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The Effect of Wildness on the Built Environment

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THE EFFECT OF WILDNESS ON THE BUILT ENVIRONMENT

by

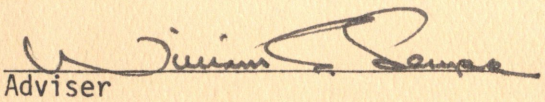
SAMUEL T. REA, JR.

A professional paper submitted in partial fulfillment
of the requirements for the degree

of

Bachelor of Architecture

Approved:



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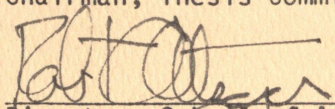

Director, School of Architecture

Montana State University
Bozeman, Montana
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This exploration is dedicated to my Mother

who taught me how to Love,

and to my Father,

who taught me how to Care.

But in reaching out, in the effort to grasp, to attach myself, left high and dry as I was, I nevertheless found something I had not looked for--myself. I found that what I had desired all my life was not to live--if what others are doing is called living--but to express myself.

Henry Miller

Tropic of Capricorn

Any path is only a path, and there is no affront, to oneself or to others, in dropping it if that is what your heart tells you.... Look at every path closely and deliberately. Try it as many times as you think necessary. Then ask yourself, and yourself alone, one question: Does this path have a heart? If it does, the path is good; if it doesn't, it is of no use.

Carlos Castaneda

The Teachings of Don Juan

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Explanation

The Quality of Wildness

This project is an exploration into the dynamic relationship of wildness and the built environment. It involves the theoretical plans for a prairie restoration center and a museum designed to house a prairie exhibit, and Indian artifacts display, and a fine arts gallery for contemporary primal art. The site is located on the 7,000-acre grounds of the Fermi National Accelerator Laboratory, thirty-five miles west of Chicago, Illinois. A prairie restoration project currently is underway in the 680-acre center of the main particle accelerator ring, and there are plans eventually to convert the entire site to native Illinois prairie.

This is not wilderness by any stretch of the imagination, but wildness. I mean by "wildness", that the area's ecosystem is restored by man to a state faithful in content and aesthetic quality to presettlement conditions; that is, to an original tallgrass prairie. Man's presence will always be evident in the buildings, roads, and surrounding communities, but the prairie itself will embrace the orders that are most advantageous to the unaltered natural system. Human presence may also be evident in the restored prairie--slight "rowing" occurs, for example, when quantities of seeds are mechanically applied to the soil--but still the wildness of the prairie dominates the built environment. A restoration of this magnitude is necessary, I feel, for the health and understanding of the human communities that have developed on the "prairie state"--Illinois. For the original settlers of the 1800's, the prairie wilderness seemed endless and inexhaustible; for their ancestors, the prairie's wildness is all to alien and inaccessible.

Structure and Openness

I believe that man desires both structure and openness in his environment. Openness, in this sense, refers to the freedom provided in nature's orders; structure refers to the built environment that man produces, that has spatial meaning, and that leads to the understanding of place in a given environment.

We have been conditioned to think of man and nature as opposites; it is more valid, I believe, to deal with this relationship in terms of complements. Purists at one end of the spectrum will grant no value to nature except as it serves human interests. Purists at the other end may contend that any man-built object detracts from nature's intrinsic values, and in some cases this is true; when in the wilderness I think it is best for man to keep a low profile if he must keep any at all. But nature can work with man, and man can work to bring out the qualities of nature.

This complementarity is manifest in the writings of Henry David Thoreau, in his "experiment" at Walden Pond, and in his own conception of the man-nature relationship. Roderick Nash writes of Thoreau's experience:

> The problem was now clear: could man live so as to secure all the advantages of civilization without suffering any of the disadvantages? The answer for Thoreau lay in a combination of the good inherent in the wilderness with the benefits of cultural refinement. An excess of either condition must be avoided. The vitality, heroism, and toughness that came from a wilderness condition had to be balanced by the delicacy, sensitivity, and intellectual and moral growth characteristic of civilization.[1]

For Thoreau, the ideal man "occupied such a middle position, drawing both from the wild and the refined".[2] This is a position that I feel is most

relevant to architecture that deals with the interface of man and nature--the "middlescape", as E. Fay Jones termed it in a recent lecture.[3] Man's dynamic desire for both structure and openness not only complements the natural environment, but also complements his understanding of meaningful space. This is the main thrust of my thesis as well: To understand how the built environment is made meaningful through a complementary approach to design.

Values Behind Space

Another important factor in creating meaningful architecture involves understanding the values that are represented in spatial terms. Values are those qualities which the architect sensitively gathers from the dreams and desires of the user and combines with those inherent in both the man-made and the natural context. The values are intuitively comprehended and expressed in meaningful spatial form. Thoreau's cabin at Walden Pond is an example of one person's expression of human and natural values. Understanding the meaning of this building and investigating the significant values behind it will help clarify this notion of values.

On the shores of Walden Pond, Thoreau built a small cabin, using only local materials in its construction. This cabin was a simple structure, fifteen feet long, eight feet wide, with a garret, a closet, a large window on each side, a door at one end, and a stone fireplace at the other. Thoreau was the designer, user, and the builder as well, fashioning the cabin with the same integrity, precision, and care with which he wrote Walden itself: "... the boards were feather-edged and lapped, so that it was perfectly impervious to rain."[4] The interior was

of utmost simplicity: a small hearth for heat and the preparation of metals, a bed, three chairs, and a writing table, all contained in one simple space. Thoreau plastered the walls with sand from Walden's shore, and so protected the interior from the winter's chilly winds. Stones from the pond were used to build the fireplace. In warmer months, the single door was always open to allow nature and occasional passersby (Walden Pond was only a short walk from Concord) to enter.

This structure exemplified in a built form the values of a man very much concerned with the relationship of man and nature. But why would one so involved with nature desire such a structure? Why wasn't an even less elaborate enclosure considered? Because this was more than a simple shelter. Thoreau wrote:

> Though we are not so degenerate but that we might possibly live in a cave or a wigwam or wear skins today, it certainly is better to accept the advantages, though so dearly bought, which the invention of industry and mankind offer. In such a neighborhood as this, boards and shingles, lime and bricks are cheaper and more easily obtained than suitable caves, or whole logs...or even well-tempered clay or flat stones...with a little more wit we might use these materials so as to become richer than the richest are now...and make civilization a blessing.[5]

Thoreau was not seeking to return to a more primitive mode of existence, but to produce a built environment appropriate for the time and place. So today one should not strive to recreate a romantic past that never was, not to create an idyllic future than never can be; rather, we must learn to use sensitively the advantages that "invention" has brought us. Materials should be appropriate to the given idea, since it is through materials that man creates structure from the openness of the surrounding natural landscape. The designer uses materials to produce

and structure space, while the "invention" of industry and mankind provide the most meaningful and resourceful ways.

The one room plan and the three-chair furnishings provide insights into Thoreau's feelings toward himself in relation to the public. He felt that the functions of groups or people in the community often led to petty disagreements and to the neglect of understandings important to man. Hence, a space was provided that could accommodate comfortably the conversations of only two other people. This was a space meant to serve primarily the values of one man: Thoreau himself. For Thoreau, the interior space allowed dor comfortable reflection upon the relationship and reconciliation of man and nature:

> Yet I passed some cheerful evenings in that cool and airy apartment, surrounded by the rough brown boards full of knots and rafters with the bark on high overhead. My house never pleased my eye so much after it was plastered, though I was obliged to confess that it was more comfortable. Should not every apartment in which man dwells be lofty enough to create some obscurity over-head, where flickering shadows may play at evening above the rafters.[6]

As a transcendentalist, Thoreau felt that the real truths resulted not from conclusions derived by the community at large, but from the individual's intimate understanding of his surroundings. His structured space reflected this belief.

Following Thoreau, I believe the space created by materials should reflect how one understands one's surroundings. In a sense, the space provided is a reflection of how the world is understood and given meaning. Form is the articulation of ideas through materials by the architect. Form creates space. The defined space--the enclosure--acquires meaning as it serves as a model of the world and defines how the world is

understood by the user.

The hearth that Thoreau built provides a deeper understanding into the values he expressed in built form. The materials which formed this prominent feature were taken from the shores of Walden Pond. Thoreau felt that the meaning of himself and the natural world derived from a clear understanding of nature. The pond provided the external metaphor of self to Thoreau; looking into the pond he could see himself, yet he could see more than a simple reflection. To Thoreau, the pond <u>was</u> himself. The hearth is the seat of fire, which symbolizes man's achievement of a better way of life through advancement in thought. Thus, the fire is somewhat representative of life in man. It seems only appropriate that the stones came the same source of knowledge--the pond, the self--and housed the symbol of man. The hearth was made of stone for practical reasons, but when contrasted with the rest of the wooden cabin, other meanings become evident. The stone represents the permanence of symbol and many in general. These will persevere long after the individual housed in the wooden cabin has passed. The ideas and meanings represented in the hearth are far more permanent than the physical life of the maker of the hearth.

The hearth, then, is symbolic in a way that transcends individuals and gives meaning to all men. It provides the structure for and complements the inherent openness of the natural force of fire, a force that all men respond to. The fire of life is in us all. In the same way, the prairie also contains a certain degree of universal understanding that all men feel. Presently, it is my belief that if "universals" exist at all, they exist in nature. There are no golden rectangles outside of

cultural understanding. Space represents a current understanding, at best, of nature's openness. James Luis Borges, in a short story entitled The Immortal, makes the following observation about his experience in a "foreign" place:

> In the palace I imperfectly explored, the architecture lacked any such finality. It abandoned in dead end corridors, high unattainable windows, portentous doors which led to a cell or pit, incredible inverted stairways whose steps and balustrades hung downwards. Other stairways, clinging airily to the side of a monumental wall, would die without leading anywhere, after making two or three turns in the lofty darkness of the cupolas.[7]

Borges here shows how cultural preconceptions are derived a posteriori from the built environment. And, in turn, lead to spatial associations. Architectural forms are understood to a certain extent through experience; from certain forms we expect certain functions. They are not universals, but forms derived from cultural and experiential constructs.

Thoreau's values are also evident in his placement of the cabin. The cabin was built on the shore of Walden Pond, within easy walking distance of Concord, Massachusetts. This was not a site for a recluse, but existed in the wildness of a natural setting. The always-opened door faced the pond; thus, as the central feature for spiritual reflection, the pond had easy metaphorical access to the interior space of the cabin. The presence of man was quite apparent: a train passed on the other side of Walden Pond every day. Yet, the surrounding forest and the pond were quite sufficient for the "natural" experiment at Walden. Thoreau did not desire wilderness, but rather felt most comfortable when immersed in the wilds of nature alongside the security of civilization. Nash comments that, according to Thoreau, "wildness and refinement were

not fatal extremes, but equally beneficent influences Americans would do well to blend."[8]

It seems obvious that Thoreau sought not to mirror nature per se with his cabin, but to try and symbolize how the values of man and nature could exist in a complementary manner, and how these values are involved in the need that civilized man has to be self-consciously expressive and to merge with the understanding of nature. This interpretation of the values behind the Walden "experiment" reveals how Thoreau attempted to merge civilized man--as opposed to primal man--with the wildness of nature. As a transcendentalist, Thoreau believed that a greater knowledge of the natural world through observation and personal reflection led to a greater understanding of being. Yet, he was quick to recognize the need for civilization, and for the logic and structure that it provided. The cabin exemplifies this desire for a structured place to complement the openness of nature.

The values embodied in Thoreau's cabin are the foundation for my own exploration into man's relationship to nature and how that relationship is expressed in the built environment. We live in a time and place far different from Thoreau's. Values change. How these values are expanded and given meaning in our current culture will be developed in the part of my paper entitled "Ecological Man." The values of "Ecological Man" will be expressed in the built environment produced by the theoretical design of the Prairie Restoration Center.

MAN-NATURE RELATIONSHIPS

I believe that man exhibits three basic attitudes toward nature. First, he wishes to mirror the natural world in which he exists; for him, everything is nature, including himself. Second, man eishes to eliminate nature, or at least to avoid it; nature is looked upon as fearsome and mysterious. A passing glance at any large city reveals such an attitude: nature is covered up as much as possible. Even the land that man has not buried beneath asphalt and buildings is given over to agriculture. Nature is gridded into man-centured pieces. The open land is for grazing. The parks are not "natural", but planted with grass that is as close to man-made carpet as possible. The quality of the landscape is determined on an economic basis, not necessarily one that improves the quality of life.

Thirdly, man wishes to combine the two. He desires both the structure that the built environment provides and the openness and lack of human order that nature provides. Both contribute equally to his well-being. Both are needed.

> Take off your shoes and walk along the beach through the ocean's last sheet of water gliding landwards and seawards. You feel reconciled in a way that you would not feel if there were a forced dialogue between you and either one of these great phenomena. For here, in between you and either land or ocean--in this in-between realm--something happens to you that is quite different from the seaman's alternating nostalgia. No landward yearning from the sea, no seaward yearning from the land. No yearning for the alternative. No escape from one onto the other. Now there is nothing wrong with the seaman as long as we realize that he is always wanting to go home in both ways.[9]

Like the seaman who is content in the two realms of his existence, man in general should be content that he is both a separate, self-conscious

being and an intimately involved part of nature's whole being. These realms complement one another. Nature and its openness is as fulfilling as the ordered structure that man can provide himself in his built environment.

> There is a kind of spatial appreciation which makes us envy birds in flight; there is also a kind which makes us recall the sheltered enclosure of our origin. Architecture will fail if it neglects either one or the other.[10]

The appreciation of the bird's open flight complements the need to understand structure. The sheltered enclosure somehow gives man a place of known meaning, a point where man can find greater understanding in, and give further meaning to, the infinity and openness of nature.

> As an artist, I frankly write about what I like in architecture... From what we find we like--what we are easily attracted to--we can learn much of what we really are.[11]
>
> Robert Venturi
> Complexity and Contradiction in Architecture

I have also chosen to write about what I like, namely, the role of the natural environment and its effect on my conception and formation of space in the architectural sense. The historical examples that I have chosen do not closely follow any strict chronological or stylistic progression. "I rely less on the idea of style than on the inherent characteristics of specific building. (I am) writing as an architect rather than a scholar...."[12] This is not an ad hoc study of the architectural relationship between man and nature, but a personal one. This personal investigation of architectural designs in different cultural and environmental contexts will lead to a firm understanding of concepts significant and relevant to the present project. I do not seek to prove anything more than how I feel at this particular moment in time. Since feelings change through further discovery, I do not see this "historical sketch" as anything more than a foundation, a tool, to use in further investigations into what I like in architecture--namely, the interface between man and the world in which he exists.

PRIMAL MAN -- One who does not distinguish art (architecture) from one's life.

> Oh, yes, I went to white man's schools. I learned to read from school books, newspapers, and the bible. But in time I found that these were not enough. Civilized people depend too much on man-made printed pages. I turn to the Great Spirit's book, which is the whole of his creation. You can read a big part of that book if you study nature. You know, if you take all the books, lay them out under the sun, and let the snow and rain and insects work on them for a while, there will be nothing left. But the Great Spirit has provided you and me with an opportunity for study in nature's university -- the forests, the rivers, the mountains, and the animals, which include us.[13]
>
> Topanga Mani, A Stony Indian
> From Touch The Earth--A Self Portrait Of Indian Existence. Compiled by T.C. McLuhan

I define primal man as one who does not actively separate the making of art (architecture) from the functions of existence--both spiritual and spiritual and physical--in the natural world, of which he sees himself a part. His architectural expressions mirror nature and the meaningful space produced is not a self-conscious human construct. A good example of this primal expression is the pueblo cliff dwelling of the American southwest. "All human construction involves a relationship between the natural and the man-made," Scully notes.[14]

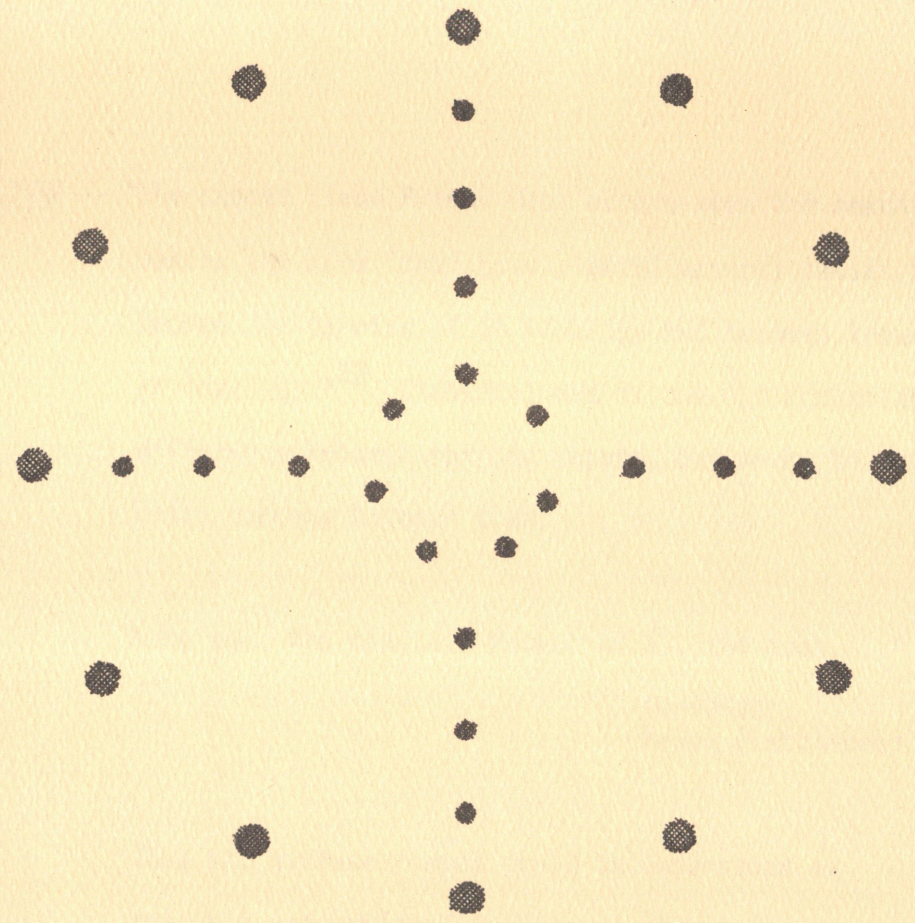
> The Puebloan peoples of the American southwest ritualized their relationship to the natural world around them. This symbiosis is fundamental to their architecture as well, for the environment is an implacable catalyst in the kind of shelter primal people create for themselves. The balance between the artificial and the so-called natural can be clearly seen in the architecture of the Pueblo settlements, as well as those inhabited today.[15]
>
> Though Indian art demonstrates the way in which primal mentality constructs a manifestation of

> place out of the ideal of space. It is in Indian architecture that we best witness the intrinsic amalgamation of space and place, of place and nature, of man and nature. Not only Native Americans, but all primal peoples have always found the means by which to be protected from the infinity of space. The tipi, the hogan, or the longhouse, just as the temple, cathedral, or ceremonial center of antiquity, determines the perimeters of space in such a way that sacred space is established.[16]

For native American Indians there is no word for art. For Indians everything is art.[17] But even primal man, so close to nature, still recognized himself as somehow separate from nature. Most Indian religions contained the notion that man had to go out into nature and obtain sacred power from an object in nature; most of the cultures believed that all objects, including such things as rock and water, were animate. Usually at puberty, a youth would go to some sacred place, a high mountaintop for instance, and through a vision quest obtain an individual Orendas--a fundamental life force which has usually seen in the form of a specific animal which represented certain powers to the individual. In most American Indian cultures it was generally believed that man alone in nature did not possess Orendas from the outset. The relevant point here is that, while man alone had to seek his specific power in nature through the vision quest, this separation points to a realization that man's reflective capabilities caused a self-conscious mind, unique in nature, to appear. Thus, even primal man recognized a split between the mind of man and nature.

But this split was not reflected in the architecture of these primal people. They tried to mend this split, to mirror the natural environment, and not to draw particular attention to their own feelings. They tried

to capture the feelings of nature in their own being. Man was perceived as one with nature, but he also possessed a unique identity apart from all the other forces of nature. Religion, thus, sought to bind man with the intrinsic powers of nature; it was the human construct through which man could fulfill his relationship with nature. These peoples' produced their physical constructs in much the same way: "It would seem that buildings and mountains are all one for the Hopi. Man-made structures are works of nature, too, no different in that from the home of the bees."[18]



THE INDIAN MEDICINE WHEEL

> In the middle of the Wheel you see Seven stones, and they are right, they are in the Circle. These are the seven stars. They are also Seven Arrows. They are seen as the Seven Natures of man and the Universe. Man is mirrored within these Seven. Two of the seven can be love and fear. The rest we must search out for ourselves because this is part of our learning. Seven Arrows always reflects what we truly are.[19]
>
> From Seven Arrows By Hyemeyohsts Storm

Primal man sought knowledge of the universe through an abstraction of nature. In the circle man found a natural form that mirrored the relationship between man and openness. The center became the sacred place of self-conscious man. This is reflected in many of his structures. The Tipi, for instance, had a sacred fire ring at the center of its structure, a structure that protected man from the infinity of nature.

CLASSICAL MAN -- "The change (from Primal Man) occurs when the meaning behind the word 'art' (i.e., architecture) ceases to become the carrier of an ideology and becomes known as an ideology."[20] Classical man is one who recognizes a difference between man and nature, but seeks to establish harmony between them.

"Long ago, the mountain Mother of all the gods...."

Euridides,
Helen (Lattimore)

"Thus the diffuse cosmos could be understood as tangible and rational in the eye of man."

Cornelius Van de Ven
Space in Architecture

Another phase in the evolution of ideas about the relationship of man and nature involved the recognition of man's self-conscious mind as distinct from nature, yet in harmony with the orders of nature. Primal man had mirrored nature in his architecture; the spaces produced were not self-conscious in nature, but were nature. But architectural space began to take note of man's self-awareness, recognizing that consciousness as somehow separate from the surrounding landscape, yet profoundly involved with it. Building forms began to emphasize man's logic and reason, qualities that did not necessarily advance the comprehension of the man-nature relationship, but provided a distinct interpretation of it.

Classical man's new interpretation can be seen in the architectural expressions of the Ancient Greeks. Many have felt that this culture consciously separated man and nature, and often gave nature a subservient role, the desires of man a dominant one. But this is not an accurate representation when we investigate two Greek building forms--the Greek temple and the Greek theatre--that reflected the values of the culture. Some believe that, "the Greek temple is an expression of the man-conceived divinity, and not a response to nature's divinity. It is heroic; it confronts and shapes, but it is not part of them."[21] This common belief appears to be false when one investigates the placement of temples and theatres on the land.

The Greek Theatre was oriented in such a way that people could view the performance of theatre and the beauty of nature simultaneously. Usually, the open air theatre was in a stepped dish form, left open behind the stage to a view of the landscape. The open part of the theatre was not disrespectful of nature's presence, but allowed the beauty of the natural to be harmonized with the beauty of the theatrical. Man witnessed the harmony, and, in a sense, created it. The Greek theatre provided a space where man could feel "place": a defined point in nature where he sensed a certain degree of protection from the infinity of the surrounding landscape.

Greek temple placement reflects a respect for the intuitive sanctuaries of nature. Temple placement often coincided with a certain natural sanctuary in the landscape. It must be noted that, for the Greeks, every action had a purpose. The temple oriented their lives and gave them direction. The Greeks further saw the powers of the gods in

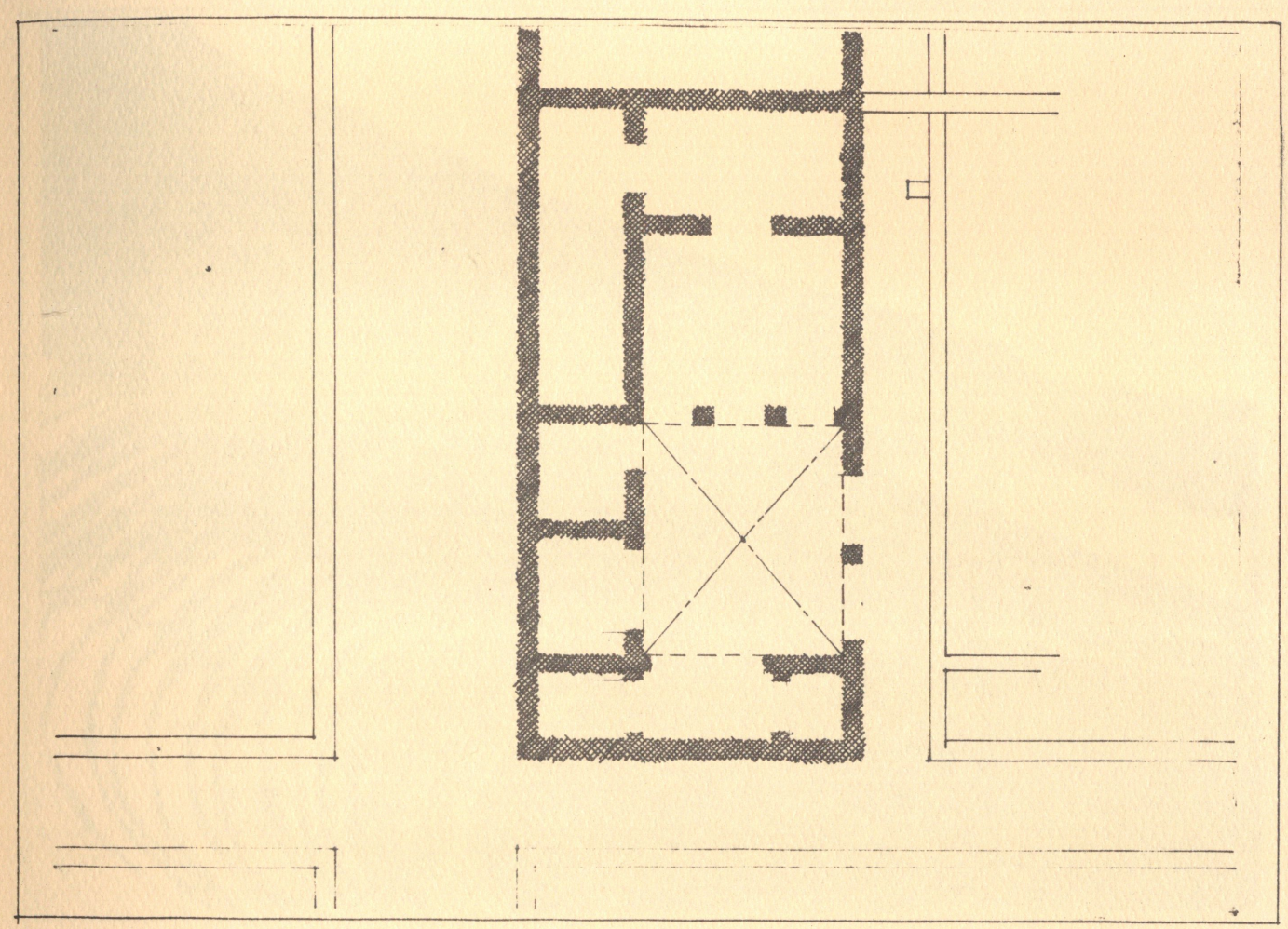
the forces of nature; to offend the one would be to provoke the other. Their balance between man and the landscape thus probably came from fear. Since they did not want to get on the wrong side of the gods, they did not want to disturb with their man-built temples the specific qualities of the landscape that nature had provided.

Often temples were built on the sites of previously-existing open air altars. These altars, in turn, had been placed in a specific natural sanctuary which best exemplified the character of the god for whom the temple was built. For example, a temple to Hera, mother of the Gods, would often be placed in an area where the presence of the earth was quite prominent. The earth, where plant growth began, where even human birth was ultimately rooted, still represented the notion of birth to the Greeks. The earth was integrated into the eventual form of the building.

