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Recycling the Family Farm: *exploring implement architecture*

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The relationship between farmers and the land is a conflict of ecological conduct. Current agro-industrial landscapes have distorted the contextual relationship between artificial and natural landscape signifiers. As a result, contemporary agricultural models have become ethically deficient, producing unified monocultural cultivations in place of once diverse networks of polycultural ecologies. The stability of agricultural communities can no longer be seen as an isolated rural problem. At the cultural expense of damaged environments, depopulating communities, decomposing buildings, and faded traditions, agro-industries have extracted vast amounts of wealth from rural areas. As Wendell Berry wisely said, “Eating is an agricultural act.” A simple but illuminating message; we are all a part of the rural communities that grow our food; we need to become accountable for the effects our purchasing and eating has on the agricultural environment.

More than any other input, technology has overwhelming reshaped how and what farms produce. New technologies delivered to farms need to be inherently architectural; derived not from physical objects such as devices, implements, and buildings but from the social patterns that objects generate, along with the displacement of activities that such patterns produce.

This thesis establishes architectural strategies for restoring social and ecological resilience within agricultural communities. It defines alternative ways of thinking about farm ecologies as a methodology for architectural alterations to the existing rural landscape. These ideas are applied to the [re]design of a once productive family farm in Northern Minnesota, generating a catalog of potential architectural alterations intended to restore sustainable production, ethical determinism, and cultural significance to the working farm-landscape.
To Traci, for her unfaltering confidence and support. You are truly the foundation of my efforts.

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Figure 1.1
Family photograph of turn of the twentieth century Minnesota classic farmstead.
Chapter 1
from Self-Sufficiency to Agricultural Efficiency: a historical account of Minnesota farm development.

“We live in a country of small farms... a country in which men cultivate with the own hands, their own fee simple acres: drawing not only their subsistence but also their spirit of independence and manly freedom from the ground they plow. They are at once its owners, its cultivators, and its defenders.”

Daniel Webster, 1840

“By avarice and selfishness and a groveling habit, from which none of us is free, of regarding the soil as property, or the means of acquiring property chiefly, the landscape is deformed, husbandry is degraded with us, and the farmer leads the meanest of lives. He knows nature but as robber.”

Henry David Thoreau, 1854

The nineteenth century produced, for many underprivileged persons, the fulfillment of a common dream—to own land, and by their labor to benefit from its cultivation free from exploitation. The opening of the American West provided opportunity to any individual willing to risk the dangers of the frontier. The first plows to open furrows on the prairie landscape of western Minnesota arrived between 1850 and 1870. Their arrival released the virgin fertility of the northern plain states, exposing the Minnesota wilderness to the ox and plow and redefining the organization of its landscape. Entrepreneurial settlers swarmed upon the landscape, extracting its stored wealth. These people wanted to farm, to raise and provide for a family. Through these early frontier’s people the image of the American farmer was forged; a romanticism of presumed virtues that include thrift, self-sufficiency, authenticity, common sense, and integrity. A symbolic image of contrast held against the decadence of urban existence. An image that is often too easy to stake one’s self to; too easy to be blinded by its nostalgia; too easy to forget that the current condition does not result out of the absence of this image but as a result of it.

Today the architectural remnants of these early farms stand isolated in the endless fields of the agro-
Figure 1.2 *left*

Figure 1.3 *below*
Horse drawn swathing machine cutting wheat rows.
industrial landscape; a series of deteriorating headstones marking the swiftly strangled family farms that once signified its identity. To a passer byre they are the fading memorials of a way of life that extended beyond the motivations of capital growth, an evidence of creative destruction. Such glaring irony has potent effects on those viewing the constructed landscape of the American Midwest.

1. Subsistence Agriculture: 1862 - 1873

The seeds of this destruction were not sown by farmers riding diesel-powered tractors, but by those hand-guiding oxen drawn plows. The earliest cultivations in Minnesota ranged from 1862 to 1873. These early beginnings were seen as subsistence agriculture, settler's focused their efforts on establishing the essential frameworks for survival. Few however, were truly self-sustaining. Instead most bartered or traded with other farmers, local stores, or Native Americans. Early farmers mastered the basics of wheat production and used their excess harvest to procure the other goods needed to survive.

2. Classic Agriculture: 1874 - 1893

The period from 1874 to 1893 is designated as the Classic Agriculture phase of Minnesota farm development. The ideal site for a classic Midwestern farmstead was on a broad slightly sloping hill or rise. The locations of the buildings on the farm plot were varied based upon the farmer's intentions. Those primarily concerned with technical efficiency would locate the farmstead at the center of the property, making it equidistant from all of the farm fields but placing it at the end of a long drive. Those seeking a more socially oriented existence would locate the buildings at the edge of the property, allowing the family members to look out at neighbors and view those traveling along the country roads. Maximum sociability was achieved by placing the farmstead at the corner of the property along the crossroads. This would provide views to multiple country roads and place the farm within a short distance of other socially like-minded farm families. During this period, the main technological advance was the replacement of oxen with horses. Implements once made of wood and cast iron were replaced by light and sturdy steel upgrades made in urban factories. Horse drawn implements allowed farmers to work at horse speeds. More land could now be cultivated with same amount of labor, allowing farmers to produce nearly twice as much surplus grain in 1890 as in 1870. Farmers diversified their production to raise hay, corn, oats, barley, flax, cattle, hogs, poultry, and dairy cows along with their wheat and began establishing
conventions for the commercial and social systems they had developed.9

3. Early Agricultural Disintegration: 1893 - 1935

The disintegration of Minnesota agriculture began with the Panic of 1893 and continued to erode away through the Great Depression. The national economy moved away from the institution of family farm and toward industries driven by middle class suburban consumerism. Farming changed from a complete way of life to highly specialized production systems focused on profit and optimization. Farmers put themselves more at risk by deploying overspecialized technology to cultivate vast quantities of a limited number of cash crops. The tractor took root in the 1920’s, followed shortly after by rural electrification; both reduced the amount of redundant work required to maintain life on the farm. Both also reduced the amount of direct contact the farmer had with the land; decision-making shifted from an artisanal to a scientific model.10 The knowledge contained in artisanal farming was traditionally passed farmer to farmer. It relied on sensorial experiences and intimate knowledge of the farm as holistic organism. Scientific decision-making relied on equations, textbooks and farm manuals. It isolated individual farm components and provided solutions without consideration for the system as a whole. In so doing, industrial agriculture matured and family farming dissolved; the classic way of rural live was effectively dead, self-sufficiency, replaced by production efficiency.11

4. Agro-Industrialism: 1935 -

From 1935 to the present the social make-up of the farm has continued to [d]evolve along the path of production efficiency. Farms continue to grow larger in accordance with the government policies enacted to help farmers during the Great Depression. Now they form the primary incentives behind the growth of large monocultural farming operations. The continued development of improved farm equipment, chemical farm controls, and genetic plant and animal modification means that fewer people are required to produce the food quantities needed to feed the world’s growing populations.

