A NEW REGIONAL ARCHITECTURE
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A NEW REGIONAL ARCHITECTURE

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Acknowledgments

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P. 1 ABSTRACT
P. 2 THESIS STATEMENT
P. 3 SITE ANALYSIS
P. 4 CLIMATIC DATA
P. 5 DEVELOPMENT CONCEPTS
P. 6 PROPOSED DEVELOPMENT
P. 7 PROGRAM DEVELOPMENT
P. 8 INITIAL SECTION CONCEPTS
P. 9 FINAL SECTIONS
P. 10 FINAL PLAN
P. 11 STRUCTURE
P. 12 WOOD TRUSS AND CONVENTIONAL STUD FRAMING
P. 13 PURLIN FRAMING AND ROOF OVER HANG FRAMING
P. 14 ADDED STRAW BALE
P. 15 ISOMETRIC
P. 16 NORTH FACADE
P. 17 SOUTH FACADE
P. 18 EAST FACADE
P. 19 INTERIOR PERS. OF LIVING ROOM
P. 20 INTERIOR PERS. OF KITCHEN
P. 21 CONCLUSION
P. 22 BIBLIOGRAPHY

APPENDIX A
P. 23 TABLE OF ATTRIBUTES

APPENDIX B
HISTORY OF THE I-HOUSE
P. 24 SINGLE PEN
P. 25 KITCHEN ADDITION
P. 26 DOUBLE PEN
P. 28 I-HOUSE
P. 30 I-HOUSE VARIATIONS
P. 31 MISC. DETAILS

APPENDIX C
P. 32 FRANK LLOYD WRIGHT'S USONIAN HOUSE
ABSTRACT
A NEW REGIONAL ARCHITECTURE

"In the 1700's, new settlements blossomed all along the migratory trails with dwellings built according to climate, skills, available materials and most importantly, house building skills acquired from the original culture region. In the 1950's, the Neocolonial, vernacular style gained attention through plans published in home magazines and were copied in all parts of the country. Not only have contemporary suburban developments destroyed a sense of place within regions, communities and homes, they have also greatly increased in cost. Designing for climate has been replaced by an increased dependence on climate control systems, which results in increased utility bills. Cul-de-sacs have replaced green spaces and the garage has detracted from the social importance of the porch and front door and created an isolated space for residents without a sense of belonging.

A new regional architecture is an exploration of community development and residence design. It will attempt to define a small community which is more responsive to its residents by using characteristics found in many small Midwestern towns. It will also focus on a prototype residence which uses materials and our temperate climate to reduce the construction and life-cycle costs of contemporary dwellings. The design decisions are based on a combination of modern building methods with forms and concepts of vernacular architecture. Although many forms of vernacular architecture exist in the Midwest, I focused on the I-house. I was intrigued by its simplicity. The square room with a fireplace is the building block for which the rest of the structure is based. The Usonian house, by Frank Lloyd Wright, is another design I explored. This concept placed an emphasis on affordability. Like the I-house, the Usonian house took advantage of the climate and used a simple additive block form for the plan.

The intent of this thesis is not to recreate the past. It is however, an attempt to learn from the past and create the sense of place which is missing in today's world.

Lester Walker American Shelter: The Overlook Press, 1981
In society today old is synonymous with bad. Older, local forms and concepts have become discredited and replaced. At the same time there seems to be a lack of community, of collective activity, of public space and of traditional values. Technology has allowed modern architecture, especially in the area of homes, to become a process of assembling machine made parts. These new, mass produced communities are thus created to meet the standards of average taste. It regards architecture as an application of fashion and style. Technology is used for technology sake and is consumed rather than designed. I believe that architecture should be a hybrid of vernacular principles and modern technology. This concept should satisfy society’s desire for modernity without losing a sense of tradition or culture within a region. We should allow what is already built to instruct us rather than abandon it.

