INVESTIGATION OF FACTORS WHICH INFLUENCE FLOW DEVELOPMENT IN EXHIBITION DESIGN

Thesis for the Degree of M. A.

MICHIGAN STATE UNIVERSITY

Bruce A. Riley

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By

Bruce A. Riley

AN ABSTRACT

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

MASTER OF ARTS

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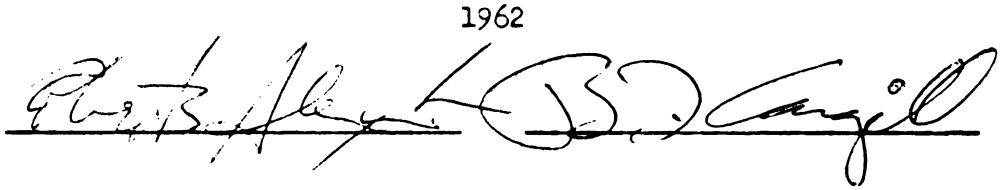
Approved 

ABSTRACT

INVESTIGATION OF FACTORS WHICH
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Investigation of the various facets which affect the movements of people through exhibition was undertaken to aid in the formulation of a procedural outline for incorporation of flow principles into general exhibition design. The study was initiated by a need to uncover basic exhibition flow concepts which could be applied to THE TECHNORAMA at Michigan State University.

The study was launched with an investigation of historical architecture. The area deals with great historical architecture as an expression of its function, organized with a philosophical yet serviceable unity. Today's architectural philosophy proposes that the structure must emanate from the interior; wherein an exterior shell serves only to service and protect the interior mechanics. This philosophy was also historically true, except that the interior mechanics probably took more account of innate human emotionalism.

Industrial manufacturing and commercial establishments have investigated the adaptability of flow patterns to their respective operations. Industrial plants have found that pre-planning of the channels of product movement has considerably lowered manufacturing costs. By the same token, commercial establishments have found that customers can be guided into special merchandising areas by a planned flow pattern.

Six samples of educational museums and trade shows were selected and observed. The observations have shown that many educational museums, after realization of flow value, have adapted flow pattern principles as devices for creation of a wider experiential environment.

The basic element of perception, with an emphasis on the visual aspect, is discussed. Lighting, sound, and color are discussed as valuable contributions to successful exhibition design. Also under consideration is the fact that the human becomes a part of the exhibition and the exhibition is not complete without him. And often, the architecture must provide the means for him to initially adapt to this new environmental situation. A marriage of architecture with interior design is responsible for maintenance of visual organization and, therefore, is an aid to the visitor's environmental adaptation.

Flow is but one facet of the exhibition totality. Yet, a convincing flow pattern can exist as the fiber of the exhibition: a place in which the visitor can partake of the experiences offered him, which is essentially his reason for coming. The offered experiences should ideally appeal to all perceptive senses and should function in an environment conducive to their operation.

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NOTE

This thesis was presented to the author's Graduate Committee in conjunction with a complementary graphic show. Much of the material from the graphic show, a graduate requirement of the Department of Art at Michigan State University, can be found in a loose leaf photographic album in the Department of Art library.

ACKNOWLEDGEMENT

The author is deeply indebted to Dr. A.W. Farrall for financial support while conducting research with an exhibition project as many-faceted as THE TECHNORAMA at Michigan State University.

He also wishes to express his gratitude to the Graduate Committee, consisting of Dr. B.F. Cargill, Mr. Robert S. Alexander, Dr. Merle Esmay, and Mr. Ralph Hendricksen for their aid in formulation of a comprehensive graduate program.

With special gratitude, he wishes to acknowledge the aid of Dr. B.F. Cargill and Mr. Robert S. Alexander, whose technical assistance, observations, and reassurances were of vital importance in the preparation of the manuscript.

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CHAPTER I

INTRODUCTION

1. Statement of the problem

Flow is a term variously applied to subjects dealing with hydraulics, industrial materials handling, movements of people, and medicine. Webster says the verb flow means "to run or spread, as water; circulate; glide; rise, as the flow or inundate: n. a current or stream; copiousness; the rise of the tide."[1]

Inasmuch as this thesis will concern itself with flow as applied to exhibition design, it is in the best of Platonic methodology to define more precisely what is under consideration. Flow, as considered here, shall be defined as the process of physically conducting individuals and/or groups of people from some predetermined initial point, through a predetermined arrangement of exhibit materials, to a predetermined exit, by use of physical impediments or psychological processes.

Extensive investigation has been conducted in the area of flow as applied to the merchandising field. With few exceptions, patterns of arrangement on this level have often been symmetrically composed and rigidly confining. Although it appears that the concept of flow adapted to the merchandising layout has been extremely profitable with existing flow standards, further research is being conducted in this area.

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[1]Joseph Devlin, Webster's New School and Office Dictionary and Atlas (Cleveland, New York: World Publishing Company, 1946), p. 291.

In contrast to the merchandising aspect, it appears that only meager research has been conducted in search of flow applications for exhibition design. The author has searched fruitlessly for studies dealing explicitly with exhibition flow and, on the basis of this search, can only assume that present applications of flow are assimilated by calculated guesswork and the personal experience of the designer.

2. Objectives

The thesis objectives are three in number:

1. To collect and analyze ideas concerning flow in exhibition design which have been proposed by current designers, and to establish goals for the use of these principles in future exhibition design.

2. To arrive at better techniques for the psychological involvement of the viewer in the subject matter.

3. To incorporate sound principles of flow into the exhibition scheme of THE TECHNORAMA at Michigan State University.

3. Justification

Justification of a study involving flow or, for that matter, any characteristic of exhibition design can easily be founded on the feasible observation that approximately 87 per cent of our impressions are received via our visual sense. The ear claims 7 per cent and the remainder of our impressions are dispersed among the olfactory, taste, and tactile senses.[2] Not only is our perception physiologically enriched by a maximum use of the visual sense, but also, being the highly developed animal that we are, we tend more than ever to rely upon it. "Today,

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[2]Better Light Better Sight Bureau, Eyes, Our Windows to the World (Printed in U.S.: BLBS Form #B-564), frontispiece.

after the passing of five centuries, there is a marked swing away from the dependence on words which the Renaissance brought about. Once again we are strongly picture conscious as medieval man was."[3] However, this observation was probably true in the pre-Renaissance era only because a greater portion of the population was often illiterate.

The Michigan State University programs of teaching, research, and extension are founded on principles which "look to the future", and attempt to align themselves with the ever changing demands of an education conscious population. Realizing the importance of mass communication, Michigan State University has embarked on an extensive conference-exhibition program, designed to reach the estimated million yearly visitors to the campus.[4] Many visitors are expected to participate in the conference segment of THE TECHNORAMA and to enrich the verbal experience with a complementary visual experience which can be gained on the exhibition floor. The exhibition floor transforms conference statements into visual reality. An exhibition program of this magnitude requires a futuristic, experimental outlook if it hopes to remain abreast of the pace set by its parent program -- university extension.

Further justification of the objectives are found in the premise that the modern man tends to overlook printed typography in favor of the pictorial image. Based on van der Elst, we can assume that modern man has gained a more pronounced sophistication in his evaluation of exhibit materials, probably as a result of his attempt to select and retain only meaningful information.

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[3]Baron van der Elst, Last Flowering of the Middle Ages (Garden City, New York: Doubleday, Doran, and Company, Inc., 1944), p. 126.

[4]Unpublished "Prospectus of THE TECHNORAMA".

CHAPTER II

REVIEW OF LITERATURE

A. Historical Development

1. Religious structures

Investigation suggests that the progenitors of our modern civilization were extremely interested in an appeal to man's inner emotions by an approach directed to his visual sense. An appeal was often directed through the mediums of art, especially architecture, to remind him that religion was a significant part of his daily existence. In most cases, buildings devoted to religion were constructed in such a way so as to remind the visitor that he was approaching a token to his god.

The Athenian Acropolis is an excellent example of a design directed to the visual sense, as shown in figure 1. In ancient Athens, religious rites were performed in the open. Sculpture of religious implication soon entered the Athenian sphere of worship and, with it, the necessity for its protection. Thus, a building mode developed which appeared to be conceived as a form of sculpture -- abstract in form and calculated to evoke an emotional response from all worshipers who visited the religious structures.

The Acropolis was the name given to a group of religious structures located on an outcropping of solid rock high over the city of Athens and dedicated to the goddess of the city, Athena Promachos. The workmanship and physical characteristics of the complex are recognized as

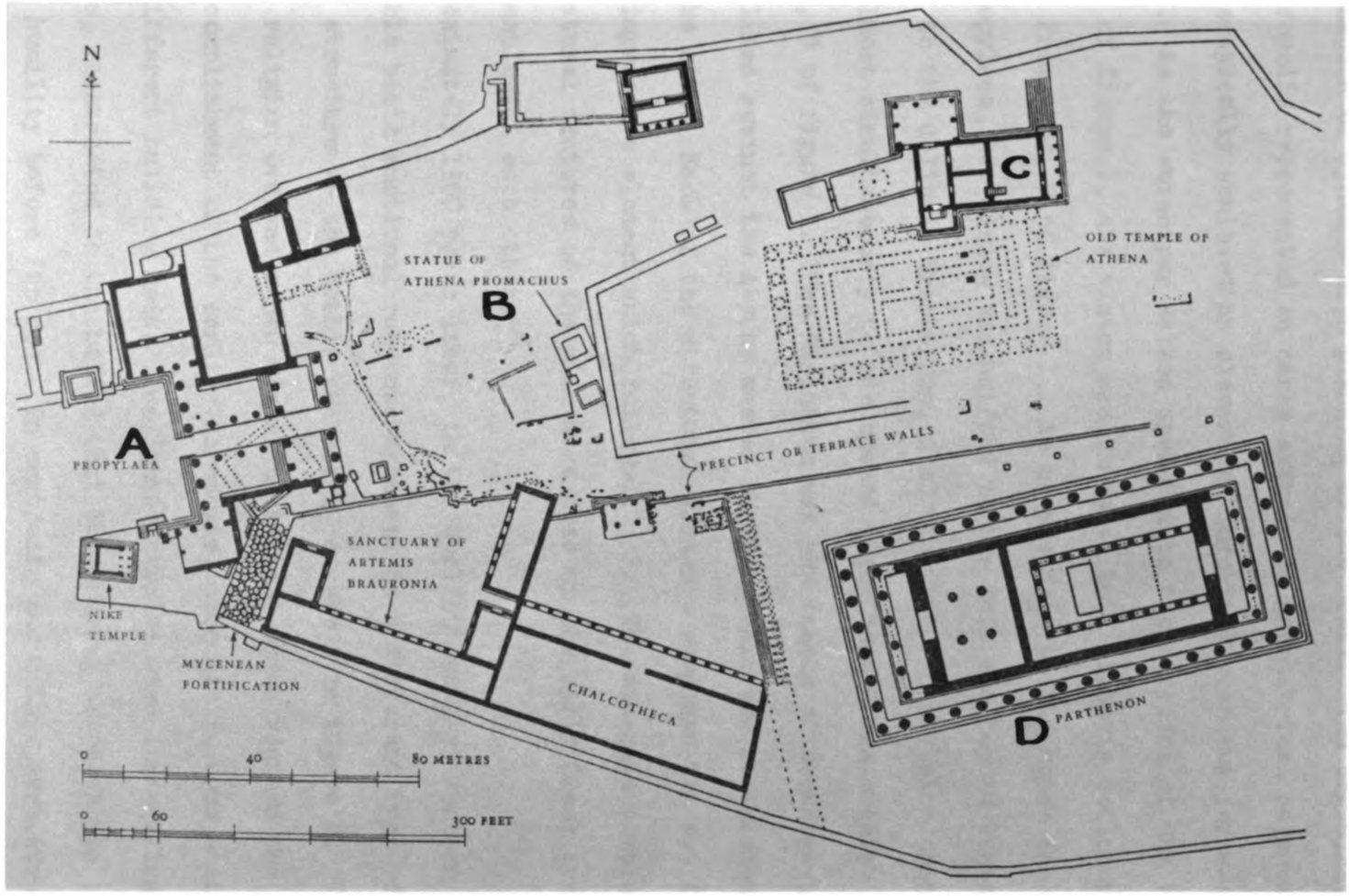

FIGURE 1. Plan view of the Acropolis showing the route of visual progression from A to D.

the culmination of dynamic site planning by the Greek. The organization of the Acropolis represented an early example of asymmetrical balance which theoretically achieved an element of surprised grandeur for each worshiper. As the worshiper walked upward into the corridor of the Propylaea, A of figure 1, his vision was funneled to a gigantic sculpture of Athena Promachos, B of figure 1. As he ascended to the upper reaches of the Propylaea, his vision was shifted to the left and beyond Athena Promachos to the delicate Erechtheum, C of figure 1. His vision then shifted almost simultaneously to the upward right toward the mighty Parthenon, D of figure 1. The Parthenon was the temple of worship which stood outlined against the sky as master of the summit and as culmination of the rite. Each of the structural elements prepared the eye for the more impressive element which followed.[1] "...The man-made temple and the natural features of the site were used by the early Greek architect to complement each other."[2]

Approximately 1300 years later, in the twelfth century, concern for a comparable basic emotional response appeared in a different type of religious structure -- the Gothic cathedral, as shown in figure 2. The Christian religion evolved a new visual excitement which reached the emotional accomplishment of the earlier Acropolis, although it used a completely different building mode. Pre-Gothic temples were low-ceilinged structures, constructed in the belief that the praying heart should place itself in humility before its god. In contrast, the Gothic structure

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[1]Helen Gardner, Art Through the Ages (New York: Harcourt Brace Company, 1959), pp. 110-113.

[2]Ibid., p. 112.

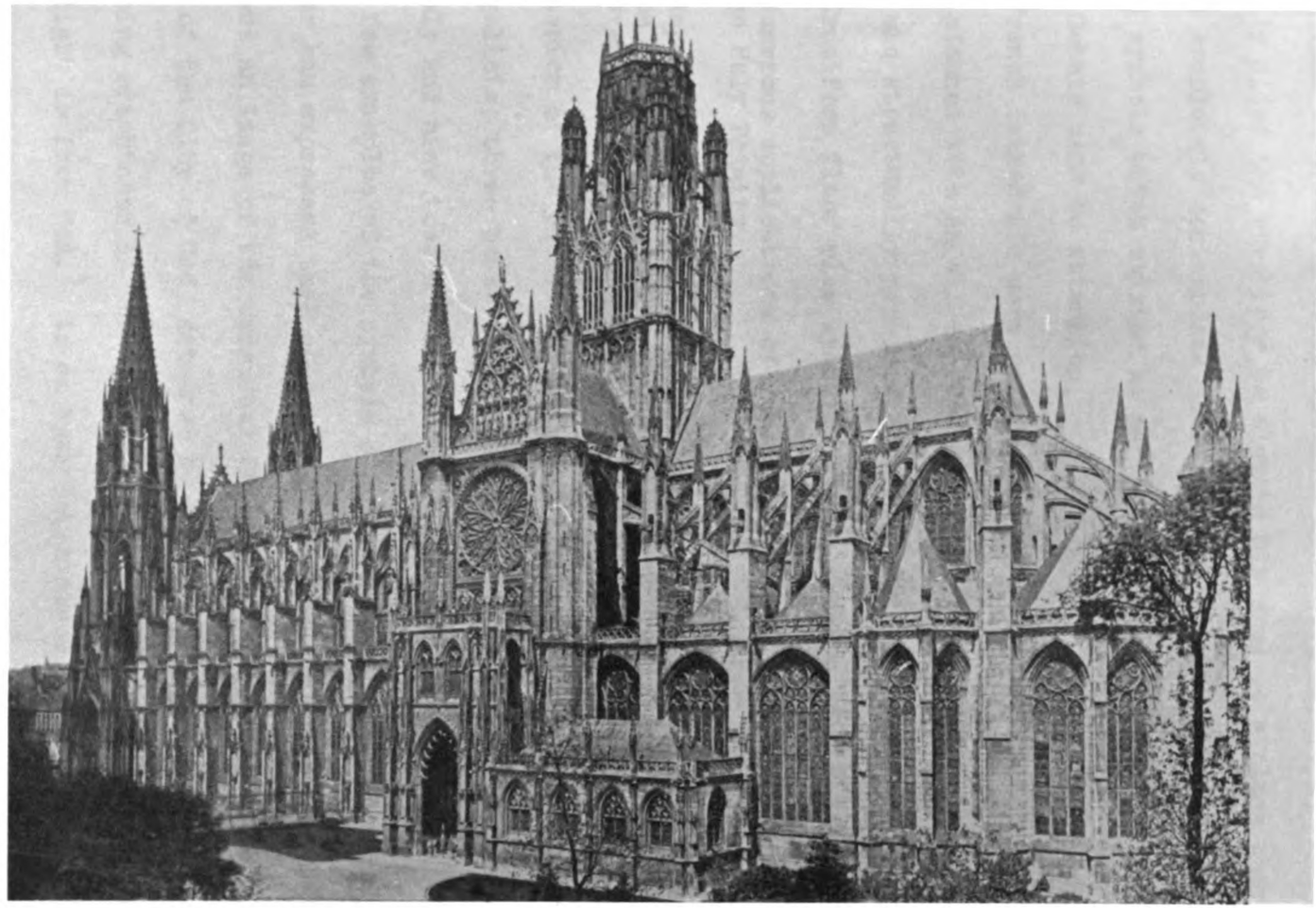

FIGURE 2. Cathedral of St. Ouen of Rouen, France.

raised the roof to create a lofty spacious interior, figure 3, which perceptually aided the worshiper to elevate his soul to a plane where he could more completely contemplate God.[3] In the Gothic cathedral, visual images and symbols which existed as part of the church structure helped bring the Gothic mind to attention.