In the Acropolis, the Greek attitudes toward the man-made and natural are further elaborated. The temple forms themselves reveal a clear man-made order through the use of pure geometries and mathematical proportions. Yet the placement of the Acropolis reveals a certain intuitive sense of its relation to the surrounding man-made and natural features. The site plan shows a sympathy towards the existing landscape in terms of placement and orientation, while the building forms themselves reveal a formalism based in form and design. The pure geometries and proportions are human abstractions, yet details reveal a conscious effort to fit the building into the landscape. The columns, for example, of the temple to Hera would lack a base and so make one aware of the ground on which the temple was placed. The noticeable

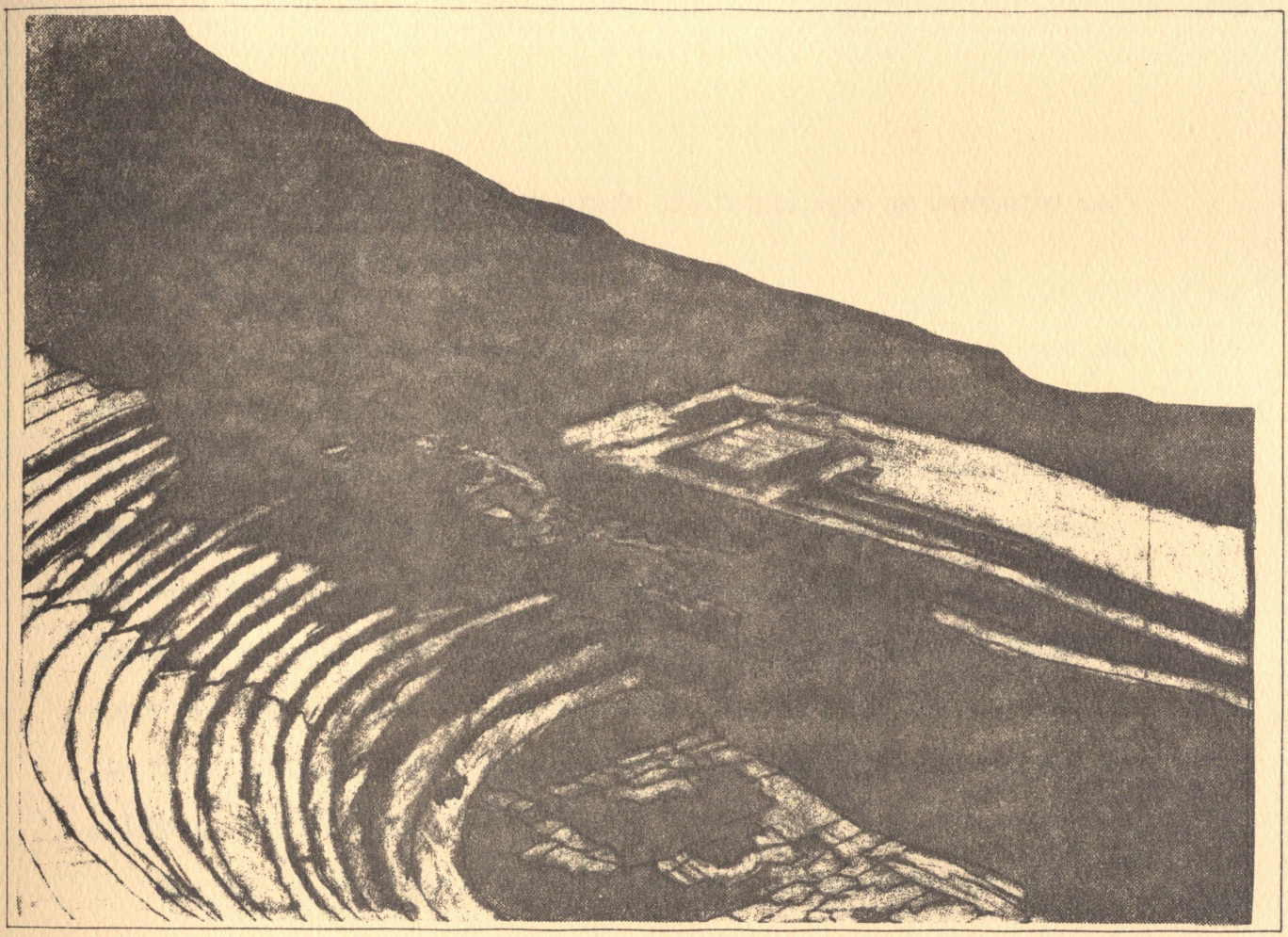
"squattiness" of the columns would also draw more attention to the earth.

The Greek atrium house also reveals classical man's attitude toward nature. The house, often located in the city, would be built in such a way that the rooms wrapped themselves around a courtyard open to the sky. This enclosed space kept the noise and dirt away from the interior of the house, yet allowed light to enter the space. More importantly, this space had an altar in the center where religious offerings were made, a place insulated against the city and all of its urban noises, yet remaining sympathetic to the presence of nature. Nature came into the space through light and sky. The interior thus had the qualities of structured space and open nature simultaneously. Space was still given definition by nature, through the light that was allowed to enter.



CLASSICAL MAN

This small house, built in the town of Priene during the Hellenistic period, reflects a concern for bringing the qualities of nature into an urban environment through light. The open atrium in practical terms brought light into the space while maintaining a sense of privacy, away from the busy streets outside the building. More significantly, this space served as an open pavilion with an altar, where offerings could be made to the gods. For the Greeks, as for Primal man, the center had significant connotations. Man and the forces of nature--represented in the gods that were paid homage to--occupied the center of the household. Although the natural landscape was hidden by the city, nature was still significant to man, and natural light provided the connecting link.



CLASSICAL MAN

The theatre at Epidaurus creates a space that accommodates man-made structure and natural openness at the same time. The drama of theatre and the drama of the landscape can be perceived in unison. One feels the security of the built environment together with the power of nature, and neither dominates. Self-conscious man is invited to view the works of man and to reflect on the work of nature.

DIVINE MAN -- One who imposes man-made constructs upon an unknowing and uncaring nature.

Man has always sought to understand why things are the way they are. Often man's overzealous desire to understand has led him to impose a false order over that which he doesn't know. Divine man created known orders--such as euclidean geometries--and imposed them on an unknowing and uncaring nature. These orders had nothing to do with the aesthetic qualities or workings of nature. Internal, structured architectural space did not let natural light penetrate its wall, nor were the exterior forms concerned with understanding of the natural world, neither as wildness or wilderness.

A study of the typical medieval town illustrates this "divine" attitude toward nature. At this time in history, towns began to flourish in Europe. "In general the medieval town resembles a living organism, where the (peripheral) wall is the hard shell and the church in the center forms a delicate core."[21] The town grew according to its own desires and its own needs, emanating from the central organizing element and terminating at the peripheral wall. "The city wall was more than a means of protection; it was a symbol of the civitas, a domain reigned by law, order, and security. In the civitas, man was free."[22] The center of this organism, the cathedral, was the "mirror of the world" and gave order to the immediate community. The gardens emanating from this core organized the natural world according to man's beliefs.

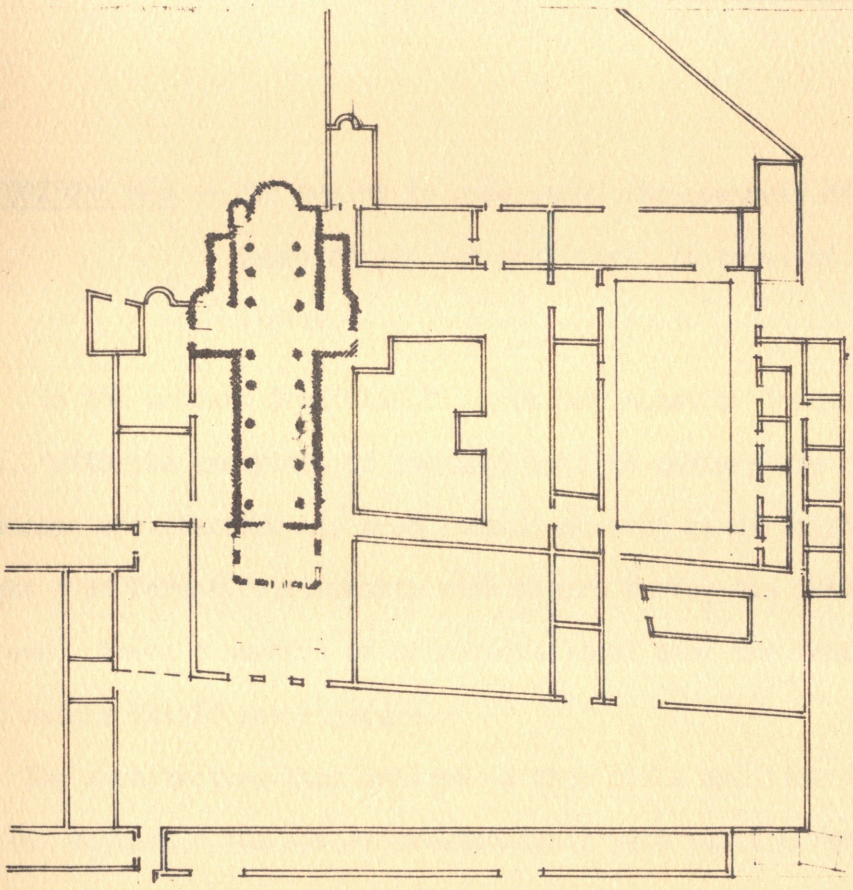
These orders did not represent the openness of wildness, but were organized in a way that only a select few could understand. About the medieval garden and its understanding J. B. Jackson has commented:

> We are familiar with the symbolic nature of the medieval garden connected either with the castle or the monestary and its exclusive, other-worldly character. Whatever its charm and beauty, this garden had to be deciphered to be appreciated, rather than viewed. The talents of the gardener, the astrologer, the alchemist were all involved in its composition, and to enjoy the result one needed to be a member of a small society of initiates The medieval villager or townsman had no part in this aristocratic garden culture.....[23]

The openness was hidden by an order that had nothing to do with those natural orders which could be understood by all. The community clung to and amorphically grew around a structure that was unknown to them. Nature and its openness, hidden beyond the "outer" wall, were not perceived as meaningful, but as incomprehensible. Nature was mysterious and represented evil.

Man feared the seemingly unknown orders of nature; hence, he sculpted it and placed it into geometries and shapes that he himself produced and understood. This attitude also shaped the structure of the built environment. Man's structures celebrated his dominance over the natural world. The stories these buildings told were personal ones, on either religious or man-centered themes. Man-made space was not thought of as complementary to natural space since nature was subservient to his beliefs. The openness that nature presented was either omenous or unimportant:

> Nature was given meaning in the walled garden, separated from nature: a symbol of beneficence, island of delight, tranquility, and introspection, but the order of its array is unlike the complexity of nature, reduced to a simple and comprehensive geometry.[24]



DIVINE MAN

In this example of the Cluny II and the monestary of CA. 1043 one notices a shift in emphasis in the way the forces of nature are reconciled. Divine man placed nature within gardens and did not permit wildness to permeate the monastic walls. He considered wilderness the hiding place of evil. The light brought into the center of the space was no longer left to project its own meaning, but was changed by man's orders, becoming a divine light once one entered the central organizing space: the church. The wall surrounding the monestary separated man from his surroundings; man's divine order somehow represented understanding, while nature and all of its "disorder" represented evil.

PICTURESQUE MAN -- Man begins to understand the openness of nature in terms of its own qualities, in terms of its own sublimity.

"In the western tradition," Ian McHarg notes of landscape architecture, "with the exception of the English 18th-century and its extensions, landscape architecture has been identified with garden making." Man sought a different relationship with nature during the 18th-century in England. There a handful of architects leapt over the fence-row and saw that nature itself was a garden.

The architecture that evolved in this place and time followed a similar pattern. The spaces created dealt with sublime romantic understandings that relied on certain references to the past that were initially made popular by English writers, poets, and painters. Nature as wildness presented romantic images; landscapes were reproduced to recall unaltered nature and to induce subliminal emotions in the observer. Landscapes were naturalized, native plants were re-introduced. Man began to understand nature on its own terms, at least aesthetically. Gardens placed in Euclidean geometric contexts were regarded as simple-minded and false to the understanding of nature. Nature, at least in these terms, was no longer an alien order, but one whose qualities could not be ignored or disregarded.

Without the ecological understanding of the workings of nature, picturesque man still reproduced landscapes that seemed to adhere to natural patterns; imposed patterns were no longer valid. The notion of wildness was introduced, at least on an aesthetic level. Loren Eiseley has said that "the unknown within the self is linked to the wild."[25]

Picturesque man realized this. When one imposed his own distinct order upon the natural world, wildness was somehow lost. Seeing this, man tried to restore and reproduce its sublime characteristics, using his direct observation of the natural environment and very little experimentation. Man and nature came closer together during this period, and worked together in a complementary manner.

Nature in a seemingly unaffected state induced certain sublime sensations, and architecture based on cultural understandings of past periods and styles brought to mind other emotions. Architecture and its space produced a certain type of feeling and nature another, yet they existed as complements. The built environment strove to recall sublime imagery of the past. A house could look like a Gothic cathedral, or have medieval castelated walls. Both architecture and nature became highly emotional. Nature, its wildness, and its openness began to be understood and appreciated for their intrinsic qualities.

THE "PRAIRIE SCHOOL" -- A Picturesque View Closer To Home.

When one senses the power of nature--in the strength of the Rockies, in the thunder of a waterfall, in the peacefulness of the open prairie--one is at the first stage of understanding and appreciating nature: the feeling of the sublime. This is what the tourist sees and feels. Failing to grasp that which is beneath the surface of the picture, the tourist touches only the surface of the landscape. The "prairie school" and the landscape architects who followed this new style also displayed this tourist's understanding of the landscapes they created in the midwest at the end of the 19th century.

The early prairie landscape architects were heavily influenced by the 18th century landscape movement which, in turn, had its roots in the English romantic literature of the period. They developed a perspective that harmonized man and nature, but without any true understanding of the processes through which the natural landscape--the prairie--came to be.

Ossian Simonds embodied most of the values underlying the prairie school's understanding of the midwestern landscape and how it should be utilized to create meaningful architecture. In 1922 Simonds made an address at the University of Illinois entitled "Nature as the Great Teacher." Nature, Simonds felt, taught by direct observation. He emphasized the use of indigenous plants, understood by going to the woods and seeing what plants and shrubs they contained. As Mara Gelbloom, in her article "Ossian Simonds: Prairie Spirit in Landscape Gardening," points out:

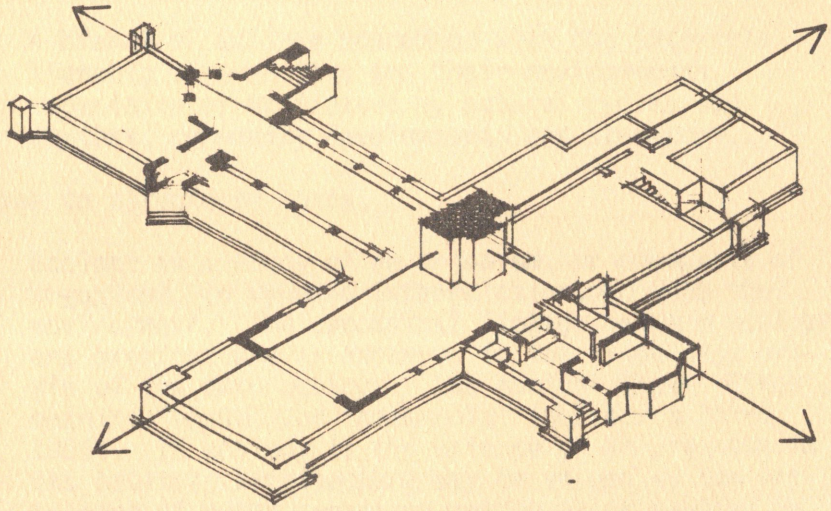
> However, Simonds did not believe in the haphazard choice of plant arrangements found in nature and emphasized that a proper selection of material and arrangements which nature provides must be made; for while nature is the best teacher and does some things incomparably well, she does not produce the most artistic effect, at least from man's point of view.[26]

Simonds acknowledged that, to him, nature was haphazardly arranged, at least from man's point of view. This "picturesque" view of nature lacks understanding of the prairie beyond a "gut" feeling. This view was immensely popular at the time. Frederick Law Olmstead along with his partner Vaux incorporated such a view of nature in their widely acclaimed plan for New York's Central Park. Olmstead realized that such a contrived natural setting could provide wildness, and that this could complement the structure of the built environment like New York City.

Likewise, the architectural forms of the prairie style acknowledged such a picturesque view. The emphasis on the horizontality of the roof planes reflected the horizontality of the prairie and the actual horizon. Frank Lloyd Wright's Robie House, built in 1909, exemplifies this view.

> We know from Kenneth Boulding (1956) and other behavioral scientists that human behavior is dependent upon one's image of the world (i.e., Nature).[27]

Our image of nature has not yet come to comprehend nature on nature's terms. Still, a "picturesque" view was produced and maintained when man attempted to increase that comprehension and to confront that interface between man and nature.



PICTURESQUE MAN

Frank Lloyd Wright's Willets House of 1902 establishes the center as a sacred space. As its core, symbolizing the center of man and nature, is fire, representing the natural within man. This core introduces nature into the center, just as the classical atrium house opened its center to natural sky. The center, then, is given over to the forces of nature while implying a strong sense of enclosure as well. From this symbolic core the spaces radiate out into the openness of nature. This allows free, radiating access outwards to the openness of nature while maintaining a certain sense of permanence and place.

ECOLOGICAL MAN

Webster's Third Dictionary defines ecology as:

> A branch of science concerned with the interrelationship of organisms and their environments, especially as manifested by natural cycles and rhythms, community developments and structure...[28]

In relation to structured space,

> Ecology is a study of an organism, or community of organisms, in dynamic interrelationship with the environment. The conceptual linkage between ecology and architecture is apparent in the linguistic origin of the term ecology: the ancient Greek "Oikos", meaning "house" and "household" (Webster's Third, 1966). If ecology is the science of an organism in its habitat, architecture may be viewed as the art-science of human organisms making their habitat in the natural environment."[29]

In 1854 Henry David Thoreau remarked on the transformation that occasionally takes place in one's relationship with the natural world. A young man commonly seeks out the woods as a hunter and fisherman, but "at last, if he has the seeds of a better life in him, he distinguishes his proper objects, as a poet or naturalist it may be, and leaves the gun and the fish pole behind." Aldo Leopold fit this pattern closely, except that he found his proper object in ecology.[30]

Aldo Leopold was one who brought together the logic and structure of the scientist and the sensitivity of a romantic "picturesque" man. This synthesis helped produce a new way for man to relate himself to the land, and gave civilized man a reason to appreciate wildness. Leopold was an ecologist-philosopher who brought to civilized man an understanding of the proper values according to which man may relate himself to the natural environment.

The ecological view will be given form and space in the actual

design of the Prairie Restoration Center, and the "how" of these expressed values will be explained in the summary following the design. This section will define the values with which I am working in this thesis, values that build first on those of Thoreau, and then as they were extended and expressed in the beliefs of Aldo Leopold, particularly as Leopold developed them in his classic A Sand County Almanac.

The proposed ecological theory changes our perceptions of what land is for, though it accepts the picturesque as a logical place to begin to understand wildness. As Leopold states:

> Our ability to perceive quality in nature begins, as in art, with the pretty. It expands through successive stages of the beautiful to values yet uncaptured by language.[31]

Leopold felt that wildness was essential to a healty community. Following Thoreau, he saw the need for both the extremes, the openness of nature as well as the structure of community. "While the reduction of the wilderness has been a good thing," Leopold notes, "its elimination would be a bad one." Neither Thoreau nor Leopold were sacrificing the community to nature; both saw the need for both extremes. Nature and civilization do, in fact, present different values to the quality of civilized life. These values, introduced through the gained knowledge of ecology, produce the proper ethics for man to abide by when dealing with his fellow organisms. These ethics accept civilization as a positive force, yet recognize that some changes have to be made if the community and the individuals that comprise it are to lead lives of true quality, and come to know nature on its own terms.

Ecology is a science that allows man to view himself and nature in

complementary terms. It is a science that is holistic, dynamic, and evolutionary.[32] If we accept Kenneth Boulding's belief--"that human behavior is dependent upon one's image of the world"--then the image of the world that ecology provides will necessarily alter man's relationship to the natural world, as well as his understanding of meaningful structured space.

In nature, complementarity exists between an organism and its environment, and between the forces that define that relationship: order and disintegration, structure and openness, responsibility and freedom, stability and change. In the same way, the structured space of man complements the openness of nature.

> What I am trying to make clear is that if in a city we had six vacant lots available to youngsters for playing ball, it might be "development" to build houses on the first, and the second, and the third, and the fourth, and even on the fifth, but when we build houses on the last one, we forget what houses are for. The sixth house would not be development at all, but rather...stupidity.[33]

The gained meaning of structured space must necessarily be complemented by the openness of nature.

An ecological approach also destroys the notion that nature, and more specifically the prairie, is a "haphazard arrangement of plants," as Ossian Simonds felt. Man is not the sole creator of order in the environment, yet only those orders which he produces are considered to possess order. The degree of order recognized in a given set of objects or sequence of events is dependent on the cognitive capacity of the observer. Ecology expands that cognitive capacity to reveal that nature is not "haphazard" in its arrangements, but in fact is highly and intricately ordered. Ecology understands nature not in terms of disorder,

but in terms of an open, infinite set of interrelationships, the comprehension of which leads to rich insights into the processes of all life. Leopold felt that this vision of ecology constituted "the outstanding discovery of the twentieth century."[34]

Structured space contains a finite set of objects and a given sequence of events. If, in fact, the space is understood to have a meaningful sense of enclosure and an understanding of finiteness within openness, then it grants a certain degree of security. This perception does not necessarily conform to the rational methods of understanding. Just as an organism may be isolated and examined, yet only fully understood when its relationship to its total environment is taken into account, so is structured space finite only in the sense that it can be understood holistically. In the meaningful built environment man gains a certain degree of security in relation to the infinite order of nature. Defined space then becomes a model of the world, and may reflect the holistic perspective. For man, it produces a known place from the space of nature.

Nash comments that:

> Leopold pointed out that an ecological conscience makes possible the extension of an ethical attitude toward nature. This in turn "changes the role of Homo Sapiens from conqueror of the land community to plain member and citizen of it. It implies respect for the community as such."[35]

Currently, our reverence for natural places is forgotten. Our sense of place in the natural environment has been diminishing, neglected as our sympathies and desires for balance have been replaced by our overzealous yearning for dominance. Our values have not yet been

directed by the "higher laws" of our consciousness, but by our craving to influence everything that has the potential to be structured, even if this structure is not a valid means to quality in life.

In A Sand County Almanac, Leopold reveals the shortcomings in our current perceptions of nature, problems that have produced environmental degradations as well as qualitative deficiencies. Leopold laid the necessary philosophical foundation on which man could begin to restore a balance in his interaction with the natural world. He pointed to values that could lead civilized man to a fuller understanding of nature in ecological terms. Leopold states:

> The culture of primitive peoples is often based on wildlife. Thus the plains Indian not only ate buffalo, but buffalo largely determined his architecture, dress, language, arts, and religion. In civilized peoples the cultural base shifts elsewhere, but the culture nevertheless retains part of its wild roots. I here discuss the value of this wild rootage.[36]

An ecological approach reflects these values and reveals how nature and place, in terms of the built environment, come together and work as complements when perceived holistically.

"We need knowledge--public awareness--of the small cogs and wheels (ecology), but sometimes I think there is something we need even more. It is the thing that Forest and Stream on its editorial masthead once called a refined taste in natural objects."[37] The Prairie Restoration Center investigates the small cogs and wheels through ecology--a holistic, dynamic, and evolutionary investigation. This new way of looking at the world changes one's sense of structured space and the values behind that created space. The built environment, then, incorporates this understanding. The values of the evolving ecological awareness will be

expressed in spatial terms in the Prairie Restoration Center. Leopold comments:

> The ordinary citizen today assumes that science knows what makes the community clock tick; the scientist is equally sure he does not. He knows that its workings may never be fully understood.[38]

Imagine a giant doughnut. The doughnut is four miles in circumference, made of concrete, and buried in the earth 35 miles west of Chicago. This is the housing of one of the world's most powerful atom smashers, at Fermi National Accelerator Laboratory. There scientists accelerate protons to nearly the speed of light, then smash them to study the basic structure of matter.

Now imagine a hole in that doughnut. It is a mile and a quarter across, 700 acres in area. In that hole, surrounded by 20th century technology, Bob Betz and colleague Tony Donaldson--a Fermi electrical engineer--and a lot of other enthusiastic volunteer helpers are re-creating the 19th century Illinois prairie, piece by piece.

"I like wildness," Betz told volunteer Polly Cosgrove that day. "I like the idea of wildness. I'd like to see us restore areas as reserves for our grandchildren. The reserves would be kind of like Noah's Ark. Then, if our grandchildren ever wanted to expand the area of wildness, they'd have these nuclei. That's what we really are trying to do now--save the nuclei.

"Can The Tallgrass Prairie Be Saved"
National Geographic, ?-?-80

WHAT IS A PRAIRIE?

My home state, Illinois, is nicknamed "The Prairie State." I grew up near Oak Park, home of Frank Lloyd Wright and the "Prairie School." The Illinois bicentennial exhibit for architecture was entitled "Illinois Architecture: A Revolution On The Prairie."

Ironically, I learned about the "prairie state" and the "prairie school" before learning about the prairie. Up until last year I had never seen even a small portion of prairie anywhere in the prairie state. All had been plowed up, fenced off into farms and grazing land, and then developed into cities: Chicago, Aurora, Rockford, Springfield.... The grasslands where the Miami, Kickapoo, and Illinois indian tribes hunted bison exist now only in small isolated plots of land along railroad rights-of-way and in old pioneer cemetaries. The once vast prairie still exists, but only in small "plots" which mark its near death, quiet corners where the plow and suburbs have not reached.

Referring to the popular perception of what the prairie is, Dr. Robert Betz, biologist and initiator of the Fermi-Lab Prairie Restoration Project, concluded, "that to some, prairie means a vacant lot between houses; to others it is the open land of the western United States." I, too, once thought that the prairie was a weedy streetlot, a western wheatfield, or a muddy cow-pasture. Nothing could have been further from the truth.

During a lunch break one afternoon I went to the Fermi National Accelerator Laboratory--once the town of Weston, Illinois--to investigate how a scientific instrument four miles in circumference could reveal the secrets of atomic particles, particles far too small to be seen

even by the most powerful of microscopes. Ironically, I did not leave with any greater appreciation for the high-level scientific work going on there, but instead with an appreciation for the prairie. For in the 700-acre center of this accelerator ring, a prairie restoration project was underway. Finally, after living in the "Prairie State" for most of my twenty-three years, I found a prairie; not a cornfield or a weedlot, but a prairie. Other people, I feel, should have the same opportunity.

To understand how to design a project in the mid-west, it is necessary to explore further the virgin prairie environment, before man gridded off its majestic landscape to make way for suburbs and asphalt, Central American corn and Eurasian lawn grass. "There is no figure without ground," Arnheim says. "To see an object in space means to see it in context." I want to show how one can deal with the interface of the natural and the man-made on a truthful and realistic basis. Thus, the Prairie Restoration Center came to mind.