*Improved farm equipment* has had unprecedented effects on the number of individuals needed to adequately plant, cultivate, harvest, and manage livestock on industrialized farms. The development of self-propelled and pull-behind farm implements meant that nearly all of the labor-intensive actives associated with farming were quickly replaced by expensive equipment.
The development of chemical agriculture changed the historical make-up of farming. Crop production became a factor of external inputs rather than a result of sustainable land management. Livestock practices quickly followed pace with the introduction of steroids and antibiotics. Livestock treated with antibiotics could survive housing densities that would otherwise result in rapid disease transmission among the tightly packed animals. The introduction of steroids to livestock diets development decreased the time it took farmers to bring animals to market, and resulted in completely unnatural animal growth development.\textsuperscript{12}

Genetic engineering took production efficiency one-step further. By breeding animals (pollinating plants) together in isolation for desired traits, engineers yielded a limited variety of plants and animals whose production potentials far exceeded those of natural varieties.\textsuperscript{13} The result was unprecedented crop and animal yields at the cost of unthinkable reductions in overall farm diversity.

Conclusions and Applications

This simplified historical account is meant to contextualize the anticipated difficulties facing the application of the ideas explored in this thesis. It is apparent that farming has developed along industrial lines; its development up until now, purely directed at obtaining increased efficiency. Resisting the nostalgic images of the classic family farm is not an easy task considering the effects agro-industrial farming has on rural the way of life. Nostalgia neglects the fact that it is neither possible, nor desirable, to return to an imagined preindustrial condition. The following chapter examines the individual components of these images, and establishes a better understanding of the successful principles and avoidable failures that can inspire alternatives for contemporary agriculture.
(Endnotes)


4 Roger Jager, 16

5 William G. Gabler, 17


7 William G. Gabler, 25-26

8 Paul K. Conkin, 3


10 Ibid., 17

11 Ronald Jager, 26

12 Paul K. Conkin, 116

13 Ibid., 121
Figure 2.1
Aerial photograph showing the orthogonal divisions of farmsteads and fields. The Jeffersonian grid subdivided land parcels into one mile by one mile squares which were then typically divided into four 160 acres farm plots. Shelterbelts were planted along the north and west edges of the farmstead to protect the buildings from frigid winter winds.
Chapter 2
Field Objects: Classic Minnesota Farm Structures

The buildings are all womanly. Their roofs are like the flanks of mares, the arms and the hair of wives. The future prepares its satisfaction in them. In their dark heat I labor all summer, making them ready. A time of death is coming, and they desire to live. It is only the labor surrounding them that is manly, the seasonal bring in from the womanly fields to the womanly enclosures. The house too yearns for life, and hot baths come to it out of the garden and the fields, full of the sun and weary. The wifeliness of my wife is its welcome, a vine of yellow flowers shading the door.¹

Wendell Berry, 1967

The Organization of the Farm

The house and barn were the two most important farmstead structures. Neither, was however, the spatial or activity center of the farm. In Benjamin Gianni’s analysis of farms, he compared the prototypical American farmstead to the traditional European farm model. He observed that the European farm acted as a compound. Buildings were organized around a central open-space that created a closed farmyard. American farms tended to be open-ended and loosely organized. Buildings were placed within a centralized opening and tended to resist axial alignment making the definition of the farmyard, loose, at best. The American farmstead was developed as a series of disparate objects programmatically linked into a loose collective of buildings.² Though not formally organized, spatial trends still existed. For example, barns tended to be located in diagonally from the farmhouse in a loose attempt to contain the sprawling farmyard.³ The shelterbelt was always located on the north and west edges of the farmstead. It consisted of several rows of trees, often retained when the land for the farmstead cleared and provided protection from harsh winter winds.
Figure 2.2  *top left*
Hay loft of typical plank barn

Figure 2.3  *middle left*
Typical Midwestern gambrel roofed barn, Ohio

Figure 2.4  *middle right*
Typical Midwestern gambrel roofed barn, Minnesota

Figure 2.5  *bottom*
Typical Midwestern bank barn, Minnesota
**The Barn**

At this time the barn was the architectural edifice on the farm. At this time the farm was primarily horse powered. The amount of work done on a farm was dependant upon the number of horses the farmer owned. The larger the barn the more horses a farmer could own because he could store more hay. The most common kind of barn built in Minnesota during the late 19th and early 20th century was the gambrel-roofed, plank barn. This was a two-storied structure that housed hay on the second floor and reserved use of the first floor for milking cows, housing horses and livestock, and storing machinery. These barns were generally sized at around thirty-four by forty feet with approximately sixteen foot tall side walls. The end walls sprung to about thirty feet under the gambrel. If site conditions were appropriate a bank barn was often built. Bank barns also consisted of at least two stories but were dug into sloping sites, which allowed the second floor to be accessed by either cart or tractor. Four sloping planes were raised in a high arch atop the sidewalls to form the roof. Ideally the pitch of the lower two planes was 60° and the pitch of the upper two planes was 30°. This allowed for maximum storage capacity and provided efficient water and snow shedding. The roofs protruded beyond the end wall by approximately six feet and contained a hoist or pulley that was used by farmers to lift hay into storage. Walls were typically clad in pine siding and roofs with pine shingles. William Gabler, described in detail the construction of this type of barn.

“All the materials used in barn construction were standard dimension lumber… Barns were built of two-by-six inch wall studs and roof rafters. The two-by-twelve inch floor joists lay on eight-by-twelve inch girders that rested in turn on eight by twelve inch posts. Both posts and girders were built by spiking together four two-by-twelves. They were called plank barns because nothing larger than two-by-twelve inch planks was needed to build them.”