The French cathedrals were outstanding in Gothic architecture. They were planned with an all-encompassing symbolism. On the inside, symbolism was structurally personified by means of:

1. Cruciform floor plan symbolizing the cross of the Passion.

2. Numerous applications of groups of three elements, symbolic of the Holy Trinity.

3. Repeat applications of groups of seven elements, indicative of the seven graces, seven sacraments, creation of the world in seven days, seven virtues, and the seven deadly sins.

On the exterior of the cathedral, groups of four towers referred to the four Evangelists; three towers signified the Archangels Michael, Gabriel, and Raphael; and nine towers meant the nine hierarchies of angels. These are but a few examples of the symbols peculiar to the Gothic society.

Lesser has expressed that each church building on earth in the medieval era was an image of the Universal Church.[4] The cathedral was also the image of the City of God, attested by a new concern for capture of an enveloping brightness in the structure in recognition of the belief that all light is from God.[5] As an example, stained glass windows

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[3]Elizabeth G. Holt (ed.), A Documentary History of Art (Garden City, New York: Doubleday & Company, Inc., 1957), I, p. 246.

[4]George Lesser, Gothic Cathedrals and Sacred Geometry (London: Alec Tiranti Ltd., 1957), I, pp. 144-150.

[5]Marcel Aubert, Simone Gaubet, Gothic Cathedrals of France (London: Nicholas Kaye Ltd., 1959), p. 32.

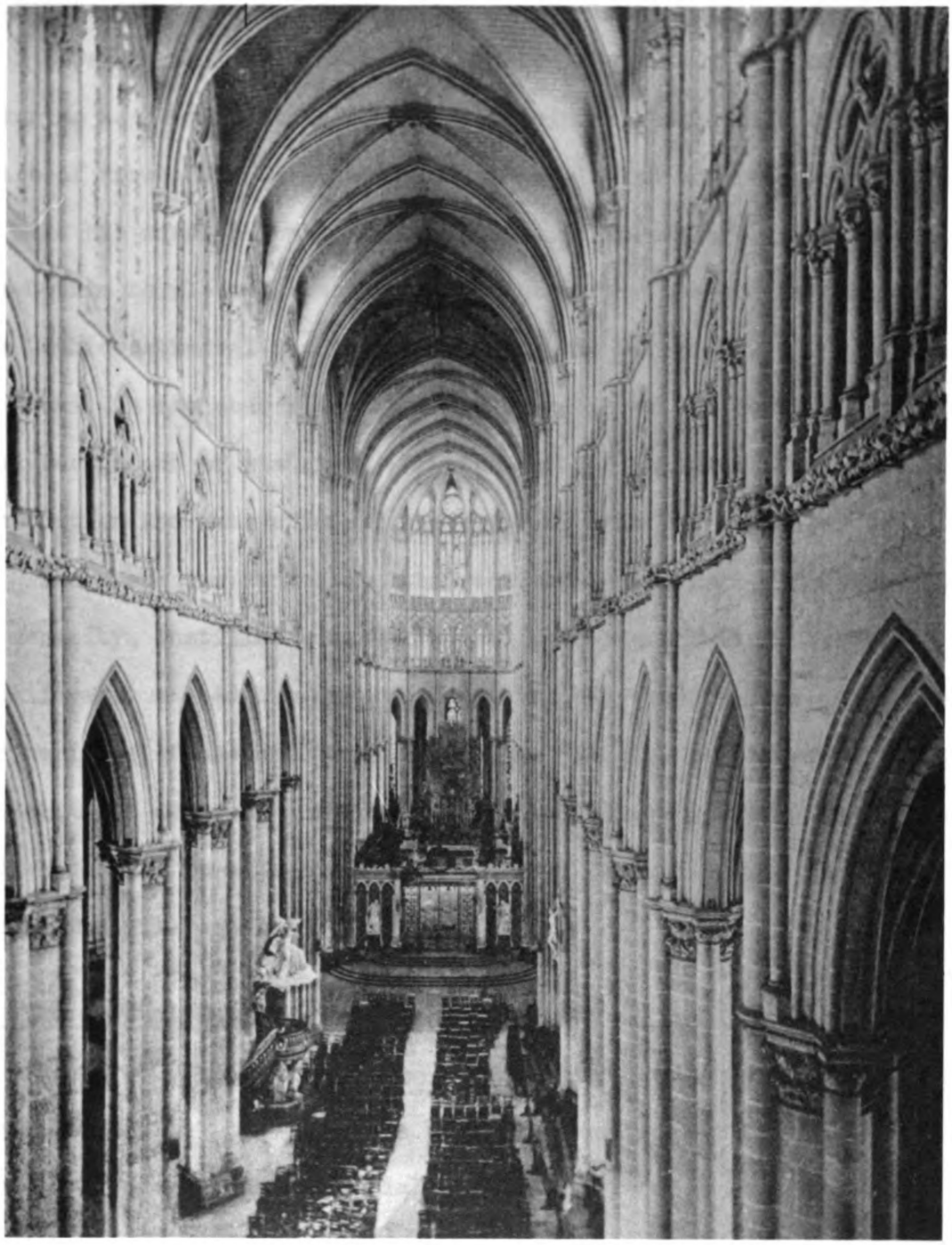

FIGURE 3. Interior of Amiens Cathedral, France. Example of visual uplift.

permitted entry of multi-hued light in recognition of the same belief.

Rows of regimented statues commanded the vision of each believer entering a church portal, a symbolic reminder that he was entering a place of worship.[6] Once inside he was sheltered and reassured, ready to mold his mind to humble contemplation. Whereas the low-ceilinged pre-Gothic temple was conceived as an abode for the god of the sect, the Gothic cathedral was made to service the worshiper.[7] The essence of Gothic is the absorption into the building of the complete intellectual background of its time. The form of the building is the interpenetration and saturation of the complete cultural heritage.[8]

Therefore, we can assume that the Gothic architect, in the interest of veracity, instilled a visual appeal into his architecture which specifically stated the purpose for which the building was constructed. Our heritage of ancient architecture has illustrated the necessity of a legitimate modern architecture which will clearly state its purpose and which will be adapted to the needs and aspirations of the modern people who will use it.

2. The Crystal Palace

Nearly 600 years later, mankind embarked on his first venture with organized exhibition. The idea of an international exhibition was fostered by a prevailing industrial climate desirous of showing its latest

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[6]Helen Gardner, Art Through the Ages (New York: Harcourt Brace Company, 1959), pp. 249-251.

[7]Aubert, op. cit., p. 18.

[8]Paul Frankl, The Gothic (Princeton University Press, 1960), p. 827.

accomplishments. In view of these circumstances, an exhibition building was designed which was compatible with its industrial climate and was dedicated to the purpose for which it was originally conceived.

In 1851, the Crystal Palace was built in London's Hyde Park by the British Government, figure 4. It was one of the earliest examples of a building designed expressly for major exhibition. The project was entitled "The Great Exhibition" and was "...the first visible attempt to dignify toil and refine it by its appeal to self-respect, by collecting together specimens of scientific and aesthetic art in the hope that comparisons would raise home standards."[9]

After extensive discussion, working plans were eventually completed by Sir Joseph Paxton which outlined a radical new concept in building. The structure required neither stones, bricks, nor mortar, and could be easily extended or reduced in size, since its basic components were interchangeable. Paxton had developed the idea of a giant glass showcase from his extensive experience with the design of glass greenhouses; thus, the building appeared as a lattice-work repetition of form, which exposed its primary construction method for all to see. Upon completion, many critics considered the Crystal Palace as only an engineering marvel; however, today, the concept of the Crystal Palace is considered an even greater architectural accomplishment. The construction method utilized by Paxton suggests the terms of future building practice; namely, ferrovitreous prefabrication with generous expanses of glass.[10]

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[9]Yvonne ffrench, The Great Exhibition, 1851 (London: Harvill Press, 1950), p. 260.

[10]Ibid., pp. 92-93.

FIGURE 4. The Crystal Palace at London, first full-scale international exhibition hall.

> "Everywhere an extraordinary luminosity was diffused by the unrestricted light and air and space. This and the iridescence filtering through the glass roof, the haze of distance and the warm tones of the primary colour scheme contributed to an overpowering effect...."[11]

The interior seemed to melt with the exterior in a spatial accomplishment which had never been before realized, as shown by figure 5.

By virtue of political circumstances, Paxton was forced to incorporate gigantic trees into the scheme of the Crystal Palace, only to later recognize that they were a main feature and a factor which seemingly aided the apparent merger of interior and exterior spaces.

Materials shown in the exhibition were placed according to basic grid layout. However, the objects were positioned with relation to size, the smaller objects dispersed within areas defined by larger objects -- the complete pattern tending to contribute to an overall visual interest. Therefore, the visitor selected his own pattern of leisurely movement.[12] It appears that, along with consideration of object placement, the only consideration for interior flow control was recognition of possibilities that the crowds may reach massive proportions. This possibility was anticipated by inclusion of large aisle spaces.

It is interesting to note from lithographs in the book, The Great Exhibition, 1851, that the greater part of goods shown at the Crystal Palace fall into categories of sculpture, fabrics, machinery, and organic plant life. Gardner, a current exhibition designer, selected these identical materials for display in natural daylight.[13] He pointed out

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[11] Ibid., p. 182.

[12] Ibid.(from lithograph prints in the book).

[13] James Gardner and Caroline Heller, Exhibition and Display (New York: F. W. Dodge, 1960), p. 88.

FIGURE 5. Transcept and Crystal Fountain of the Crystal Palace

that most other objects of exhibition are more effectively shown in artificial light.

In spite of arguments by The London Times that the glass roof of the Crystal Palace would be uncontrollably leaky, the heat would be unbearable, and ventilation would be totally inadequate, the exhibition was heralded as a great success with over 6,000,000 local and foreign visitors.[14]

Herbert Bayer said "...it may well be accepted that the great ((international exhibition)) in Hyde Park, London, 1851, marked the beginning of an impressive sequence of exhibitions thereafter."[15]

B. Modern Flow Concepts

Investigation has shown that the concept of flow has found increasing acceptance from specialists in industrial and commercial layout planning. Industrial specialists have investigated flow diagrams as a possible solution to products handling problems. The specialist has also investigated flow applications as a possible solution to the time-wastage factor in product manufacturing. Unnecessary time involvement in product handling often becomes immeasurably costly.

Commercial planners have investigated the flow concept from quite a different angle. Preplanning of aisles has offered the commercial establishment an opportunity to control customer movement. Customers may be channeled directly through a specific area, or they may be unconsciously enticed to browse in an unintentional shopping area.

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[14]ffrench, op. cit., p. 97.

[15]Erberto Carboni, Exhibitions and Displays (Milano: Silvana Editoriale d'arte, 1957), p. 5 (Introduction by Herbert Bayer).

Contemporary exhibition, in cases where flow principles have been applied, has apparently attempted to control visitor movement in much the same way as commercial flow controls customer movement.

From the literature reviewed, it appears that industrial flow has attempted to accomplish the opposite of commercial flow. Industrial flow applications have sought the shortest and most direct time-saving route for product movement, while commercial flow has sought to contain the visitor for a maximum time and provide a maximum exposure.

1. Flow in industrial and commercial situations

Industrial manufacturing processes have grown to a point where increased consideration has been given to time and motion economy; for example, studies of time and motion, industrial change-over methods, flow of products, and many other factors. There has been an increased attempt to introduce sound industrial flow concepts into manufacturing buildings tentatively scheduled for construction.

According to Immer, industrial manufacturing assembly plants have been more economically functional if limited to a single story, thereby eliminating costly vertical transport. Immer has also proposed that an ideal solution would be the enclosure of a predetermined layout with a building adapted to serve the layout needs.[16]

Some layout check points have been offered by Apple:[17]

1. Insure that adequate power connections are proposed and

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[16]John R. Immer, Layout Planning Techniques (New York: McGraw-Hill, 1950), p.31.

[17]James M. Apple, Plant Layout and Materials Handling (New York: Ronald Press Company, 1950), p. 256.

indicated on layout drawings.

2. Insure accessibility to all heating, lighting, and service controls for maintenance purposes.

3. Provide adequate door clearances.

4. Protect door jambs from truck damage.

5. Include a conducive painting scheme.

6. Provide smoking and recreation areas.

7. Locate adequate fire-fighting, fire-detecting, and sprinkler systems.

8. Check Building and Safety Codes.

An important feature of economical movement of materials has been preplanning of aisle systems. Plants usually have "backbone" aisles that begin and terminate at entrances or other aisles.[18] Factory aisles are most efficiently serviceable when they are straight as possible and extend directly through areas which they must serve. Apple has stated that other aisle planning considerations are also important. Efficiency suggests that they be planned to a serviceable width, clearly marked along each side.[19]

Flow as applied to industrial and commercial establishments appears to be primarily concerned with time and motion economy, wherein the raw material ideally enters a convenient delivery entrance, takes the most direct processing path, and exits with little waste of time.

Industrial flow has assumed multifarious forms, often governed by the structure in which the layout has taken shape. A one-product flow

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[18] Ibid., p. 240.

[19] Ibid., p. 33.

will often take the simplest form, a straight line, as in figure 6.[20] However, in order to achieve maximum operational movement in a smaller area, or to conform to the building shape, flow lines have assumed more intricate patterns, as also shown in figure 6.

Power sources have often dictated machinery placement; and in order to avoid the error of inadequate services, industrial engineers have made extensive use of power systems patterned after the floor grid.

Commercial establishments have instituted plans of flow which place emphasis on initial sidewalk attraction, complemented and hopefully concluded by a sale on the sales floor. Fleischman recommended that store entrances which are dark, difficult to open and close, and/or too constricting have tended to repel potential customers.[21]

Interior treatment has received extensive consideration by Immer.[22] He has proposed that all exits be within range of view of the customer in order to avoid an unnecessary "closed-in" feeling. He has also proposed:

1. An arrangement of flow calculated to hold the customer a maximum time and provide maximum exposure to the material.

2. A location of "demand items" at rear of the store.

3. An individual display arrangement visible from many locations on the sales floor.

4. An adjacent placement of complementary items.

5. A minimum four-foot and maximum six-foot aisle width.

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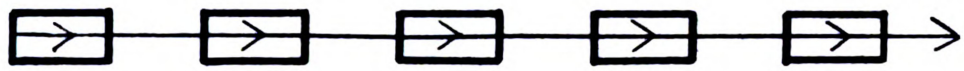
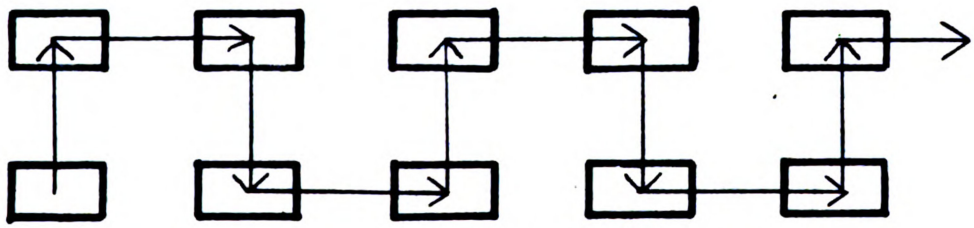
[20] Ibid., pp. 66-67.

[21] Ernest Fleischman, Modern Luncheonette Management (New York: Ahrens Publishing Company, 1955), p. 26.

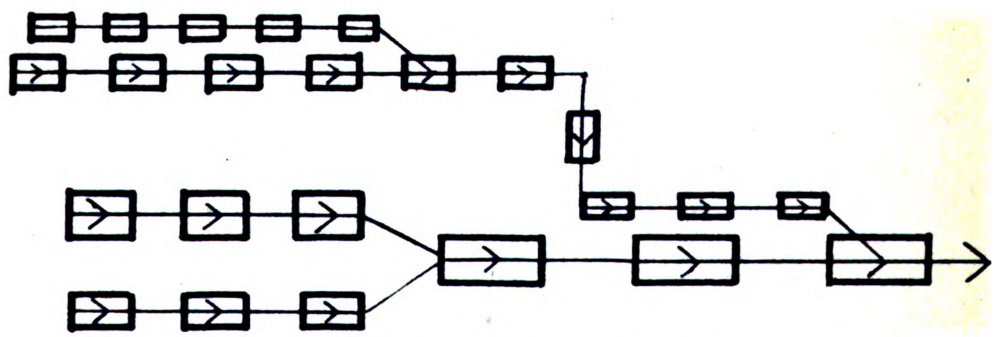
[22] Immer, op. cit., p. 61.



Simplest form



Flow shortened for maximum movement in a small area



Complex flow including main and sub-assembly lines

FIGURE 6. Industrial flow patterns.

He has recommended that display arrangements should recognize the customer's propensity to purchase goods placed at eye level; and to purchase items found on right-hand shelves as opposed to items on the left.

