR is only an incomplete method of guiding development. Other important concepts must be developed to provide an acceptable degree of environmental quality.

Previous Methods of Handling Growth

I had a hand in just about everything put up around here. I tried to design for future expansion but often didn't think big enough. We would design something and, before it was finished, we'd have to change. From that original move in 1961, the place just continues to grow. Day by day we built what was needed. 3

-Ermal Owens
Late Vice-president
This quote by the late Vice-president of The Way International, Ermal Owens, expresses the basic method of handling growth used so far. That is, to simply oversize things in such a way as to allow for the likely future demand. Although this is a simple way to deal with the uncertainty of future growth, it provides no system of providing for future environmental quality. It also tends to tie up capital perhaps unnecessarily prior to the actual demand. Another problem of oversizing as a strategy is that once the facility is built with extra space, that space will tend to get used eventually. However, the use which fills the space may not be the use originally intended due to some pressing need of the moment. Consequently, conflicting uses may wind up adjacent, and similar uses may wind up far apart. This has happened in several instances at the site: a residential area adjacent to the maintenance building and sewage treatment plant; a retail bookstore and administrative office complex immediately adjacent to loading docks and warehouse space; staff housing far away from the work destinations; two related office complexes far away from each other; the two major assembly halls far away from each other; etc.

Another prior method used to handle growth has been the use of a master plan in the traditional sense. In September, 1972, a $3.5 million, five-year expansion plan was produced. Dormitories, an administration center, and an auditorium were laid out, along with a system of walkways and roads. The plan was only partially carried out in a very minor way due to a change of policy in the types of land use that would be permitted in the area of the proposed facilities.
Another problem with this master plan was the uncertainty of the program. As has been the case with several buildings at the site (the Executive Office Building and the Outreach Services Center) a building may be started with one use intended and then change in the middle of construction due to a greater need. Therefore what might start out as a complete arrangement of buildings and uses in a comprehensive master plan, could wind up completely different in the end. The traditional type of master plan just does not contain enough flexibility and versatility to handle this type of uncertainty.

The use of prefabricated building systems and mobile homes has dominated the building program at the site over the last 20 years. As a method of handling growth, this has been only partially successful. Their success lies in the fact that they are inexpensive and quick to install. When a need for additional space comes up, it can be fulfilled almost instantly by installing a mobile home or throwing up a metal building. The problems arise over the long run when the buildings deteriorate or the required use changes. When they deteriorate, maintenance and operating expenses increase greatly to keep them at an acceptable level. When the required use changes, the structures tend to be so insubstantial that they cannot stand up to extensive remodeling.

Another drawback to their use is that they cannot fulfill the required program as well as a custom designed building theoretically can. A poor design "fit" can lead to extra unanticipated costs to retrofit a building for a use that was not anticipated when it was originally planned. Using mobile homes for dormitories and warehouses for offices has led to some extensive
and expensive retrofitting.

The last major method previously used to handle growth at the site has been to relegate less attractive buildings to the periphery of the site. As the figure below shows, this has happened in several stages as growth has occurred. Site planning on the basis of physical appearance primarily, of course, is not the ideal method either. When buildings are set in the periphery without attention to use relationships, conflicts can and do occur.

Results

Several negative consequences have come as a result of utilizing these methods of handling growth at the site. First, there is a lack of continuity of scale and form. Traditional farm buildings, mobile homes, "California Ranch Style", metal prefabs, and "Neo-modern" dot the landscape. Second, as mentioned before, there are conflicting land uses adjacent to each

Figure 9. Stages of growth.
other, and similar land uses are separated. Third, the transportation network is poor. There are redundancies and ambiguities of paths, and a heavy dependence on cars to get around the site. Fourth, the site organization is unclear. An easily recognizable hierarchy of paths and nodes is not present. Fifth, costs perhaps have been higher than anticipated because of retrofitting and remodeling to correct deficiencies.

An Underlying Problem

Perhaps a source of the problem lies in the decision-making process. Perhaps the problem is that multiple decisions are made simultaneously and sequentially in the face of uncertainty with different and often conflicting criteria for making the building decisions, and often by different people. The approximate decision-making process that occurred in the construction of the Outreach Services Center is set forth below to illustrate this:

- decision to build a large warehouse for storage of festival equipment;
- decision to use industrial metal building system;
- decision to locate building at periphery of property;
- decision to transfer retail and mail-order bookstore and shipping and receiving department to portion of warehouse;
- decision to transfer all offices located in rented buildings off-grounds to the new building;
- decision to oversize office space to allow for expansion;
- decision to invest additional money to upgrade the appearance of the metal building;
- decision to allow other departments to share the warehouse space;
• decision to build a large staff and student dining hall in the building;
• decision to use dining hall for large meetings several times each week.

Thus, an oversized industrial building has become the focus of much of the activity at the site. Much money has been spent to bring it up to an acceptable standard of appearance for such a "center", when originally it was intended as a warehouse located at the periphery of the grounds.

The need for some kind of systematic approach to handling growth under these circumstances is apparent to all. This is summed up by John Habraken very clearly:

Generally speaking, the need for a systematic approach becomes more apparent when: 1) several participants, with different interests and skills, are involved in the decision making process, 2) matters of quality must be made explicit in terms of standards and norms to be understood and agreed by different participants, 3) decisions must be made incrementally in such a way that each decision leaves open a number of options to be dealt with at a later stage, 4) several participants need to be able to operate independently but simultaneously in a coordinated way, 5) different participants need to be able to operate independently and sequentially in a coordinated way.4

All of these conditions seem to be present in this problem, and therefore a systematic approach must be found.

Requirements of a System

system: 1. a group of units so combined as to form a whole and to operate in unison5
A system is made up of units which have coherence and function together. In a design problem, these units must be able to successfully meet their program requirements and yet have qualities or characteristics which link them with the whole. The form of the whole must be a shared and agreed upon concept in order for the system to be usable. The system must be able to deal with all contingencies and uncertainties and retain wholeness and unity. And the system must be understandable to all participants who must put it to use.

Search for a Shared Concept

That move to New Knoxville has been the finest move we ever made. It's a quiet rural atmosphere. I love this place. I love to see the corn and beans grow. I love to see the wind playing across the wheat. I love the beauty of the place because people come and get blessed.

-Dr. Victor Paul Wierwille

It is not necessary to look far for this common unifying concept. Surrounded by vast fields of corn, soybeans, and wheat the facility was founded on the roots of an ancestral farmstead and operated for many years as a profitable farming venture as well as a growing research center. Ties to the traditional agricultural character of the region as well as ties to all that is non-urban throughout the United States have always been respected and fostered by the leadership of The Way International. This emphasis on rural America, coupled with a great respect for history has been reflected in a number of facilities at the site. Keeping the original farmstead intact, the small log cabin in the woods, the covered bridge, the rural murals on the
front of the Outreach Services Center, and the Corps Chalet are all examples of this interest, as shown in Figures 10 through 15. This desire to preserve and promote a "rural atmosphere" (perhaps in an ideal sense) is interpreted in this study as a common shared concept to be used as a basis for the unifying form of the system.