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Figure 2.6  left
Wooded out buildings at a farm in northern Ohio

Figure 2.7  right
Outbuildings on Minnesota farm showing their decentralized organization and loosely defined farm court.
The Outbuildings

In addition to the barn, Gabler accounted for six other basic outbuildings typically found on farms. These included the granary, hoghouse, henhouse, machine shop, corncrib, and outhouse. The granary was a rather tall, square building, and contained three to four internal wooden bins used to store various types of grains grown by the farmer. The elevated height of the structure made unloading grain after storage relatively easy through a gravity feed system that consisted of operable slats located at bottom of the pitched storage compartments. The corncrib had a similar storage function but was slightly shorter than the granary. Its assembly was more open than then the granary. Unlike the granary’s storage compartments, which were clad solid to prevent leakage of small grains, corncribs were open clad with either metal screen or narrow wooden slats that allowed air to circulate through and dry the cob corn stored in the crib. The henhouses and hoghouses respectively housed their namesakes. As artifacts they illuminate how farmers thought about their livelihood and the benefits of husbandry. Relatively small in size, and inefficient in terms of the amount material used to enclose such small spaces when compared to larger barns, they are the inefficient necessities farmers used to achieve self-sufficiency. The hoghouse was placed downwind from the farmhouse, adjacent to the barn. The henhouse was placed at an intermediate distance from the farmhouse to allow easy egg gathering. It was the most recognizable outbuilding due to the large number of windows it required to provide ample light and ventilation for the hens. The machine shed was placed adjacent to the farmhouse and varied greatly in size and complexity, dependent on farmers’ skills and desire to fix their own equipment. The outhouse was the smallest of the out buildings, and unlike the rest it was not located within the farmyard but in between the farmhouse and the shelterbelt.6
Figure 2.8

Typical classic Minnesota “L” shaped farmhouse.
The Farmhouse

Like the barn, the farmhouse played a critical role in the daily operation of the farm, and was the center of domestic and social activity. Farmhouses were typically modest structures, lacking any ornament or decoration; a reflection of the values held by those who built and lived in them. The most recognizable characteristic of these houses was their shape. Earliest farmhouses were rectangular as a result of the materials from which they were constructed. Log construction was typical and resisted the effort required to construct corners, both out of material and spatial efficiency. Farmers retained this simple rectangular form and applied it to their new lightly framed rectangular gable roofed houses. These early classic structures were quickly out grown as higher grain yields allowed families to grow larger. To account for the increased spatial requirements farmers built additional rooms at right angles off of the original house creating a newly shaped “L-House”. Like the configuration of buildings in the farmyard, these new additive farmhouses lacked a holistic formal structure. Rather, they took on the disparate language of the farmstead in general; each volume contained a separately programmed space and was joined together by the functional requirements of the house. The evolution of the L-House design incorporated thousands of variations since the shape of the structure was derived from programmatic necessity rather than a formal idea. Each example is unique, derived from the individual needs of the family that built it.
Figures 2.9 - 2.14 from top left to bottom left
Equipment

Two things – the farmer, and the farmer’s application of tools implemented to create a desired affect on the land, reshaped the frontier into the world’s most productive farmland. During this brief period, agricultural technology gave way from oxen-powered machinery, to horse-powered machinery, to tractor-powered machinery. The implications of these changes are discussed at length throughout this thesis; this section is specifically concerned with the devices themselves. The amount and variety of farm equipment defies adequate documentation, what is within the scope of this research is the classification of the different relationships that shape the farmer’s experience with these devices; relationships that result directly from experiencing the application of a device to a specific process; in other words, through implementation.

These classifications are of two kinds. The first deals with experiential directness. This classification was inspired by Peter McCleary’s writings on the “transparency” of technology. McCleary defines the use of equipment as being transparent if the information gained through its application is not mediated through its use, i.e., “the environment is experienced through the equipment.” The opposite of this is opacity, in which “the experience is of the equipment and not the environment.” The second kind of classification deals with social autonomy. These resulted from personal experiences with farm equipment in my youth, and the observation that there are two broad types of activities that happen on the farms. The first of these are daily activities done in isolation, these are the morning chores: feeding hay to the cows, gathering eggs from the henhouse, etc. The second is a ceremonious activity that brings people together, these are the seasonal events: chopping silage, bailing hay, making maple syrup, etc.

From these two kinds I have distilled five distinct classifications. Some pieces of equipment fall into multiple categories. The first is, direct relationships. This applies to devices like axes and fences, things in which the environment is experienced through the equipment. The second is, indirect relationships. This applies equipment like tractors and lifts, things in which the experience is of the equipment. The third is, automated relationships. This applies to things like windmill-powered water pumps and chemical weed controllers, systems that replace experiences of the environment. The forth is, isolated relationships. This applies to machinery like feed grinders and wagons, things used in the daily maintenance of the farmstead. The fifth is, ceremonious relationships. This applies to things like smokers and oil presses, devices that require the input of multiple people and are only used on occasion.
(Endnotes)


3 William G. Gabler, 27

4 Ibid., 27

5 Ibid., 27

6 Ibid., 27-28

7 Ibid., 24

8 Ibid., 16

9 Ibid., 29

Figures 3.1
Collage examining the impacts of urban sprawl on farm communities.
Chapter 3
Ordinary Objects in an Artificial Landscape

“When the pioneer hewed a path for progress through the American wilderness, there was bred into the American people the idea that civilization and forests were two mutually exclusive propositions. Development and forest destruction went hand in hand; we therefore adopted the fallacy that they were synonymous. A stump was our symbol of progress.

We have since learned, with some pains, that extensive forests are not only compatible with civilization, but absolutely essential to its highest development.”1

Aldo Leopold, 1918

“Quit thinking about decent land use as solely an economic problem. Examine each question in terms of what is ethically and esthetically right, as well as what is economically expedient. A thing is right when it tends to preserve the integrity, stability and beauty of the biotic community. It is wrong when it tends otherwise.”2

Aldo Leopold, 1949

Everything built, every fence line, every field plowed, every building, is an expression of man’s dominion. Looking at a forest man sees in it piles of board lumber waiting to be sawn from thick stands of trees. Once the forest has been exploited man then sees in the land a farm; stored in the biota of the soil are visions of grain, grasses, produce, cattle, poultry, and swine waiting to be harvested or slaughtered. Through this complexity man comprehends more efficient methods of production, and reduces complexity to a signal crop, or animal, and produces it at a much larger scale. Once the fertility of the farm has been dissolved, man sees space for
development. He sells it to a developer who then subdivides the land into individual lots, and sells it again. What man is most intuitively capable of is reduction, to take something inherently complex and explain it as something simple. We have applied our control to the demise of what were once large stretching areas of wilderness, but what improvements has such thinking produced?

No farmer can refute such accusations; by definition a farm is a tract of land cultivated for the purpose of agricultural production. Few farmers are able to respond with any conviction to the question above. The relationship between the farmer and his land is an ethical conflict that results from artificial control of natural systems. The current resolution this polemic based on excepted agro-industrial procedures, where it was once based on shared cultural values. Social and ecologic conducts are not distinct from one another, but linked. In his essay, *The Land Ethic*, Aldo Leopold remarks that the tradition of ethics rests on the premise that individuals are members of a larger community. Instinct causes individuals to fight for their place within the community, while ethics prompts them to co-operate (perhaps as a way to provide the motivation needed to find something worth fighting for). Leopold’s land ethic extend’s the boundaries of this community to include the entire host of individuals that make up its ecology.