2. Contemporary exhibitions

Investigation shows that flow principles have often been considered in the planning stages of contemporary exhibitions, and most noticeably in educational exhibition. Many educational exhibitions, or museums, have recognized that application of a consecutive flow pattern best serves their need for a cohesive story progression. In many cases such pre-planned exhibitions have been more financially capable of an investigation into the mechanics of an effective flow pattern and, therefore, have uncovered newer applications of flow. As a general surmise, the more permanent exhibitions are educational in content and usually utilize more advanced flow concepts.

The Museum of Science and Industry. The Museum of Science and Industry, housed in the Fine Arts Building of Chicago's 1893 Columbian Exposition, has remained as a free admission museum which has been successful with educationally-oriented permanent exhibits. Sponsored by industry, the Museum has maintained approximately 70 major exhibit areas which portray subjects ranging from basic science to historical artifacts -- presented in a manner which appeals to both children and adults. The plan of the entrance and ground floor, figure 7, was adapted from a classical cruciform floor plan which included numerous smaller adjoining rooms. The application of flow principles to the labyrinthine floor plan has been accomplished, insofar as the existing structure permits, with a major subject area residing within each architectural subdivision. The

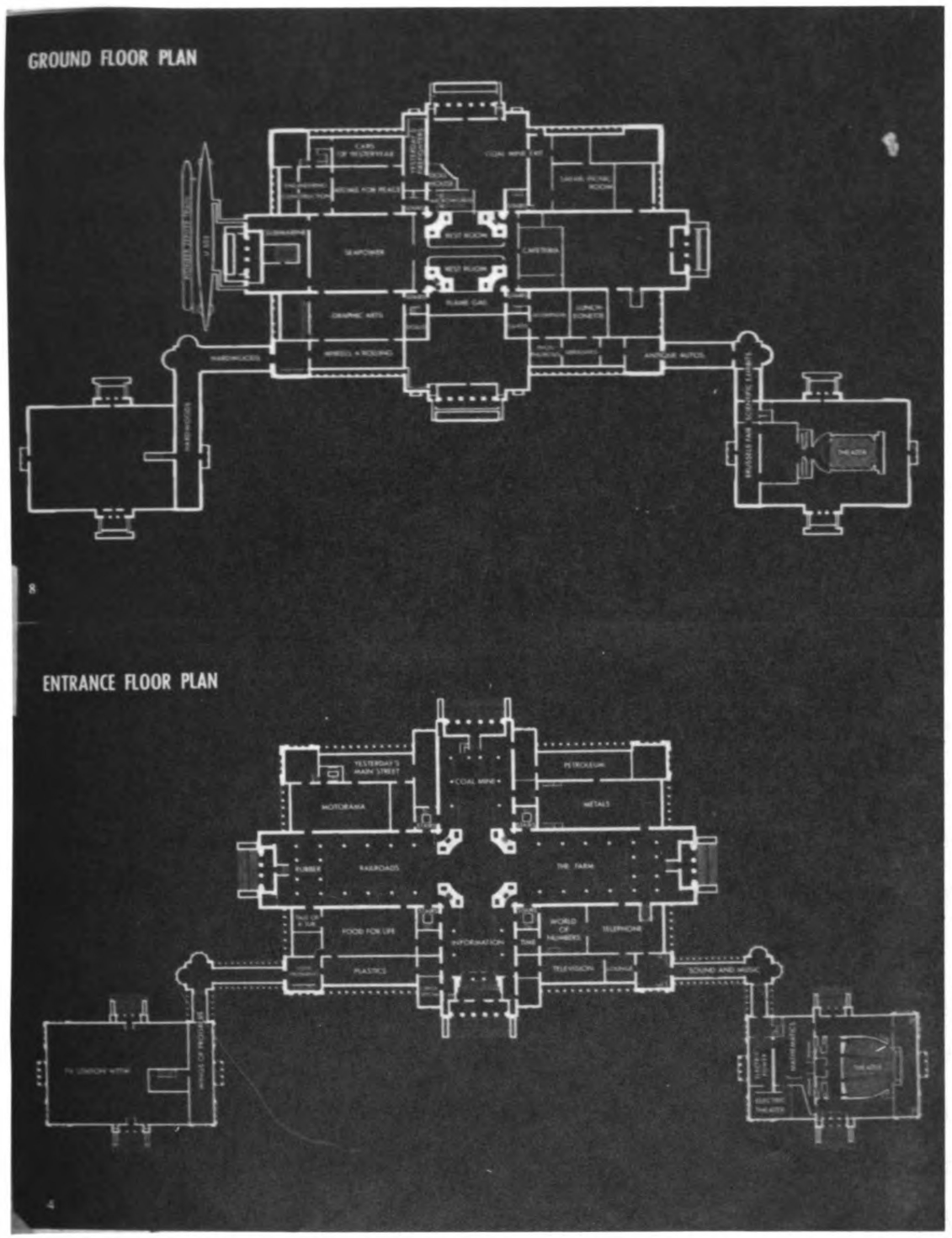


FIGURE 7. Floor plans of the Museum of Science and Industry, Chicago.

physical nature of the building has, in some cases, forced the adjacent placement of incongruous subject matter. Movement through the subject matter areas is governed by the many walls and doors imposed by the architectural subdivision. Consequently, the visitor seems to wander aimlessly from one spectacle to the next, never quite aware of where he is or where he has been.

Interior illumination ranges from darkened alcoves to brilliant, open spaces and, thus, allows exhibits to express their individual characteristics in an attractive manner.

Free parking accommodations have been provided in a relaxed atmosphere of lawns and trees.

United States Air Force Museum. (Still under construction) Another example of a permanent exhibition is the United States Air Force Museum, figure 8, which is located at Wright-Patterson Air Force Base in Dayton, Ohio. The free admission museum will display aeronautical objects related to the history of flight and will be directed to all interested citizens. Herbert Bayer, design consultant, has conceived an extensive flow layout which utilizes undulating ramps that appear to flow through the exhibition space. To give the viewer a more powerful visual image, historical flight suits, fighter planes, bombers, and examples of contemporary rocketry will be strategically situated along the elevated ramp. Bayer has introduced a series of airy structural forms to help the visitor realize that he is in an imaginative new environment. By means of structural elements, controlled color, controlled illumination, and the climbing and curving ramp, the visitor is enticed to forget the problems of the exterior world and concentrate on a colorful representa-

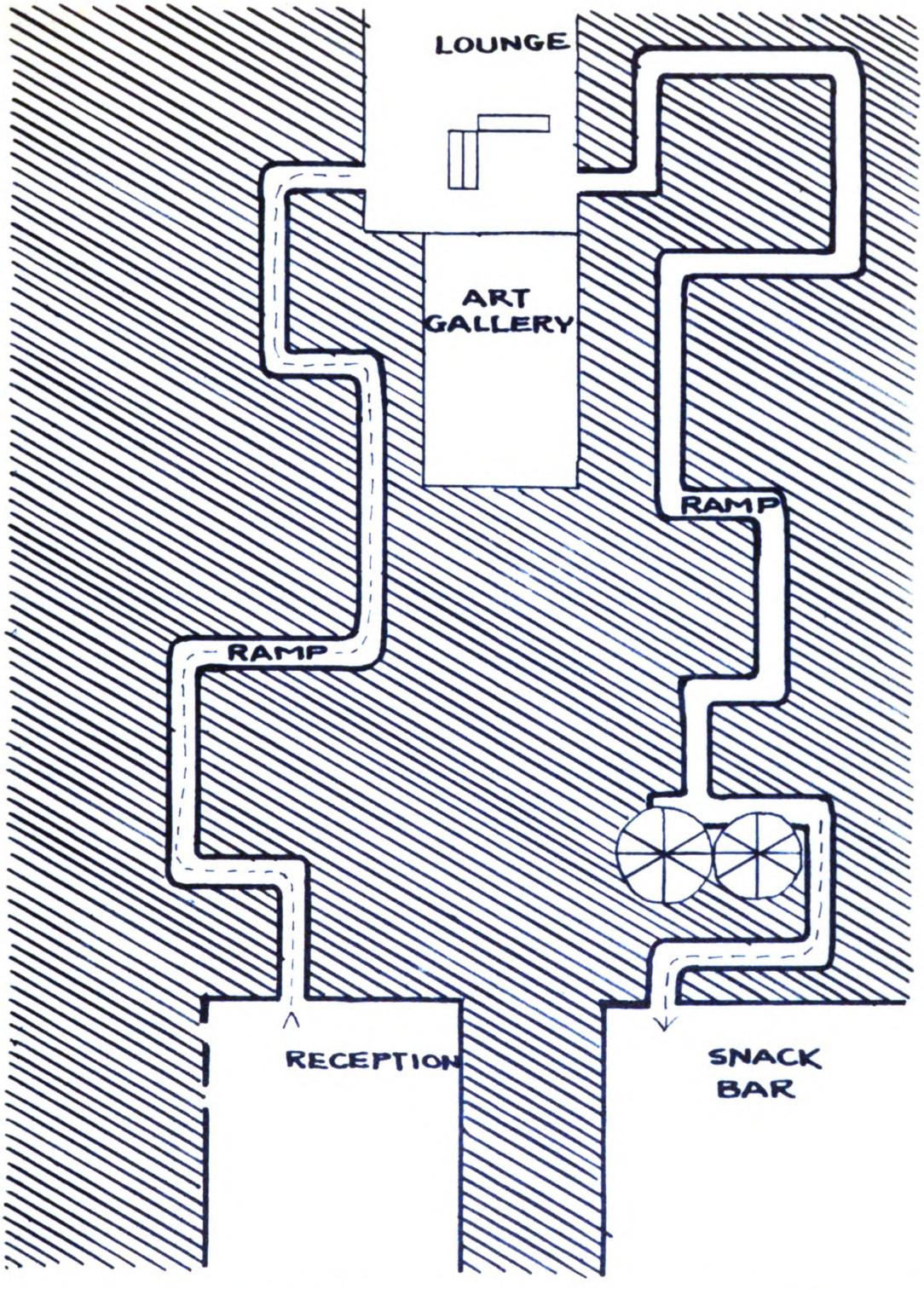


FIGURE 8. Schematic floor plan proposed for the United States Air Force Museum, Wright-Patterson Air Force Base, Dayton, Ohio.

tion of the history of flight. Unity of the interior is achieved by the continuous ribbon of ramp and a continuous overhead illumination grid.

The 43rd Auto Wonderland. The 43rd Auto Wonderland, figure 9, held in conjunction with the 1961 Detroit Auto Show, was another example of an educational exhibition sponsored by industry. It differed from the majority of educational exhibitions only in the respects that it was a limited duration show, and it had a secondary promotional interest. The Auto Wonderland portrayed processes of manufacture, including styling, research, road test, and structural elements which, when totally grouped, outlined the procedure leading to production of a new automobile. To accommodate the vast crowds, a prearranged flow pattern was calculated which would facilitate easy movement. The pattern also exposed all segments of the subject material to every passing viewer. Color continuity was maintained along the backdrop facing to insure a visual unity, A in figure 9. Rarely seen machines and processes -- such as, a tire manufacturing press, dream vehicles, and three-dimensional schematic cutaways -- appeared to command rapt attention from many visitors.

The Show appealed to a wide admission-paying public.

Cranbrook Art Academy Student Show. In spring, 1961, the Cranbrook Academy of Art developed an expressive approach to a temporary art and design student exhibit which was directed primarily to an art-oriented audience. The limited duration of the show, plus apparent limitations of space, called for an exhibit which was aesthetic in appeal and concise in scope. A flow layout which minimized physical impediments and maximized a play of visual progression was utilized, as sketched in figure 10. At

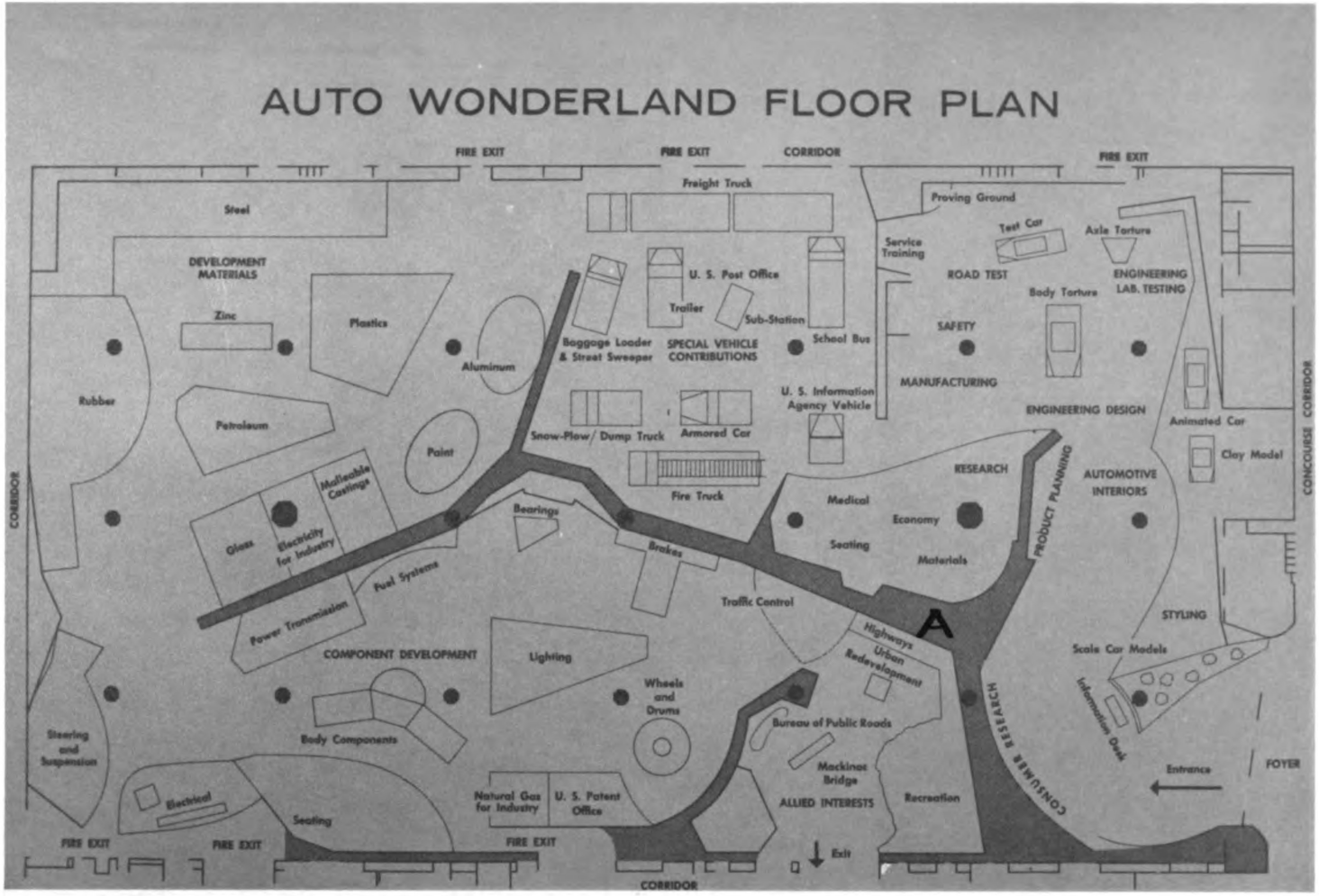


FIGURE 9. Layout of the 43rd Auto Wonderland, showing the backdrop at A as a unifying and traffic control device.

