Circulation In Museums

Linda Hsu

Seton Hall University

Follow this and additional works at: https://scholarship.shu.edu/dissertations

Part of the Arts and Humanities Commons

Recommended Citation

Hsu, Linda, "Circulation In Museums" (2004). Seton Hall University Dissertations and Theses (ETDs). 1141.
https://scholarship.shu.edu/dissertations/1141
Circulation in Museums

Linda Hsu

Thesis Advisor: Professor Charlotte Nichols

This thesis is submitted in partial fulfillment of the requirements
for the degree of Master’s in Museum Professions
Seton Hall University
December, 2004
Abstract

Twentieth century museums are more than just buildings to display and store collections, they have become cultural centers. More and more, their architecture is seen as the prologue to the museum experience that extends beyond the galleries into restaurants, shops, theatres, conference rooms and research area. Central to the design of these multi-functional museum buildings is the plan for how the various spaces are connected – its circulation. The unique circulation plans of three high-profile museums noted for their unique architecture were compared: the spiral ramp in the Guggenheim Museum in New York City, the irregular linear axes of the Jewish Museum of Berlin and the open circulation of Centre Pompidou in Paris. Despite their impact on the art world and their instant popularity, two factors conspired to frustrate the architects’ original intent and worked against these museum building designs. First, issues regarding installation design for exhibit space that conflicted with the circulation function and, secondly the unanticipated huge number of visitors to the museums. With both the Guggenheim and Centre Pompidou recent renovations included plans to improve the circulation.

Future museums will continue to be important civic buildings central to the communities they serve. Their architecture will likely evolve with new design concepts and the use of high tech materials. A crucial element to new museum design should be its circulation plan which gives form to the building and differentiates the space for a variety of functions. Careful consideration of a proper hierarchy of space that balances aesthetic representation with functional needs is crucial to the circulation plan for a successful museum building.
# Table of Contents

Table of Contents i  
List of Illustration iii  
Illustration Credits iv  

I. Introduction 1  
II. Definition of circulation in architect 1  
III. Brief survey of museum architecture in the West 4  

IV. Guggenheim Museum 13  
   Historical background 13  
   The building and design plans 14  
   The circulation plan 15  
   The spiral ramp as exhibition space 17  
   Changes in design 19  
   The Museum then and now 20  
   Postscript on the Guggenheim 22  

V. Jewish Museum in Berlin 24  
   Historical background 24  
   The building 26  
   The circulation plan 28  
   The three axes and voids 30  
   Comparison with the United States Holocaust Museum 32  

VI. Centre Georges Pompidou 34  
   The building 36
The circulation plan 39
The successes and failures of Beaubourg 41
Renovations 42
Beaubourg and contemporary museums 43

VII. Conclusion 45

VIII. Endnotes 50

IX. Bibliography 61
<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fig. 1</td>
<td>Configuration of path</td>
<td>2</td>
</tr>
<tr>
<td>Fig. 2</td>
<td>Altes Museum ground plan</td>
<td>7</td>
</tr>
<tr>
<td>Fig. 3</td>
<td>Variants of the enfilades in museum design</td>
<td>9</td>
</tr>
<tr>
<td>Fig. 4</td>
<td>Frank Lloyd Wright's 1951 perspective of the Guggenheim Museum</td>
<td>14</td>
</tr>
<tr>
<td>Fig. 5</td>
<td>Rotunda of the Guggenheim Museum</td>
<td>16</td>
</tr>
<tr>
<td>Fig. 6</td>
<td>Revised final plan (1958)</td>
<td>19</td>
</tr>
<tr>
<td>Fig. 7</td>
<td>Aerial view of Staatsgalerie showing its open rotunda and ramp</td>
<td>23</td>
</tr>
<tr>
<td>Fig. 8a</td>
<td>Zinc clad façade with windows in the form of slashes</td>
<td>27</td>
</tr>
<tr>
<td>Fig. 8b</td>
<td>Gallery interior showing windows</td>
<td>27</td>
</tr>
<tr>
<td>Fig. 9</td>
<td>Floor plan illustrating Libeskind's idea of the &quot;discontinous void&quot;</td>
<td>28</td>
</tr>
<tr>
<td>Fig. 10</td>
<td>The three axes of circulation</td>
<td>29</td>
</tr>
<tr>
<td>Fig. 11</td>
<td>Voids and bridges</td>
<td>31</td>
</tr>
<tr>
<td>Fig. 12</td>
<td>View of Centre Pompidou, west façade</td>
<td>37</td>
</tr>
<tr>
<td>Fig. 13</td>
<td>Floor plan of Musée Nationale d'Art Moderne</td>
<td>38</td>
</tr>
<tr>
<td>Fig. 14</td>
<td>Floor plan of renovated gallery</td>
<td>42</td>
</tr>
<tr>
<td>Fig. 15</td>
<td>Heizer's &quot;North, East, South, West&quot;</td>
<td>44</td>
</tr>
<tr>
<td>Fig. 16a</td>
<td>Plan, Kimbell Art Museum</td>
<td>47</td>
</tr>
<tr>
<td>Fig. 16b</td>
<td>Interior</td>
<td>47</td>
</tr>
</tbody>
</table>
Illustration Credits

Fig. 1, Configuration of path. (Francis D. K. Ching, *Architecture, Form, Space & Order* New York: John Wiley & Sons, 1996, p253).

Fig. 2, Altes Museum ground plan. (Josep Montaner and Jordi Oliveras, *The Museums of the Last Generation*, New York: St. Martin's Press, 1986, p.18).


Fig. 7, Aerial view of Staatsgalerie showing its open rotunda and ramp. (Douglas Davis, *The Museum Transformed, Design and Culture in the Post-Pompidou Age*, New York: Abbeville Press Publisher, 1990, p.114).

Fig. 8a, Zinc clad façade with windows in the form of slashes. (Bernhard Schneider, *Daniel Libeskind Jewish Museum Berlin*. Munich: Prestel, 1999, coverpage).

Fig. 8b, Gallery interior showing windows. (Bernhard Schneider, *Daniel Libeskind Jewish Museum Berlin*. Munich: Prestel, 1999, p.54).

Fig. 9, Floor plan illustrating Libeskind’s idea of the “discontinous void”. (Bernhard Schneider, *Daniel Libeskind Jewish Museum Berlin*. Munich: Prestel, 1999, p. 20).

Fig. 10, The three axes of circulation. (Bernhard Schneider, *Daniel Libeskind Jewish Museum Berlin*. Munich: Prestel, 1999, p.20).

Fig. 11, Voids and bridges. (James Russell, “Project Diary: Daniel Libeskind’s Jewish Museum.” *Arch. Rec.* 188.1, 1999: p.88).

Fig. 12, View of Centre Pompidou, west façade. (Victoria Newhouse, *Towards a New Museum*. New York: Monacelli Press Inc., 1998, p.195)

Fig. 14, Floor plan of renovated gallery. (Charlotte Ellis, “Redesign of galleries, Centre Georges Pompidou, Paris”, *Arch. Rev.* 178/1065 (1985): 88).

Fig. 15, Heizer’s “North, East, South, West”. (http://www.diacenter.org/exhibs_b/heizer/)


Fig. 16b, Interior. (http://www.kimbellart.org/building/building_tour12.cfm)
I. Introduction

The examination of museum architecture provides one way to chart the evolution of the museum from a sacred space reserved for a few to the current public entertainment forum enjoyed by more visitors annually than the collective fans of all popular sports. In turn, the analysis of museum architecture can be approached from many different aspects: as an example of public building, as an art form, or as representative of social change and relevance. This thesis will address one specific component of museum architecture: its circulation. Three examples of twentieth century museums, the Guggenheim in New York, the Centre Pompidou in Beaubourg (Paris) and the Jewish Museum in Berlin, will be discussed to illustrate the role of circulation and the way in which it distinguishes each specific museum.

II. Definition of circulation in architecture

If one looks at museum architecture as a means to design and build to meet a specific need for sheltering the collection, one important consideration involves the creation of solutions for how movement in space/time will be resolved in the ultimate plan. Although we may not be conscious of this, “our bodies and our movement are in constant dialogue with our building”.1 In essence, how we experience the three dimensionality of a building (perceptual function) is basically through movement of our bodies through time, sequence and space. To meet this circulatory function, the architectural design should include appropriate space to accommodate, direct and enhance movement from area to area.2 This encompasses at least five aspects: approach, entrance, configuration of the path, path/space relationship and form of the circulation space.3 Using any museum as example, one can appreciate the relevance of each following component of circulation:
• **Approach** involves the distant view prior to entering the building, preparing the visitor for the experience of the spaces within the museum.⁴

• **Next is the entrance**, where the visitor goes from the exterior to the interior. While its utilitarian purpose is obvious, the psychological function of the entrance to any building is more subtle yet very important and can be conveyed by a number of architectural manipulations. Museum entrances are usually highlighted by eye-catching decorative or structural components. Traditionally, the entrances are grand and colonnaded to signify the formality of a cultural institution. In more modern museums, special effects associated with the entrance have served as a preview of what the visitor can expect within.⁵

• **Configuration of the path** – this refers to the path of movement from a starting point. In any building, the configuration of the path is determined by a subset of conditions, such as the overall shape of the pathway, the volume of space allotted to the path and organizational pattern of the spaces it links. Although all paths are linear, the configuration or shape can take on other forms (Fig. 1).

