

THESIS

ARCHITECTURE:

Transitions with Nature and Space

TRANSITIONS WITH NATURE AND SPACE
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ARCHITECTURE: Transitions with Nature and Space

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PREFACE

The School of Architecture at Montana State College realizes the need for original research in the field of architecture. This undergraduate thesis, including research and original thin^King, is intended to develop the individual's concept of architecture as well as provide material for subsequent reference.

Architecture as transitions of line, plane, and form within an "environment" of nature and space was selected because it is a relatively unexplored but vital phase of a philosophical concept reaching toward a total architectural approach.

The writer of this paper gratefully acknowledges the assistance which aided crystallization of the concept. Included are the staff and facilities at Montana State College-- Mr. Hugo Eck and Mr. Lawrence Gerckens as advisers; Mr. Verne Dusenberry as English consultant. We are also grateful to Mr. Albert Bush-Brown, Massachusetts Institute of Technology, for directing us to valuable resource material.

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INTRODUCTION

The search of an architectural approach throughout history has witnessed a tremendous development from the original concept of providing shelter for man and his activities. It would be impossible to completely cover the increase of complexity that paralleled this development in this introduction. Very briefly, we have seen architecture move from the primitive indigenous approach, into a period of surface "aesthetics" where structure invisibly support form, through the Industrial Revolution where increased technology allowed structure a creative expression, to architecture today approaching a total experience for the occupant. It is a controlled environment of enclosure, space, form, light, sound, climate, color, and numerous other measures of human enjoyment.

The appearance of certain presupposed forms or ideas from time to time has tended to limit creative design. Eclecticism is probably the most easily recognized example of such formula "creativity". Traditional architecture held rigid forms as the basis for creativity while modern architecture is inclined to recognize the elements which compose such forms as basic.

"Creative expression reaches its climax when shape, space, and composition satisfy completely the practical requirements and interpret them in a design of intrinsic harmony."¹

¹Albert Frey, In Search of a Living Architecture, (Cornwall Press: Architectural Book Publishing Co., 1939), p. 7.

Improper emphasis on a particular phase of a total architectural approach is therefore not true creativity. Modern architecture, or that which is recognized as the expression of this century, should rightfully be subjected to the same critical analysis as the historical expressions are.

In America we have brutalized, bulldozed, and billboarded nature. The popular picture window, which affords a "framed view" like a flat mural decoration, in no way integrates the house and site together in terms of form.

Architecture, assumed the predominant accent upon the human landscape, is necessarily composed of transitions with material, mass, and the environment of nature and space. The latter of these, environmental transitions of solids, planes, lines, and space, lacks emphasis in the modern architectural approach and shall be the topic of this thesis.

PART I. BASIS FOR ANALYSIS

I. DETERMINANTS OF ARCHITECTURAL FORM

Architectural form is not a pure creation in the mind of the designer but is subjected to outside influences. In art, the sister creative field, the mental attitude of the designer is primary. Certain determinants of form have been evident in all architectural eras. Sir Geoffrey Scott in Architecture of Humanism points out that "the men of the Renaissance evolved a certain architectural style because they liked certain forms of a certain kind. These forms, as such, they preferred, irrespective of the mechanical means by which they were produced, irrespective of the materials out of which they were constructed. They had immediate preference for certain combinations of mass and void, light and shade, and compared with this, all other motives in the formation of their distinctive style were insignificant."²

At the risk of destroying creative thinking by over-simplification of the determinants of form in contemporary architecture, the following sections deal with the basic elements to serve as reference for the transitional investigation.

Function

Form is related to function; this determinant is recognized as one of the major contributions of the modern architectural approach. Architects of today have a passionate concern for how a building works.

²Paul Rudolph, "Six Determinants of Architectural Form," Architectural Record, , (October 1956), pp. 183-90.

Architecture is currently in a structural exhibition stage. Form which might well be reserved for great visual emphasis and otherwise treated as a means to an end is applied to all situations. Form is and should always be the physical relation of an inner concept, function.

Material

Utilization of the potential of a material in order to seek the most eloquent expression of shape, color, and size possible is another well employed determinant of form in the modern approach. Materials which are native to a region naturally create an expression for that area. Recent years have seen industrialization, ease of travel and communication, rising costs of traditional material, and the desire for conformity shed an entirely new and controversial light on the use of material as an expression to determine architectural composition.

Human Aspect

Architecture is a creation by humans for their use and enjoyment. Interpretation of the psychological aspect of the human desire for expression is a major responsibility of the designer. While there is great variation in the psychology of human beings there are certain concepts, such as color and enclosure, inherent to all mankind.

The success of great architecture can only be determined by the test of time; humans are the guardians of the life of building even after nature has taken its toll.

Paul Rudolph, in a recent article, challenges contemporary architects to the following concept:

Architects should concern themselves with meeting psychological demands primarily through manipulation of symbol . . . understanding the meaning of monumentality . . . creating a place of worship and

inspiration; how to make quiet, enclosed, and isolated spaces; spaces full of hustling, bustling activities pungent with vitality; dignified, vast, sumptuous, even awe inspiring spaces; mysterious spaces; transition spaces which define, separate, and yet join juxtaposed spaces of contrasting character. We need sequences of spaces which arouse one's curiosity, give a sense of anticipation, beckon and impel us to rush forward to find that releasing space which dominates, which promises a climax and therefore gives direction.³

Assuming man as the measure of all things, his perception should then be a form determinant. How much aesthetic sense the layman has to appreciate architecture with is a subject of considerable debate. Even though the average person might not understand the theory determining his architectural environment his native artistic sense certainly allows him to perceive scale, enclosure, shape, and color in the visual field with some validity. Gregory Kepes in Language of Vision analyzes humans:

Looking at a landscape, at people on the street, or at any single object, as the visual field has no definite boundaries, one can only make a spatial interpretation of the things he sees-- their location, extension-- based upon his own spatial position. Man measures and organizes vertical, horizontal, left, right, advance, and recession in a single body physical act-- interpreted against a background.⁴

It is therefore evident that man, the object of design, interprets architecture in relation to a given context which the architect must create or adapt to. The human equation must be the care of all architectural problems.