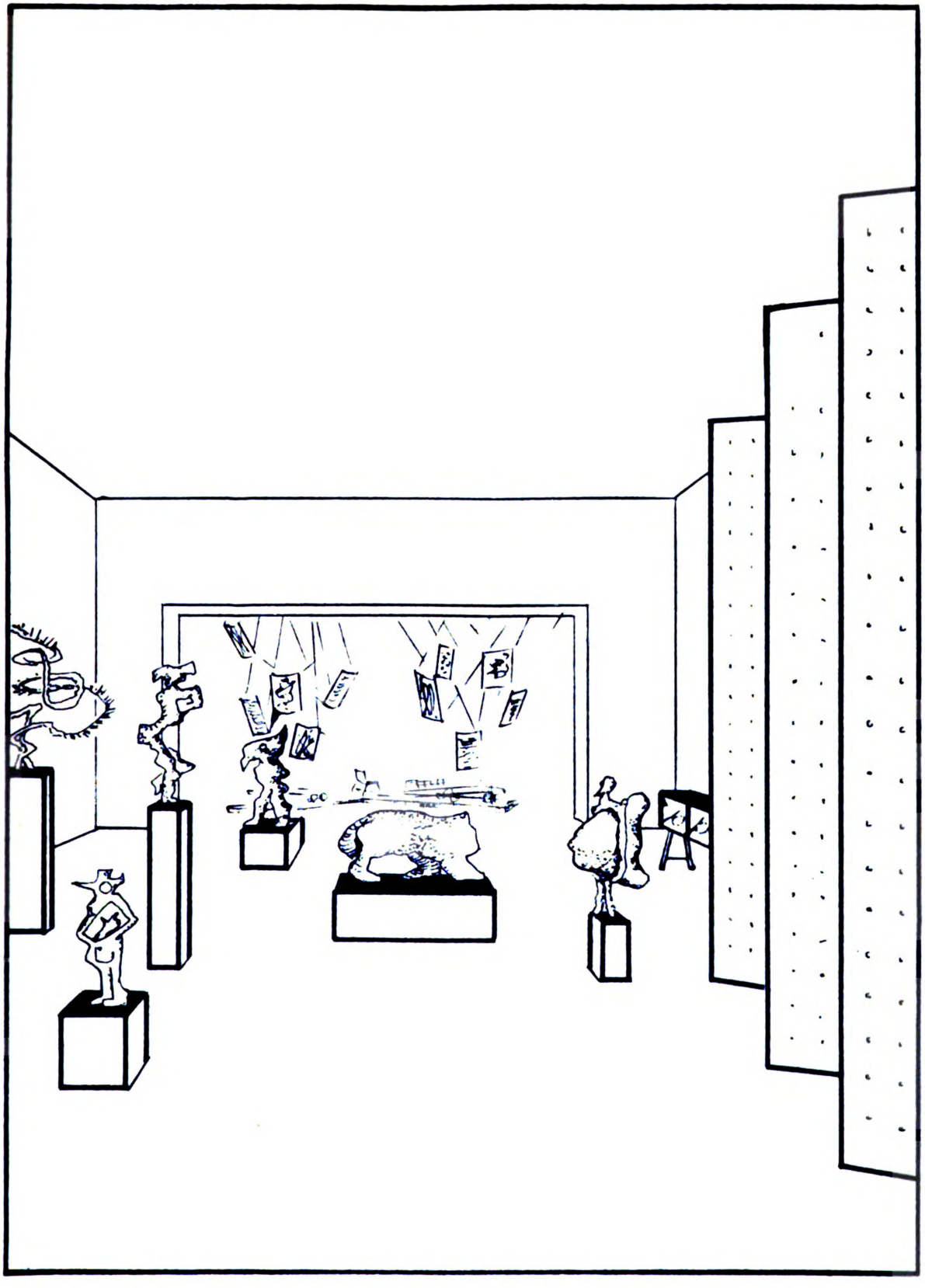


FIGURE 10. Sketch showing space modulation at Cranbrook student show.

the entrance, the visual space was subdivided by suspended panels. As the eye approached and came abreast the panels, A of figure 11, a vista of asymmetrically arranged sculpture entered the field of vision, B of figure 11. Placement of one sculptural piece acted as a visual link to the one placed beyond it until, with a continuous progression, the room was traversed. A slightly elevated spoke pattern, C of figure 11, served as an exhibit platform for designed objects. Each spoke arm directionally indicated a special design piece at the termination of its outward movement, shown at D in figure 11. Ceramic pieces were also exhibited in an adjoining room, shown at E in figure 11. Another adjacent room, disguised by a baffled entrance, featured architectural models dimly illuminated by an oblique light, F of figure 11. A continuous automatic color-slide show offered angle shots of student architectural models. A complementary side room, at G in figure 11, invited the viewer to stroke floating samples of hand-woven fabrics, suspended from the ceiling on panels.

Free parking in an educational atmosphere added a note of conducive serenity to the Cranbrook Show.

3. Trade shows.

In contrast with educational exhibitions, flow patterns have experienced only limited exploration in the trade-show field. Trade shows are usually sponsored by various segments of industry for promotional reasons. The sponsoring industries generally construct their exhibit materials according to company policy and finance costs of shipment from show to show. The trade exhibit, by its ephemeral nature, must be modular in concept to facilitate construction and dismantling. Therefore, most trade shows adopt a gridiron flow pattern to accommodate the modular

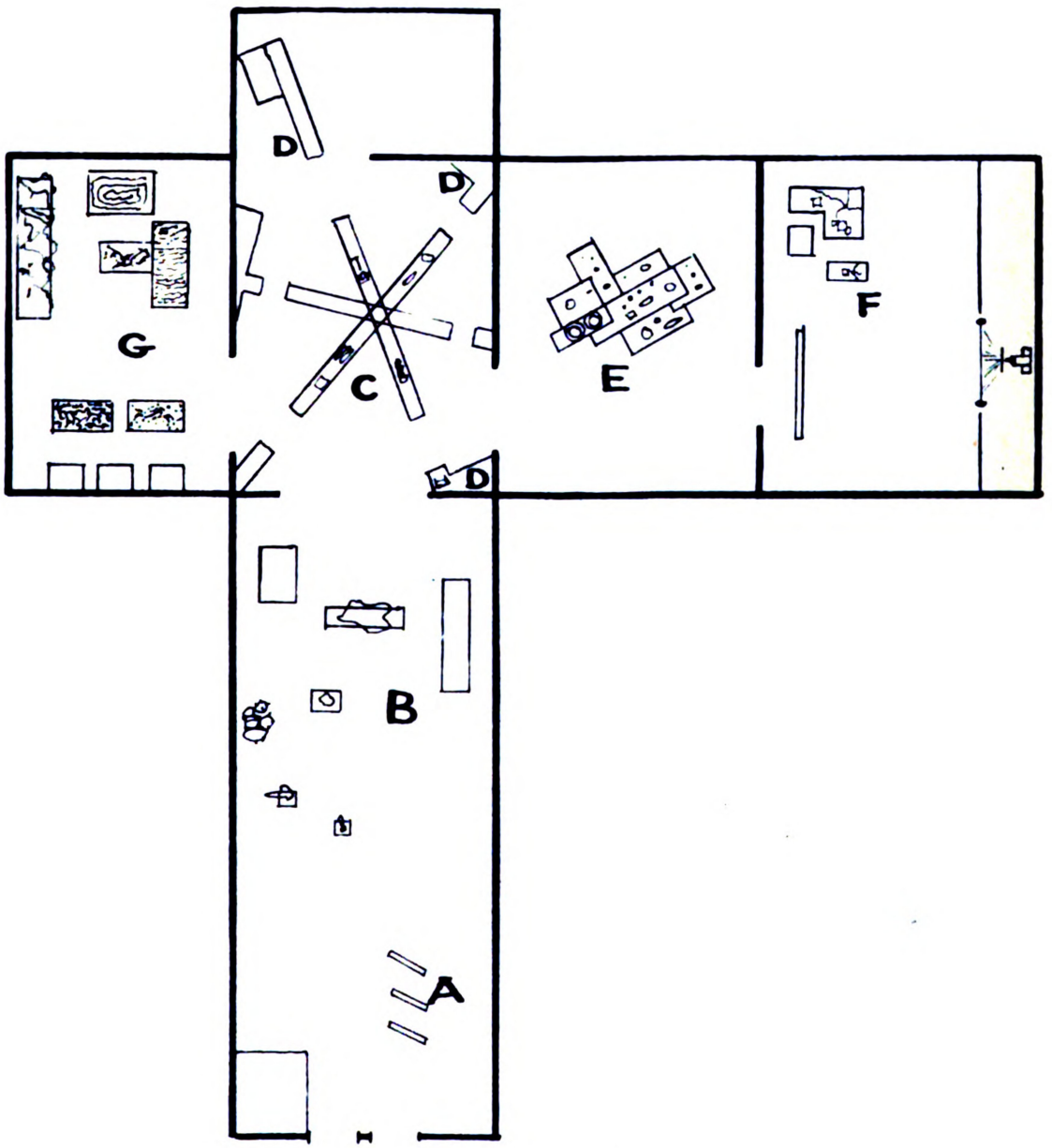


FIGURE 11. Layout of Cranbrook student show, showing the various display areas.

trade exhibits.

Buildorama. The Buildorama, figure 12, in Miami, Florida, is an example of a permanent free-admission trade show dedicated to the exhibition of structural materials. The main lobby entrance is located directly adjacent U.S. Highway 1 -- Florida's major north-south artery.

The exhibits, contributed by industry, were constructed for promotional purposes only and are generally directed to a structurally-oriented audience.

Flow has been suggested by use of a modified grid pattern that demands no specific direction of movement. The exhibits are not designed to tell a sequential story, so a more sophisticated flow pattern is not necessary. However, the modified grid pattern affords an opportunity for the element of surprise. The viewer's vision is restricted to a limited scope; and, in order to realize the full impact of the material along the aisle, he is forced to venture deeper into the exhibits. The exhibits are placed in opposition on either side of the aisle and allow the visitor to wander freely from one subject to another.

Precision Engineering Trade Show. The Precision Engineering Show was held in Detroit's Cobo Hall in Spring, 1961 for a specialized engineering group. The floor layout was planned as a symmetrical grid system which allowed maximum viewer traffic, figure 13. Utilization of a strict grid system appears to be valuable only in cases where the individual exhibits are portable and will be only temporarily shown. However, such an arrangement probably allows facility of material transport in the erection and disassembly of exhibits.

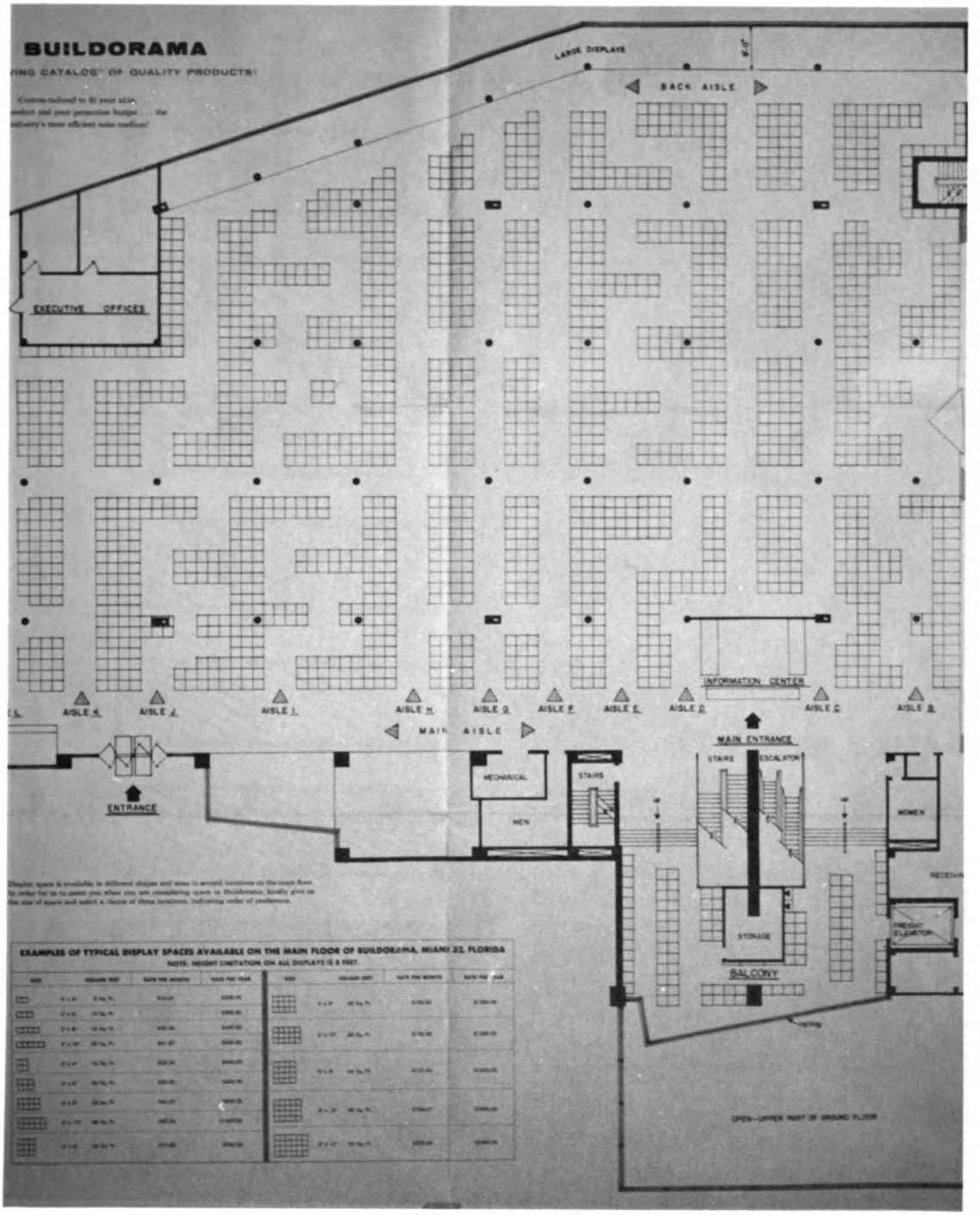


FIGURE 12. Flcorplan of the Buildorama, showing the modified grid arrangement.

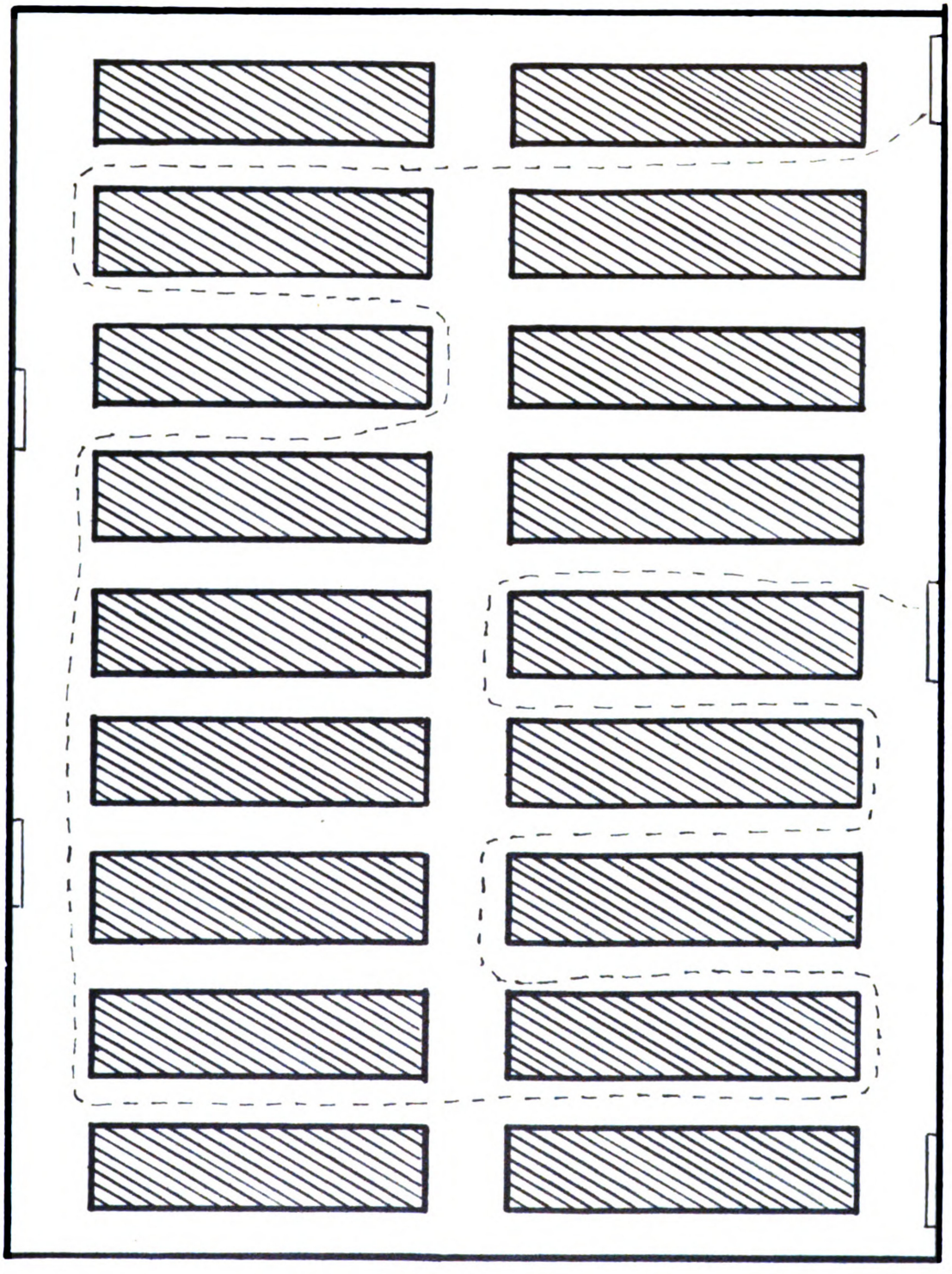


FIGURE 13. Grid layout of the Precision Engineering Show, with the route of an imaginary visitor.

Flow control at the Precision Engineering Show was seemingly non-existent; and, consequently, many viewers did not take the personal effort to see the complete show. Repetition of tricky animation, flashing light, and abstract shapes added to viewer fatigue.

4. Summary

From the discussed exhibitions, it appears that such elements as a functional structure in an appropriate location, good access routes, ample parking, controlled circulation of movement, and an educational message are paramount considerations for the execution of a successful exhibit complex. Some of the previously cited exhibitions have taken all these aspects into consideration in the planning stages and the results have been gratifying. In other exhibitions, the previously suggested considerations have been only partially adopted; however, they have then been presented in an individually successful way.

In the case of the contemporary exhibition, it is noticeable that the concept of flow is somewhat similar to that practiced in commercial enterprise. The flow pattern apparently attempts to contain the viewer for a maximum time and for a maximum exposure.