The idea of using the vernacular as a guide for modern house design came when I realized the amount of home people can afford becomes less with increased utility bills. To reduce utility bills, I looked to those dwellings built without climate control technology. I explored the I-houses in Centerville, Indiana and found a sense of place inherent within the building’s ability to work with the climate. I soon realized that modern society would not readily adapt to the livability within an I-house. I looked to Frank Lloyd Wright and Christopher Alexander for a more up-to-date form of natural climate control and sense of place. This led to a list of attributes, from the three sources, that I could use as a palette for modern design. The concept became one of using vernacular technologies, without disrupting what society had come to expect from a home. I also used a surrogate client as a source for the needs and wants of a family today. I wanted the design to adapt to the resident instead of the resident adapting to the design. This too, became a category in my Table of Attributes (see Appendix A).

I next found a proposed residential development on the South side of Indianapolis and decided to further my exploration of regional design at the community level. The intent was to design the community using concepts from most small towns in Indiana, while maintaining a plan similar to the developer’s original ideas. I concluded that in order to be accepted by the future residents and the developer, it must remain feasible.

My process became one of design build, within the computer environment, in order to work out details and concepts of combining vernacular and modern methods and materials. The following pages consist of this process and the search for a solution to a sense of place defined by the climate, the culture, the past, the present and the future. A new regional architecture.
The site of my proposed community development is located in Center Grove on the South side of Indianapolis. It is bordered by a lake to the South, a high school to the North, a baseball field to the East and an existing row of houses to the West. The area surrounding this site is rural and not yet fully developed.
**CLIMATIC DATA**

<table>
<thead>
<tr>
<th>Solar radiation in Langleys (gram cal. cm²)</th>
<th>JAN.</th>
<th>APRIL</th>
<th>JULY</th>
<th>OCT.</th>
</tr>
</thead>
<tbody>
<tr>
<td>150</td>
<td>375</td>
<td>525</td>
<td>275</td>
<td></td>
</tr>
</tbody>
</table>

| Mean monthly sunshine (hours) | 120 | 230 | 340 | 220 |

| Mean monthly precip (inches) | 3"  | 3"  | 3"  | 3"  |

| Monthly dew pt. temp. | 25F | 40F | 65F | 45F |

| Relative humidity (%) | 70% | 60% | 60% | 70% |

| Mean monthly wind | 2 SE | 2 NE | 2 N | 1 NE |

| Ave. monthly temp. | 25F | 55F | 75F | 55F |

**DEGREE DAYS**

- Annual cooling degree days (above 65) 1500F
- Annual heating degree days (below 65) 5500F

**SUN ANGLES 40 N. LAT.**

<table>
<thead>
<tr>
<th>DEC. 22</th>
<th>Azimuth</th>
<th>Altitude</th>
<th>JUNE 22</th>
<th>Azimuth</th>
<th>Altitude</th>
</tr>
</thead>
<tbody>
<tr>
<td>noon</td>
<td>180</td>
<td>26</td>
<td>noon</td>
<td>180</td>
<td>73</td>
</tr>
<tr>
<td>1000 - 1400</td>
<td>150</td>
<td>20</td>
<td>1100 - 1300</td>
<td>138</td>
<td>69</td>
</tr>
<tr>
<td>0800 - 1600</td>
<td>127</td>
<td>5</td>
<td>1000 - 1400</td>
<td>114</td>
<td>60</td>
</tr>
<tr>
<td>0730 - 1630</td>
<td>121</td>
<td>0</td>
<td>0800 - 1600</td>
<td>89</td>
<td>37</td>
</tr>
</tbody>
</table>

The data collected for my site was used to calculate glazing area and location, roof and porch overhangs, amount of thermal mass and building orientation.
The initial concept for the development (fig. 1) was an attempt at creating a cluster of dwellings which would become the prototype for the rest of the community. The intent was to wrap an alley system around the cluster for detached garage access, provide a shared green space between the street and houses and to bring the sidewalk close to the front porches.