![Diagram of Path Configurations](image)

Fig. 1 Configuration of Path (adapted from Ching)
In the radial configuration, linear paths extend from a central common point; the spiral pathway revolves from a central point and moves farther away from the origin. A grid form will have two sets of parallel pathways intersect at regular intervals to create rectilinear spaces, and, as a network, various paths connect at established points that tend to define irregular shaped spaces. In truth, most building exhibit a combination of pathway patterns to meet structural/functional needs. In the context of museum architecture, the configuration of the pathway is very important in the overall design since it is intrinsic to the movement of museum visitors through the exhibit areas that constitute much of the building. Thus, the configuration of the pathway plays a critical role in orienting the visitor and helping him/her to understand the spatial layout of the museum.

- **Path/Space relationship** — the relationship between the path and space in a building can be linked in three different ways. First, the path passes by the spaces, ensuring the integrity of each space. In museums, this is exemplified by the typical enfilade arrangement where long corridors open into galleries. Next the path passes through spaces. In turn, the intervening of spaces trespassed creates patterns of rest and movement. This is also frequently encountered in a museum setting as an intervening space between exhibit areas serving a variety of purposes e.g. reading rooms, sales stations. Lastly, the path terminates in a space, often as a way of emphasizing the importance of the final destination.

- **Form of the circulation space** — this is really about how the pathways for movement are integrated into the spatial organization of a building. Here, the overall form and scale of the circulation space are considered. A circulation space
may be enclosed, open on one side or open on both sides. It can be narrowed to encourage forward motion or widened to accommodate more traffic or create spaces for pausing. The form of the circulation space is adjusted to distinguish the role of the pathway as either a public promenade, private hallway or service corridor. Vertical circulation is also part of the form of the circulation space that affects movement in a building. Both the location of the stairway and its width and slope have to be considered within the overall design because they affect the visitor’s perception of space and also carry much symbolic freight.  

All components of circulation are particularly important in a museum, since it is key to decisions regarding how the collection will be displayed and viewed. More practically, circulation is critical for moving the museum goers through the building. In this paper, the approach and entrance to museums will not be discussed in depth, but the three other components will be examined especially in the context of how the plans of circulation have affected the function of the museums.

III. Brief survey of museum architecture in the West

Early European museums were private, belonging to royalty or papacy, and the physical structure of these early museums were usually a part of the residences or palaces. A corridor framing courtyards that linked the Vatican Palace to the Villa Belvedere may in fact be the first example of museum architecture. Designed by Bramante in 1503 for Pope Julius, this covered passageway, punctuated by statue-filled niches, enhanced the basic circulation function of connecting two buildings with an additional aesthetic component by transforming the walkway into a sculpture court. Such passageways were
the foundations for galleries which in turn became synonymous for museums.⁹

According to Pevsner in his discussion of the museum as a building type, the word
“Musaeum” first appeared in 1543 inscribed on a hall-like structure in Como, Italy with a
series of small rooms along a colonnaded cloister.¹⁰ Usually approximately 200-300 ft
in length, these galleries became part of the architectural design of palaces or residences.
Such structures were more common as the collecting of paintings, sculptures and other
rarities became the preferred past-time of the rich or royal. For example, to display the
Vatican’s collection, Simonetti and Camporesi created the Museo Pio-Clementino
(1773-80), which consisted of a series of monumental rooms inspired by palaces and
baths of Ancient Rome.¹¹ Included in the plan was a grand staircase and a rotunda.¹² By
the seventeenth and eighteenth century, museum building had spread from Rome to
France, Germany and England. The adopted style was Neoclassical as befitting the
emphasis on collections of classical statues. Neoclassicism in architecture embraced
classic forms and themes while rejecting the complexities of the preceding Baroque era.¹³
Refinement and classic proportions were emphasized and the liberal use of the classical
order in the otherwise severe-looking buildings became the prototype of public buildings
including museums. The Neoclassic style was believed to project “correctness” and
authority, befitting the idea that public buildings represent a means of elevating civic
virtue.¹⁴

It was in France, at the Ecole des Beaux Arts, that the use of Neoclassic designs
gained influence in the training program for arts and architecture. Etienne Boulée, a
teacher at the Ecole des Beaux Arts, designed award-winning plans for museums. Boulée
is accredited with the international promotion of the Neoclassic (read as Beaux-Arts)
style. His designs were grandiose and symmetrical. Typically, the museum building was rectilinear with a floor plan that was in the shape of a Greek cross. A prominent rotunda is found above at the crossing and semicircular porticos are placed in the middle of each of the fours sides of the square and represented areas designated to display collections of art, science and natural history. The formality and scale of his designs easily conveyed the notion that museums were temples of art and artifacts.

It was Boullée’s student, Jean-Nicolas-Louis Durand, who modified and made popular his prototype museum in his Précis des leçons (1802-09). This book, which illustrated various building types, was widely circulated and adopted. The spatial lay-out for museums codified by Durand was both aesthetically appealing and flexible for adaptation or variations. The inclusion of massed columns, long, vaulted galleries surrounding courtyards, and a central rotunda appeared in museums built in the nineteenth century, with Leo von Klenze’s Glyptothek in Munich (1816) and John Soane’s Dulwich College Picture Gallery in London (1814) serving as prime examples.

The Altes Museum in Berlin (1823-30), designed by Karl Friedrich Schinkel, also followed principles outlined by Durand and exemplifies the ideal museum building even for architects of the twentieth century. With the Louvre representing the access of a royal collection made public in 1793, the Altes goes one step further to underscore “how the spread of art makes mankind participate in the highest good”. The architecture of the Altes Museum is inspirational. Situated next to the royal castle and cathedral, the Altes Museum represents a key public building which emphasizes the civic and social virtues of the Prussian regime. It was also part of a larger planning program for Berlin,
which involved landscaping and the creation of a public plaza from property previously owned by the Prussian rulers.

A broad flight of stairs from the open square brings the visitor to an impressive and severe building reminiscent of a Greek stoa in form. The building is set on a platform which further enhances its elevated status.20 (see Fig. 2)

![Fig. 2 Altes Museum ground plan, a. steps to platform b. double stairs](image)

The front is flanked by eighteen Ionic columns. The portico is set in the windowless, decorated wall behind the columns and provides a glimpse to the interior of the museum. Even from the outside, one can see a double staircase, making it very clear that the museum is two-storied, a significant variation on earlier museum plans. Beyond, there is a huge Pantheon-like rotunda flanked by two courtyards. This allows light to reach the galleries that surround these courtyards. The adoption of the rotunda as the central focus of the Altes by Schinkel was a motif emphasized by Boullée/Durand that had lasting influence on the designs of other nineteenth and twentieth century museums. For Schinkel, who involved himself in every detail of the museum from the exterior sculptural ornament to the types of picture frame used, the rotunda and stairs were central
to his circulation plan. Schinkel regarded the rotunda as the sanctuary from whence the public initiates this visit to the display of great works of art just as one would visit a temple to pay homage to the gods.\textsuperscript{21}

The central location of the rotunda and the double staircase were obvious signifiers of directions to be followed. The ground floor displayed sculpture while the first floor was devoted to paintings which were arranged in chronological order in adjoining rooms. The circulation pattern devised by Schinkel reflected his intent to coordinate the building’s function in the display of works of art as an educational task.\textsuperscript{22} The stairs were recessed at the center of the stoa creating an unusual point of focus which was both indoor and outdoor (Fig. 2, b). The visitor steps into the building and confronts the rotunda, but if he/she looks back, the view of the outdoor plaza and Berlin beyond is immediate. In this way, Schinkel emphasizes this approach and entry into the Altes as key to the museum experience. He also informs the visitor of the immediate surroundings by tying together the museum and its setting which becomes a recurring principle in museum architecture in the twentieth and twenty-first century.

The neoclassical style of the Altes remained in vogue for the next century throughout Germany, Russia and England, where museums all evoked the somehow understated yet sweeping style deemed so suitable for this specific form of civic buildings devoted to culture. The Beaux-Arts/Neoclassic design in public building was also popular in the United States,\textsuperscript{23} e.g. the Metropolitan Museum of Art (1876), the Museum of Fine Arts of Boston (1876), and remained so even to the mid-twentieth century. The design plan of the National Gallery of Art in Washington, D.C. by John Russell Pope (1937-1941)
echoes the Durandesque motifs of columns and rotunda. It fits in particularly well with the other Neoclassical government buildings in the Capitol.

Museum building in Europe and later in America during the latter half of the nineteenth century reached a record. Not only were there more numbers of museums but there were also more types of museums. In addition to museums of art or natural history, there were now history museums and special ones for applied and decorative arts. Regardless of their distinctive collections, however, the architecture of nineteenth century museums was similar. The exteriors were familiarly severe-looking, and the interior spatial arrangement followed a general pattern with the entrance hall or rotunda serving as the central core of the building. Beyond the rotunda, the collections are exhibited in a series of room, referred to as enfilade (see Fig. 3).

![Diagram showing variants of enfilades in museum design]

**Fig. 3** Variants of the enfilades in museum design

Within the enfilade of galleries specific exhibits may be chronologically or thematically ordered. Although the enfilade arrangement encourages initial free choice circulation, the return trip is fixed and the visitors must backtrack towards the central core for exit.
from the museum. On paper, the floor plans of these museums projected an orderly image of these early museums as storehouses of treasures. In reality, museums of the nineteenth century were actually overly cluttered buildings that can only be truly appreciated by the curators and knowledgeable collectors. The general assumption was that visitors who came to museums did so for specific educational reasons and that they were intelligent enough or sufficiently familiar with the layout to navigate through the building without assistance from the staff. As pointed out by Karsten Schubert in his historical analysis of museums, cultural sophistication (read as the educated upper class) served as the distinguishing criteria for access to the nineteenth century purpose-built museums. Compared to the previous era when only aristocracy was associated with museums, the presence of the educated public within museums was a small step towards the democratization process that took place later in the twentieth century.