C. Psychological Factors

1. Perception

Kingsley has said:

> "In perception we apprehend objects or events. When we perceive we translate impressions made upon our senses by stimuli from our environment into awareness of objects or events... the objects and events of which we become aware are regarded in perception as present and as going on. This activity of perceiving is such a universal and intimate feature of our mental life that it is often difficult to realize that objects

> of the physical world do not merely present themselves and that we do anything more than open our minds to receive them as they really are. It is easy to overlook the fact that we construct our world of things and events out of our sensory processes and that physical objects as we know them through sight, sound, taste, smell, and touch are products of our own perceptions...widely differing qualities of sensory experience depend upon the organs of sense and upon the nervous system. They are the basis of our knowledge of the world about us. Without them, there would be no awareness of anything."[23]

From the text of a paper by Carreiro:

> "Perception is the experience of objects and events which are here and now. Perception is the virst step which leads from stimulus to action or understanding. Perception can involve anything which sets off a response."[24]

The intricate mechanics of the totality of experience we call perception have been under scrutiny by psychological and physiological specialists for some time. Tests have shown that a rich perceptual background greatly enhances a learner's ability to cope with his environment. In thinking processes, the learner is limited by the number, variety, and scope of perceptions from past experience; thus, it is evident that learners who have had a broader background of experiences which can be recalled at will often perform at a higher thinking rate than the learners who lack this broad background. Experiential background has also been considered a determinant in the formation of impressions -- and especially in the formation of impressions about the meanings of words and symbols. For example, Wittich and Schuller cited a case in which three artists were given a verbal description of an animal and were asked to draw the

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[23]Walter Arno Wittich and Charles Francis Schuller, Audio-Visual Materials (New York: Harper and Brothers, 1957), p. 24.

[24]Joseph Carreiro, "Text of Remarks" (Washington, D. C.: USDA Visual Work Shop Symposium, July 17, 1961), p. 2. (Mimeographed.)

image of the animal from their imagination. All representations were completely different.[25]

> "The normal learner...gains understanding in terms of multiple impressions recorded through eye, ear, touch, etc. These functions do not occur in isolation but rather through a blended pattern from any or all of the perceptor mechanisms that are stimulated by external occurances. Understanding results from coordinated perception. This phenomenon is proved by cases in which physical impairment of one sensory receptor eliminated the possibility of a complete perception pattern."[26]

Instructional techniques have great dependency upon a factor of learner participation. Observation has suggested that a learner's retention is on a direct proportional basis with the scope and variety of his participation. Worland has proposed that "...an exhibit should reach out to the viewer with experience that will impress all his senses -- hands, eyes, ears, and even nose and throat if necessary."[27]

Although exhibition designers must be aware of the totality of perception, Carreiro has stated that vision is the most fundamental factor around which a designer creates. He said that man has historically utilized the visual sense as a primary device for orientation to his world.[28]

The phenomena of proximity, similarity, closure, and continuance are recognized as operative factors in visual perception. The eye also seeks out areas which contrast in size, shape, color, or brightness from other

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[25]Wittich and Schuller, op. cit., pp. 22-25.

[26]Ibid., p. 25.

[27]Donovan Worland, "A New View of Museum Exhibit Design" (Asilomar, California: Western Museums Conference, October, 1959), p. 6. (Multilith.)

[28]Carreiro, op. cit., p. 1.

more monotonous areas.[29] Symmetry has also been accepted as a psychological phenomenon of visual perception. Symmetry affords the viewer a sense of balance and restfulness. However, symmetrical repetition can just as often be a source of boredom; the viewer, on the basis of what came before, is capable of grasping what is likely to come after.[30] As a modern trend, asymmetrical forms have been used with a sense of balance. In asymmetrical form, the eye seeks unity of feeling and movement, articulated with a variety of sizes and shapes. Effective asymmetrical balance can be achieved by repetition and/or an apparent unity of segments. Generally, horizontal movement has a perceptual quality of restfulness as opposed to the dynamism created by vertical and oblique configurations.[31]

Oddly, visual perception has a tendency to stabilize its environment. As a consequence, we tend to be least aware of things most familiar to us.[32] Objects seen daily from a certain angle often appear much larger when seen from an unusual vantage point. Consequently, surprise views of an everyday object have been recognized as an effective means of attracting attention.[33]

Education through visual appeal. Frederick Kiesler has said of

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[29]Sybil Emerson, Design, A Creative Approach (Scranton, Pennsylvania: Laurel Publishers, 1953), p. 14.

[30]James Gardner and Caroline Heller, Exhibition and Display (New York: F. W. Dodge, 1960), p. 34.

[31]Emerson, op. cit., p. 9.

[32]Carreiro, op. cit., p. 2.

[33]Gardner and Heller, op. cit., p. 56.

visual impressions:

> "We want to be informed about things quickly. Our age is forgetting how to hear and how to listen. We live by the eye. The eye observes, calculates, advises. It is quicker than the ear, more precise and impartial."[34]

"Building concepts" is the terminology which has been given as a realistic definition of education; and, when the learner has absorbed something new and utilized this new something, he has built or refined a concept. Dale has defined a concept as a group of past experiences. On the assumption that we move to abstract conceptual thinking only through the concrete, there is an obvious value to methods of visual communication.[35] Models or graphic presentations appear to speak in direct concrete terms by elimination of the necessity to transfer verbal symbols into mental images. Dale has cited seven proven contributions of audio and visual materials when they are used for education:

1. Supply concrete basis for conceptual thinking, hence they reduce meaningless word responses.

2. Have a higher degree of interest.

3. Make learning more permanent.

4. Offer reality of experience which stimulates self-activity on the part of the viewer.

5. Develop continuity of thought.

6. Contribute to the growth of meaning and hence to vocabulary development.

7. Contribute to the efficiency, depth, and variety of learning; a highly personal experience is usually not easily obtained through other materials.[36]

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[34]Frederick Kiesler, Contemporary Art Applied to the Store and Its Display (New York: Brentano's Publishers, 1930), p. 73.

[35]Edgar Dale, Audio-Visual Methods in Teaching (New York: Dryden Press, 1954), pp. 31,36.

[36]Ibid., p. 65.

The photograph has been especially effective as an educational tool. It has been recognized as the most powerful medium for convincing the public because a photograph is more often than not accepted as fact.[37] In contrast, the photograph can also be the source of complete ambiguity. Portrayals of ambiguous events or actions have often elicited totally different responses from different beholders.

Visual communication, especially as applied to educational exhibition, calls for concise presentation. Textual material should be condensed to simple digestible statements; this is considered by Pick to be of utmost importance.[38] Ernest Horn has proposed that: "A selection can hardly be easy to read when it deals with ideas that are new, inherently difficult, and remote from the reader's experience.[39] Visual communication has also taken into account that the eye selects material for perusal and, if looking for it, is capable of picking a known shape or sign from a maze of detail. Regardless of the capabilities of the eye, a profusion of abstract shapes are a distraction and annoyance. Profuse abstraction may worry the visitor to the point of looking elsewhere. The disc, ring, square, rectangle, and other simple geometrical forms are most easily seen and held in vision.[40]

The eye starts off at top activity and gradually tires; it then

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[37]Beverly Pick, Display Presentation (London: Balding and Mansell Printers, 1957), p. 136. (Available through George Wittenborn, Inc., New York.)

[38]Ibid., p. 16.

[39]Ernest Horn, Methods of Instruction in the Social Studies (New York: Scribner Sons, 1937), p. 157.

[40]James Gardner and Caroline Heller, Exhibition and Display (New York: F. W. Dodge, 1960), p. 51.

begins to select. Flashing lights and severe abstractions are rejected in preference to simple geometrical shapes. Gradual changes in illumination, changes in scale, and material arranged in relation to eye level are generally considered to be restful to the eye.[41]

Gyorgy Kepes has summed the power of visual language:

> "Visual language is capable of disseminating knowledge more effectively than almost any other vehicle of communication. With it, man can express and relay his experience in object form. Visual communication is universal and international. It knows no limits of tongue, vocabulary or grammar and it can be perceived by the illiterate as well as the literate. Visual language can convey facts and ideas in a wider and deeper range than almost any other means of communication. It can reinforce the static verbal concept with the sensory vitality of dynamic imagery."[42]

Color. The visual arts have for centuries utilized color as a vehicle for symbolic communication. Today, color has undergone scientific research and classification in order to find better psychological basis for color usage. Hospitals have experimented with color in the interest of therapeutic treatment. Light colors have been suggested for ceilings and floors as a means of gaining higher reflectivity and, consequently, better general illumination. Conversely, a hospital room with color as a highly dominant factor has been recognized as a source of visual discomfort.[43]

Faber Birren has proposed a psychological color therapy wherein the

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[41]Gardner and Heller, op. cit., pp. 51-52.

[42]Gyorgy Kepes, Language of Vision (Chicago: P. Theobald, 1944), p. 13.

[43]Studies in the Functions and Designs of Hospitals, Nuffield Provincial Hospitals Trust (London, New York: Oxford University Press, 1955), p. 109.

patient is excited by warm colors, bright illumination, and loud, pleasing noises. Almost immediately the environment is changed to one of cool colors, dim illumination, and quietude. This cycle is then repeated. He feels that pulse rate will be high, low, and then high -- which is, in effect, a shock treatment.[44]

Shocking colors should not be used as a background for acting or thinking. Goldstein wrote that a strong red atmosphere incites the mind to activity and is favorable for emotionally determined action; green creates a condition of meditation which leads to fulfillment of the task. Red provides the emotional background out of which ideas and actions emerge; green is the background in which these ideas are executed.[45]

Colors used in a symbolic context cannot become too numerous. Complex color images cannot be retained without great mental strain.[46]

Harmonious color combinations result from uses of complementaries, triads, split complementaries, and analogous colors. However, large areas of a color used in conjunction with its complementary creates a problem of spectral absorption. When used together, one of the complementary colors should be grayed or restrained to prevent undue absorption. Complementary combinations appear to flicker; therefore, they are extremely effective as attraction influences.[47]

In general, children favor brighter colors, whereas adults respond

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[44]Faber Birren, Color Psychology and Color Therapy (New York: McGraw-Hill Book Company, Inc., 1950), pp. 262-263.

[45]Ibid., p. 150.

[46]Dale, op. cit., p. 355.

[47]Ibid., p. 361.

to off-shades and sophisticated mixtures. Color preferences shift with increasing age from warmer to cooler colors.[48] It is believed that most "... emotional effects of color can be traced to memorable personal associations developed out of our differing individual experience."[49] The average order of color preference is blue, red, green violet, orange, and yellow. Tests have shown that yellows and whites appear dimensionally largest in visual perception -- followed by red, green, and blue. From a distance, yellow is the most visible color and, combined with black, forms the most legible of all color combinations. Black objects on white ground are best shown in weak light conditions; whereas, bright illumination best presents white objects on a black ground.[50] Rudolph has suggested that colors in exhibition are better emphasized by maintaining tones from white through black for all backgrounds, floors, and ceilings.[51]

As a means of unity and a factor in flow:

> "...a color repeated in different parts of a display tends to show a relationship among these parts. A brilliant cerise used only twice in one design will make those two points seem related to each other, and the eye will tend to go back and forth between them. A bright green that is next to a slightly grayed green, that, in turn, is next to a grayer tone of green gives a feeling of relationship among the colors that carries the eye along. Such a color plan might also show a relationship between the ideas that are presented in the three similar colors."[52]

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[48] Ibid., p. 378.

[49] Ibid., p. 376.

[50] Birren, op. cit., p. 243.

[51] Paul Rudolph, "Good Design Exhibition," Arts and Architecture, Vol. 69, No. 5 (Los Angeles: Entenza Publications, May, 1952), p. 19.

[52] Edgar Dale, Audio-Visual Methods in Teaching (New York: Dryden Press, 1954), p. 359.

Lighting. Lighting is a determinant of what we see and influences the type of opinion we form about what we see. Mood can also be determined by lighting; such as, tungsten (generally warm) light, and flourescent (generally cool) light.

In artificial lighting situations, illumination should be adjusted to allow the eye to adapt to changing conditions. Subdued light, followed by dramatic spots on focal exhibits, which is interspersed with dappled light reflections, can add to a dynamic and pleasing environment. This lighting plan has been adapted particularly well to a sequential exhibit scheme because the eye is attracted to brilliantly lighted objects.[53]

Colored light also creates a mood. Birren has said that "... the eye sees best in white, yellowish, or yellowish green light and worst in blue light."[54] Mental reactions are quicker and time tends to be overestimated in red light. Green light has a contrasting effect; it promotes slower muscular responses and lends to underestimation of time.

Softer and deeper colors, with good illumination over the task, promote a better environment for exacting mental and visual study.[55]

For the purposes of effective exhibition, Gardner feels that it is desirable "...to have a building with no windows so that all illumination is under control."[56]

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[53]James Gardner and Caroline Heller, Exhibition and Display (New York: F. W. Dodge, 1960), p. 59.

[54]Faber Birren, Color Psychology and Color Therapy (New York: McGraw-Hill Book Company, 1950), p. 243.

[55]Ibid., pp. 142-144.

[56]Gardner and Heller, op. cit., p. 88.

Sound. Research investigation has shown that visual perception is affected by sound. Birren notes that a Russian scientist, S. V. Kravkov, found that sound decreases rod sensitivity of the eye. However, it increases cone sensitivity to green and blue and decreases cone sensitivity to red and orange. The yellow-green region of perception is virtually unaffected by sound. Birren also mentions that Heinz Werner found that sounds of high pitch shifted perceptual appearance of colors to lighter hues, while sounds of low pitch shifted the appearance to deeper hues.[57]

The synchronous sound systems of multiple track tapes have become prominent in current exhibition. They permit synchronization of mechanical motion, sound, and lighting for the more elaborate exhibits.[58] Devices for directional and localized sound reproduction have also been used. It seems probable that a sequential pattern of localized wound would be an outstanding feature in flow.

2. The human in exhibition design

The approach. The immediate, as well as distant, approach to an exhibition hall appears to be an important determinant of exhibit success. Flow of people, in number and direction, can be determined by exterior physical conditions which surround the exhibition center. Some of the apparent necessities to exhibition success may be outlined as follows:

1. Population -- exhibits are built to be visited. A population center offers many more potential visitors.

2. Interest -- an exhibition must present subject matter of general interest to the surrounding society, diverse if the society is multistratified and limited if the society if homogeneous.

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[57]Birren, op. cit., pp. 147-148.

[58]Donovan Worland, "A New View of Museum Exhibit Design" (Asilomar, California: Western Museums Conference, October, 1959), pp. 13-14. (Multilith.)

3. Prestige -- prestige can be of paramount importance. Visitors are apparently inclined to prefer an exhibition which is placed in an atmosphere of recognized social good and, especially, where ideas or values can be accepted as factual.

4. Transport -- a location which affords adequate arterial access has an advantage over an isolated location. Convenient parking must be available.

5. Topography -- topographical relief can enhance the structural elements of the exhibition totality. Likewise, landscaping has been considered a prime requisite for the creation of a conducive atmosphere. Successful landscaping provides a more relaxed and, therefore, susceptible attitude for both visitors and workers.[59] Within the realm of the immediate approach area, color can be a determining factor. Coordinated color arrangements can arouse the visitors curiosity and interest.

6. Architecture -- in many cases the exhibition structure, by its architectural form, has been capable of exciting the most complacent visitor. It appears that the visitor often visits an exhibition to escape some drabness of everyday life; therefore, we also can assume that he expects the exhibition to create a new experience.

Among other museums, the Cleveland Natural History Museum has attributed much of its popular acceptance to its location, a wooded lake park setting within a scattered arrangement of cultural buildings.[60]

Orientation. Cabot maintained that an arriving visitor is often disoriented. He may be under tension from driving, family problems, food, parking, or business commitments. He is often unfamiliar with the exhibition center and approaches it with a nervous and insecure attitude. He is not functioning as he normally would in more familiar surroundings. With a summation of these considerations, Cabot stated that there should

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[59]Raymond Sloan, Hospital Color and Decoration (Chicago: Physicians Record Company, 1944), p. 218.

[60]Statement by Mr. William Scheele at Midwest Museums Conference, Room 101 Kellogg Center, October 12, 1961.

be an initial entrance feature which serves to relieve the visitor from irritating external stimuli.[61] The visitor should be freed from a necessity to make immediate decisions: he should not be made to choose one course of inspection from a multitude of possibilities; yet, conversely, he should not be made a complete captive of a highly structured system. The visitor should be immediately supplied with an over-all understanding of the situation and then gently led into it.

> "We must place the visitor in a good frame of mind and set up a clear communications atmosphere for him. He should be relieved of all problems solving and decision making insofar as it is possible and practical. Through the use of the finest known techniques and a catering to the psychological attitudes of the visiting public, visitors should be made comfortable and welcome as possible.[62]

Cabot also suggested that the architectural features of an entrance could allay viewer fears and provide a situation where decision-making seemed less important. Ideally, the general entrance illumination would vary with outside conditions; on dark and gloomy days the lighting would be different than during the bright sunshiny days of summer. These conditions would promote psychological and perceptual orientation. The next step in orientation would be the invitation of the visitor through a bright and well-defined architectural entrance that led to the exhibition complex. From this point, the exhibit program would unfold in a sequential order.[63]

Visitors like to know where they are and must feel comfortably

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[61]John Cabot, "The Visiting Public and the Museum," Midwest Museums Quarterly, Vol. 21, No. 2 (Spring, 1961), p. 22.

[62]Ibid., p. 23.

[63]Ibid., p. 23.

inside the exhibition hall before turning to the exhibits. Gardner noted that there is a strong tendency for visitors to step warily into a hall, hesitate to orient themselves, and move boldly off into the desired direction. For this reason, intricate displays should be banned from the entrance.[64]

Divisional, or gridiron, floor plans are at once apprehended by the viewer.[65] Therefore, a plan of this type may be more conducive to orientation. Conversely, however, this plan appears virtually unadaptable to a story sequence.