I have learned that this huge ring for scientific investigation may be obsolete in as little as twenty years. Prairie restorationists feel that within this time the entire ten-square-mile site may be restored to prairie, and the accelerator ring, too expensive to update, may become a modern scientific stonehenge. Perhaps the prairie will then become the central of attention, for all to appreciate and understand, for a period far longer than twenty years. Perhaps by then the prairie will have begun its brilliant comeback. And perhaps by then man will have come closer to understanding the true beauty of the open prairie.

HISTORY OF THE PRAIRIE

The word "prairie" originally came from the French, and means "meadow." The first Europeans to see these extensive grasslands were the French explorers and voyageurs who had access to the interior of the continent via the St. Lawrence River and the Great Lakes, and probably confronted the prairie expanse at the south end of Lake Michigan, near the present city of Chicago.

For thousands of years native American Indians roamed the prairies of the middle west without damaging the natural ecosystem. The Indians hunted with fire on the prairie, encircling the buffalo, concentrating their numbers for an easier kill. Ecologists debate whether this custom created or merely maintained the prairie system. It is clear, however, that frequent fires were advantageous, even necessary, to the health of the system. Fire promoted a greater diversity of plant life prohibitted the invasion of woody species. The role of fire is just now coming to be understood and is recognized as an important element in resoration efforts: "Prairie areas subjected to occasional burning have shown a tendency to form a rich mixture of many species of prairie flowers--probably because the thick accumulation of matted undecayed vegetation is eliminated from the ground cover."[39] Fire created the prairie, but what remains of it today does not follow a natural fire frequently, and a greater number of non-prairie and alien plants dominate the system.

Not until the coming of the white settlers in the nineteenth century did the native vegetation succumb to purely human orders. The westward migration of the pioneer led to an almost overpowering sense of openness and freedom. The settlers moved from the virgin forests of the east,

driven by an obsession to clear land and eliminate the "vision-obscuring trees and vines, to bring light into darkness." Of this obsession, Nash notes:

> Certainly there was an economic motive for this attitude. Religion also figured in it, since wilderness was construed by most frontiersman to be in league with devils, demons, and the evil forces of darkness that civilization must overcome. But, I increasingly feel, the heart of the bias against wilderness was the ancient association between security and sight. The American pioneers re-experienced the situation and the anxieties of early man. Neither felt at home in the wilderness.
>
> In this connection it is interesting to note that many accounts of western migration in North America contain expressions of relief on emerging from the eastern forest wilderness to the openness of the great plains. All at once the pioneers could see, and their spirits immediately brightened. In the rhapsodic language, never applied to the forests, accounts such as James Hall's Notes on Western States (1836) described the waving grass, the profusion of flowers, the brilliant sunshine... The term "wilderness" was seldom applied to the grasslands of the middle west; "garden" on the other hand was frequently employed.[40]

The openness of the prairie was so overpowering that these newly-arrived settlers often sought refuge in or by the small patches of trees that dotted the mid-western prairie. It was not for years that the pioneers actually settled on the open landscape.

The process of turning the prairie under was not easy. The hardy prairie plants had root systems so deep and so well established that special plows, dragged by as man as ten oxen, were needed to turn over the unbroken sod. Once broken, the earth was so rich that it clung to the plows; only with later developments in agricultural technology did it become easy to produce domesticated crops. Parts of the prairie were

immediately ruined by overgrazing of cattle, which, along with the innovation of barbed wire fencing, created a strain on confined parcels of land. For thousands of years the prairie withstood the grazing of the bison and other wild creatures; the fence, the plow, and the domestic animal destroyed the prairie in a relative flash of time.

"'Were fences the first straight lines and right angles on the face of the prairie?' wondered one of the family. 'It is hard to visualize Wheatland township without that network of powerlines and roads and fences--and furrows.'"[41] When man sectioned and quarter-sectioned the land with his fences and subdivisions, he lost forever the vastness of the prairie landscape, not to mention the diversity of the native community.

> Every July I watch eagerly a certain country graveyard that I pass in riding to and from my farm. It is a time for a prairie birthday, and in one corner of this graveyard lives a surviving celebrant of that once important event.
>
> It is an ordinary graveyard, bordered by the usual spruces, and studded with the usual pink granite or white marble headstones, each with the usual Sunday bouquet of red or pink geraniums. It is extraordinary only in being triangular instead of square, and in harboring, within the sharp angle of its fence, a pinpoint remnant of the native prairie on which the graveyard was established in the 1840's.[42]

The prairie should no longer be hidden, confined to small parcels of forgotten land, but complimented, appreciated, and given rightful presence alongside man. The prairie, afterall, was there first.

A. PRE-FERMI LAB USE

The 6800 acres on which the Fermi Laboratory is situated was previously farmland. Before development there were eighty-one farms on the land, ranging from 12 to 500 acres. Farmsteads and individuals houses occupied 240 acres. The former village of Weston had eighty-four houses, all of which are now used by the N.A.L. to house visiting staff. The buildings in the village have been supplemented by additional farm-houses relocated from other parts of the immediate region.

B. TOPOGRAPHY

The site consists of gently rolling terrain, of which two percent has a slope of five percent or more. Drainage is generally sluggish and dependent now on man-made canals and previously placed drainage tiles, used to dry wetland pockets for farming.

Between the Ferry Creek swamps in the southwest corner of the site and the hills in the northwest, the total elevation difference is eighty-five feet. The average elevation of the land is halfway between these extremes. The site straddles the divide between the DuPage and Fox Rivers.

C. CLIMATE

In general, the climate is extreme. Winters are cold, with days of -10° to -15°F. Not uncommon, and occasional wind chill factors of -60°. Summer is generally hot and humid, spring short and rainy. Autumn, for the most part, is the most favorable time of the year. From September to mid-November the weather is pleasantly cool at night, sunny during the day.

Average annual rainfall is approximately thirty inches, with most of this falling in the early spring and late fall. Winds are strong and tornados not infrequent. Winds at twelve miles per hour or more from the northwest in the winter and from the southwest in the summer are to be expected. Protection from winds is probably the greatest climatic concern on this open site.

ENTRANCES TO THE SITE

A. Through Traffic On Wilson Road

Wilson Road crosses the site from east to west along the northwestern edge. The road provides direct access to the center of the city of Batavia from the east. The street also links the cities of Batavia and West Chicago. At present the road is open to the public from 6:00 A.M. to 8:00 P.M. This road has become the major thoroughfare to and from the site since the main entrance was not carried on beyond the Fermi-Lab site. Wilson Road is the major access route to the Prairie Restoration Center, and, as the connection between the major cities, will have a great deal of public as well as employee use.

B. Secondary Entrances

The main entrance to Fermi-Lab is from Kirk Road, which is a four lane road running north and south along the western limits of the laboratory grounds. Kirk Road intersects the east-west tollway at the Farnsworth-Kirk interchange to the immediate south.

Batavia Road is the most important entrance to the site from the east. It crosses Route 59, which in turn interchanges with the east-west tollway two miles to the south of the Fermi-Lab complex. The tollway is the major connection to the city of Chicago thirty miles due east of

Fermi-Lab. Many visitors entering the site for the first time would use the tollway.

The Kautz Road entrance at Butterfield services Fermi-Lab from the south and leads directly to the parking lot of the main building, the R.R. Wilson Research Lab.

"In the temple of science are many mansions...and various indeed are they that dwell therein and the motives that had led them there.

Many take to science out of a joyful sense of superior intellectual power; science is their own special sport to which they look for vivid experience and the satisfaction of ambition; many others are to be found in the temples who have offered the products of their brains on this alter for purely utilitarian purposes. Were an angel of the Lord to come and drive all the people belonging to these two categories out of the temple, it would be noticeably emptier but there would still be some men of both present and past times left inside.... If the types we have just expelled were the only types there were, the temple would never have existed any more than one can have a wood consisting of nothing but creepers...those who have found favor with the angel...are somewhat odd, uncommunicative, solitary fellows, really less like each other than the hosts of the rejected.

What has brought them to the temple...no single answer will cover...escape from everyday life, with its painful crudity and hopeless dreariness, from the fretters of ones own shifting desires. A finely tempered nature longs to escape from his noisy cramped surroundings into the silence of the high mountains where the eye ranges freely through the still pure air and foundly traces out the restful contours apparently built for eternity."

Albert Einstein 1918 Speech
Zen And The Art Of Motorcycle Maintenance pg. 113

THE BUILT ENVIRONMENT AT FERMI-LAB

The Fermi-Lab, then called the National Accelerator Laboratory, was completed in February, 1974. The design of the facilities was influenced by Robert R. Wilson, the first director of the center. As an artist and sculptor as well as physicist. Wilson took on the responsibilities of supervising and giving final approval to most of the buildings at Fermi-Lab.

It was Dr. Wilson's philosophy that "a research laboratory should be an attractive cultural center in the community and the nation."[43] He personally suggested designs and in many cases imposed his personal beliefs on the project. Basically, the site contains four distinct works of architecture and a housing development consisting of renovated farm houses taken from the fifty individual farms that originally made up the ten-square mile Fermi-Lab site. The major buildings are: The Central Laboratory (now called R.R. Wilson Hall), The Proton Pagoda, The Meson Building, and The Neutrino area. In addition, there is the hugh atomic accelerator, whose dominant feature in the circular synchrotron, which is four miles in circumference.

These structures affect one's perception of the Fermi-Lab landscape and of the Prairie Restoration Center that I propose. My interpretation of their meaning is important in understanding the features of my theoretical design.

"The atom stands for peace and cooperation at the National Accelerator Laboratory now under construction in Batavia, Illinois. The 200 billion electron volt atom smasher--more formally called synchrotron--will be the largest research plant ever built for peaceful purposes,

splitting atoms into sub-nuclear particles at a never before achieved energy range."[44] This was the description of the project as it appeared in the A.I.A. Journal in July, 1969 just prior to the construction of the buildings supplementing the accelerator. Of the center's construction, R. R. Wilson notes:

> From the most ancient times philosophers, and more recently physicists, have been preoccupied with the pursuit of the ultimate atom. How elusive it turned out to be. We are reminded of Wilson's words: "And in the lowest deep a lower deep...opens wide." Yet the search goes on and what has been found so far is both strange and wonderful.[45]

Actually, Fermi-Lab is a large scientific instrument that probes into the basic building blocks of matter. The center seeks to know: Why is matter stable? Why is the charge on the electron exactly equal to the charge on the proton? Why is that charge 1.6×10^{-19} coulombs, and why is the mass of that electron 9 x 10 GSM.? These fundamental questions can only be answered with the aid of an instrument that requires the services of 1705 employees and has a stainless steel ring more than four miles in circumference. A brief description of the instrument is necessary if one is to fully understand the forms of the built environment, since the structures were designed to reflect the scientific process that went on at each of the structures.

> "The principal scientific instrument at Fermi-Lab is a system of four accelerators working in sequence to accelerate protons in the following manner:
>
> Hydrogen atoms are stripped of their electrons in an ion source contained inside a Cockroft Walton generator. The resulting ions, bare protons, emerge from there with an energy of 750,000 electron volts.
>
> They move along to the linear accelerator, approximately 500 feet along, which accelerates them to an energy

> of 200 million electron volts (MeV). The linac contains hundreds of pairs of copper electrodes between which oscillating electric fields are induced, tuned in such a way as to generate the electrical equivalent of a surf wave. The protons are accelerated as they ride this electrical wave down the tube.
>
> Next, they are injected into the booster Accelerator which is a circular machine, a rapid-cycling synchrotron, approximately 500 feet in diameter, which goes through its accelerating cycle 15 times in one second. It raises the energy of the protons to 8 billion electron volts (6 ev). It normally cycles 13 times in rapid succession, loading 13 booster pulses into the main accelerator for fuller acceleration.
>
> The protons are injected from the booster into the main accelerator--a synchrotron 6,562 feet in diameter--and here they are accelerated to a full energy (200-500 Gev). The main accelerator, also called the main ring, Contains about 1,000 specifically developed magnets spaced along the protons' orbit, to mix and focus the beam within a 2-inch by 5-inch vacuum chamber built into the center of the magnets. The protons travel around the ring about 50,000 times in one second, receiving a 3-million electron volt boast of energy on each revolution. After reaching the desired energy, the protons are extracted from the main ring and transported to experimental areas."

R. R. Wilson had the final approval over all the major design decisions at Fermi-Lab. Apparently, the design of the most distinctive building on the site--the 17-story Wilson Hall-was inspired by Wilson's travels to France and, in particular, his visit to Beauvais Cathedral, built in Beauvais, France in 1224 A.D. The central laboratory, Wilson Hall, consists of twin towers joined by crossovers at the first through fifth floors and thirteenth through sixteenth floors on the south, and the seventh through sixteenth floors on the north. In the center is a large atrium space with a variety of plants and shrubs. Like Beauvis, the twin spires of the lab create a sacred space on the main floor.

This structure houses the administrative functions of the laboratory as well as research facilities, small technical areas, and a large computer.

This building is the main visual statement on the Fermi-Lab site. Wilson envisioned the lab site as a community cultural center, a concept that seems to have been forgotten and replaced by an egocentric attitude among the scientists, who took an arrogant stance toward the community. This structure stands as a large vertical element on the horizontal landscape, consciously separate from the land as well as the people who view the structure unaware of its internal functions. Preliminary designs, some thirty-six in all, were for the most part lower and somewhat sympathetic to the land, but the scientists kept pushing the building up and away from the land, separating science from the community and the landscape.

R. R. Wilson, a scientist by trade, seems to have carried a sense of rationalism to the design of the Central Laboratory, and to the other structures on the site as well, including the sculptures that he exclusively designed and constructed. All of his work seems to reflect a rational personality. The sculpture entitled "hyperbolic obelisk" in front of the Central Laboratory simply mimics the form of the laboratory itself. The sculpture seems to lock one's perception against the backdrop of the Central Laboratory, leaving little room for the observer to employ his or her own personal beliefs. What you see is literally what you get. Like the other buildings at Fermi-Lab, the Central Laboratory seems to detach itself from the surrounding context, and the structures always seem to align themselves with the process of scientific experiment. The Central Laboratory seems to place the workings of the intellect above

the natural landscape, leaving nature to serve the structures of man. The structures seem to be designed for the intellect, and feelings seem to have been forgotten.

R. R. Wilson was nicknamed "R^Z" by members of the architectural design team, a dubbing that was undoubtedly influenced by his strictly rational approach to the design of space through his beliefs in sculpture and architecture. Many who worked on the project were left with a feeling that the structures produced were not attractive cultural centers, as Wilson maintained, but reflected the arrogance and elitism of the scientist. My personal experience has given me the same feelings.

In the three other dominant structures on the site, the forms follow the function of the experiments that take place within. The Meson detector building, distinguished by a roof of inverted half-sections of corrogated culvert, facilitates a large area of unrestricted space beneath the scalloped roof. The culvert sections are painted blue on one side, orange on the other. The building provides a research area where large linear experiments can take place. Since the building implies a large linear segmented space, the exterior form is an obvious reflection of the process that takes place within.

The Neutrino Area is a building consisting of a large truncated concrete base topped off by a modified geodesic dome. This structure reflects the housing of a large 30-million dollar bubble chamber that traces the tracks of sub-atomic particles. These "bubble wakes" help researchers understand the properties of these minute particles. The geodesic dome reflects this experiment and provides adequate space within for the large machine and related material to be set up in.

The last research area, the Proton Pagoda, is a large, black, stylized pagoda standing ten feet in the air on twenty-six foot long legs. It has a yellow double spiral staircase in the center, housed in a transparent glass tube. This staircase leads either to the control center above grade or to the experimental areas below. The yellow double-helix stairway dominates one's perception of this building and seems to emphasize a complex movement system. This seems to agree with the building's function: to capture the properties of an atom traveling at approximately the speed of light in a quite complex manner.

All of the structures mentioned, especially the three research areas, reveal a particular use of space. All make a conscious and intentional detachment from the landscape and exist as distinct entities that sit above the natural environment. The structures are not complementary in terms of structure and openness, but recognize themselves as distinctly separate from their surrounding environment.

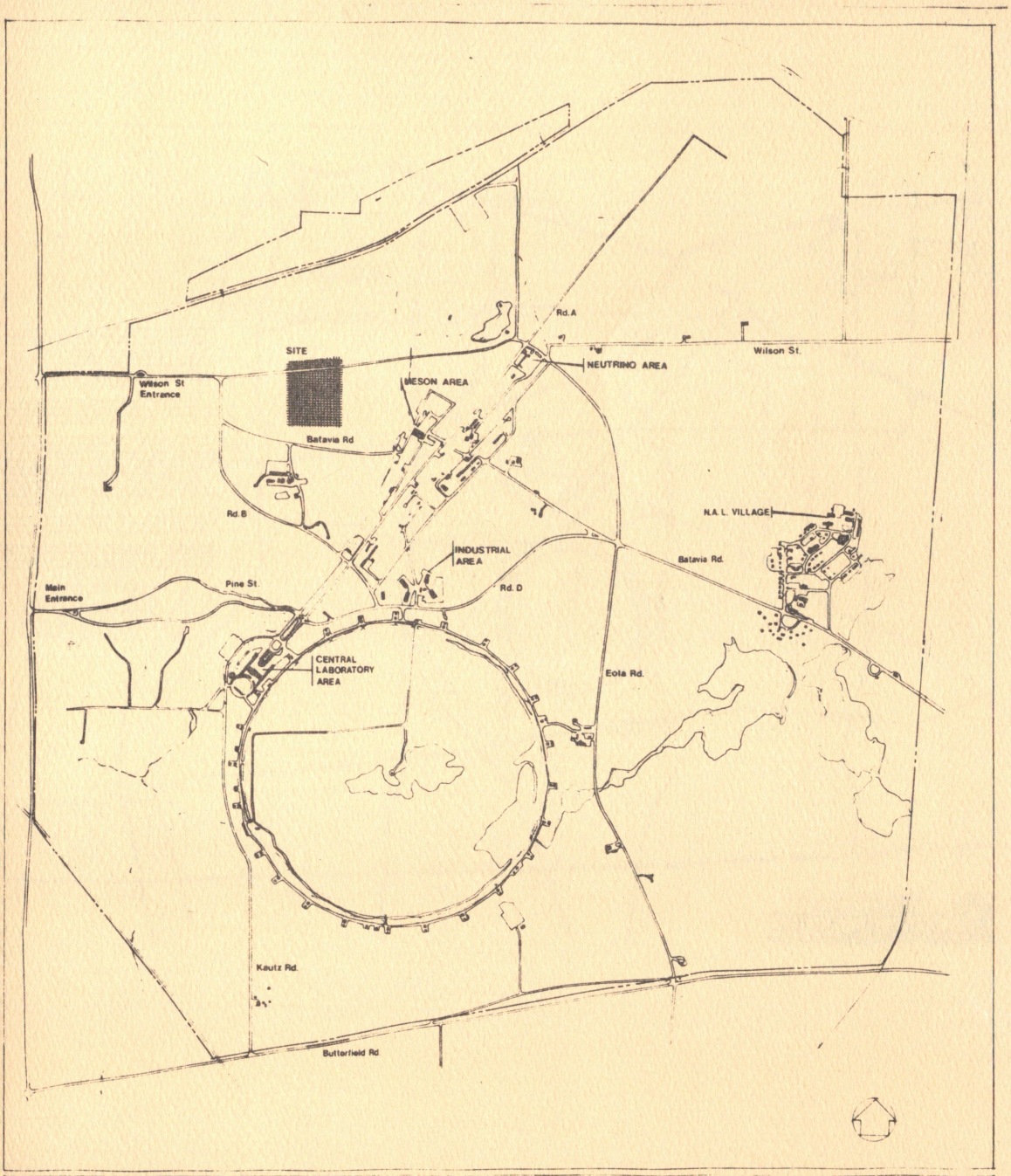
The restored residences in N.A.L. Village constitute the final group of buildings. This is the area that was once Weston, Illinois. The homes of this town have been returned to their original state and painted blue and orange. Along with a number of farmhouses that were taken from the fifty-one farms on the site, the homes of Weston house visiting scientists at Fermi-Lab. Many of these homes were moved and placed into cul-de-sacs. Since our strong cultural preconditions want us to see these farmhouses immersed in a sea of corn or wheat, the housing complex comes off as somewhat strange. It seems as if these structures were picked up and dropped onto an unsuspecting site, under an alien set of circumstances.

The site planning of the Fermi-Lab complex seems to work quite well with the landscape. The roads and placements of the buildings are sympathetic to the landscape. The planning was such that the buildings appear to have a quite human scale, especially when viewed from an automobile. The roads wind through the landscape in quite a picturesque manner, passing through groves of aged oak trees, past ponds alive with wildlife, near segments of the main accelerator ring. The roads complement the natural landscape and often offer striking views of the buildings at Fermi-Lab. It is unfortunate that the buildings were not so considerate of the human scale. In an effort to be futuristic and to comply with the orders of the scientific process, the buildings isolate themselves from a meaningful relationship to place. The community, unfamiliar with the scientific process, is left to question how these structures came to be, leaving the observer with a feeling of alienation toward the built environment.

Robert M. Pirsig in Zen And The Art Of Motorcycle Maintenance makes the following statement:

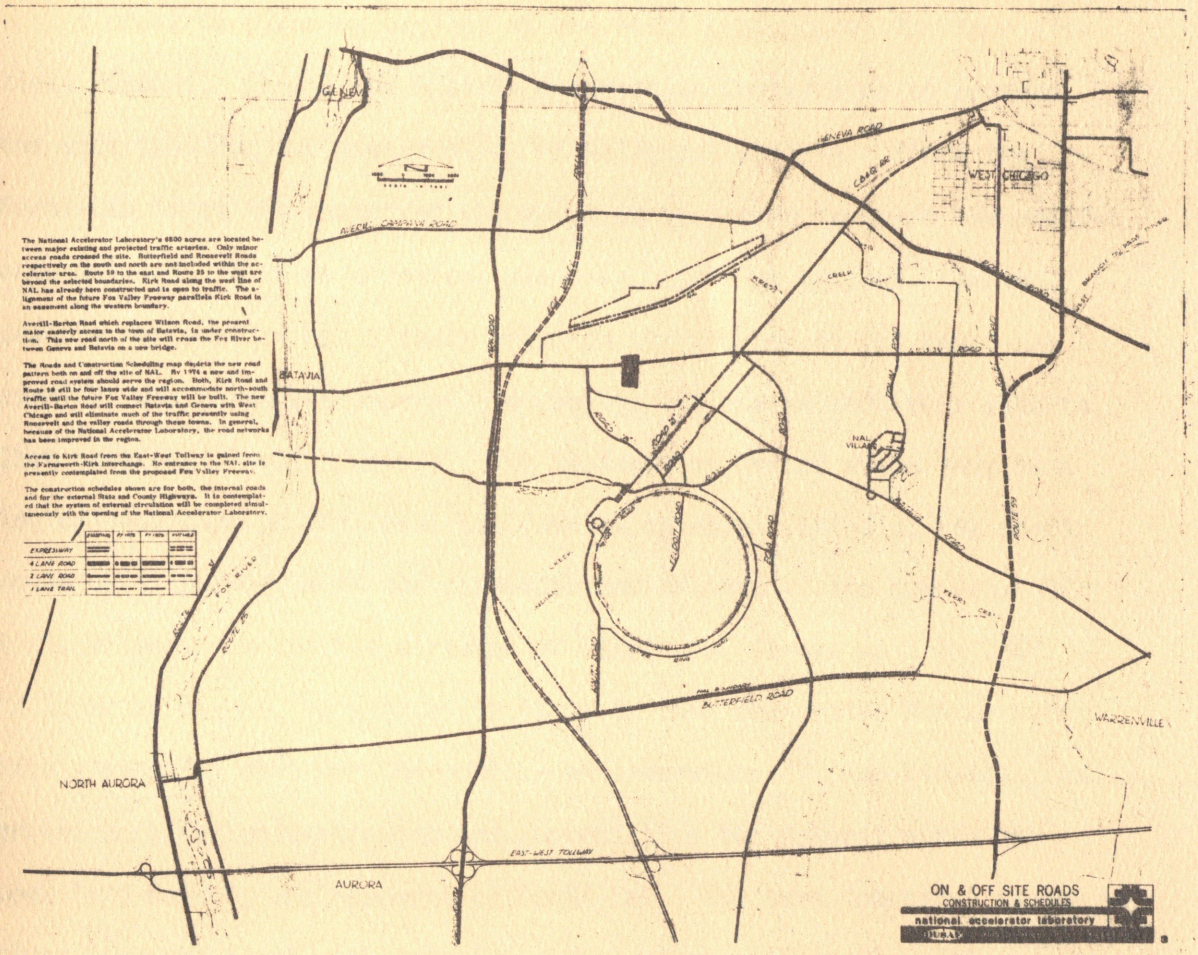
> What you've got here are two realities, one of immediate artistic appearance and one of underlying scientific explanation, and they don't really have much to do with one another. That's quite a situation.[47]

The buildings at Fermi-Lab generally try to reveal themselves through a scientific process that takes place on the interior. If one is not familiar with the workings of the areas, there is little of immediate artistic merit to maintain interest, and one quickly becomes bored.



The Site

Roads on the site: Note the straight path connecting the towns of Batavia and West Chicago passing immediately in front of my site.



The site in relation to the other structures on the Fermi-Lab complex

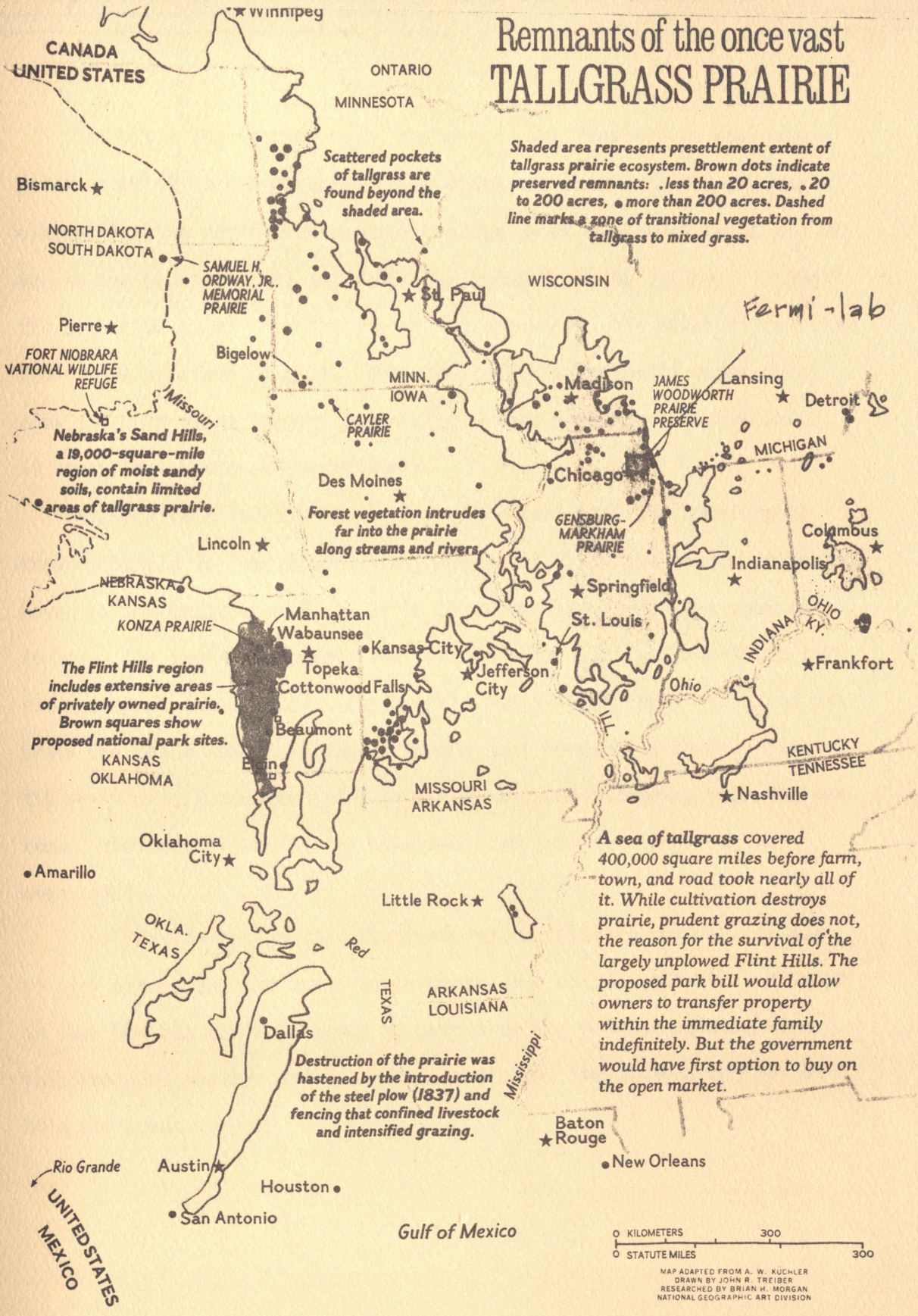
I chose to place my project at the Fermi-Lab complex for four distinct reasons. First, the Prairie Restoration Center aims to promote the understanding and preservation of tallgrass prairie. Since the Fermi-Lab is at the center of the multi-state region in which the prairie once existed, it seems a logical place to locate my project. Second, prairie restoration has already begun on the grounds of the Fermi-Lab complex, and plans are underway to convert the entire 6800-acre site to 18th century Illinois prairie. The Restoration Center would thus be a logical addition to the Fermi-Lab complex as well. Thirdly, the center would be in harmony with the character and beliefs of the complex. Of R. R. Wilson, the initial director of Fermi-Lab, it was said in 1968: "A lover of nature, he eventually plans to turn the entire N.A.L. site into a peaceful spot for the public--an arboretum."[48] And finally, the ground work for understanding and appreciating the natural world has been laid down by the research at Fermi-Lab. The term "physics" is derived from the Greek work "physis", which meant, originally, "the endeavor of seeing the essential nature of all things." It seems appropriate that exploration of the invisible atom should take place alongside the exploration of the quite visible natural environment--the prairie.

