

## ABSTRACT

Title of Thesis: THE MUSEUM OF WOMEN AND SCIENCE

Lisa Firstenberg, Master of Architecture, 2005

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School of Architecture

From prehistoric priestesses to contemporary post-doctorates, the contributions that women have made to the world via science have been left out of history. The goal of this thesis is to design a building that articulates the relationship that women have had with science through the ages. Just like women are expected to be many things throughout the course of their lives, the building will respond to the many pressures of the site, including surrounding context and the preservation of a 19<sup>th</sup> century historic schoolhouse. Through the exploration of the architectural issues, the building will be a metaphor for the way in which the history of women can and should be incorporated into the public's understanding of how we got to where we are and why we are going where we are going rather than remaining an obscure field of study on the fringe of what is generally accepted as history.

THE MUSEUM OF WOMEN AND SCIENCE

by

Lisa Firstenberg

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Dedicated to the two men who helped make me what I am today:  
my father, Fred Steers, Master Carpenter  
and  
my husband, Allen Firstenberg, my biggest fan

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## ***Introduction: Women and Science***

From prehistoric priestesses to contemporary post-doctorates, the road to the recognition of the contributions that women have made to the world via science has been a rocky one. Most think of the history of science as a history of men and certain specific men at that. Everyone knows the names Einstein, or Newton. But the countless people, both men and women, who laid the groundwork for the great leaps that these heroes made, remain nameless in history.

Watson and Crick could not have made their Nobel prize winning discovery of DNA had Rosalind Franklin not been able to photograph it. In fact, if Franklin had the kind of peer network that her male counterparts at the time had, it's quite possible that she would have been the one to win the prize. And so it has been throughout history as women have made contributions that have subsequently gone either unnoticed or unrecognized because of their exclusion from scientific communities.

This is much less the case today as women of all classes are allowed to attain degrees and participate in the scientific process, however we still rarely hear about the discoveries made by women. Equally absent from our understanding of our past is the way in which science has affected the lives of women throughout history. The goal of this thesis is to link two educational phases of women via architecture: the beginning phase of their childhood curiosity, when their love of science is first being formed and the beginning phase of their adulthood curiosity when they become full fledged members of the scientific community and participate in research via a museum dedicated to the relationship that women have with science.



The childhood phase is represented by the preservation of a small 19<sup>th</sup> century schoolhouse on Massachusetts Avenue that will be turned into a center for educational programs directed at school groups. The adult phase is represented by a proposed laboratory building on North Capitol Street. The two will be linked by a museum that deals with both the past, present and future of the relationship between women and science. This thesis will explore how to articulate these ideas within the framework of the understanding of history that already exists using architecture and accepted historic preservation practices to create an environment that enhances the understanding of visitors to the museum of not only the contributions that women have made (and continue to make) to the world but also how science has changed the way that women live.

***Women's History: A Theoretical Framework***  
**Twentieth Century Theory and Method in Women's History**

One traditional view of history is that it is merely a record of the transmission of power. Because women are typically outside of that power structure, historically they have been excluded from the narratives of our past. In the twentieth century, the focus of historians shifted as people began to become interested in social as well as political history. The interest in social history provided an opportunity to look those groups who were excluded from the power structure, including women. Interest was focused on the position of women within the family and within the context of social station, however, and scholarship remained mostly descriptive and devoid of any interpretation.<sup>1</sup>

Still struggling for a conceptual framework in which to interpret women's history, feminist writers began to explore the realm of women's history in ways that historians would not. Attacking the problem with zeal, they soon dubbed anything that women did in history as a "contribution." Unfortunately, just like their predecessors they displayed a very strong bias. Rather than considering the narratives of women to be unimportant, feminist writers believed that the history of women is only important as the representation of the history of an oppressed group and its struggle against their oppressors. For this reason, the vast majority of early scholarship in the field of women's history focuses on suffrage.<sup>2</sup>

In the 1930's and 1940's, Mary Beard came forth with an idea that challenged the view of women's history in terms of oppression. She said that the importance of women's history is not that women were oppressed, but rather the focus should be on the "continuous and impressive contribution that women have made throughout history."<sup>3</sup> Those contributions do not fit into the value system traditionally held by historians

because they tend to focus on the role of women in social rule and in terms of their contributions to community. Although Mary Beard was quite a bit ahead of her time (and subsequently had few followers), in the last decade her ideas about the way to approach the scholarship of women's history within the contextual framework of values that are different than, but not necessarily at odds with those traditionally held has become the preferred method of interpreting women's history.<sup>4</sup>

## *Museums and Memory*

*“The simple should go there to learn, the wise to remember.”*  
John Ruskin, on Museums

### **Museums through the Enlightenment**

Although the grouping together of precious objects has occurred on since antiquity<sup>5</sup>, the idea of collecting art appeared for the first time in the Italian Renaissance.

The interest in antiquity and development of a sense of history in the fifteenth century



**Figure 1:** Belvedere Court at the Vatican by Bramante. Niches were designed for the display of antique sculpture.

lead to a desire for a physical connection to the past. Bramante provided the first space that was actually designed for the display of Antiques, which consisted of niches in the cloister of the Belvedere Court in the Vatican, meant to hold ancient Roman sculpture. Although the word

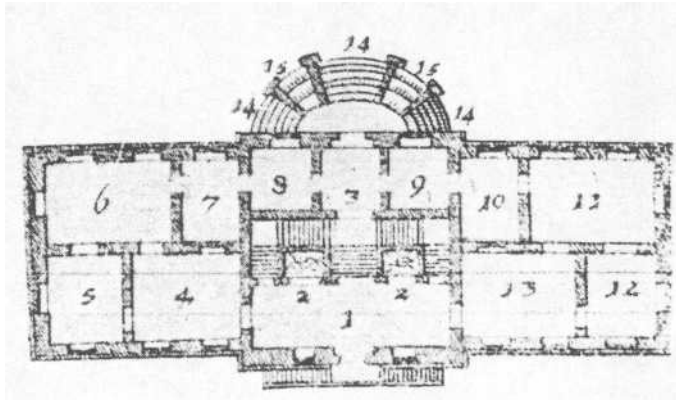
“museum” was used in Hellenistic Alexandria to describe the entire cultural precinct in which the

famed library was located, the first use of the word to describe a collection of antiques occurred in 1534. Just four years later, the word appeared for the first time as a prominent inscription on a building. By the late sixteenth century, the museum as a building type had begun to take on distinctive characteristics. The gallery in which objects were displayed was a long, narrow room, which was often vaulted and top-lit and was a standard part of palace planning.<sup>6</sup>

Although the Italians focused on fine arts (painting and sculpture) for their collections, in Northern Europe a parallel interest in collections was taking place. The *Kunstammer*, or “cabinet of curiosities” was a late sixteenth and early seventeenth

century collection which included natural specimens, examples of decorative arts and objects of curiosity.<sup>7</sup> By the end of the sixteenth century, some *Kunstkammern* became so large that aristocratic collectors required an entire building for their storage and display. Often new buildings would be constructed, but the Habsburg archduke Ferdinand II renovated a corn silo for the purpose of displaying his collection at his castle of Ambras in the Tyrol, which established a precedent for adaptive reuse in museums that is still followed today.<sup>8</sup> While the fine arts remained the purview of the aristocracy, the *Kunstkammer* was a vehicle through which the middle class could collect materials that provided a link to their past as well as the natural world surrounding them.

With the eighteenth century came the Enlightenment, and shifting attitudes about social relationships. Princes who held large collections began to feel that their collections should exist in separate buildings that could be open to the public in order to share them with their subjects. Additionally, the Enlightenment brought the idea of specialization. The eclectic *Kunstkammer* of the previous century gave way to a separation of objects by type. The architectural implications of these changing attitudes show up in the first plan



**Figure 2:** L. C. Sturm's design for an ideal museum, 1704. The ground floor consists of spaces for antiquities as well as small decorative objects. (Pevsner)

for an ideal museum, published in 1704 by Leohnard Sturm. In this project, the museum type is expanded from the single gallery found in palaces into a building with a public sequence through many connected galleries, each with their own theme. By the

end of eighteenth century, museums became more elaborate and included grand staircases and large rotundas as part of their sequence and had expanded programs to include libraries, giving them a more explicit educational purpose in keeping with the spirit of the time.

### **The Post-Enlightenment Crisis: Preservation of a Collective Memory**

Although the social and political changes occurring in the late eighteenth and early nineteenth centuries facilitated the creation of more public museums, it was the perceived loss of the past caused by industrialization and modernization that transformed the museum, previously a collection of objects, into the public institution for the sustentation of memory that we are accustomed to today.<sup>9</sup> Likewise, it's no surprise that it during this time that notions of historic preservation began to form in the writings of people such as Ruskin, acknowledging that a conscious effort must be made to preserve that which for centuries before had been second nature to retain within the fabric of every

day life.

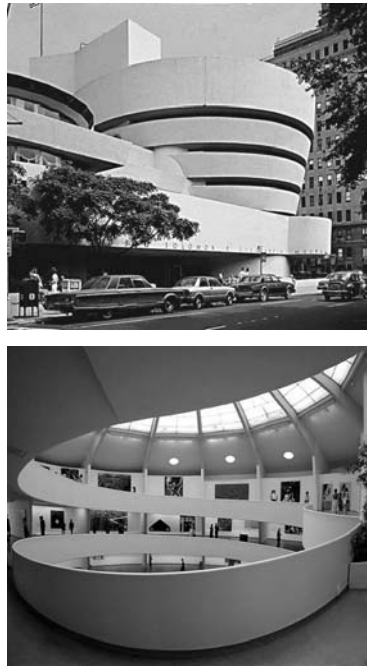


**Figure 3:** Altes Museum by Karl Friedrich Schinkel. View showing the colonnaded portico and the "sanctuary," the rotunda which organizes the building.

Remembering the past is crucial for our sense of identity, for to know what we were confirms who we are.<sup>10</sup>

The past, once part of daily experience and consciousness, now became something to be studied scientifically using the tools of the Enlightenment.

**Figure 4:**  
Guggenheim  
Museum,  
Exterior  
(above) and  
Interior view  
looking  
across atrium  
(below)



Architects in the nineteenth century responded to the perceived loss of the past with a wealth of buildings in a variety of historical styles. Most prevalent among public buildings, however, was the classical revival. The Altes Museum (figure x) by Karl Friedrich Schinkel became the archetype for the museum as a “temple to art.”<sup>11</sup> The long colonnaded portico and the Pantheon-inspired rotunda,

which Schinkel called “the sanctuary” became a favorite motif of museums.<sup>12</sup> Although the Altes Museum solved the problem of what a museum ought to look like and the way in which its spaces should be organized, the more profound question of just what role the architecture of the museum played in the organization of memory was left unanswered.

Two different schools of thought existed as to how the architecture should participate in the narrative of the museum. Art connoisseurs saw the museum as merely a neutral backdrop for that art. They felt the architectural mood ought to be modest so that it wouldn't lessen the importance of the objects that were being displayed.<sup>13</sup> Others, like Ruskin, saw the museum as the “object for the transmission of tradition” and consequently, its architecture as being crucial to the preservation of memory.<sup>14</sup> On the role of architecture in collective memory Ruskin wrote, “We may live without her, and

worship without her, but we cannot remember without her.”<sup>15</sup> Although in this statement Ruskin is specifically referring to the preservation of architectural ruins, the propinquity between the goals of historic preservation and the goals of museums as the guardians of memory link the sentiment to museums.

Through the early twentieth century, the argument over whether a museum should be an active or a passive container for the objects within remained a relative whisper compared to the roar of discussion that surrounded Frank Lloyd Wright’s 1959 Guggenheim Museum in New York City. The Guggenheim went beyond merely a new interaction between the container and the contained. While respecting the classical museum typology of the central dome and grand stair (transformed into a ramp), at the same time Wright revolutionized the relationship between object, architecture and the viewer. No longer was the architecture merely a passive container for the objects for which it was built. The Guggenheim’s ramps and rotunda allowed viewers to be an active part in the process of viewing art. In making the viewer a part of the narrative, the Guggenheim gives people an importance equal to that of the objects for which it was established.<sup>16</sup>

With the creation of an architecture that turns the museum visitor into an active participant in the experience, the next logical step is an architecture that frames the way we collectively recall the memories of us as a species even if they are not the memories of us as individuals. The United States Holocaust Memorial Museum by James Freed takes this next step by creating spaces in which those who have an individual memory can remember, but also allows those who do not have the personal experience to identify with the people of a distant place and time. By identifying with people who have had



different life experiences, we can merge their memories into our identity so that the memories become part of the heritage of a common humanity.



**Figure 5:** Hall of Witness from the U.S. Holocaust Memorial Museum, contains the archetypical features of the museum such as a central "rotunda" (here an atrium) and grand stair.

A critical part of being able to identify with those whose experiences are separated from ours by barriers such as place or time is to create a sense of removal from the time and place of the present. In the Hall of Witness, Freed creates that sense of removal necessary for identification to occur. Although the permanent exhibit exists within a neutral container where the exhibit designer controls the experience, at certain moments the architecture of the building pierces that neutrality.<sup>17</sup> When visitors cross the Hall of Witness in glass enclosed bridges they become a part of the memory in much the same way visitors in the Guggenheim become part of the act of

viewing art.

Because collective memory no longer functions in an organic and natural way, a wide gulf has opened between memory and history. "Sites of Memory," which include both monuments as well as museums, help to systematize collective memory in ways that artificially organize the past in order to create meanings that various groups can readily assimilate into their identities.<sup>18</sup> This artificial organization has led to a history that does not represent the full spectrum of social memory, but instead excludes large groups because they are not the ones writing it. A National Museum of Women's History seeks to bridge the gulf between the memories and experiences of women and history as

written. Through its architecture, it seeks to enable people to identify with the experience of the American woman so that her experiences become part of the collective experience, and her memories inform history in order to create a more complete understanding of and closer connection with the past.

## *Historical Context*

### **The New Federal City**

When Washington D.C. was founded as the capital city of a fledgling United States of America in 1790, there was the opportunity that no other European capital had ever had before. The chance to start from scratch allowed the vision of the people who



**Figure 6:** The L'Enfant Plan

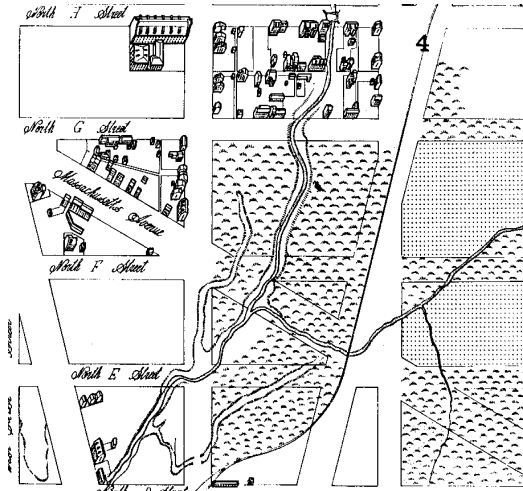


**Figure 7:** Detail of the L'Enfant Plan showing the proposed site and the planned traffic circle at the intersection of Massachusetts and New Jersey Avenues.

remembered of Versailles from his boyhood.<sup>19</sup> The plan includes wide avenues, which are named after the states that connect major squares and public buildings on diagonals overlaid on an orthogonal grid.

The most prominent building, the Capitol, was sited on the Federal City's highest point with views down eight major diagonal avenues, as well as the orthogonal avenues that provide the boundaries for the four quadrants of the current city. The proposed site for the National Museum of Women's History is one of the original triangular shaped blocks (an artifact of L'Enfant's system of diagonal streets), and bounded by Massachusetts Avenue, North Capitol (which divides the Northeast from the Northwest Quadrant) and G Street.

shaped the country in its infant stages to express their ideals in the plan of the capital. Washington chose the site on the Potomac as an economic gateway to the interior of the country. Jefferson, who was Secretary of State at the time, imposed his classical vision on the city. Washington recruited the French engineer, Pierre L'Enfant to lay out the new Federal City and L'Enfant drew on the magnificence that he



**Figure 8:** Site Axonometric ca. 1800 showing sporadic residential development next to an undeveloped area.

### The Growth of Washington in the Nineteenth Century

Although the founding of the Federal from scratch presented numerous opportunities, it also presented a number of problems. Although an unlikely target



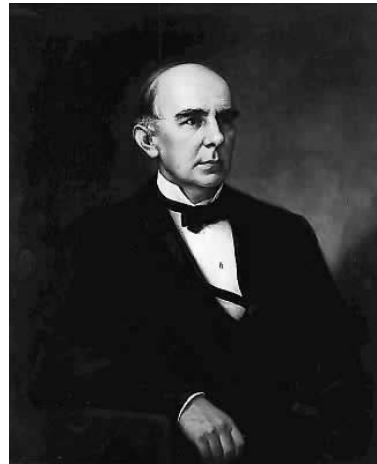
**Figure 9 :** Streetscape in Capitol Hill that is typical of what residential Washington DC looked like in the late nineteenth century.

because of its incompleteness the city was burned by the British in the War of 1812, which caused renewed debate about the choice of site. The decision was made to stay, however, and by the 1840's and 1850's, the Washington D. C. landscape began to fill with the erection of several major governmental buildings.<sup>20</sup>

Although the monumental core of the city was envisioned as the “White City” made popular by the Columbian Exposition of 1893 and the City Beautiful movement, the character of the residential areas outside of the monumental core was much more modest. A few blocks from the white limestone government buildings were neighborhoods that looked very much like the present day Capitol Hill, containing modest brick rowhouses.

Within the context of this tremendous residential growth, along with the rapid expansion of both public and private education in the last decades of the nineteenth

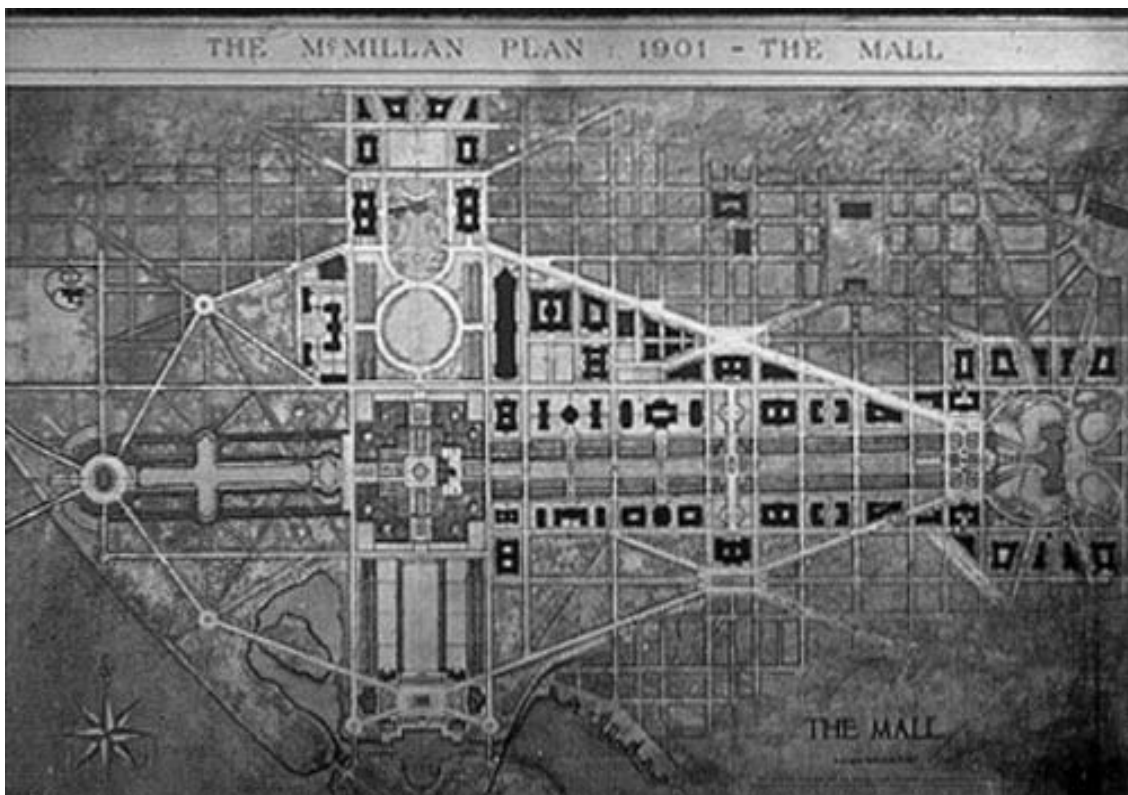
century there arose the need for more schools.<sup>21</sup> The Gales School, named for Washington's eighth mayor, was designed and built in 1881 by the Architect of the Capitol, Edward Clark. Although previous Architects of the Capitol were responsible for the actual design and building of the complex, Clark is well known for the many technological improvements he made to the building, including electricity, steam heat, and elevators. During his tenure, the grounds of the Capitol were greatly enlarged by Frederick Law Olmstead. Although his primary responsibility was for the Capitol, Clark designed and built many smaller public structures around Washington DC, including several schools.