On controlled circulation, Gardner has said, "If an exhibition has a story to tell the only way to make sure that everybody sees everything and in the right order is by controlled circulation."[66] However, with reference to large exterior exhibitions, the plan should not maintain absolute restriction over a distance of 100 yards but should include periodic loosening of movement. From this observation, we can see that inside exhibitions should maintain absolute restriction for even shorter distances. Excessive control tends to create a psychological feeling of constriction.

Two-dimensional and three-dimensional elements must be incorporated in a logical sequence which conforms to the movement of the visitor and his reading habits. Much contemporary exhibition has utilized a technique called "weighting" which attracts the viewer to consecutive exhi-

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[64]James Gardner and Caroline Heller, Exhibition and Display (New York: F. W. Dodge, 1960), p. 39.

[65]Frederick Kiesler, Contemporary Art Applied to the Store and Its Display (New York: Brentano's Publishers, 1930), p. 72.

[66]Gardner and Heller, op. cit., p. 43.

bits, and which has, in many cases, eliminated the need for physical barriers. Although the visitor has complete freedom to select his direction, it has been found that he will unconsciously select the pre-planned course conceived by the designer.[67] Herbert Bayer, in a specialized art show, incorporated undulating patterns into the floor decor. These devices are also unconsciously suggestive of directional movement.[68]

A theme which is consistently repeated throughout the space has been recognized as a means to achieve visual unity. Visual unity promotes visual comfort and calm orientation.[69] Atmospheric spatial changes with a sense of unity must be related to the visitors' movement through the theme. Varied ceiling heights for different story areas have been suggested as prime devices to achieve these atmospheric changes.[70] Short, tighter areas which open into bays have also been proposed as effective devices to create spatial interest. Large, or high, accent exhibits at critical focal points have been suggested as valuable aids to visitor orientation.[71]

Sections which deal with a particular subject -- such as a social or political subject -- should carry the visual personality of that subject. An example of visual accomplishment of a personality can be found

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[67]Donovan Worland, "A New View of Museum Exhibit Design" (Asilomar, California: Western Museums Conference, October, 1959), p. 15. (Multilith.)

[68]Display, Vol. 3, Interiors Library (New York: Whitney Publications, 1953), p. 116. (Introduction by George Nelson.)

[69]Ibid., p. 54.

[70]Gardner and Heller, op. cit., p. 40.

[71]Opinion expressed by Donovan Worland, private interview.

in the Milano chemistry exhibit by Erberto Carboni.[72] Any and all means should be explored to accomplish orientation through unity, for "... most people will not bother to associate the idea in front of them with anything they have already seen."[73] It is therefore obvious that the task of offering orientation through unity rests with the designer.

Organization. "The basic requirement of an exhibition is that it should offer the spectator knowledge which will increase his receptivity for new ways of life."[74] In terms of the organizational layout, new thoughts are often best presented by relegation of objects to a role of support for ideas and processes.[75]

Adaptation of tight flow principles should not be considered as an all-encompassing rule of good organization, for:

> "...controlling the flow does not mean that people are to be moved along predestinate grooves like trams or shuffled around hurdles like sheep. Ideally, the planner is aiming to direct people's movement in such a way that they see what there is to see with ease and in their own terms."[76]

Good adaptations of flow have considered the element of fatigue. Tiredness is as much expectation as experience and should be combated by simple and constant variations in scale in both exhibit size and placement. Changes in level, flooring texture, and general atmosphere have been

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[72]Erberto Carboni, Exhibition and Displays (Milano: Silvana Editoriale d'arte, 1957), Plates, 348-360.

[73]Gardner and Heller, op. cit., p. 28.

[74]Richard Lohse, New Design in Exhibitions (New York: Frederick A. Praeger, Ind., 1954), p. 12.

[75]Worland, op. cit., p. 5.

[76]Gardner and Heller, op. cit., p. 33.

recognized as effective deterrents of fatigue.[77] Carreiro has colorfully expressed some ideas on space variation. Constrictions in flow, followed by a sudden expansive view, coupled with elevation of the audience or lowering of the ceiling and climaxed by a bend and an unobstructed view are sequences of deliberate spatial experiences. A pierced or perforated translucent wall with a teasing glimpse of something beyond is a tantalizing play on natural curiosity.[78] On the premise that people enjoy surprise, spectacular features have been effectively placed at sudden turns. Sound and light leaking through a partial barrier has been found to excite great curiosity.[79] These devices are apparently recognized as valuable combatants to fatigue.

Gardner stated that linked galleries of different sizes remain more to the human scale than large stately buildings which often vie with exhibits for viewer attention.[80] He also noted that aisles which radiate from a center have been found to be a source of complete confusion for the visitor, for in his initial disoriented state, the viewer cannot readily decide which course to investigate.[81]

Individually, exhibits should be organized so as to be perceived in eyefuls; and each eyeful should express a simple point which is relatively free of reference to the exhibit which precedes or follows -- that is, the viewer should not be compelled to turn to another exhibit for information to clarify the exhibit he is now perusing.[82] An exhibit must also

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[77]Ibid., p. 39.

[78]Joseph Carreiro, "Text of Remarks" (Washington, D. C.: USDA Visual Work Shop Symposium, July 17, 1961), p. 2. (Mimeographed.)

[79]Gardner and Heller, op. cit., p. 39.

[80]Ibid., p. 45.

[81]Ibid., p. 43.

[82]Ibid., p. 28.

bridge the gap of differences between the adult, child, layman, scientist, or aesthete. A message of universal appeal can be sidelined only if the exhibit will appear before special groups.[83] Another consideration is the subject matter which, if not easily understood, tends to gather excess numbers of spectators who block traffic. For this reason, technical exhibits should be placed in conjunction with side aisle viewing space.[84]

Great consideration has been given to the creation of three-dimensional effects. Framed apertures containing exhibits, recessed pictures, diagrams, peep shows, dioramas, models, transparencies, and miniature stage sets are some of the devices which have been used.[85] Juxtaposition of contrasting objects or shapes produce the necessary intensity to achieve attention as well as convey meaning. However, such contrasts must exist within a framework of unity in order to be successful. A visual unity can be achieved by repetition of symbol, uniform or modular construction, consistent use of graphics, or one binding color. Carreiro has said of variety:

> "Grouping of similar items played against one large object or photo produce a change in rhythm (density/openness). Areas of quiescense or low intensity...tend to further dramatize the areas of focus and provide the necessary margins of comprehension.[86]

Lounges and rest areas have been given greater consideration in modern museum planning. As Cabot has noted:

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[83]Worland, op. cit., p. 13.

[84]Gardner and Heller, op. cit., p. 43.

[85]Beverly Pick, Display Presentation (London: Balding and Mansell Printers, 1957), p. 85.

[86]Carreiro, op. cit., p. 4.

> "There is rarely enough seating space liberally dispersed throughout museums. Planners, for some reason, overlook the important item called "museum fatigue." Fatigue in itself is bad at anytime, but when you require the public to stand on hard surfaces to which they are not accustomed, there are certain physical reactions that cannot be avoided. I think it is archaic that you must be uncomfortable. But to the average American, discomfort is synonymous with museums. If sufficient lounge areas are used, some of the distress will be eliminated. They do not need to be large areas, but seats should be comfortable and there should be table and ash receptacles. Though smoking may be a nervous habit, it is also associated with relaxing. There is a limit to the amount of material that can be effectively absorbed by a visitor at one time, and lounge areas provide a relaxing break and an opportunity for contemplation and absorption."[87]

Within the building, lounges have been suggested as welcome additions, especially when adjacent to areas of greater public congestion, viz., elevator stops or main architectural entrances.[88]

Various planning accommodations have been suggested as a check list in exhibition design:[89]

1. Ticket office
2. Information desk
3. Registration accommodations
4. Public telephone
5. Offices
6. Press room
7. Check room
8. Rest rooms
9. Guide rails to define a lane of travel
10. Clear passage to exits
11. Study or reference room
12. Theater or motion picture booth
13. Dressing and property rooms
14. Platforms for audience demonstrations
15. Committee rooms
16. Bulletin boards
17. Drinking water
18. Restaurant

Other accommodations which may merit consideration are:

1. Reception desk
2. Security measures
3. Recording rooms (sound proof)
4. Lounges
5. Maintenance rooms
6. Shipping crate storage
7. Fumigation chamber
8. Brochure and literature room
9. Conference rooms
10. Waste disposal
11. Snack bar
12. Convenient rest areas

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[87]John Cabot, "The Visiting Public and the Museum," Midwest Museums Quarterly, Vol. 21, No. 2 (Spring, 1961), p. 22.

[88]Raymond Sloan, Hospital Color and Decoration (Chicago: Physicians Record Company, 1944), p. 68.

[89]Evart Routzahn and Mary Swain, A B C of Exhibit Planning (New York: Russell Sage Foundation, 1926), p. 98.

It is also important to have the final flow plan checked and approved in writing by city building, fire, and police departments to insure compliance with safety codes.[90]

It appears that the organizational mechanics of exhibition design have been largely evolved on an individual basis. Carboni organizes the subject matter and then organizes the overall design according to bounds set by the subject matter. He then incorporates phantasy and imagination into the plastic form of the exhibit, careful to express an atmosphere of which seems congruous with the subject matter. Three-dimensional scale models are always built to give a better dimensional insight.[91] By contrast, Gardner has stated that a visual image often precedes the script.[92] To deal with the aspect of flow, Bayer has suggested a personal four-point consideration for organization of exhibition flow:[93]

1. Set up a functional flow of traffic in accordance with the subject material.

2. Take into consideration the visitors' walking direction and reading habits.

3. Work for an extended field of vision.

4. Explore the possibilities of new materials, techniques, with inclusion of animation, lighting, sound, etc.

Other considerations. Display is comprehensible at a glance; whereas, exhibition is a story involved in time and cannot be treated as

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[90] Ibid., p. 100.

[91] Erberto Carboni, Exhibitions and Displays (Milano: Silvana Editoriale d'arte, 1957), p. 10. (Introduction by Herbert Bayer).

[92] James Gardner and Caroline Heller, Exhibition and Display (New York: F. W. Dodge, 1960), p. 27.

[93] Carboni (Bayer), op. cit., pp. 9-10.

a static or disconnected show.[94] For this reason, exhibition demands that the fields of the architect, graphic artist, photographer, painter, and designer merge to create a cohesive visual unity.[95] The script material must be organized by a trained script writer who has the humility to face facts, and is imaginative enough to bring out some of the awe, humor, and significance that the facts imply. His basic material must be compiled by a qualified researcher who knows the subject matter intimately, yet who knows not what the exhibition visitor will accept. Final selection of story material should be left to one who is not closely familiar with the subject matter. He is, therefore, more capable of a story choice that will interest the public. An effective story line should support one central statement which can ideally be composed in one sentence.[96] In terms of organization, consideration must be given to the fundamental concept of psychological contrasts. Rudolph says:

> "This is accomplished by arranging constricted spaces so that they are in juxtaposition to freely flowing spaces with distant vistas. In addition, brightly illuminated areas penetrate into fields less brightly lighted. Psychologically this should mean that the visitor becomes less tired on his tour through the exhibition. A comparison may be made with the experience of seeing the sun disappear behind a cloud only to shine brightly again, which makes us feel exhilarated."[97]

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[94] Display, Vol. 3, Interiors Library (New York: Whitney Publications, 1953), p. 116. (Introduction by George Nelson).

[95] Renata Matassi, "Window Display," Graphis, Vol. 2, No. 102 (New York: Frederick A. Praeger, Inc., 1961), p. 60; and Mischa Black, "Window Display," Graphis, Vol. 2, No. 102 (New York: Frederick A. Praeger, Inc., 1961), p. 242.

[96] Donovan Worland, "A New View of Museum Exhibit Design" (Asilomar, California: Western Museums Conference, October, 1959), pp. 10-11.

[97] Paul Rudolph, "Good Design Exhibition," Arts and Architecture, Vol. 69, No. 5 (Los Angeles: Entenza Publications, May, 1952), p. 19.

However, the effects should strive for attraction without raucous clamor for attention and must tell the viewer to do something or must appeal to a basic emotional drive -- such as, hunger -- so that he will be motivated to learn.[98] The successful exhibition must also strive for a format which furthers cultural education, wherein:

> "...the spectator comes to realize the deeper relationship between a piece of furniture and the interior in which it is placed. Thus a visitor who has come intending to look at furniture may suddenly find himself studying layout planning..."[99]

In the area of architecture, Cabot has stated that many museums have been planned for the convenience of operational needs and that little concern has been given for the problems of visitor accommodation. He also stated that museum "static" has often resulted from poor architectural planning; few architects are well versed in the needs of an exhibition building.[100] Previous to construction, the Davenport Museum at Davenport, Iowa, and the Cleveland Museum of Art financed a tour for their architects, wherein they examined existing museum facilities in order to uncover problems that might have otherwise been overlooked.[101] It is also worthy of note that successful museums, as well as successful businesses, must have a structure which is spatially congruous; that is, there must be a similarity between the outside perceived atmosphere and the inside perceived atmosphere.[102]

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[98]R. H. Talmadge, Point-of-Sale Display, How to do it Series No. 77 (Charles Rasner and Associates, 1958), p. 48.

[99]Richard Lohse, New Design in Exhibitions (New York: Frederick A. Praeger, Inc., 1954), p. 12.

[100]Cabot, op. cit., p. 22.

[101]Statements by Donald Herold and William Ward, Midwest Museums Conference, Room 101 Kellogg Center, October 12, 1961.

[102]Frederick Kiesler, Contemporary Art Applied to the Store and Its Display (New York: Brentano's Publishers, 1930), p. 85.

3. Summary

Investigation has shown that the physical location of an exhibition center within the population complex may have an effect upon its success. Visitors apparently prefer to browse in an atmosphere of sylvan tranquility. One museum official has proposed that his museum enjoys a great deal of its success because of its wooded lake front setting.

It has been proposed that the average museum visitor approaches the museum with misgiving, probably stemming from personal problems or an unfamiliarity with the surroundings. A visual unity, or continuity, of subject matter and structure, has been proposed as a necessity if we hope to allay the fears of the visitor. However, within the unified story area, we must also provide spatial varieties to combat visitor boredom. The task of providing cues for viewer orientation to the area in which he stands and orientation to the complete facility is left in the hands of the design staff.

Organization of the subject matter should be in an unfolding sequential progression in order to achieve meaning in the viewer's mind. The message should be direct and comprehensible to all visitor types; sound, color, light, and form should be utilized to accent material which may otherwise be considered dry. The organizational plan should recognize the need for proper placement of operational services and should include public rest areas along the exhibit right-of-way.

A sensible organizational procedure has been suggested by Worland. Utilize material furnished by a qualified researcher, edited and written by a professional script writer, and visually completed by a graphic artist and exhibition designer.

CHAPTER III

CONCLUSION

A. Procedures for Incorporation of Flow Principles into Current Exhibition Design

1. Policy, Content, Exhibits, Architecture

At least one major museum consulting firm has proposed policy, content, exhibits, and architecture -- in that order -- as a sound procedure for museum planning. In this discussion, the procedure for incorporation of flow principles will be limited to applications on the building interior, inasmuch as the exterior flow pattern is largely governed by existing roads and property bounds and is, therefore, relatively speaking, outside the control of the designer. From the previously discussed outline of policy, content, exhibits, and architecture we can see that the evolution of an interior flow pattern should probably be initiated in the content phase (mentioned above) and terminate in the exhibits phase. However, continuous improvement of the plan should always be the goal, regardless of an immediate involvement with one phase or another.

2. The Flow Pattern

The communication problem. Investigation has shown that, after establishment of policy, the establishment of content is a necessary step to development of an effective flow pattern. The content must be founded on an understanding of the communication problem; that is, what

type of subject matter is to be presented, and to whom it will be presented. As often as not, subject matter may be completely determined by its expected visiting public; for example, a technical radar exhibit may be appreciated only by members of an electronics group.

Worland[1] has outlined five considerations which exhibition communications should strive to realize:

1. Put across ideas, concepts, and processes in a comprehensible way.

2. Teach enjoyably, by stimulation of the imagination.

3. Teach in contemporary terms, by the use of objects to dramatize and document current ideas.

4. Communicate not just fact, but a memorable experience on which future learning can build.

5. Use the past to explain the present and the present to suggest the future.

Evolution of a communicative story progression will usually aid development of a more effective flow pattern.

Analysis of material. The flow pattern will also be determined by the amount and nature of material to be presented. After general content has been determined, secondary subject matter areas should be outlined as to content and mode of presentation. All subject matter areas should have the material collected by a specialized researcher. The material should then be selected and edited by an accomplished professional script writer. A finished script should be the synthesis of the story line and, by the nature of its composition, should prove invaluable as: 1) a selling tool, and 2) an inspiration for the designer to create a

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[1]Donovan Worland "A New View of Museum Exhibit Design" (Asilomar, Calif.: Western Museums Conference, Oct 1959), p.7.

unique visual environment. The subject matter may often undergo condensation or expansion in secondary areas, dependent upon economic or related factors.

It is also recommended that the planners remember that the size and and type of an exhibition should be warily respectful of its potential public acceptance.