Building and Environment

Modern architecture is related to its environment in terms of controlled climate, regional flavor, landscape, and natural color but is lacking in employment of the forms in nature. Richard Neutra, in Mysteries

³Ibid., p. 4.

⁴Gregory Kepes, Language of Vision, (Chicago: Paul Theabold, 1944), p. 19.

and Realities of the Site, defines a site as a "three-dimensional space to be wholly used by man by means of controlled shelter and privacy and controlled openings and penetrations into solids, to fit the needs of daily living."⁵

Nature is rich in form; form as the effect of the laws of universal evolution: gravity, coherence, resistance, growth, and erosion. Of these endless forms there seems to be a preference toward the less complex shapes. However, to assume a triangular shape as the only fitting form applicable in a mountainous terrain is unreasonable and restrictive. Nature should be critically analyzed for all it holds within its scope.

The last two determinants of architectural form, human aspect and natural environment, serve as the basis for this thesis. Eliel Saarinen covered this relation well in his discourse on organic order:

Let's stand on a hill and look at the landscape beneath our eyes. We see fields surrounded by woodlands and graves. We discern groups of trees and bushes bordering lakes and reflecting their verdant masses into the watery mirrors. Our eyes follow the rhythmic outline of hills and forests against the contours of the meadow, the plastic display of light and shadow. We perceive the picture as a whole. We perceive the details of the picture, each in good correlation to the others and to the whole. We understand that the beauty of the landscape details is not sufficient to make the landscape beautiful, unless there exists a proper correlation between these details so as to keep thing together and to make of the whole an integrated picture of correlated order.⁶

⁵ Richard J. Neutra, Mysteries and Realities of the Site, Review, Architectural Forum, 94, (June 1951), p. 90.

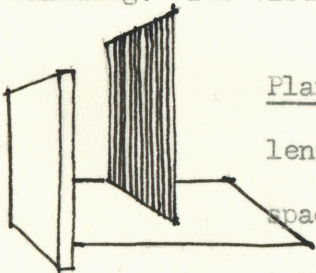
⁶ Eliel Saarinen, Search for Form, (New York: Reinhold Publishing Corporation, 1948), p. 26.

II. ELEMENTS OF INVESTIGATION

Certain geometric elements in combination produce an architectural form. These same elements are the primary factors in the transitions of architecture with nature and space. The following definitions from Design Fundamentals by R. G. Scott⁷ will aid in clarification of the analysis to follow.

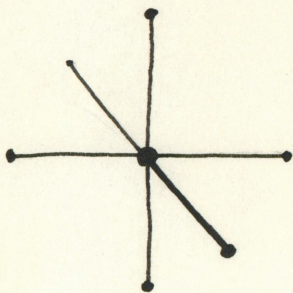


Solids- Something with bulk, something that expresses itself by projection in all three dimensions of space. It may be solid all the way through like a block of stone. It may be hollow like terra cotta, or like a building. Its visual quality is the same.



Planes- In geometry, a plane has only two dimensions, length and breadth. We cannot express a plane in space without thickness as well. It has to exist as a material. The difference between a solid and a plane is relative. If the length and breadth dominate over the thickness, we perceive the form as a plane. We think of the great wall of China as a plane in spite of the bulk of material it contains. In other words, it depends to a great extent on the nature of the other elements in a composition whether a given form reads as a plane or a solid.

⁷R. G. Scott, Design Fundamentals, (New York: McGraw-Hill, 1951), p. 131.



Lines- A line, in geometry, has only one dimension, extension. We cannot express the extension in material without giving it thickness. Again, the amount of mass a form can have and still read as a line is a relative matter.

Space- The activities of our three material elements gives rise to another. Space, itself, becomes a plastic element. In architecture, for instance, it is the principal element. The others are chiefly important as a means for patterning space.

III. EXPRESSION OF GEOMETRIC ELEMENTS

In the world of contemporary architecture, as seen by the layman, certain geometric elements are readily acceptable. Recognition of regular shapes establishes in us a conviction of their dependability and consequently we feel confident in their presence-- and conversely. Man is constantly seeking a scale, shape, form, or idea within an architectural composition that is familiar to him and a resting place for his eye. Strict adherence to such a concept is a somewhat limiting factor to creative architecture. A great revolution in form, exemplified by the plastic feeling in Le Corbusier's Ronchamp Chapel, may be developing in architecture. However, within such a creation the designer realized the necessity of incorporating regular geometric elements.

The horizontal, in line or plane, has traditionally assumed an expression of quiet or contentment because we experience it in the shape of masses at rest. It proclaims equal support throughout the entire length, whether from its own form or extraneous support. The horizontal, in expression and word derivation, produces a close affinity to the horizon upon which it is viewed.

The vertical is generally typical of activity, initiative, and aspiration, showing the effort necessary to raise matter above the ground. The vertical as a pendant expresses utter flexibility while the vertical with a buried base creates stark rigidity.