This is not a position that farmers have traditionally embraced, partly because it gives prominence to the non-profitable members of any given community. Adopting this message requires that the industry-minded farmer restructure his value system to the larger concerns and benefits of the socio-ecologic community.

“To those devoid of imagination, a blank place on a map is a useless waste, to others, the most valuable part”

*Aldo Leopold, 1938*

Adopting this ethical position requires farmers to severe ties with history. What motivated early settlers to take risks and expose their families to the dangers of the frontier was not purely capital gain, but the freedom to work in the absence of exploitation. The opportunity, through their own labor, to carve an existence out of the wilderness and raise a family. These early entrepreneurs followed no manuals; their guide was their will. Daily challenges were met creatively, and solutions were created on the spot with the knowledge and resources at hand. The profits provided to these early farmers held no currency. They were the freedoms allowed by the land:
the ability to make their own choices, the recreation it contained, and the family it provided for.

The land still provides these freedoms, though our current definition of profit conceals their existence. If our definition of profit changed so that we saw the land as part of our community, we could position ourselves as stewards, and preserve the land’s use for future generations. We could once again come to love and respect the land. If we saw our communities as more than just a group of individuals occupying a single environment, but as an environment in which we were only a small component, we could begin to adjust our behaviors to improve the quality and diversity of that community.

What remains in the Midwest, after the historically brief period of agro-industrial development, is an artificial landscape devoid of natural or historical signifiers. This research is not intended to inspire a nostalgic return to pre-settlement conditions, rather it is meant to understand the landscape alterations that have occurred as a result of industrialized agriculture, and further to explore sustainable alternatives that will restore stability to rural communities. As constructed environments, farms have a complex set of unique requirements. They must be both productive, supplying food and fiber to consumers, and seductive, insuring the happiness and well-being of those who work on and live around them; a type of living-working farm[scape]. Rural communities do not exist outside of the farms that surround them but as integrated components within a landscape for agricultural production. When working harmoniously, farms and rural communities form a self-supportive ecology; a linked socio-ecologic system that ensures economic stability and environmental integrity; a working model as described by Leopold that places equal importance on both ecological and social components.5

Exploring alternatives require that we shed the misconception that we are in some way reducing our impact on nature; a realization that often eludes altruistic architects and farmers. Impact is unavoidable, it is the very thing that qualifies us as human beings, the ability to manipulate and control our environment, allowing us to improve our health, well-being and longevity as a species.

“The landscape of any farm is the owner’s portrait of himself. Conservation implies self-expression in that landscape, rather than blind compliance with economic dogma.”6

Aldo Leopold, 1939
Figures 3.2
Collage examining the relationship between farmers and rural communities.
Impacts produced by classic agriculture manifest themselves in patterns of loosely aligned objects on this artificial landscape. These patterns trace the agricultural and architectural developments that combined to create a fading image of the agricultural landscape. The buildings erected by early settlers have all but eroded; foundations and thickly wooded shelterbelts denote those that have not been cleared and plowed under. A number of gambrel barns and L-houses still stand in a state of mid decay. Others have been maintained or modified and still function on some farms; their scale and plank construction hint at the small family that once occupied them at a time when Minnesota’s great white pine forests were still the primary source of building materials. The rusted pole sheds that replaced these wooden buildings stand weathered, porous to rain and weather from neglected up-keep, many identical to one another as a result of plan sharing initiatives developed by university extension offices aimed to provide farmers with cheaper, more standardized buildings. Adjacent to them on most working farms stand some painted variation of a much larger commercially produced pole shed or barn. Some of the newer ones are equipped with non-functioning dormers in a nostalgic attempt to resemble early L-houses. Fields exhausted from lack of rotation, or burned from excessive fertilization, lay fallow among the endless rows of corn and soybeans. Rarely are there more than one variety of livestock visible, and typically the single varieties that exist, do so in large numbers.

Breaking down these patterns reveal the stunning similarity between the organization of the farmstead and artificial landscape in which it was situated. Often these buildings reveal more about the cultural motivation behind the people that created them than they do about the buildings themselves. Their potency relies on their ability to narrate the progression from which they evolve, the success of new buildings hinges on their ability to clarify the narrative progression of their alternative system.
(Endnotes)

1. Aldo Leopold, *The River of the Mother of God, And Other Essays*. (Madison, WI, University of Wisconsin Press, c1991) 49


4. Ibid., 176

5. Ronald Jager, 238


Figures 4.1 Farmer spraying chemicals on a field
“It would be absurd to want to return to the past to reconstruct former ways of living. After the data-processing and robotics revolutions, the rapid development of genetic engineering and the globalization of markets, neither human labor nor the natural habitat will ever be what they once were.”

Felix Guattari

What cultural motivators will determine the form and function of contemporary objects added to this decaying agricultural landscape? Will the same forces of industrial optimization that have yielded a completely production oriented farming determine our future relationships with land?

Despite our best intentions we continue to diminish the systems and ecologies we actively try to protect. We reduce their complexity in an attempt to gain control over them, and justify this simplification through a false sense of security. Brian Walker and David Salt put forth an argument that our failed attempts result from the rootedness of our current “best practices”, with an adherence to optimization. Walter and Salt point out that, “…while optimization is supposedly about efficiency, because it is applied to a narrow range of values and a particular set of interests, the result is major inefficiencies in the ways we generate values for societies.” The optimization of rural farms has produced a system of values that prioritize production over social and ecological sustainability. Farming methods and technologies once supportive of individual communities and local ecologies have shifted instead to support collective industrialism. The continued displacement of this, once socio-ecologic, value set needs serious realignment, if, as a society, we intend to restore both social and ecological resilience.

The ability to make such shifts lies in the consciously known and responsibly willed self. That is, in the forces combined to determine our human subjectivity. Under the paradigm of optimization, the forces that impact subjectivity are reduced to activities that create growth and promote consumption. Current adherence to such ideals has effectively reduced the potential possibilities contained within the collection of individual subjects to the singular solution of the whole, the standardization of individual subjectivities.

Individual subjectivity generates uniqueness, as no two people are exposed to the exact same internal and external forces. Guattari’s concept of “mental ecosophy” describes an expanded ecology that helps form
individual subjectivity. Jonathan Maskit describes it “not as a (re)discovery of some essence of the subject, but as a reinventing of a whole network of different types of relations in which the subjects find themselves and which are, at least partially, constitutive of subjectivity itself.” Guattari delegitimizes the nostalgic approach for “(re)discovering” a previously existing subject by clarifying that it is neither possible, nor desirable, to return to an imagined preindustrial condition. Subjectivity is instead, a reinvention resulting from a different set of relationships networked between the individual, society and nature. This is the proper definition that both Guattari and Leopold would term as an “ecology”.