Search for Elements

The elements that will make up the system must satisfy their individual program requirements. Generally, these will fall under one of these use categories: residential, office, educational (classrooms and auditoriums), warehouse, commercial (stores and restaurants), guest housing, public facilities (elementary schools, libraries, recreational facilities, etc.), maintenance and municipal (workshops, storage, vehicle and implement storage, utility plants, etc.), and open space. The specific program requirements will be determined as the need arises. All that can be done when defining the elements of the system is to address only the general use categories and be sure that they can be adapted to the specific situation.

These elements must be able to relate to the whole system as well as be compatible with the other elements. Therefore they will be drawn from the same reference as the whole concept, namely, the rural context.
Figure 10. Log Cabin.

Figure 11. Covered Bridge.

Figure 12. Wierwille Barn.
Figure 13. Way Corps Chalet.

Figure 14. Mural at front of Outreach Services Center.

Figure 15. Mural at front of Outreach Services Center.
Defining the Uncertainties

The major uncertainties which the system will have to handle are the following: 1) available land for development; 2) timing and types of future land use demands; 3) the future participants in the design and planning process. If these factors were known now, it would be a simple matter to put together a beautiful and functional complete master plan by careful and thoughtful designing and engineering. However, this is not the case and has proved to be at the base of the problem. If these uncertainties can be narrowed down to a probable set of outcomes rather than total uncertainty, and the system made to work for this set of probable outcomes, a better living and working environment at the site can be produced.

Overview

Chapter One has defined the problem to be studied and the general approach to its solution. Chapter Two will be about the definition of the rural atmosphere and its physical fabric. It will point out some of the basic patterns found in that fabric that can be applied to this site. Chapter Three will be about deriving a design system utilizing these patterns from the rural fabric. Chapter Four will apply this system to the site. It will define and therefore limit the set of uncertainties, demonstrate the capability of the system to deal with these uncertainties, and illustrate the use of the system on a specific portion of the site. Chapter Five will summarize the work and
make recommendations for additional study.

The Appendix will supply additional information about forecasting land use requirements.

2. Ibid., p. 6.


Chapter Two
DISCOVERING THE PATTERNS OF THE RURAL FABRIC

The Rural Vernacular Landscape

In going to the American vernacular landscape for design references as this paper does, it is important to be somewhat selective. Rather than glorifying the cheap and mundane form of the "strip" or the paper mache world of Disney Land, perhaps a more heartfelt and commonly shared value can be found in the rural and semi-rural countryside that makes up most of the area of the continental United States.

Frank Lloyd Wright considered the Jeffersonian ideal of the self-reliant rural proprietor to be one of his primary references in his design for Broadacre City in the 1930's and 40's. The plan of Broadacre City, shown in Figure 16, which closely resembles the fabric of the agricultural midwest, was to him the perfect setting for his version of cultural reform which he felt would bring freedom and prosperity to the people he saw as enslaved in the crowded, dirty, post-indus-

Figure 16. Plan of Wright's Broadacre City.
trial cities of the twentieth century.\textsuperscript{2} Although his ideal city is recognized today as politically, socially, and economically unattainable, his vision of the rural countryside as a repository of important American values is no less significant.

It is also necessary when going to the rural American vernacular landscape to be somewhat selective. There is the rural countryside of rusting junk cars, decaying, peeling and decrepit barns and houses, and cheap dented metal mobile homes strewn about the countryside. However, there also is a rural countryside which reflects a bit more prosperous and hope-filled times. This is a countryside of people like Adolph and Kristina Wierwille who founded the original farmstead at the site in the late 1800's. Harry Wierwille remembers:

Our grandmother came over from Germany around 1850 because of the military conscription there. My grandfather came about the same time too.
Dozens of couples bought a boat and landed in New Orleans. There they bought a team of oxen. When they got here, they stopped – anchored.

Our grandmother died in 1920. She died at 83, and two weeks before she died, she was hitching up her own horse. She gave each child a deed to a farm when they got married. She was a dynamo...

Grandma made her money by selling eggs and butter in Cleveland. She culled them, put them in boxes and put them on the train to Cleveland, and sold them there for a quarter a box when all you could get around here was a few cents. She did the same thing with cream. Grandma was fearless. Sometimes people drove up to rob her because they knew she kept her money at home, but she'd yell out the window and they would disappear. She was without fear.

Grandpa died early, at about 45, but Grandma had a lot of life in her, lived almost twice as long. She lived here on this farm with our mother and father till 1920 when she died. She led the family devotions every morning. I remember that...

Dad was a prosperous farmer in this area. We sold milk, eggs and hogs. We enjoyed life, lived well, but we never threw anything away. We had our own garden too. The only things we bought in the store were sugar and coffee...

These immigrants were a hard-working group who managed to pass some of their prosperity and values on to at least a second and third generation. The wilderness in which they made their homes, they transformed into a pastoral, subdued, sometimes orderly, and even comfortable patchwork quilt of fields, farms and rural towns. This is the rural fabric which is the focus of attention of this chapter and is seen as a valuable reference source of the American vernacular landscape for the design of the facilities of The Way International.
In thirty of the fifty states of the Union that are west of Ohio, inclusive, you know you are going north or south because the road you are on actually goes north and south, and you know you are going east or west because that road actually goes east and west. That striking Cartesian grid of the mid-west and west that gave meaning back to the four points of the compass, dates back to post-Revolutionary War times when the greater part of the land outside the thirteen colonies became the property of the federal government.

At that time the federal government found itself with vast tracts of undeveloped and mostly uninhabited land that had few natural characteristics that would lend themselves to the use of the old metes-and-bounds survey system. A new standard system had to be devised in the face of the vast task of dividing up the countryside. Even before the adoption of the Constitution, a committee headed by Thomas Jefferson evolved a plan for dividing the land into a series of rectangles, which the Continental Congress adopted on April 26, 1785. The system adopted and subsequently modified and refined, is known usually as the "Township and Range System" and in such a wide-spread and thoroughly developed application is truly an American phenomenon.

The basic pattern is a continuous grid of north-south range lines, and east-west township lines (with periodic corrections to allow for the curvature of the earth) at six mile intervals, as shown in Figure 18. Each of the six mile squares is divided into 36 "sections" of one square mile or 640 acres each. These are always numbered consecutively as shown.
Figure 18. Township and Range System.5
As shown in Figure 19, subsequent acts of Congress divided the sections in half both ways, and at least statutorily each of the resulting quarters in half both ways again. Further divisions of the land not required by Congress are common as shown, although parcels of less than 20 acres are not likely for
agricultural uses. Traditionally, farms in the area of the site consisted of about 120 acres, though larger and occasionally smaller farms were possible as in the case of the original Wierwille farm of 147 acres.

When the land was cleared of the wilderness that covered the countryside, stands of woods of roughly 20 acres per farm were left intact to serve as an important source of fuel and food. Because of the extreme regularity of the property divisions, these clumps of woods almost always occur in very orthogonal patterns throughout the landscape. There are no allusions to the picturesque "natural" English landscapes here.

Most roads throughout the countryside are laid along these township, range, section, and even half-section lines. Consequently, most roads are north-south and east-west. What started as an abstract land division system has become etched permanently in asphalt as the transportation network.

The farmsteads themselves usually occupy only about an acre of land or so, and tend to be located toward the center of the farms to provide easy access to the fields.