Further development (fig. 2) tried to maintain the developer's cul-de-sac idea while adding the shared green space, alley system, and sidewalk / porch relationship.
The final design incorporated original concepts of alley access, shared green space, sidewalks and the developer's intended number of lots (fig. 3 and fig. 4). Instead of a cul-de-sac a narrowed one way boulevard provides each lot with front access and encloses each of the centered green spaces. The boulevard is curved to slow traffic and provide a variety of experiences.
### APPROX. ROOM SIZES
### ACCORDING TO CLIENT FURNITURE PLACEMENT

<table>
<thead>
<tr>
<th>ROOM</th>
<th>SIZE</th>
<th>LGTH</th>
<th>X</th>
<th>WDTH</th>
<th>SQUARE FOOT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Living room</td>
<td>28</td>
<td>X</td>
<td>15</td>
<td></td>
<td>420</td>
</tr>
<tr>
<td>Kitchen</td>
<td>12</td>
<td>X</td>
<td>8</td>
<td></td>
<td>96</td>
</tr>
<tr>
<td>Pantry</td>
<td>5</td>
<td>X</td>
<td>5</td>
<td></td>
<td>25</td>
</tr>
<tr>
<td>Child room</td>
<td>12</td>
<td>X</td>
<td>11</td>
<td></td>
<td>132</td>
</tr>
<tr>
<td>Child room</td>
<td>12</td>
<td>X</td>
<td>11</td>
<td></td>
<td>132</td>
</tr>
<tr>
<td>Mstr. bedrm.</td>
<td>15</td>
<td>X</td>
<td>17</td>
<td></td>
<td>255</td>
</tr>
<tr>
<td>Mstr. bath</td>
<td>20</td>
<td>X</td>
<td>8</td>
<td></td>
<td>160</td>
</tr>
<tr>
<td>Mstr. closet</td>
<td>8</td>
<td>X</td>
<td>8</td>
<td></td>
<td>64</td>
</tr>
<tr>
<td>Bath</td>
<td>8</td>
<td>X</td>
<td>8</td>
<td></td>
<td>64</td>
</tr>
<tr>
<td>Utility</td>
<td>12</td>
<td>X</td>
<td>8</td>
<td></td>
<td>96</td>
</tr>
<tr>
<td>Garage</td>
<td>26</td>
<td>X</td>
<td>23</td>
<td></td>
<td>598</td>
</tr>
</tbody>
</table>

**TOTAL**

| LOT SIZE | 160 | X | 100 | 16000 | 0.37 | Acres |

*fig. 6*

### CLIENT PROGRAM

- **Living room**: Most time spent here, display decorative items, fireplace, desk area
- **Kitchen**: Lighting, storage, open to living room, big window, cntr. island, nook for family eating
- **Children rooms**: Accessible to L. R., homework area, connected to each other
- **Mstr. bedroom**: Away from kids room, with view
- **Mstr. bath**: Double sink, separate toilet area
- **Bath**: Tub closed off, double as guest bath
- **Utility**: Near baths, double as mud room, next to back entrance or garage
- **Closets**: Many in all rooms, lots of storage

*fig. 7*

My surrogate client provided me with a detailed description of an average day in the life of her family from which this program was derived. (fig. 6 and fig. 7)
I made an early decision to combine straw bale as a wrap around a masonry pier structure. The straw bale provides an R-42 insulation value on the North, East, and West sides of the residence. These sketches (fig. 8) are preliminary concepts for construction using these materials and were used in an effort to determine the form of the structure. It was an exercise in manipulating known methods of straw bale construction to fit my intended use.
The final sections (fig. 9) are details of material connections for the straw bale construction and conventional stud framing. This became my palette in determining exterior elevations and building form.
The residence is a single story structure with a heightened ceiling over the living area to accommodate the clerestory windows. The ceiling height is 12' over the living area, and 8' throughout the rest of the house. This is in keeping with standards found in L-houses for primary and secondary spaces. The plan is an L-shape to provide exterior enclosure for the backyard and to increase southern exposure for passive solar heating. (fig. 11) This footprint was often used in the L-house and in Frank Lloyd Wright's Usonian house (see Appendix B and C). The front yard was eliminated and the porch is in close proximity to the sidewalk. The garage is detached, accessed by the alley and helps create a sense of enclosure. (fig. 10)
The structure consists of masonry piers and a slab on grade. These also provide thermal mass to store and release heat and help control interior temperature swings. I used a rubble trench footing to support the straw bale wrap. This is a vernacular foundation technique which does not require digging below the frost line, thereby saving on concrete costs.
WOOD TRUSS AND CONVENTIONAL STUD FRAMING