Excepting this definition of ecology concedes that we all live and work in a connected network of relationships, with the occurrence of change in one component contributing to the individual subjectivity of another. The complexity of the relationships between the parts of an ecology cannot be understood in isolation, as both the subjectivity of the individual components and that of the ecology as whole, are linked. As humans, we cannot comprehend how our subjectivity directly shapes our values, partially because of its complexity and partially because it is continuously changing. It is our awareness of this lack of knowledge that causes us to continuously question everything from our environment to our own existence. Change occurs when we shift from isolating uncertainty through optimization, to embracing it, and the unknown possibilities contained within it. As Jonathan Maskit phrased it, to find, “practices oriented not towards being the way we always could have been but towards being a way that we did not know we could be.” The outcomes attached to an ignorance-based worldview are incredibly unclear, yet is a positive outlook that provides for the possibility of innovation; innovations differing not in degree, but kind, of which we were not previous aware and had no previous knowledge of.

**But if we are up against mystery, then knowledge is relatively small, and the ancient program is the right one: Act on the basis of ignorance. Acting on the basis of ignorance, paradoxically, requires one to know things, remember things – for instance, that failure is possible, that error is possible, that second chances are desirable (so don’t risk everything on the first chance), and so on.**

Wendell Berry, 1982
Ignorance as a design methodology accounts for the actual condition in which we find ourselves. It accepts that we are infinitely more ignorant than we are knowledgeable. Ironically, this awareness is rarely a determining factor in design decisions. Rather, in a bold heuristic display, we assume the possession of knowledge needed to sustainably design and control systems, and further, to be able to select specific areas of knowledge over others to effectively optimize our systems. How do we determine whether or not we actually possess enough knowledge, or whether we can adequately interpret the knowledge we contest to hold? A simple measure of success would be to assess whether we have improved, sustained, or diminished the natural productivity of the earth since we began to substantially alter it. Wes Jackson addresses this question in his essay, *Toward a Ignorance-Based Worldview*, “Since agriculture began, humans have produced no technological product or process – including our crops and livestock – without drawing down the earth’s capital stock and, thereby, reducing the overall net primary production of its ecosystems using only contemporary sunlight.” Historically persistent issues centered on sustainability and environmental degradation result from a long running heuristic knowledge-based worldview. Persistent issues are so, because existing knowledge is inadequate to solve them. An ignorance based design methodology accounts for these inadequacies, embracing the full complexity of both the known and unknown aspects of the design problem, with the intent to increase the potential for design innovation.

Designers negatively associate risk and uncertainty with ignorance. Risk, as it relates to ignorance, is a function of resilience—the capacity of a system to experience interference in its function, structure and feedbacks, and remain, by in large, the same. Uncertainty suggests the potential for multiple outcomes, and an increased likelihood of the end result being different than what is expected. The complexity of systems with inherently high levels of ignorance, that is, systems that account for both known and unknown variables, produce, through their many linkages and feedbacks, high levels of resilience. As a result, risk is lowered. Simultaneously complexity prevents us from predicting, with certainty, the effect of any intervention on the system, thereby increasing the uncertainty of the outcome. As a result, risk is increased. Shifting back to a purely knowledge-based design methodology means that the design problem necessarily becomes more rigid, reliant on a reduced number of variables to perform large portions of the system’s operations. Efficiency diminishes the potential flexibly of the system, and therefore compromises its resilience, and increases the certainty of the outcome. Therefore, if the
Figures 4.2
Diagram examining the risk associated with simple and complex systems.
animal processing

SYSTEM 1

swine/cattle

SYSTEM 2

cattle/chickens

SYSTEM 3

meat goats/brush clearing

SYSTEM 4

sheep/chickens

inputs

outputs

meat

waste

INCREASED EFFICIENCY

INCREASED RESILIENCE

[sub]cycle 1

egg production

[sub]cycle 2

agroforestry

[sub]cycle 3

wool production

animal processing

INCREASED EFFICIENCY

INCREASED RESILIENCE

SYSTEM 3

meat goats/brush clearing

SYSTEM 4

sheep/chickens

SIMPLE OPERATION

COMPLEX OPERATION

INCREASED EFFICIENCY

INCREASED RESILIENCE
goal is to design innovative systems and structures, an ignorance-based design methodology is more likely to result in success. If however, the goal is to design predetermined systems and structures, then the knowledge-based trajectory is to return us to the same problems we set out to solve.
(Endnotes)


4 Ibid., 134

5 Brain Salt and David Walker, 31-32


10 Brain Walker and David Salt, 76-77
Figures 5.1
Examples of contemporary farm implements (John Deere sprayers)
Chapter 5
Convergent Technology:

*agricultural [implement]*

*implement* architecture

“...what needs moral consideration in production is not so much the producing as the product. Insofar as production is a kind of doing, it is amenable to the application of conventional morality... What remains unexamined all the while is the power of products, of the material results of production, to shape our conduct profoundly.”

Albert Borgmann, 1992

“The past is our definition. We may strive, with good reason, to escape it, or to escape what is bad in it, but we will escape it only by adding something better to it.”

Wendell Berry, 2005

Farm Implements are a fascinating technological component of agriculture; their inner workings provide both much the danger and efficiency found on farms. They are tractors that mothers yell to their children to stay away from. The hay making equipment, with stories of distant relatives or a family friend who lost a limb in this or was wrapped up in that. They are the feed mixers and round balers that incite anxiety in children when revved to excitement. These are the implements that make the farm run, the modern equivalents of the men, women and children once required to facilitate planting, cultivating, and harvesting. Though the danger and power of these machines is intriguing, they also have a role as cultural symbols with an ability to reshape social patterns.

Technology has overwhelming reshaped how and what farms produce. Machines that harvest corn, or the devices used to lift hay into storage, define the processes of modern farming. Certainly improvements on the farm brought about by technology have made life in many ways better for farmers. Farm Implements reduced the drudgery of physical labor and improved safety for farmers. Benefits paid for at a very steep socioeconomic cost as a result of the inherent logic of farm technology. If a farmer has a certain standard of living then acquires a new piece of technology it is likely he will in turn increase his efficiency and reduce the unit price of production. This provides a slightly larger profit which is used to pay for the technology. Other farmers see this advantage
Figures 5.2
Industrial farm
and acquire the technology as well. The newly formed efficiency of the group increases supply of agricultural product to the market. The market adjusts to this increase in supply by reducing the price at both the consumer and producer ends, which in turn reduces the per unit income of the farmer. To maintain the previous standard of living the farmer must now enlarge his operation to produce more units at the now lower unit price. The new lower unit price puts pressure on the smaller and less efficient farms, causing them to eventually fade or disappear.\(^3\)

The cultural impact of farm technology is crippling. Presently it addresses the single issue of production, and in so doing fails to value the culturally significant activities that it comes to replace. Acquired experiential knowledge is replaced with standardized manuals that fail to account for the specific conditions of a piece of land. Local support networks made up of many small interdependent farms are replaced with large farm conglomerations. Crop and livestock diversities are reduced in an effort to achieve ever-increasing efficiencies will simultaneously driving their value down. This logic seems obviously flawed, or at least extremely narrow sited. If we consider its effects on the social patterns attached to farm communities, then the application of technology certainly needs to be rethought in order to stop it from replacing the things that produce stable communities, i.e., many, relatively small, diversely stable farms, with what amounts to independent production operations, i.e., few, relatively large, specialized farms.