An important characteristic of this rural farm fabric is in the typical building configurations of the farmstead. The original Wierwille farmstead seems to be fairly representative of this pattern. It consisted of a house, a barn, a slaughterhouse, and two other small farm buildings. Figure 20 shows these buildings in a figure-ground illustration. The five free-standing buildings are organized around the farmyard where the water pump is located. The driveway originally passed by the east side of the house rather than the west side as it is today. Other than that, most of it remains basically
Figure 20. Wierwille farmstead.
unchanged. This group of buildings, each individually isolated in space as an object, yet defining that farmyard space as distinct from all the other wide open space around is an important pattern in the rural fabric.

These patterns grouped under the heading of Township and Range are basically summed up by the diagram below. About the only exceptions to this pattern occur when there are diagonal roads which connect towns and cities, or around standing or moving bodies of water. In such cases, the orthogonal grid usually acknowledges in some way the diagonal or irregular edge.

Figure 21. The basic Township and Range pattern.
The adjacent town of New Knoxville will serve to illustrate the basic patterns of the traditional rural town fabric. With a current population of about 900, a built-up area of about 250 acres (out of about 420 acres of incorporated area), and about 375 dwelling units, the approximate densities are as follows:
Table 3: Densities of New Knoxville

Residential................................. 1.5 dwelling unit/acre
FAR (at roughly 2,000 SF per dwelling)..... 0.09
Population................................. 35 persons/acre

This is, of course, significantly greater than the densities found in the open countryside, but far less than anything that could be called urban. Even the densities at The Way International facilities are greater than this.

Throughout its history, the town has served as a fairly healthy economic and social center for the surrounding prosperous farm community. It never was a transportation or manufacturing center - its sole purpose and source of wealth was basically derived from agriculture which perhaps intensifies its "ruralness".

The physical form reflects this quality. Figure 24 is a figure-ground plan of the town showing the unbuilt space in black. Obviously, open space is a dominant ingredient. Private, semi-private, semi-public, and public space flows uninterrupted around all structures. The quality of this space is understood when compared with that of other nearby communities. Figures 25, 26, and 27 compare the towns of Wapakoneta, St. Marys, and New Knoxville. Both Wapakoneta and St. Marys exhibit similar qualities of space in certain areas, but also exhibit a type of space not found in New Knoxville. This type of space is enclosed by a continuous or almost continuous dense built edge along the main commercial street in town. This space is definitely urban and quite foreign to anything found in the rural environment. It is an aberration in the rural fabric.
Figure 24. Figure-ground plan of New Knoxville.
and can be traced to the evolution of these two cities. St. Marys evolved as a transportation center along the Miami-Erie Canal in the early 1800's, and later as a junction-point of two major railroads. Wapakoneta also grew as a railroad town originally, and later as the county seat of Auglaize County. Figure 28 is a map showing these communities and their relationships to major transportation systems by 1880. New Knoxville was isolated and therefore insulated from these urbanizing influences.
The patterns of public open spaces in New Knoxville are not like the typical public park, town green, or piazza spaces of other contexts. The only area that could be considered public open space would be the playing fields behind the high school in the south-west part of town - hardly a formal open space in the traditional town-planning sense. The streets are the major public open space in this rural town. Main Street, its actual name in New Knoxville, is an American institution in its own right as a unique type of open space. Other types of open spaces such as squares or parks, often used as a viewing point for buildings or monuments, as a commercial or social center, or as a recreational area, usually work best when they offer something different from the normal surrounding cityscape. A public square set in the middle of a dense
urban tissue, as shown at right, can act as a "relief valve" from the compact surroundings. Such public places are usually heavily used. This condition exists in St. Marys where Spring Street gives way to the public park immediately to its south-east. This heavily used park offers a welcome alternative to the compact commercial district.

A different condition exists in Minster, a city south of St. Marys, where a small formal public park is surrounded by low density housing. This park is hardly ever used in contrast to the St. Marys park. Perhaps this is because it offers no alternative to its surrounding fabric - the residential area offers plenty of open spaces of all kinds. This seems to be the condition in New Knoxville as well.

Figure 30. Spring Street, St. Marys.
With a great variety of open spaces everywhere throughout the town and a world of open space in the surrounding fields, no one must have thought there was any need in the center of town for a formal public gesture.

These qualities of low built density, the uninterrupted flow of open space, and no urban continuous built edges so far have been identified as characteristics of the rural town fabric.

The aerial photograph and figure-ground plan of New Knoxville reveals another important characteristic of the rural town fabric. The physical structure of the town is based on a fairly repetitive module, as shown in Figure 31. These modules of 330 feet by 330 feet, measured roughly from the road centerlines, define the block pattern of the town. In another nearby town there is a one by one-and-a-half module block pattern (330 feet by 495 feet), and in another town (as well as in New Knoxville), there is a one by two module block pattern (330 feet by 660 feet).

The origins of this unusual dimensioning lie again in that uniquely American phenomenon, the process of surveying and platting the millions of acres of wilderness in the eighteenth and nineteenth centuries. The dimension of 330 feet corresponds to multiples of traditional surveyors' dimensions: 20 rods, five chains, and half a furlong. When the town of New Knoxville was originally platted, it is possible to imagine the surveyors starting at the intersections of sections 19, 20, 29 and 30 of Washington Township, measuring south 10 rods to locate Spring Street, 20 more rods to locate Bremen Street, 20 more rods to locate German Street, and so on until all twelve of the original blocks were laid out as shown in Figure 32. This 330 foot module is so
Figure 31. Basic rural town grid module.
integral in the rural fabric of the United States, that it can be found wherever the Township and Range system was used.

Another important feature of this physical block structure of the rural town fabric is a series of service-oriented alleys that divide the blocks into four quarters in the case of the square block pattern, and in half the long way in the case of the elongated rectangular block pattern. Occasionally the elongated blocks will also be cut by an alley running across the short dimension of the block. Although these alleys are not always paved, they always exist as unobstructed rights-of-way. They are quite visible in the 1880 map of New Knoxville and in the figure-ground plans of New Knoxville, St. Marys, and Wapakoneta. Figures 33, 34 and 35 diagrammatically show the structure of this pattern for the one by one module block, the one by one-and-a-half module block, and the one by two module block.

Residential buildings are typically sited along the outer periphery of the blocks with service buildings (garages today, stables before) located along the service alleys generally towards the interior of the block. Figures 36, 37 and 38 illustrate some typical arrangements of this pattern. This can be analyzed in terms of zones where buildings are located as shown in Figures 39, 40 and 41. The unbuilt space between the service building zone and the house zone generally is a private outdoor residential space often separated by a fence or hedge from the backyard of the neighbor. Occasionally, as shown in Figure 42, this space becomes shared by some or all of the dwellings within that block. As shown, a small play lot and communal lawn occupies this space and is used by all adjoining residents. More normally, though, this area is private and
Figure 32. Map of New Knoxville, 1880.
Figures 33, 34, 35. Typical road and service alley patterns.
Figures 36, 37, 38. Typical building configurations.
Figures 39, 40, 41. Zonal analysis for typical building configurations.
the service alley is the shared semi-public space. Car washing, socializing, ball playing, jogging, etc. all happen in this space.

Non-residential buildings generally respect these same structural patterns unless a building is too large to fit within one quarter of a block. In the older parts of the rural towns this pattern violation only occurred where public buildings were set in the center of the block and surrounded by lawns to give sufficient space for viewing the building. This is perhaps an "imported" aesthetic value to the rural countryside.