Incline, in line or plane, declares the significance of a double

thrust in opposite directions. The incline may be interpreted as tangency, parallel, or expressive as basically a horizontal.

In terms of enclosure, the following are quite traditional and somewhat obsolete concepts. The hemisphere possesses a feeling of universality, the cube or square signifies integrity, while the circle or sphere is infinite or all-enclosing in feeling.

PART II. TRANSITIONS ANALYZED

IV. INTRODUCTION TO ANALYSIS

Walter Gropius clearly sums up the status of architecture today in relation to this thesis investigation:

Our society needs participation in the arts as an essential counterpart to science in order to stop its atomistic effect on us. Made into an educational discipline it would lead to unity of our environment as the very basis of culture . . . In contrast to the former emphasis of the earth-bound law of gravity, today's creative architect triumphantly makes use of new structural techniques that create lightness and bouyancy of appearance; cantilevered building parts and hovering slabs seem to defy the law of gravity, by transmitting a feeling of openness to the world at large, they offer generous window areas which may be thrown open or closed according to our needs. A unity of inner with outer living space has thus been achieved. Space has become floating.⁸

A unity of architecture, enhanced by transitions of nature and space, is that which we are in searching for. Thus far we have established a set or combination of geometric elements and determinants of architectural form as a basis for the investigation.

A unity of architecture is the goal, not a uniformity. Uniformity of architecture is not creativity. Random transplanting of form throughout the universe could tend to confuse the human so that he might attempt to enter a house identical to his own, not just on the wrong street, or in the wrong city, not even the wrong country, but maybe in the wrong hemisphere. Granted, nature's forms are multiple and repetitious such that an Italian villa might take a natural setting in Bozeman, Montana, U. S. A. Full understanding of the nature and terrain of the respective areas would be necessary in a unity of architecture.

⁸Walter Gropius, "Architect and Our Visual Environment," Arts and Architecture, 71, (March 1954), pp. 14-36.

Thus, we are ready to conduct an investigation into the transitions of architecture with nature, or the base plane, and space, or the infinite surrounding void. It is the intent of this investigation to analyze the illustrative examples in terms of the contemporary human conceptions of architectural form thus far defined. Durability and the test of time will only determine the relative "goodness" of the examples, but each one represents a specific concept important to transition.

V. BASE TRANSITION

"A building should appear to grow easily from its site and be shaped to harmonize with its surroundings if manifest there, and if not try to make it as quiet, substantial, and organic as she would have been were the opportunity hers."⁹ These words from the late master of architecture Frank Lloyd Wright provide a fitting introduction into the problem of base transition.

The natural laws of gravity require that all objects of mass placed upon the face of the earth must express a functional and aesthetic connection. This kinship to the site is provided by the structure which acts as roots to the ground.

This base relation might be thought of in terms of a marriage or divorce with the ground. Serving as judge in the case is the human eye searching for a visible support and connection, whether it be a point, mass, or cantilever. Assisting this vital ground connection are such elements as water, reflection, terraces, landscape, and scale. The following sections will deal first with support, secondly with the other affecting elements, all explained with illustrative examples.

Transitions as a Method of Support

Fulfilling the requirement of support to oppose horizontal and vertical thrusts is the building structure and footings. Although

⁹Frank Lloyd Wright, Wright on Architecture, (New York: Duell, Sloan, and Pierce, 1941), p. 34.

there is an abundance of base transition examples in the world of architecture they may all be classified into two general support categories: the podium, or marriage and the pedestal, point, or divorce.

The podium method consists of a marriage to the site through broad planes and horizontal lines. The stability of the podium is illustrated by the Greek temples which stand today in their simplicity of form on the prominent hills of that country. The feeling of the low, rolling hills is carried into the building through broad, terrace-like steps.

Another excellent example of the podium feeling is found in the work of Frank Lloyd Wright. The quotation in the introduction to this section shows Wright's feeling that planes parallel to the ground would do the most to make the buildings belong to the ground. From this phase of his philosophy grew the immortal prairie house, intended to be in harmony with the quiet level of the prairie. He has a feeling a house in this area should begin on the ground, not in it, and "have a projecting base course as a visible edge to the foundation where, as a platform, it was evident preparation for the building itself and welding the structure to the ground." (see illustration 29d.) One of Wright's apprentices refers to Wright's term "ground hook" which he used to explain the low, intersecting, and outreaching walls he so often employed in his design. These "ground hooks" were used by Wright to enclose outdoor spaces. He also used a cantilever extensively because it provided a strong horizontal, as in the Kauffman House. (see illustration 29c.) Not limiting himself to one approach, however, we will again discuss Wright in terms of the infinite transition.

¹⁰Ibid., p. 34.

Probably the most current and controversial example of the podium method is the United States Air Force Academy in Colorado. (see illustration 21b.) Providing mechanically perfect and level drill areas created a massive horizontal plane statement, varying in vertical thickness from zero to over 20 feet. This massive block that the complex of buildings rests on overshadows the individual structures and the human scale. The recognizable and necessary horizontal plane has been imposed on the mountainous site with very little consideration to unity of environment. While the building functions well within the scope of the problem it seems misplaced and would be better adjusted to a plains condition such as Illinois or Texas. However, the use of horizontal statements in mountains or hills should not be restricted. It is a desirable transition provided the scale is recognized. The large surface area required for the Air Force Academy is thus overpowering to the natural environment.

The Milwaukee County War Memorial Building (see illustration 21d.) is an example of a change of material defining the plane of rest. The podium walls have been carefully battered to create a more gentle transition. This would have aided the Air Force Academy base plane. Unfortunately, the functional use of the base plane and the selection of shape and color of the stone in the War Memorial loses the natural character of the building growing from the ground.