Reestablishing the components of farming that formed strong communities does not mean removing the technologies that restructured the social pattern throughout the development of modern agriculture. Past technologies could never account for current agricultural demands. We must instead account for the components of farming that we have lost, and deploy new technologies that could reestablish the social patterns technologies focused wholly on optimization have either reduced or removed.

These new technologies are inherently architectural. Derived not from the physical objects (devices, implements, and buildings), but from the social patterns such objects generate and the displacement of activities that such patterns produce. New technologies can exist as old buildings or pieces of used equipment; not necessarily consisting of new objects but of new processes focused on forming socially sustainable relationships. This technology manifests itself in hybrid structures that provide space for both communal and farm programs. The construction of which is not wholly focused on standardization and economic efficiency but is also didactic as to the processes which they contain and the cultural activities they seek to reinstate.
Figures 5.3
Amish barn raising
This line technological thought is an extension of Albert Borgmann’s concept of the device paradigm. In it he proposes that technology is the constraining pattern to our lives, and that the recognition of this pervasive pattern would allow us to identify the essential processes within it. Objects and activities that relate to both bodily and social contexts acquire meaning for us through their close relationships to specific ecologies (relationships networked between the individuals, society and nature). Borgmann classifies these activities as, focal practices. Celebratory meals, listening to live music, or raising a barn are examples of focal activities. Technology has the potential to remove our focus from such activities, as technology can distract us from engaging in them. Technology redirects our focus toward consumption, i.e., replacing such activities with things like takeout or fast food, recordings, or kit buildings. Understanding the effects of technology, primarily the increased pace at which it requires we live our lives as a result of increased efficiency, allows us to once again engage in the focal activities that technology would otherwise have us disregard.

The concept of an architectural implement refers to the technological interventions that are directed toward reestablishing focal practices on the farm. Architectural implements are a kind of convergent technology, directed at both retaining production and restoring focal practices. They are implements in that, as new technologies, they are designed to aid in the performance of a specific task, and architectural in that the tasks they perform are not restricted to farm production but extend to the production of focal practices.
(Endnotes)


2. Wendell Berry, *Standing by words*, (San Francisco: North Point Press, 1983)

3. Ronald Jager, 200-01

Figures 6.1
Monocultural farming

Figures 6.2
Polycultural farming
Chapter 6
Alternative Farm[scapes]

“The dominant model of agriculture includes astonishing levels of production, intense concentration of ownership, mechanization of the relationships among humans, animals, and the products of the soil, and alienation of food producers from consumers. It generates great wealth from the countryside but often returns to farmers and workers, harm to nature, and depopulation and disintegration to its communities, churches, and civic organizations. It is industrial agriculture.”

SOUL OF AGRICULTURE PROJECT, Charter for a Shared Farming Ethic, 1997

The combination of land uses, crop selections, livestock selections, implements, buildings and people constitute a farmscape, the composition of which results from the application of agricultural practices. Few forces reshape our natural environment in such an extensive way. A goal of this thesis is to expand upon the conventions of current agricultural trends and provide an architectural model for reestablishing sustainable rural farm ecologies. This chapter provides four farm program alternatives. Each is specifically chosen for its capacity to critique the environmental, economic, and social effects that industrialized agricultural has on rural communities.

1. Polycultural farming [environmental]

Historically, polycultural farming has exceeded any other system of agricultural production, in part because, as a system, polycultural farming is elegantly simple and effective. A polyculture is any agricultural system that supports multiple crop or livestock types in an effort to mimic the diversity and complexity contained within natural systems. The balance and complexity of each polyculture is unique. Its composition depends upon the specific acreage, location, market, economic goals and personal values of the individual farmer. This method of stewardship has remained popular with those who hold the position that farming is a way life. Its relatively recent decline is the result of farmers who have adopted industrial methods and applied them to modern farm
Figures 6.3
Diagram of closed loop farming system
procedures. More recently sustainability-minded farmers have begun to reapply polycultural techniques in an attempt to restore the cultural and environmental degradation caused by industrial agricultural.

2. Value-added farming [economical]

Value-added farming is directed at the production of a specialized product. Depending upon the motivation and particular location of a farmer their products may often be directed at niche markets; a process called niche farming. For all intensive purposes, niche farming is a specific type of value-added farming dependant on market conditions, thus they both fall under the broad umbrella term of “value-adding farming”. Value-added farming is generally achieved by processing a material to some extent beyond its raw state in order to add value to it and increase its unit price. Depending upon the raw material and the methods of its value-added production, this type of farming requires specialized program space; including specific levels of environmental conditioning, sanitation, and community visibility. Issues of sustainable production are often a component of value-added farming. Farmers will often seek production labels such as organic, grass fed, or ethically treated in order to add value to their products. This does not however ensure that the farms practicing a value-added system are themselves sustainable. Rather, it provides a method to improve profitability and ensure economic security.

3. Communal farming [social]

This category is meant to explore the ideas of communal farming without distracting from the importance of larger social issues. At times throughout this research it was refreshing to linger upon utopian scenarios, pulling from their imagery and often redirecting the research to better understand them. That being said, this farming system is the least likely of the three to be applied to the larger society. Successful communal farms tend to be relatively small in scale as a result of a shared value system held by its members. Communal procedures, such as supportive networks and self-sufficiency which are shunted by conservative societies, are given serious consideration in counter-cultural communities. Self-sufficiency ensures a relatively high level of autonomy
Figures 6.4
Diagram of value added wool processing farming operation.
- raw wool
- washing
- blending/carding
- spinning
- weaving/knitting
- finishing
- storage

- chicken coop
- shearing station
- wool processing building
- washing blending/carding
- spinning weaving/knitting
- finishing storage
- raw wool
from the larger society. This sovereignty reduces the pressure on communes to conform to cultural norms and encourages the adoption of the alternative agricultural methods that more directly align with the shared goals of the community. Members work together to create a localized network that evenly distributes the needs of the farm throughout the community as a whole. Though these communal farms are somewhat isolated and relatively small, they demonstrate how sustainable agriculture and economic stability can be achieved through local networks.