Thus, the pattern of the rural town fabric basically consists of low density development at an FAR of around 0.10. The blocks of this fabric are
either roughly 330 by 330 feet, 330 by 495 feet, or 330 by 660 feet. Paved and unpaved service alleys bisect the square blocks in both directions, and the longer blocks usually in only one direction. These alleys are hardly ever built over. Residential buildings are located in a zone at the periphery of the block, and service buildings are located in a zone adjacent to the service alleys toward the interior of the block. The space between the service building zone and the house zone is usually private residential space, but is occasionally shared semi-public space. Non-residential buildings generally respect this same pattern.
Pattern 3. - Traditional Building Forms

This paper has so far described the patterns found in the rural land organization and tenure, the individual farms and farmstead, and the rural town block, building, and open space configurations. Now the microlevel of individual rural building forms must be described.

Since most of the farms were settled in this area in the mid-to-late 1800's (Wierwille farm in 1891), most of the original rural structures date from that period or soon thereafter. The later growth periods associated with industrialization in the adjacent towns exhibit later building styles and forms less strongly identified with the original agricultural settlement of the area.

The 1880 Atlas of Auglaize County contains illustrations of some of the better homes of that period. Figures 43 and 44 show a common house type of the time used for both houses on the farm and in town. Sometimes it is referred to as the Four-over-four (four rooms over four rooms) or "Domestic Georgian". It is often of brick with the gable ends perpendicular to the road, and with five second story windows over four first story windows symmetrically arranged around the front door as shown.

Another type, as shown in Figures 45 and 46, is referred to as the One-and-a-half. It also has gable ends perpendicular to the road (usually), with the roof raised up just enough to allow a second floor under the eaves. This type of house is now beloved of suburban real estate dealers who add green vinyl shutters and, of course, call it a "Cape Cod Cottage". The 1880 versions
show entry gables added perhaps with a bit of Gothic Revival flair.

Figure 47 shows a fourth house type from the atlas sometimes known as the Upright-and-wing. This type has an upright two story section with gable ends parallel to the road, and a joining perpendicular section often of one-and-a-half stories, but sometimes of two stories.

The last major house types from the atlas are shown in Figure 48. The house on the right is either "T"-shaped in plan or with an additional wing making it cross-shaped.
Figure 45. Typical One-and-a-half in 1880.\textsuperscript{14}

Figure 46. Typical One-and-a-half in 1880.\textsuperscript{15}
(Though both versions are common, this illustration is ambiguous.) Always two full stories in height, these houses are either of brick or wood. The house on the left could either be a degenerate throw-back to the Greek revival style or some unclassified vernacular type.

The streets and countryside in the region of the site are just littered with these houses. Figures 49 through 55 attest to that fact. Figure 56 shows one more common traditional houses type not included in the 1880 atlas. It is called the "I" house due to its original discovery as a type in Illinois and Indiana. The simple two story, one room deep plan conceals a complex origin going back to the "dog-trot" rustic vernacular cabins of earlier settlers. Perhaps it was such "humble" origins that kept it out of the 1880 atlas.

The prevalence of all of these vernacular house types at this time in history reveals two important facts about this region. First, this area was influenced by two major streams of vernacular architectural style. Figure 57 shows roughly how these streams moved westward.
Figure 49. Brick Four-over-four in Lock Two.

Figure 50. Brick Four-over-four in Minster.
Figure 51. Wooden Four-over-four in New Knoxville.

Figure 52. "T"-shaped house in New Knoxville.
Figures 53, 54, 55. "T"-shaped houses in New Knoxville (upper left), and St. Marys (upper right and lower left).
from the East by way of the flow of settlers in the nineteenth century. They not only carried with them their physical baggage of personal belongings, but their mental baggage as well. The traditional house forms with which they grew up were part of this mental baggage. The Four-over-four, the "I" house, and the One-and-a-half (not shown) were all by then traditional house types emanating from both the Middle Atlantic cultural region and New England. The Upright-and-wing came almost exclusively from the New England region as shown.

The second fact about this region is indicated by the presence of the "T"-shaped and cross-shaped houses which are not known vernacular house types from the East. By the mid-to-late 1800's architectural pattern books had be-
Figure 58. Typical Upright-and-wing. 21

Figure 59. Typical Four-over-four. 22

Figure 60. Typical "I" house. 23

Figure 57. Westward migration of architectural ideas. 20
come a major medium of spreading architectural ideas. Figures 61 and 62 are illustrations from Pallisers' New Cottage Homes and Details, published in 1887 in New York. Probably similar illustrations could be found in any number of books from this period, but these serve to illustrate the likely origins of the "T"-shaped and cross-shaped houses. Being perhaps the most oft repeated house types in this region, the use of the pattern books surely caught on in the late 1800's and probably early 1900's. Figures 63 and 64 are two more existing examples of these houses and are almost dead ringers of those from the pattern book. Undoubtedly some local builder got a hold of one of these books and went to work.

Barns are also an important building type of the rural landscape. The largest individual barns in this area measure about 60 feet by 130 feet for a total ground area of about 8,000 square feet. The average barn dimensions are closer to 50 feet by 90 feet. (The Wierwille barn measures about 55 feet by 110 feet.) Gambrel, hip and shed roofs are used interchangeably and sometimes combined in the same barn. Silos are only sometimes present, being a more recent addition to farming technology.

The larger old commercial buildings in New Knoxville are probably closer in form to a barn than anything else. The builders probably looked to the countryside for their reference when faced with the problem of building these larger commercial structures in their rural town.

The only major examples of distinctly civic architecture of the early period in this region are the Auglaize County Courthouse in Wapakoneta and
Figures 61, 62. "T"-shaped and cross-shaped houses from pattern book.26,27
Figure 63. "T"-shaped house south of McCartysville.

Figure 64. "T"-shaped house in St. Marys.
the Shelby County Courthouse in Sidney about 15 miles south of the site (shown in Figures 65 and 66). The latter seems to be a Second Empire style composition and the former some kind of Renaissance Revival conglomeration. (The dates of construction are not known to the author.) In any event, these are definitely foreign imports to the rural environment and will not serve as primary references for deriving a design system. Instead, this paper will look primarily to the traditional basic building patterns found in the immediate rural fabric: the Four-over-four, the "I" house, the Upright-and-wing, the "T" and cross-shaped houses, and the traditional barn.

Figure 65. Auglaize County Courthouse, Wapakoneta.

Figure 66. Shelby County Courthouse, Sidney.

2 Ibid., p. 125.


5 Ibid., p. 9.

6 Ibid., P. 10.

7 Ibid., p. 11.


10 Ibid., p. 10.

11 Howland, op. cit.
12 Ibid., p. 6.
14 Howland, op. cit.
15 Ibid., p. 90.
16 Ibid.
17 Ibid.
18 Lewis, op. cit., p. 10.
19 From conversation between Peirce F. Lewis and the author on April 14, 1982.
20 Lewis, op. cit., p. 1.
21 Modified from Lewis, op. cit., p. 15.
22 Ibid., p. 5.
23 Ibid., p. 11.
24
Lewis, op. cit., pp. 10, 12.

25

26

27
Ibid.
Chapter Three
DERIVING AN OPEN-ENDED SYSTEM
FROM THE RURAL FABRIC

Building Forms

The house types and building forms described in the last chapter provide some of the ingredients for deriving the design system. These rural houses and buildings were small scale and free-standing, and generally one-and-a-half or two stories tall. They had simple geometries, pitched roofs, and often at least some references to the architectural style then in vogue. Greek Revival, Gothic Revival, Victorian Gothic, and Eastlake Style show up in some of the details and decorations of these buildings.