The small campus church (see illustration 21a.) shows a well-balanced podium transition incorporating scale, battering of planes, natural materials, and water as a reflective plane.

The platform method is defined as a separation of the building and ground, connected at points to create a floating effect. The feeling

of lightness and freedom in this approach allows a pleasing spatial transition to take form. Columns, or similar attachments, then provide the actual connection or transition to the ground.

Columns were a primary consideration in the early historical styles, especially the three Greek orders. It is evident that the mass of the column must often be increased beyond the structural minimum to create the proper feeling of stability the human eye looks for. The Greek orders considered base transition with fluting and accounted for optical correction, making them worthy of study.

A column might well be compared to the trunk of a tree, a true organic approach. All of the elements of transition are expressed in this natural form. Taper and optical correction, recognized long ago by the Greeks, are forgotten today because of the desire for simplicity and economy.

As the structure is the roots of a building, a lesson can be learned from tree roots projecting nearly tangent from the base. This transition functionally increases the bearing area and aesthetically creates a return to the horizontal, or calm feeling.

The perfectly symmetrical pedestal (see illustration 30a.) is another example of a platform relationship connected to the ground at given points.

Paul Rudolph, in summarizing a recent design competition, stated that 50 per cent of the buildings fell into the podium category, and 47 per cent into a platform category with 25 per cent gaining this effect by employment of glass at the base plane.¹¹ Remaining is only 3 per cent

¹¹Rudolph, "Six Determinants. . .", Architectural Record, (Oct. 1956), pp. 183-90.

for other structural concepts of transition, such as the cantilever or pedestal.

Combinations of these transitional concepts should be employed with extreme care. Placement of a platform condition over a podium, as in the Milwaukee County War Memorial Building (see illustration 21d.), seems a dishonest expression, especially at the intersection of the column and the podium.

The Massachusetts Institute of Technology Chapel (see illustration 21c.) and the new Brazilian government buildings (see illustration 21e.) were selected because of their unique point to ground relationship through the gentle curves. Unlimited potential exists for a new expression of structure at the base plane.

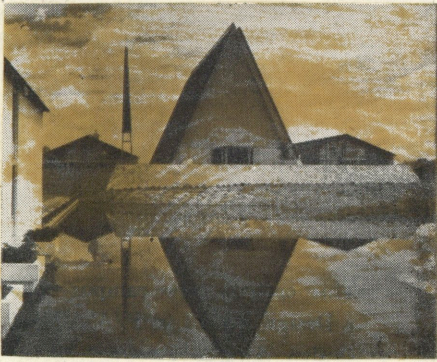
Transition Expressed by Other Methods

In addition to the necessary supporting means, there are other ways of effecting the base transition. A gradual building up of terraces and spatial areas, such as at Taliesin West, expresses a pleasing relationship of the vertical mass to the horizontal ground plane.

One of the most effective and least used methods is employment of light and reflection to enhance the base relationship. Use of water or a white reflecting surface on the horizontal base plane will cast an excess of diffused light on the underside of an overhang. This light, greater than that on the adjacent wall, gives the entire composition a floating effect. The white marble walks of the Taj Mahal accomplish this effect. Water and reflection employed in the United States Embassy for New Delhi, India (see illustration 22e.) tend to melt the building into the ground and create a sense of security.

Probably the most common cliché in modern architecture is the use of landscaping for transition of building and site. This should be permissible only when the building is able to effectively be experienced in the absence of the shrubbery due to lack of finances or the weather. Shrubby should not be a crutch to the creative designer but should be employed with understanding. The architect, like the doctor, should bury or dispose of his mistakes instead of planting trees in front of them, as the saying goes.

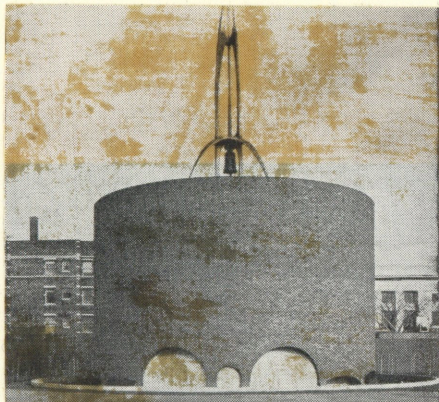
The main elements of the base transition have thus far been explored. The natural site, or nature, should be preserved and adapted to by architecture. A large percentage of similarity in approach to this transition indicates the necessity of developing the potential of form and the base transition in modern architecture. Architecture must create a harmonious transition with nature which is true creation.