4. A Hybrid

These systems are chosen as examples of alternative responses to the environmental, economic, and social issues produced by industrial agriculture. Polycultural farming provides an alternative to the pervasive monocultures industrial agriculture requires in order to achieve its economies of scale. The use of perennial grasses and multiple crop plantings help to stabilize topsoil levels and replenish soil fertility diminished by annual tilling and non-rotational planting. More diverse and complex farmscapes can increase the resilience of the farm’s ecologies and reduce the risk of wide scale failure attached to simplified systems. Value-added farming provides an alternative for those farmers unable to survive the reduced crop and livestock prices that resulted from the efficiency achieved by industrial agriculture. Small farms unable to afford the increased capital investments needed to achieve these production efficiencies are able to generate profit margins through value-adding product processing. Communal farming provides an alternative local network for depopulated rural communities that result from the consolidation of small farms into centralized industrial operations. Local networks are able to create working economies and reestablish a group of individual members mobilized to achieve a common goal.

Isolating specific problems and their concomitant solutions recognizes that individual alternatives are limited in their potential application. A successful alternative is not directed to press toward a singular solution nor is it isolated to explore a single problem. Rather, it seeks to conceive of a system with potential for addressing all of the salient issues currently deterring the reemergence of small-scale sustainable agriculture. The alternative method needed for this is one that amalgamates components of all three into a cohesive system.
Cooperative farming

Cooperative farming effectively combines the attributes of the previous three systems into a hybridized model aimed at broadly improving farm ecology. For the purposes of this research and subsequent design project some clarification between communal and cooperative farms is needed. Communal refers to a network of people living outside the larger society as a type of self-described sovereign community. The motivation of individual membership is dependant upon a shared goal or common interest that runs counter those of the society at large. Cooperatives on the other hand refer to groups of individuals bound together in an effort to reposition themselves within the larger society. The motivation of individual membership is dependent upon an economic benefit or savings, achieved through pooled resources and shared risk. Cooperatives are able to mine specific solutions from the other three systems so long as it does not jeopardize the security of the group’s investment. Cooperatives benefit from the same localized networks as communes, only the motivation between members is not wholly ideological but as least moderately quantifiable (monetary). This allows members to apply innovative solutions without fear of having to account for their total risks. These risks are further minimized by the localized economy generated by the cooperative itself, with individuals able to rely on the buying power of the larger cooperative group. This innovative platform means that the application of a polycultural growing technique is more likely to occur, and since the primary resource held by farm cooperatives is the land owned and shared by its members, improving its resilience is a way of insuring the initial investment. Value-added objectives reinforce sustainable land use, with more sustainably grown crops and livestock increasing the value of farm products. Cooperative farming addresses the identifiable issues currently deterring the reemergence of small-scale sustainable agriculture, and provides an alternative method for shifting the industrial farm[scape] toward a better way of rural life.
(Endnotes)

Figures 7.1
Chicken coop alteration
“The reaction to failure, once so direct, now becomes less and less direct. Materials are no longer close to hand. Buildings are more permanent, frequent repair and readjustment less common, than they used to be. Construction is no longer in the hands of the inhabitants; failures, when they occur, have to be several times reported and described before the specialist will recognize them and make some permanent adjustment. Each of these changes blunts the hair-fine sensitivity of the unconscious process’ response to failure, so that failures now need to be quite considerable before they will induce correction.”

Christopher Alexander, 1964

Resilient architecture is found in structures that understand and engage a changing world. Resilience stresses the combination of social and natural organizations into complex socio-ecologic systems; adding that these systems are not only complex but also adaptive. Understanding the limits of a system, and the changes that occur once those limits are breached, are the foundations of resilience thinking. Socio-ecologic systems change continuously within their defined limits, shifting back and forth between various stable states. However, once a threshold has been crossed, the system undergoes a regime shift, after which returning to its previous state becomes extremely difficult. The distinction between minor changes and major thresholds is often blurred. Change within a stable system can be seen as a difference of degree, certain quantities or qualities within the system may change but as a whole the system is still relatively the same; this could be considered a system modification. When a system crosses a threshold is seen as a difference of kind, changes within the system no longer result in a distortion of its previous condition but in a purely new and different system; a system transition. Resilience, the ability of a system to experience change yet by in large stay the same, can be defined as the distance a system is from a threshold. The further away a system is from a threshold the more traumas or interference it can withstand before translating into something completely new.

Architectural resilience is found in buildings that are not only complex, but also adaptive. How then, could a permanent solution be applied to a problem under the expectation that the initial problem will not remain
- **distance between components** [threshold]  
  deconstruct existing building, use salvageable components in the newly relocated structure.

- **program capacity** [threshold]  
  create portable structures, or components of structures, that relate directly to the crop or livestock systems relying upon the adjacency of system components.

- **environmental conditioning** [threshold]  
  If the program is ideally suited the building typology, create additional space by extruding the existing sectional profile of the building in question.

If the program is not ideally suited the building typology, create additional space by sliding components that do not conform to the existing sectional profile of the building in question.

If the construction of the building does meet the environmental control needed for a specific program, create a membrane within the existing structure that will allow for additional control.

If the construction of the building does meet the environmental control needed for a specific program, create an independent space within the context of the larger building that has its own environmental control system.
fixed? For this to occur current design objectives must shift their focus from objects toward relationship-based solutions. Design becomes the anticipation of how systems adapt, and produces buildings that are responsive to the thresholds contained within their systems unique complexity.

The intent is to modify rather than to invent, adaption provides a point of arrival for design considerations, and point of departure for intended modifications that seek to address the architectural thresholds produced by the complex adaptive systems that contextualize the design problem. Modifications made to these thresholds can best be understood through the “unselfconscious process” described by Christopher Alexander; “the unselfconscious situation learns by being put right whenever he goes wrong. ‘No, not that way, this way.’ No attempt is made to formulate abstractly just what the right way involves. The right way is the residue when all the wrong ways are eradicated.” The suppression of superficial attempts to achieve immediate success results in the repeated adjustment of the initial design idea overtime. This reduces the designer’s focus on invention and replaces it with observation. “It is not even necessary that these changes be for the better. As we have seen, the system, being self-adjusting, finds its own equilibrium – provided only that misfit incites some reaction in the craftsman.” The architectural intervention is then, simply, an adjustment applied to a threshold that persists within the progression of a building ridding itself of wrongs. This position hinges the success of each architectural solution on the resultant accumulation of its alterations over time. As Alexander states “The forms produced in such a system are not the work of individuals, and their success does not depend on any one man’s artistry, but only the artist’s place within the process.”