Another ingredient in deriving this system is the basic set of functional requirements. Currently the general categories of use at the site include: residential, office, educational (classrooms, lecture rooms, etc.), child care (perhaps eventually to include primary education), convenience shopping, guest housing, warehouse, light industrial (printing, shipping and receiving, tape duplicating, etc.), and maintenance and municipal (vehicle storage, workshops, tool and implement storage, utilities, etc.). It is likely that the same categories will be needed in the future only varying in scale and intensity.

A series of hypothetical building elements to illustrate the use of these two ingredients are shown in Figures 67 through 74. These diagrammatic
Figure 67. Apartments or dormitory; 9,900 sq. ft.

Figure 68. Apartments or dormitory; 9,200 sq. ft.
Figure 69. Classroom and lecture room building; occupancy approx. 200.

Figure 70. Office building; 18,000 square feet.
Figure 71. Large auditorium; 49,000 square feet.
Figure 72. Elementary School; approx.
250 students, grades 1-6.
Figure 73. Guest house; 100 rooms.
Figure 74. Warehouse; 15,000 square feet.
buildings were roughly derived from the traditional set of building forms, some estimated functional requirements, and any applicable common standards of practice. Each real design situation will produce its own unique interpretation of these patterns due to the specific functional requirements, available site, budget, and designer. Therefore, these designs are only suggestions and not mandates.

Density

Density guidelines can have a major impact on the quality of the environment. A maximum allowable FAR in conjunction with building height and set-back restrictions can determine at least partially whether a district in a community becomes developed as detached homes, a local commercial shopping district, or a high-rise business district. In New Knoxville the FAR was estimated to be roughly 0.09. The FAR of the built up area at the east end of the site is about 0.12, and about 0.50 at the west end. All of these environments feel and look different at least partly because of their different densities.

Figures 75 through 79 serve to illustrate some of the spatial and physical characteristics of density as they relate to residential development within this system. They are a series of five hypothetical residential blocks at various density levels and which utilize variations on the building form pattern. They are based on either one by one, or one by two module block size. The FAR levels of 1.0, 0.50, 0.25, 0.15, and 0.075 were chosen to give a good range of variations yet remaining at less than normal urban densities. (1.0
Figure 75. Residential development; FAR = 1.0.

Figure 76. Residential development; FAR = 0.50.
Figure 77. Residential development; FAR = 0.25.

Figure 78. Residential development; FAR = 0.15.
Figure 79. Residential development; FAR = 0.075.
is fairly low FAR for urban development usually associated with townhouses, row houses, and low-rise apartments; FAR's of 10 to 15 are more common.) Again, these diagrams are only suggestions of what these density levels are like.

The spatial characteristics of these blocks are shown even more clearly by the figure-ground illustrations in Figure 80. When compared side by side it is clear that there is precious little of that wide open rural space at the higher densities. At 1.0 the buildings dominate over the space; at 0.50 the buildings still dominate but have made room for some larger spaces; at 0.25 there is about equal dominance, and at 0.15, and 0.075 space has clearly won out. Perhaps an FAR between 0.50 and 0.25 would be good to set as a maximum for this system to preserve the spatial characteristics of the rural fabric.

Figures 81 through 86 show some similar block diagrams for the non-residential uses. Figure 87 shows their corresponding figure-ground plans. The FAR levels of these hypothetical elements are as follows: office at 0.50, educational (classrooms and lecture rooms) at 0.25, auditorium at 0.15, elementary school at 0.05, guest house at 0.35, and warehouse at 0.40. The density, of course, depends on the actual siting and designs used, but again the system should probably be limited to FAR's of less than 0.50.
Figure 80. Figure-ground plans of residential blocks.

- FAR = 1.0
- FAR = 0.50
- FAR = 0.25
- FAR = 0.15
- FAR = 0.075
Figure 81. Guest house development; FAR = 0.35.

Figure 82. Office development; FAR = 0.50.
Figure 83. Auditorium development; FAR = 0.15.

Figure 84. Educational development; FAR = 0.25.
Figure 85. Warehouse development; FAR = 0.40.

Figure 86. Elementary school development; FAR = 0.05.
Figure 87. Figure-ground plans of non-residential blocks.
Block Vocabulary

The block patterns found in the rural towns basically were of three types: square, short rectangular, and long rectangular. The square block dimensions were one module square (330 by 330 feet); the short rectangular block dimensions were one module by one-and-a-half modules (330 by 495 feet); and the long rectangular block dimensions were one module by two modules (330 by 660 feet). This pattern requires locating streets every 330 feet in one direction and no more than 660 feet in the other direction. For a rural town tenure system of private individual property ownership which requires a good deal of street frontage, this amount of infrastructure makes sense. However, in a development where all the property is owned and operated by a single entity as at the site, this much infrastructure could be unnecessary. A derived block vocabulary which uses the dimensions of the rural town blocks yet requires fewer streets is shown in Figure 88. The original three rural block patterns are in the top row. Those shown below allow depths of one-and-a-half modules (495 feet) and two modules (660 feet). This expanded vocabulary will allow a greater freedom and flexibility because of the greatly increased number of combinations of different blocks possible.

Based on the service alley pattern, the other lines within the blocks define areas where building should be avoided when possible. These are areas where the development of passageways should be encouraged.

Not only will these larger blocks reduce the amount of infrastructure, but they will also allow larger internal shared open spaces to be developed.
Figure 88. Enlarged block vocabulary.
within the blocks, a pattern occasionally found in the rural towns. Figure 89 shows how such a block might be designed using a one-and-a-half module by two module block. The peripheral buildings are kept within the house zone described in Chapter Two, and the service buildings zones have become reinterpreted to allow a second layer of housing in the interior of the block. This size of development almost begins to have the character and potential of the traditional town-planning "superblock".

**Township and Range**

The Township and Range pattern provides the game board upon which the previously described elements can be deployed. This pattern has already provided the existing regular road network, the basic orthogonal fabric of the countryside, the regular, fairly predictable property divisions, and even the underlying grid of the rural towns. All the system must do is to work within these existing patterns and continue them where appropriate.
Summary

The system then that has been derived from the rural patterns discovered in Chapter Two is now basically complete (albeit somewhat loose). A system, as defined in Chapter One, is "a group of units so combined as to form a whole and to operate in unison". This derived system first of all defines a series of units or elements - at one level, building forms and types, and at another level, a block vocabulary. It also defines some rules or suggestions regarding the arrangement of these elements - densities of overall development, and built and open space zones for building configurations. With these elements and rules it is now possible to devise a strategy for applying this system to the site in such a way as to handle the major uncertainties outlined in Chapter One.
A finished completed design is not the purpose of this chapter. It is simply to illustrate the application of the patterns and rules previously described. Only through an ongoing dialogue with the actual participants in the building process and with real design constraints could such a completed design be made.

**Applying the Grid**

The first step is to overlay the 330 foot grid as shown in Figure 90. The property currently owned by The Way International is enclosed within the dashed line. The property lines fall almost exactly on the grid lines or at midpoint. The area outside this property is gridded because the actual direction and quantity of future land acquisition is currently uncertain. The grid gives a framework for this future growth.