Psychological interest. The physical nature of the flow pattern also revolves around the amount and type of psychological devices which are included by the designer. Outlined below are samples of representative psychological considerations:

1. The walking and reading habits of the potential public affect the layout.

2. The success of a subject matter area often depends upon the psychological environment created for it.

3. The movement of people can be decidedly dictated by placement of participation devices.

4. The inclusion of closed areas, highly structured areas, open bays, darkened alcoves, ramps or other types of elevations, and lounge areas, all contribute to modifications in a flow pattern.

5. The inclusion of bends and physical impediments that offer surprise elements of light, sound, and animation are also determinants of flow.

Physical conformation of the flow pattern. The side aisles should always attempt to recirculate visitors back into a general area which is recognizable as an orientation point. However, to prevent visitor confusion, a maze of intricate side aisles should never radiate from one central hub. Side aisles should practice complete restriction for only limited distances, at which points an area of rest or hesitation should be provided. Innumerable variations are possible within any given secondary

area by manipulation of the side aisle which runs through it.

The flow pattern should recognize and plan for its visitor type; such as, guided groups, wandering individuals, week-end masses, specialists, adults, or children. Aisle widths should be planned according to the expected visitor type.

Visual features. The finished complex should be initially apparent to the visitor as a different and unusual visual stimulus. This is essential to arouse his interest. Although it is true that individual exhibits which uniquely appeal to all physical senses are best remembered, the exhibition, in toto, will remain in the visitors memory as a visual experience. To create and maintain a more profound visual impact, the completed exhibition must exercise an overall visual unity; it will help the visitor remember the exhibition for a much longer time. The exhibits may be weighted to appeal in a sequential order; but they must still retain a likeness, especially in areas where like subject matters are presented. Continuity can be maintained by utilization of such features as modular elements, repetition of symbol, repetition of a neutral backdrop or form, continuous graphic material, or one binding color. By use of these devices, successful flow patterns will create a quiet cultural atmosphere which aid the visitor to study, digest, and thus retain the material.

The visitor must remain visually oriented within the exhibit complex. The pattern should be provided with large, specially-located focal points or architectural contrivances to aid the visitor establish his position in relation to the exhibit whole. Light and color may effectively serve this purpose.

The type of visual presentation, namely by two-dimensional or three-dimensional elements, often determines the physical nature of the flow pattern. Three-dimensional elements will normally be touched and should invite perusal from a multitude of angles; therefore, these items demand adequate viewing space.

Finally, the flow pattern should strive for a visual unity which is apparently continuous from the exterior parking lot to the interior exhibit floor.

Architecture. As mentioned in Policy, Content, Exhibits, Architecture, architectural plans should be the final consideration. This viewpoint has been proposed by both industrial manufacturing planners and exhibition consultants for their respective structure types. They stress that the totality of the interior should determine the exterior shell. In some cases, a new structure can be obsolete on opening day; either because the architecture is dated, or by inadequacy of the interior plan to service its proposed activity. Seldom can a building constructed for one major purpose adequately service a different major purpose. However, in many contemporary situations, we find that flow patterns for exhibition have been adapted to dimensions defined by an existing structure.

In all respects, the flow pattern should be defined in accordance with fire and safety codes. Provisions for fire-fighting equipment and adequate fire escapes must be included in the finalized plan, which in turn must be approved by local authorities.

The finalized version must provide access pathways to allow movement of exhibits and equipment to and from service facilities, such as elevators and maintenance quarters. The plan must conform its physical

characteristics to existing power outlets or, ideally, include a universal power/service floor grid in the building's blueprints.

Also, the architecture should provide for an entrance conducive to visitor orientation. The selected entrance must have adequate space to allow for the traffice flow which the floor plan will disgorge into it. It must also provide a side rest area where visitors can relax.

3. Summary of procedure. A flow pattern must develop from subject matter content which has been organized in a sequential manner. Secondly, the exact communicative device which will be utilized depends heavily upon the type of public to which the exhibition hopes to appeal. Thirdly, the flow pattern must induce psychological participation by excitation of visual interest and must convey a worthy message. The plan must also be formulated to include adequate access to services and facilities. Lastly, it is imperative that the architectural shell be planned around the mechanics of the interior operation.

B. Explanation of Reasoning Leading to Flow Development for the Facility, THE TECHNORAMA

1. Background Information

In order to avoid lengthy discussion of the many ramifications of THE TECHNORAMA, I will briefly sketch its scope and purpose.

The project was instituted by Michigan State University as a tool for extension education -- calculated to service conference participants, students, and visitors with a unique exhibition, conference facility, and a food service. Visiting guests will be enticed to visit special interest areas on the exhibition floor before retiring to the conference table.

This particular arrangement capitalizes on the idea that approximately 87 per cent of our impressions are received through the visual sense; and, therefore, the guest is pre-keyed to the subject matter which will be discussed in the conference room.

The exhibition will offer a contemporary approach to basic science, economics, and other educational materials by a sequential story arrangement. Many tours will be arranged according to a guided group principle; yet the exhibit stories are open to all interested visitors. The size of the exhibition floor -- approximately 70,000 square feet -- coupled with the idea of a slower, more intensified guided group principle, necessitated segmentation of one complete story into a group of unified secondary stories.

Organization of the total material into a sequential educational experience was a major consideration. The plan also had to arouse interest among prospective sponsors and the visiting public.

2. The basic layout

Although there are many important facets to organization of an exhibition, flow planning is the present problem of this thesis; and, therefore, discussion will center around the evolutionary development of the basic flow layout.

Food, Feed, and Better Living were the original designations which described a complete story sequence that showed the American agricultural process. The story began with food, moved through the story of associated processing industries, and finally explained the ramifications of ultimate consumption by the American family. Compatible with suggested triad, a plan was proposed which maintained controlled

circulation through three major areas, figure 14.

Later, on the premise that each of the three areas was too lengthy and may consequently repel visitors, the areas were segmented into manageable sections of: food, electricity, communication, transportation, large machinery, land management, structural materials, and the home. Shown in figure 15 is the floor plan, now transformed into a configuration which accommodated the secondary areas, yet retained a counterclockwise unfolding of the original story ideas; food, processing, and consumption. To minimize visitor confusion, entrances to the various areas were staggered along the central aisle. This device erased the necessity for a viewer to choose between two adjacent paths.

In order to conform with structural limitations the plan was compromised. It became necessary to adopt some path areas which backtracked through a number of right-angle turns. However, the general leaf appearance was maintained. The leaf configuration provided a more unified feeling of orientation and order for the viewer as he walked through paths which appeared to keep a certain organization of parallel movement.

The pattern also serves other purposes. The outer extremities of each area offers access to exits (at an approximate mid-way story point) and, each aisle can be easily scanned by a balcony guard who has been placed to watch for vandalism and pilferage. Each secondary aisle has been designed to control movement within the story area and to recirculate visitors into the main stream. Aisles have been plotted to allow ample access to: services, elevators, maintenance features, stairs, and offices.

Within secondary story areas, many aisles have been designed with gentle curves and built-in bends, figure 16. Many of the built-in bends

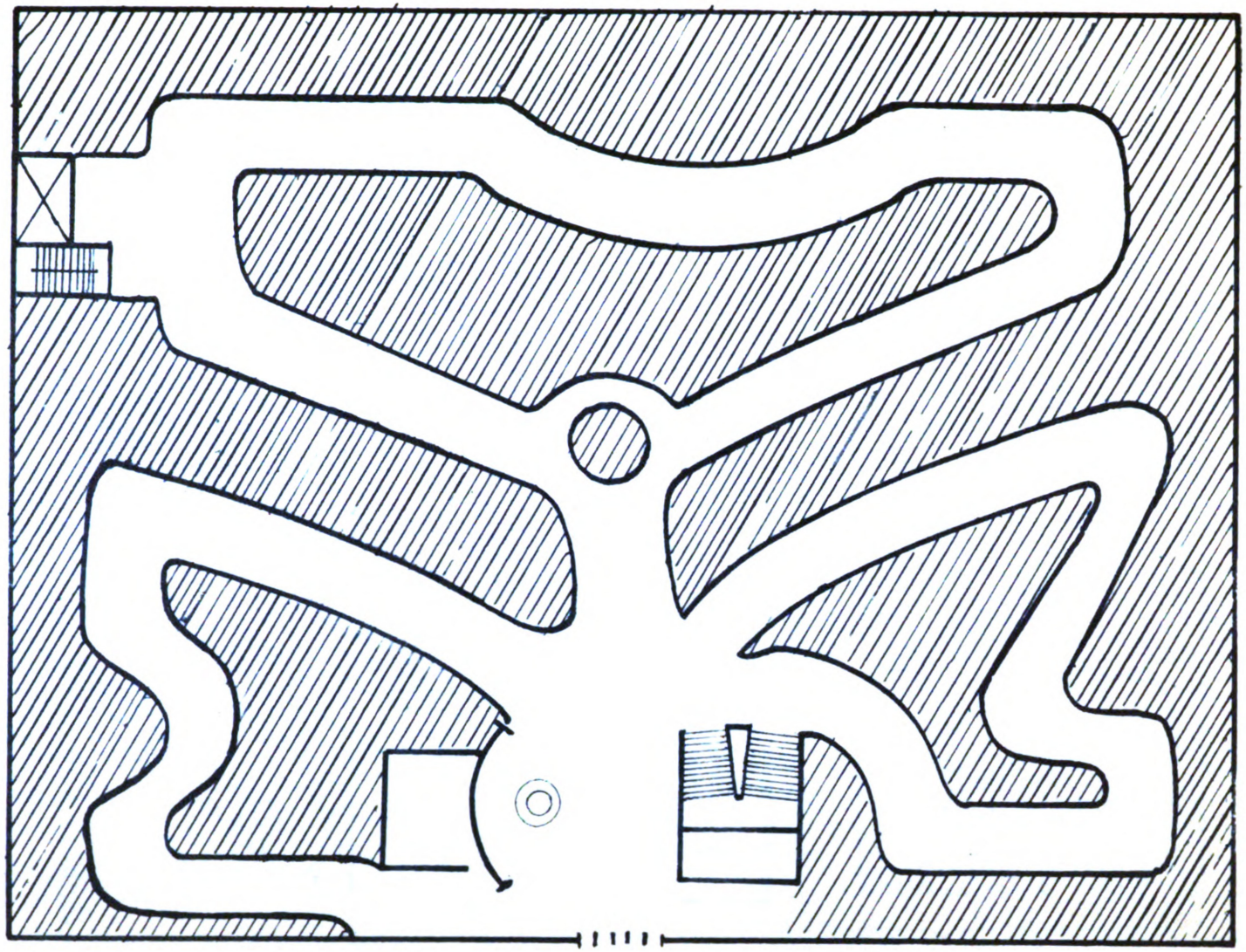


FIGURE 14. Sketch of the initial three area layout for THE TECHNORAMA.

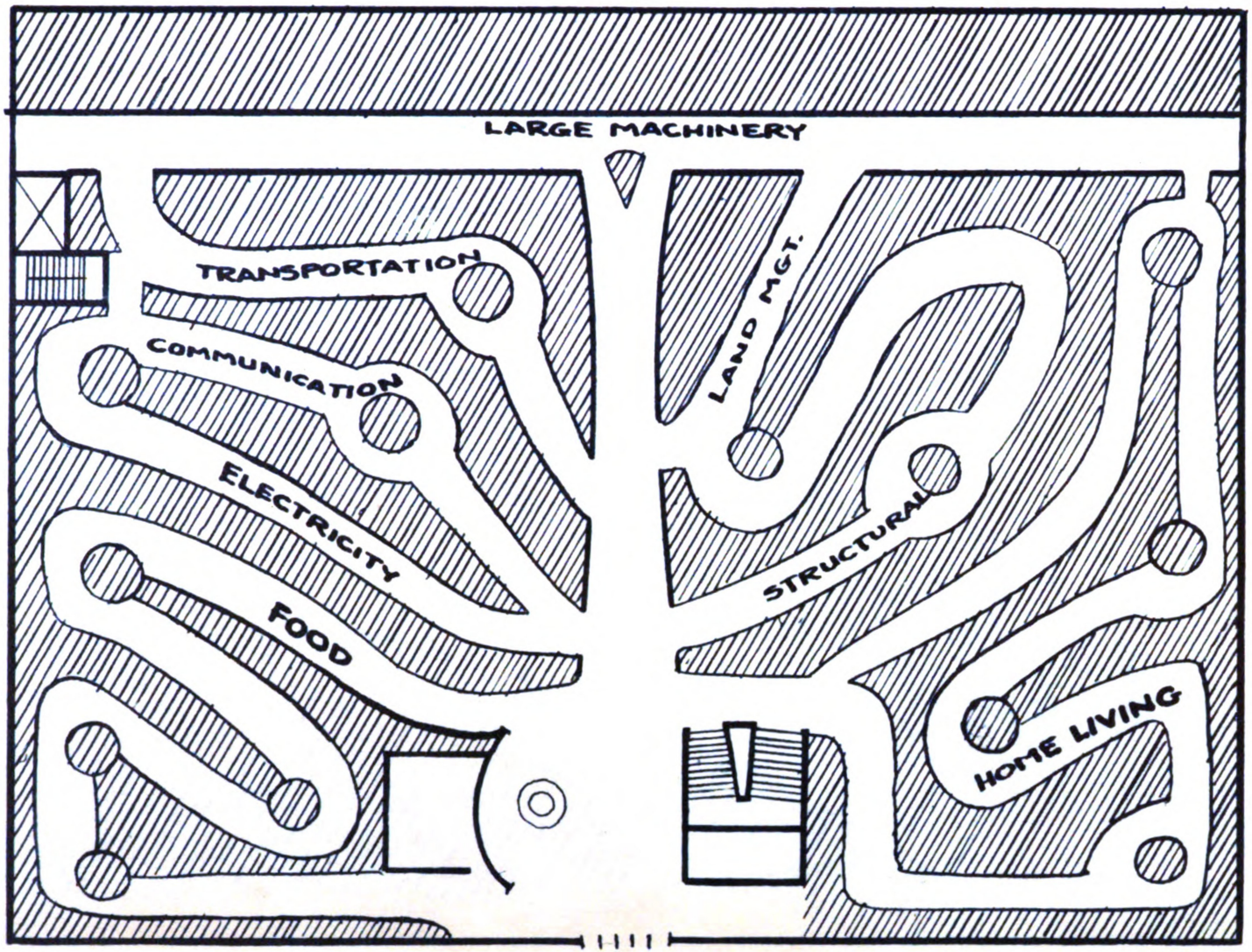


FIGURE 15. The "seven area" proposal for THE TECHNORAMA.

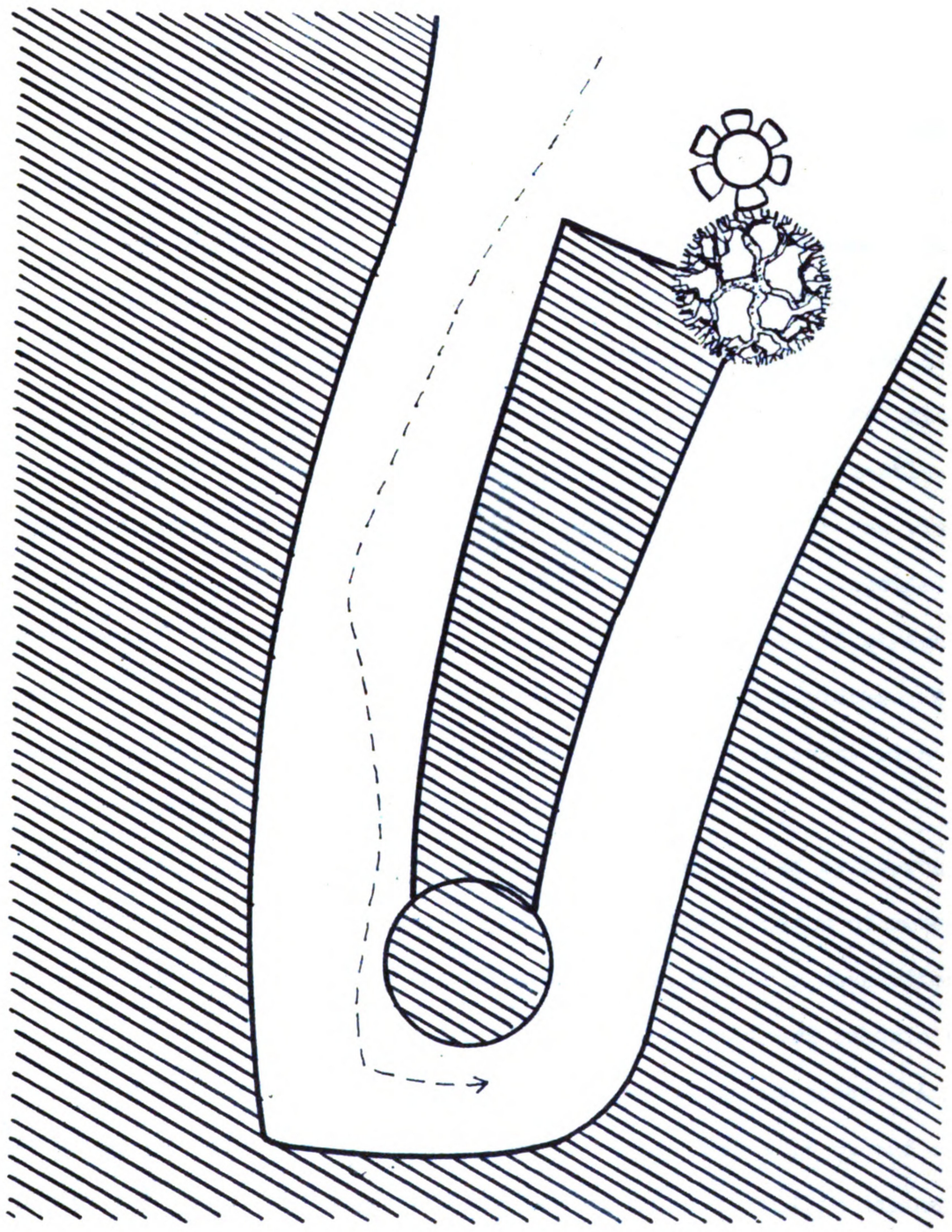


FIGURE 16. Sketch of a story area with gentle curves and bends.

were calculated to appear in conjunction with introduction of a new train of thought. For example, the visitor, after a tour through the relatively straight aisle of the communications area, rounds a focal point bend and finds himself entering into the electricity story. If, throughout the exhibition this pattern is randomly maintained, the visitor is able to anticipate subject matter variation when he approaches a bend, and will adjust his perceptions to the change. This device constitutes another attempt to maintain order throughout the exhibition floor. The gentle curves and bends help also to create an environment of psychological variety wherein the visitor can only partially see along a gentle curve. Therefore, with each few steps he can uncover a completely new vista. In other cases, built-in bends offer the opportunity for a special exhibit, a rest area, or some surprise feature. The aisle width (if strict aisle patterns must be adhered to), can undulate with varying widths. A movable background can also undulate in unity or in contrast with the aisle for greater spatial variation, figure 17.