21a. Concordia Senior College



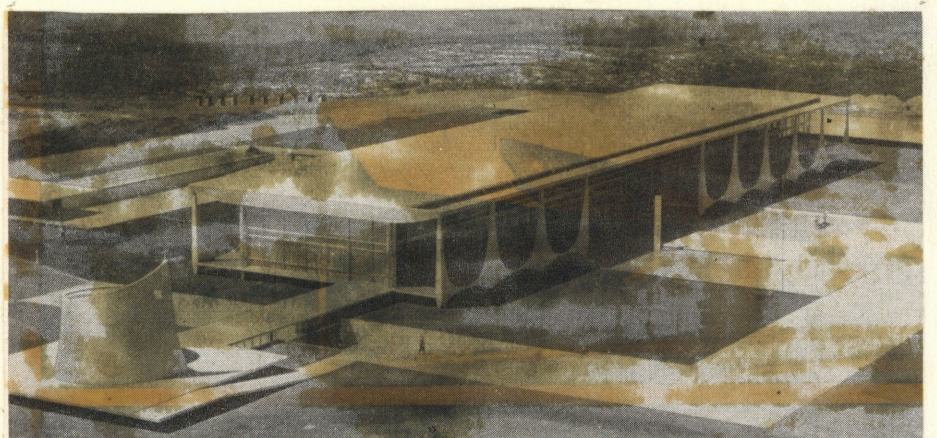
21b. United States Air Force Academy



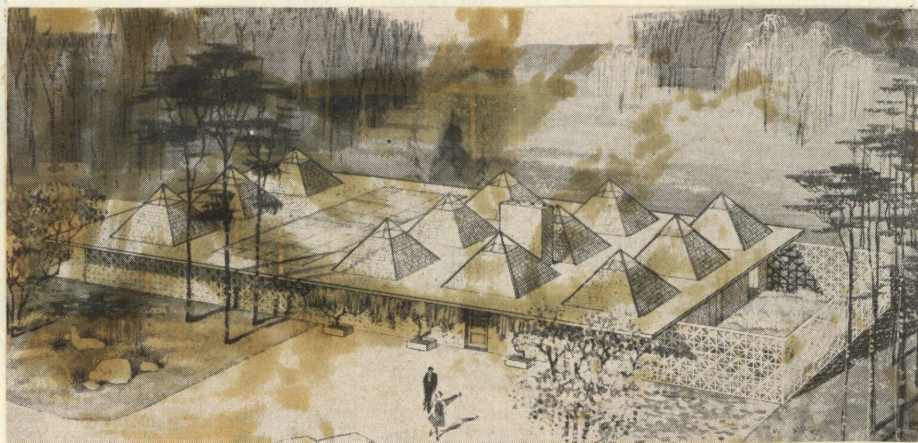
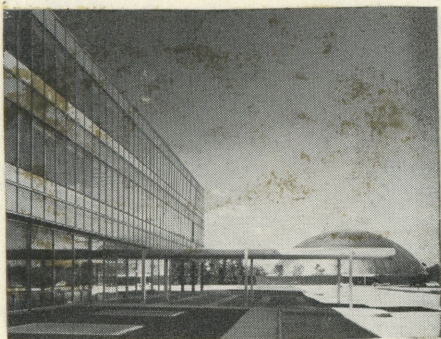
21c. Chapel- Massachusetts Institute of Technology



21d. Milwaukee County War Memorial Building



21e. Brazillia- Government Buildings



22a.(top left) General Motors Technical Center

22c.(bottom left) Auditorium- Massachusetts Institute of Technology

22b.(top right) Celanese House- showroom

22d.(bottom right) American Technological-Cultural Fair



22e. United States Embassy for New Delhi, India. Edward D. Stone, A.I.A.

VI. INFINITE TRANSITION

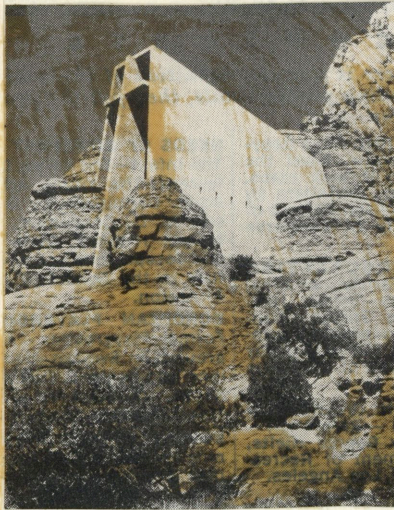
The form of roof statement, the shelter providing element of an architectural composition, is the primary means of expressing the purpose of a building. Roof lines constitute a natural division between the parts of a building, the lower part being the mass and will and the upper part the character or feeling to the infinite void of the sky. The approach to determining a roof form differs from the base transition because a roof is a mass to void, or silhouette relationship, and the foundation is primarily mass to mass or points. In terms of scale the roof is related to an infinite while the base transition is necessarily a direct connection. The roof expresses the "architectural character, or ensemble, which distinctly points out the particular use or destination for which the edifice is intended."¹²

Transitions and the Natural Environment

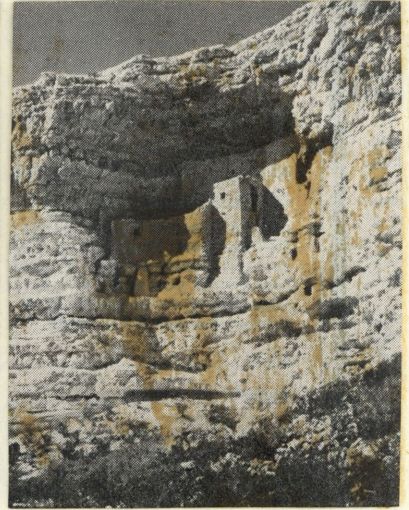
The endless forms in nature provide inspiration for relation to expressive and harmonious roof forms. This indigenous approach is seen in Wright's prairie house (see illustration 29d.), recalling the strong low horizontals of the terrain. Similar examples can be found in mountainous terrain, recalling the triangular form and serving functionally to reduce the snow load. Albert Frey approaches the concept with such examples as a cylindrical form derived from the terraces

¹²Lewis Mumford, Roots of Contemporary American Architecture, (New York: Reinhold Publishing Co., 1952), p. 96.