**Figure 10:**  
Edward Clark,  
Architect of the  
Capitol from  
1865-1902,  
Designer of the  
Gales School,  
1881

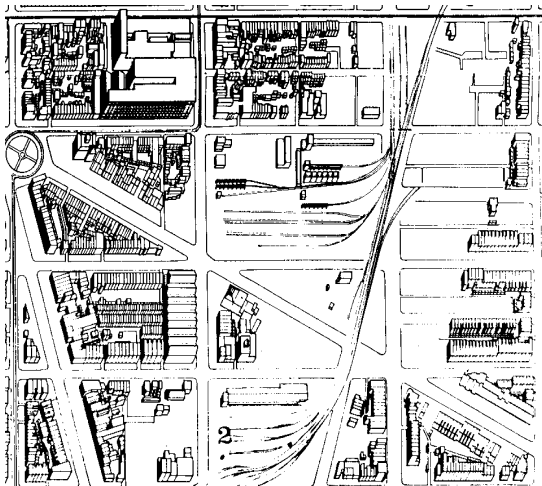
## The Turn of the Century and the McMillan Commission

In response to growing public alarm over the chaotic development of a rapidly growing city, the McMillan Commission, led by Daniel Burnham revisited L'Enfant's original plan to further emphasize the magnificence of the city's monumental core. In order to change the grand boulevard originally intended by L'Enfant into the national mall that we know today, Burnham needed to remove the railroad tracks and steam locomotives from the planned idyllic landscape. Burnham consolidated the two separate and inconveniently located existing train terminals into one monumental Union Station located to the north of the Capitol. <sup>22</sup>

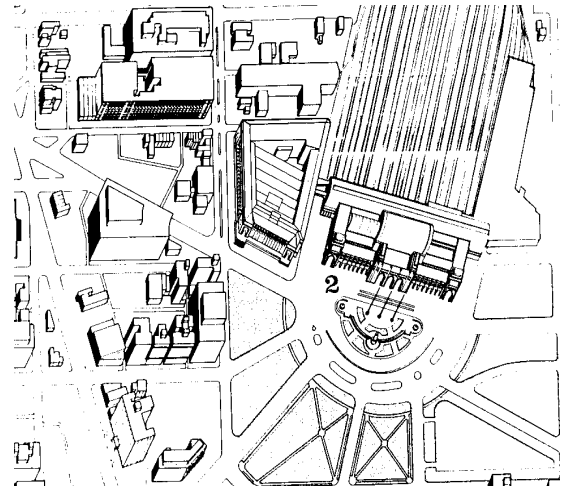


**Figure 11:** McMillan Plan of 1901

A comparison of axonometric drawings of the area surrounding Union Station ca. 1900 and ca. 1970 shows the profound impact that Union Station had on the proposed site. Before Union Station and the reemphasis of a monumental core focused on the national mall, the site and its environs was largely residential. By 1970, a distinct dividing line exists between those blocks west of Union Station (and closest to the monumental core of the city) and those to the east of it. The blocks to the east of Union Station have maintained their residential character and comprise the historic Capitol Hill neighborhood that exists today, while the blocks to the west are now characterized by their institutional uses.



**Figure 12:** Site Axonometric, ca 1900, showing the residential character of the area and the two separate train systems just prior to the building of Union Station



**Figure 13:** Site Axonometric, ca 1970, showing the loss of row houses in the area and the addition of institutional scaled buildings.

## **Post-War Washington and the Modern City**

In the years after World War II, Washington DC suffered the same problems that many other cities suffered. Because Daniel Burnham has set limits on building heights as part of the McMillan Plan, it was inevitable that the city's growth would be horizontal rather than vertical. Post-war road improvements and the pursuit of the American dream led to a rapid suburbanization of Washington. By 1950, suburban developments in Maryland and Virginia covered more area than the District itself. The mass exodus from the historic city was further spurred on by school integration in 1954, leaving many schools that had previously thrived empty due to lack of students.<sup>23</sup>

The Gales School is a good candidate for rehabilitation because it has demonstrated its resilience in reacting to great social, cultural and economic change over the 120 years of its existence. Although it hasn't served students as a school since 1944, the building has been reused numerous times for various educational and institutional purposes. Additionally, a comparison of photographs of the building from ca. 1900 and 2002 shows that the exterior character defining features of the Gales School retain a great deal of their integrity. By using the school building as an educational center for the National Women's History Museum, the school can continue to operate in the educational mode that it has for much of its life. Additionally, the interpretation of an elementary school as a site where women traditionally greatly contributed adds an additional level of meaning to a museum dedicated to the study of an alternate value system that encompasses the contributions of women.





**Figure 14:** Comparison of the Gales School ca. 1900 to the Gales School ca. 2002. The character defining features of the building, including its massing, segmental arched windows and pressed brick



## Site Description

Although there are some history museums devoted to the narratives of women across the country, Washington DC, our nation’s capital, is lacking in such an institution. The proposed site for the National Women’s History Museum is the triangular block bounded by Massachusetts Avenue, North Capitol Street and G Street in the Northwest section of Washington DC. The site is located two blocks west of the major transit hub, Union Station, which provides service not only to local commuter’s on DC Metro’s red line but also regional service to Amtrak customers. Although the site is not on the National Mall, it is close to a number of other museums and sites, including the Capitol and the Postal Museum.

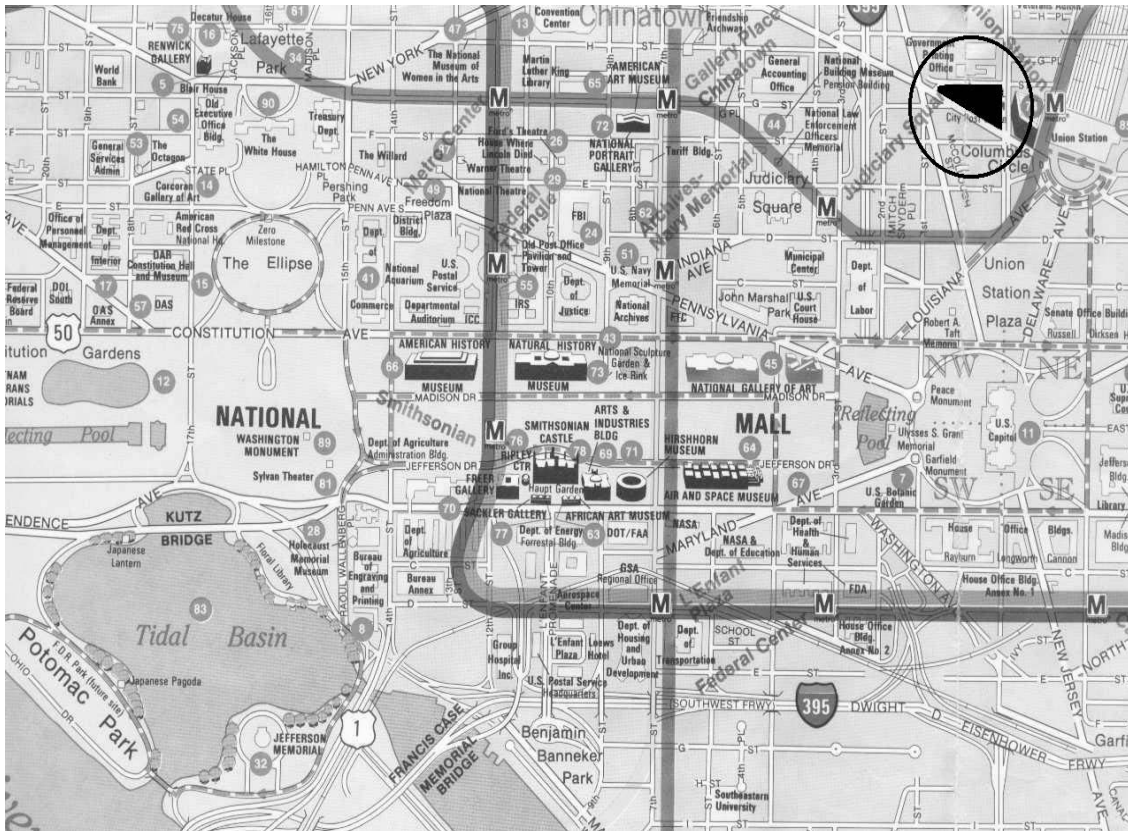
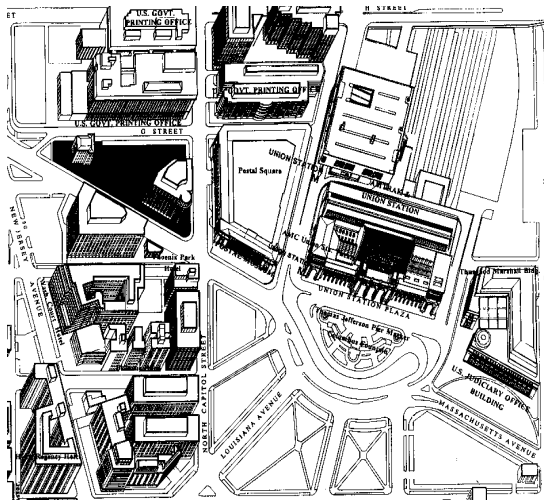
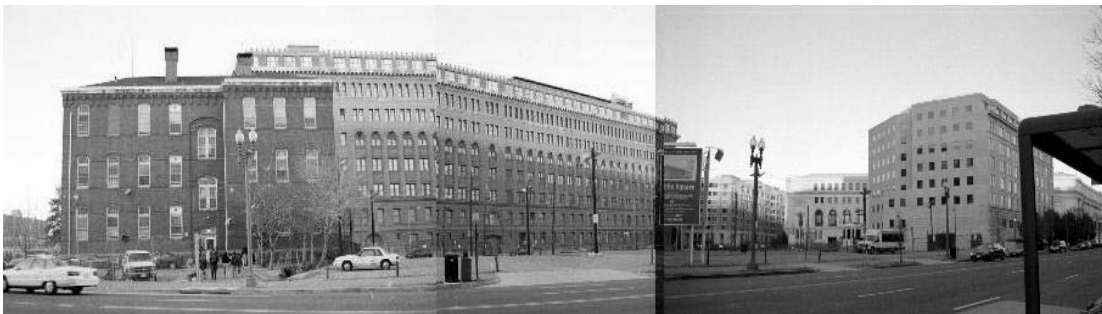


Figure 15: Map of the Museums and Metro system of the Monumental Core of Washington D.C.

The site is currently a government employee parking lot that exists between a small three-story building, the Gales School building, and the eight-story National Guard Building. The block is an eclectic mix of late nineteenth century pressed brick buildings and larger office building that is built of the light colored stone that Washington is characterized by today. The backdrop for the site is the block-long Government Printing Office, also a nineteenth century building.



**Figure 16:** Site Axonometric: The site and its immediate vicinity, showing the relationship between the Gales School and the National Guard Building as well as proximity to Union Station and the United States Postal Museum



**Figure 17:** Site Panorama: The side of the Gales School is on the left, with the 1861 Government Printing Office as a backdrop behind the site. To the right is the 1957 National Guard Building, which houses offices for the National Guard as well as a small museum



**Figure 18:** The front of the Gales School is around the corner from Massachusetts Avenue. The approximately 12,000 sq. ft. structure will be rehabilitated for use as the administration and educational center for the museum.



**Figure 19:** The National Guard building sits prominently on the corner of Massachusetts Avenue and North Capitol Street. In the background is the back side of the Gales School

The site has two dramatic view corridors down major avenues to the dome of the capitol building, providing a visual connection to the monumental core of the city even though the museum will not itself be on the mall.

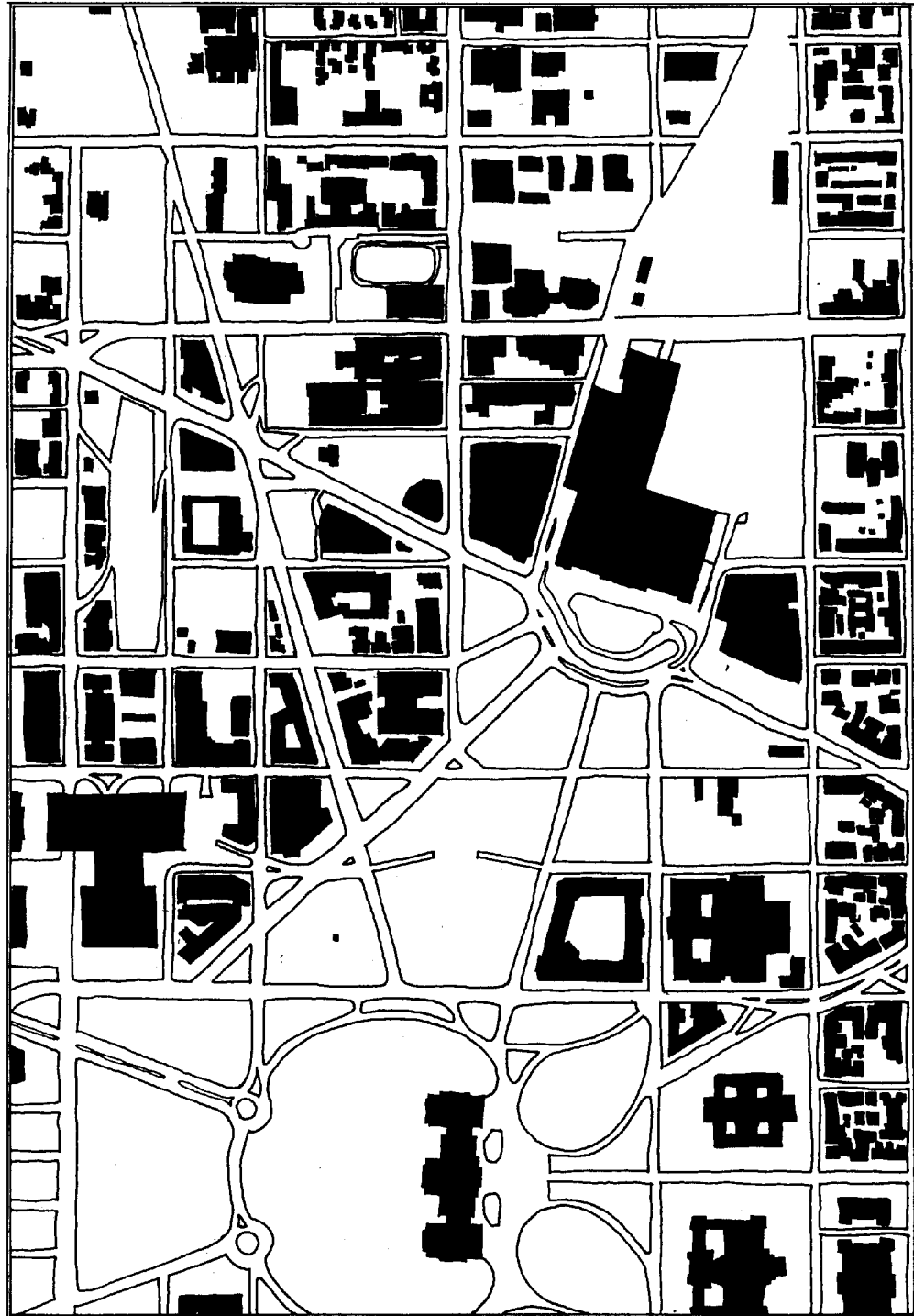


**Figure 20:** View of the Capitol down New Jersey Avenue

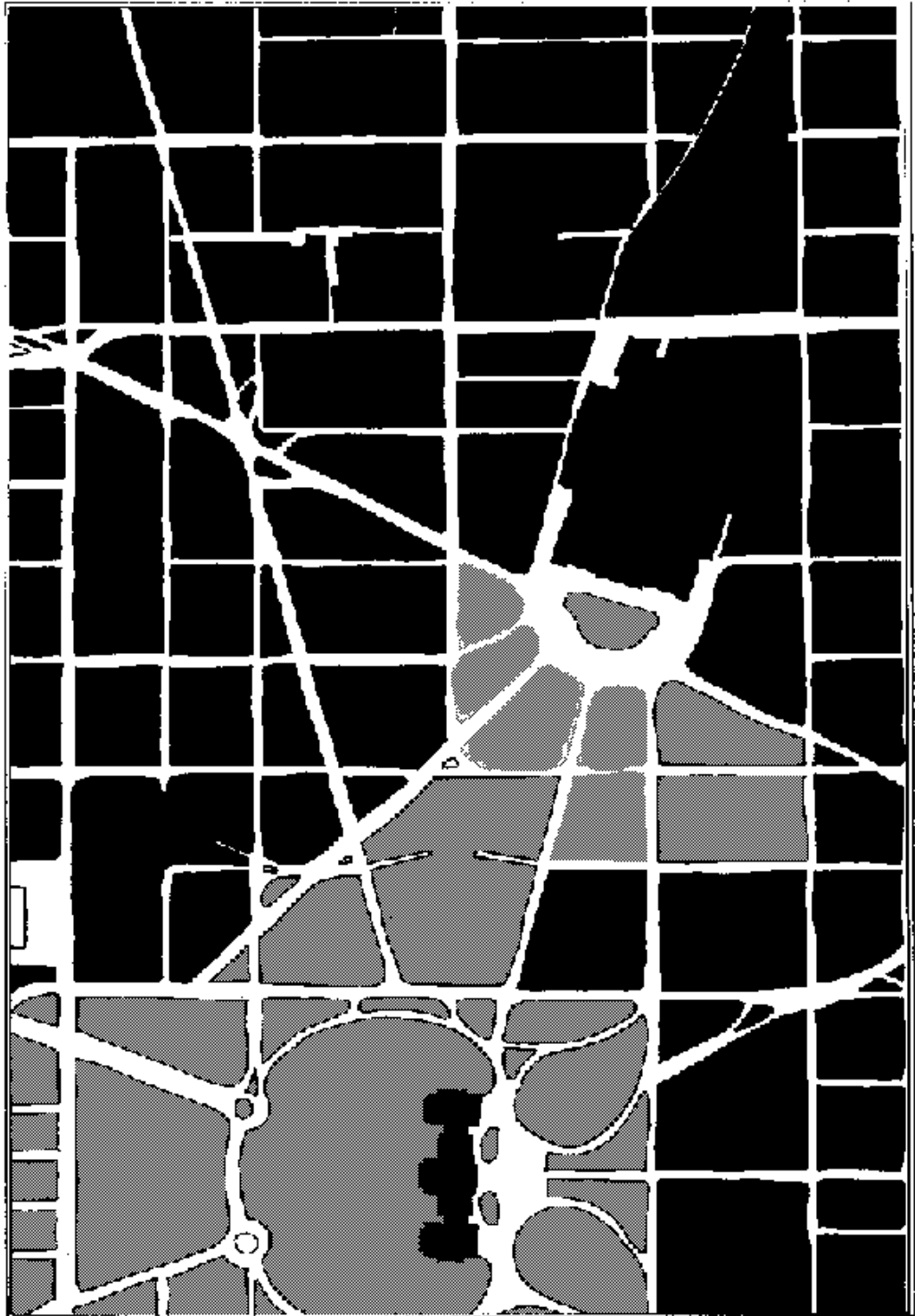


**Figure 21:** View of the Capitol Dome down North Capitol Street

*Site Analysis*

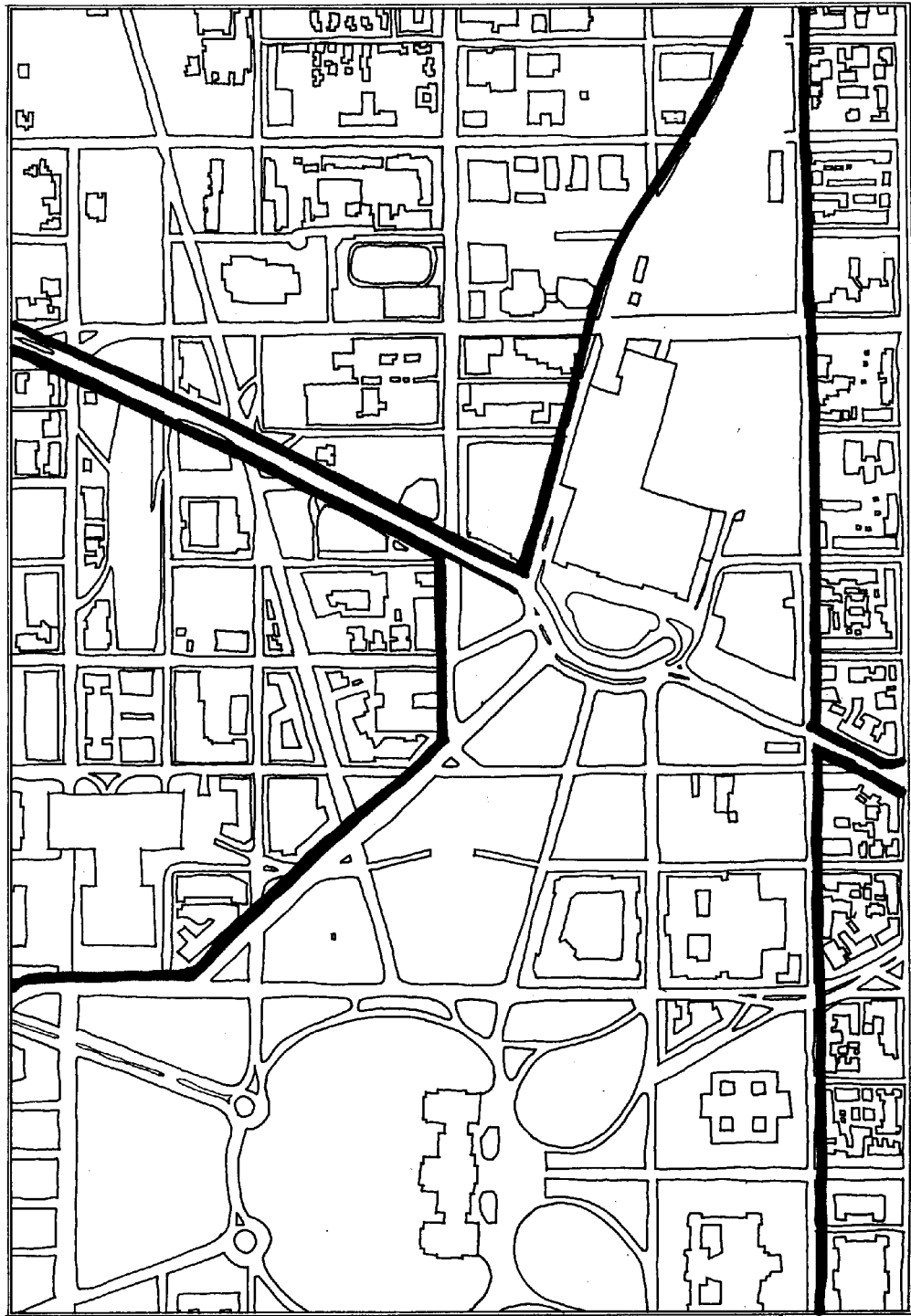


**Figure 22: Figure-Ground Diagram**, shows the residential edge to the east of Union Station and the relationship of the monumental landmarks to their respective open spaces.