**Design Application**

Farm[scapes] are fraught with architectural thresholds that result from the complexity contained within the adaptive systems that make up their unique ecologies. These architectural thresholds pertain specifically to relationship experiences by farmer—[moral / practical], between the farm and the environment—[ecological], and between the farmer and the rural community—[social]. Built alterations are designed to respond to these different relationships. By adopting the principles of Alexander’s unselfconscious process these alterations are allowed to address individual threshold conditions under the presupposition that the alterations themselves will at some
point be altered. This prevents the architecture from becoming an invented object reduced in complexity by the assumption of immediate success.
(Endnotes)


2 Walker and Salt, 11.

3 Brain Walker and David Salt, 62.

4 Christopher Alexander, 155

5 Ibid., 153

6 Ibid.


Chapter 8
Design Appendix: Program

The design project for this thesis constructs an alteration to the existing constructed farm environment. The goal of this project is to recycle the focal activities and social networks discarded by the institution of farming as a result of its adopted technological transformation. In this sense the term “recycle” refers to both a literal and theoretical application of its meaning. Literal, in that the project reuses processes of artisanal farming once performed by farmers that sought self-sufficiency, and also through the material reuse of technological devices and existing farm buildings. Theoretical, in that the architectural alterations provide a context through which farmers can reevaluate their relationship with the implements that have reshaped their environment.

The project’s first step toward reestablishing the economic and cultural stability of small-scale farms is to reassess the complexity of the components that make up its working composition. Cooperative farming effectively combines the efforts of a group of separately working individuals into a supportive network. The motivation of individual membership is dependant upon a shared goal or common interest that runs counter those of the society at large. This allows members to apply innovative solutions without fear of having to account for their total risks. These risks are further minimized by the localized economy generated by the cooperative itself, with individuals able to rely on the buying power of the larger cooperative group. This innovative platform means that the application of a polycultural growing technique is more likely to occur, and since the primary resource held by farm cooperatives is the land owned and shared by its members, improving its resilience is a way of insuring the initial investment. Value-added objectives reinforce sustainable land use, with more sustainably grown crops and livestock increasing the value of farm products. Cooperative farming addresses the identifiable issues currently deterring the reemergence of small-scale sustainable agriculture, and provides an alternative method for shifting the industrial farm[scape] toward a better way of rural life.
Dairy Processing
Grain Processing
Wool Processing
Timber Processing

portable goat pen

chicken coop

lumber storage

planing

sawing

cut timber

drying

solar kiln
portable goat pen
chicken coop
lumber
storage
planing
sawing
cut timber
lumber storage
drying
solar kiln
Vegetable Processing
The southern edge of the site contains the farms community supported agriculture program. This low raising site sits within a man-made buffer zone. The area was pulped in the recent past and now consists of small clearings and patches of dense low raising brush. The slope of the site allows buildings to embed themselves into the gentle terrain, providing cold storage that extends the seasonal length of the vegetable operation.
The project is sited on a 240 acre dormant dairy farm in Northern Minnesota. The land can be classified into three distinct categories based on harvest yield potential. The first of these is “tillable land”. This land has already been broken and has the potential to produce high yields. Its typography is gentle and allows tilling and harvesting equipment to easily move over it. The second category is pasture, or land that can be “grazed” by livestock. This land that has been cleared but is not actively tilled due to topography, moisture content, or soil quality. It’s typography is often such that a tractor or other farm implement can move over select sections of it and tends to exist at either the edge of woodlands or in low lying areas. The final category is “woodland”. This is land that cannot be tilled or grazed due to the trees and wild vegetation that grows over it. Its topography varies; many areas are flat enough to allow for tilling but have not been cleared to provide habit for wild animals and to maintain a balance between controlled and nature ecosystems. Other areas are completely inaccessible.

From these categories patterns emerge. Tillable land is distinct from the others, arranged in a series of orthogonal fields. The location of these fields is determined by the farmers ability to access and work the land without crossing areas where the typography is so steep that it is impassable by the farmer’s equipment, or too low that the farmer and his equipment would get stuck when crossing it. The fields run from north to south, stretching the entirety of the mile long site. At the edge of these fields, the pasture provides a buffer zone between the tillable land and the woodland. The width of this zone varies, sprawling from several hundred feet across at times to less then ten feet at others. Parts of this zone are fenced to allow livestock to graze, but the majority of it remains open acting only as a buffer. Opposite the field, on the other side of this buffer zone, is the forest.

Proposed buildings occupy this buffer space. They become a theoretical filter, mediating the conflicted relationship between the farmer and nature, between land that is tilled and land that is wild. This strategy results in minimal disturbance to existing crop producing land and the wilderness.

The emergence of buffer zones results from a change in natural conditions that define the separation between one field and another. The specific location of buildings within this zone depends upon the relationship between the processes they contain and the conditions of the site that align to those processes.
Grain Processing
The five cooperative processes inserted into the site are spread throughout its length adhering to a variety of operational site conditions. The dairy is located at the existing farmstead on the north end of the site. This placement takes advantage of the farm’s existing power and water infrastructures, and the locations adjacency to a county road that allows for daily milk pickups.
Grain Processing
The granary is located south of the existing farmstead. Its placement aligns with a buffer zone caused by an extreme shift in topography. This elevation change contains an operational advantage. It reduces the embedded energy required to move the grain through out the many processes of refinement through a gravity feed supply system.
Wool Processing
The fiber mill is located south of the granary in a buffer zone along the edge of a ravine. No topographical advantage is applied. The advantage is achieved by collecting water from the creek when it is running. It also provides a picturesque setting for those engaged in the process of refining fiber, taking advantage of the natural beauty the farm contains.
Timber Processing
The sawmill is located further south still in a cleared buffer zone that was once actively used as pasture. This site is long and flat and allows for the sequential cutting and storing of timber through the lumber refinement process.
Vegetable Processing
The southern edge of the site contains the farms community supported agriculture program. This low raising site sits within a man-made buffer zone. The area was pulped in the recent past and now consists of small clearings and patches of dense low raising brush. The slope of the site allows buildings to embed themselves into the gentle terrain, providing cold storage that extends the seasonal length of the vegetable operation.
Existing Farm Building Typologies

Three different building typologies exist on the farmstead. The first is the central-column pole shed. This type of building allows unitized objects, such as hay bales, to be stacked vertically to the peak of the building. The column however, restricts the amount and kinds of horizontal movement. For example, livestock could easily move about within the structure but it would be difficult to arrange large pieces equipment within the column bays. The second type of structure is the truss supported pole shed. This building is more restrictive vertically because the trusses effectively produce a ceiling at the height of the exterior walls. This shed is ideally suited for storing equipment since the interior space is free from structural obstructions. The third building type is the stick-framed barn. This is the only farm building on the site that is insulated. It allows the space to house livestock or specialized processes that require increased requirements of thermal conditioning.
Design Appendix: Design Images