The Association put us up first in Phoenix, to see the house site, and then at the southern rim of the Grand Canyon to do the judging. The trip between the two points—one way by plane, return by car—was for me a sight of a section of our country that I hadn't seen before at close range. On the way we took many pictures, and I found a comparison of Anshen & Allen's Chapel at Sedona (20th Century) and Montezuma's Castle, some thirty miles farther south (13th Century), rather disconcerting. One, in simple, elegant pride *protrudes from* the red-rock forms. The other, modestly but with equal elegance, *adapts itself to* the white limestone hill. At what period in the development of architecture on the North American continent, I wondered, did the natives know best how to wed man-made structures to the natural landscape?



a.



b.

at Mammoth Hot Springs in Yellowstone National Park.¹³ The above illustration and comments show the relationship of form and site of a modern and historical example.

An approach to form derived from natural environmental forms carries dangerous implications, however. Over-simplification of the forms viewed tends to restrict creative design, as would a concentrated effort to exactly repeat the form. The desirable approach is a recognition of the form in nature so that a unity and harmony may prevail between the building and environmental forms. This is expressed in reference to an indigenous hacienda near Puebla, Mexico where "builders carefully selected a rhythmic point in relationship of the plain to the hill that would absorb human settlement . . . the perfect accord of roof lines and hill lines is by no means accidental."¹⁴

Transitions and Silhouette

The silhouette or profile of a roof form is the primary factor

¹³Frey, p. 18

¹⁴Moholy-Nagy, Native Genius in Anonymous Architecture, (New York: Horizon Press, 1957), p. 58.

in determining the character of the structure. "The roof of a building allies to the open air, and carries the suggestion of shelter as no other part does, and to belittle it, or conceal it, or in any way take from it the honest and direct purport of it as a shield, the main matter after all, is not to be allowed,"¹⁵ states architectural critic Lewis Mumford on this aspect of form.

Paul Rudolph, in a recent article, challenges modern architecture with ignoring the relation of a building to the sky, or silhouette. In analysis of the design competition he learned 95 per cent of the roofs were flat, the the remainder pitched. He stresses silhouette as of the utmost importance, stating "one doubts a poem was ever written to a flat roofed building silhouetted against the sky and setting sun. And what about its appearance on a misty, foggy day. The insistence on flat roofs tends all too often to make modern architecture have the appearance of a dog house, when juxtaposed against the high ceiling pitch roofs of earlier architecture."¹⁶ Examples such as Rudolph's High School in Florida (see illustration 29a.) offer a pleasing relief to the bold, flat statement through interplay of plane for mechanical and lighting functions.

Units of folded planes or curves (see illustration 31 a,b,c.) also provide interest for the silhouette. In this case the unit scale must be carefully selected such that the volume of space enclosed is readable to the human eye. The contrast between the massive form and space enclosed in the MSC Fieldhouse is contrasted to the smaller units

¹⁵Mumford, p. 242.

¹⁶Rudolph, "Six Determinants . . .", Architectural Record, (Oct. 1956), p. 183-90.

and enclosures of the restaurant and office buildings illustrated.

The matter of a return to the horizontal mentioned in the base transition discussion appears again with great importance. The early Egyptian pyramid stands today as a bold and simple tangential relationship to the dominant horizontal line of the terrain. The Chinese or Japanese pagoda roof (see illustration 30d.) is an example of a form "vastly superior to the crude triangular form common in Western countries because the sides of the triangle bend outwards, and their lower extremities become almost tangent with the horizontal."¹⁷ Another example of the base tangency would be the Eiffel Tower while a reversal of this is found in the mushroom pedestal (see illustration 30a.) or a Renaissance Florentine cornice, both of which return to the horizontal at the roof line instead of the base. The work of Victor Lundy, contemporary Florida architect, is worthy of mention in terms of curves and tangency creating a natural flow of form from the ground. (see illustration 30c.) Dynamic and rhythmic curved forms (see illustrations 30 b and d.) are other examples of the infinite relationship of a return to the horizontal.

The matter of terminal masses and a gradual buildup of form was described by Wright as follows: "Terminal masses are most important as to form. Nature will show you in her own fabrications. Take good care of the terminals and the rest will take care of itself."¹⁸ The matter of a phoenix is well demonstrated in the Taj Mahal. It is important to notice the delicate relation of building bulk and detail in Wright's work. As the building rises from the ground it becomes looser and lighter,

¹⁷A. Tryston Edwards, Manners in Architecture, (London: John Tiranti, Ltd., 1946), p. 106.

¹⁸Wright, p. 107.

while the detail becomes more elaborate and tenuous.

Other Factors Affecting Transitions

Besides the requirements of form, expression, readability, or character that affect roof design there are numerous other environmental conditions.

Climate was at one time the most important consideration. Improved methods of water tight construction no longer make this the primary factor, although roof drainage is a problem lacking in expression and successful design, especially for flat roofs.

The effect of glass at the roof line carries with it many of the characteristics of marriage and divorce mentioned before. Wright developed roofs which "free themselves from the substructure through widely overhanging projections and spread like lofty tree tops, making the house with its loosened silhouette stand out against the horizon."¹⁹ Glass as a freedom expressing element through the play of light then becomes a transitional element.