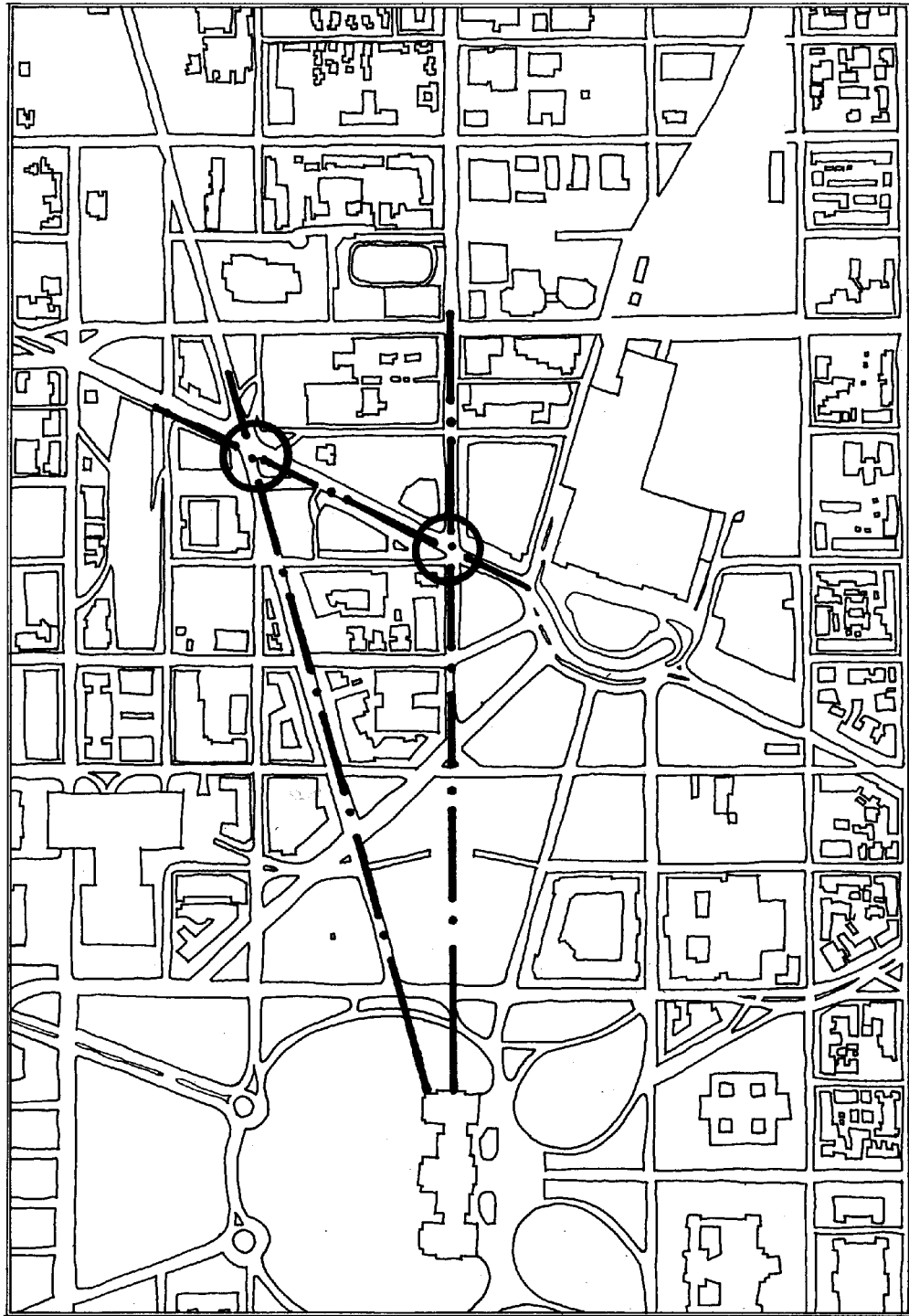


**Figure 23: Block/Street Pattern**, shows the diagram of the L'Enfant Plan of the diagonal avenues juxtaposed on the orthogonal grid.

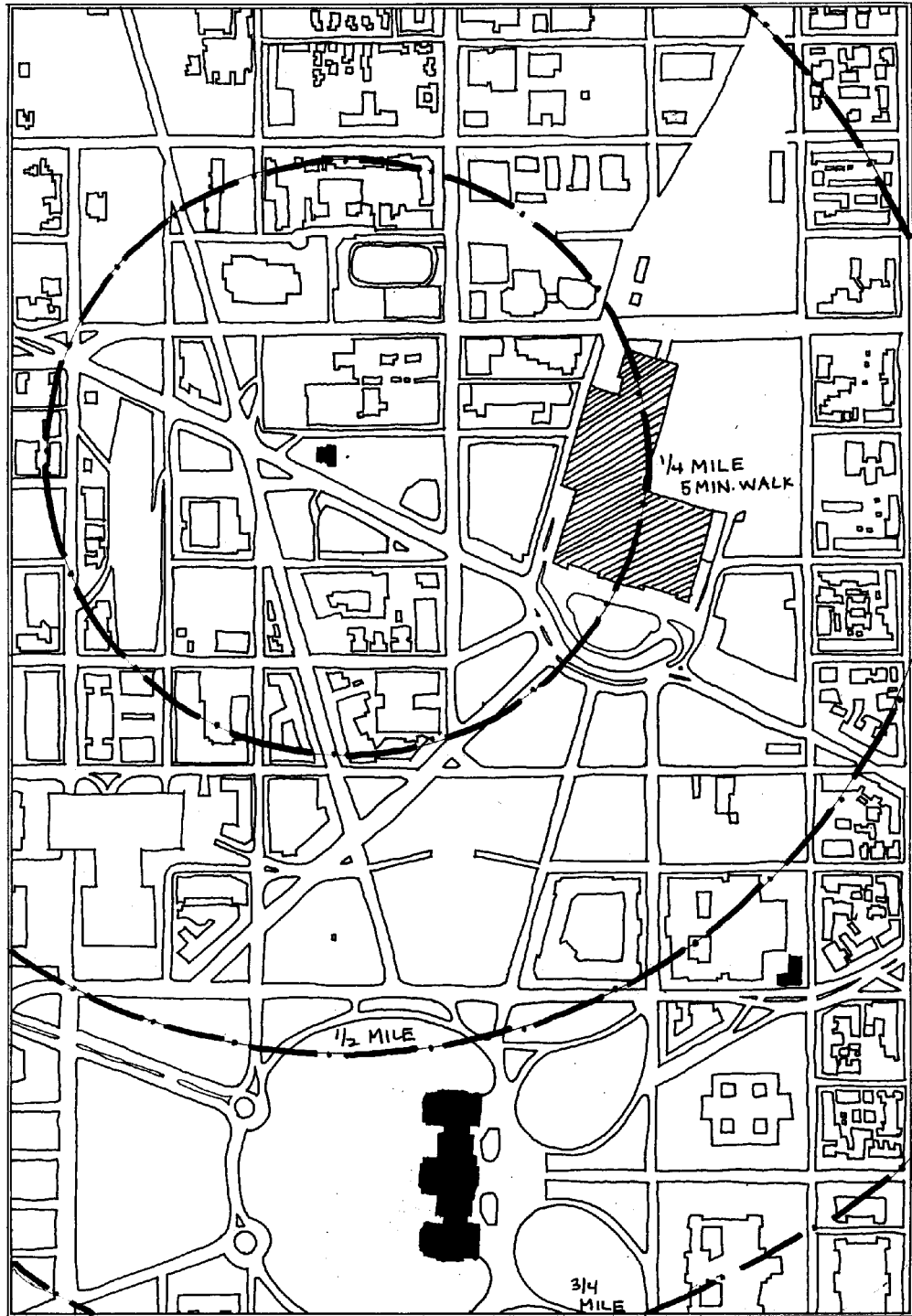




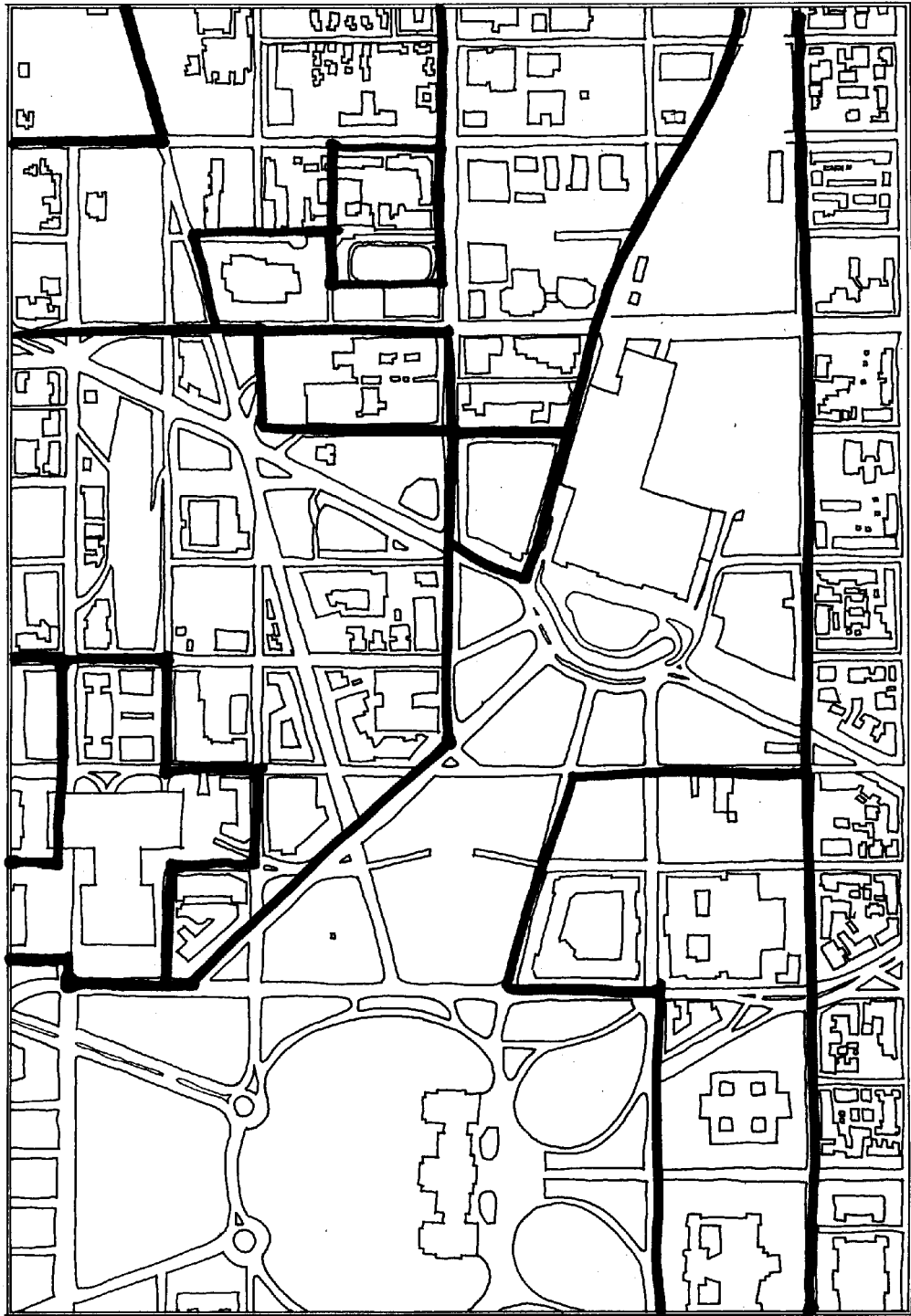
**Figure 24: Edge Diagram:** The dense urban edge along the diagonal avenues help to both define the avenues themselves, as well as the green spaces surrounding the Capitol.



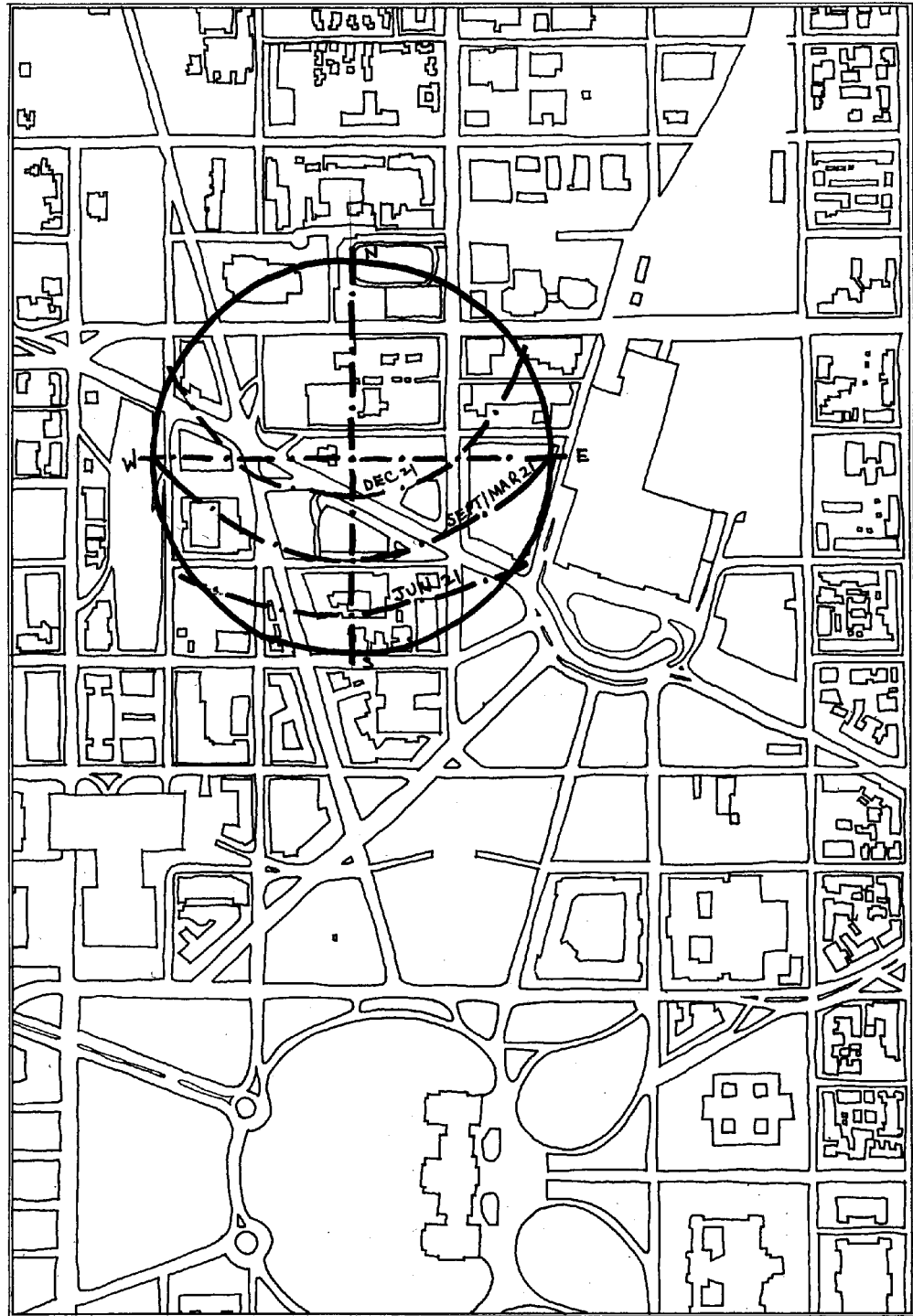
**Figure 25: Axes and Nodes:** The prominence of the proposed site is evident from the intersection of both North Capitol Street and New Jersey Avenues, both of which have view corridors back to the Capitol building with Massachusetts Avenue, which leads to Union Station.



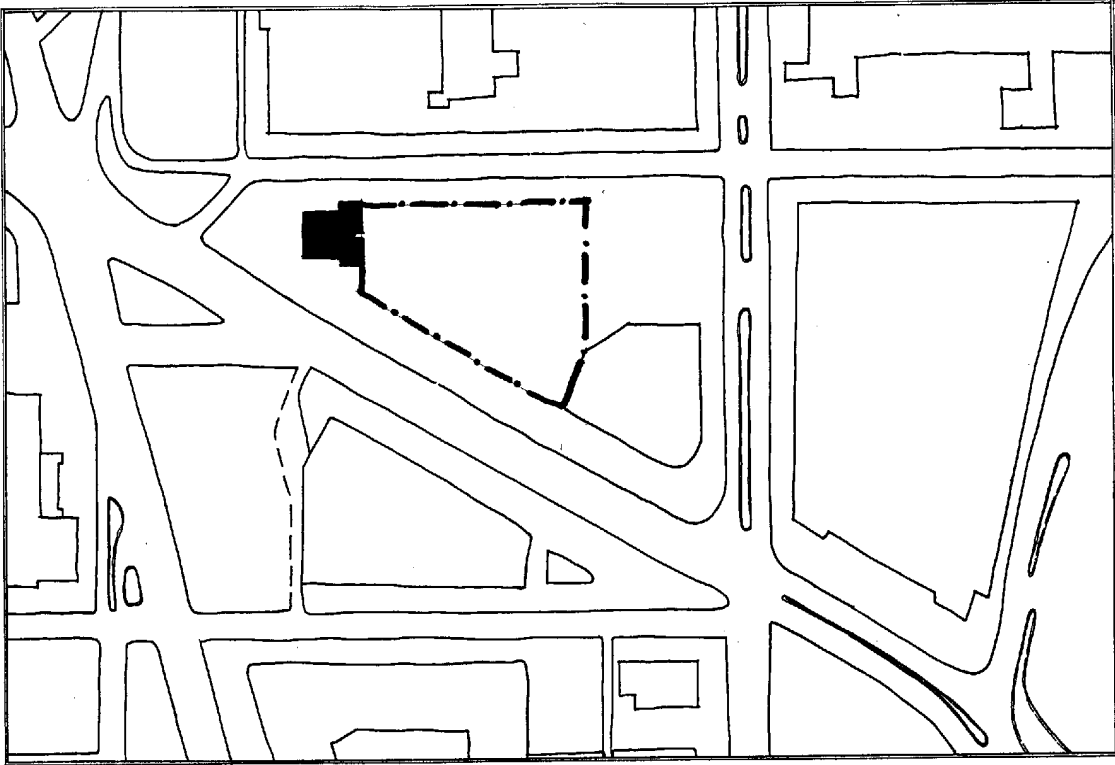
**Figure 26: Walking Radius:** The site is ideally located, within a 5 minute (1/4 mile) walk from Union Station, a major transportation hub. The site is also located within a 15 minute walk from other major Women's History Sites, including the historic Sewell-Belmont house and the Women's Suffrage Monument at the Capitol.



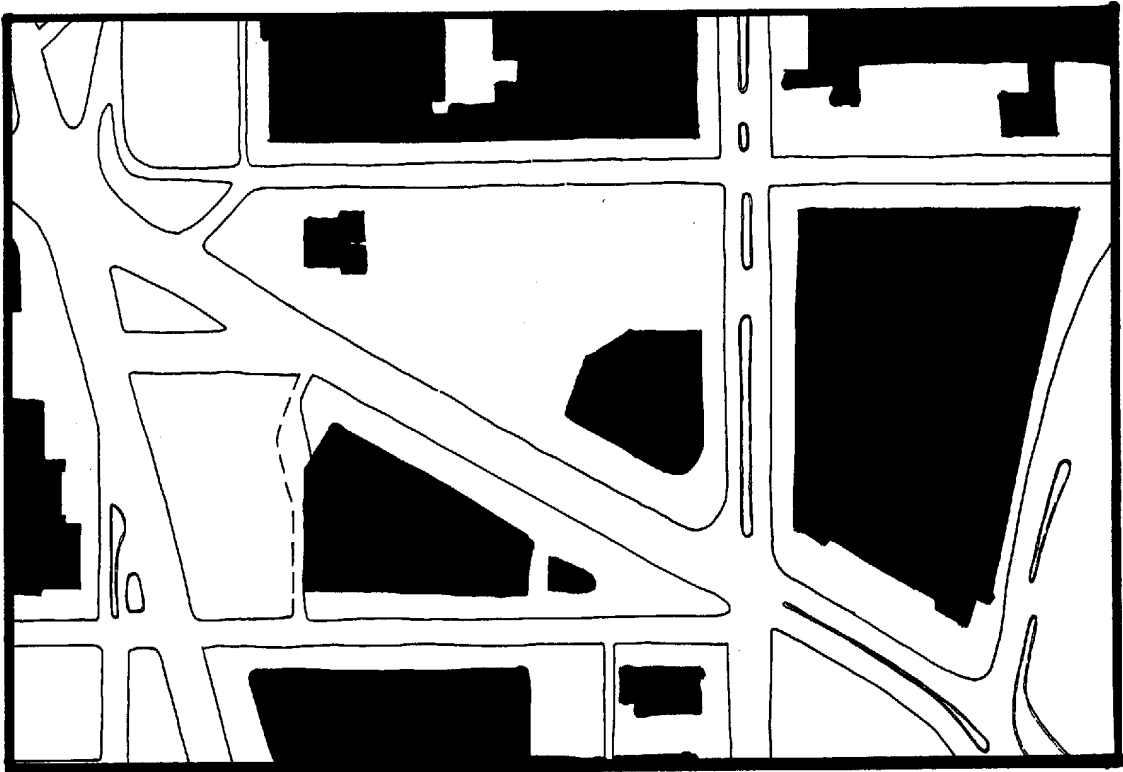
**Figure 27: Zoning Diagram**, shows that the proposed site is currently zoned for Commercial, and is surrounded by many pockets of Federal.