The surge in museum building in the latter half of the nineteenth century corresponded with the imperialistic drives of European nations. Starting with Napoleon and later sanctioned by the governments of England and Germany, their respective museums were filled with objects from archaeological excavations and indigenous works of art. By claiming their rights as conquerors or posing as guardians of cultural artifacts that presumably would be ill cared-for by the ignorant countries of origin, France, England and Germany carried out wholesale plunder of Mediterranean, Middle and Far Eastern countries for much of the nineteenth century. By the twentieth century, with the major museums stocked to capacity and with increasing objection from the victimized countries, Western museums shifted their focus from building their collection to the study and display of their acquisitions. Museum building slowed considerably from about the
first decade of the twentieth century to the 1960’s. The havoc of World War II, which devastated many of the monumental museums, especially in Germany, further halted museum growth. After 1945, rebuilding was also not high on the government’s priority list and most of the established European museums struggled to maintain their collections which desperately needed repair and proper conservation.30

While European museum development was waning in the latter half of the nineteenth century, museum building was just getting started in the United States. This growth of museums paralleled the growth of wealth in America’s Guilded Age. Between 1876-1926, major art and science museums were established in New York, Boston, Philadelphia, Chicago, Pittsburg, and Detroit marking an era that defined the singular trend in American cultural life,31 that of conspicuous consumption. Museums glorified the wealthy citizens that sponsored their existence and showcased their good taste. Their collections grew as their rich Americans patrons purchased artworks from Europe at wholesale levels during the period before World War II. By then, in appearance and content, these early American Museums resembled the model nineteenth century European museums. They were large and formal buildings erected in imposing Neoclassical, Romanesque, Gothic or a mixture of these styles as Americans sought to imitate European cultural achievements.

It was also in America, specifically in New York City, that a dramatic change in direction occurred in museum architecture and in fact, the museum culture in general. The Museum of Modern Art (MoMA, 1929) was the inspiration of three forward-thinking (also rich) women and the brainchild of Alfred Barr, its wunderkind founding director. Since a museum dedicated solely to modern art had no precedent, it was
appropriate that its architecture should deviate from previous nineteenth century models.
In fact, the first temporary home of MoMA was an office building that was transformed into several, different-sized galleries and its permanent building designed by Goodwin and Stone (1939) was just as neutral in appearance, clearly moving away from the monumentality (read classicism) that was associated with nineteenth century museums. The message was very clear from Alfred Barr, who coined the term International Modern Style to reflect the severe cubic, multi-storied steel and glass designs promoted by emigrant European architects, including Gropius, Le Corbusier and Mies van der Rohe, that were distinctive for their lack of historic reference. For Barr and all those influenced by him, the very neutrality of the building and its transparency (the glass façade) were key symbols of modernism. In modern museums, patterned after MoMA, the focus was to be on the artwork, and everything else, including the architectural details of the building were muted to avoid detracting attention from the exhibits. The “white box” gallery became de rigueur for all modern museums. Barr’s proclamation of a modern museum as “a laboratory; in its experiments, the public is invited to participate” 33 emphasized the twin goals of public outreach and educational concern, which surprisingly popularized the museum visit in America as never before. The immediate success of MoMA was based on its collections and Barr’s forward-thinking emphasis on research and dynamic programming. In contrast, the three high profile museums to be discussed in this thesis (the Guggenheim, Centre Pompidou and the Berlin Jewish Museum) claimed their fame largely because of their distinctive architecture. At the heart of each of their architectural design is the unique circulation plan which is crucial to the overall function of these museums.
IV. Guggenheim Museum

*Historical background*

In every sense, the Solomon R. Guggenheim Museum is a modern museum as envisioned by Barr. Although it was built in the mid 1950's, some twenty years later than MoMA, it has a timeless quality epitomizing modernity that the architecture of MoMA was not able to transcend. What is different about the Guggenheim is its architecture, which was far from neutral. Furthermore, Wright’s founding philosophy to “make the viewing and enjoyment of art a far richer and meaningful experience than the traditional museum plan” was based on his spiral design that combined both the circulation pathway and the exhibit gallery. As a result, this unique museum building supercedes the art within, a trend widely followed in museum building at the end of the twentieth century.

The making of the Guggenheim Museum reads like a saga in which the architect, the curator, the client, the New York city officials and much of the art world all played a role. The complex history behind this remarkable building illustrates all too well the constant, struggle for artistic authority that takes place, which often times help explain the success or failure in contemporary museum design.

Solomon Guggenheim built his fortune on copper, tin, gold and diamond mines in both North and South America and Africa. An avid art collector, his sizable holding included classical masterpieces and also contemporary abstract art which he started to amass when he recruited Hilla Rebay to be his artistic adviser/curator. By 1928, Hilla Rebay had convinced Guggenheim that the study of non-objective art, such as those of Vasily Kandinsky, Paul Klee and Piet Mondrian, was key to a creative life and peace.
and that this kind of new art must be seen in a wholly new kind of space. For both Rebay and Guggenheim, a suitable place to show non-objective art should have the quiet ambience of a temple for contemplating such works. In her choice of architect, Rebay rejected European Modernists who championed the International Style which she deemed too conventional. Instead, she approached Frank Lloyd Wright, whose building design included organic materials and themes from nature projecting a cosmic vision, concepts that fitted Rebay’s philosophy and utopian interpretation of non-objective art.37

The building and design plans

The Museum was to be located at the southeast corner of Eighty ninth Street and Fifth Avenue overlooking Central Park in the midst of a wealthy residential area. Wright’s original plan showed an eight story tower that contained the spiralling gallery/ramp around an open court, or Rotunda, lit by natural light from an immense glass skydome. This tall tower in turn is connected to a four story wing (the Monitor tower) for storage, classrooms and Rebay’s apartment. These two towers were interconnected by a roof-garden. Both towers rested on a horizontal band that defined the Fifth Avenue façade and reached across the main entrance. (Fig. 4)

Fig. 4 Frank Lloyd Wright’s 1951 perspective of the Guggenheim Museum
Wright's spiral design for the museum and the creation of essentially a single exhibit space within a rotunda was inspirational and in sharp contrast to the conventional typography of museum building as a box. As Wright explained to Rebay and Guggenheim, the single continuous gallery in the form of the spiral was the best way to express the space-time continuum that will allow the viewer to appreciate the non-objective art on display. Non-objective art was pure "space, form and line" and Wright created a museum interior to match that. Wright referred to the Guggenheim Museum as the Modern Gallery where the viewer can appreciate "multiple vistas of the art instead of the conventional single frontal perspective." Both Rebay and Guggenheim envisioned a memorial building so unique in its atmosphere that visitors would be overwhelmed and in turn be lifted into the spiritual realm of non-objectivity. For Wright, the spiral design was symbolic of completeness and self-fulfillment. Neil Levine, in his analysis of Wright's architecture, believes that "the circle and spiral were thus initially associated in Wright's mind with the creation of a public space for leisure activity and cultural events, a social and intellectual gathering place."

The circulation plan

Wright's use of the circle/spiral motif is obvious everywhere in and outside the building. Regardless of the direction of approach, from the north, south or across Central Park, the large rotunda is clearly visible and stands out starkly against the neighboring, rectilinear high rises. The Guggenheim is the only round building on Fifth Avenue. The round motif is even repeated on the sidewalk between Eighty-eighth and Eighty-ninth Street which is paved with circular concrete slabs enclosed in brass. The entrance to the building is rather understated, being recessed from the street and placed
beneath a hovering low ceiling. Here, Wright prepares the visitor for the surprise within, for when the visitor passes through this low entrance, he or she is greeted with a brightly lit lobby space that opens up to a ninety-six feet wide sky dome located over one hundred feet above. A spiraling ramp frames this space and from the lobby level, the art work displayed on the walls cannot be seen. In a word, the building must be experienced first before the art.

The genius of his design and true innovation was to make the Great Room/Rotunda both the exhibition space and the circulatory path. The mainstay of Wright's design resembles a ziggurat that has been modified in two important ways. First, he inverted the form, such that the widest stage formed the top and the narrowest the base. This ensured that the light from the skydome will reached to all lower levels. Secondly, the core of the ziggurat was gutted to create the voluminous space for the Rotunda with the perimeter of the ziggurat forming the spiral ramps or parapets. The upturned ziggurat design also allowed the vertical view of the central court of the Rotunda to be unobstructed from any parapet level. The entire building is to be experienced and not just at fixed points in the process of circulation (Fig. 5)

Fig. 5 Rotunda of the Guggenheim Museum
In his original planning, Wright envisioned the visitor to take the glass-enclosed elevator to the top of the ramp and then descend in a leisurely fashion while viewing the paintings along the way until the main floor is reached. Connecting all levels is a vertical core, situated between the tall and short towers. This vertical circulation core consisted of two glass-encased elevators and a narrow ramp which wrapped around the elevators to provide an alternate route for reaching each level. Expanding from the vertical core are the parapets which serve as both the circulation pathway and the gallery. The visitor also had the option to skip floors by using the steeper ramp around the elevator to gain access to any specified floor. The rationale behind his circulation plan, according to Wright, was that this up-and-then down direction was more logical, because the visitor did not have to retrace the pathway if he/she started from the top level at the beginning of the spiral and ended near the exit. Starting at the top of the building was symbolic since the ride upwards in the glass elevator signified a “cosmic embrace of the sky” that was central to Rebay’s ideals of the spiritual realm of non-objective art. Ending the museum tour on the ground floor in the special Grand Gallery, where Rebay has chosen to display the most important works accentuated the focus on non-objective art. Finally, when the viewing of art was finished, Wright envisioned the lobby area as the center of social activities that was to distinguish the Solomon Guggenheim Museum from other museums which did not offer such an enjoyable social experience with a museum visit. Visitors can mingle in the lobby, meet friends, refresh themselves at the restaurant or shop in the museum store.