After choosing the Fermi-Lab as the general area for the Prairie Restoration Center, I picked the actual site of the Center for the following reasons: it is an area dominated by the restored prairie; it is along a corridor that is used extensively by the public (Wilson Road connects two major towns and visitors to Fermi often use this road to enter the complex); and the physical buildings of the Fermi-Lab complex

are not really noticed in the surrounding landscape.

The chosen site's visual connection to the physical experimental areas at Fermi-Lab is minimal. The topography and heavy forest cover hide all the areas except for the four top floors of R. R. Wilson Hall to the southeast. Potentially, then, the prairie may be viewed virtually unobstructed by the presence of man. Additionally, a link to the prairie's past is preserved in a pioneer cemetary located immediately to the west of my site. Wilson Road and a few distant signs of the community are the only remaining features of the man-built environment that interfere with the prairie horizon.

I decided to remove the Center from the presence of the Fermi-Lab complex because I feel that its research would be of a different kind than that of the lab. Fermi-Lab investigates the unseen, and seeks to discover the properties of materials--sub-atomic particles--that cannot be observed directly, but only traced by the tracks that they produce while traveling through a bubble chamber at the speed of light. The Prairie Restoration Center, on the other hand, sees easily the material it works with. Ecology is not primarily concerned with finding out what a thing is made of, but with the way in which that thing is related to all the forces and substances in its environment. The Prairie Center seeks to understand how the many pieces of the prairie work together in harmony; only indirectly is it concerned with the analysis of the pieces. The Prairie Center studies the complexity of the seen.



This map from National Geographic shows the range of the tallgrass prairie, and the central location of the Prairie Restoration Center. The site at Fermi-Lab is ideal for such a regional tallgrass prairie center.

Man has a fascination with "centers." The "center" is that one point at which he can metaphorically stand and peer into the unknown without feeling adrift. A central vantage point evokes in man a desire to see the boundary that separates the known from the unknown. Though the seaman be miles from the distant unseen shore, his nautical calculations make him feel at ease. Once the shoreline actually comes into view the trip is no longer fascinating. Once something becomes known, it loses its allure and enchantment.

Ecology is a science that accepts the fact that the boundary of known material is just beyond its grasp. Yet, like the seaman returning home, it celebrates the fact, as it seeks meaning in its own special domain. The center is merely the vantage point that one stands to see the beauty of the unknown. The Prairie Restoration Center tries to express the value that learning is joyous just beyond the known. From the realm of science man tried to extend his understanding into the unknown. Science offers him an expanded view into the unknown, the meaningful.

The Prairie Restoration Center tries to reveal a new way for man to view nature and the built environment that exists upon it. It tries to show how man can use reason to gain a better vantage point. From this improved vantage point man may comprehend the unknown and yet behold the beauty beyond.

Area: PRAIRIE LIBRARY

Specific Space Prairie Restoration Center

Sq. Ft.: 2000 for Book Storage
700 for Reading and Research w/ Micro-Film Area

Use: Library Research and Reading Area. Adequate space for storage of appropriate prairie literature.

Capacity: For 50 People

Adjacency: Seminar Areas
Research Labs
Washrooms
Xerox Space

Illumination: General illumination; control of natural light must also be provided.

Floor: Carpet or a similar material for acoustical considerations.

Ventilation: General requirements. Natural ventilation is no problem.

Equipment:

Comments: A public library also, but material cannot be removed from the area. Security for the protection of the material from theft should be minimally provided. Office space for a head librarian, approximately 100 sq. ft., should also be included. Area should be large enough for overflow seminar space when needed.

Area: LARGE SCALE LABORATORY SPACES

Specific Space Prairie Restoration Center

Sq. Ft.: 2 at 750 sq. ft. each

Use: For research and seed development, which require a larger space.

Capacity: 4-6 Research persons maximum at any one time.

Adjacency: To individual research labs. Access to cold storage. Storage rooms.

Illumination: General articicial, source lighting should be provided at work spaces.

Floor: No special requirements.

Ventilation: No special requirements.

Equipment: Stand up incubators, three in each space. Each is the size of a large freezer unit. In one of the spaces a walk in 8'-10' with refrigeration should be provided.

Comments: Primarily a research space.

Area: INDIVIDUAL RESEARCH LABS

Specific Space Prairie Restoration Center

Sq. Ft.: Each of the six individual lab spaces should be approximately 380 sq. ft.

Use: For individual lab research.

Capacity: For a researcher and possibly a few assistants.

Adjacency: Next to large lab spaces. Immediate access to the cold storage. Direct access to seed sorting labs.

Illumination: General articicial lighting and source lighting at lab benches.

Floor: Linoleum tile or stone or even wood. Somewhat durable and washable. Adequate for general lab use.

Ventilation: General, so special requirements.

Equipment: Benches with water sources, outlets, and places to carry out intermediate--individual experiments; also plenty of work space.

Comments: Not a public space, but should not be isolated from the public; this area should not be mystical. A place for exploration as well as thinking about individual ideas.

Area: SEED CLEANING ROOM

Specific Space Prairie Restoration Center

Sq. Ft.: 900

Use: Seed cleaning--a process that separates the actual seed from the plant material. Crates of stalks are loaded into seed separators (5 maximum).

Capacity: Five seed separators; and an area for the seeds to be temporarily storedl and the stalk material should be removed.

Adjacency: Raw seed storage. Seed Packaging Room. Refrigerated storage.

Illumination: General and diffuse natural lighting.

Floor: Concrete, finished--resilient and cleanable

Ventilation: Large exhaust for general space; and individual exhaust removal for each machine.

Equipment: 5 seed separators, each occupying an area approximately 40 sq. ft.

Comments: Ventilation is important.

Area: SEED PACKAGING ROOM

Specific Space Prairie Restoration Center

Sq. Ft.: 1200

Use: Cleaned seeds are packaged and grouped for storage and distribution. Long work tables and shelf storage for equipment and seed should be provided.

Capacity: Space for ten people to work comfortably.

Adjacency: Seed Cleaning Room. Regrigerated and Dry Storage. Direct access to experimental areas.

Illumination: General artificial, and diffuse natural.

Floor: Concrete finished floor or resilient flooring. i.e. linoleum tile or the like. Surface must be cleanable.

Ventilation: General; dust free, no direct openings.

Equipment: Sorting tables--clean up space.

Comments: General work space. Room temperature, good lighting at work spaces since seed storage has the potential to cause eye strain.

Area: REFRIGERATED STORAGE SPACE

Specific Space Prairie Restoration Center

Sq. Ft.: 900

Use: Long term storage of packaged seeds.

Capacity: Storage shelves having an approximate depth of four feet. Bins should accommodate small parcels of seed and have a storage system where cataloguing is easy.

Adjacency: Seed packaging room. Access to lab space.

Illumination: Artificial and diffuse natural.

Floor: Finished concrete or comparable.

Ventilation: No special requirements.

Equipment: A great deal of mechanical space. For cooling and humidity control. The 100 rule, i.e. 50% humidity,--5C degree farenheight.

Comments: Walk-in refrigerated unit. Walls should have adequate insulation since climate control is paramount.

Area: RAW SEED STORAGE

Specific Space Prairie Restoration Center

Sq. Ft.: 3600

Use: Large crate-size containers containing seed not yet separated from the stalk. Brought in by trucks, these crates are stored in this area until they can be processed and the seeds permanently stored.

Capacity: For storage space. Storage shelves approximately ten feet deep should be provided. Circulation of approximately twelve feet is necessary since machines will be used for internal circulation.

Adjacency: Loading dock for semi-trailer delivery. Seed separation room, access to the immediate exterior should also be provided.

Illumination: General all purpose illumination; diffused daylight.

Floor: Concrete finished, resilient and cleanable.

Ventilation: Controllable exhaust for the entire space.

Equipment: Shelves and some means to remove storage from the upper bins.

Comments: This is the first area for the seed. Careful precautions should be taken for insect control and the potential problem of rodent problems due to the constant food supply produced by the seed material.

Area: ENCLOSED STORAGE

Specific Space Prairie Restoration Center

Sq. Ft.: 800

Use: Large open storage. Similar to storage rooms or silos. Economical large protected space.

Capacity: Access for semi-trailers both from the delivery room and from the seed processing area.

Adjacency: Within the general periphery of the other storage areas. Direct access to and from the seed storage space.

Illumination: Artificial and natural diffuse.

Floor: Finish concrete flooring.

Ventilation: Mechanical ventilation to prevent dust explosion.

Equipment: For large scale storage of seeds.

Comments: Should be easily accessible to pick-up and delivery. Should have access to the main delivery road. Delivery from seed cleaning room is also essential.

Area: MACHINE STORAGE AREA

Specific Space For the machines used in the prairie

Sq. Ft.: 1000

Use: For the storage of farm-type machinery such as a tractor, sower, burn-off equipmentl fuel storage and a small space for maintenance and storage of many hand tools.

Capacity:

Adjacency: Anywhere that is convenient to the prairie restoration file. A reasonable adjacency would be the large storage bins.

Illumination: Natural, both diffused and direct. Artificial -- any type.

Floor: Finished concrete.

Ventilation: Special ventilation may be necessary for removing exhaust fumes from the area while machinery is taken care of.

Equipment: Storage areas for tools and implements. Fuel storage area.

Comments:

Area: CONTEMPORARY PRIMAL ART MUSEUM

Specific Space Public, museum space.

Sq. Ft.: 4500 sq. ft. for the display of art
4500 sq. ft. for the storage and preparation of displays.

Use: For the display of contemporary fine art, specializing in art depicting a primal attitude towards understanding.

Capacity: For 40 people.

Adjacency: To the primal and prairie museum.

Illumination: Diffuse natural since art work may be sensitive to light. Artificial should be a mixture of incandescent and flourescent.

Floor: Any type that can endure a constant flow of pedestrian traffic.

Ventilation: General. Humidity control should be provided.

Equipment: Some means of transport to and from storage. Also access from the outside should be considered. A large means of access is necessary since large exhibits may be displayed.

Comments: A place that explores the qualities of structured space and provides a space where one can enjoy the qualities of man and the STRUCTURED environment.

Area: PRIMAL MAN ARTIFACTS MUSEUM

Specific Space Public, Museum Area

Sq. Ft.: 2400 for display
1200 for storage

Use: 300 sq. ft. for additional circulation.

For the display of artifacts found at the archeological digs at the Fermi-lab site; and supplemented by other artifacts found in the tallgrass region.

Capacity: For 40 people circulating through at any one time.

Adjacency: Directly related to fine arts and prairie museum.

Illumination: General artificial. Natural diffuse and direct. Source lighting for displays.

Floor: Any type that can endure a constant flow of pedestrian traffic.

Ventilation: General, no special requirements.

Equipment: Display area for artifacts.

Comments: Acoustics, noise control should be supplied, so to provide an environment where one can observe the prairie and how it affected the production of their art work.

Area: PRAIRIE RESTORATION MUSEUM

Specific Space Public, Museum Area

Sq. Ft.: 2500 sq. ft. display area
300 sq. ft. additional circulation
Use: 900 sq. ft. storage

Display of prairie related material. Should be a place that reveals the process and problems of man restoring the prairie.

Capacity: Approximately 40 people.

Adjacency: Should be directly related to the archeology and contemporary fine art museum spaces. Also direct access to the restored prairie should be accommodated.

Illumination: Artificial and controlled natural lighting should be provided. Source lighting for displays should also be taken into account.

Floor: Any material that can withstand constant flow of people.

Ventilation: General; no special requirements.

Equipment: Display areas and views to different phases of land restoration.

Comments: Acoustical noise control should be provided due to the constant interaction of people. The environment provided should produce a space where one can observe the process of prairie restoration. Also, this space should provide a means for ecological understanding. A place where one can appreciate the quality of a restored prairie and how the land's openness can complement the structured environment of man-produced place.

Area: MUSEUM OFFICE SPACE

Specific Space Public, Museum Space

Sq. Ft.: 900 sq. ft. 100 for public information.
300 sq. ft. small conference and reception room
Use: 300 sq. ft. for washrooms

For the offices of two museum curators and two additional offices. Also, a space for secretarial work should be provided here.

Capacity: For a staff of 6 people and a conference space for approximately 15 people.

Adjacency: Should be located around the museum spaces.

Illumination: General artificial and natural both artificial and diffuse.

Floor: No special requirements.

Ventilation: No special requirements.

Equipment: A general reception space for public information should be provided.

Comments:

Area: PUBLIC INFORMATION

Specific Space Prairie Restoration Center

Sq. Ft.: 150 sq. ft. for receptionist and information.
400 sq. ft. for lavatories.

Use:
To orient people not familiar with the project.

Capacity: ---

Adjacency: To the library and seminar room.

Illumination: General artificial and natural, both direct and diffuse acceptable.

Floor: Material has no special requirements.

Ventilation: No special requirements.

Equipment: Reception space.

Comments: A place of orientation for people not yet familiar with the project.

Area: SEMINAR ROOM

Specific Space Prairie Restoration Center

Sq. Ft.: 600

Use: For meetings and the sharing of ideas.

Capacity: For 40 people maximum.

Adjacency: To public areas and lab spaces.

Illumination: General artificial and natural both diffuse and direct. Darkness for slide presentation should also be available.

Floor: Material can vary from wood to stone to carpet. No special requirements.

Ventilation: No special requirements.

Equipment: Should be a comfortable informal space strongly influenced by the spirit of ecological research.

Comments: Should be a comfortable informal space. A view of the restored prairie should be considered. A place for gathering and sharing ideas.

PRAIRIE RESTORATION CENTER

1. Raw seed storage
2. Seed cleaning room
3. Seed packaging room
4. Refrigerated storage room
5. Enclosed storage

6. Research labs
7. Individual research labs

8. Seminar room
9. Prairie library
10. Public information

11. Prairie restoration museum
12. Primal art gallery
13. Indian artifacts gallery

SQUARE FOOTAGE TOTALS

Prairie Restoration Center

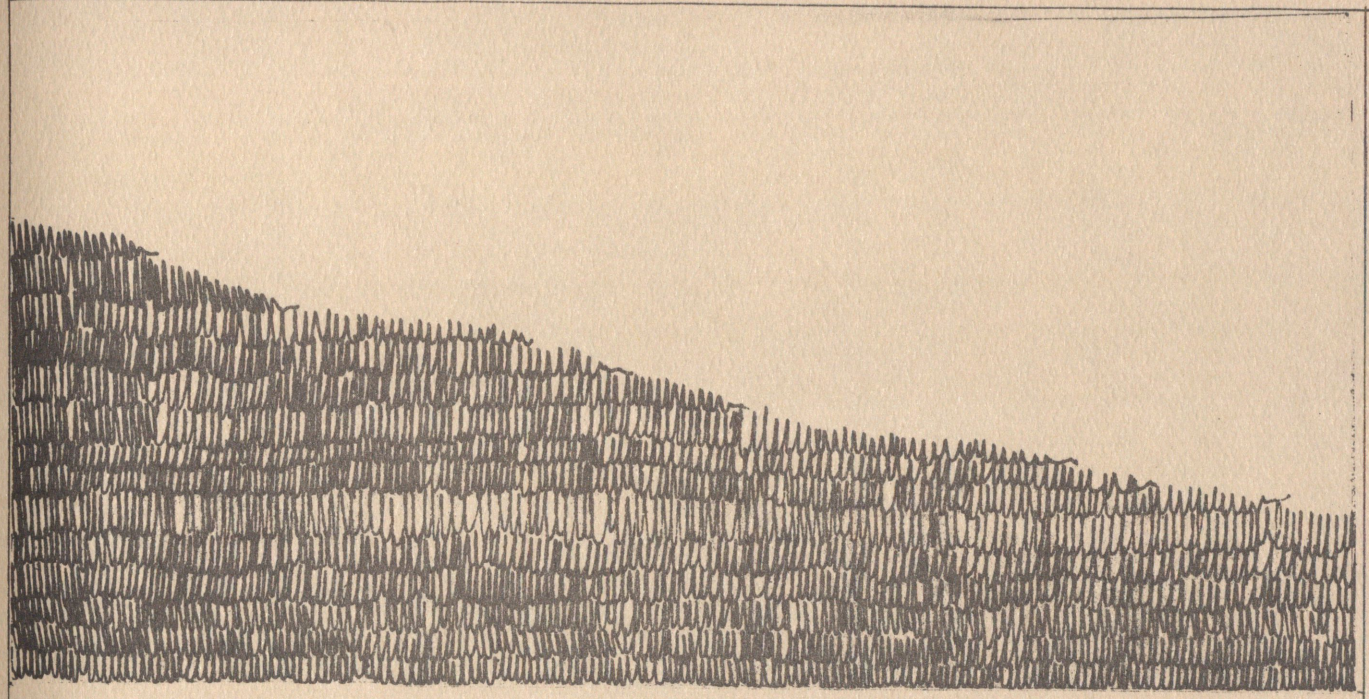
Public information	550 sq. ft.
Seminar room	600 sq. ft.
Prairie library	2,700 sq. ft.
Large scale research	1,400 sq. ft.
Individual research	2,280 sq. ft.
Seed cleaning	900 sq. ft.
Seed packaging	1,200 sq. ft.
Refrigerated storage	900 sq. ft.
Raw seed storage	3,600 sq. ft.
	14,130 sq. ft.
Enclosed storage	8,000 sq. ft.
Machine storage	1,000 sq. ft.

Museum Space

Contemporary primal art	7,500 sq. ft.
Primal man artifacts	2,700 sq. ft.
Prairie restoration	2,700 sq. ft.
Office and public info.	1,600 sq. ft.
	14,500 sq. ft.
Museum storage	2,800 sq. ft.

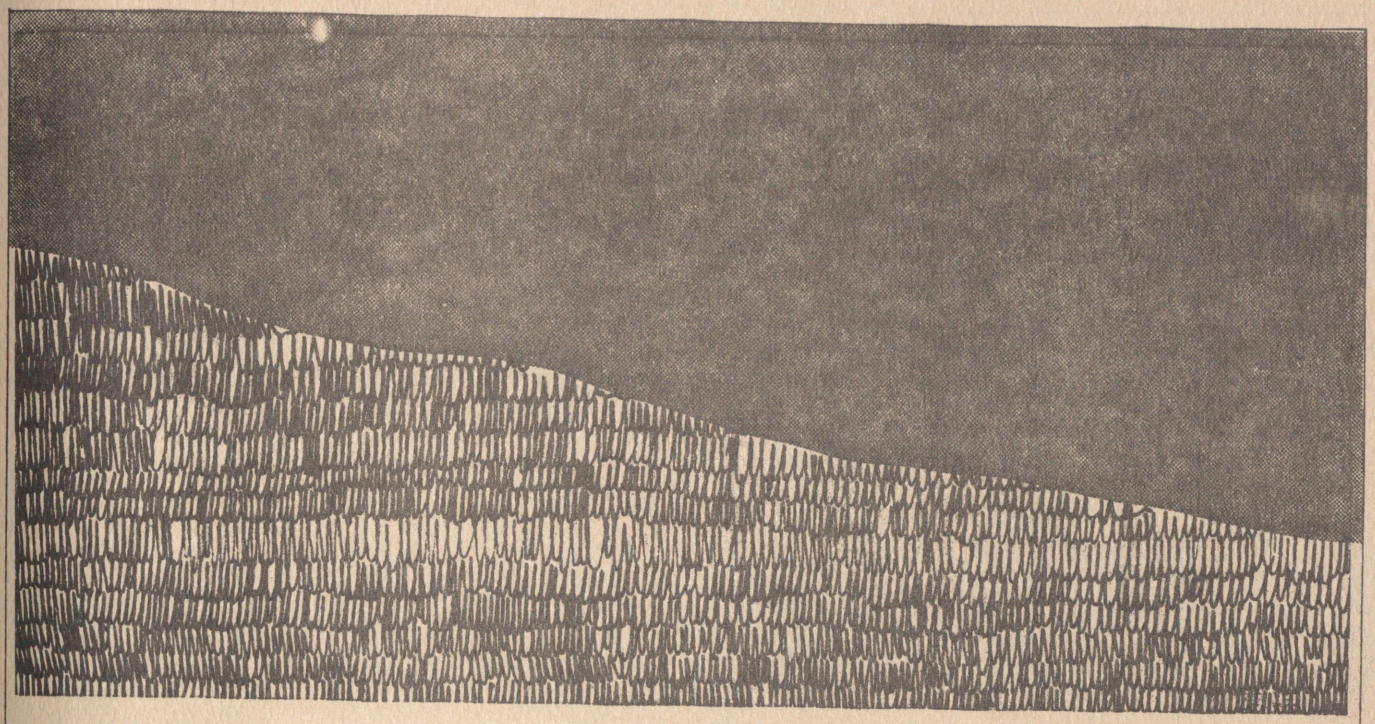
Automobile Parking

For 130 cars at 400 sq. ft. per car	5,200 sq. ft.



Man on Nature

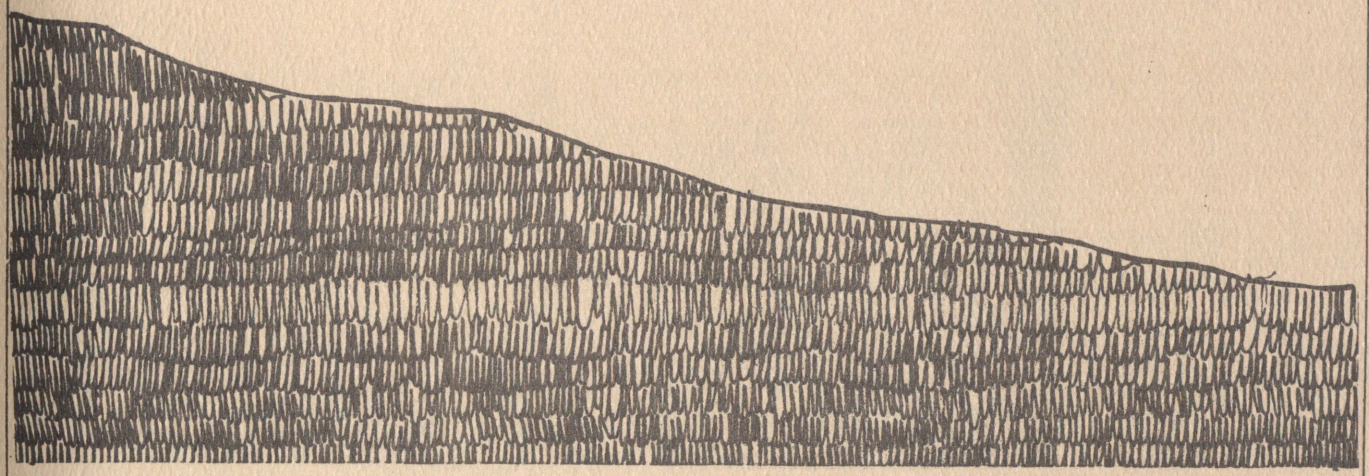
Man on the Prairie



SKY: THE UPPER BOUNDARY

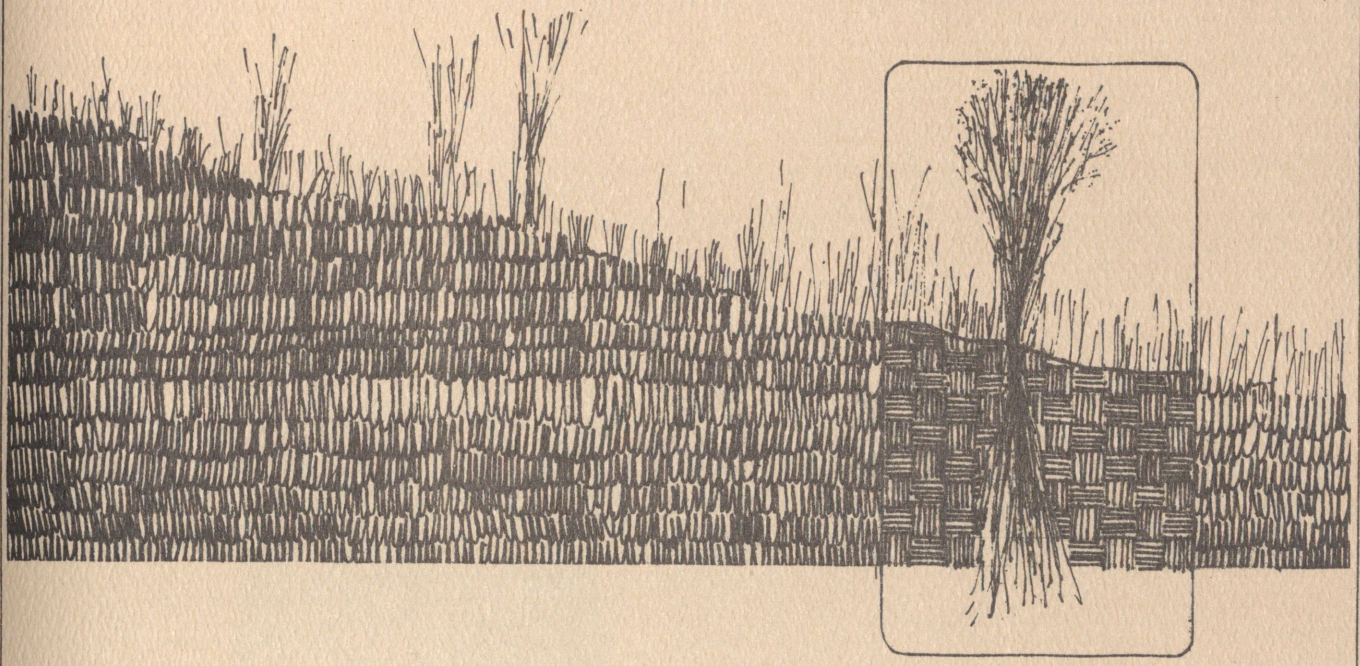
> Contemporary phenomenological and existential philosophers question the relevance of scientific knowledge of the universe, since the concretely experienced space to be lived in does not have the character of infinity, but that of the finite. Like the Greeks in antiquity we still experience the sky as a concave dome in which the sun rises and sets.[49]

The sky in the midwest possesses light of a certain dullness; edges lose their sharpness and the prairie tends to merge with the sky at the horizon. The light in all seasons tends to be intense when it is not shaded by colors.