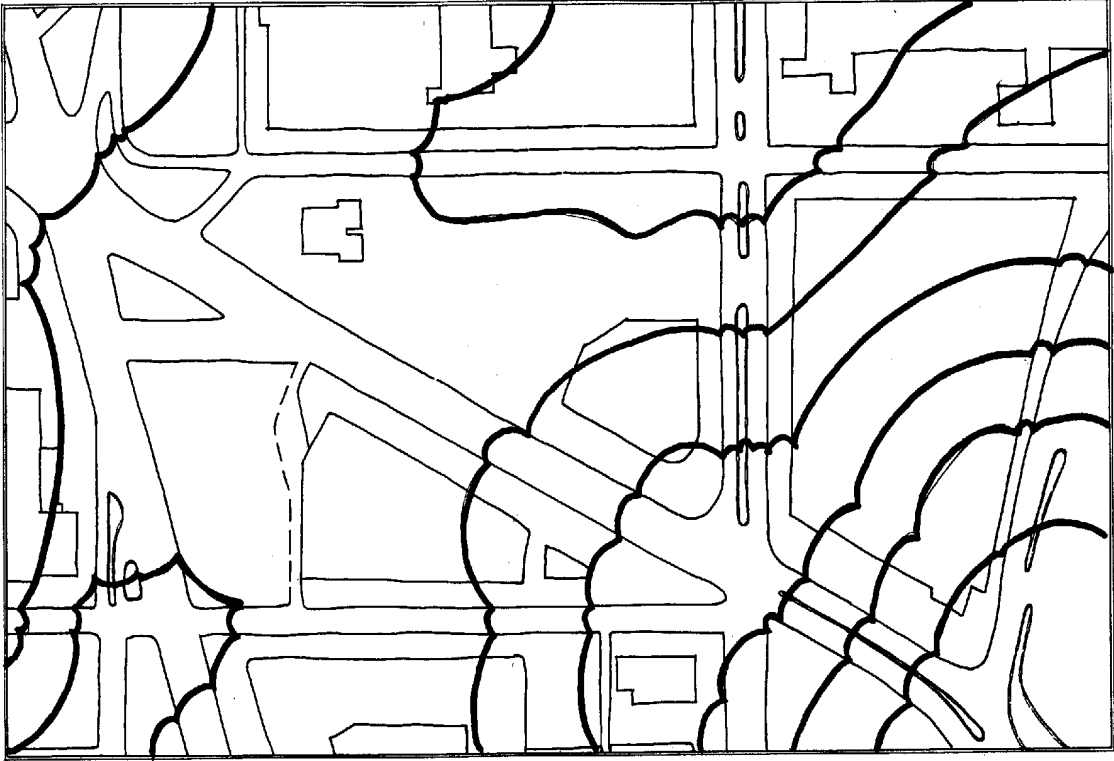
**Figure 28: Solar Orientation Diagram:** Shows that the site's primary face along Massachusetts Avenue faces southwest.



**Figure 29: Site Boundaries:** The site consists of the empty parking lot between the Gales School building and the National Guard building.

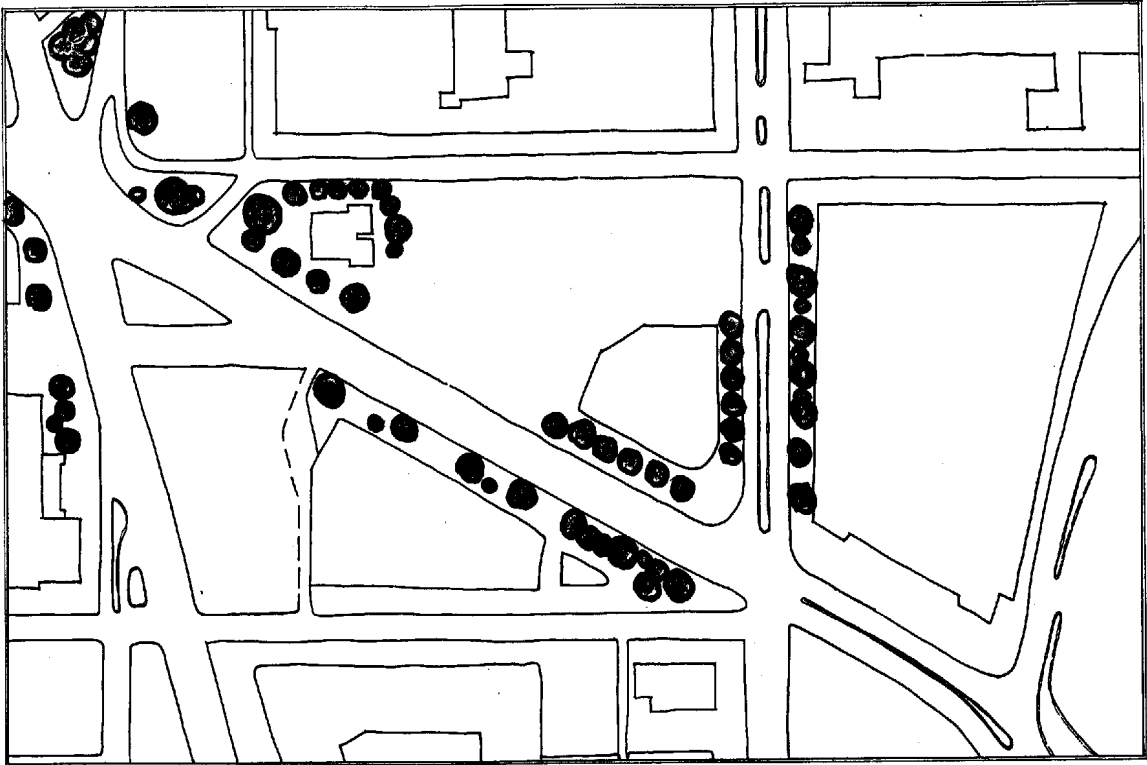


**Figure 30: Local Figure Ground:** shows that although the footprint of most of the buildings in the immediate area are quite large, there are some smaller buildings which coexist.

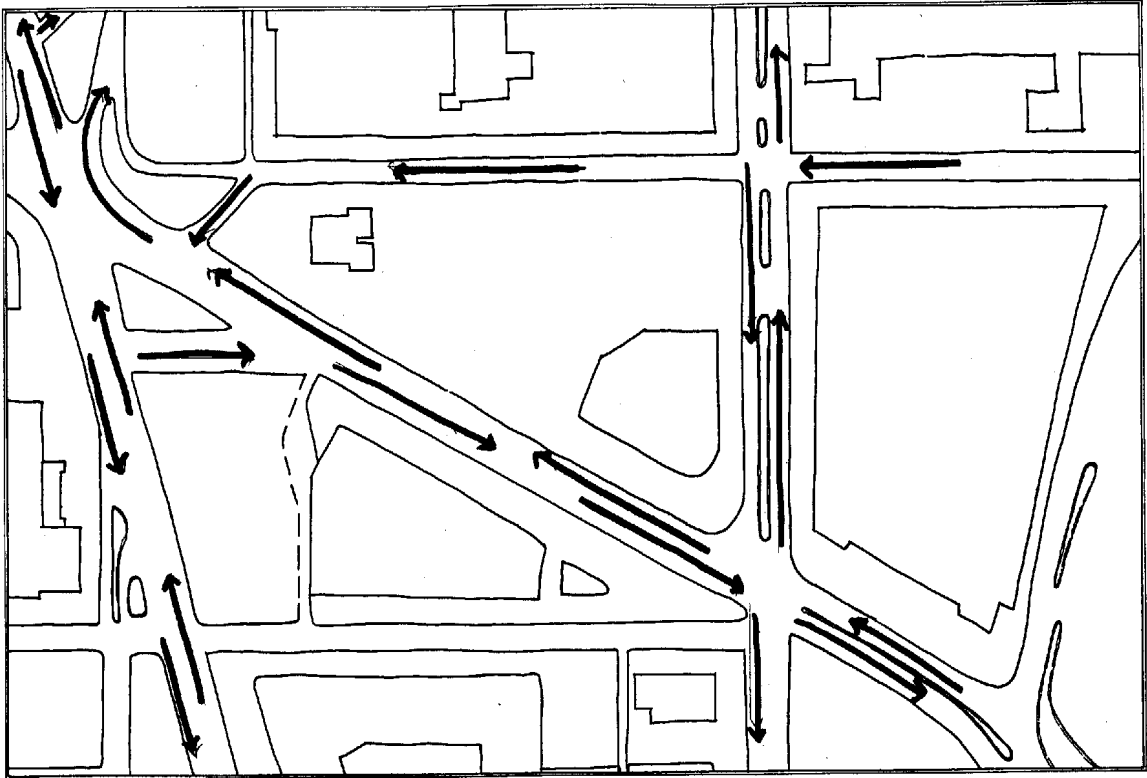


**Figure 31: Topography:** shows that the site is flat.

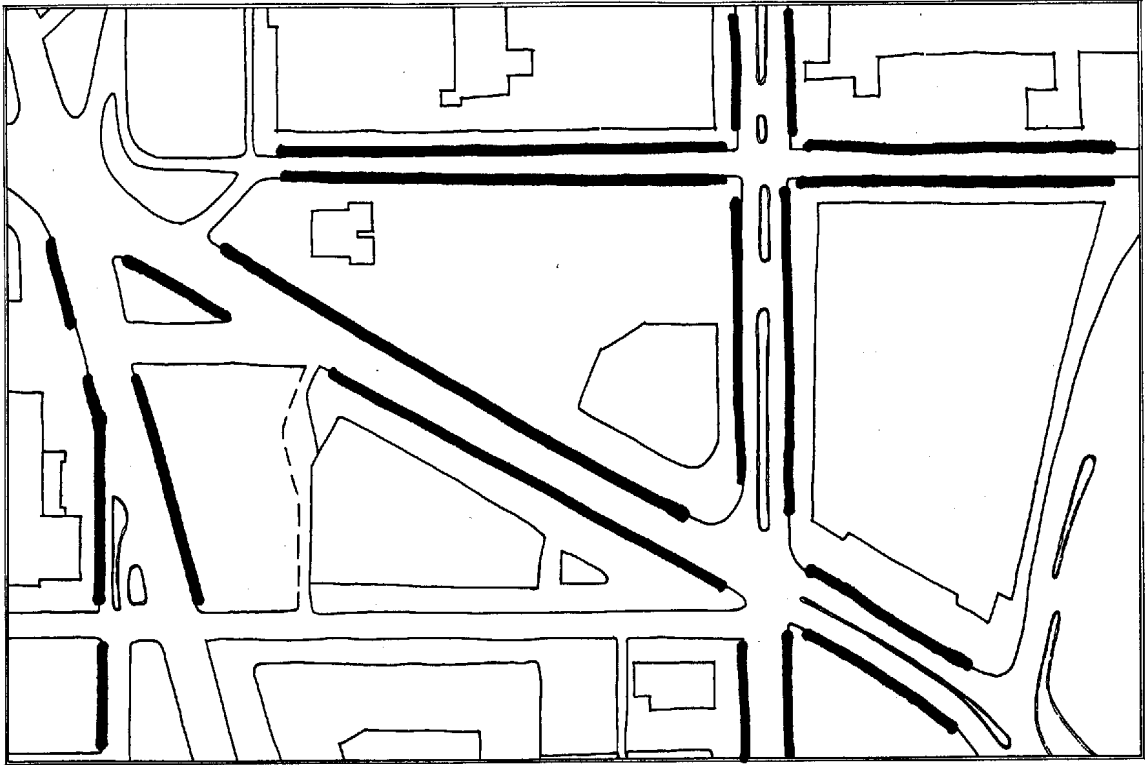




**Figure 32: Site Vegetation diagram:** shows that Massachusetts Avenue has numerous street trees which could be continued in front of the new building.



**Figure 33: Traffic Pattern Diagram:** Shows that the site is bounded on two sides by primary streets with vehicular traffic in two directions. The north side of the site is G street, which is a secondary one-way street coming toward the site from the major North Capitol Street.



**Figure 34: On Street Parking Diagram:** shows that there is some available parking on street and in the surrounding blocks.

## *Functional Program Requirements*

### Program Tabulation

<b>Space</b>	<b>Qualities</b>	<b>Square Ft.</b>
<b>Visitor Services</b>		
Lobby/Atrium	Connection to all major spaces	5,000
Café	Street accessible	2,000
Bookstore/Museum Shop	Street accessible (?)	2,000
Coat Check/Lockers	50 lockers	200
Patron's Lounge		200
Restrooms		<u>350</u>
		9,650
<b>Exhibition Areas</b>		
Permanent Collection Exhibition		40,000
Temporary Exhibition Galleries	flexible space	
2 small @ 2,500 sq. ft.		5,000
2 medium @ 5,000 sq. ft.		10,000
1 large @ 10,000 sq. ft.		10,000
Outdoor Exhibition/Sculpture Garden		<u>20,000</u>
		65,000
with garden		(85,000)
<b>Educational Areas @ Gales School</b>		
Auditorium	300 seat capacity	3,500
Educational Center		
2 classrooms @500 sq. ft.		1,000
2 classrooms @1,000 sq. ft.		2,000
Teacher Resource Center		1,000
Computer Based Learning Center		<u>1,500</u>
		8,000
<b>Research Center for Women's History</b>		
Research Library		
Stacks		5,000
Offices		1,000
Reading Room		<u>1,000</u>
		7,000

**Administrative**

Administrative Offices	@Gales School	5,000
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**Building Services**

Loading Dock		1,000
Storage of Artifacts/Displays		10,000
Workshops		2,500
Mechanical/Utility		<u>7,500</u>
		21,000

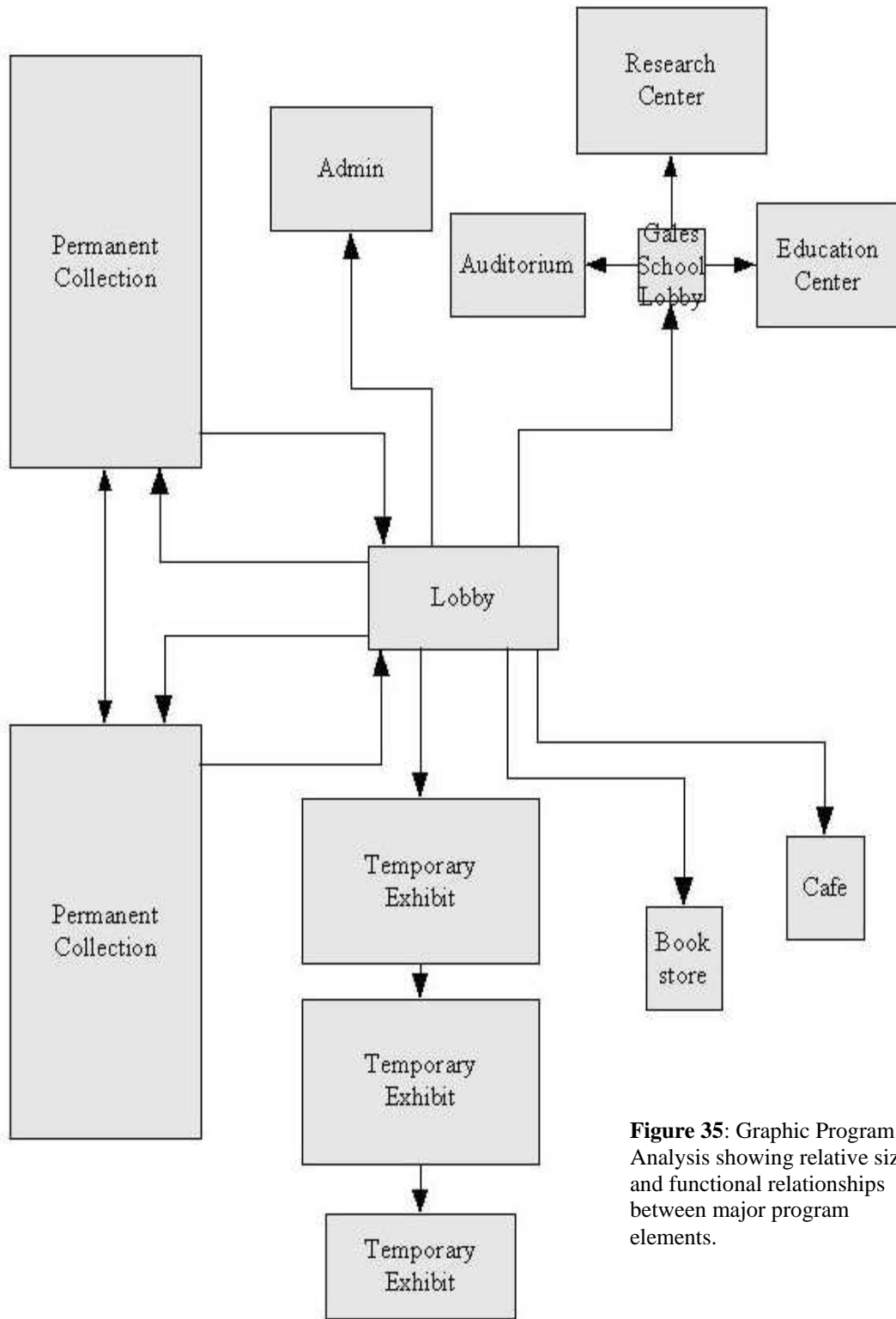
<b>Building Subtotal</b>		<b>108,400</b>
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Circulation, etc. (20%)		21,680
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<b>Building Total</b>		<b>130,080</b>
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(note: The Gales School has 3 floors, each between 4,000-5,000 sq. ft.)

**Graphical Program Analysis:**



**Figure 35:** Graphic Program Analysis showing relative size and functional relationships between major program elements.

## **Descriptive Program Requirements**

### ***Public Areas:***

#### ***1. Visitor Services***

##### **Lobby/Atrium 5,000 sq. ft.**

The Atrium will be a central gathering space through which visitors will pass to all parts of the building. Services such as ticket desk, Donor Desk, and Information Desk are located within this space, which acts as a lobby as well as an introduction to the narrative of the building.

##### **Café 2,000 sq. ft.**

The café will serve as a meeting place for those interested in the serious study of women's history as well as a lunch spot for the casual visitor. As such it will have access to the street and an outdoor seating area.

##### **Bookstore/Museum Shop 2,000 sq. ft.**

The Museum Shop and Bookstore will be a comprehensive source of books, videos, music and teaching materials for, teachers, students and scholars who are interested in the field of Women's History as well as a place for tourists to purchase gift items related to their visit to the museum.

##### **Coat Check/Lockers 200 sq. ft.**

Located within the atrium and easily accessible for those who have items to check.

##### **Patron's Lounge 200 sq. ft.**

Located off the atrium, a place where patrons of the museum may to go relax.

##### **Restrooms 1000 sq. ft.**

## **2. Exhibition Areas**

### **Permanent Collection Exhibition** **40,000 sq. ft.**

Flexible, free plan spaces, divided among 2-3 floors with a connection to the atrium on all floors so that visitors become a part of the experience.

### **Temporary Exhibition** **20,000 sq. ft.**

Several galleries that can be subdivided according to need, to house temporary and traveling exhibitions.

### **Outdoor Exhibition Area/Sculpture Garden** **20,000 sq. ft.**

Because of the size of the site, there is the potential for a garden that could be a combination outdoor exhibition area/park/outdoor café.

## **3. Educational Areas** (Ideally these would be located within the rehabilitated school building)

### **Auditorium (300 seat capacity)** **3,500 sq. ft.**

May depend on existing auditorium in rehabilitated school building.

The auditorium will be used for lectures and films related to the study of Women's History.

### **Educational Center** **3,000 sq. ft.**

An educational center including a teacher's resource center and classrooms of various sizes will create a place in which school children of all ages can participate in programs about women's history.

### **Computer Based Learning Center** **1,500 sq. ft.**

A place to interface with the existing online exhibits of the website for the National Women's History Museum.



*Semi-Public Areas:*

**4. Research Center for Women's History**

**Research Library** **7,000 sq. ft.**

A research library that would be open to public in which scholars on the subject of women's history could be represented. It would be affiliated with Women's studies programs at local Universities and work together with the Educational Center in outreach programs.