The spiral ramp as exhibition space

It was uncanny that Rebay’s initial ideas for the museum also centered on a spiral pathway with no stairs. However, much as Rebay and Wright seemed to be of the
same mind in their vision of the museum, the very radical plans that Wright presented to
Solomon Guggenheim in the summer of 1944 immediately created a lot of questions.
There was concern about the slope of the ramp. Rebay worried about the constant
climbing along the ramp and was reassured by Wright that the Guggenheim Museum
“will be a paradise for elderly and tired people to see beautiful things” and that the ramp
would be an effortless walk that is only slight uphill! In fact, Wright’s seeming
disregard of such practical issues to vouchsafe his design caused his critics to complain
that the museum was all about his architecture and not about the museum or the
collection.

The perception that the Guggenheim Museum is in reality what Wright himself
called an “archesem” (a hybrid of architecture and museum with the emphasis on the
former) is not quite accurate. The Guggenheim project was no doubt the crowning
achievement of Wright’s late years and the embodiment of his building philosophy.
Wright was emphatic that this design reflected the totality of aesthetic experience where
the paintings and architectural elements worked together to form a unified environment.
Issues of the physical height of the ceiling, the amount of light and the type of the light,
the texture of the gallery wall were all taken into consideration. The cosmic feel of the
Rotunda with its tremendous skydome was counterbalanced by the human scale of the
spiral ramp/gallery. The width and height of the parapet, which measured nine feet high
and less than twenty five feet deep was comfortably suitable for the display of medium-
size canvases. Wright suggested the use of three-foot deep bases which projected from
the wall on which the paintings rested, propped against the slightly slanted wall, lit by
natural light coming from the clerestory along the perimeter. Wright believed that
eliminating both the frame and overlying glass from the paintings was necessary to engage the viewer more fully and the curved wall of the spiral ramp liberated the painting from the “neutral/orthodox” environment which robbed the works of their spiritual significance.\textsuperscript{48}

\textit{Changes in design}

Although most of Wright’s design remained intact through the protracted period of 15 years before the building was completed in 1959, significant changes were made because Wright had to concede to a new client, Harry Guggenheim, who represented the family’s Foundation upon Solomon’s death in 1949. More problematically, Wright faced a new museum director, James Johnson Sweeney, who replaced Rebay and virtually opposed every idea Wright and Rebay had about exhibiting the artworks. To meet the charge of the Foundation to keep within the budgeted two million dollars, cost saving measures included the reduction of the building height by one story, and narrowing of the gallery ramp.\textsuperscript{49} To meet fire codes and building regulations, the original plan for a second ramp that wrapped around the elevator had to be scrapped. Instead, Wright replaced the semi-circular ramp in the vertical core with a triangular tower fitted with stairs (Fig.6).
The additional installation of a fire stair and freight elevator in the space between the circular service nodules necessitated the displacement of the ramp into the open court space. This break in the symmetry of the rotunda interior (see Fig. 5) actually lends a pleasing bowing effect that increases the dynamism of the circular space compensating somewhat for the de-emphasis of the vertical core of the elevators as the starting point of the circulation plan.50

The Museum then and now

When the Guggenheim Museum opened its door in October of 1959, six months after Wright’s death, it was hailed as “the most extraordinary and most controversial example of modern architecture”.51 As a museum however, with the expanded mission of the Guggenheim Foundation to exhibit more than the non-objective forms of abstract art championed by Rebay, the question of suitability of the gallery space and circulation plan dictated by Wright again loomed large. There were those who criticized Wright for his dismissal of the fundamental rectilinear frame of reference for paintings, accusing the architect of sublimating the art for his architecture. Yet, there were also admirers including Philip Johnson, the leading museum builder, who proclaimed that in the Guggenheim, Wright created “one of the greatest rooms of the twentieth century [with] art defying architecture.”52

The Guggenheim Museum of today has seen several additions and renovations to accommodate its ever-expanding collection and functions. In the opinion of the architectural historian Victoria Newhouse, criticisms lodged against the original Wright building stemmed largely from ignorance of the architect’s original intent and subsequent changes further ruined or masked Wright’s design. In short, she charges that additions to
Wright’s building are “just plain wrong”.\textsuperscript{53} The new tower of the Guggenheim designed by Charles Gwathmey and Robert Siegel (1992) is a slim rectangle that rises four stories above the Rotunda. Its location on Eighty-ninth Street serves as a backdrop to the original building just as Wright had suggested in 1951.\textsuperscript{54} The Gwathmey/Siegel building provided an addition 7,450 square feet of exhibition space in four rectilinear galleries\textsuperscript{55} that are interconnected to the original building. Gwathmey and Siegel articulated the spiral ramp gallery space with the new rectangular galleries using the vertical core of the stairs as the focal point. This is an interesting twist from Wright’s use of the vertical core of the elevator as the axis for the spiral ramp. The additions and renovations that took place in the early ‘90s also restored original features from the Wright plan including the use of the top ramp level as exhibition area rather than for storage, the use of the continuous clerestory to allow in natural light,\textsuperscript{56} and the restoration of the auditorium and relocation of the restaurant. Despite these beneficial functions, the disruption of the original circulation path is obvious. The fact that the three towers, each with their separate set of galleries, are now interconnected still does not translate to a smooth circulation plan that clearly orients the visitor.

Wright’s emphasis on an open, flowing interior space was central to his goal to free architecture from the “box” concept. That he should have met his goal in a museum building is even more germane. His spiral design and prominent use of the circular or oval motifs sought to reduce the rectilinear frame of references fundamental to two dimensional works and the building typology of existing museums. When plans for the Guggenheim Museum were made public, well-known painters including Willem DeKooning, Philip Guston, Franz Kline, and Robert Motherwell spoke out against
Wright’s ideas.\textsuperscript{57} Since then, the curators of the museum have persisted in arguing about the advantages and disadvantages of the spiral ramp as the exhibition space. The coexistence of the exhibition space and the circulation pathway puts a constraint on both functions. While the spiral ramp and its enclosed bays can serve at once as a continuous yet separated gallery, the size of the art work must be considered. Large works of painting or photographs will suffer on one hand, but three-dimensional sculptures or installations are well suited. When the architecture of the Guggenheim was specified in the commission of works such as those shown in the 1971 International Exhibition,\textsuperscript{58} those that engaged the motifs of the spiral ramp or the rotunda space were particularly successful and eye-catching e.g. Donald Judd’s concentric circular sculpture, Donald Flavin’s colorful installation of fluorescent tubes that highlighted each gallery bay, and Daniel Buren’s huge striped banner that hung from the rotunda skylight. It would seem that at the Guggenheim Museum, art is frequently overshadowed by the architecture.

The current building is problematic when the circulation component is considered. With the circulation path coexisting as exhibition space, the logistics of people movement is greatly compounded. When a million visitors/year are involved, the crowding and the noise level significantly decrease the aesthetic experience. The persistent shortage of elevators to move people to the top to start an exhibit has led to the curatorial practice of installing exhibits from the ground floor up instead. In truth, as one museum staff notes that this does little to solve the problem of crowding except to save on elevator repair.\textsuperscript{59}

\textit{Postscript on the Guggenheim}
The seduction of the spiral form in architecture continues to inspire other museum builders. In the High Museum of Art (1983) in Atlanta, Georgia, Richard Meier created an atrium that is surrounded by a long spiral ramp and capped by a fan-shaped skylight. The white interior of this museum is also reminiscent of the Guggenheim. The big difference between the two lies in the function of the ramp which is used only to transport the visitors to each level in the High Museum where the art is displayed in traditional rectilinear galleries. Another contemporary museum frequently compared with the Guggenheim for its innovative architecture is James Stirling and Michael Wilford’s Staatsgalerie (1984) in Stuttgart, West Germany. The underlying design of this museum complex reflects Durand's prototype which, of course, is very much the antithesis of Wright's building. Here, the galleries form an angular shape which surrounds a central court dominated by an open rotunda. Within the rotunda, a spiral ramp leads the visitors into the connecting galleries. Thus the rotunda again serves as the point of reference much as it did for the Guggenheim. Stirling’s post-modernist touches with the use of color and varying building materials created a distinctive architecture that is definitely also not neutral or "box-like" (Fig. 7).

Fig. 7 Aerial view of Staatsgalerie showing its open rotunda and ramp.
V. Jewish Museum in Berlin

In quite a few ways, the Jewish Museum in Berlin resembles the Guggenheim Museum in New York. For one, its architecture has been described as “the last architectural masterwork in twentieth century Berlin and its foremost building for the twenty first” which carries the same weighty importance as Wright’s masterpiece in New York. The architecture of the Jewish Museum, which is often described as having a zig-zag geometry, is just as distinct as a building form as Wright’s spiral. In both museums, it is the form that determines the museum, more so than its contents. Its architect, Daniel Libeskind, however, did not design and build the Jewish Museum (1989-1999) when he was already famous as Wright was when he designed the Guggenheim Museum. In fact, when Libeskind won the competition for the design of the Jewish Museum, he had not yet built a single structure, even though he had won several prestigious competitions. Libeskind impressed the jurors because he was able to translate the philosophy and mission of the museum with his architectural plans. Remarkably, Libeskind’s building plan revolves around three principle axes which corresponded to the three phases of Jewish history in Berlin. Those three axes also form the circulation plan of the museum.