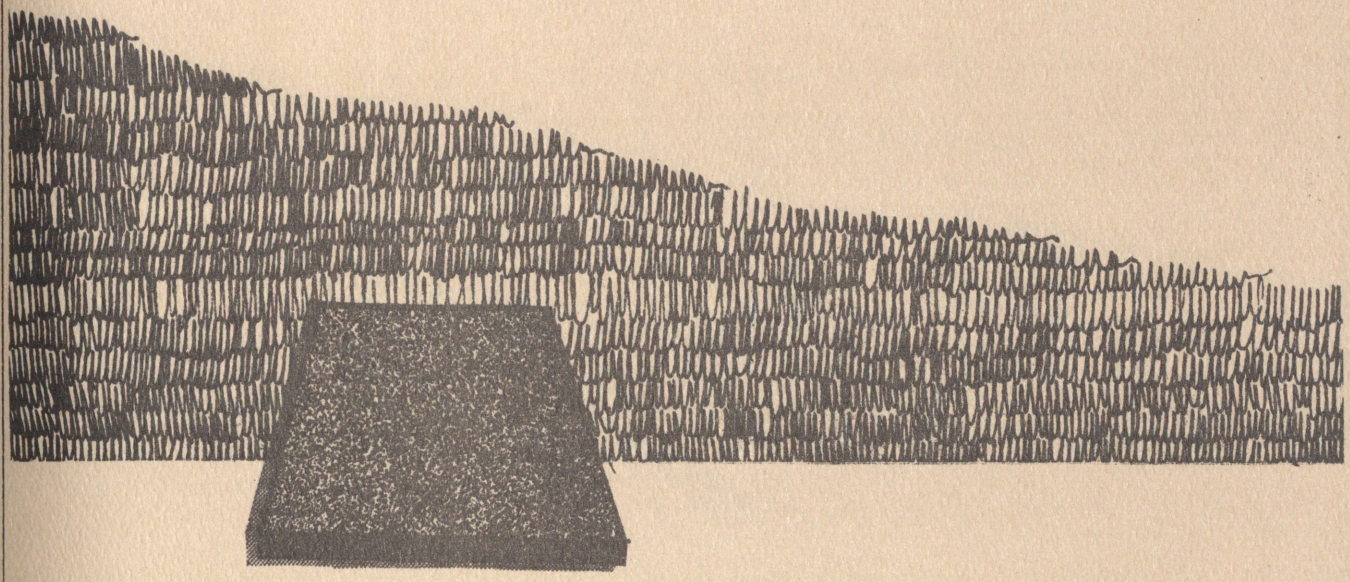
HORIZON--INFINITY

When viewed to the horizon, the prairie--like the sea--arouses a sense of infinity. The land is comforting since light is everywhere, yet this perception of infinity leaves one with a feeling of disorientation and a desire to complement this feeling with a sense of enclosure and structure.



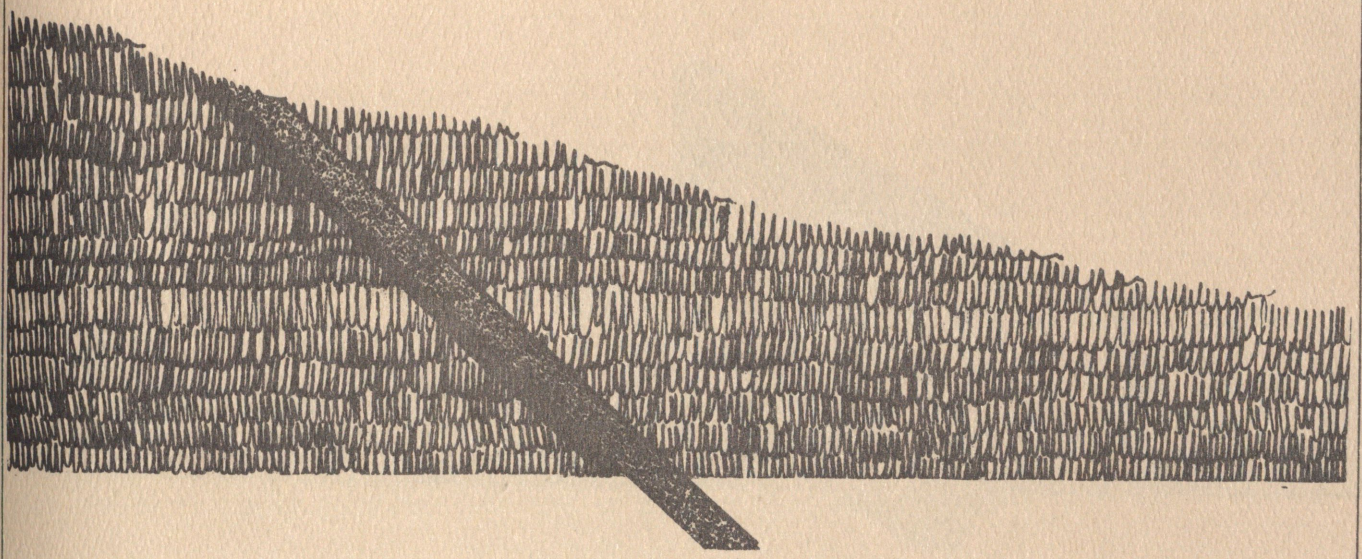
BENEATH THE SURFACE

The prairie is not as fragile as it appears to be. In a tallgrass prairie 6,000 to 7,000 pounds of plant material are found in the first six inches of every acre's topsoil. But the prairie landscape is very sensitive to man's built environment. It seems that any structure placed on the prairie touches the very soul of the land. There are no sublime characteristics to hide or overwhelm the human element; the built environment must be tailor-fit to and in agreement with the intricate and complex system that the prairie actually is.



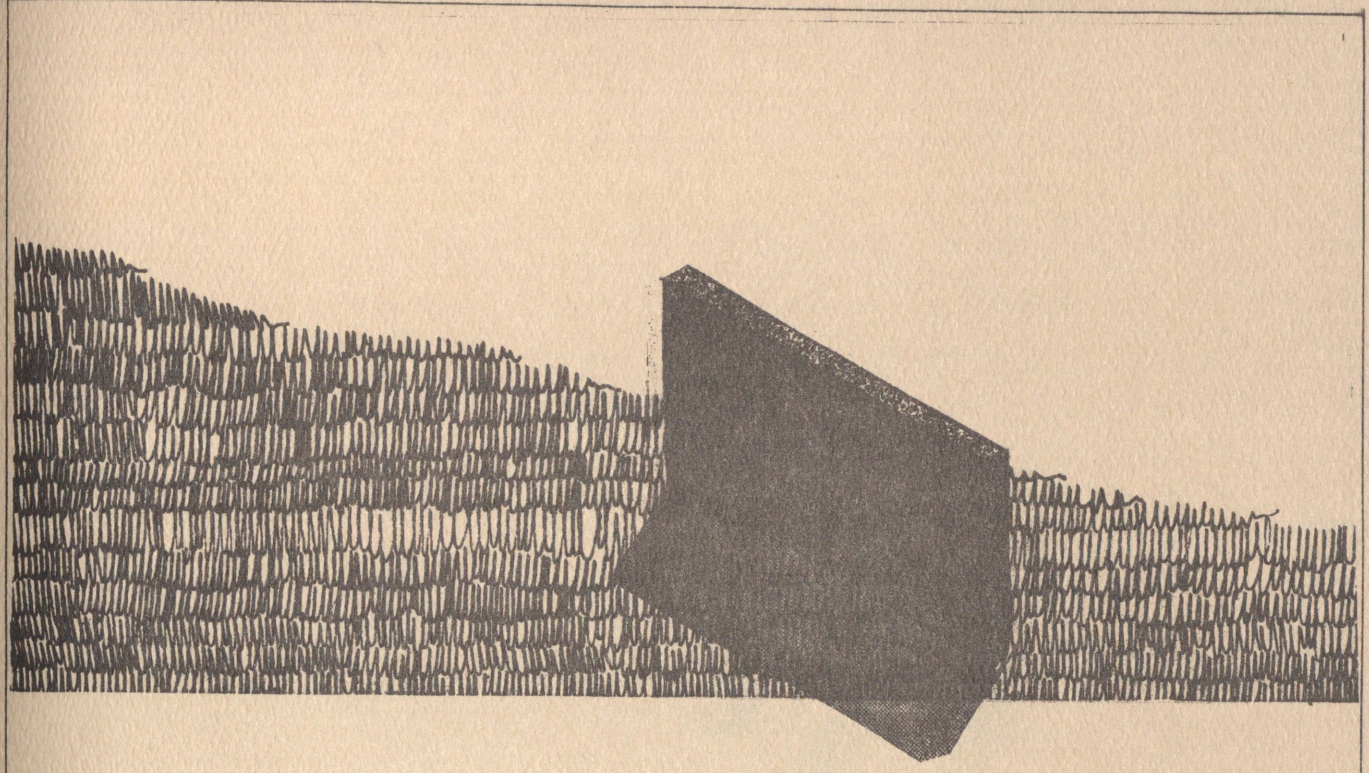
PRAIRIE BEAUTY: REFINED TASTE, FEELINGS FORGOTTEN

Of all the landscapes and ecosystems on the continent, none was so extensive yet so subtle as the prairie. It is easy to appreciate a redwood forest or an alpine meadow or a mountain view; these are special elements within magical landscapes. But it takes a much keener sense to appreciate a prairie. The special element of the prairie <u>is</u> its landscape, a landscape tedious and monotonous at worst, free and expansive at best. Historically, it was land to be plowed under as completely as possible, or crossed over as quickly as possible. Its intrinsic qualities were literally overlooked. And so it was turned into....Iowa.



LINES OF ORIENTATION

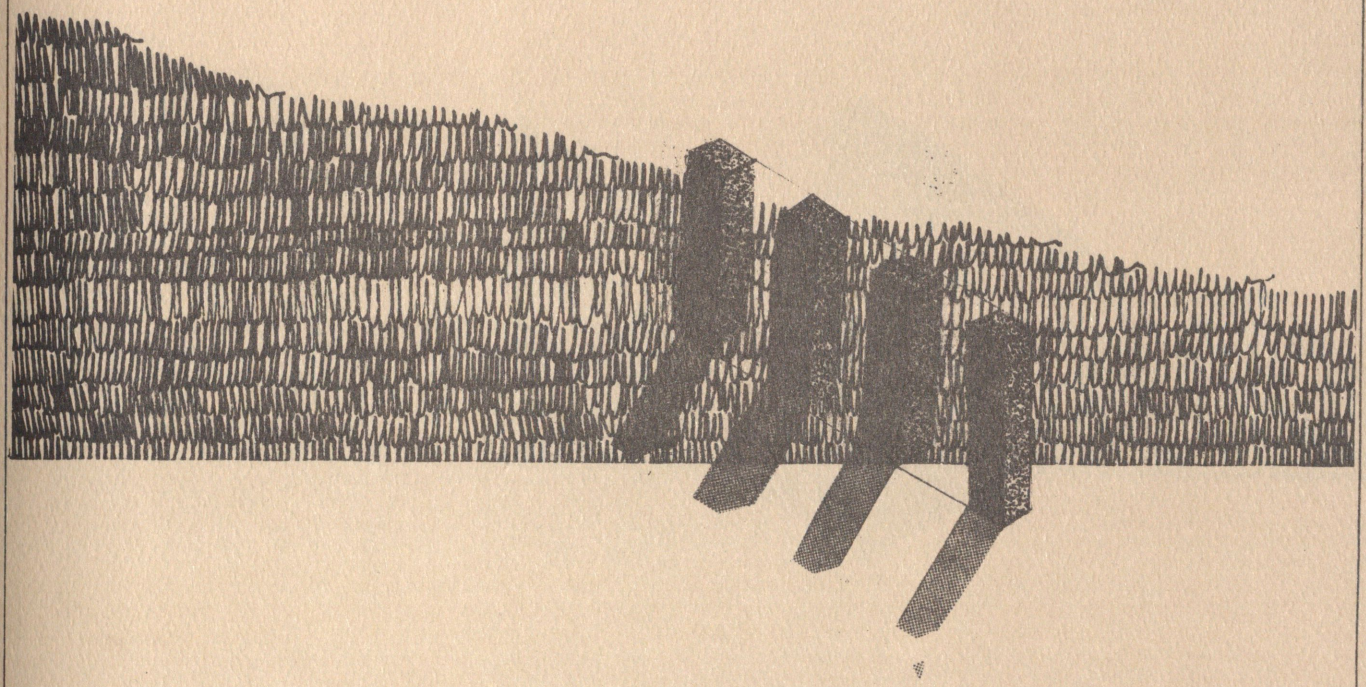
One may establish a meaningful sense of space on the prairie by defining places of orientation along and through the land. This can be done with as little as a line. In a sense, a line divides the perceived infinity of space. In the landscape, the line is not perceived as the connection of two points in the landscape, but as a path where one finds comfort while traveling along its contrived and structured space. The idea of line can be suggested by an arc or a winding trail with a familiar and homogenous surface.



PLAINS IN CONTEXT

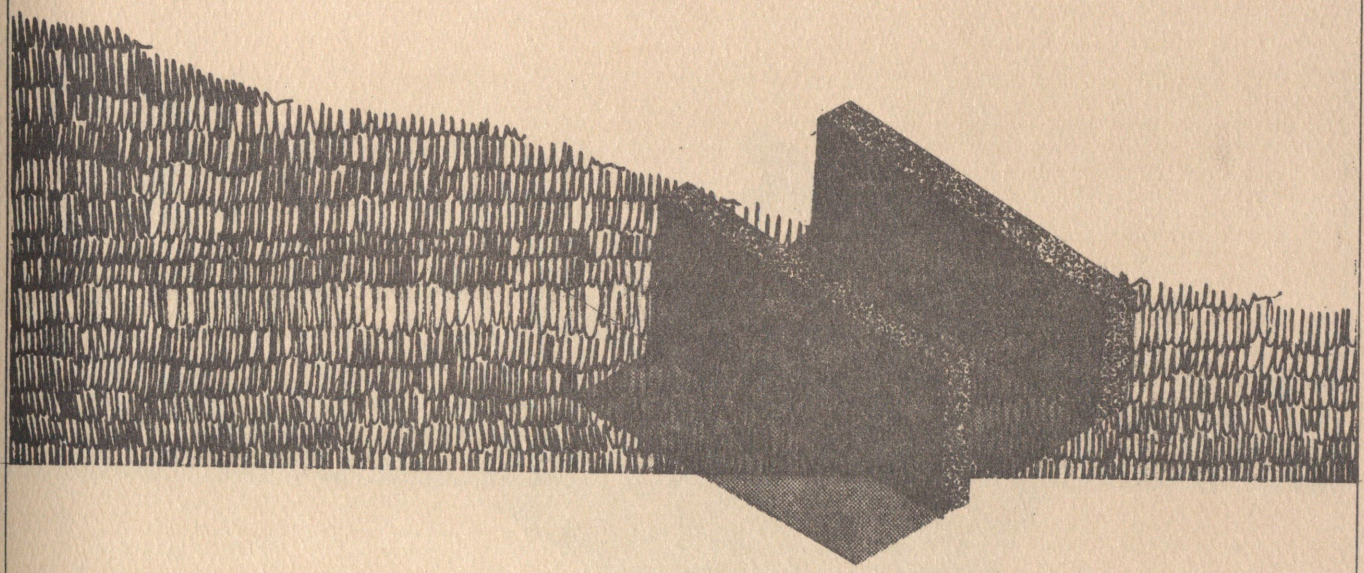
> Designing from the outside in, as well as the inside out, creates the necessary tensions which help make architecture..... Architecture occurs at the meeting of interior and exterior forces and use of space.[50]
>
> Robert Venturi
> Complexity and Contradiction in Architecture

The wall produces space when man-imposed enclosure occurs, thus creating man-made place. When seen from a distance, one vertical plane on the landscape does not enclose, but does direct space, at least in the horizontal dimension. Within close proximity the wall may provide a certain degree of enclosure within the environment.



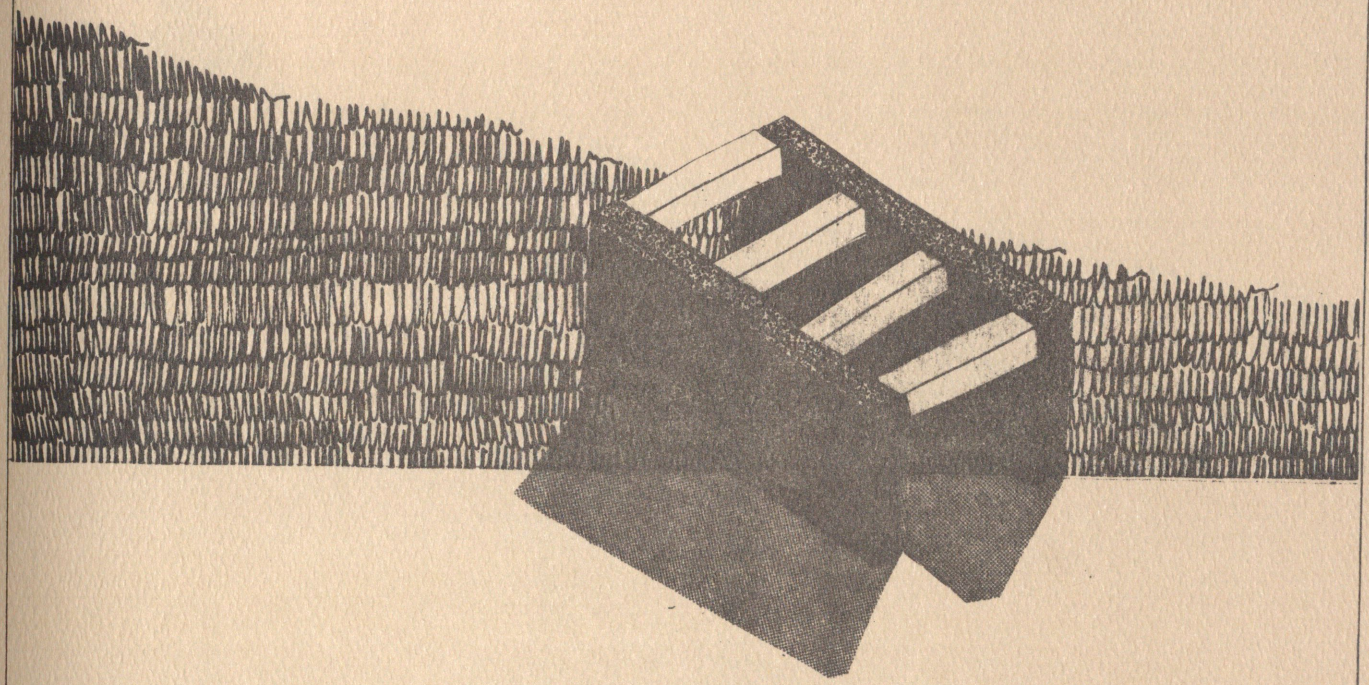
MAN-MADE RHYTHMS

The built environment may provide rhythmic constructs that complement or ignore the given rhythms of land, horizon, and sky. Light and shadow occur in a given sequence, and can give order and a sense of time as one travels through the landscape. Light and shadow can complement structure and openness. As structured space provides shadow and natural light gives life to the materials upon which it falls, we become aware of the complementary relationship of structure and openness.



STRUCTURAL ORGANIZATION

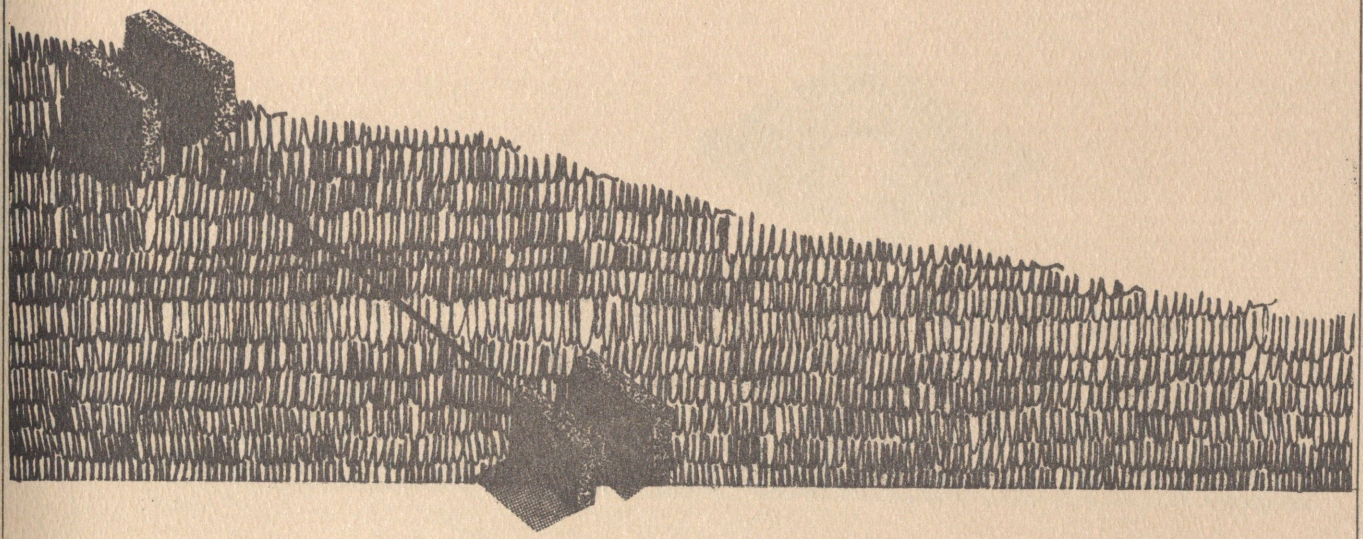
Two walls begin to produce a definite distinction between inside and outside. Two parallel walls produce an enclosure that limit man's perception of the landscape to two distinct directions, and also limits to some extent the perception of the sky. Enclosed space is thus directional and gives an edge to the sky. To a limited degree man can change spatial perception and produce enclosures that he himself orders, apart from nature.



STRUCTURE

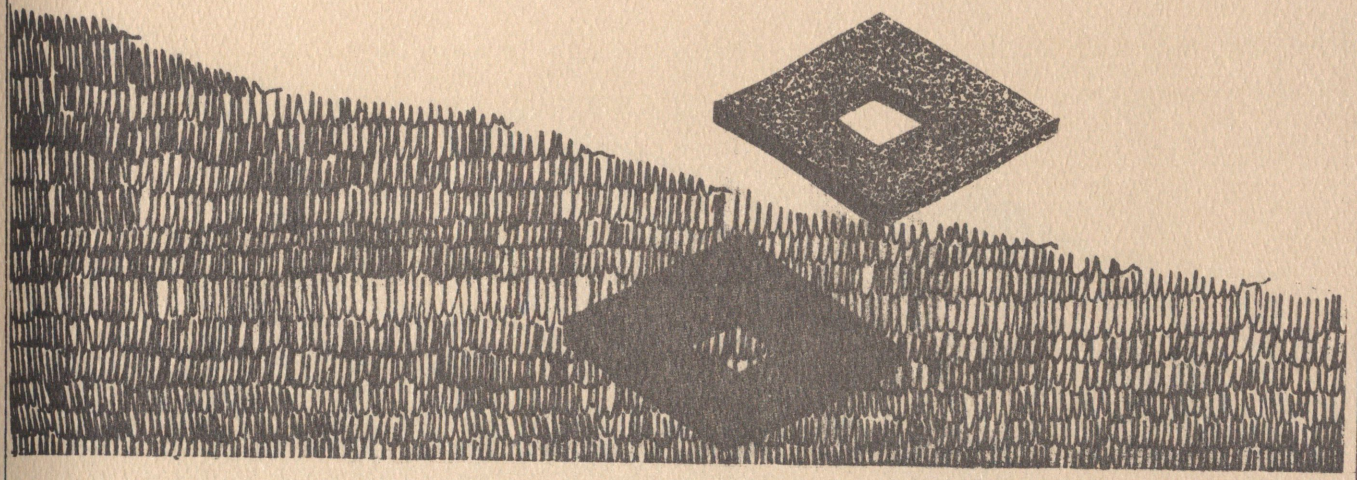
Space is formed by walls, floors, and ceilings, each contributing to a varying degree to the overall structure. The effect that each surface presents varies also, depending on the amount of enclosure desired and the ways in which the planes intersect. The "ceiling" is made possible by the introduction of structure.

> The visible expression of the act of spanning has been of special interest to builders, who have sometimes communicated their enthusiasm to inhabitants.[51]
>
> Moore, Allen, Lyndon
> The Place Of Houses



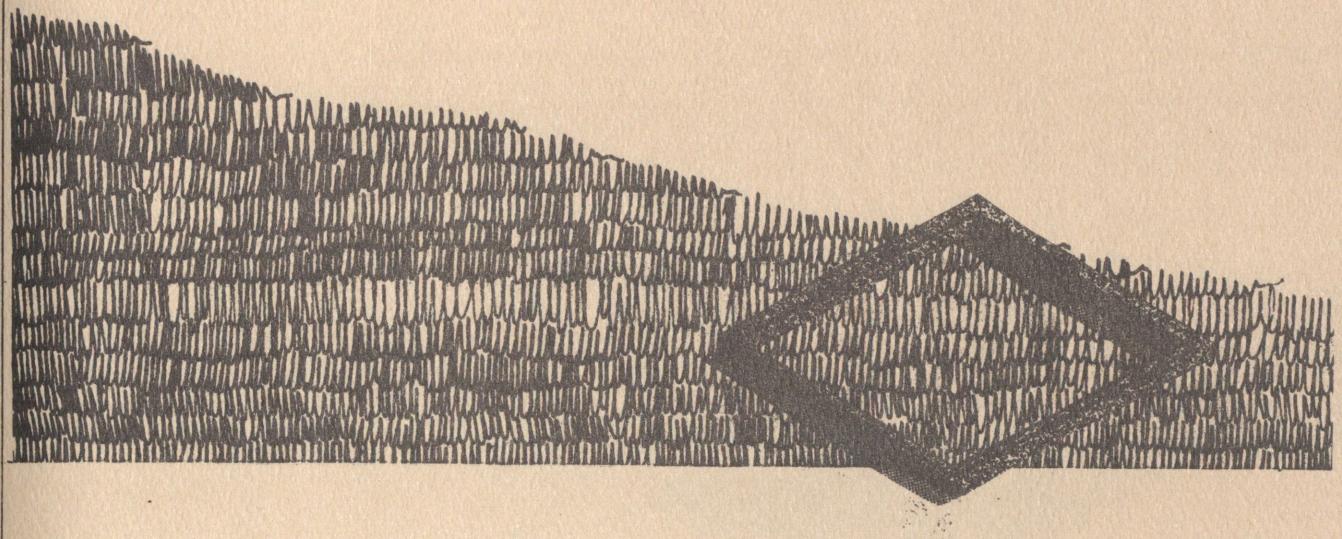
POINTS OF ORIENTATION

Structured space can provide points of orientation in the landscape. The points provide, in turn, a degree of security while the path connecting these points is left open and the observer is free to choose his or her own path. Orientation, then, implies direction, but it is not deterministic; the points, and not the implied line, constitute the structure.