*Non-Public Areas*

**5. Administrative Areas**

**Administrative offices** **5,000 sq. ft.**

Ideally would occupy the top floor of the rehabilitated school building, to include offices and conference rooms and a Board Room for the Board of Directors of the museum to hold meetings.

**6. Building Services**

**Loading Dock** **1,000 sq. ft.**

As per District of Columbia Zoning Requirements.

**Storage of Artifacts/Displays** **10,000 sq. ft.**

Adequate storage for artifacts not in use, climate and light controlled.

**Workshops** **2,500 sq. ft.**

Spaces for curators to perform necessary repairs/restoration to artifacts

<b>Mechanical/Utility</b>	<b>7,500 sq. ft.</b>
<i>Subtotal</i>	<i>108,400 sq. ft.</i>
Circulation (20%)	<b>21,680 sq. ft.</b>
<b>Total</b>	<b>130,080 sq. ft.</b>

Note: The Gales School has 3 floors, each between 4,000-5,000 sq. ft. for a building total of 12,000 – 15,000 sq. ft.

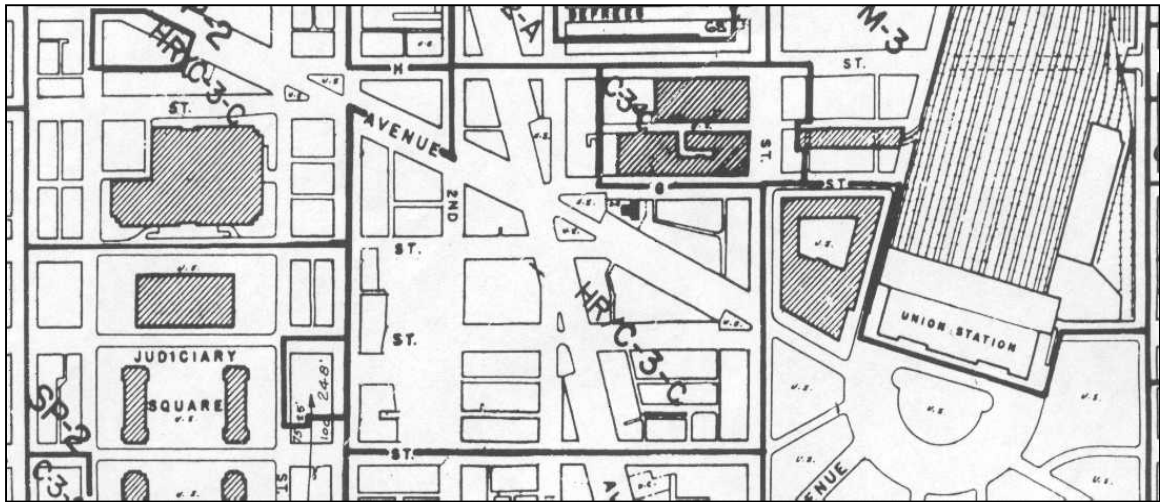
## *Special Design Issues*

### **Historic Preservation**

Although the Gales School is not located within a Historic District, its imminent designation as a national landmark requires adherence to the Secretary of the Interior's Standards for the Treatment of Historic Properties. The Gales School will be rehabilitated, which is defined in the 1995 standards as "the act or process of making possible a compatible use for a property through repair, alterations, and additions while preserving those portions or features which convey its historical, cultural or architectural values."

In compliance with the standards, the Gales School should be used as it was historically used, or given a new use that requires minimal changes to its distinctive materials, features, spaces and spatial relationships. For this reason, the Gales School will be used primarily for the educational aspects of the program. Changes made to the building should not create a false sense of historical development (such as adding conjectural features or elements from other historic properties). Distinctive materials, features, finishes, and construction techniques or examples of craftsmanship that characterize a property will be preserved. The new addition of gallery space to the Gales School will not destroy historic materials, features and spatial relationships that characterize the building. The new work will be differentiated from the old and will be compatible with the historic materials, features, size, massing, scale, and proportion to protect the integrity of the property and its environment. The new addition will interface with the old building in such a manner that, if removed in the future, the essential form and integrity of the environment would be unimpaired.

## Zoning



**Figure 36:** Site Zoning Map

The proposed site for the National Women’s History Museum is zoned a commercial lot and classified as C-3-C, which permits medium to high-density development. According to the District of Columbia Municipal Regulations on Zoning, buildings or structures in this zone may not exceed 90 feet in height. This height may be exceeded by the following structures: spires, towers, domes, pinnacles or minarets serving as architectural embellishments, penthouses over elevator shafts, ventilator shafts, antennas, chimneys, smokestacks or fire sprinkler tanks. The maximum floor area ratio may be no greater than 6.5. The building may not exceed 100% occupancy of its lot.

The building must have a rear yard with a minimum depth of 2 ½ inches per foot of vertical distance from the mean finished grade at the middle of the building to the

highest point of the main roof or parapet wall or 12 feet, whichever is greater. This requirement may be waived. Where a courtyard is provided for a building or portion of a building, at any elevation in the court the width of the court shall be a minimum of 3 inches per foot of height measured from the lowest level of the court or 12 feet, whichever is greater. In the case of a closed court, the minimum area shall be at least twice the square of the width of the court based upon the height of the court, but not less than 250 square feet.

All buildings zoned C-3-C in excess of 2000 square feet require one parking space per each additional 800 square feet of gross floor and cellar floor area. Exceptions to the parking requirements may be made when the building is located within an 800 foot radius of a Metrorail station entrance, which allows for a 25% reduction in required parking spaces. Parking shall be located in either a permitted garage or carport or in an open area lot located within a rear or side yard.

All buildings with a gross floor area between 30,000 and 100,000 square feet require a minimum of one loading berth that is 30 feet deep, one loading platform that is 100 square feet and one service/delivery space that is 20 feet deep.

## *Precedents*

### **The United States Holocaust Museum**

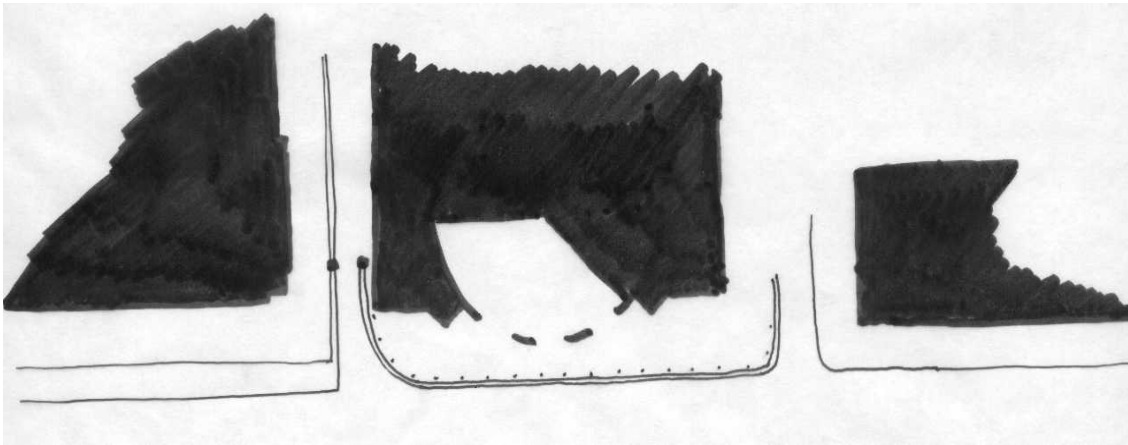
The United States Holocaust Museum is an appropriate precedent for a museum that serves to tell a story rather than act as a container for a collection of objects. There are several issues with which the architecture deals:

**Iconography:** This view of the museum illustrates one of the many dualities of the building. One reading suggests that the four blocks are representative of guard towers. Another suggests that there is a connection between the building and its context. The pyramidal roof forms echo the pyramid that crowns the Washington Monument.



**Figure 37:** US Holocaust Memorial Museum Roofline with Washington Monument in the background. This image shows one way in which the building can be anchored to the site via the repetition of forms in the roofline. The pyramid top of the obelisk is reflected in the roof forms of the tower elements in the museum.

**Urban Condition:** Many of the sites in the monument core of Washington, DC are urban infill sites. The United States Holocaust museum maintains the urban edge of the block, using a plaza to make the transition between the more outside world and the interior space that is disconnected from the street in order to turn the attention of the visitor inward.



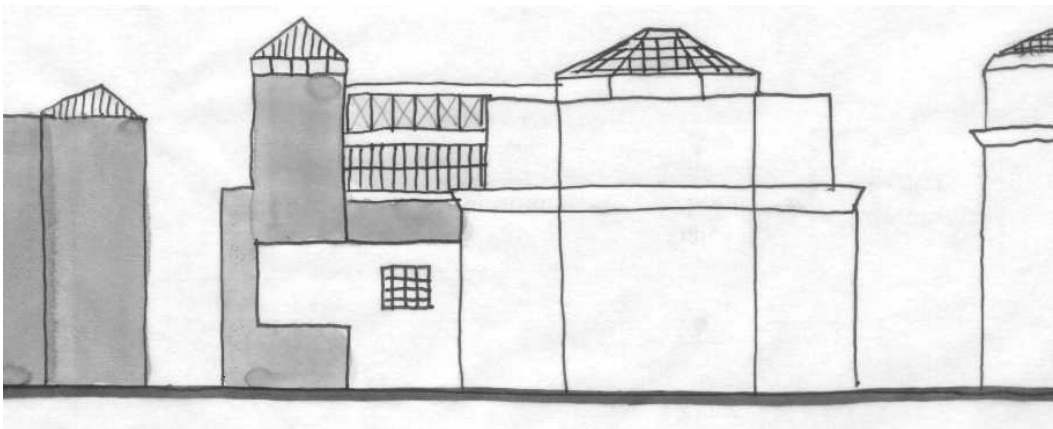
**Figure 38:** Figure-Ground Diagram of the Urban Condition, showing how the U.S. Holocaust Memorial Museum creates a plaza/transitional space while maintaining the street edge.



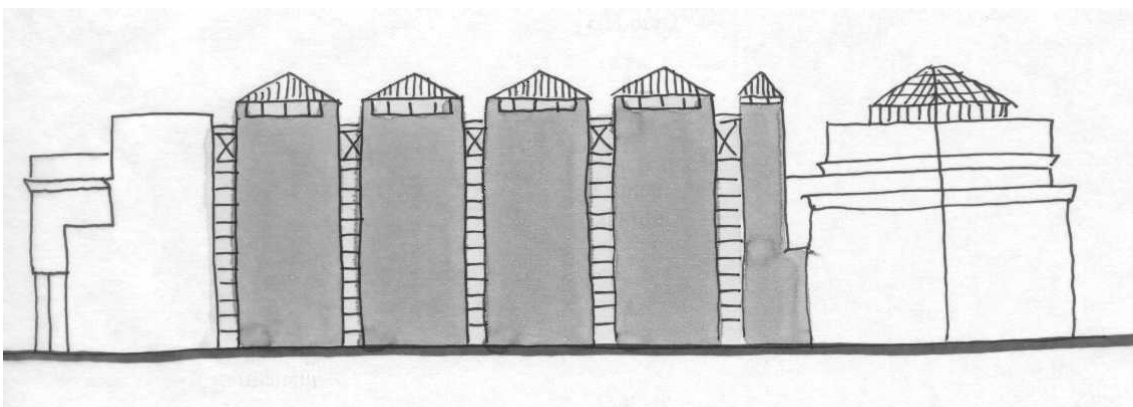
**Figure 39:** View of the streetscape in which the U.S. Holocaust Memorial Museum sits



**Materials:** Since the early twentieth century, Washington DC has primarily been known as a city of classical, white stone buildings. However, prior to the McMillan Commission and its influence on Washington DC, there was an abundance of nineteenth century brick architecture as well. Both types of buildings surround the United States Holocaust Museum. To one side is the 1913 Bureau of Engraving and Printing, a white beaux-arts building. On the other side is the a nineteenth century pressed brick building. The elevations of the Holocaust Museum weave the two materials together successfully, remaining contextual next to both types of neighbors.

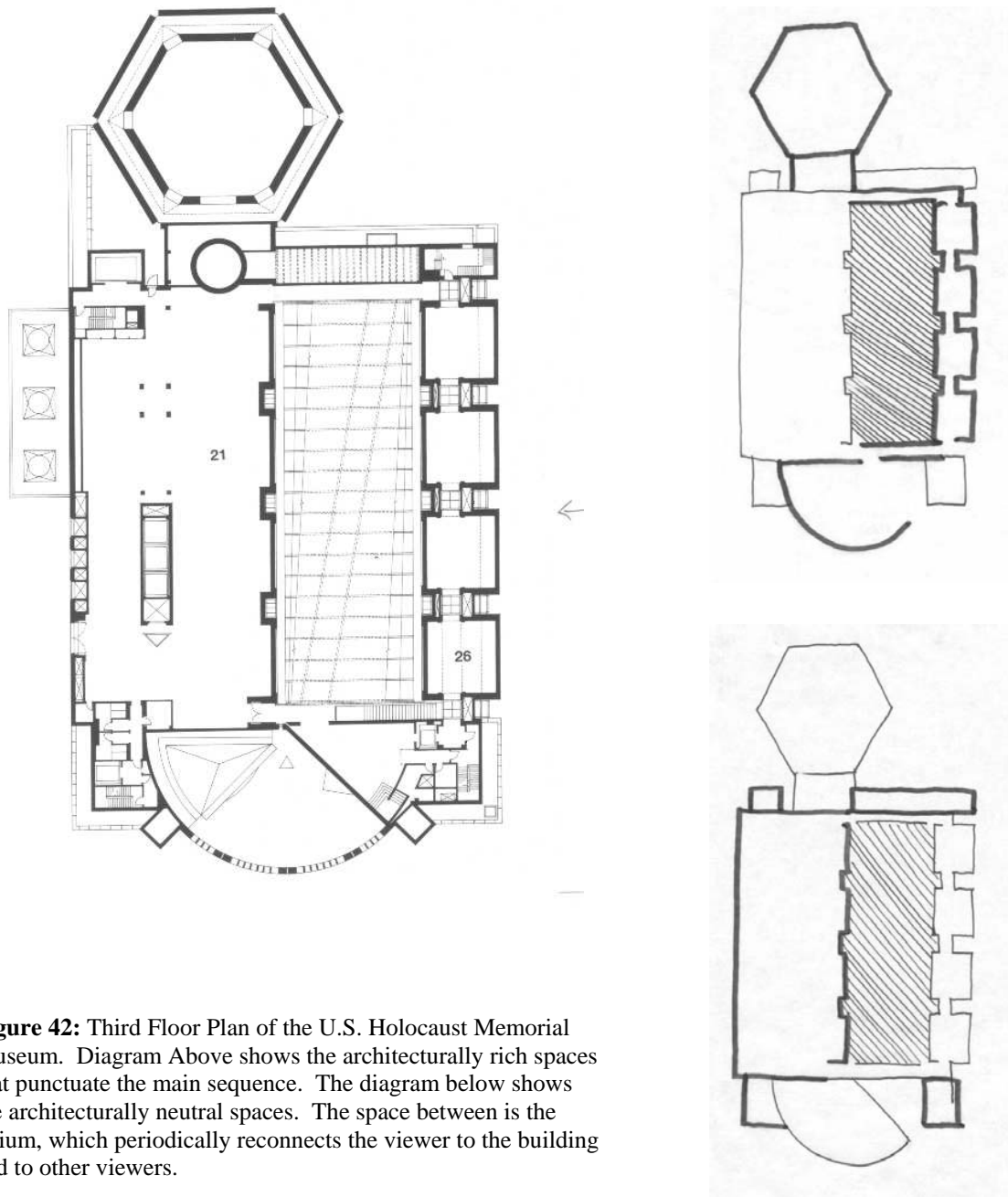


**Figure 40:** U.S. Holocaust Memorial Museum, Raoul Wallenberg Place: Shows the integration of both forms and materials from both of the building's neighbors



**Figure 41:** U.S. Holocaust Memorial Museum, Side: Shows the integration of brick and limestone.

**Procession:** In any museum that focuses on a narrative, the way that you move through the space is extremely important. The United States Holocaust Museum achieves this by integrating large, neutral spaces left to the control of the exhibit designer with spaces laden with architectural meaning.



**Figure 42:** Third Floor Plan of the U.S. Holocaust Memorial Museum. Diagram Above shows the architecturally rich spaces that punctuate the main sequence. The diagram below shows the architecturally neutral spaces. The space between is the atrium, which periodically reconnects the viewer to the building and to other viewers.

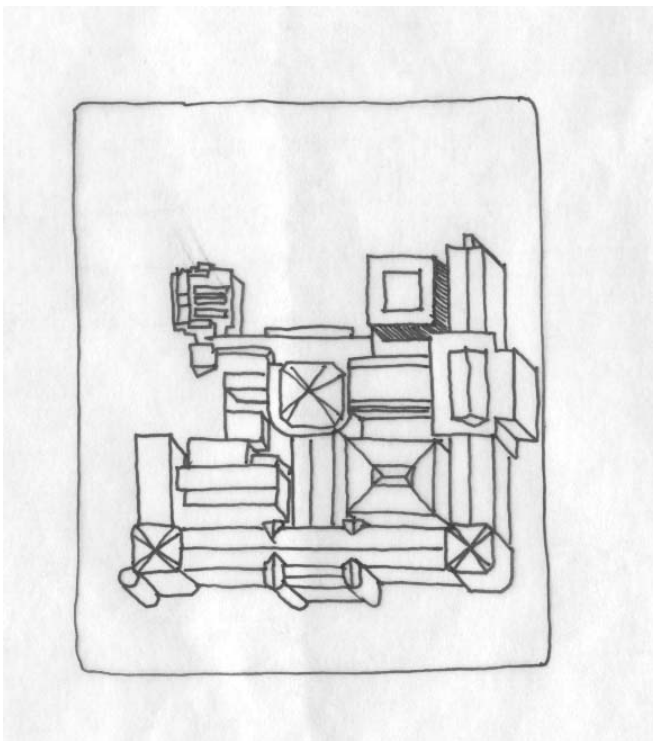
## The Rose Center for Earth and Space

The Rose Center for Earth and Space at the Museum of Natural History in New York City is an example of one approach, in which the architecture of the new building has clean, modern lines and is transparent, allowing the surrounding historic fabric to act as the backdrop for the building rather than trying to replicate its neighbors. In this addition, there is no confusion created by an overly historicist addition that blends with the existing building while at the same time the addition is architecturally compatible.



**Figure 43:** This view from within the Rose Center shows how the transparent walls allow the historic architecture surrounding the site is allowed to be the backdrop for the experience in the building.

**Compatibility of plan:** Although the Rose Center is different from the historic building that it was added on to, there are some elements that keep the addition compatible with the original museum. In plan, the new addition is roughly the same dimension and scale as other elements in the building, continuing a pattern already established by the Museum of Natural History.



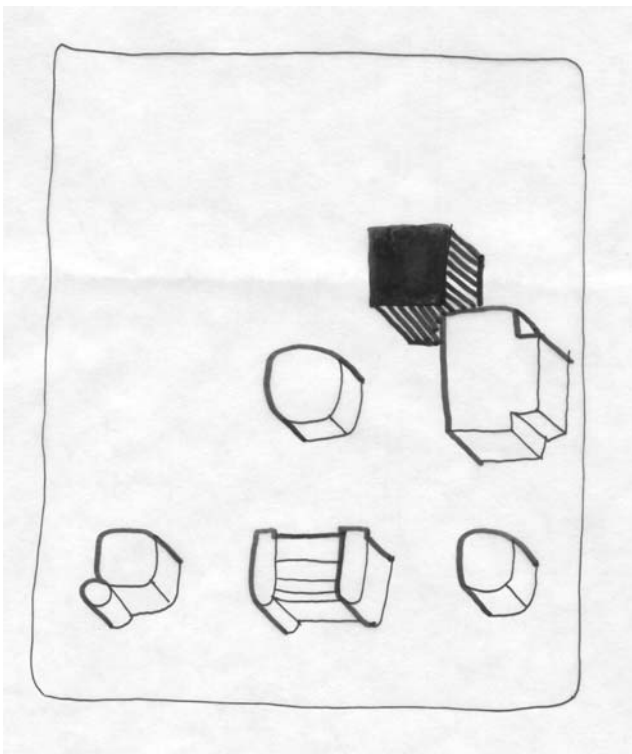
**Figure 44:** Axonometric Diagram of the Museum of Natural History with Rose Center Addition

**Compatibility of Massing:** The simple, prismatic form of the Rose Center is also in keeping with the massing of the rest of the parts of the building.