Historical background

The founding of the Jewish Museum of Berlin has a complex history that goes back to 1933 when Berlin’s first Jewish Museum opened, one week after Hitler became chancellor. It lasted only five years when its contents were plundered and the museum was dismantled by Nazi authorities. Not until the 1960’s was the need to rebuild it addressed. The city council eventually decided to integrate the collection of materials
and artifacts on Jewish history within a Jewish Museum Department as part of the newly established Berlin Museum. Earlier, in 1962, the Berlin Museum was founded in response to the separation of the city by the Wall which prevented access to the existing history museum, the Markische Museum, which was located in the East sector. In West Berlin, the city museum was set up in a restored Baroque palace revamped as the High Court, the Colliegenhaus. In 1988, the Senate agreed to approve the financing for a separate building for the Jewish Museum Department.

The directors of the Berlin Museum and the Jewish Museum Department were very definite in their conceptual brief for the architectural competition. They essentially challenged the architectural design to specifically address the accommodation and exhibition of the historical collection that included:  

- Jewish religion, customs and ritual objects
- the history of the Jewish community in Germany, including the rise and decimation of Jews under the Nazis
- materials on the lives and works of Jews who left their mark on the face and history of Berlin over the centuries

In addition, the architectural design had to fit in with the existing Colliegenhaus and its neighboring environment. It was also clear that the design should reflect the undeniable fact that the history of the Jews and the history of Berlin are intricately woven together and that the void left by the Holocaust must somehow be reckoned with. In short, the Berlin Museum with the Extension of the Jewish Museum Department wanted to be identified as the center of Berlin’s civic culture and the focal point of its historical self examination.
The building

The Berlin Museum, which includes the Colliegenhaus and the Libeskind extension, faces west along Lindenstrasse in the center of South Friedrichstadt, a part of East Berlin which was decimated by air raids. The site sits amidst post-war reconstruction housing projects in a largely residential section with a few historical public buildings that have survived. Amongst these is the restored Colliegenhaus, a symmetrical, U-shaped, Baroque building with a red tiled roof. Libeskind's new extension which has its shortest elevation right next to the Colliegenhaus is immediately noticeable for its distinct façade and shape. This highly abstracted structure is based on zig-zag plan that runs from West to East and is dramatically clad in vertical zinc panels. It is the same height as the Colliegenhaus, but without the conventional placement of windows in a grid-like arrangement, the number of floors or the interior cannot be ascertained. Windows receive the most unusual treatment in Libeskind's extension. There are over a thousand windows that appear as narrow bands incised into the zinc cladding and framed by rows of rivets. These bands intersect vertically, horizontally or diagonally, creating abstract geometric patterns over the shiny metal façade (Fig. 8a). For the approaching visitor, this unusual treatment of the building's exterior serves as a prologue to the subsequent experience of being in a building that is wrought with architectural features that are tied to history of the Jewish people in Berlin. Libeskind explains that the interesting patterns created by the intersecting window bars were "defined by plotting the lines of connectivity between individual places of Jewish importance on the Berlin city map."
With a design that included irregular trajectories, slanted walls and disconnected building components, Libeskind’s plan at first seems irrational and indecipherable. However, the architect explains that the idea behind the design is simple: to build the museum around a void that runs through it, a void that is to be experienced by the public.”74 (Fig. 9) Libeskind prefers to describe this project as “between the lines”. He explains that “it is a project about two lines of thinking, organization and relationship. One is a straight line, but broken into many fragments; the other is a tortuous line but continuing infinitely. These two lines develop architecturally and programmatically through a limited but definite dialogue. They also fall apart, become disengaged and are seen as separated. In this way, they expose a void that runs through this museum and through architecture – a discontinuous void.”75
Libeskind’s architectural approach follows Deconstructivism, disregarding any connection between form and function, often disarticulating and reassembling geometric shapes to create new forms. The asymmetry and manipulation of space typical of deconstructive design has profound psychological effects on the occupants. This was certainly true with Libeskind’s Jewish Museum. When the building was open to the public in 1999, prior to any interior installation, more than 350,000 visitors flocked to Berlin just to experience the empty building. These visitors were overwhelmed by their emotional response to the building. At the heart of this phenomenon was Libeskind’s carefully considered circulation plan.

The circulation plan

To begin with, the approach to the new extension is unusual in that the museum does not have its own separate public entrance. Instead, one must enter via the sole entrance of the Berlin Museum in the Collegienhaus and confront a giant stairwell to reach an underground corridor leading to the Jewish Museum. That the two museum divisions are clearly separate above ground, share a common entrance and are connected underground are all important architectural features that symbolizes the complex
German/Jewish history. As explained by Libeskind, "the existing building is tied to the extension underground, preserving the contradictory autonomy of both on the surface while binding the two together in depth."\textsuperscript{78}

This subterranean corridor is the backbone of the circulation plan and leads in three directions guiding the visitor to separate areas of the museum representing different phases of German/Jewish history. (Fig. 10) The most direct path (called the Axes of Continuity) brings the visitor to the exhibit galleries located in the upper three floors where Jewish history from 1871 to the present is exhibited. The other two Axes veer from the main corridor and intersect with each other to form a "X" terminating at the Holocaust Tower or the Garden of Exile and Emigration which are two separate units located outside the main building.

Fig. 10 The three axes of circulation

This seemingly straight-forward circulation plan allows the visitor to choose where they want to go within the Museum. What is unusual about the Jewish Museum is the way in
which Libeskind built into the circulation plan numerous features that have powerful emotional effects on the visitors, enriching their experience in the galleries and reinforcing the memory/meaning making purpose of the museum itself. Libeskind's architectural language is not so much narrative but a juxtaposition "of deeply abstracted materiality". His design details awaken the visitors' senses and create memory traces of his remarkable building long after the museum trip is over.

For the visitor, walking through the museum with its thirteen galleries is both an emotional and physically demanding experience, a kind of psychological journey, unlike the Guggenheim's designated stroll on the ramp. The unconventional spatial design is at once disorientating and stimulating. Libeskind has definitely tapped into the studies of wayfinding which explain that the initial visit to a new environment is the most important because the necessary exploratory efforts make one aware of the spatial/architectural layout. For a museum visit, this implies that it is the first visit that helps the museumgoer to be keenly aware of the circulation plan. In the Jewish Museum in Berlin, the first visit for the museum visitor is enriched by the physical challenges built into the interior environment.

**The three axes and voids**

To reach the exhibits, one must pass the main corridor (the Axis of Continuity), which has a slight incline before facing a steep set of stairs running three stories high without any breaks. The stair's immense vertical space contrasting with its narrow width creates a powerful forbidding form. When the exhibit areas are reached, they are definitely unconventional, being irregular in shape with angled walls. Both the natural lighting, from the distinctive window bars and artificial spotlights embedded in the
ceiling, cast unique patterns on the pathway, creating different atmospheres from gallery to gallery (Fig. 8b). There is a definite sense of disorientation because the passageway is tortuous, preventing the visitor to see what is ahead. Furthermore, the circulation pathway is repeatedly interrupted by the five voids that cut through the museum galleries on each floor. In order to continue, the visitor must cross over narrow bridges (see Fig 11) of which there are 60 in total.

![Diagram of voids and bridges]

**Fig. 11** Voids and bridges

As explained by Andreas Huyssen, "Their very presence points to an absence that can never be overcome . . . and thus becomes a space that nurtures memory and reflection for Jews and for Germans". Libeskind painted the void areas graphite-black to contrast with the grey or white of the remainder of the museum and stipulated that no exhibits be displayed on the walls of the void (Fig. 8b).

In his original plan, Libeskind suggested four separate tower structures that mirrored the vertical voids within the museum proper. Budget constraints allowed only the Holocaust void to be built. This can be reached by the Axis of Holocaust, a long corridor which is steeply inclined as it reaches the tower where the ceiling height correspondingly decreases. Along the walls are display cases filled with artifacts.
previously owned by Holocaust victims. The names of Nazi death camps cover the walls. The pathway ends at the Holocaust Tower which is entered by a large, heavy metal door. Beyond, the visitor finds him/herself in a concrete tetrahedral space that reaches three stories where a narrow opening at the top lets in dim light. The closed, unheated, empty tower representing the concept of the void is an austere place that impacts powerfully on the visitor. Here, the sense of loss is acute and immediate.

The third Axis leading to the Garden of Exile and Emigration provides some relief to the visitor. Along the corridor are displays demonstrating the story of 276,000 Jews who successfully fled Hitler’s Germany. At the end of the corridor, the path leads outside to an unusual garden where trees grow out from 49 concrete columns; these columns are set in a 7 x 7 grid enclosed by a low wall and surrounded by rose bushes. This garden of concrete columns has a slanted floor which poses as yet another obstacle for the visitor and a reminder of the emigrants’ disorientation and struggle.

Since its opening, the Jewish Museum has attracted a record number of visitors (660,000 in 2002 and 2003) making it the third most popular museum in Berlin, a city filled with monumental museums. No doubt, the visitors came to experience the building as well as the exhibits of Jewish/Berlin history. However, critics have raised the issue that Libeskind’s architecture evokes such strong emotions that it distracts the visitor from experiencing the permanent collection. The same critics have suggested that the best way to memorialize the tragic history of the Jews in Berlin is to leave the museum as an empty building.

*Comparison with the United States Holocaust Museum*
A comparison of Libeskind's Jewish Museum with James Ingo Freed's Holocaust Museum (1993) in Washington, D.C. is instructive. Freed's Holocaust Museum is a complex of brick and limestone that denotes a mixed style combining the requisite formality of the neoclassic public buildings (like its neighbors on the Mall) with the ordinariness of an industrial factory. Its understated appearance has been cited as "the 20th century's most successful example of architectural form in dialogue with its very content." In short, its architectural design is ideal for its program and narrates the sense of tragedy that is the Holocaust. In the architect's own words: "I have to make a building that allows for horror, sadness. I don't know if you can make a building that does this, if you can make an architecture of sensibility." In his plans for the United States Holocaust Memorial, Freed created a building of exceptional sensibility and impact. Here again, the circulation plan plays a critical role.