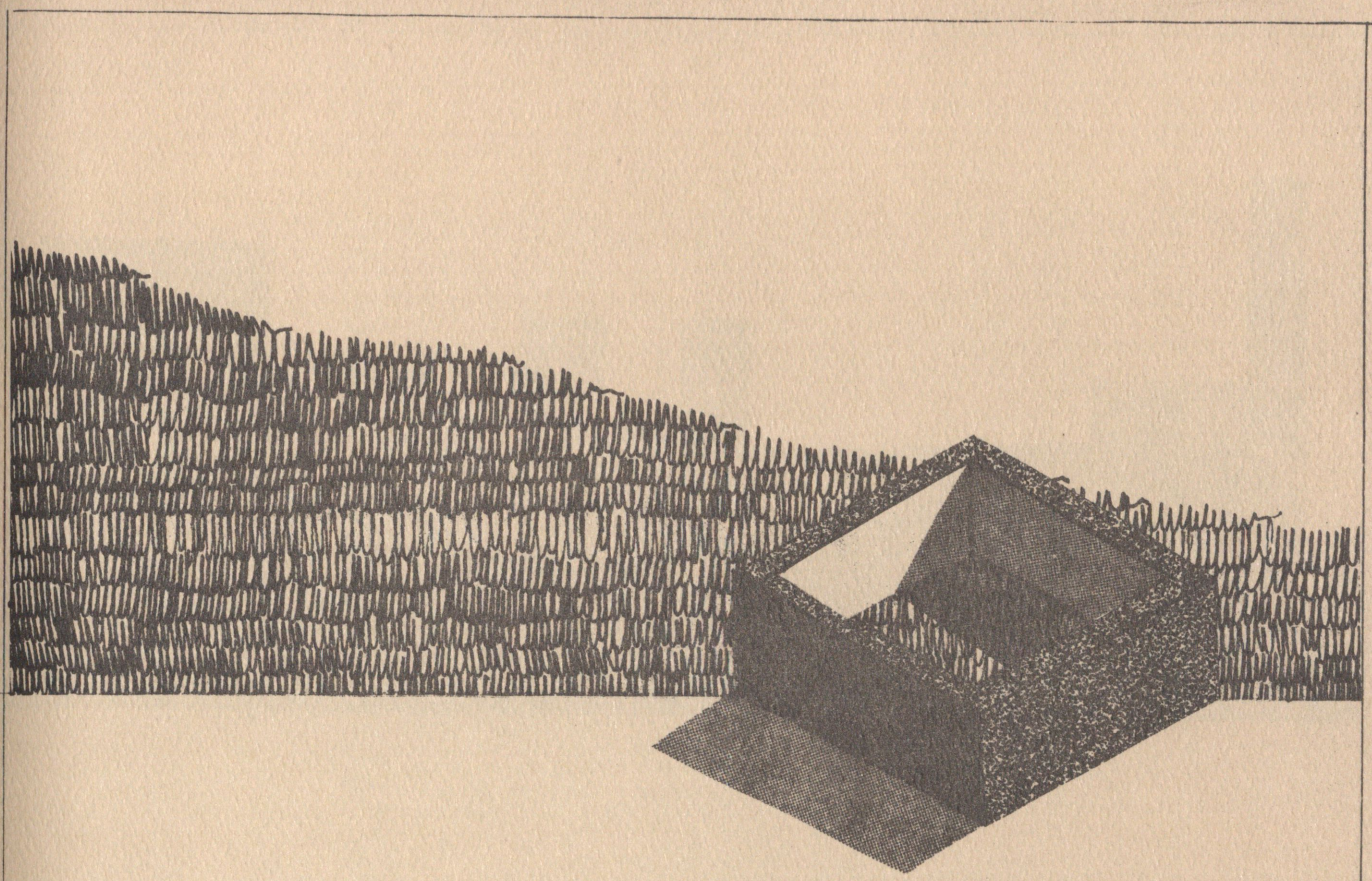
AWARENESS OF THE LANDSCAPE

Structured space can direct one's perceptions away from the sky and the quality of natural light. When this happens the observer becomes more aware of the qualities inherent in the land's topography and cover. The land establishes itself as the meaningful connection to the openness of nature. The implied space produced by this blockage of light can also provide a place of meaningful orientation in the infinity of nature.



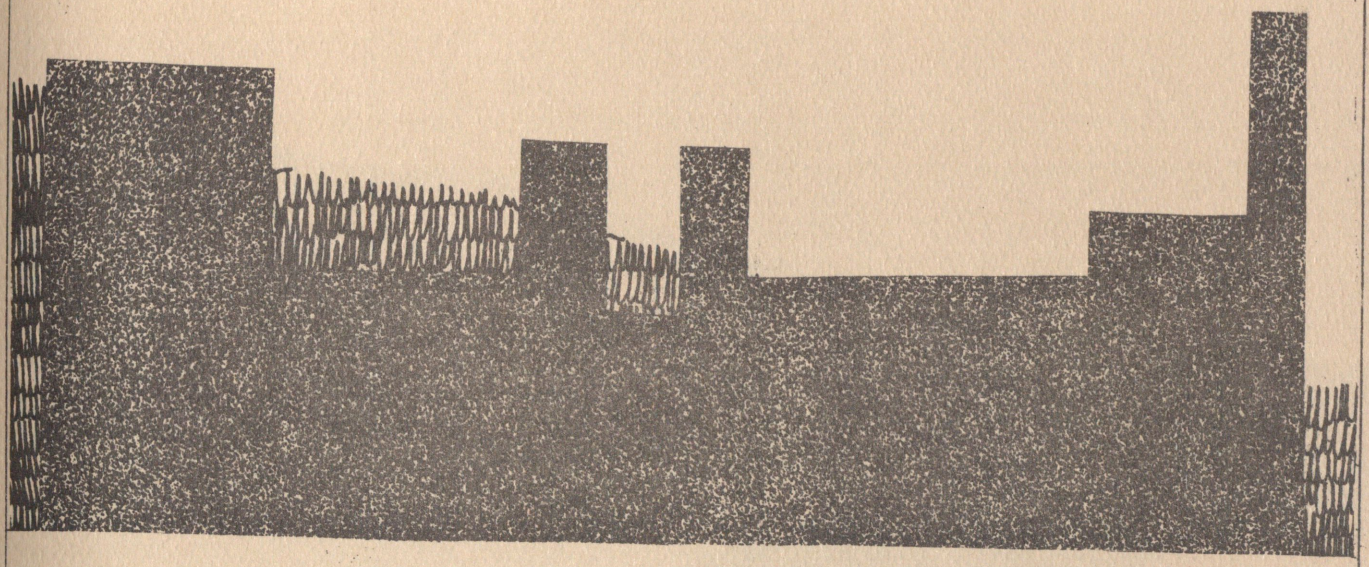
FRAMING INFINITY AND OPENNESS

When one places a geometric construct on the land, one becomes more aware of the material placed within these boundaries. Typically, the idea of framing land has occurred through history with the garden wall. Within these walls, man has usually attempted to order the openness of nature. But the garden wall can define a piece of infinity that is easier to comprehend; if the materials within and beyond the walls remain the same, untouched by the limited orders that man sometimes imposes on nature, then such a structured space can give the observer a point of departure in understanding the openness of nature.



ISOLATION FROM CONTEXT

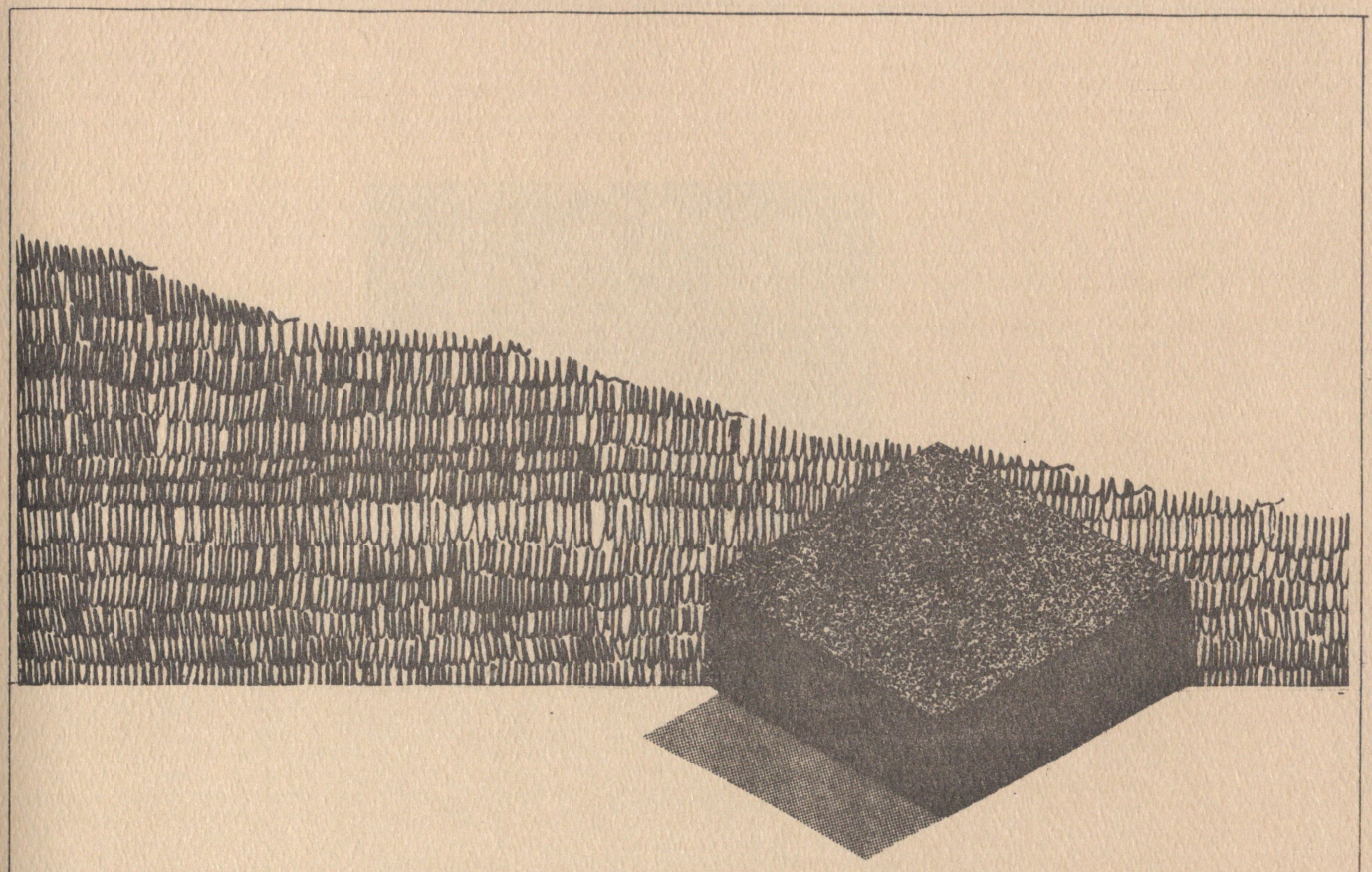
When space is enclosed and defined by man's surrounding walls, light and relation to the sky can give a sense of the natural. The sky becomes the external reference point as the landscape loses meaning. Natural light gives the walls character. Depending on its use, this space can be either a place of reflection and introspection, set apart from the visual distraction that surrounds the enclosure, or a place of access that allows one to see what actually exists beyond the enclosure.



WHEN MAN AND NATURE ARE NO LONGER COMPLEMENTARY

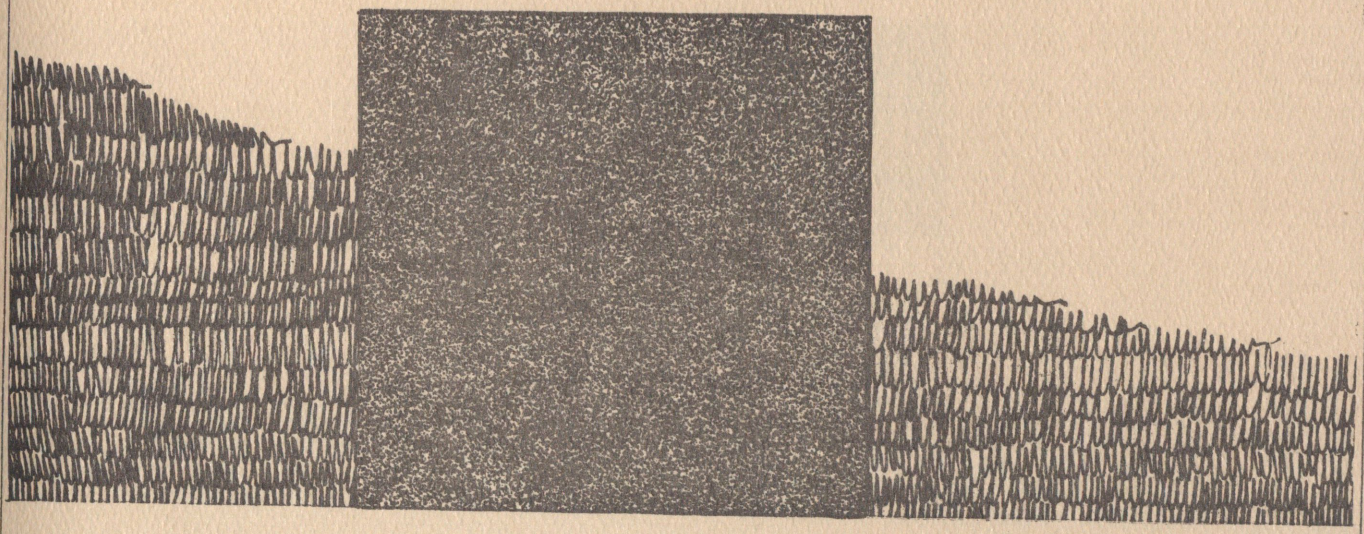
> Once we had breakfast in Mexico City. We talked about a commission he was just offered, to design a religious place in the heart of a large city in Texas. He explained how happy it made him to be offered such a trust, but also how let down he was when he saw the site surrounded by uninspired buildings. "I cannot," he said, "find a beginning. I am afraid I must refuse." I reminded him of Independence Square, which gained its significance from all the structures around by simply being four feet above the level of the street, and then asked, "If you were able to tear down all the buildings on one side, revealing to the religious place a mountain range in the distance, would their silence inspire you to a beginning?"[52]
>
> L. Kahn discussing Luis Barregan

Without an interface between man and nature, it can be awfully hard to find a beginning. Perhaps in the city the sky provides a suitable start. Even when the sky is polluted by man, it still possesses light.



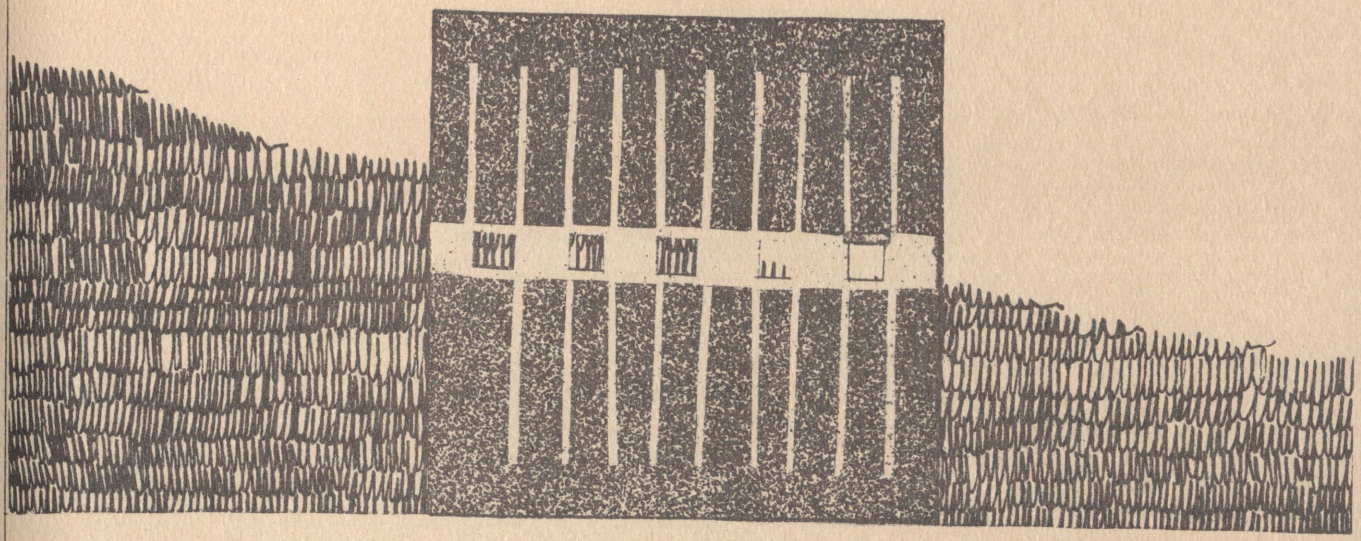
FORMS ON THE LANDSCAPE

Forms can create new space within the landscape. Interior space can ignore all reference to the external world if that is desired. But for it to be meaningful, structured space must communicate how the external world is understood by the user. On the prairie simple geometric forms seem to exist as isolated objects on the landscape. While more complex forms compete with the inherent orders of the land, and try to impose a new and different order, simple forms express man as a self-conscious being connected to the land.



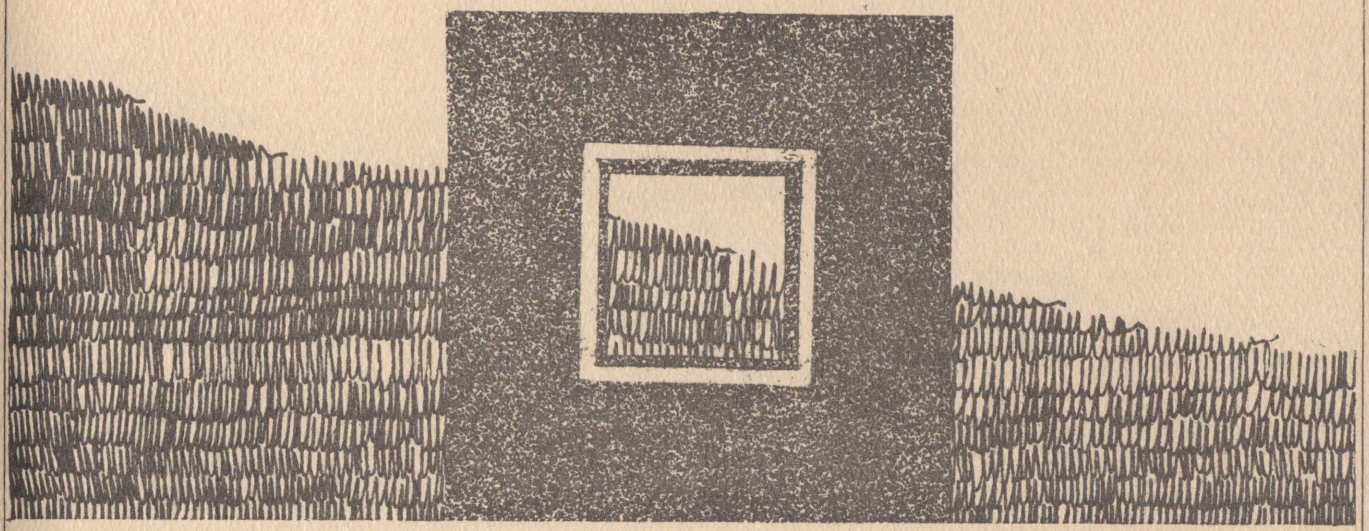
THE WALL

The wall is the beginning of the tension between structure and openness. Openness can be introduced into the space which the surface of the wall creates, but it is always altered and structured. While the openness is somewhat destroyed, structured space is created, an internal space that removes the fear of the infinite which openness evokes. The tension between interior structure and exterior openness becomes complementary at the wall.



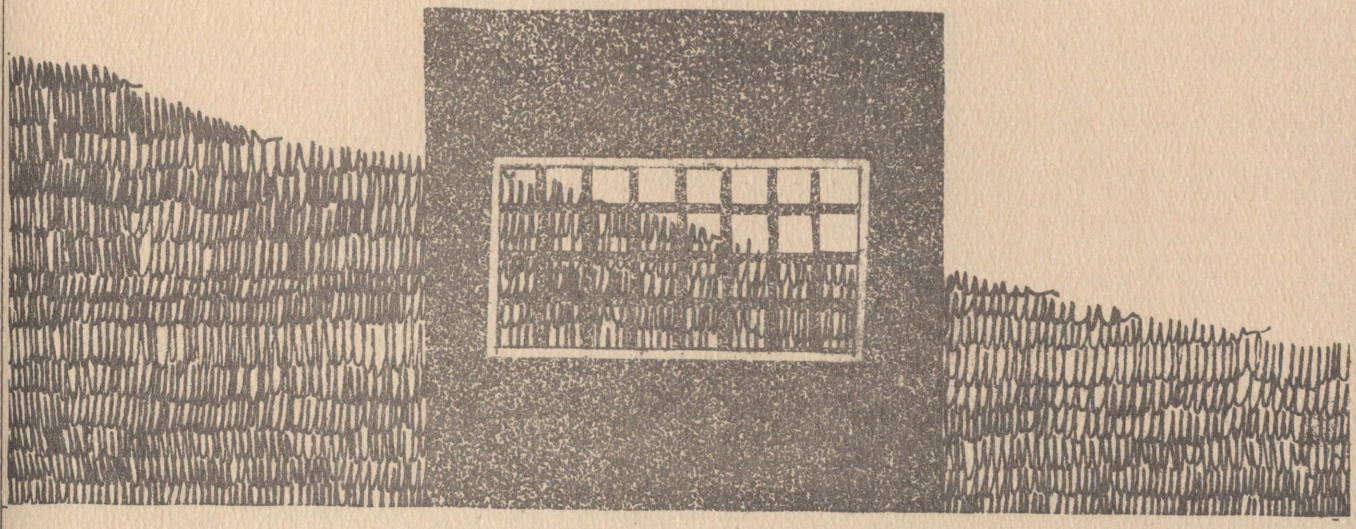
INTERIOR SPACE

Interior space utilizes the properties of natural light; the openings provide an internal rhythm. The qualities of natural openness serve the values of the structured space. For example, the interior of a Gothic cathedral takes the properties of natural light and produces divine light. The orders of nature inherent in light are harnessed by man and used to represent the orders of the divine.



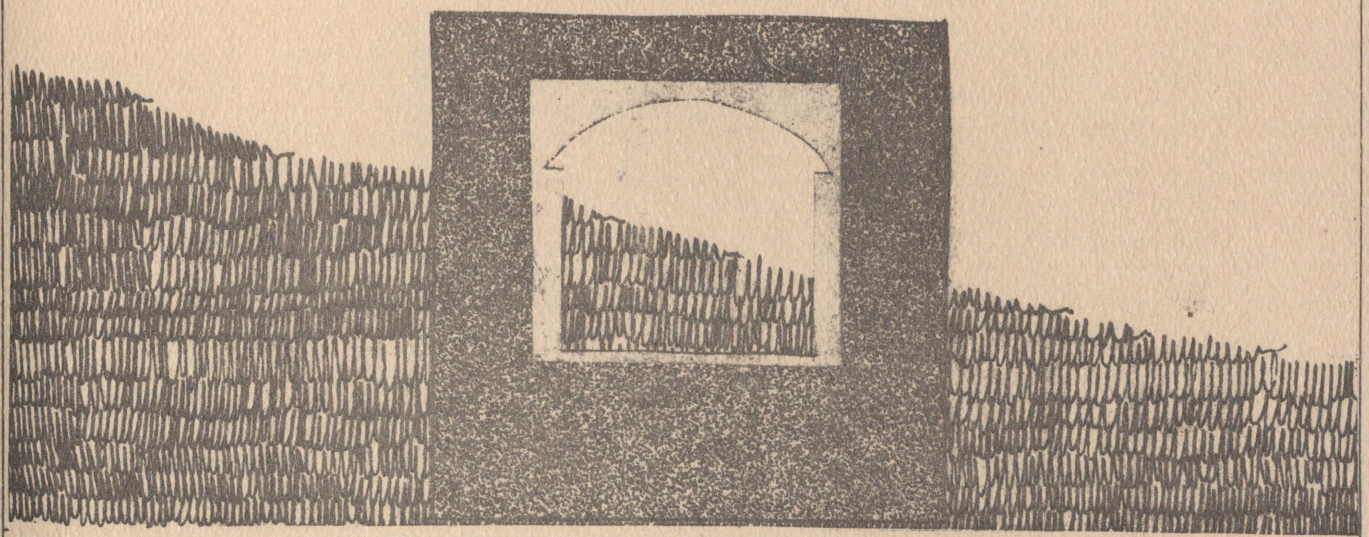
OPENINGS -- THE INTERFACE BETWEEN OPENNESS AND STRUCTURE

Openings in the wall's plane allow nature into the interior space. Views through the openings can frame perceptions and highlight certain characteristics of the exterior environment. Height of the openings in relation to the user can determine what part of the environment that user will perceive. For example, a window above eye level may introduce the qualities of light but exclude the characteristics of land. The role of openings varies. An atrium, one extreme, incorporates the qualities of nature, but modulates them. At the other extreme, space can be altered, with the aid of technology, to produce a fully man-based structured environment, devoid of nature's openness.



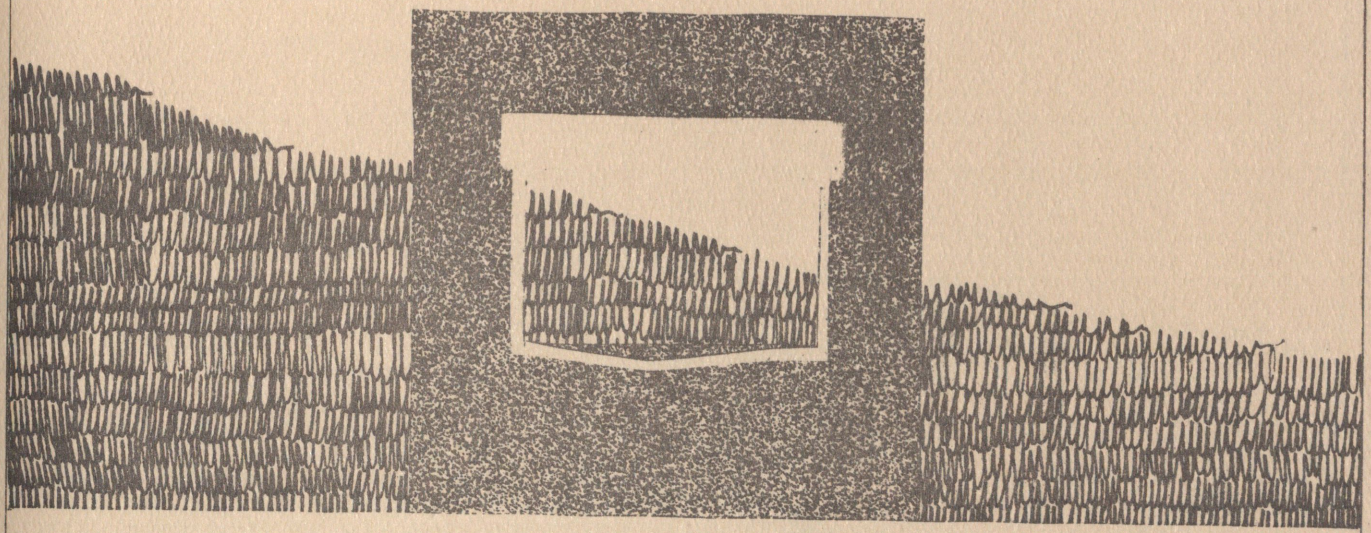
INTRICACY

Intricacy deepens the experience of the interface between man and nature, structure and openness. When the external is screened by structure, one never loses the sense that one is understanding the infinity of nature in an enclosed environment. Internal space is always reassuring, but one can always see beyond the structure, out into the natural environment.