2 x 4 wood trusses were placed 3' on center to provide support for the straw bales. Conventional stud framing was used for the South facade and interior partitions.
PURLIN FRAMING AND ROOF OVERHANG FRAMING

2 x 4 purlins were placed vertically, 2' on center, to provide a nailing surface for the 1/2" thin brick exterior and gypsum board interior. Framing was placed on the interior of the outside wall to provide a bulkhead for HVAC and recessed lighting. It also serves as a light shelf for the clerestory windows in the living room. Framed awnings were used to provide an overhang over the porch and to prevent unneeded southern exposure. Framing was also used as overhang extensions for the Alpine truss system roof (NOT SHOWN) providing continuity in the roof line.
Straw bales were used for their durability and insulation qualities. (R-42) Tests show that straw bales are less likely to burn than wood and can possess a compression strength comparable to concrete. It is also a by-product and relatively inexpensive depending on location.
A low-pitch hipped roof was used in keeping with many Midwest vernacular styles. It provides a perimeter overhang, is easily constructed with a pre-manufactured truss system and is predominantly used by the adjacent houses. Thin brick was used to clad the straw bale fill. It provides the aesthetic quality and durability of real brick but is less labor intensive, making it more cost effective.
CONCLUSION

Vernacular architecture, dwellings built by the inhabitants, have the potential to offer a palette of principles to which we can return and absorb into our modern way of thinking. We can learn from patterns and trends, that those before us used in dealing with the climate, protection and socializing with others. In dealing with these issues they inherently created a sense of place within their community and within their region.

These are qualities which we try to copy with concepts like plastic shutters, fireplaces, and undersized porches. The question is, why not understand the concepts and use them to their fullest extent? Materials and methods of vernacular construction can also be analyzed for possible contemporary uses. The rubble trench footing has been tested and used for hundreds of years, it is more cost effective and uses less material than a contemporary small structure. Straw bale construction has also been used and tested for centuries and found to be a very cheap and durable building material. There are many examples which may not appear as obvious as materials and methods. They include window size and placement to provide light, ventilation and heating which is not controlled by a switch. Porches, which were often used as an extension of the house and place for gathering with friends has been reduced to a stoop. Fireplaces which brought the family together are now a decorative element stuck in a corner. The idea is to use these valuable precedents as a tool or a foundation from which we, as designers, can create structures responsibly. Too often, we look at precedents for stylistic and aesthetic reasons and overlook the functionality, the details and concepts. I believe it is this functionality which creates the quality of the space.

An understanding and manipulation of vernacular architecture, to coincide with changing modern culture, creates a sense of place and makes all contemporary structures a new regional architecture.