Freed's design includes a three-story building that can be accessed by both the Fourteenth and Fifteenth Street entrances, one for individual visitors and the other for groups. The Fourteenth Street entrance for individuals is guarded by a rotating door which slows the flow of visitors to single file, subtly preparing the visitor for the somber experience that awaits within. Beyond the entrance is the Hall of Witness. This Hall is equivalent to the rotunda of nineteenth century museums and serves as the initiating point of the visitor's tour. It is an arresting space that is at once intimidating because of the rising brick walls that enclose it and open because it is well-lit from the overhead glass roof that runs the length of the Hall. Despite the brightness, it is not a welcoming or serene space, as would be typical of other atria or rotunda of museums, due to the heavy criss-crossing metal beams that form a framework over the skylight. Freed thus subvert
the space of the Hall creating a grid pattern of shadows on the walls and floors that is
disturbing to the visitors.

The circulation through the museum starts from this central locus. Beyond the
Hall of Witness, the visitors must choose their way. They can go up a flight of stairs to
the hexagonal Hall of Remembrance, or go down to the auditorium and auxiliary galleries,
or enter the elevators to proceed to the permanent exhibits which start on the fourth floor.
Regardless, the pathway is always one way and one must retrace one’s steps, ending back
to the Hall of Witness. Throughout the circulation plan, Freed created an alternating
atmosphere of light and dark as the visitors move from the closed galleries to the glass-
covered bridges that cross over the Hall of Witness back towards another series of
galleries. As in Libeskind’s Jewish Museum, the visitors in Washington D.C. experience
more than just the exhibits’ narrative because the architectural details also remind them
of the history of the Holocaust. In both museums, the architects have used their
circulation plans as the reinforcing element for the visitors to become aware of the
enormity of the tragic history of the Jewish people. Libeskind’s distorting axes and
Freed’s relentless use of repetitive crossing over the Hall of Witness are not only
functional in that they provide passage to the exhibits, but also are important features that
help to articulate the tragic history of the Holocaust.

VI. Centre Georges Pompidou

The drawing of great crowds to museums remarkable for their architecture started
with Wright’s Guggenheim in the late 1950’s and is certainly true of Libeskind’s Jewish
Museum at the end of the century. However, the credit for popularizing museums and
energizing the architectural world to recontextualize this type of civic building goes to
Renzo Piano and Richard Rogers (P+R), a pair of young unknown architects who were
responsible for creating Centre Georges Pompidou (1971-1977). The P+R team had
entered and won the international competition to design a cultural center cum library in
the Marais district of Paris known as Beaubourg.\textsuperscript{92} It was President George Pompidou’s
idea in 1969 to combine the need for a public library and a modern art museum in a
contemporary building that would re-establish Paris as the center of culture.\textsuperscript{93} Out of
681 entries, the young P+R team, partnered with the established engineering firm of Ove
Arup, impressed the jurors, including renowned European and American architects,
curators, and President Pompidou, with their high-tech design unlike any existing
museum.\textsuperscript{94} They won also because their design gamely met the criteria of the program
brief which emphasized ready access, flexibility of space and integration with the
neighboring urban setting.

This Center of National Art and Culture,\textsuperscript{95} the prototype of the museum as
entertainment,\textsuperscript{96} was to be a multi-use complex that would include not only the library
and art museum but also a children’s library and workshop, an industrial design center, an
acoustical and music research facility and performance halls, restaurants and parking.
The design plan submitted by P+R impressed the jurors because the architects projected
that their building would be “a live center of information and entertainment”\textsuperscript{97} where a
continuum of movement and activities would take place both inside and outside of the
building. This “live” center will provide artistic, educational, recreational and
commercial programs from morning till night. This image conjured by P+R amounted to
a high tech megastructure that would function as both Times Square and the British
Museum. Such an unimaginable hybrid surprisingly appealed to the independent committee set up by Pompidou to oversee this project. It was generally agreed that the creation of a contemporary structure that was user-friendly was what was needed to dispel the existing impression of French museums as stuffy, dour institutions.

Although the competition brief did not specify monumentality, it was clear to everyone that this was what Pompidou was after. P+R’s winning design achieved this by its sheer size and height. It was much larger, being over five hundred feet in length, and taller (two hundred feet) than the surrounding urban buildings. Furthermore, its form and expression were so unusual that it was an instant success. This was no small achievement since its site was very close to a number of famous landmarks in Paris, including the Eiffel Tower, the Louvre and Nôtre Dame. Initially estimated to be visited by 10,000 people per day, Centre Pompidou received two to five times more exceeding all expectations. Why did people come? Apparently, for the experience of the building and its surrounding.

The building

Centre Pompidou, known to the locals as Beaubourg, occupied over one million square feet and is situated over a rectangular plot. One of P+R’s winning features was the designation of half the acreage to an open plaza in front of the west façade. The plaza provided the best vantage point to see the unusual architecture of Beaubourg and for watching people ride in the glass escalator on the side of the building. Near the entry to the building, the slight slope of the plaza was suitable for use as an amphitheater. The building is a straight-forward geometric form and rises in elevation as a five storied rectangle of glass, steel and concrete. It gives an impression of both lightness and
transparency not usually associated with contemporary civic buildings. More radical in its design is its exterior which is a structural frame of vertical, horizontal and diagonal steel beams that envelope the glass building (Fig. 12). These lattice trusses with dimensions suitable for building bridges were crucial for the stability of the building. The industrial/high tech finish renders the building as a giant erector toy set or an oil refinery.¹⁰²

![Image](image)

Fig. 12 View of Centre Pompidou, west façade

The additional space created between the building and this outer steel frame, its exoskeleton, also accommodates the placement of services and external circulation. On the east façade facing Rue du Renard, ninety odd columns of service components are enclosed by the steel framework. Since they were color coded,¹⁰³ these vertical components add considerable interest to the simple building form which now looks like a giant pop-art creation in the midst of the urban Parisian landscape. More importantly, by moving the service ducts, water pipes and electrical boxes outside the building, the interior space is uninterrupted by vertical columns or walls. A vast open space is realized
approximately measuring 166 m x 48 m x 7 m high. The original plan even called for movable floors such that mezzanine levels can be created.¹⁰⁴ (Fig.13)

![Floor plan of Musée Nationale d'Art Moderne](image)

Fig.13  Floor plan of Musée Nationale d’Art Moderne

The emphasis on flexibility was practical; the program brief stated that “the Centre’s internal dimensions should as large as possible “to accommodate its multipurpose function and anticipate its ‘evolution of needs’”¹⁰⁵ This was especially applicable to the two active zones, the top and street levels. The top three stories housed the Musée Nationale d’Art Moderne. The architects wanted to keep this space fluid to accommodate changing modes in installation or trends in art forms. To exhibit paintings, temporary partitions of 3 x 5 m were hung from the ceiling or formed three-sided huts to enclose an area for exhibition. In accordance with the flexibility planning that was central to the winning design, aesthetics were less important than the speed and ease of assembling or disassembling these screens.¹⁰⁶ The notion of flexibility was applied differently for the ground floor where multiple usages rather than fluidity of space were of concern.
Referred to as the Forum, it measures over 12,000 square feet and is 47 feet in height. This is the starting point for the visitor's tour of Beaubourg. Visitors arriving from the outdoor plaza or from the underground parking facilities are faced with not only this enormous space but also with numerous choices of activities. The Forum is used for temporary exhibitions and musical events. In addition, along its periphery are a bookstore, a subsidiary library, the gallery for industrial design, a separate library and studio for children, and a café and theatre. With large crowds arriving daily, the Forum is like a busy transportation hub with a distinctly different atmosphere than the traditional museum atrium.

The circulation plan

The architects were aware that to maintain flexibility, access and circulation are very important in the plan for Centre Pompidou. Basically, three main zones have to be served: the open plaza, the superstructure that is above ground and the substructure that is underground. By closing off three sides of the open plaza to traffic, pedestrian traffic was encouraged. Presumably, shoppers in the stores at the edge of the plaza would be attracted to also visit Beaubourg especially if the original plan to use the external framework for displaying information about the Centre's exhibitions or activities had been carried out. Even without overt advertisement on its west façade, Beaubourg's unique architecture easily drew local visitors and those who arrived by cars or buses. In the original plan, there were eleven entrances from all four sides of the building with no designated main entrance to further encourage the movement of visitors into and through the building. This proved to be not workable within a few years because the demand for more exhibition space and security concerns lead to the elimination of the
entrances on the north and south sides. Access is now restricted to a set of central doors on the west side at the lower edge of the plaza.

Within the building, the starting point for the visitor’s tour of Beaubourg is the Forum. There, he/she has numerous choices: to partake in the activities within the Forum, or descend by escalator to the underground level where there are meeting rooms and a theatre. To reach the Museum and its permanent collection, visitors have to purchase tickets from booths on the plaza level and go up an escalator to the northwest corner of the building where there is a lobby to connect to elevators and the exterior escalator.

The exterior escalator was a crucial element in the overall design with regards to circulation. Not only was it functionally significant as a people mover, its glass enclosure and location on the entire west façade made the ride the key experience for visitors to Beaubourg. As the visitors ascend at a leisurely pace, they can see the activities in the plaza below them and the spectacular view beyond towards the Seine and Notre Dame. The escalator accesses the mezzanine and levels for the Museum which occupy the fourth, fifth and sixth floors. After the museum closes, direct access to the restaurant and its terrace on the fifth floor is possible by means of an emergency exit on the ground floor. The public library is housed on the second, third and fourth level of Beaubourg. It is not accessible via the exterior escalator but can be reached by a separate set of interior escalators off the mezzanine.