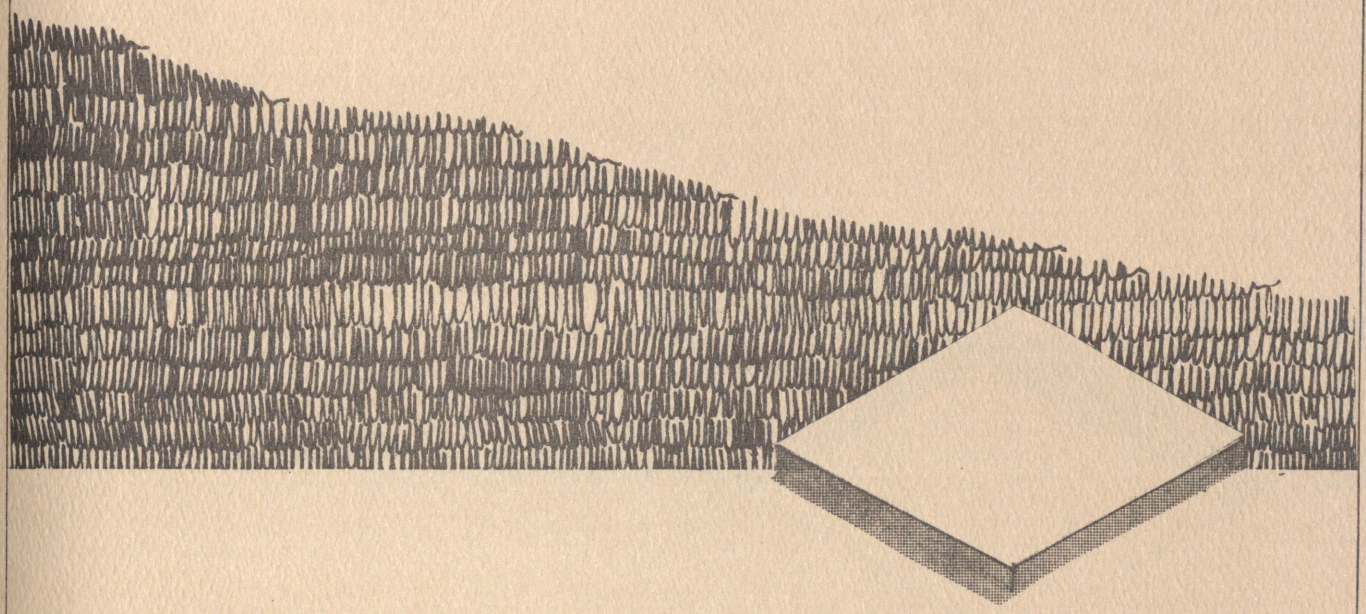
NATURAL STRUCTURE

While man uses the lintel to oppose the abstract forces of nature--specifically gravity--the arch celebrates these forces. The arch represents in the abstract the struggle of man to create an opening in the wall and so bring light and openness into structured space. Louis Sullivan felt that the arch symbolized the constant renewal of life through death and rebirth.



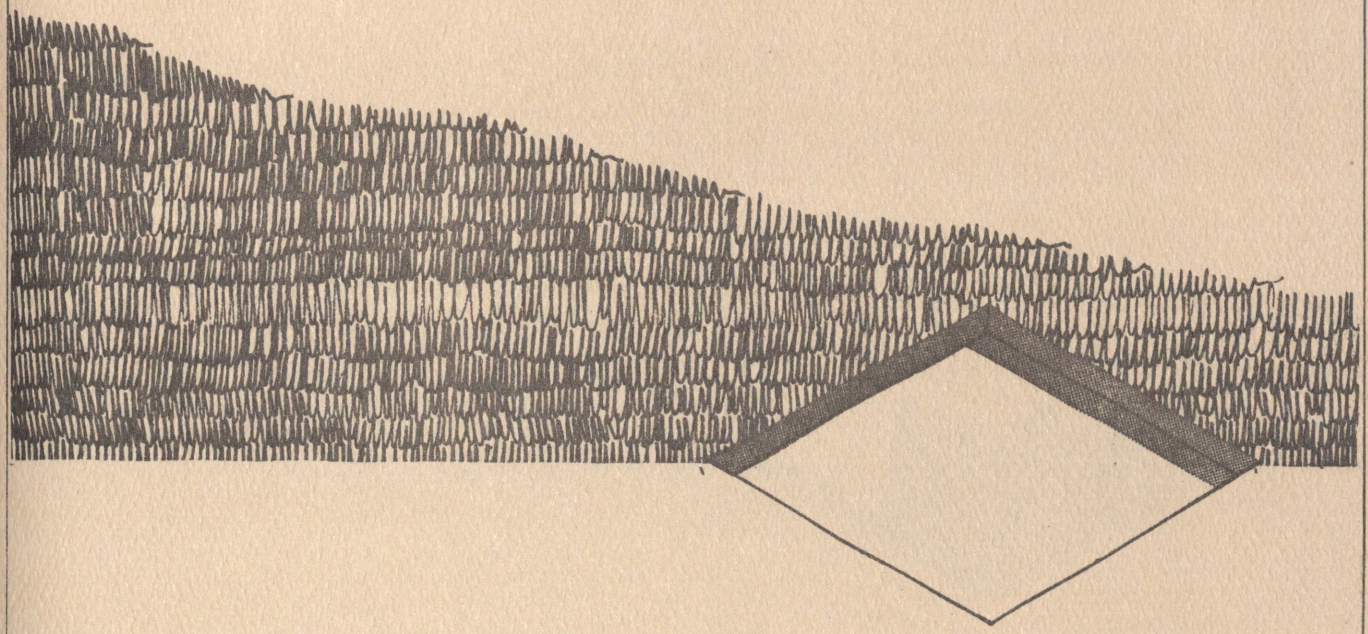
MAN OVER NATURE

The lintel, by opening the wall and establishing a relationship with the openness of nature, seems to fight the abstract forces of nature. Man, too, seems to struggle constantly against these abstract forces. When man creates structured space he creates a distinction between himself and the external environment. This distinction is the source of the inherent tension between openness and structure, and between man as one with nature and man as the intellect detached from nature. We tend to think of tension as the conflict of two dynamic forces in opposition to one another; an ecological ethic, however, redefines tension, accepts it as healthy, and sees the two forces as different from, but complementary to, one another.



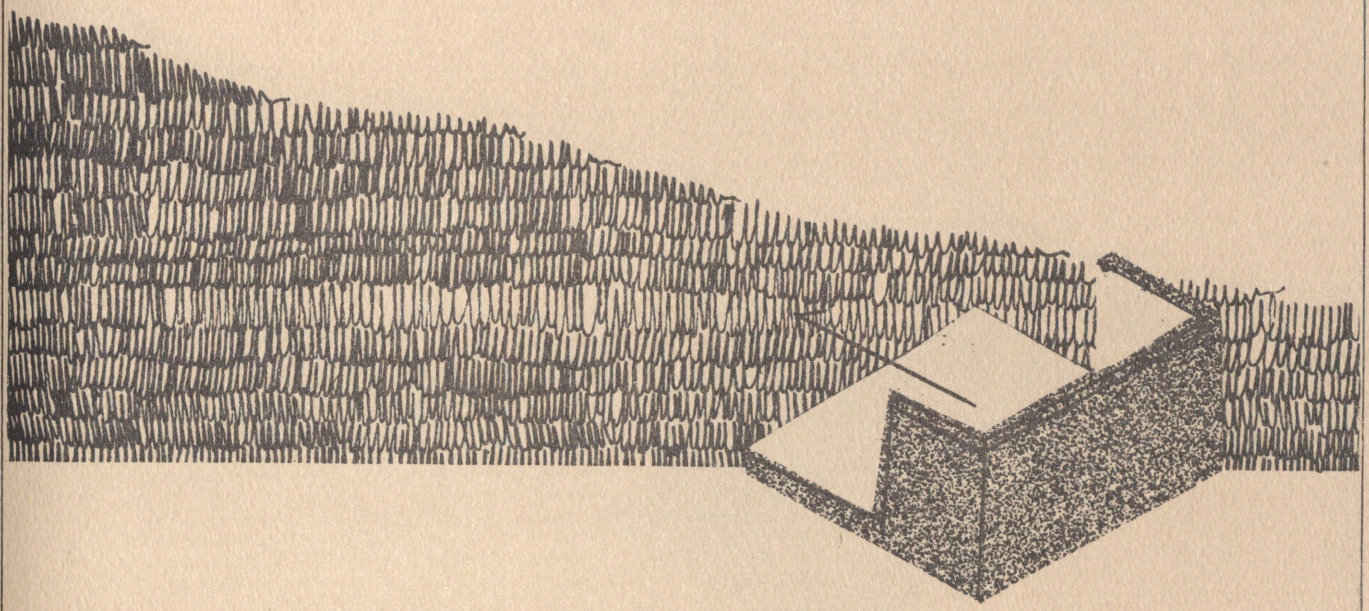
BUILT PLACE

Structured space gives one a sense of enclosure and finiteness when complemented and contrasted with the openness and infiniteness of nature. This distinction can be produced with as little structure as a material placed on the ground plane.



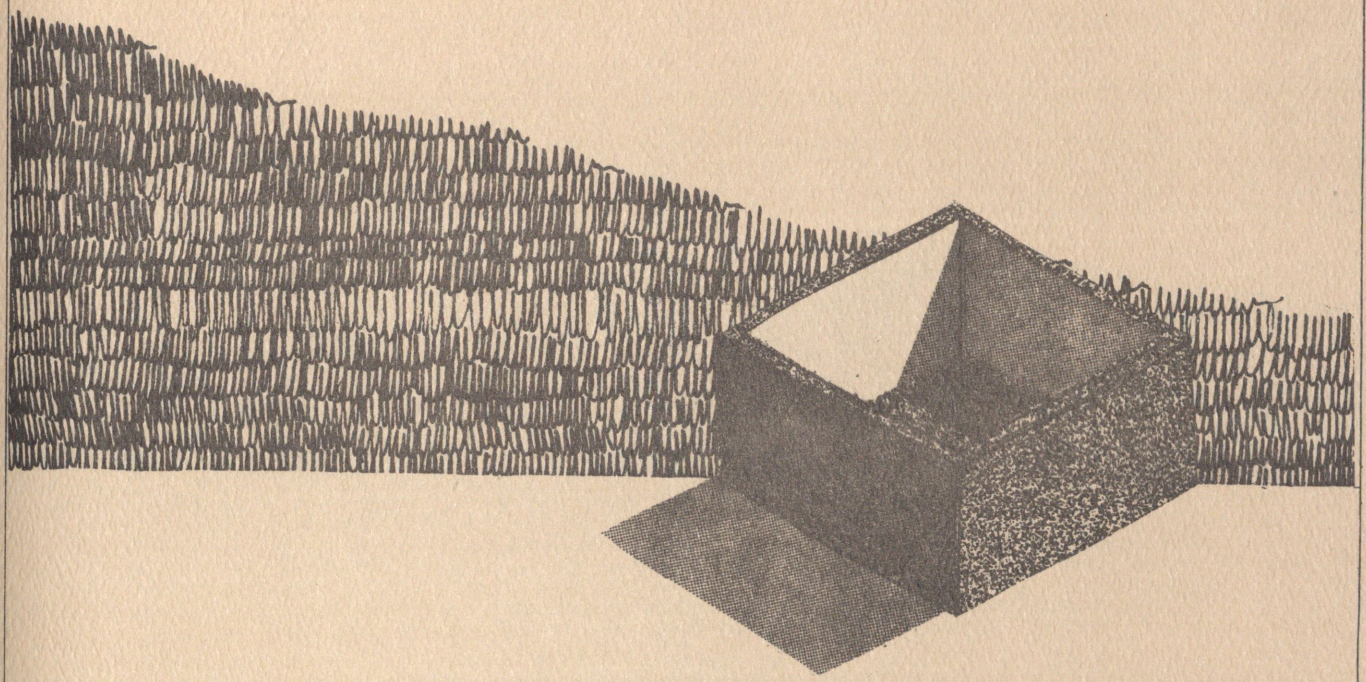
LEVEL CHANGES

When the man-built environment alters natural levels in the landscape, one's perceptions of the land are likewise altered. Space at a level below the natural horizon seems more closely connected to the land. Structures that project above a given natural context can seem detached from the environment, as the land is reduced to a purely visual phenomena. Level changes on the virtually flat prairie heighten one's awareness of the built environment, moreso than in more topographically varied landscapes.



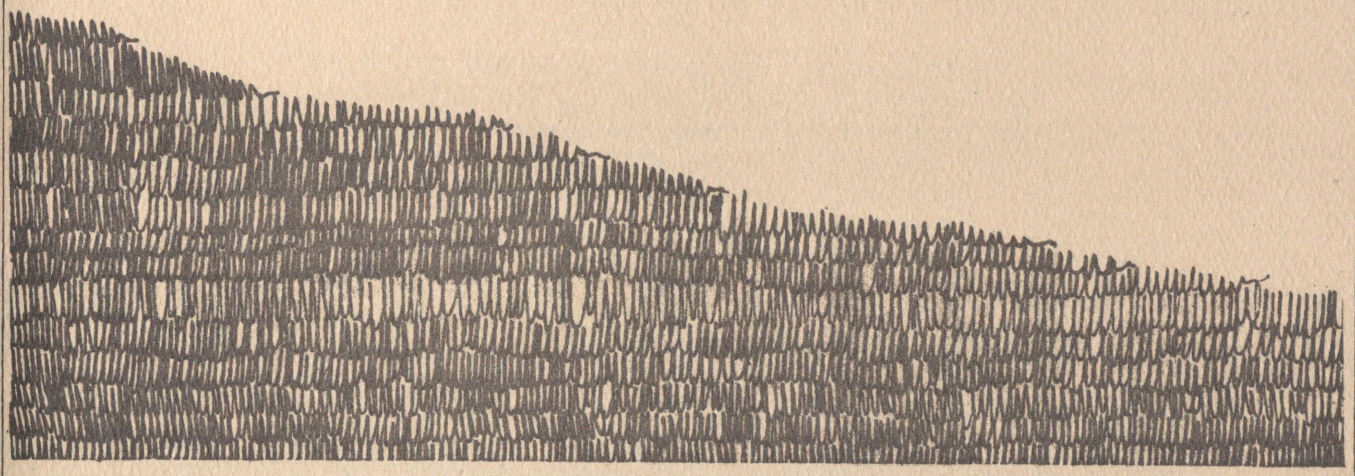
STRUCTURED SPACE

Structured space can enclose to varying degrees. Spaces can enclose as well as extend out and tie in to the landscape. For instance, the space created by a veranda or a portico acts as an intermediate space between structured and open space. The sense of enclosure can actually be strengthened when tied in to an intermediate space. Neither structure nor openness dominate, but they merge with one another.



ENCLOSED SPACE

Man desires enclosure at certain times just as he desires wildness at others. Structure can enclose and yet maintain its ties to the natural environment. How great a degree of enclosure a structured space provides depends on the values and feelings that man chooses to produce in a given space.



Man on Nature

Man on the Prairie

Summary

"The church had been fitted into the landscape
as to become the keystone of its intelligibility.
Its presence imparted a special significance to
everything alse ahat the eye beheld to the hills,
the forests, the fields..."

Thomas Merton
The Seven Story Mountian

The understanding of the openess of nature and the structure of the built environment, either a priori or learned, is beyond the scope of this project. Let it suffice to say that the culture that we learn in establishes certain ways in which we see the world, and more specifically nature and the man-produced objects. Ecology is a new scientific method of seeing and interpreting the natural environment. In the past. scientific methods were often responsible for reshaping the way that we view ourselves in relation to all things. For example, Galieos"discovery of a round earth reshaped the structured architectural of the time as well as the beliefs of planitary motion. Ecology is no exception. It not only reshapes our views towards nature, but how we interpret and shape meaningful space. Natures" beauty is often what draws us to her, and through the active process of ecology, we are further led to an understanding of a richer beauty. Ecology changes our knowlege, and we now see nature with a refined beauty, not a mere romantic one.

The prairie restoration center has sought to put this notion of ecology into meaningful architectural space, and also become somewhat of a keystone of intelligibility to the surrounding prairie. The project maintains its complimentary aspects toward the natural environment by granting a ecological perception, while at the same time maintaining its inhereht sense of man produced structure. I will explain how these complimentary aspects of the

prairie restoration center were given understanding in form and show what ideas were the specific seeds of development to the Prairie Restoration Museum itself.

The holistic totality of the built environment is where the true emotion of the architectural space exists, like an ecological understanding, this is a refined understanding that leads to true beauty-- an aspect that transcends literary means. The perception of this refined beauty is left to the persons who experience the architecture itself. And since the project is a theoretical design and not an actuality, perception must be undertaken in the drawings and in the photographs of the model. Starting with the site planning and then to more specific details of the buildings themselves I will try to explain how the specific ideas of the building were given form and space.

The entrance to the site (Fig. 1) is on the north side of Batavia road a few hundred yards from a pioneer cemetary. The site takes full advantage of the prairie by appearing to be undisturbed by man in terms of existing buildings and roads. Also, it is important to locate the Prairie Restoration Center close to the existing pioneer cemetary because these plots of land were often the salvation to many prairie plant species , being protected from plows and suburbs. The vehicular and pedestrian entrance to the site is directly in line with the parallel rows of trees which bisect the site. At one time these trees helped define a small farmroad and imply a time in past history where man tried to order the vastness of the landscape with an imposed form. The parking area is hidden from the surrounding prairie by a four foot berm that surrounds the parking lot on the three sides facing the prairie. The forth side is left open to Batavia Rd. to permit visual access by the people driving on that road, and also to permit snow removal fom the parking area. From the

parking lot, then, one progresses through the existing row of trees towards the buildings themselves. From this pathway one begins to come in contact with the first building on the site, the Main Museum (Fig.2)

The Main Museum attempted to order itself in a self-conscious manner, from the exterior, and to compliment the surrounding landscape. The materials of: the Main Museum consist primarily of walls made of:Colored concrete block whose colors create horizontal bands of alternating light and dark greys, the south end of the exterior is different as the walls break down in mass and become simple columns infilled with glass, Immediatly above the exterior walls and directly below the roof line there exists a one foot yellow stucco band that wraps around the entire complex except at the ends (Fig. 3) , The roofing material is a machine cut shake roof with a light blue stain -- which quickly weathers to the forces of nature.

The upper ridge of the roof receeds to varying degrees and the revealed structure below is covered in glass. The ammount that the ridge becomes transparent is dependent on the ammount of natural light that would be permitted to ~~eeter~~ enter the specific spaces below. In the contemporary Arts area the light is brought into the space via a large opening, since this ammount of natural light would be potentially harmful to the artwork and could present a glare problem the light is diffused by a white canvas material that is stretched on the underside of the structural system. In areas where natural light can occur, such as in the primal arts display area light is permitted to pass directly through the glass and into the spaces below.

The lower portions of the exterior of the center tries to be a simple background to the tallgrass prairie. And the upper portions of the center tries to reveal the orders of the man-structured space.

The entrance (Fig. 4) occurrs at the upper level of the Museum so the order of the interior space will reveal itself as clearly destinct from the orders of the prairie landscape below. It is inthe upper poutions of this space that one becomes aware of the presence of man strictired space (Fig. 5). As mentioned prewiously in my thesis, Thoreau makes the following comment:

> "Should not every apartment in which an dwells be lofty enough to create some obscurity owerhead, where flickering shadows may play at evening above the rafters." (p. 5)

Similar to Thoreau I feel that one often becomes aware of the structured space in the upper levels of structured space. It is here that the Main introduces light and structured space. The space that one enters is directly beneath the Contemporary Arts display space. Here one becomes aware of the organizing element of the building; the line. The line represents the notion of self-conscious man on the landscape and it is from this line that the idea of structured space unfolds itself. In this portion of the center the upper level is given to entrance and public information. Like all display areas, I think it is very important to spell out a clear circulation, which grants one a greater freedom to view the art that is shown within the space. Also, it is along this line where the dea of the space is most dominant, so as not to interfere with the perception of the artwork (Fig. 6).

Next, one progresses to the upper portions of the south end of the center which is the ceramics display area. Here natural light could be brought in directly and the awareness of the light is further emphasized by a stepped up rhythm of light and shadow, as the structure -the giver of darkness- is given a quicker cadence, when contrasted with the Contemporary Arts display area. The space here reveals an intricate mixture of light and shadow, making the

distinction between the inside and outside somewhat unclear (Fig. 2). From here one progresses to the lower level of the south end which is the Primal Arts display area.

In the Primal Arts display area, the wall breaks down to a simple rhythm of columns, and the artifacts can be seen through large glass openings; revealing the prairie. Since the work exhibited here is usually a reflection of the natural landscape, it became essential to provide a space where the prairie could be seen in unison with the artifacts (Fig. 7).

From the Primal Arts area one progresses into the Contemporary Arts display. This space was intended to be a simple one where the line becomes less dominant. Also, the natural light, being diffuse, exhibits a certain man-structured quality in keeping with the notion that the space is meant to be a place where man-structured space dominates. The thick walls make a sharp distinction between the interior (structured) and the exterior (openness) space, leaving a clearly definde structured space to reflect upon a work of art. In the next phase one exits the center and proceeds along a walkway towards the Prairie Restoration Museum (Fig. 8).

Along this path one sees the prairie void of infinity, being framed by the two museums, a low wall, and the walkway itself. This space is the prairie arden, and is a place for one to reflect upon the prairie while going to the next interior display space. Unlike traditional gardens where plants are change to a man-ordered state, the prairie merely passes through these walls and is changed only by the sense of enclosure that these walls grant.

The pathway leads to the exterior of the Restoration Museum. The thick walls that once separated the interior from the exterior, is the Contemporary Arts Museum, begin to lose their solidity (Fig. 9). One of the parallel walls is on the east exterior of the building, and the other wall exists just

inside the west wall of the Restoration Center (Fig.10). This museum becomes a avillion where the walls exist to define space and not separate it from interior to exterior, and vice-versa. On the exterior the order of the ridge existant in the ridge of the Main Museum is implied. This happens because I did not want the order of the building to occurr in a linear fashion, since the interior order is implied along a series of points. The interior space of the Restoration Museum does not have a circulation of a line, and light further emphasizes ambiguity by illuminating the upper roof, while the source is hidden in darkness (Fig. 13). The order of the building is not strictly organized, points imply direction and meaning, not a line. For example, the south end of the structure reveals the central meaning of this particular space; a place where the orders of nature and man become ambigious. Here, the drain spout represents the sacred force of the powers of rain both on the structure and on the prairie, when rain occurrs the sounds of the water run off is emphasized by the detail of the drain. Also the column is given a special place for it becomes the symbol of the man-produced object that resists the abstract forces of nature gravity. These two elements are emphasized when they are placed against an exterior curved wall that is given pressence by natural light (Fig. 8). The curved wall gives natural light a soft quality that draws one towards that particular point in space. Another point of understanding, is the space that happens in between the thick interior wall and the glass wall to the west. This four foot corridor is where one goes to peer out into the undisturbed prairie that radiates to the west of the museum. This space was meant to provide a place where one could detach oneself from the rest of the interior space and look out to the wildness of the restored prairie.

These then, are some of the central ideas of the project. Ideas that were the generatrs of the architectual space. This project has given me a greater

understanding of the effects of the orders of nature. The project has been an attempt to organize some of the ideas that I have dealt with while attending school here in Montana. Montana, with all of its natural beauties has left me with a deep respect for the undeveloped; a respect that I will carry with me wherever I do architecture. Hopefully the love of the bold beauty of the Rocky Mountains has been instilled into a project dealing with the beauty of a subtle midwestern prairie. I feel at home in the prairie more so than the mountains since the former is, and always will be, my home.

Finally, I would like to thank a few of my friends, people who have helped give me the confidence to pursue, and have faith in ideas:

My advisors: Professor David Matthews and William Semple, for their guidance.

To Dr. Gordon Brittan, who helped me to discover.

To Curt Meine, who edited my words withe the care of a friend.

And to Pamela, Mike, Tobin, and Keith, who were there when I needed to talk out ideas.

Since this summary was written after the printing of my book I would like to cite some of the errors int the text.

The section labeled Codes on p. 75 was misprinted and in its place some of the spatial relationships were printed.

The maps on pp. 53 and 54 should be reversed.

And the material under the heading Site Selection pp. 42 and 43 should be in quotes, and the words should be given credit to the National Accelerator Laboratory "Development Report" listed as number 43 in my footnotes.

Descriptions of the Drawings and Photographs

Figure 1: Aerial view of the Museum complex; taken from the model looking east.

Figure 2: Model photograph looking south-east.

Figure 3: Model photograph looking east.

Figure 4: Model photograph looking at the entrance from the east.

Figure 5: Model photograph looking into the interior of the Contemporary Arts Museum.

Figure 6: Model photograph looking at the interior of the upper level of the Contemporary Arts Museum , from the west.

Figure 7: Model photograph looking from the west, to the lower level of the Contemporary Arts Museum.

Figure 8: Model photograph of the Prairie Restoration Museum looking from the east.

Figure 9: The Site Plan

Figure 10: The plan of the Prairie Restoration Museum

Fogure 11: The plan of the Main Museum

Figure 12: The south elevation of the Prairie Restoration Museum

Figure 13: A section taken directly in back of the south elevation

Figure 14: The east elevation of the Prairie Restoration Museum

Figure 15: The south elevation of the Main Museum

Figure 16: The Inside south elevation at the entrance of the Main Museum.

Figure 17: A section of the Main Museum taken through the Primal Arts area

Figure 18: The east elevation of the Main Museum.