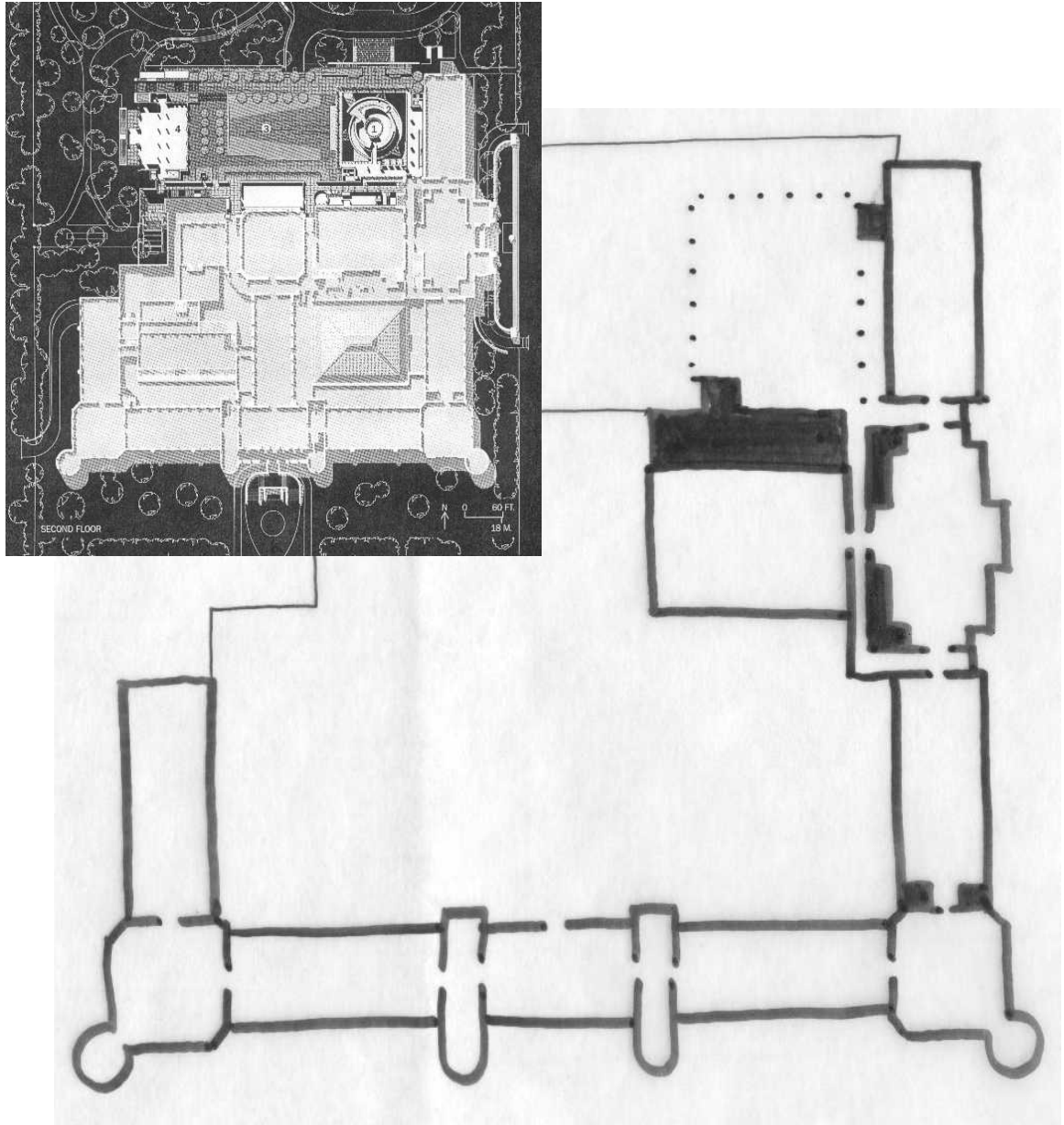
**Compatibility of Plan:** Although the Rose Center is different in character than the historic building onto which it was added, there are some elements that keep the addition compatible with the original museum. In plan, the new addition is roughly the same

dimension as other elements in the building and is in essence the continuation of a pattern already established by the building.

**Compatibility of façade:** Although technology allows the fenestration of the new addition to be handled in a way that is very different from the existing building, there is still a sensitivity to context evident in the size, placement and rhythm of joints and structural members.

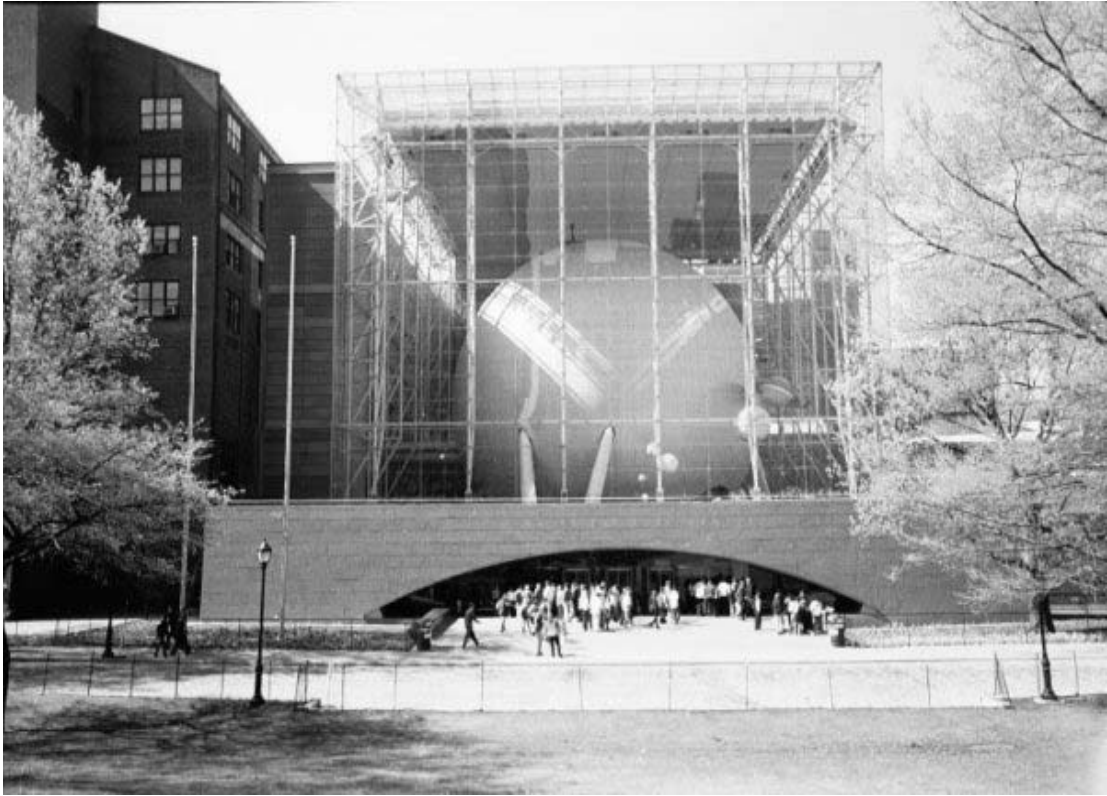


**Figure 45:** Axonometric Diagram showing just the major masses of the Museum of Natural History with compatible Rose Center addition.

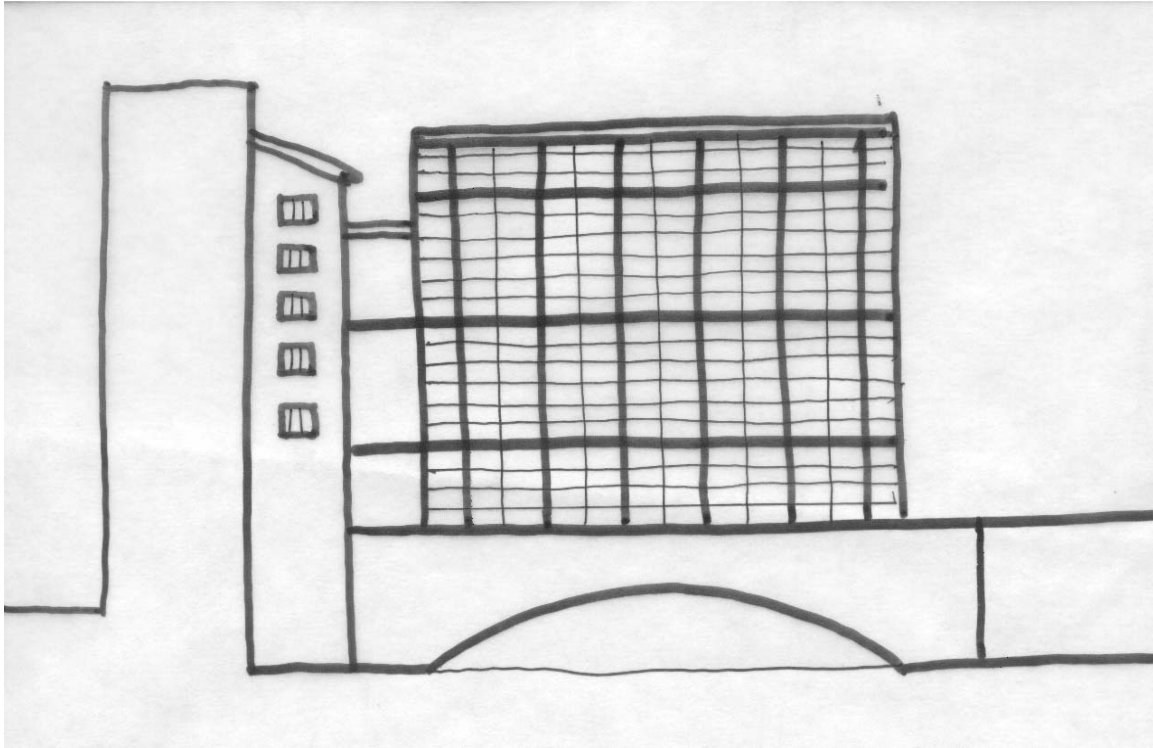


**Figure 46:** Rose Center for Earth and Space Plan and Diagram: Diagram shows that the addition is a logical part of the sequence of the building.

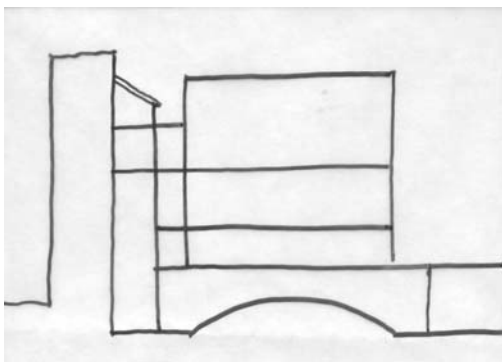
**Compatibility of Entry:** Although the Materials are very different, the entry to the Rose Center is a quotation of the low arch that you find on the main entry of the original building.



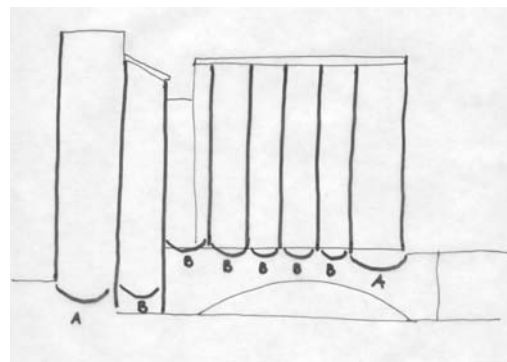
**Figure 47:** The modern addition of the Rose Center for Earth and Space to the historic Museum of Natural History in New York. The connection between the glass box of the addition and the historic fabric is one that doesn't harm the original building.



**Figure 48:** Simplified Facade Diagram of the Rose Center Addition, showing major and minor fenestration



**Figure 49:** Diagram of Facade showing horizontal connections



**Figure 50:** Diagram of Facade, showing vertical rhythms



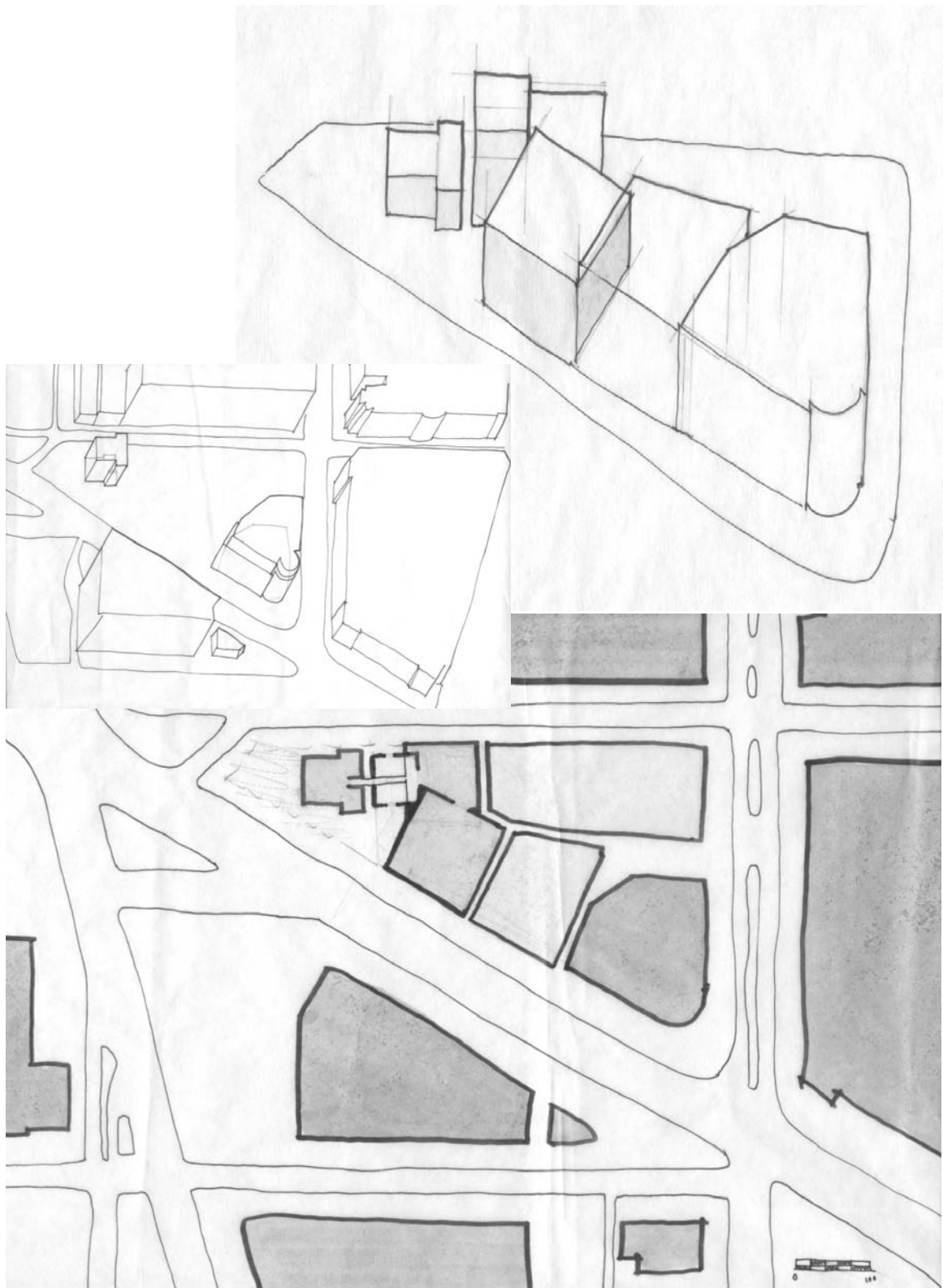


**Figure 51:** Entry to Museum of Natural History (above) and Entrance to Rose Center for Earth and Space (below)

## *The Process*

### **Preliminary Design Strategy 1: Intersecting Masses**

This approach attempts to resolve the conflicting geometry and scale issues on the site by recognizing that the Gales School is almost a cube and creating a series of interlocking similarly platonic masses. In this scheme, each mass will respond to a different contextual condition, allowing the building to hold the urban edge on a difficult triangular site, while at the same time remaining contextual by the repetition of the form of the Gales School. Additionally, the interlocking masses allow an opportunity to mitigate the height difference between the Gales School and the adjacent National Guard Building by stepping up, both in height and in bulk, between the two buildings. This also creates an opportunity for a roof terrace sculpture garden or café. Inside the masses, their ideal forms will be readily apparent from corresponding ideal rooms, while the areas of intersection will provide a place for poche.



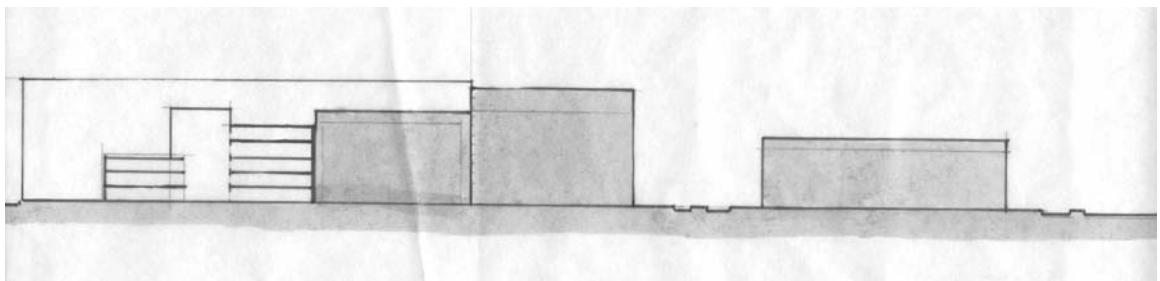
**Figure 52:** Interlocking Masses Scheme: From Top: Axonometric, Context Axonometric, Plan

## **Preliminary Design Strategy 2: Classical Rotunda**

This scheme is an interpretation of the classical museum type, which includes a rotunda as the major central space that organizes the remainder of the building. In this interpretation, the rotunda is a light structure that also provides the interface between the Gales School and the new exhibition space. The shape of the rotunda also allows for a resolution of the conflicting geometry of the site, allowing the new galleries to hold the urban edge. Filling out the remainder of the site with garden walls and terraces also holds the urban edge. By mirroring the form created by the Gales School and its associated garden walls in the footprint of the museum addition, a transitional zone is created between the street and the entrance to the museum, which is a technique used by the U.S. Holocaust Memorial Museum in order to separate people from the present time and place in order to help them more successfully identify with the narratives of the museum.



**Figure 53:** Classical Rotunda Scheme, Plan



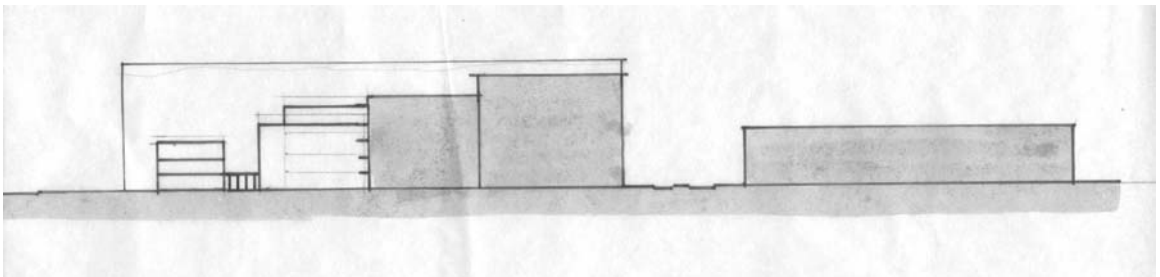
**Figure 54:** Classical Rotunda Scheme, Section

### **Preliminary Design Strategy 3: The Urban Edge**

This scheme is about holding the urban edge on a site where the geometry makes that a difficult task. In the main scheme, the gallery addition stands as a separate building from the Gales School, attached by an upper level bridge. This creates an addition that is minimally invasive on the historic resource. The gallery is able to be an infill building, and the edge is held by a colonnade that surrounds the exterior space separating the two buildings, turning what would be residual space into an exterior courtyard/sculpture garden. The lobby/atrium space retains its ideal form, embedded in a building that responds to the urban condition and accessed through a columnar screen. In a variation on the same theme, the atrium/lobby space is a connector that attaches the Gales School to gallery addition. In giving up its ideal form, the atrium actively engages the urban edge.



**Figure 55:** Urban Edge Scheme: Plan  
(inset plan is a variation on the same theme)



**Figure 56:** Urban Edge Scheme, Section

## *The Final Museum Design*

### **The Urban Design**

Because the site is located on a major avenue, little change was required of the existing urban plan. The direction of G-street was changed to facilitate traffic flow around the museum and the intersection at the western tip of the site was cleaned up to make it less confusing. Because this area of Washington DC is noticeably lacking in urban space, the final design contains a large public plaza that is a mixture of both hardscape and softscape as an amenity for both visitors to the other museums in this area as well as the people who work in this area.

The historic Gales School, which already existed on the site, was treated in much the same way as the AIA building treats the historic Octagon on its site. Rather than attaching directly to the much smaller historic structure, the Gales School is allowed to maintain the integrity of its mass and is surrounded by landscape rather than building. Not only is there precedent for this approach in the AIA building, but it allows the school to exist in much the same way that it would have when it was first built, that is a simple mass surrounded by a schoolyard on a block that is otherwise filled with dense building.

The museum is designed to allow for two different types of visitors. People who visit the museum on their own will arrive either via Metro (from nearby Union Station, which also has ample parking available for those who wish to drive). School groups will arrive by bus and be dropped off in front of the Gales School for programs in the old schoolhouse before proceeding to the museum through a private garden that connects the two buildings.