In addition to the interior and exterior escalators, the floors are linked by elevators and stairs located at the corners of the building. There are also horizontal walkways (pedestrian galleries) situated between the building proper and the external frame (behind the exterior escalator) which serve to direct the visitors from the escalator.
into the Museum. More often than not, visitors linger on the horizontal walkways to take in the panoramic view. With so many provisional routes for circulation, it was hoped that the different population of visitors will “go everywhere” in this mixed-use building thereby breaking down perceived “barriers between intellectual fields”.114 In reality, this was only partly successful because visitor surveys did indicate that museum visitors were more likely to take interest in other non-art related activities in the Centre but that the majority of college or high school students who came to Beaubourg to use the library115 seldom engaged themselves elsewhere.

*The successes and failures of Beaubourg*

The success of Beaubourg as a cultural phenomenon is important in several ways. Centre Pompidou was an early, successful example of how a museum complex can be central to an urban renewal plan. Since Beaubourg, this approach has been adopted by many city officials to improve neighborhoods in both Europe and America.116 The most spectacular example is, of course, Frank Gehry’s Guggenheim Museum in Bilbao (1999). Centre Pompidou’s architecture and the rationale for its creation have also changed the image and mode of operation for the twentieth century museum, elevating its role in the education of the masses. With the responsibility of democratizing culture, museums became multi-use complexes where the viewing of art and artifacts was only part of the experience.117 Lastly, the innovative architecture of Beaubourg set a course for high-profile buildings associated with museums that is not likely to change. New museum buildings have come to represent the larger and more prominent works of art than their collections within. Museums are also the most sought after projects for both the unknown
and established architects as there is much history to validate the correlation of museum buildings with their architects' meteoric rise to fame.

Despite its innovative architecture and engineering, Beaubourg did not function well as an art museum. The use of partitions and temporary hut constructions for display was hated by the curators and even refused by the collectors who deemed the whole set up to be too flimsy and undignified for the priceless works of art. Furthermore, the huge crowds made visits to the exhibits, where one would want to quietly view and contemplate the collection, nearly impossible. The wear and tear of hundreds of daily visitors rapidly took its toll. Plans for renovation and repair were confirmed by 1984, less than ten years of its opening.

Renovations

As a result, the open space of the museum floors were rearranged by Gae Aulenti who recreated a central corridor connected to gallery rooms of varying sizes to lend a more orderly atmosphere to the exhibition areas. She further remodeled the sculpture courts and gardens such that visitors can now enjoy breaks in the circulation along the north, west and south portions of the fourth level (Fig. 14).
The uniform height (5 m) of the gallery partitions and the covering over of the ceiling and its exposed service elements further eliminated the distracting appearance of the original P+R interior. In short, the galleries of the Musée Nationale d’Art Moderne as modified by Aulenti now look more like other traditional museums.

Beaubourg and contemporary museums

As seen in Beaubourg, the notion that museums should be flexible to accommodate changing trends in art is sound but not so simple to follow. One problem faced by art museums today is the nature of the art itself. Contemporary art forms including large sculptural pieces, or installation art are significantly more demanding in terms of exhibition conditions than framed paintings or statues. Many of them are simply too large or complex in the installation to fit into standard size gallery spaces. To promote their display, new museums have to set aside expansive galleries for huge sculptures and mural-sized paintings.\textsuperscript{120} If space is an issue, the museums may be prohibited from acquiring outsize pieces. One option that meets the challenge for space involves the conversion of industrial buildings to house large artworks. One such successful museum venture is the Dia-Beacon which opened in 2003 in a renovated Nabisco factory in upstate New York. In the Dia-Beacon, the idea of the museum as a neutral box reemerges. Monumentality is associated with the works of art not with the museum building. Within an area of almost 100,000 sq meters, the works of a dozen American artists dating back to the 1960s and ’70s are displayed. These pioneering works in Minimalism, Post-Minimalism, Earth art, Conceptualism and video art are shown in a well-lit open space that highlights the works.\textsuperscript{121} In a setting such as the Dia-Beacon, the visitor can relate to the aesthetics by experiencing the three-dimensionality. For example,
Richard Serra’s “Union of the Torus and Sphere” an elliptical steel sculpture, is installed in a passageway that is narrow enough to emphasize the work’s mass but sufficiently spacious for visitors to walk around it. Michael Heizer’s “North, East, South, West” provides a different experience. The work is a series of different shaped voids\textsuperscript{122} that are sunk some 20 ft deep into the floor. (Fig. 15)

![Image](https://example.com/image.png)

Fig. 15 Heizer’s “North, East, South, West”

To see this work that measures over a hundred feet in length, visitors are lead in a guided walk-through by appointments only between 10:30 - 11:00 am on the days of operation.\textsuperscript{123} This experience is novel since the objects cannot be fully appreciated unless the visitors walk up to them and peer over the edge of the void into the “negative form”. Heizer’s intent is to create forms that elicit “an atmosphere of awe”. Since the forms “literally displace the floor on which the visitor walks”\textsuperscript{124} he/she senses physical danger of falling into the voids that is unquestionably a unique museum experience. This innovative work is also a most unusual feature of the circulation pathway.
Large open floor plan is necessary when the collection consists of very large objects such as the eighty airplanes in the new Steven F. Udvar-Hazy Center of the National Air and Space Museum in Virginia. This brand new museum of the Smithsonian Institute, which opened in July 2003, is just a shell of a building to enclose an open flexible space.\textsuperscript{125} Within these contemporary museums the circulation plan is greatly simplified such that beyond the entrance, visitors are free to wander in the open space. In such twenty-first century museums, the artworks or objects become part of the physical environment that guides the visitor through the single exhibition area.

VII. Conclusion

The architecture of museums has evolved as the role of the museum became more diverse. Instead of storehouses, museums have become cultural centers. Objects within the museums are not just looked at in isolation, they are involved in educational programs. More and more, the architecture is seen as the prologue to the museum experience that extends beyond the galleries into restaurants, shops, theatres, conference rooms and research area. Central to the design of these multi-functional museum buildings is the plan for how the various spaces are connected – its circulation.\textsuperscript{126} This can be seen in the three examples discussed in this thesis: the spiral ramp in the Guggenheim Museum defines the Rotunda, the three axes in Jewish Museum of Berlin determine its irregular linear configuration and in Beaubourg, the circulation is moved to the outside of the structural frame to maximize the interior open space.

However, for these twentieth century museums, two factors conspired to frustrate the architects' original intent and worked against the building design: first, issues
regarding installation design for exhibit space and, second the unanticipated huge number of visitors to the museums. Wright’s original ideal of a leisurely stroll down the spiral ramp to enjoy the non-representational art was not realized when the new board of directors and curator changed the museum program in 1952 and there were too many people on the spiral ramp. Libekind’s powerful architecture is diminished in its psychological impact when the building is filled with hundreds of visitors crowding at exhibits and simply too much memorabilia. In Beaubourg, its instant popularity was not sustained by hastily planned exhibition programs that eroded the museum’s attempt to establish itself as a cultural focus. Thus, it is somewhat ironic that these architectural icons did not function well as museums. Part of the problem may lie in their compromised circulation plan that was inadequate for accommodating large crowds. Here again, the museum is caught in a bind since it welcomes and needs the increased attendance but is often hard pressed to make changes in the structural design to improve the circulation and so the problem perpetuates.

Careful consideration of the circulation plan would therefore seem to be a crucial element to museum design in order to avoid the problems illustrated by the three examples discussed in this thesis. Most importantly, a “hierarchy of space” must be observed as noted by Louis Kahn, an eminent architect who built three modern museums including, the Yale Art Gallery (1951-1954), Yale Center for British Art (1969-1972) and the Kimbell Museum (1966-1972). Kahn believed that “the measure of the architect is in the organization of the connecting spaces” which in reality is reflected in the building’s circulation. Kahn’s principle regarding building organization is based on the distinction between “served space and servant spaces”. In Kahn’s buildings,
secondary (servant) spaces are functional in supporting the main (served) spaces which are more important for aesthetic representation. Only with this differential treatment of spaces will a balanced design plan emerge. This is clearly demonstrated at the Kimbell Art Museum which Kahn built in Forth Worth, Texas. There, the served space for exhibitions consists of a series of galleries along a north-south axis which brings natural light into the museum. To reach the galleries, Kahn designed a simple circulatory plan (Fig. 16a) which was subtle in concept but highly effective in providing support for the served exhibit spaces. From a recessed entrance, the visitor is lead directly up a flight of stairs that immediately gives access to the gallery floors on both sides.134 (Fig. 16b)

Fig.16a. Plan, Kimbell Art Museum

Fig. 16b. Interior

On this second floor, the visitor can see interconnected galleries filled by the wondrous light made possible by the continuous slits of skylight that are built into the tops of the vaulted ceiling. This light animates the space, and the openness of Kahn's gallery design can be immediately appreciated by the visitor. With Kahn, circulation as servant space does not interfere with the served exhibit spaces, thereby preventing the undesirable consequences suffered at the Guggenheim, Centre Pompidou and Jewish Museum.
For students of museum architecture, there is much to learn from Kahn. Kahn’s buildings, including his museums, exhibit an understated monumentality that is particularly suited for museums, the designated storehouses of man’s history and creativity. Kahn’s unique ability to create buildings that are impressive but not overwhelming, classical yet contemporary reflects his training in the Beaux Arts principles and his unique adoption of Modernism. At the Kimbell, he succeeds in combining nineteenth-century tradition (vaulted galleries) with the open flowing space and technologically advanced lighting typical of the twentieth-century architecture. The timelessness of Kahn’s designs suits the image of museums. When Kahn was asked to cite what is important in museum design, he indicated “silence and light”. This is a constant theme of Kahn’s which he uses in various settings to convey his ideas on architecture. Kahn has defined silence as the desire of everyone to create. Silence is also an atmospheric phenomenon valued by Kahn who sees building as places for creation. Most of Kahn’s projects were public institutions which he considered as instruments for improving society and the means for his own mission as an architect to transform the community through his creative designs. In his teachings, Kahn emphasizes careful spatial planning, astute use of natural materials, incorporation of the environment with the architecture and above all, consideration for the human scale. In so many ways, his architectural ideals coincide with the mission for modern museums that exist as spaces to bring culture and knowledge to people in an environment that is creative and full of light. No doubt, in the twentieth-first century, museums will continue to be important civic buildings central to the communities they serve. Their architecture will likely evolve with new design concepts and the use of high tech materials. How the
architects will incorporate the circulation plan which essentially gives form to the
building and differentiates the space for a variety of functions will remain a challenge.
Endnotes


4 An example of an extremely dramatic approach would be the Getty Museum in Los Angeles. The imposing complex of light-toned travertine can be glimpsed at a distance from the intersection of Sunset Boulevard and the San Diego Freeway, and then approached by a 10 minute tram ride up the side of the Santa Monica mountains.