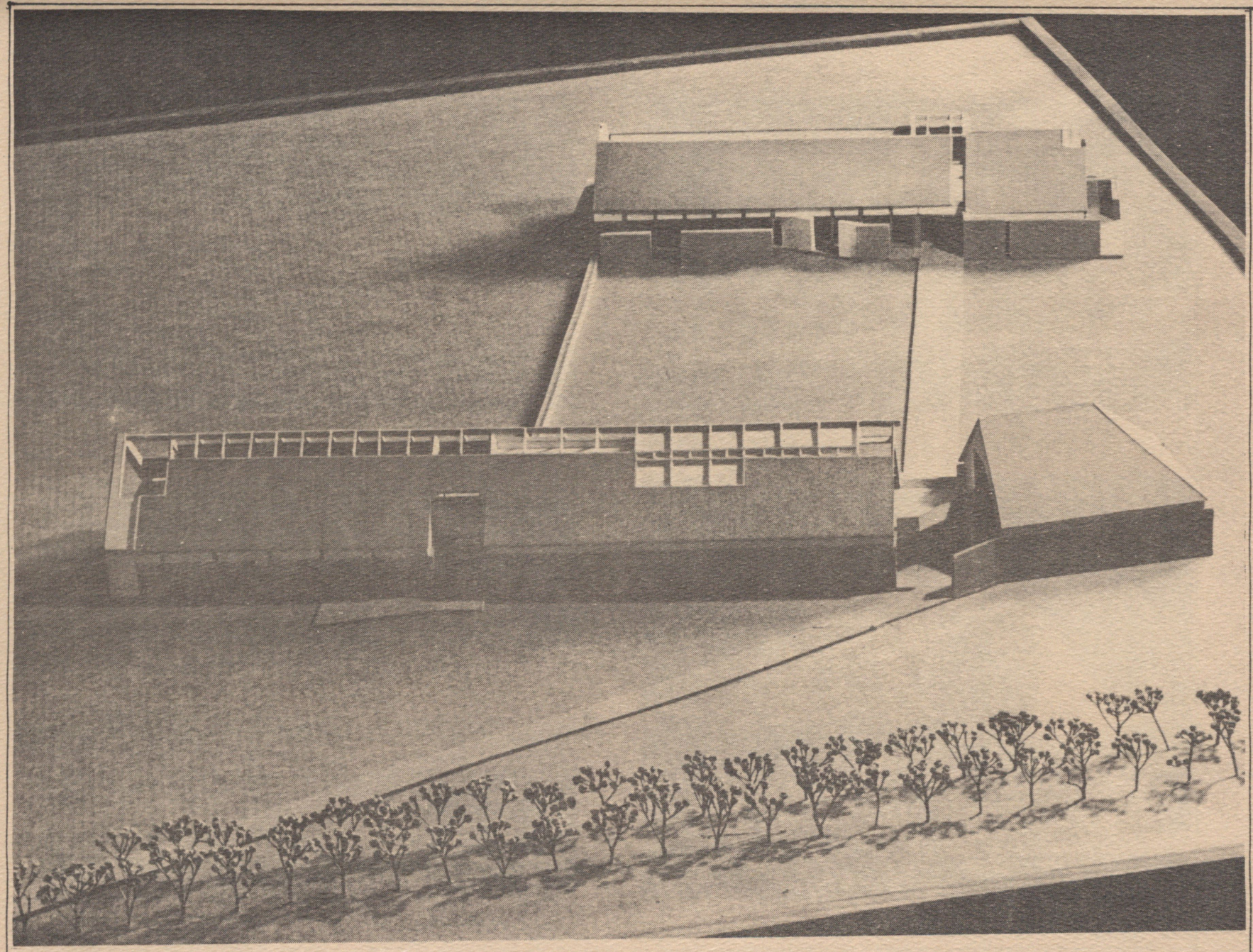


Figure 1 Aerial view of Museum

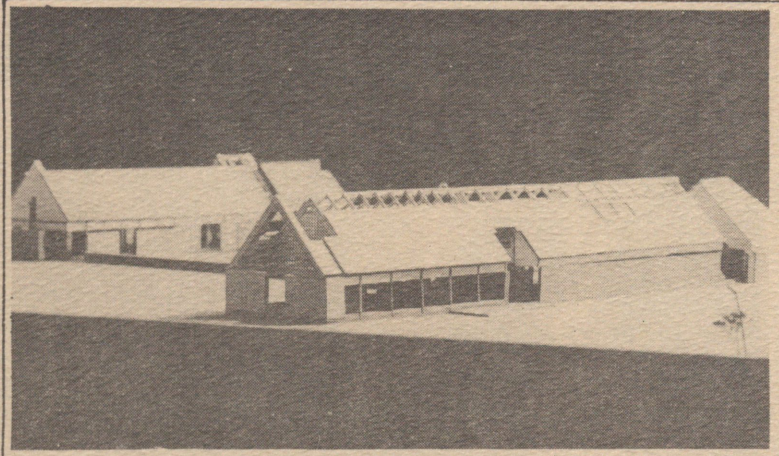


Figure 2 Approach

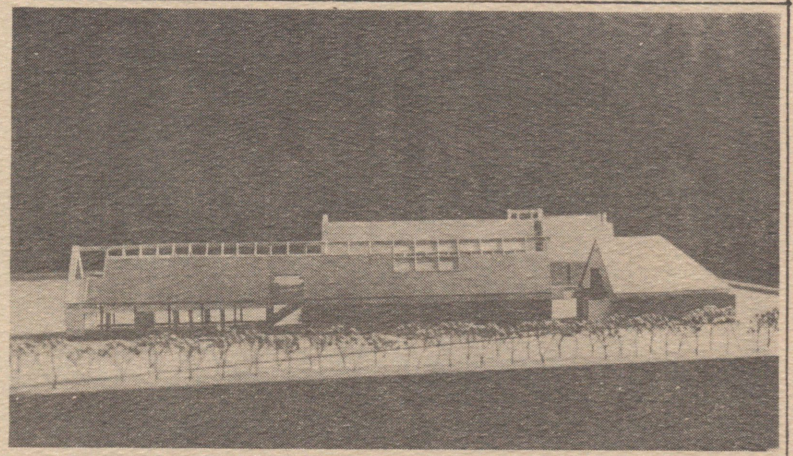


Figure 3 East

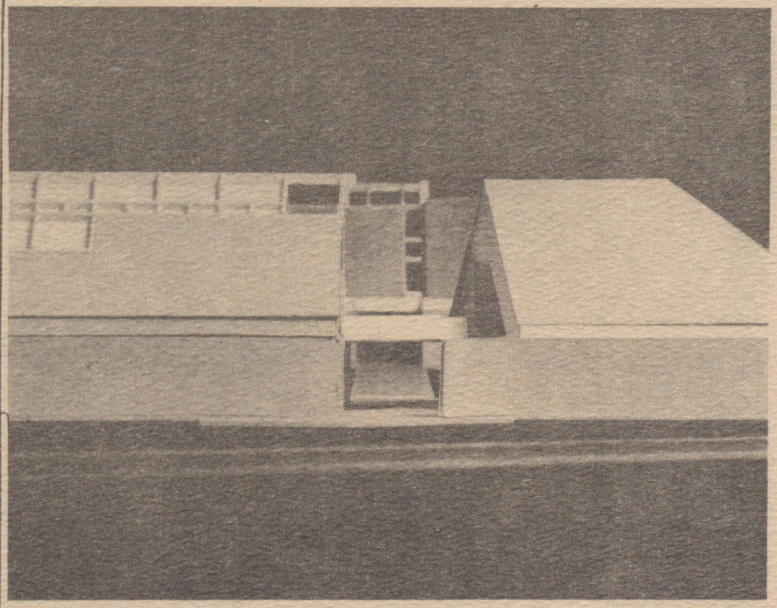


Figure 4 Entrance

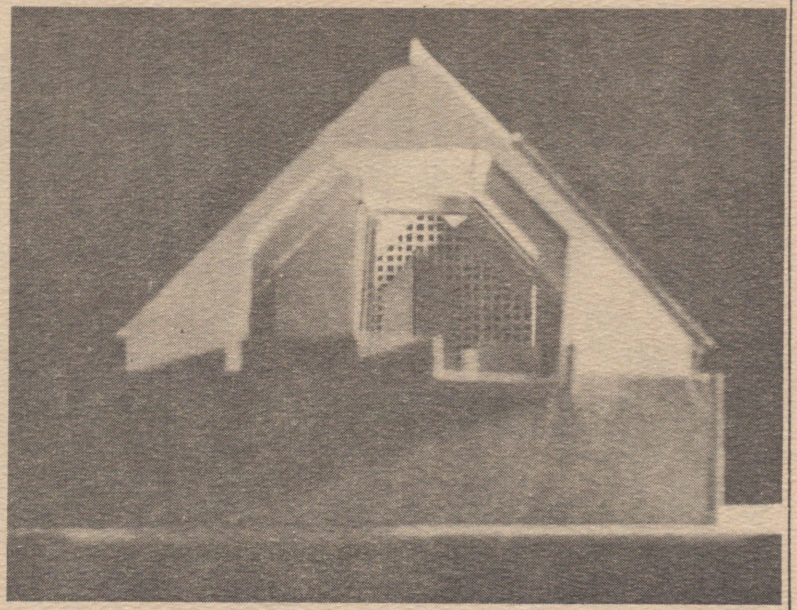


Figure 5 Interior - ent.

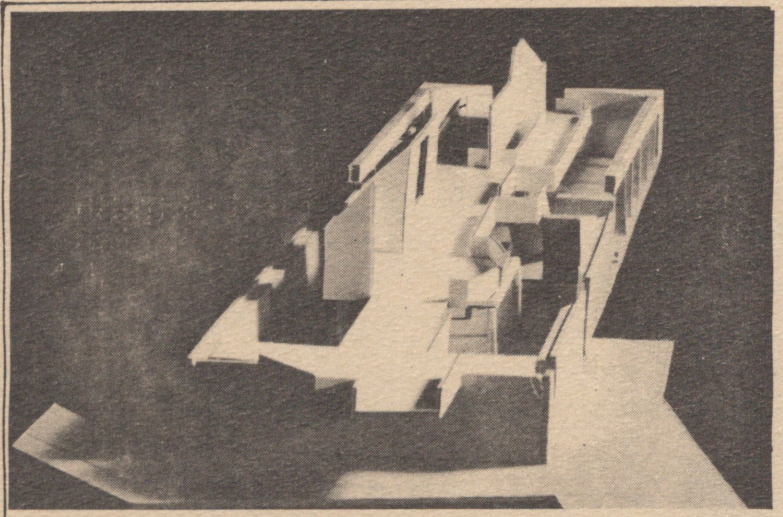


Figure 6 Upper Level

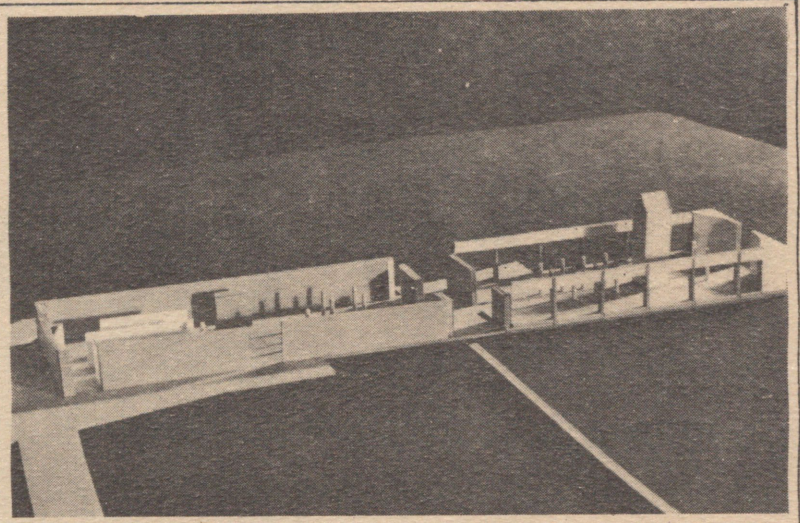


Figure 7 Lower Level

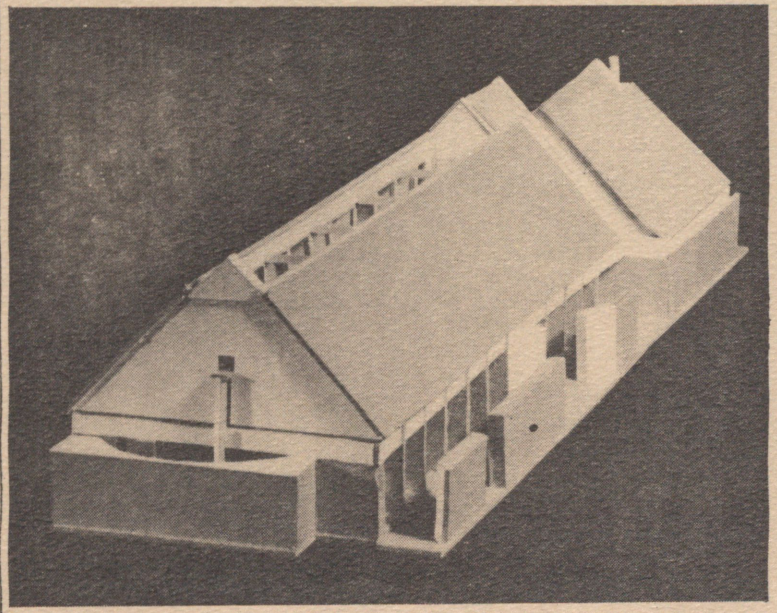
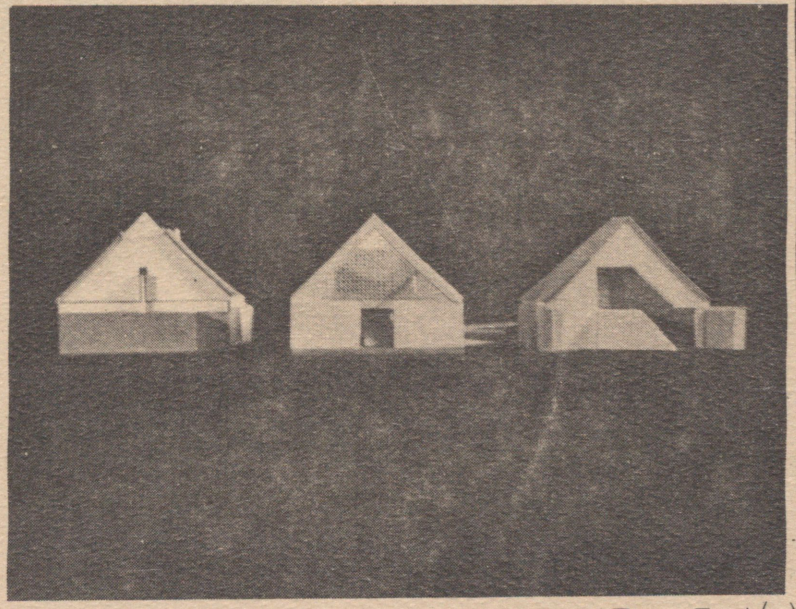


Figure 8 Pairie Restoration Museum



The End (s)

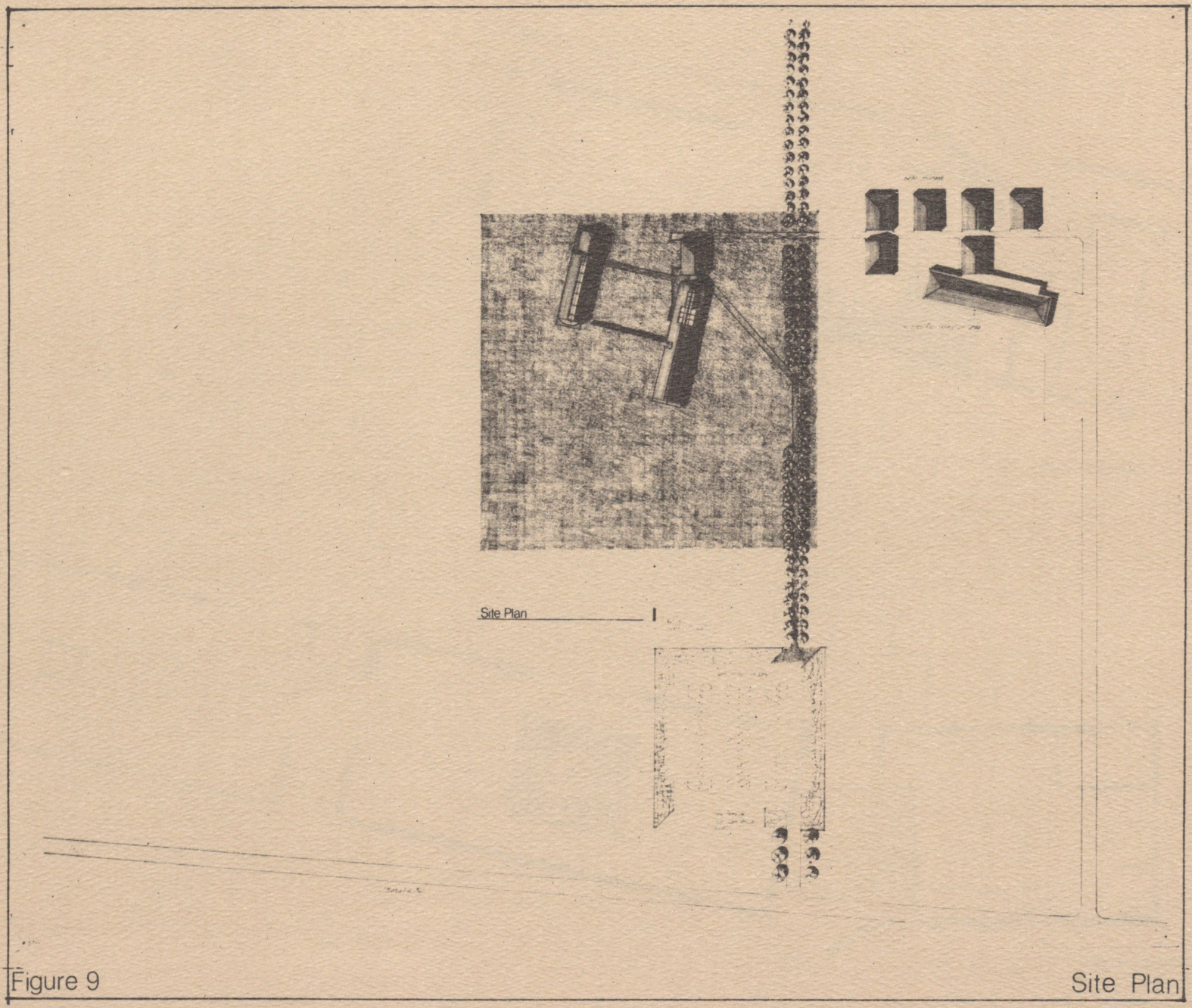
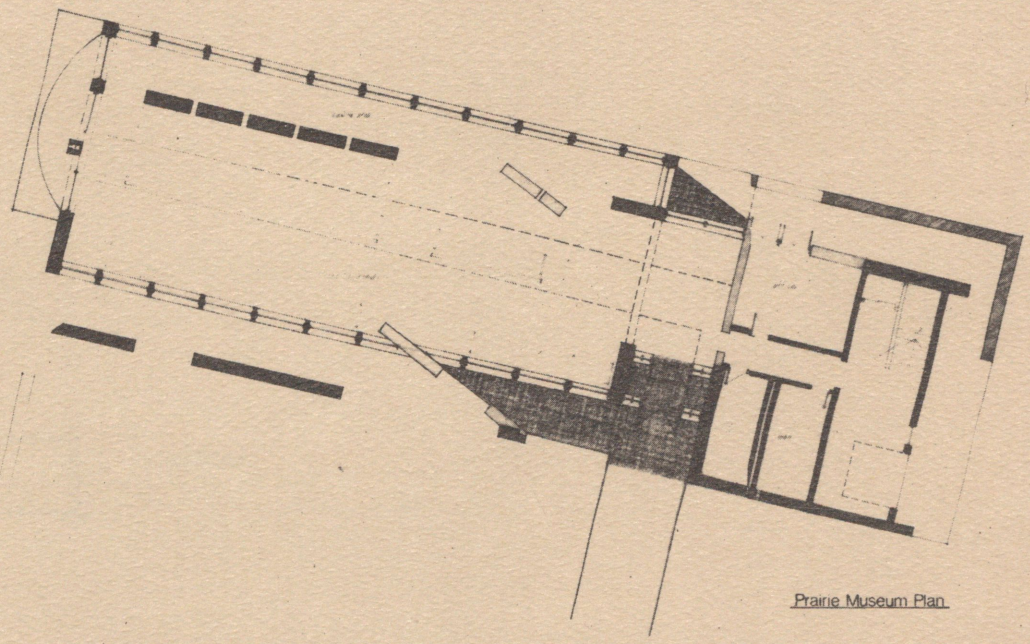


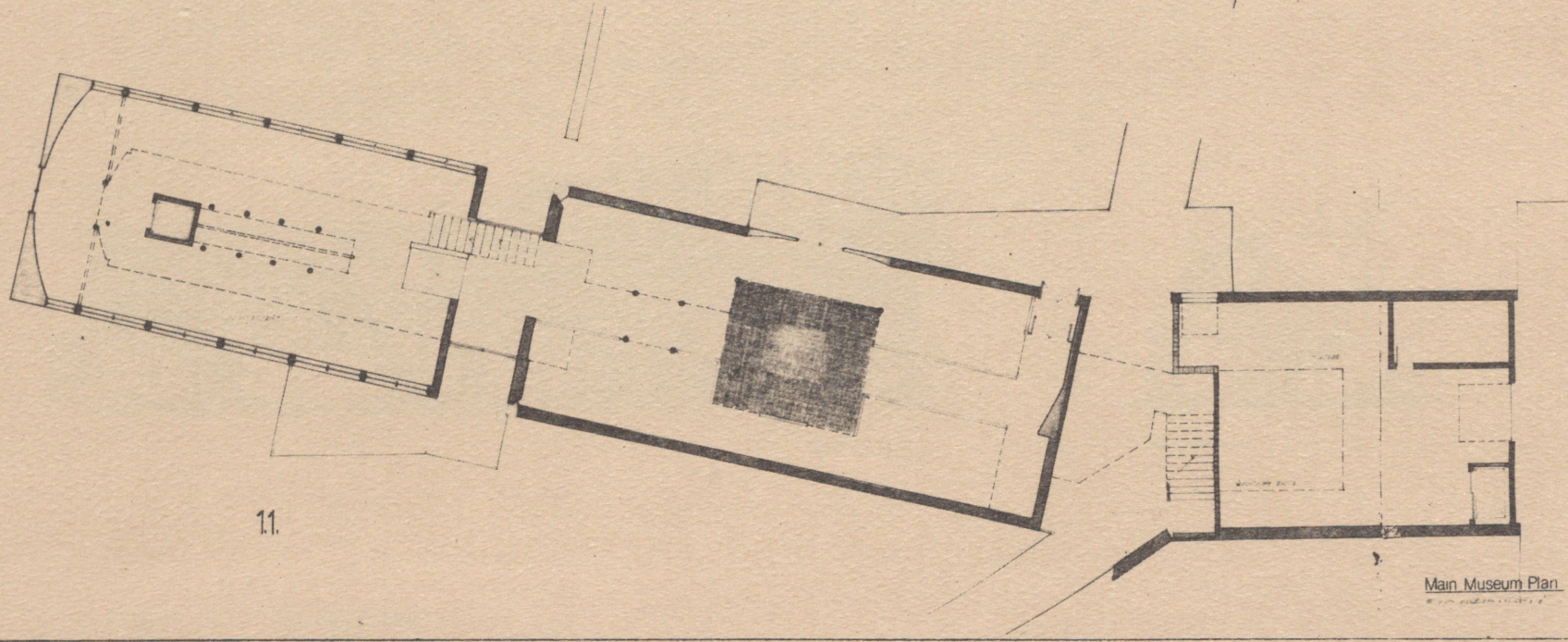
Figure 9

Site Plan



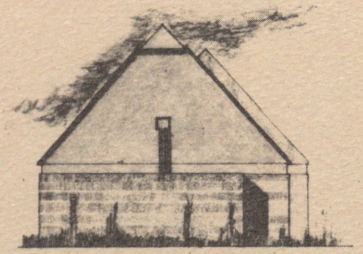
10.

Prairie Museum Plan



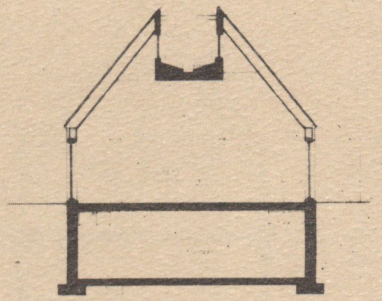
11.

Main Museum Plan



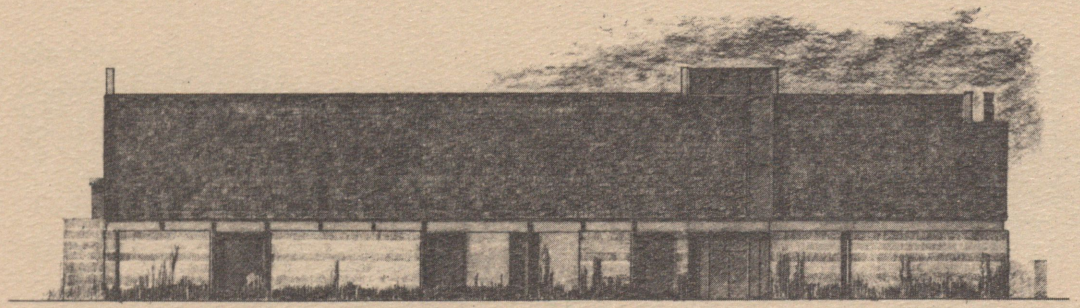
South Elevation

12.



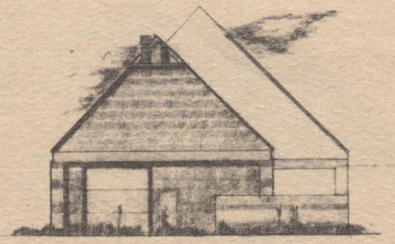
Section A A

13.



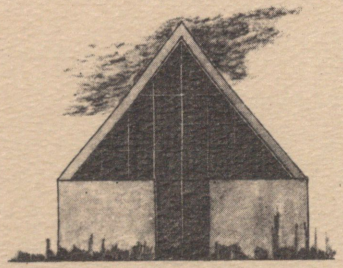
14.

East Elevation



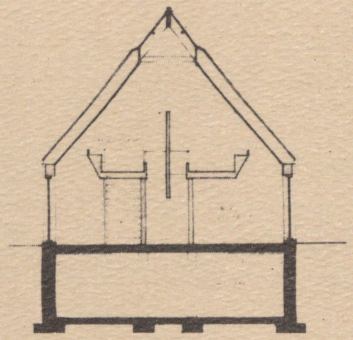
North Elevation

The Prairie Restoration Museum



South Elevation

15.



Section B.B

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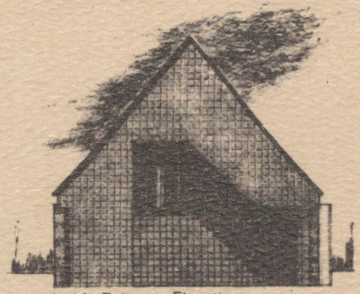
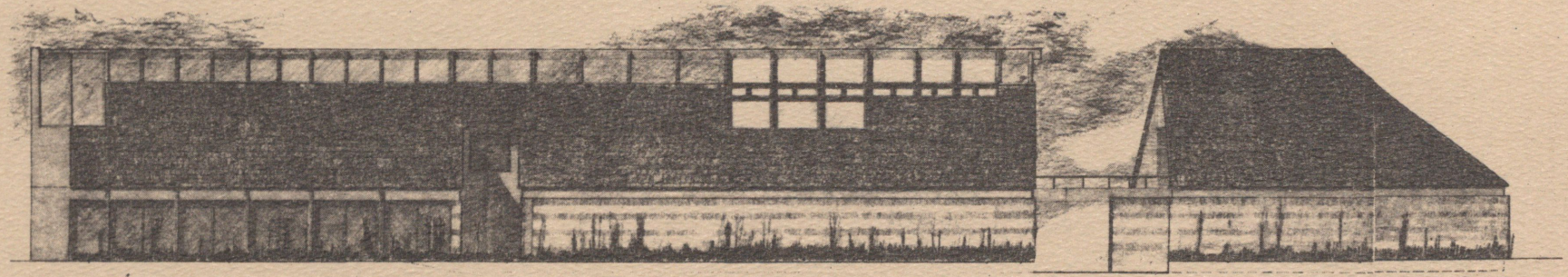


Inside Entrance Elevation

16.



East Elevation

18.

The Main Museum

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