The section lines are indicated by the heavy dashed lines. This gives a reference for locating the site within the Township and Range system.

The crosshatched areas represent woods. Their rigid orthagonality is striking. They are important space-defining elements in two major ways. First, they suggest spaces in between. That is, their edges suggest outdoor rooms and spaces, as the walls and partitions of the house by Mies (shown in Figure 91) suggest its interior rooms and spaces.
The second way the woods help define spaces is by suggesting spaces inside. Just as the figure-ground plan of the section of Paris shows how the public spaces are defined by the poche of dense built tissue of the city, the plan of the woods existing at the site shows how public outdoor spaces have been carved out of the natural tissue of the woods.
Figure 91. Rooms: interior (Mies house); exterior (site).
Figure 92. Public space carved out of solids: Paris and the woods at the site.
The open space between the woods is analogous to a blank canvas awaiting the additive process of painting, and the wood's interior to a block of stone awaiting the subtractive process of sculpting.

Assumed Direction of Growth

Although there is a significant amount of development already at the east end of the site, there are two reasons to assume that most of the future growth will be at the west end. First, the more significant amount of development to date has occurred at the west end. The total built area of the Outreach Services Center is about double the square footage of all of the development at the east end combined. Also, the proposed site of the new auditorium is towards the west end.

Second, this part of the site will give more of a "clean slate" on which to work. As per the wishes of the Board of Trustees, this will allow the old farmstead and the early buildings of the research center to remain more intact and serve as a momento to the history of the organization.

Additional Land Requirements

A second major assumption is that eventually more adjacent property can and will be acquired for future growth. Although the final area which the development will occupy cannot be predicted, some projections can be made.

At the base of this projection (and of most long-range planning pro-
jections) is an estimate of population growth. This is the basic driving variable in predicting demand for additional land.1

Currently there are about 70 students in the educational program offered by The Way International at the site. There are also about 270 staff members who are employed at the facilities. Thus, the total number of users is about 340. Plans by The Way International include adding about another 70 students in 1984, and another 260 in 1985 with the planned construction of a new dormitory.

Since some of the staff jobs can be handled by students on a part-time basis, the staff will be reduced by about 20% in 1985. Thus, by that date, the number of students is projected at 400 and the number of staff at 215 for a total of 615. Although about half of the current staff live off-grounds due to a housing shortage at the site, The Way International desires to provide housing on-grounds for all who want it. Furthermore, the increase in the student body dictates the need for more on-grounds housing oriented toward student needs. To simplify calculations, it will be assumed in the growth projections that all students and staff will live on-grounds.

A population growth from 340 to 615 in three years represents about a 22% annual growth rate. If the same rate is projected for ten years, by 1992 the population at the site will be well over 2,000. Although this rate seems unlikely to be sustained for so long, it does give an indication of the order of magnitude of growth which may occur. This is corroborated by past population growth. Assuming a staff of ten in 1962, just after the establishment of the research center at the site, the annual growth rate over the last 20 years has
been about 19%. Since 2,000 even seems today to be at the high end of growth projections, two other lower figures have been chosen for analysis of land requirements, namely 1,000 and 1,500.

According to the *Summary Report of the Shelby County Comprehensive Plan*, communities in this area develop at a density of between 6.0 and 10.0 persons per acre.² Using the high population figure of 2,000, this would require a total land area of between 200 to 333 acres. A more appropriate figure for the development of the site at a population of 2,000 would be about 178 acres. (See Appendix One for specific calculations.)

This growth projection indicates a density of about 11 persons per acre. This is higher than those densities projected by the Shelby County report perhaps because more dormitory and apartment type of living arrangements are planned for the site than normally exist in the surrounding area.

Utilizing the projected figure of 178 acres (2,000 users), and the assumption that all development will occur at the west end of the site, some possible projections of the final configuration of required land area are shown in Figure 93. This shows four different hypothetical growth projections with the 330 foot grid superimposed. They give a rough idea of the amount of land required for this size population at the given densities.

The Uncertainty of Incremental Growth

The actual increments and sequence of growth which would lead to any of these patterns is a major uncertainty faced by this project. This is one
Figure 93. Projections of future development.
of the core issues which prevents a final complete master plan from being pro-
duced at this point. This uncertainty is a major reason for producing this
open-ended design system.

Narrowing down this uncertainty to a probable set of outcomes allows
the system to handle this problem of incremental growth. Figure 94 shows the
first step in this process. It shows the west end of the property and the sur-
rounding other property divisions with the grid superimposed. The original
farm property is lightly shaded and the most recent acquisitions are darker.
Property divisions almost always follow the grid or one of its mid-points.
These parcels of land, or portions of them, are the likely candidates for future
acquisitions. Since both of the most recent property acquisitions lined up along
the grid system and were only partial parcels, future partial parcels will be
assumed to also follow the grid system. Figures 95 and 96 show some of these
possible growth increments.

Based on these projected growth patterns, Figure 97 shows a catalog of
the basic set of likely increments. This reduces the uncertainty to a fairly
well defined limited set of options. Therefore, the design system must be made
to handle this set rather than the universal set of options.

Figure 98 combines this catalog of likely growth increments with the
vocabulary of block elements developed in Chapter Three. This is only a par-
tial listing of the possible combinations of block vocabulary and increment
sizes. It does, however, begin to suggest the diversity of possible solutions
depending on the actual design conditions.

Based on these assumptions and suggestions, it is now possible to illus-
trate the use of the system. The specific site chosen for the initial growth
Figure 94. Property divisions surrounding the site with 330 foot grid superimposed.
Figure 95. Some possible growth increments: entire parcels.

Figure 96. More possible growth increments: partial parcels.
Figure 97. Catalog of likely growth increments utilizing 330 foot grid.
Figure 98. The growth increments must be divided up using the block vocabulary. This shows some of the possible combinations.
increment is the open field between the two sections of woods in the southwest corner of the existing property as shown in Figure 99. This seems a likely candidate for the first phase of growth due to its proximity to the existing Outreach Services Center and the proposed site of the new auditorium.

The chosen site contains about 1,215,000 square feet, or about 28 acres. At an FAR of only 0.15, this area would support over 145,000 square feet of new built space (excluding 20% of the site area for roads and public rights of way), which is just slightly over the 141,580 square feet of space planned to be built by 1985.
Figure 100 shows the site with the rural grid overlaid. The dark lines are the 330 foot lines and the dashed lines represent the service alley intervals. This would represent a three unit by four unit growth increment. The grid is extended into other parts of the site to allow any important connections to be made within the system.

The grid is bent slightly off of 90 degrees because Wierwille Road and Auglaize-Shelby County Road are not perpendicular. Such adjustments will probably be necessary when applying the grid to any specific site due in part to
the irregularities in the Township and Range division lines.

A part of road hierarchies was chosen and is shown in Figure 101. The basic block vocabulary defined in Chapter Three was used, employing two one by two module blocks and two one by one-and-a-half module blocks. They are arranged linearly along two major streets, one of which ties into the parcel across Wierwille Road to make a connection. Two minor streets are at the ends of the blocks which allow a connection to the existing road network. The linear pattern emanates from the large open space (perhaps the beginning of a nice public open space) in front of the Outreach Services Center. Along the way, the block pat-
tern ties into the auditorium site by means of another secondary road. This is purposely off-axis to de-emphasize and localize the connection. The minor road at the southern end of the site was placed only half of a grid unit (165 feet) away from the property line to allow development along that road to face inward toward the rest of the development and turn its back towards the adjacent open land.