5 Holocaust Museum in Washington, D.C. has a very narrow entrance, which is sealed off, leading the visitor immediately to the security check-in. This has an instantaneous effect on the visitor alerting him/her to the experience within.


7 A striking example of this can be seen in the Jewish Museum in Berlin where a long corridor ends in the Holocaust Void.

8 Stairways are used in various ways to heightened the visitors' sense of anticipation before reaching the works of art in both early and contemporary museums e.g. Altes Museum in Berlin in the nineteenth century, the Jewish Museum in Berlin.


12 Nikolaus Pevsner, *A History of Building Types* (Princeton: Princeton University Press, 1976) 120 - The Louvre is another example of a palatial building converted into a public museum with its long corridors and vaulted ceiling. The Grande Galerie was particularly impressive since it was 1400 ft long compared to the more common 200-300 ft length.


20 An important component of Schinkel’s circulation plan serves a psychological function by using the approach to prepare the visitor climbing the steps towards the monumental “temple of arts”.

21 Crimp, Douglas “The end of art and the origin of the museum.” *Art Journal* 46.4 (1987) : 264 - Schinkel used the Rotunda to demonstrate classical perfection with key pieces of statuary, and used the galleries to chronologically demonstrate the history of art following his idea of “first delight then instruct”.


26 Webster's New World Dictionary definition of enfilade – enfiler [french], to thread; James S. Curi, Oxford Dictionary of Architecture (London: Oxford University Press, 1999) 228 - definition: Baroque alignment of all the doorways in a series or suite of rooms so as to create a vista when the doors were open.


34 Not only did the International Style of MoMA’s original building become passé, the fact that MoMA’s collection of art was also not contemporary remain the subject of heated discussion.

35 Solomon R. Guggenheim Museum Catalogue, Art of this Century, the Guggenheim Museum and Its Collection (New York: Rizzoli International Publisher, 1993) 44.


40 Neil Levine, The Architecture of Frank Lloyd Wright (Princeton: Princeton University Press, 1996) 302 - Earlier, in 1924-1925, Wright proposed the use of a double helix of ramps topped by a hemispheric dome for the Gordon Strong Automobile Objective and Planetarium (Sugarloaf Mountain, near Dickerson, Maryland) that bears a basic resemblance to the Guggenheim plans.

Round circles are also set into the museum’s terrazzo floor of the spiral ramp.

James S. Curl, *Oxford Dictionary of Architecture* (London: Oxford University Press, 1999) 758 - definition of ziggurat - an ancient Mesopotamian temple/tower of pyramidal form in which each successive stage is smaller than that below it leaving a terrace all around. Each stage was connected by formal ramps.


Current museum staff attests to the difficulty of the museum for the handicapped as the slight slope is demanding to negotiate for those in wheelchair.


Neil Levine, *The Architecture of Frank Lloyd Wright* (Princeton: Princeton University Press, 1996) 313 - this unorthodox approach must have been appreciated by Rebay since she prescribed to a similar unconventional way of displaying the non-objective paintings in her first exhibit "Art of Tomorrow". In 1939, Rebay also opted to place large paintings at near ground level within a temporary gallery whose walls were covered with velour.


communication from Sharon Vatsky, Senior Education Manager, Guggenheim Museum.


Actually the shortened name for the Extension of the Jewish Museum Department of the Berlin Museum.


As he is now. In 2003, he was the winner of the competition for the design to rebuild the World Trade Center in New York.

Libeskind’s first built structure is the Felix Nussbaum Museum in Osnabruck, Germany, which was completed in 1998.


Bernhard Schneider, Daniel Libeskind Jewish Museum Berlin (Munich: Prestel, 1999) 17.


Spens, Michael “Berlin phoenix.” Arch. Rev. 205.1226 (1999) 44 - only 5 windows are identical in their dimensions.


James S. Curl, Oxford Dictionary of Architecture (London: Oxford University Press, 1999) 195 - Libeskind studied with John Hejduk, one of the pioneer of deconstructive architecture which tends to emphasize diagonal overlaps of rectangular elements and discontinuity between interior and exterior.


83 there are entrances to each floor.


87 Spens, Michael “Berlin phoenix.” *Arch. Rev.* 205.1226 (1999) 48 - columns contain soil from Berlin, symbolizing the year 1948 when Israel became independent. The last column stands for Berlin and holds soil from Israel. The rose is the only plant permitted to be grown inside old Jerusalem.


92 Leonard Bachman, *Integrated Buildings: The Systems Basis of Architecture* (New York: John Wiley and Sons, 2002) 347 - The original name was Centre du Plateau Beaubourg, named for the building site which was an existing parking lot for a previous open market.


94 Victoria. Newhouse, *Towards a New Museum* (New York: Monacelli Press, 1998) 195 - in concept, Centre Pompidou is a throwback of another prefabricated exhibition hall, the Crystal Palace, built in 1851, and more recently, the Fun Palace, an

95 Dedicated to George Pompidou at the time of its completion in 1978 to honor the late president who had died in 1974.


104 John Coolidge, *Patrons & Architects – Designing Art Museum in the 20th Century* (Forth Worth: Ammon Carter Museum of Western Art, 1989) 98 - except in the first and top floors where the height of the ceiling is twice as tall, the lower ceiling of the other floors was the result of redesign.


106 “The Pompidolium.” *Arch. Rev.* 963 (1977):288 - free standing partitions can be moved in minutes, the ones suspended from the ceiling take up to an hour and fire walls required a day or so to disassemble.
107 John Coolidge, *Patrons & Architects – Designing Art Museum in the 20th Century* (Forth Worth: Ammon Carter Museum of Western Art, 1989) 92 - the idea of animating the exterior with banners and signs was at first applauded but political concerns about what will be displayed and how this might affect the public scrapped this plan.

108 Victoria Newhouse, *Towards a New Museum* (New York: Monacelli Press, 1998) 196 - P+R’s original plan had suggested elaborate underground links to nearby streets and houses to the sunken plaza with the idea that this will stimulate more local community involvement. This was abandoned for cost reasons.


115 John Coolidge, *Patrons & Architects – Designing Art Museum in the 20th Century* (Forth Worth: Ammon Carter Museum of Western Art, 1989) 104 - as many as 13,000/day, a ten fold increase from what was estimated.


117 Von Moos, Stanislaus *Museum for a New Millenium, Concepts, Projects, Building*. Eds.Vittorio M. Lampugnani and Angeli Sachs (Munich: Prestel, 1999) 21 - Along this line of thinking, the architectural planning of museums has also been affected. Robert Venturi estimated that ‘the ratio of ‘space for art’ to ‘space for reception and access’ was 9:1 in the 19th century. Today, this ratio is closer to 1:2.


120 Victoria Newhouse, *Towards a New Museum* (New York: Monacelli Press, 1998) 251 - in Bilbao, the ground floor gallery is 450 ft in length and 80 ft wide and holds less than a dozen paintings on its walls and only three sculptural pieces.


122 Michael Govan, “Michael Heizer”
http://www.diabeacon.org/exhibs_b/heizer/essay.html - Heizer developed such negative forms where the three dimensional work is represented by the space it occupies.


124 Michael Govan, “Michael Heizer”
http://www.diabeacon.org/exhibs_b/heizer/essay.html

125 “National Air and Space Museum” http://www.nasa.gov/museum/udvarhazy/ - The Udvar-Hazy Center is a giant hangar 70,611 sq meter in size.

126 Alfonso Corona-Martinez, *The Architectural Project Number Six: Studies in Architecture and Culture* (College Station: Texas A&M University Press, 2003) 20 - This notion that the building is subordinated to its internal circulation is a nineteenth century concept in architecture which came about because of the increasingly complex distribution of space and the emphasis on utilitarianism.


129 Mercillon, Henri “Ten Years of the Centre Pompidou.” *Apollo*, 125/304 (1987): 432 - the drop in attendance in the Museum in the years following its opening is telling. From 1978-1986, museum visitors decreased from 23.5% to 15.9%. Attendance improved after renovation.


August Komendant, *18 Years with Architect Louis I. Kahn* (Englewood: Alnay Publisher, 1975) 118.


Bibliography


Patterson, Richard “The Void that is Subject.” *Arch. Design* 70.5/6, (2000): 66-75.


Solomon R. Guggenheim Museum Catalogue, *Art of this Century, the Guggenheim Museum and Its Collection.* New York: Rizzoli International Publisher, 1993


Cited Websites


“Kimbell Art Museum, Fort Worth”