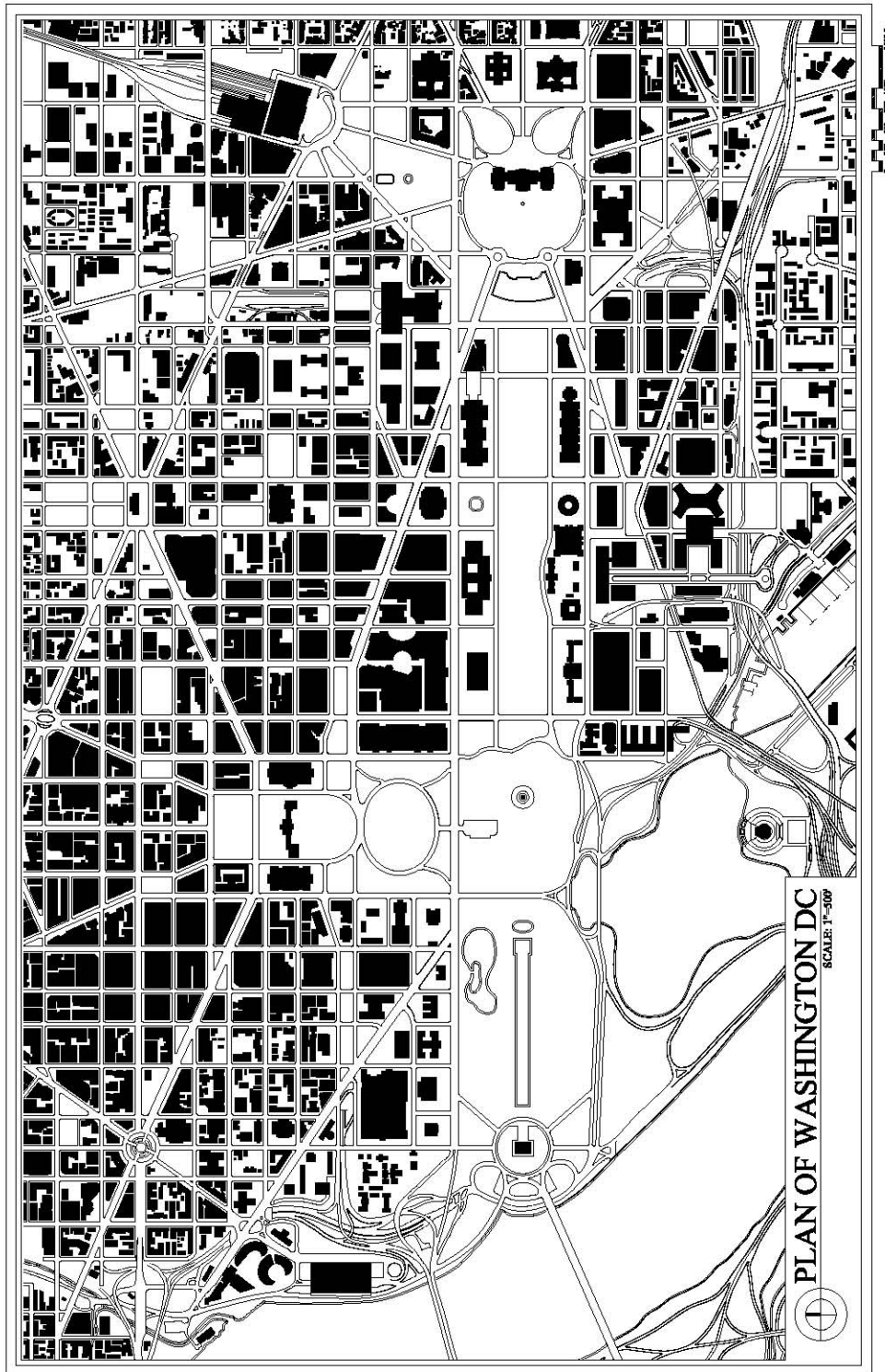
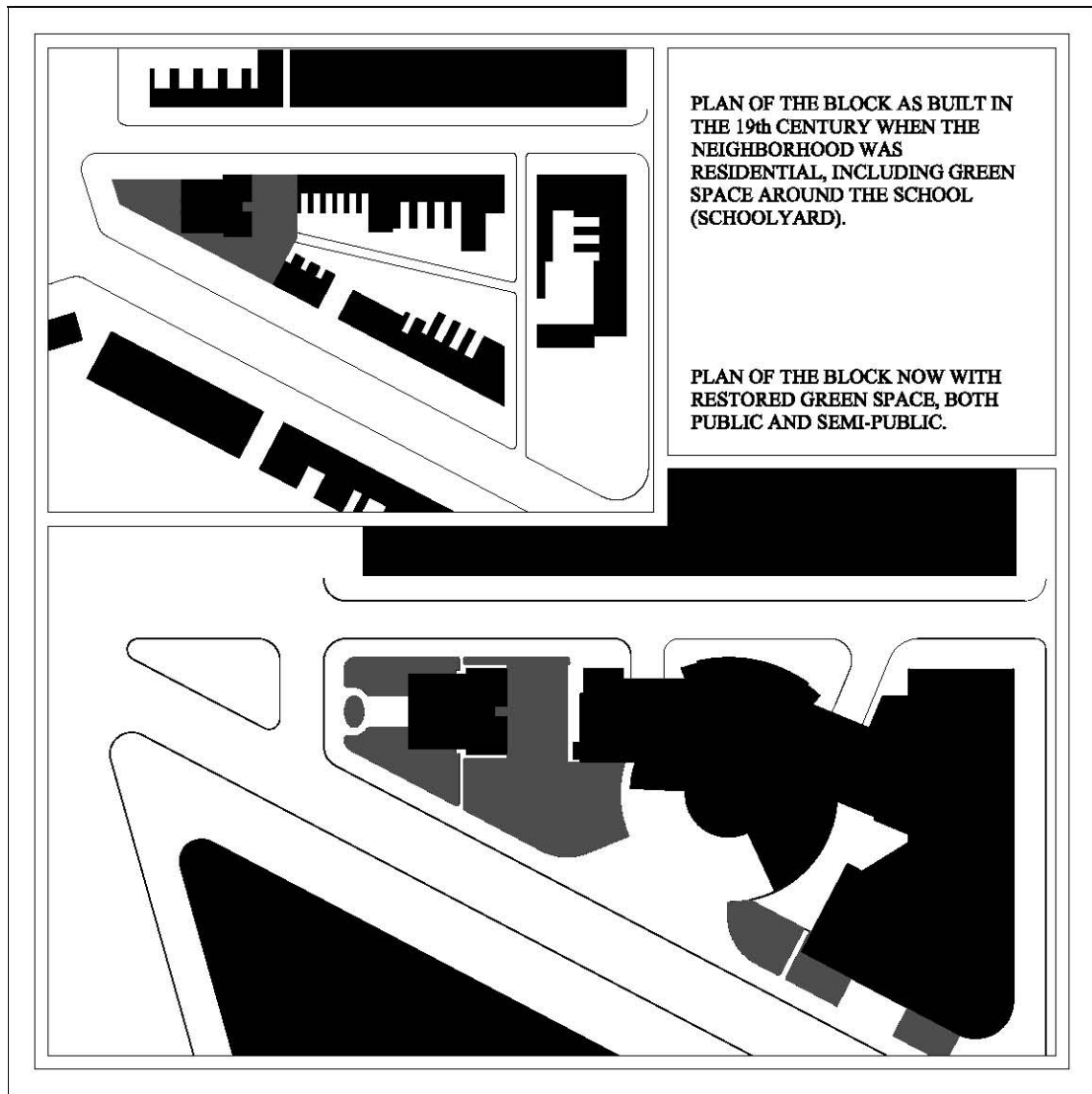


Figure 57: Plan of Washington DC



**Figure 58:** Block Plan

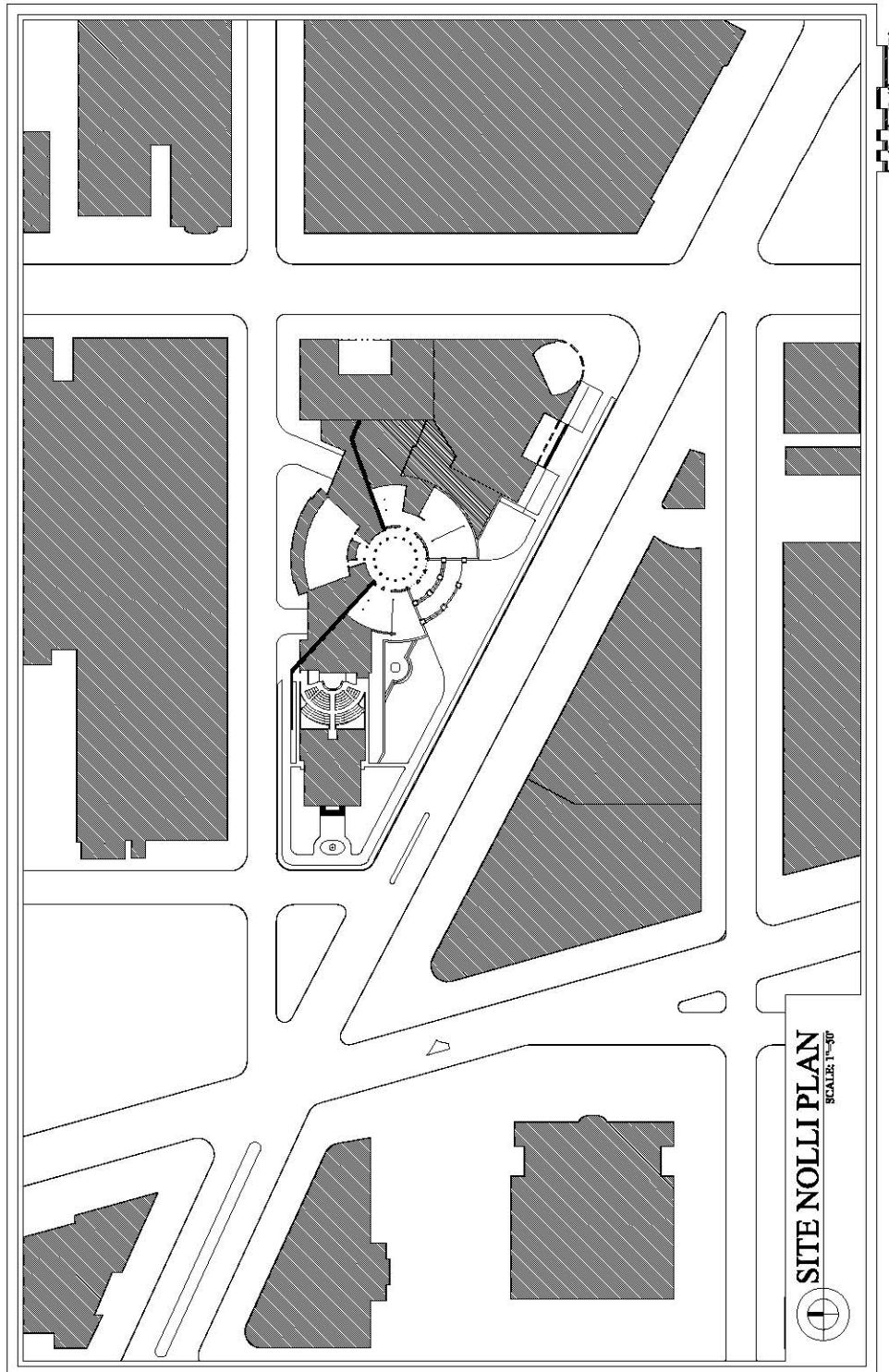


Figure 59: Site Noll Plan

## **Museum Organization and Plan**

On the plaza level all of the normal peripheral functions of the museum exists. There is a large entrance lobby (that is also the base of the large rotunda which connects both sides of the museum) along with educational areas, café and bookstore retail locations and service areas for museum personnel. The upper levels contain gallery space with one side of the museum dealing with the ways that science has affected the lives of women and the other side of the museum dealing with the achievements of women in science, both past and present. The building itself is flanked on each side by educational components. On one side are the programs held in the Gales School, aimed at educating and inspiring young students about the mission of the museum. On the other side is a research center for visiting women scientists.

Rather than organizing the program of the museum around traditional criteria (such as chronological or by discipline), the Museum of Women and Science makes visitors aware that they will be experiencing a telling of history that is different than what they have become used to right from the beginning. It has an unorthodox arrangement of its exhibits around three themes: inner space, human space and outer space.

Inner space deals with issues related to women on a micro level such as genetics, medicine and childbirth, both from the point of view of . Human space deals with issues related to women on the level of that which we perceive in the natural world and would include most of the natural sciences as well as the social sciences. Outer space deals with issues related to women on a macro or universal level, such as women in the space program and the effect that technologies developed by such programs have had on women.

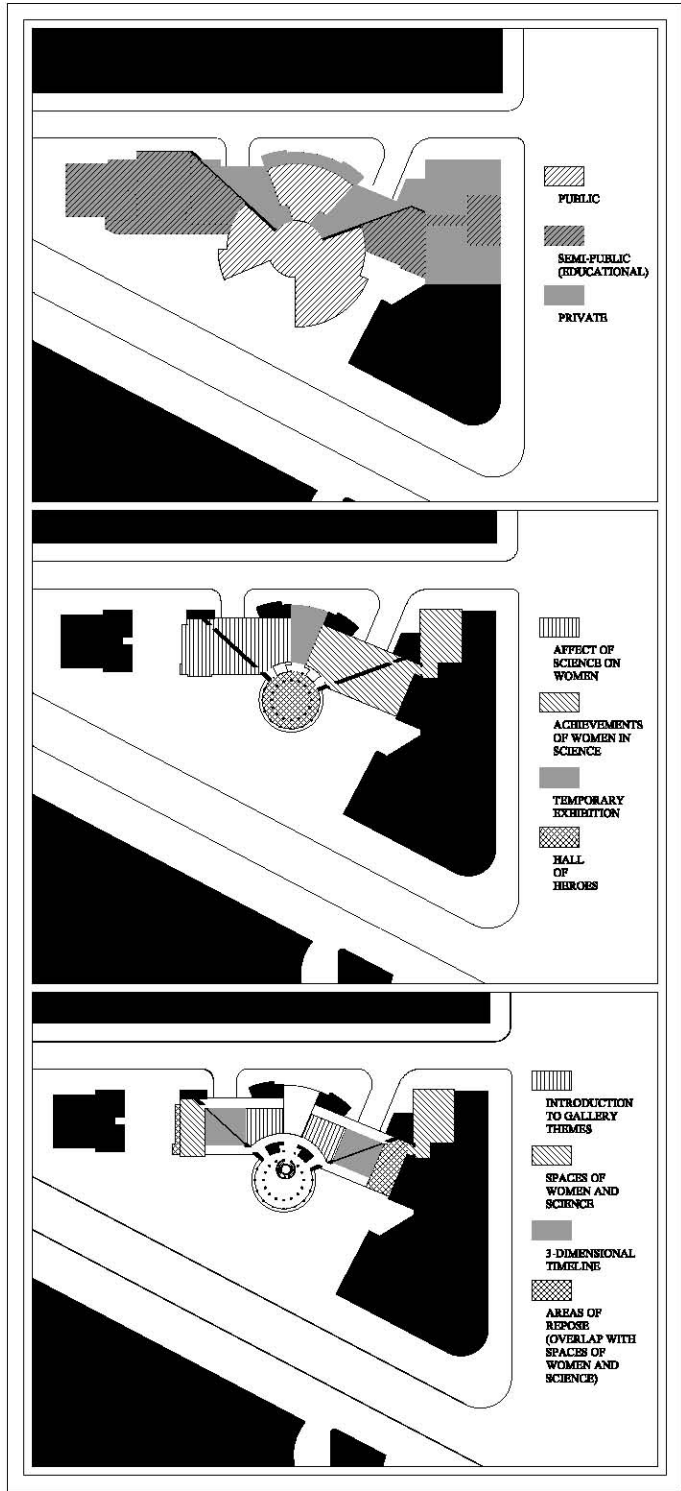


Figure 60: Use Plan

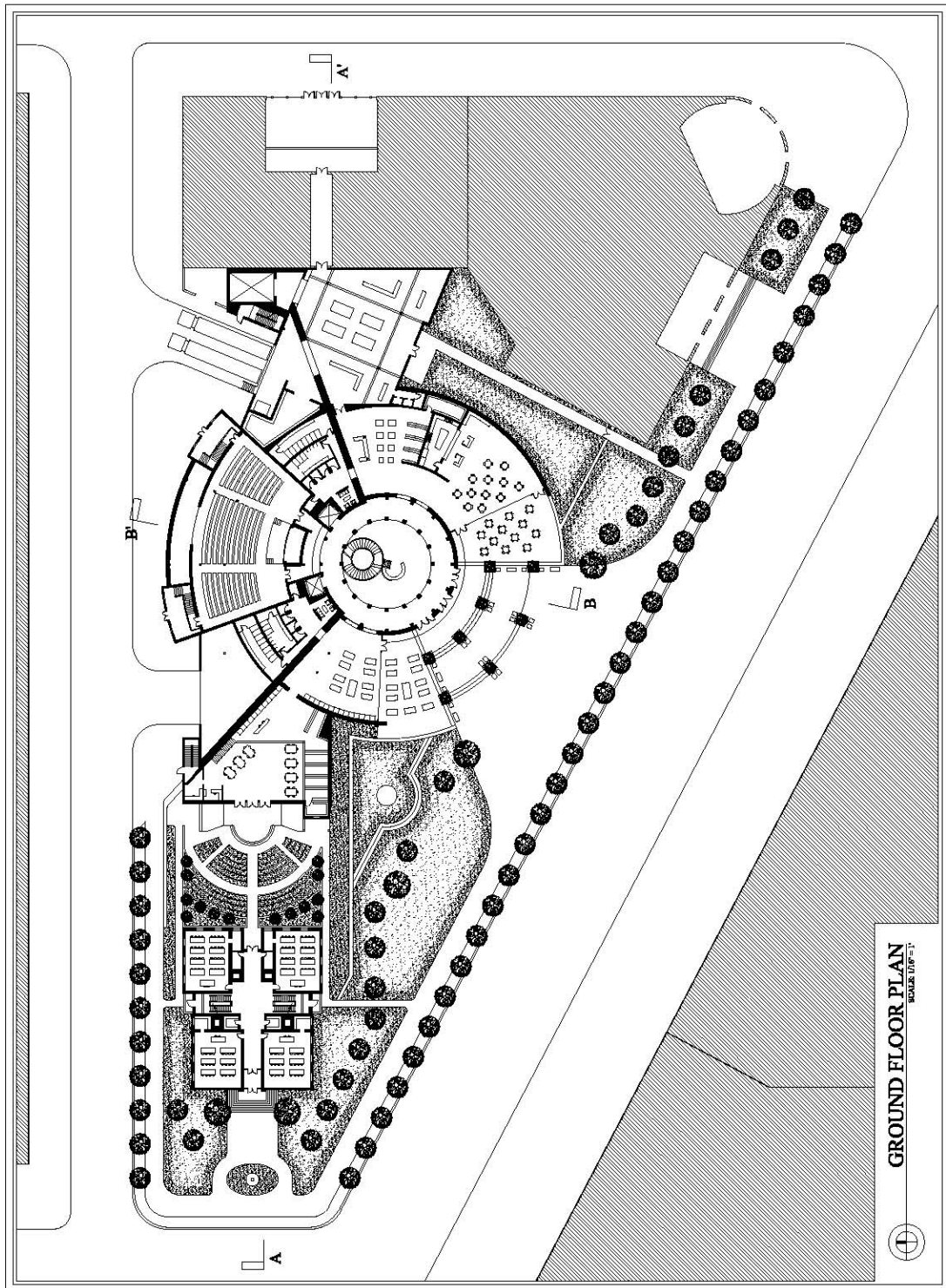
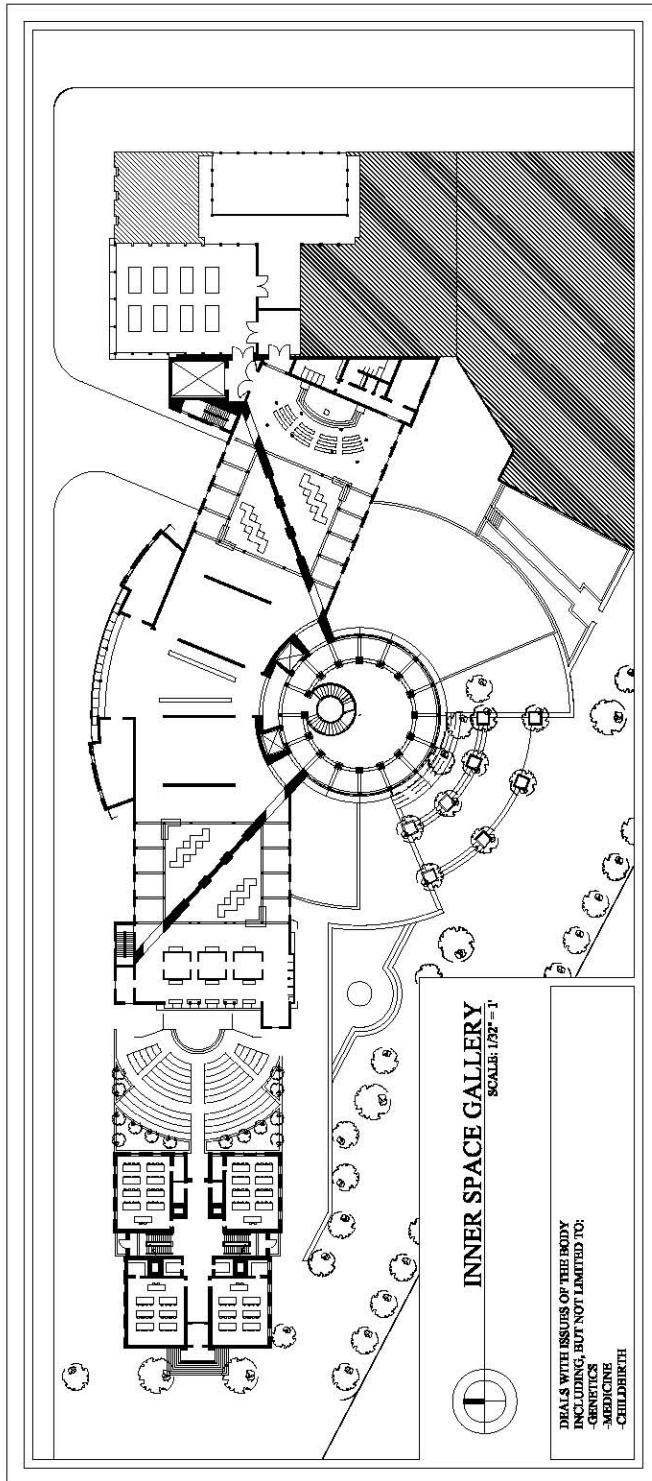