This road parti illustrates the intended flexibility of interpretation in the grid system. Roads have been placed on service alley lines as well as regular grid lines. Such flexibility will give more freedom to the future designers of the site.

A land use plan was then developed for the site. Figure 102 shows this plan with a key explaining the use symbols. Because housing is presently high in priority at this facility, a majority of this new development (about 17 acres) is devoted to this use. It is at the southern end of the site to separate it from the more public oriented open space and office and warehouse complex at the northern end.

About six acres of land are devoted to educational use in the northeast corner of the site. This provides space to develop classrooms and lecture rooms adjacent to the new auditorium. It also is adjacent to the more public edge of Wierwille Road at the northern end acting as the entrance to the site, and adjacent to what would be partially student housing on the other.

About 1.5 acres of land are shown used for office across the road to connect the new site with existing development and to begin to enclose the open
Figure 102.
Land use plan of site.

Figure 103 shows a tentative site development based on this land use plan, road network, and grid layout. Buildings are based on the prototypes developed in Chapter Three. The centers of blocks are left for parking, play...
lots, and other semi-private uses as a loose interpretation of the service alley, service building, and sometimes communal space pattern found in the rural town fabric. The streets are considered important public spaces as in the rural towns, and therefore a good edge is maintained by all the buildings to help define this space. The streets are well landscaped to increase the amenity of this public area and to help separate it from the semi-private world towards the interiors of the blocks. All grid lines and service alley lines are either left unbuilt or used as walkways also to respect the pattern found in the rural towns. A buffer zone of trees is placed along the west edge of the site making the whole development more inward oriented. Eventually this space could be given over to buildings of a more public nature, but which are compatible with the adjacent residential and guest housing uses such as light commercial or recreational. This could even spread across the road to begin developing a nice edge of woods and buildings.

In the residential district the buildings located in the center block are smaller variations on the prototypical units developed in Chapter Three to allow more room for a communal space within the block. Some parking is located off-street at the ends of the block to further insulate this communal space and provide surveillance of parking areas. This residential district is seen as a close-knit set of neighborhoods developed basically around a U-shaped street pattern.

The classroom and lecture room buildings are grouped around a central courtyard. At one corner one building opens up the courtyard to receive the
connection to the auditorium. Three more educational buildings complete the east street edge adjacent to the woods.

A small public park adjacent to both the residential and educational areas provides pedestrian access and acts as an informal anteroom for both the woods and the auditorium. The space is designed as a break from the rigid orthogonality of the site with a curvilinear set of walkways and small pond carved into the edge of the woods. It also sits at the intersection of two roads to improve its access. One educational building is at the corner of the park as a pavilion-like structure.

The guest house is a variation from the prototype of Chapter Three to provide a stronger street edge and suggest a series of residential buildings turned with gable end toward the road. Perhaps it is suggestive of three connected Upright-and-wing houses. It respects the grid and service alley patterns by stepping back at those points.

This site development would provide roughly 145,000 square feet of residential space (housing for about 800 occupants at 180 square feet per person), 37,500 square feet of educational space, 60,000 square feet of guest housing space, 36,000 square feet of office space, and about 350 parking spaces (both on and off-street parking). This would give a total of about 278,500 square feet of built space, and an FAR of about 0.30 (utilizing a total site area of 1,215,000 square feet less 20% for roads and public rights-of-way). This density is clearly within the suggested maximum developed in Chapter Three to preserve the rural fabric.
By no means is this design complete. Again, a usable, realistic proposal would depend on an ongoing dialogue with all parties involved in this type of decision-making. It does serve, however, as an illustration of the design system and to show that development can be accomplished utilizing the patterns found in the surrounding rural fabric. This is much more in keeping with a desire to preserve a rural atmosphere than much of the development that has previously occurred at the site.

Figure 104 diagrammatically illustrates how this system could be used in the future growth beyond this first phase. The increments of growth are based on acquiring surrounding property parcels. The continued use of this design system in such future development would provide a strong unity of image and scale over the entire project in keeping with the context.

Of course, the use of this system is not a guarantee of good design - it would require skilled manipulation to make a beautiful and functional form. Thus, it is an open-ended system requiring careful, sensitive, and thoughtful use today and in the future, as well as agreement by all parties involved.
Figure 104. Possible future growth.

In masterplanning for long-term growth and change, there are a number of possible strategies. One is to do a complete finished design and hope that things more or less grow into this predetermined final shape. Another is to not have any preconceptions - that is, to let things grow piece by piece, hoping that each increment will be a good complete design that will function on its own, and that the whole "collage" of complete worlds will have some coherence and unity. Another strategy is to define some system of predetermined and agreed upon set of elements and rules which can successfully handle the uncertainties of growth, is open-ended enough to allow multiple interpretations by future designers, and yet lends an overall coherence and unity to the whole.

The system outlined by this paper illustrates this last strategy. The unifying concept of the whole is that of preserving the rural atmosphere. The elements and rules reinforce and galvanize this concept by being drawn from a careful observation and analysis of the surrounding rural fabric. The uncertainties of population growth, land requirements, and incremental growth are handled by narrowing them down to a set of likely outcomes, and then making the system work for these outcomes. The preliminary testing of this system is accomplished by the schematic design of a parcel of undeveloped property within the existing site boundaries.

The recommended next step is to begin a dialogue with the participants.
in the decision-making process. An agreement must be reached about these con-cepts, elements, and rules. Perhaps they need to be adjusted or tightened up a bit, and perhaps there are important pieces that have been entirely omitted.

Some specific areas that could use further study are sizes and cost-effectiveness of the building elements, definitions of streets and types of streets, installation of sewer, water, and electrical services, set-backs and hierarchies of zones at the street edge, to mention a few. Participation by architects, engineers, and administrators would be required to fully investigate some of these areas.

The process of such coordinated participation is not simple. It requires hard work and time. However, when such an agreement is reached and the decision-making criteria are systematically set forth, growth will be less of a haphazard process and will allow for the smooth resolution of conflicts.
Appendix One
CALCULATING FUTURE LAND USE REQUIREMENTS

This appendix shows how the required future land requirements for the various population projections were calculated.