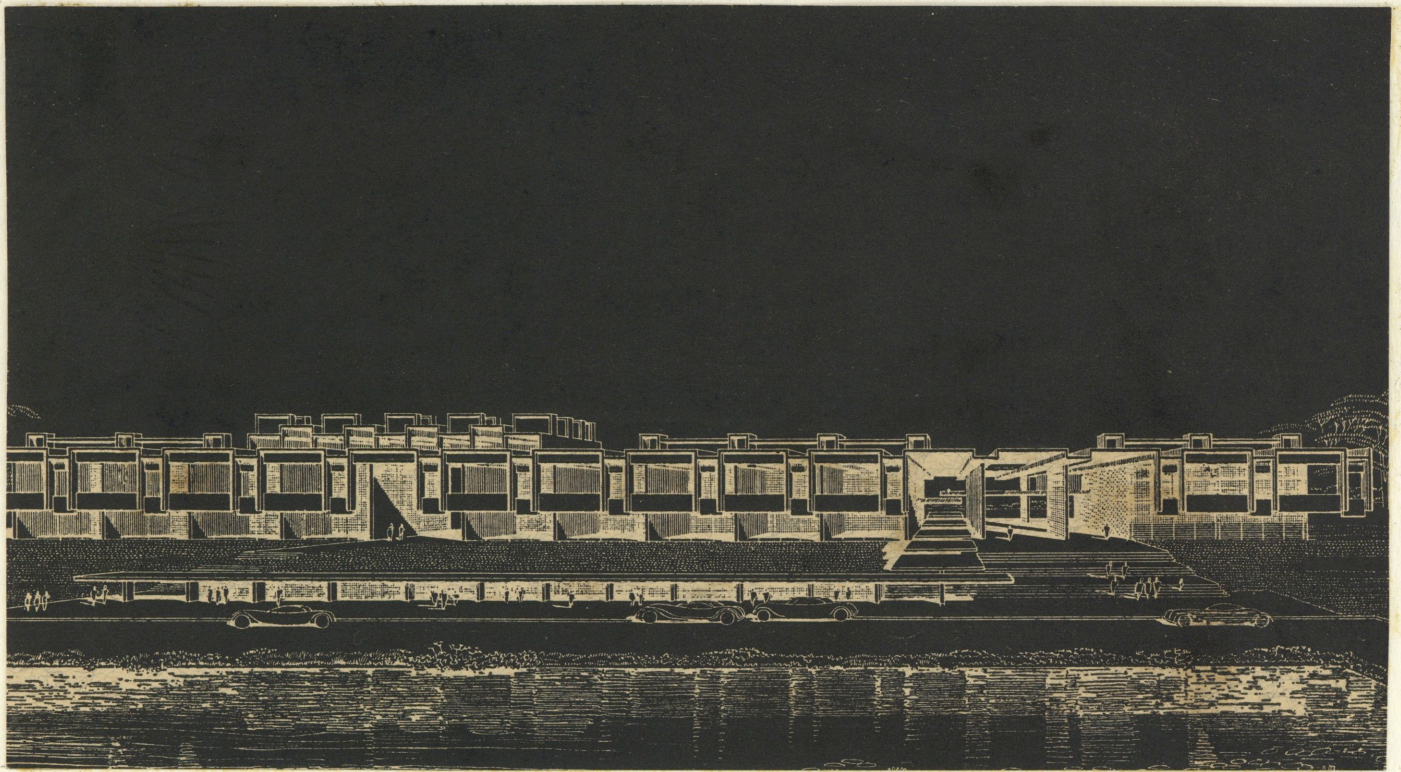
Mechanical equipment, which has increased in complexity through the demand for a climatic controlled environment, is a new factor in roof design. It should be creatively incorporated and not concealed. Such treatments should not clutter the roof form but enhance the design and give scale to the composition. Examples of the interplay of horizontal plane (see illustration 29 a and b.) show the expression possible through these last two factors, light and mechanical equipment.

¹⁹Mumford, p. 399

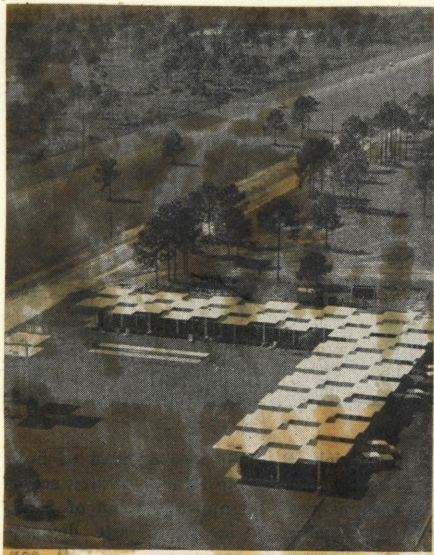
Beyond the strictly utilitarian problem of climate and roof drainage mentioned before lies a creative expression. Paul Rudolph, in his recent survey, noted that "with one exception water appeared mysteriously drained from all roofs . . . traditional methods of water shedding created real drama, and one longs for modern equivalents."²⁰

Roof design also differs from foundation design in that it must be subjected to many points of view and not only from the ground plane. It is a combination of horizontals, verticals, and angles silhouetted against a background of natural environmental form or the sky as a bright field of color.

²⁰Rudolph, "Six Determinants . . .", Architectural Record, (Oct. 1956), p. 183-90.



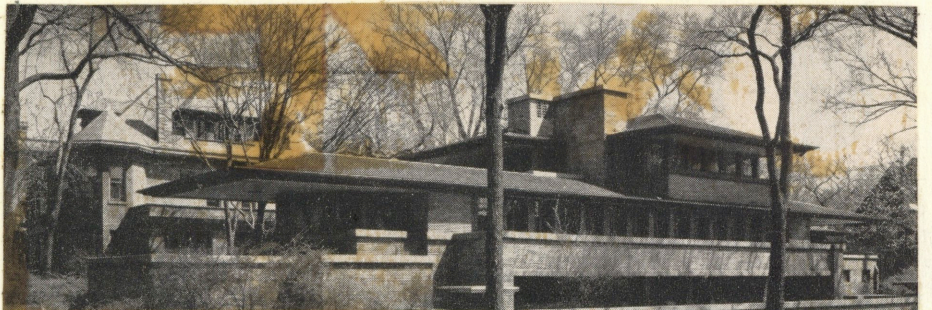
29a. High School- Sarasota, Florida



29b. Honor Award: Warm Mineral Springs Inn, Venice. Victor A. Lundy, architect; Spear,



29c. Edgar Kaufmann House- Bear Run, Pa.