Within side areas traffic control can be maintained by various devices. A courtyard pattern, figure 18 A, offers freedom of movement around and through the exhibited material, and is a most effective scheme for the display of elegant objects. The courtyard pattern also offers spatial relief when included within constricting areas. A mousetrap pattern exerts strict control of movement, figure 18 B, and can be beneficially applied in cases where the subject material is diminuitive in size and may be consequently overlooked. If a total and complete message must be conveyed in order to be effective, a ramp, figure 18 C, can be a valuable asset. It offers complete traffic control while it provides an opportunity for the designer to hover the visitor above

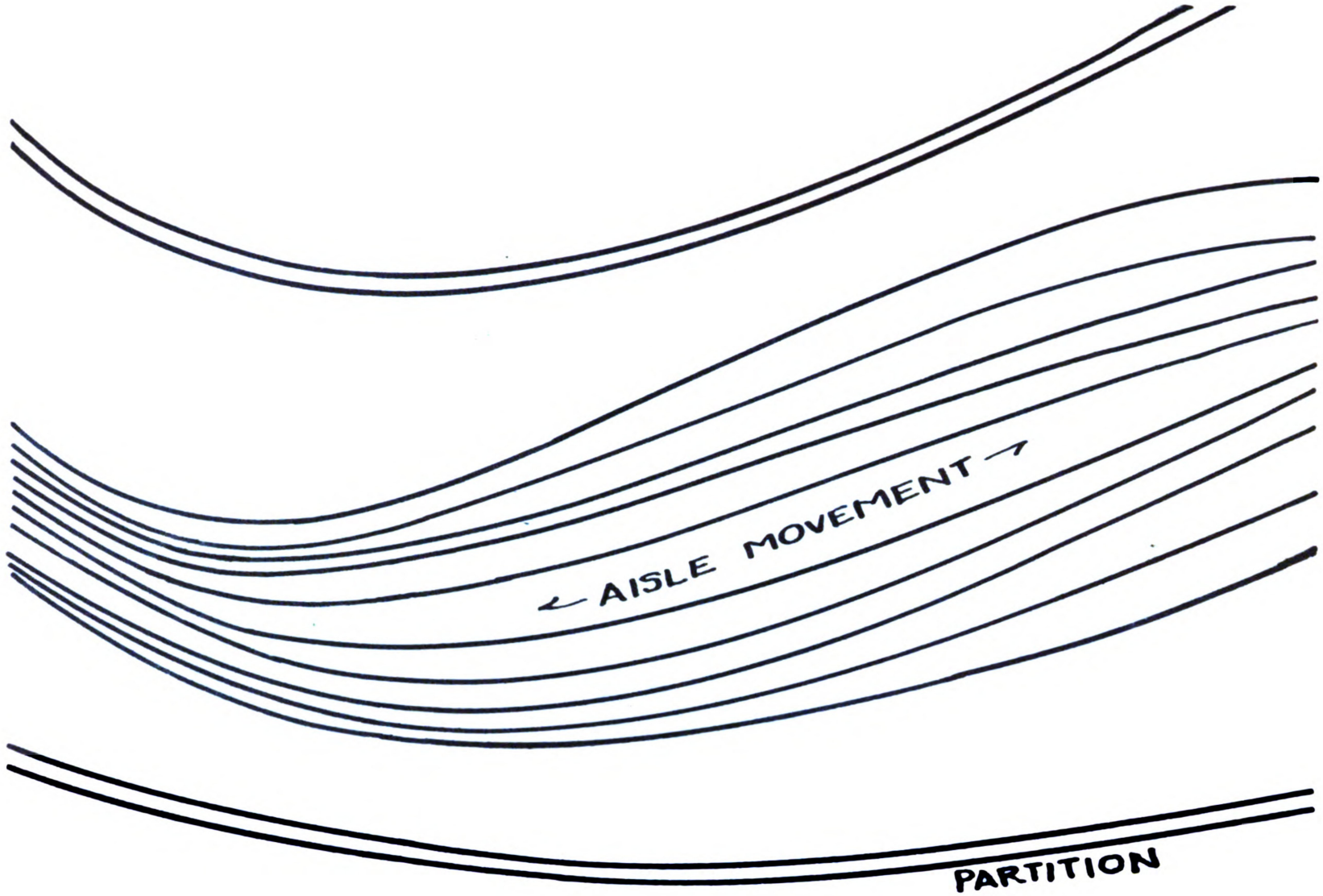
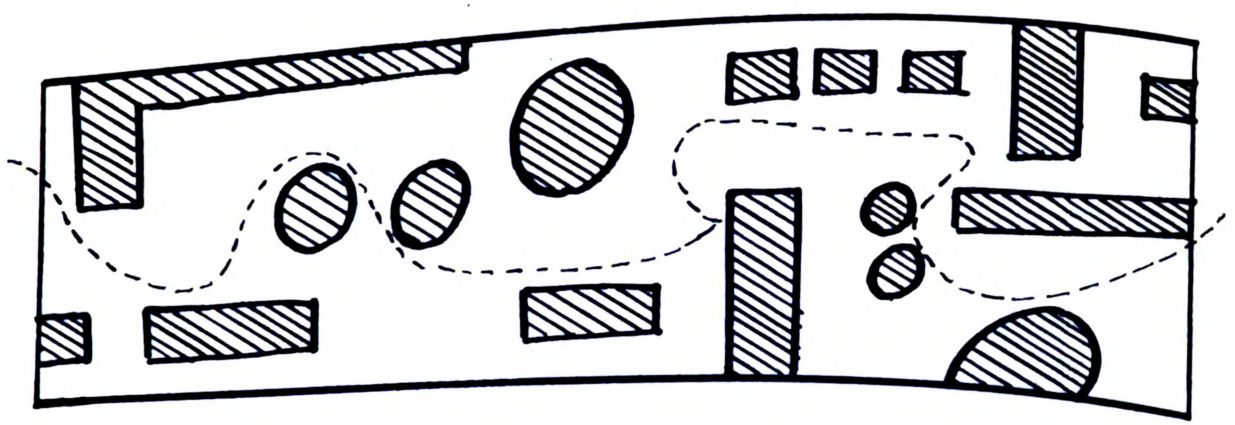
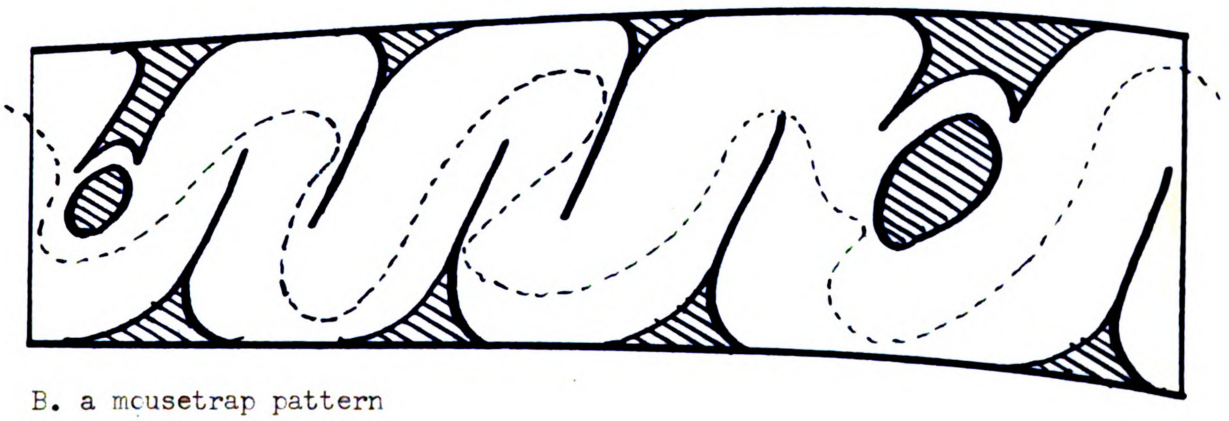


FIGURE 17. Diagram of possible space variations.



A. a courtyard pattern



B. a mousetrap pattern

C. a ramp pattern

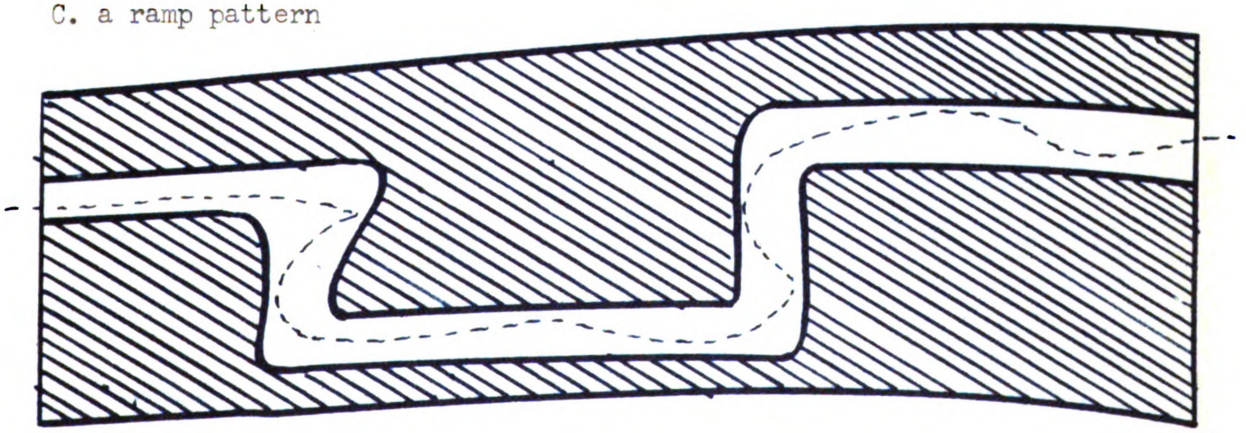


FIGURE 18. Three possibilities of plan variation within a limited area.

special exhibits. Unusual perspectives and delightful space modulation is possible with a ramp. The courtyard, mousetrap, and ramp are but limited examples of the many environmental controls which can be used.

Individual focal points have been placed within the secondary areas as devices of transition from one subject to the next. Focal points may serve as locations of special exhibits, and even more important, they may, if properly designed, serve the function of orientation points.

3. Exhibitor location system

A numbering system was devised which served as both a sales discussion guide and exhibitor location service, figure 19.

The area designated as "Food" (the first segment in the story progression) is identified by a number series beginning with 100, 101... until the area is completed. The following story area, "Electricity-Communication", begins with 200, 201... until the area is completed. The system is continued counterclockwise around the exhibition floor to the final story area, designated "Home", which utilizes a 700 series. The system locates all even-numbered saleable exhibit spaces on the right and odd-numbered on the left. The visitor is definitely aided in cases where a central aisle passes between side exhibit spaces, especially when he attempts to locate a specific exhibit. This numbering system can be applied with appreciable success to many types of exhibition configurations, including the previously mentioned courtyard, mousetrap, and ramp systems.

4. Summary

Evolution of a flow pattern for the Michigan State University facility, THE TECHNORAMA, was launched on the premise that only three major areas

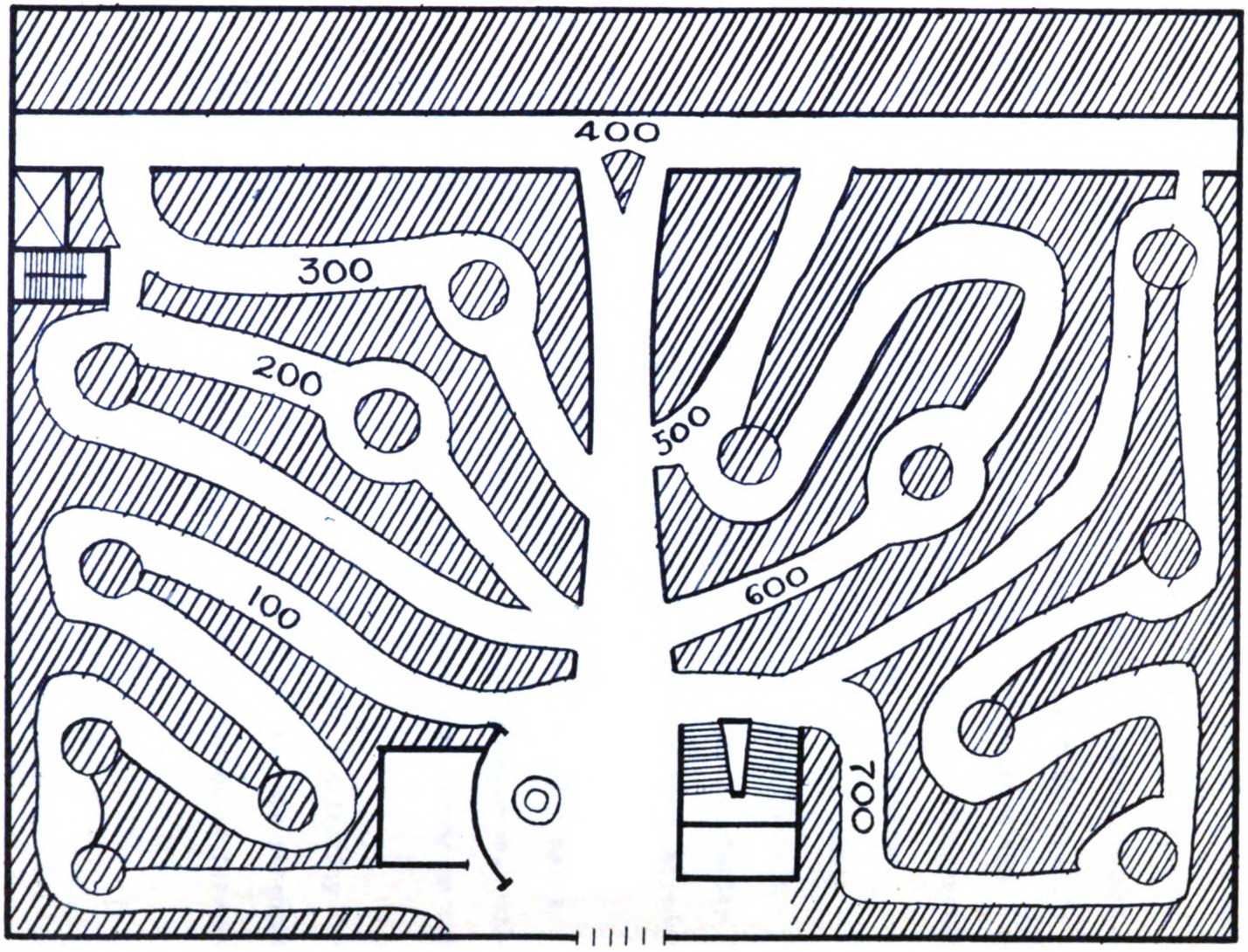


FIGURE 19. Layout of proposed exhibitor location system.

were to be portrayed. Each of the original major areas where then recognized to be too lengthy to arouse and hold visitor interest, and the plan was segmented into more manageable sections. However, the original philosophy of a sequential story progression was maintained.

The flow pattern has been designed as an instrument for traffic control of visitors and, to aid his orientation, recirculates him into the main stream. The flow pattern, by nature of its configuration, provides ready access to all service and administration features.

Within the smaller secondary areas, built-in bends and gently curving aisles provide the opportunity to introduce variety within a framework of unity. The secondary areas also offer an opportunity for easy maintenance of controlled circulation. Focal points introduce variations in subject matter.

An exhibitor location numbering system was devised which has a counterclockwise progression concordant with the story sequence. Odd-numbered exhibits appear on the left, while even numbers appear on the right.

In conclusion, I feel that this scheme offers the possibility for attainment of the prime goal of exhibition, and that is: the potentiality for every conceivable psychological appeal within an aesthetic framework of environmental unity.

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