Utilizing the figures of 340 current users and 615 users by 1985, and the current and projected amounts of built space, the table below summarizes the approximate current and projected land use standards at the site:

<table>
<thead>
<tr>
<th>Use Category</th>
<th>1982</th>
<th>1985</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>150 SF/user</td>
<td>180 SF/user</td>
</tr>
<tr>
<td>Office</td>
<td>170</td>
<td>130</td>
</tr>
<tr>
<td>Educational</td>
<td>90</td>
<td>100</td>
</tr>
<tr>
<td>Warehouse</td>
<td>180</td>
<td>150</td>
</tr>
<tr>
<td>Maintenance</td>
<td>90</td>
<td>50</td>
</tr>
<tr>
<td>Total</td>
<td>680 SF/user</td>
<td>610 SF/user</td>
</tr>
</tbody>
</table>

Using the larger of these figures for each category and increasing the warehouse and maintenance space by 10% over the current figure (even now there seems to always be a shortage), the table below summarizes the standards used to project space requirements:
Table 6: Space Requirement Standards for Future Development

<table>
<thead>
<tr>
<th>Use Category</th>
<th>SF/user</th>
<th>% of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>180</td>
<td>24 %</td>
</tr>
<tr>
<td>Office</td>
<td>170</td>
<td>23 %</td>
</tr>
<tr>
<td>Educational</td>
<td>100</td>
<td>13 %</td>
</tr>
<tr>
<td>Warehouse</td>
<td>200</td>
<td>27 %</td>
</tr>
<tr>
<td>Maintenance</td>
<td>100</td>
<td>13 %</td>
</tr>
<tr>
<td>Total</td>
<td>750</td>
<td>100 %</td>
</tr>
</tbody>
</table>

Other standards used to calculate future land use requirements are as follows:

Elementary Schools -
One per 350-600 students;
Minimum acreage = 5;
Desirable minimum acreage = 5 + 1 per 100 ultimate enrollment;
Preferred range of acreage = 10 - 25.1;
Required built area = 60 SF/student (from prototype design in Chapter Three);
Current and projected ratio of children to adult users at site = 0.2 children/user

Guest Housing -
Number of rooms = 10% of population (a projected increase in current levels due to increased short-term educational programs)
Required built area = 580 SF/room (from rough prototypical design in Chapter Three)
Convenience Shopping -
2/3 acre per 1,000 inhabitants;
2 SF parking per 1 SF of sales space (therefore, the total built
sales area is about 10,000 SF per 1,000 inhabitants)\(^2\)

Central Utilities Facility (local electrical and perhaps district
heat generation) -
Approximately 50,000 SF minimum

Based on these standards and the three projected population levels,
the following table shows the projected required future built area:

Table 7: Required Future Built Area

<table>
<thead>
<tr>
<th>Use Category</th>
<th>1,000 Users</th>
<th>1,500 Users</th>
<th>2,000 Users</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>180,000 SF</td>
<td>270,000 SF</td>
<td>360,000 SF</td>
</tr>
<tr>
<td>Office</td>
<td>170,000</td>
<td>255,000</td>
<td>340,000</td>
</tr>
<tr>
<td>Educational</td>
<td>100,000</td>
<td>150,000</td>
<td>200,000</td>
</tr>
<tr>
<td>Warehouse</td>
<td>200,000</td>
<td>300,000</td>
<td>400,000</td>
</tr>
<tr>
<td>Maintenance &amp; Municipal</td>
<td>100,000</td>
<td>150,000</td>
<td>200,000</td>
</tr>
<tr>
<td>Schools</td>
<td>12,000</td>
<td>18,000</td>
<td>24,000</td>
</tr>
<tr>
<td>Guest Housing</td>
<td>58,000</td>
<td>87,000</td>
<td>116,000</td>
</tr>
<tr>
<td>Commercial</td>
<td>10,000</td>
<td>15,000</td>
<td>20,000</td>
</tr>
<tr>
<td>Central Utilities</td>
<td>50,000</td>
<td>50,000</td>
<td>50,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>880,000 SF</strong></td>
<td><strong>1,295,000 SF</strong></td>
<td><strong>1,710,000 SF</strong></td>
</tr>
</tbody>
</table>

To translate these required built square footages into land area,
the following density standards were used:
Table 8: Land Use Density Standards

<table>
<thead>
<tr>
<th>Use Category</th>
<th>FAR (or other)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>0.15 (1)</td>
</tr>
<tr>
<td>Office</td>
<td>0.50 (2)</td>
</tr>
<tr>
<td>Educational</td>
<td>0.20 (3)</td>
</tr>
<tr>
<td>Warehouse</td>
<td>0.40 (4)</td>
</tr>
<tr>
<td>Maintenance &amp; Municipal</td>
<td>0.40 (5)</td>
</tr>
<tr>
<td>Elementary School</td>
<td>217,800 SF (5 acres) minimum (6)</td>
</tr>
<tr>
<td>Guest Housing</td>
<td>0.40 (7)</td>
</tr>
<tr>
<td>Convenience Shopping</td>
<td>0.33 (8)</td>
</tr>
<tr>
<td>Central Utilities</td>
<td>1.0</td>
</tr>
<tr>
<td>Roads and Rights-of-way</td>
<td>20% of total site</td>
</tr>
</tbody>
</table>

Notes from Table 8:

(1) From current density of existing residential units;
(2) From prototypical design in Chapter Three;
(3) From combination in prototypical auditorium and classroom building designs in Chapter Three;
(4) From prototypical design in Chapter Three;
(5) Due to similarity of warehouse land use;
(6) From Urban Land Use Planning, by Chapin and Kaiser;
(7) From prototypical design in Chapter Three;
(8) Derived from Site Planning, by Kevin Lynch.

By applying these density standards to the future built area requirements, the following future land area requirements were calculated:
Table 9: Required Future Land Area

<table>
<thead>
<tr>
<th>Use Category</th>
<th>1,000 Users SF</th>
<th>Acres</th>
<th>1,500 Users SF</th>
<th>Acres</th>
<th>2,000 Users SF</th>
<th>Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>1,200,000</td>
<td>28</td>
<td>1,800,000</td>
<td>41</td>
<td>2,400,000</td>
<td>55</td>
</tr>
<tr>
<td>Office</td>
<td>340,000</td>
<td>8</td>
<td>510,000</td>
<td>12</td>
<td>680,000</td>
<td>16</td>
</tr>
<tr>
<td>Educational</td>
<td>500,000</td>
<td>11</td>
<td>750,000</td>
<td>17</td>
<td>1,000,000</td>
<td>22</td>
</tr>
<tr>
<td>Warehouse</td>
<td>500,000</td>
<td>11</td>
<td>750,000</td>
<td>17</td>
<td>1,000,000</td>
<td>22</td>
</tr>
<tr>
<td>Maintenance &amp; Municipal</td>
<td>250,000</td>
<td>6</td>
<td>375,000</td>
<td>9</td>
<td>500,000</td>
<td>11</td>
</tr>
<tr>
<td>Elementary School</td>
<td>217,800</td>
<td>5</td>
<td>217,800</td>
<td>5</td>
<td>217,800</td>
<td>5</td>
</tr>
<tr>
<td>Guest Housing</td>
<td>145,000</td>
<td>3</td>
<td>217,500</td>
<td>5</td>
<td>290,000</td>
<td>7</td>
</tr>
<tr>
<td>Commercial</td>
<td>30,300</td>
<td>1</td>
<td>45,500</td>
<td>1</td>
<td>60,600</td>
<td>2</td>
</tr>
<tr>
<td>Central Utilities</td>
<td>50,000</td>
<td>1</td>
<td>50,000</td>
<td>1</td>
<td>50,000</td>
<td>1</td>
</tr>
<tr>
<td>Sub-total</td>
<td>3,233,100</td>
<td>74</td>
<td>4,715,800</td>
<td>108</td>
<td>6,198,400</td>
<td>142</td>
</tr>
<tr>
<td>Roads and Public Rights-of-way</td>
<td>808,275</td>
<td>19</td>
<td>1,178,950</td>
<td>27</td>
<td>1,549,600</td>
<td>36</td>
</tr>
<tr>
<td>Total</td>
<td>4,041,375</td>
<td>93</td>
<td>5,894,750</td>
<td>135</td>
<td>7,748,000</td>
<td>178</td>
</tr>
</tbody>
</table>

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