29d. Robie House- Chicago, Illinois



30a. Dining Pavillion for Swimmers- Pine Mt., Georgia



30b. New York International Airport



30c. Herrom Residence- Sarasota, Florida



30d. Chinese Pagoda Roof Line



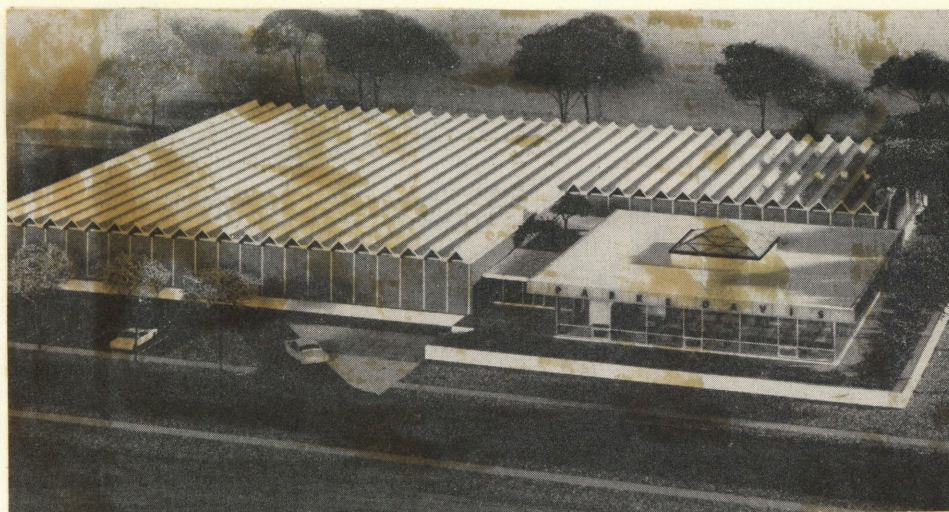
30e. Hockey Rink-Yale University



Award of Merit: Restaurant and Swimming Pool, Hot Wells, La.; Glankler and Broadwell, Architects; Gravier & Harper, General Contractor

31a.

31b.



Branch office and warehouse to be constructed for pharmaceutical firm of Parke-Davis in Skokie, Illinois; Yamasaki, Leinweber and Associates, Architects. Building, scheduled for completion in November, will have reinforced concrete roof, brick walls and for office section—large expanse of glass. Warehouse section will be approximately 40,000 sq ft; office 6000 sq ft. Estimated cost: \$500,000

31c.



Physical Education Center, Montana State College, Bozeman, Mont. Shell-type design with glued, laminated fir arch ribs. Architect: Oswald Berg, Jr., & Associates, Bozeman, Montana.

PART III. CONCLUSIONS

VII. AN APPROACH TO ARCHITECTURE

In the development of an approach to architecture it will be noted that each period provides a new insight for a total architectural approach. Throughout history emphasis rises and recedes on specific phases or determinants of form. Architecture has as its constant the human being who remains virtually the same in terms of scale and mass although his ideas and perception may vary.

Modern architecture has contributed its share to the basic principals of form and has attained new heights in technology. A total architectural approach, however, has not yet been achieved and modern architecture can justly be accused of being stagnant and even eclectic. Paul Rudolph's recent analysis indicates a mere 3 per cent original creation at the base transition, while the infinite showed only 5 per cent of the roof forms to be other than flat. Yes, even the curtain wall, the picture window, and exposed material or structure are already eclectic. Architecture becomes eclectic when a form is employed for public appeal without understanding the problem. The modern approach needs new vision toward goals of expressive architectural form. A complete relation to the environmental experience has never been fully realized in architecture; some of the historical periods have come closer than the modern period, however. Modern architecture has pioneered an environmental relationship in terms of climate, material, and landscape. . . but has virtually ignored nature as a determinant of form.

Adoption of an environmental approach by the creative designer is subject to criticism in terms of rationalization-- for it is understood that for any architectural form created there will be a companion form in nature after a diligent search. This is not the intent of approaching architecture as transitions. A harmony and unity of the whole visual field and not just an edifice which might be placed at random anywhere on the face of the earth is thus the goal of architecture: transitions with nature and space.

An affinity to the horizontal plane, which seems basic to the natural earth, is a consideration which has developed from this investigation. Careful analysis of our environment, or the earth's crust, would indicate that all of visual experience is basically a broad horizontal bounded by infinity in the vertical direction. As this assumption develops it appears at this time that all architecture rising from the face of the earth should carry a relation to the base horizontal; a relation of line, plane, space in parallel or tangency. While yet an immature theory its value is in a stimulus for thinking.

Stimulation of thinking on the part of the reader and writer has been a basic aim of this thesis. It is intended to provide a new vision into the field of creative architectural form through means for an increased appreciation and analysis of architecture, both historical and contemporary.

This thesis approach may be defined as a unity of the whole-- the whole environment of nature and space realizing no bounds but including all human experience of scale, form, color, climate, and similar determinants. Just as every note and key is vital to music, everything within the environment must be included-- a unity of the whole.

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