Frank Lloyd Wright *The Natural House*, 1927


<table>
<thead>
<tr>
<th>FEATURE</th>
<th>I-HOUSE</th>
<th>FLW</th>
<th>C. ALEX</th>
<th>CLIENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIREPLACE</td>
<td>focus ea. room</td>
<td>focus of house - organization</td>
<td>181. the fire</td>
<td>sunk space in living room</td>
</tr>
<tr>
<td>CIRCULATION</td>
<td>central hall</td>
<td>free plan 1st floor</td>
<td>131. flow thru rms.</td>
<td>central passage and along</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>132. short passage</td>
<td>exterior wall</td>
</tr>
<tr>
<td>WINDOWS</td>
<td>large windows - tall</td>
<td>corner window (visual effect for</td>
<td>159. light on two sides</td>
<td>light on two sides, north</td>
</tr>
<tr>
<td></td>
<td>windows/clg. hgt. for</td>
<td>small spaces- walls of french</td>
<td>(if 1 than high clg.)</td>
<td>clerestories, south floor</td>
</tr>
<tr>
<td></td>
<td>day lighting</td>
<td>doors) clerestory on North</td>
<td>128. indoor sunlight; 1:1.4</td>
<td>to clg glazing</td>
</tr>
<tr>
<td>L-SHAPE</td>
<td>additional bldg. form</td>
<td>polliwog (additive) enclose</td>
<td>106. positive outdoor space;</td>
<td>l-shape, u-shape, in-line pos.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>outdoor patio</td>
<td>105. S. facing outdoors;</td>
<td>outdoor space, S. facing</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>107. wing of light (20-25' deep);</td>
<td>courtyard</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>115. courtyards that live</td>
<td></td>
</tr>
<tr>
<td>ROOF</td>
<td>gentle slope /gable</td>
<td>flat or gentle slope hip/gable</td>
<td>116. cascade of roofs (lower</td>
<td>low pitched hip roof,</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>towards the edge); 117.</td>
<td>sheltering roof</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>sheltering roof (live within</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>volume)</td>
<td></td>
</tr>
<tr>
<td>ELEMENT PROTECT</td>
<td>shutters</td>
<td>broad overhangs</td>
<td>130. entrance room; 117.</td>
<td>broad overhangs, entrance room</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>sheltering roof; 119.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>arcades</td>
<td></td>
</tr>
<tr>
<td>CAR CONNECT</td>
<td>detached garage</td>
<td>car port - overhang of roof</td>
<td>113. car connection</td>
<td>attached garage, or car port</td>
</tr>
<tr>
<td>KITCHEN</td>
<td>one room large fireplace</td>
<td>kitchen- as alcove of living room/</td>
<td>139. farm house kitchen;</td>
<td>kitchen as alcove of living room,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>as ventilating feature</td>
<td>182. eating atmosphere;</td>
<td>cooking layout</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>184. cooking layout</td>
<td></td>
</tr>
<tr>
<td>HEATING</td>
<td>sun and fire</td>
<td>gravity heat</td>
<td>230. radiant heat</td>
<td>active, passive solar, auxiliary heat</td>
</tr>
<tr>
<td>BUILT-IN FURN.</td>
<td>thick walls - closets either side of</td>
<td>seating, shelves, closets</td>
<td>180. window place; 197. thick</td>
<td>thick walls, built in seats and</td>
</tr>
<tr>
<td></td>
<td>fireplace</td>
<td>between rms.</td>
<td>walls; 198. closets between</td>
<td>shelves in living rm. and</td>
</tr>
<tr>
<td>CLG. HEIGHT</td>
<td>front ea. room 10-11' - back 7-8'</td>
<td>human scale- 12' cntr. of living</td>
<td>168. ceiling height</td>
<td>clg. height, high ceiling in</td>
</tr>
<tr>
<td></td>
<td></td>
<td>rm. brought down around edges</td>
<td></td>
<td>center low around edges</td>
</tr>
</tbody>
</table>
APPENDIX B

History of the I-house:
Single Pen

The log cabin was introduced to America by the Swedish immigrants in Pennsylvania. After 1710, the Germans and Scotch-Irish began building this Swedish form. It was easily built from indigenous materials and provided natural insulation by way of the thick wooden walls.

These groups migrated to North Carolina, where the single pen style became a cultural fusion of building practices and social patterns. These log dwellings were usually built by an unpaid community effort and became the most common type of folk house. Within this one room, specialized spaces were conceptually divided up for cooking, dining, gathering and sleeping. (fig 1)

(fig. 1) plan of one room log cabin or single pen
The need for more living space separated the kitchen from the main room. This was accomplished as an ell or shed addition to the single pen or as a detached outbuilding. (fig. 2 and fig. 3) With the separation of the kitchen, the single pen structure or space where most domestic activity occurred became known as the "Big House" and later the "Living Room".

fig. 2 (variations on kitchen additions)

fig. 3 (photograph of a single pen dwelling with a detached kitchen)
Double Pen

1640 ONE-ROOM LOG CABIN, DELAWARE RIVER VALLEY

1740 LOG SADDLEBAG CABIN, OHIO RIVER VALLEY

1840 LOG DOGTROT CABIN, SOUTHERN APPALACHIANS

Fig. 4 (variations of the single and double pen types)

Fig. 5 (plan and elevation of the dog trot)

The Double Pen is an example of a reorganization of spatial use within a retained traditional form. It consisted of two adjacent single pen structures sharing a common wall and each having a fireplace. It could be one or two stories, depending on necessary space. The new addition was called a parlor and used for formal entertaining while the other room remained the general purpose space for the family. The kitchen remained a separate space, usually as an attached ell. Because of cultural patterns, early examples had two front doors. This prevented guests from entering directly into the family’s living space.
Double Pen

1675 ONE-ROOM COTTAGE, PENNSYLVANIA

1700 ONE-OVER-ONE COUNTRY TOWNHOUSE, PENNSYLVANIA

1730 ONE-OVER-ONE WITH ADDITION, PENNSYLVANIA

fig. 6 (variations of the Pennsylvania single and double pen)

At the turn of the century, spatial use began to change and the parlor became a bedroom. The main space became a sitting room and functioned as a parlor as well as the family's living space.

The dogtrot is a variation of the double pen where each single pen was separated by an open passage way. It was thought of as a single pen connected to a kitchen by a covered walkway. (fig. 5)
The single pen and double pen evolved to an addition of another full floor making a two story dwelling known as a one over one. (fig. 6) Around 1730, this two story structure grew wider with new rooms built to one side and the addition of another set of windows. This early form usually had an asymmetric front facade. (fig. 7) In 1750, the facade became symmetric with the addition of a central passage. This building type is often referred to as an I-house because of its popularity in Iowa, Illinois and Indiana late in the 18th century. (fig. 8 and fig. 9)

In North Carolina the Georgian derived I-house was connected to the social and economic diversity within the region just before the civil war. These structures were commonly framed and a product of hired labor. The I-house usually consisted of four rooms with an impressive facade, making it look much larger than it actually was. It created a formalization of spatial relationships with the front door opening into a hall and became a symbol of the rural elite. After the war this building type found acceptance with the middle class but was not compatible with traditional spatial uses. Sometimes one wall of the passage was removed to create two unequal sized rooms or three doors were incorporated for frontal access to each space. In other cases the stairway was moved from the passage and this space became the formal room.
The town of Centerville is located in Southeastern Indiana along U.S. 40 or what used to be the National Road. It was settled by the Germans migrating from Pennsylvania who brought cultural building practices with them. The original structures were small I-house style dwellings made of a combination of framing and masonry construction. These houses did not front the National Road. The National Road was originally 100 ft. wide and was narrowed in 1832 as professionals moved into the community. The trend was to build new I-houses as additions, perpendicular to the original structures, out into the road. These structures were usually larger than the original and connected to one another creating row houses along the main road.
I-House Variations

These additions were used as places of business while the original dwelling remained the principle living space. Archways were incorporated into the street facade to provide alleyes or access between the original structures. As in other early communities, the building's size, materials used and amount of detail, differed but the original I-house concept remained.
APPENDIX C
Frank Lloyd Wright's
Usonian house

The Usonian house was
developed by Frank Lloyd Wright as his
answer to America's housing problem.
He referred to it as a pollywog shape,
with the spacious living area as the
body and the other rooms as the tail,
which could grow as necessary. It had
simple form but followed his open plan
concept. He used many alternative
methods of construction in order to
keep the cost down. One such method
was the rubble trench footing, which
allowed the footing to be poured above
the frost line.