Figure 61: Ground Floor Plan



**Figure 62:** Inner Space Gallery

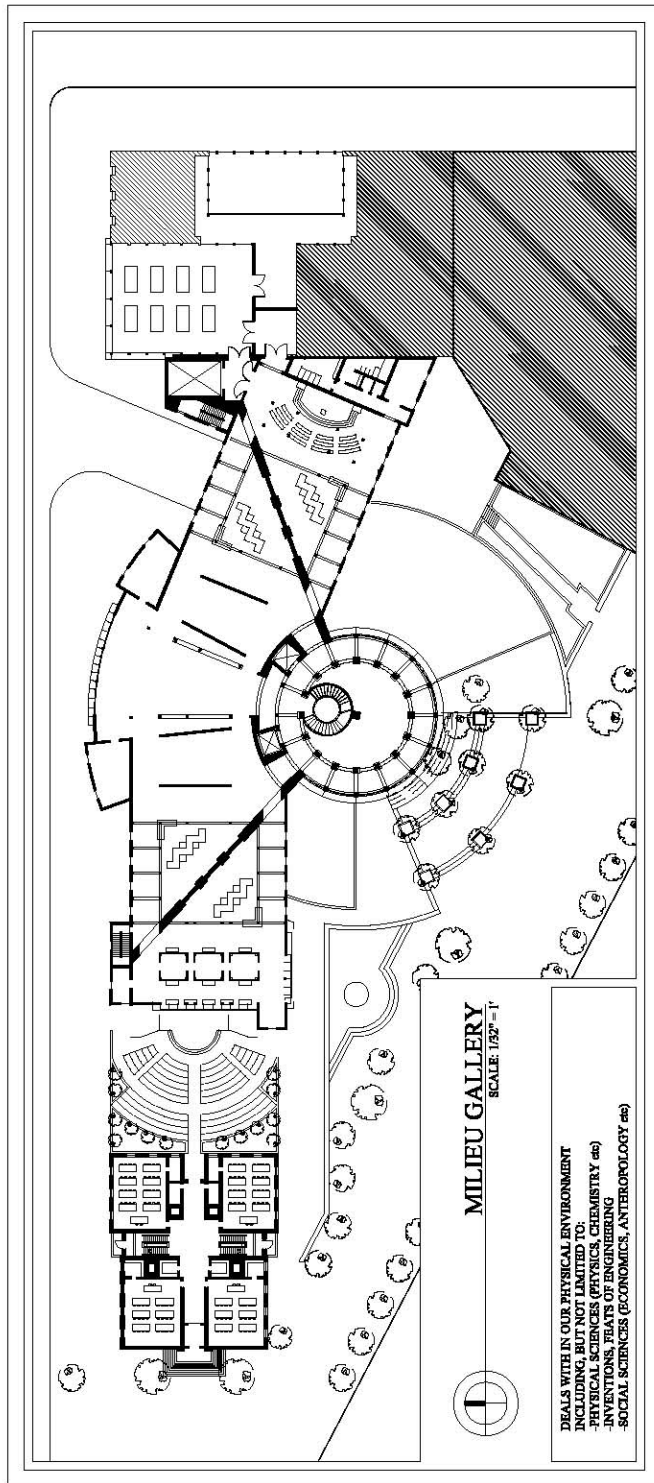
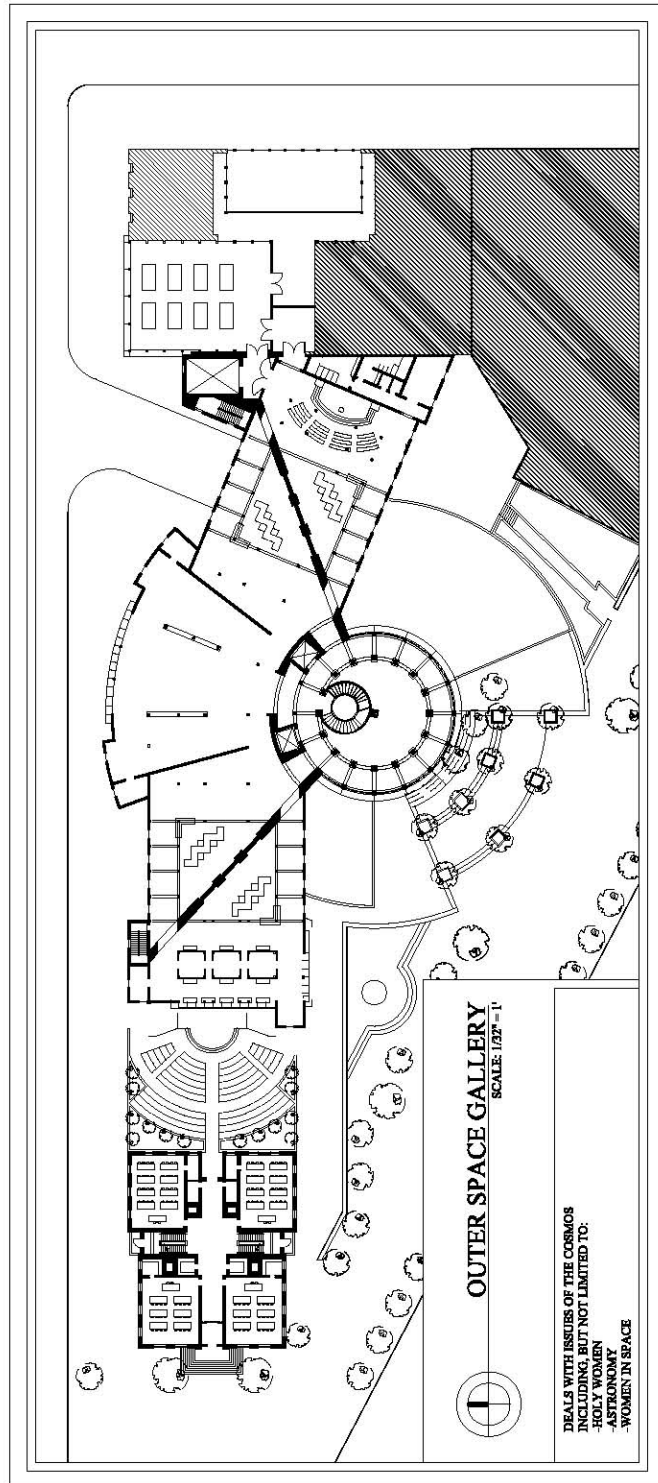


Figure 63: Milieu Gallery





**Figure 64:** Outer Space Gallery

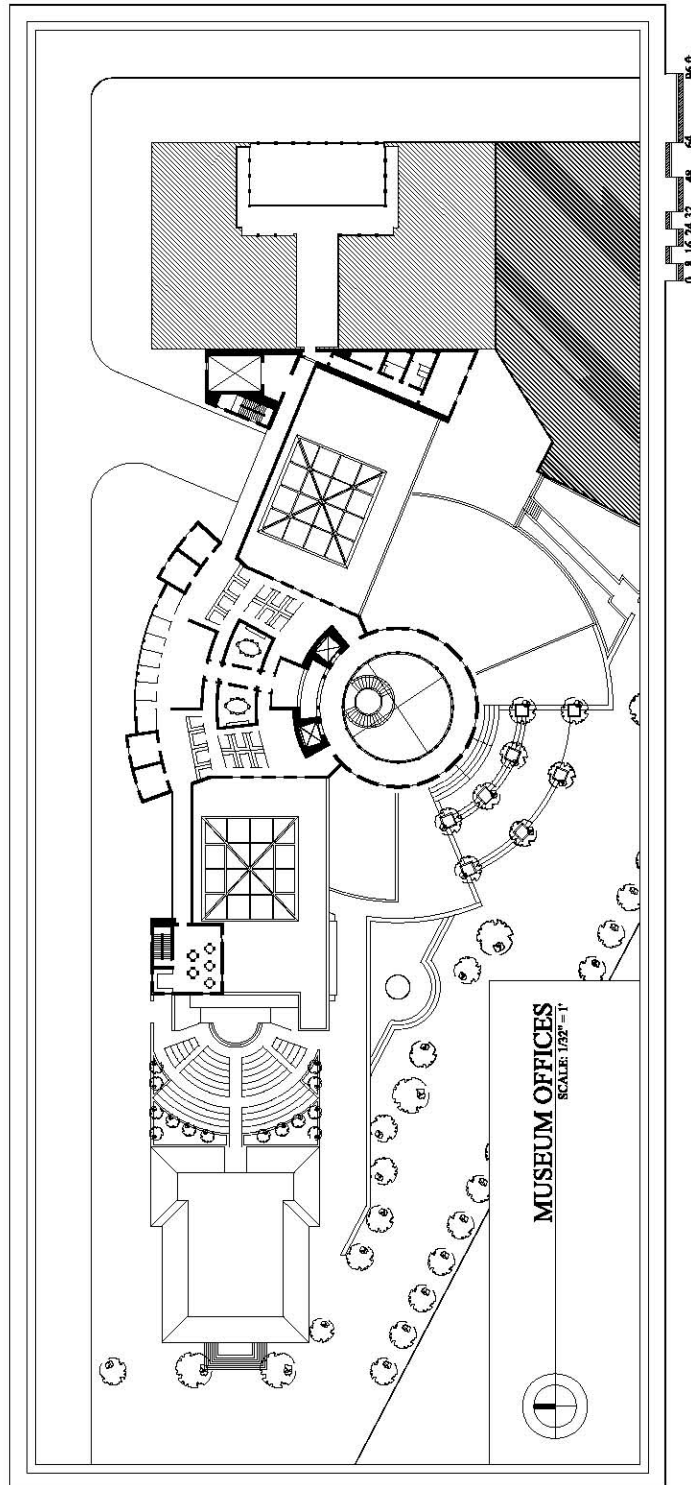


Figure 65: Museum Offices

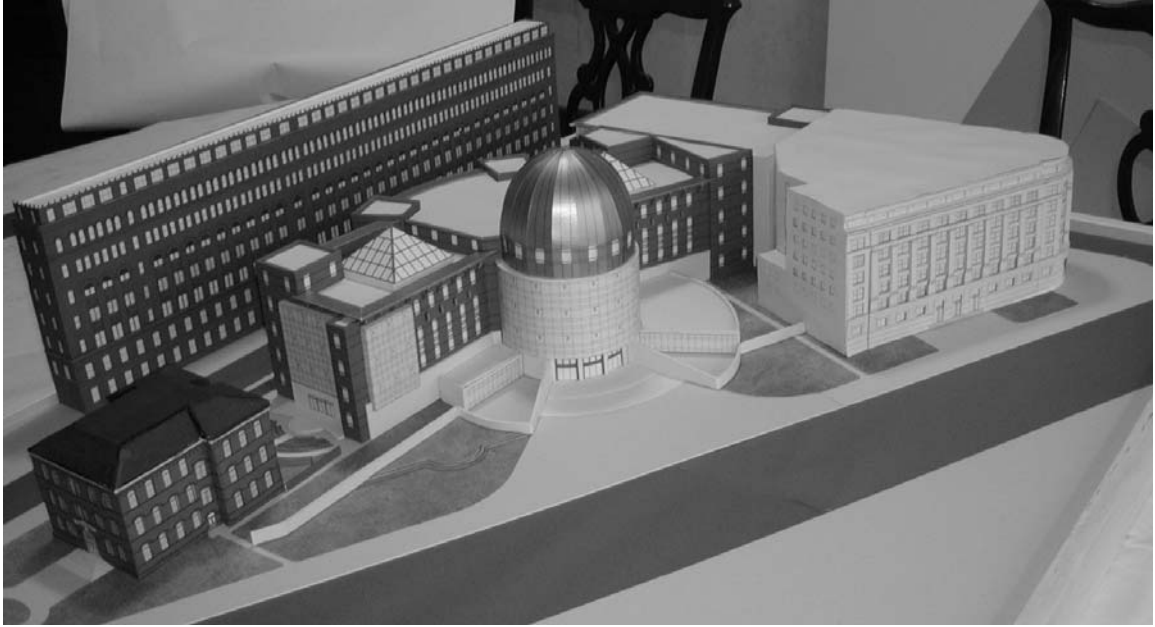
## **Museum Elevations**

The design of the elevations reflects a decidedly non-radical attitude toward feminism. Rather than approaching the building from a typical feminist attitude of the building as a metaphor for the body, the exterior of the building is instead designed to be an integral part of the existing fabric of the city, much like the museum seeks to integrate the achievements and experiences of women into the already existing social consciousness. For this reason the building was designed to work within the context of its environment using the language of traditional architecture combined in a contemporary way.

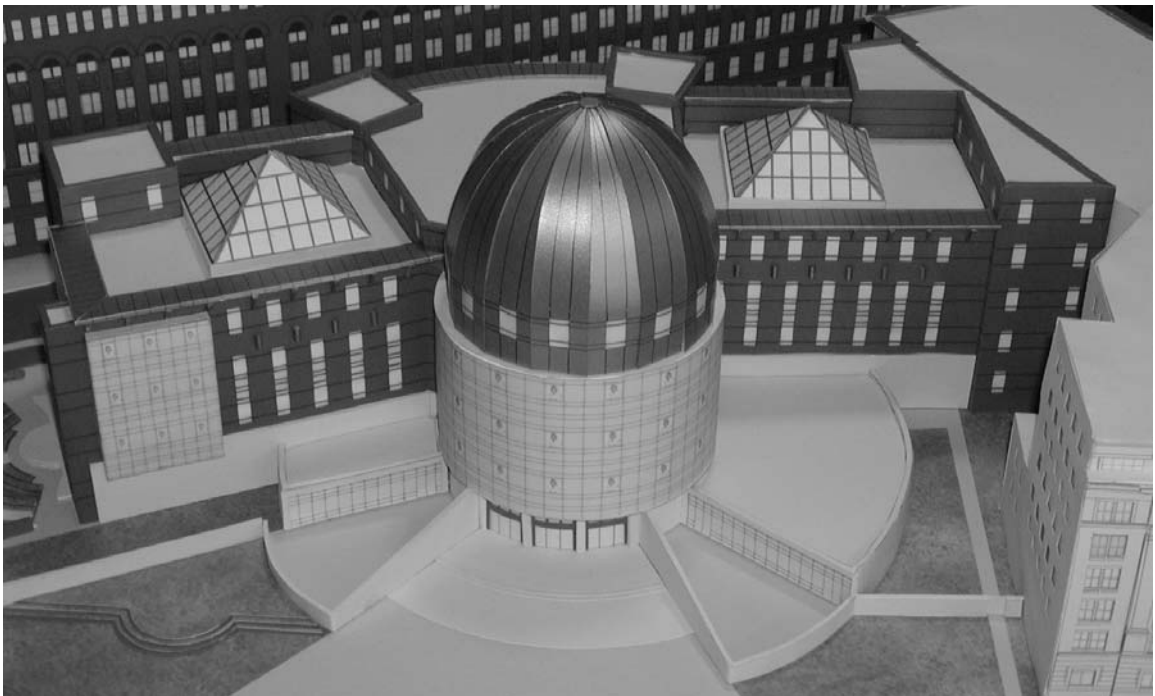
The main galleries of the museums are behind brick walls with punched openings grouped in ways that are similar to the surrounding context, with a limestone base to tie in both of the materials surrounding the site (in much the same way the Holocaust Museum does). At the same time, the masonry façade is punctuated by glass boxes, which allow for transparency into the special spaces such as the rotunda, the area of repose overlooking the garden and Gales school and the galleries containing changing exhibitions. This is in direct defiance of the traditional paternal attitudes about the public display of the achievements of women, which are generally considered only appropriate for private spaces and often are considered secondary to the achievements of men.

A dome caps the rotunda for several reasons, both formal and symbolic. On the exterior the dome gives the building a public presence and echoes the form of the nearby capitol building in much the same way the Holocaust Museum references the nearby Washington Monument with its pyramidal roof forms. It has been detailed to resemble

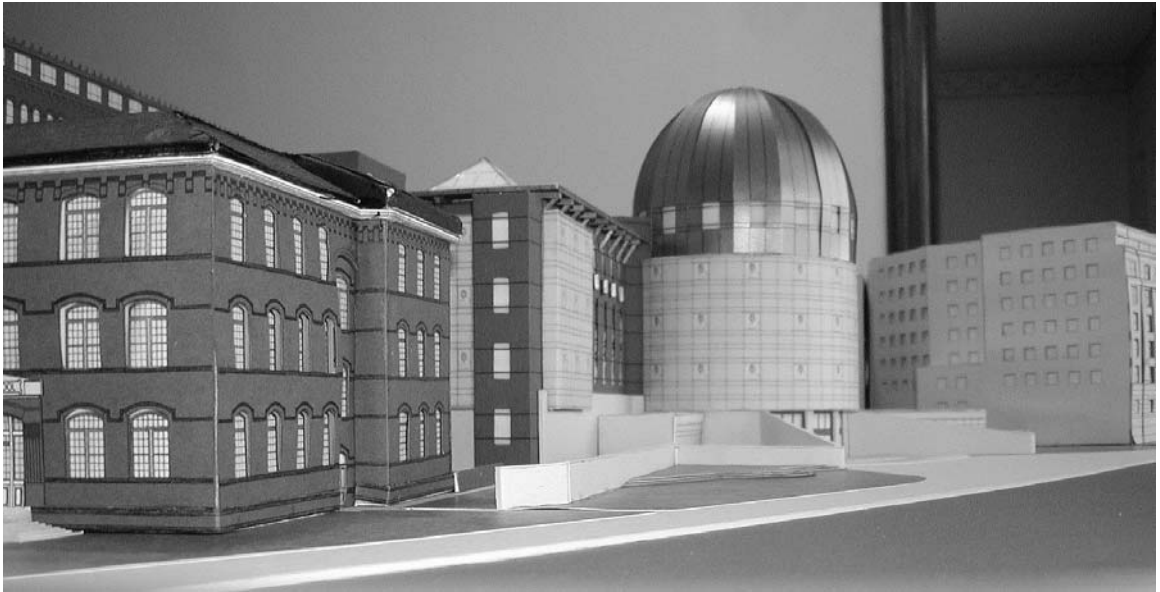
and observatory dome in keeping with the theme of the museum. On the inside, the dome creates a “dome of heaven” space for the outer space level.



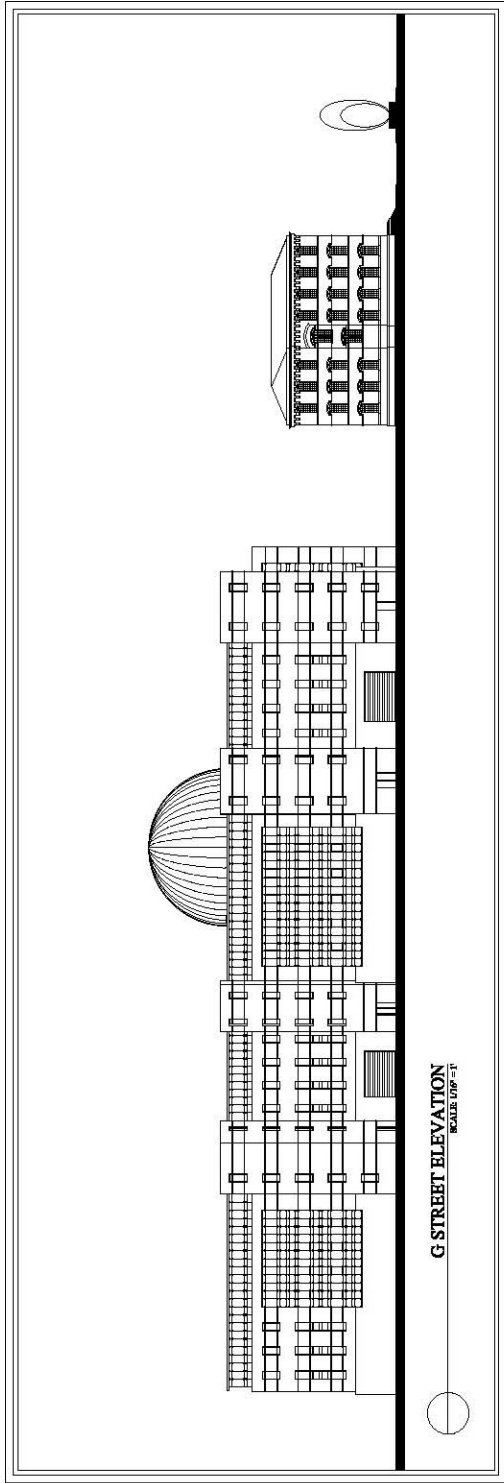
**Figure 66:** Model - Site



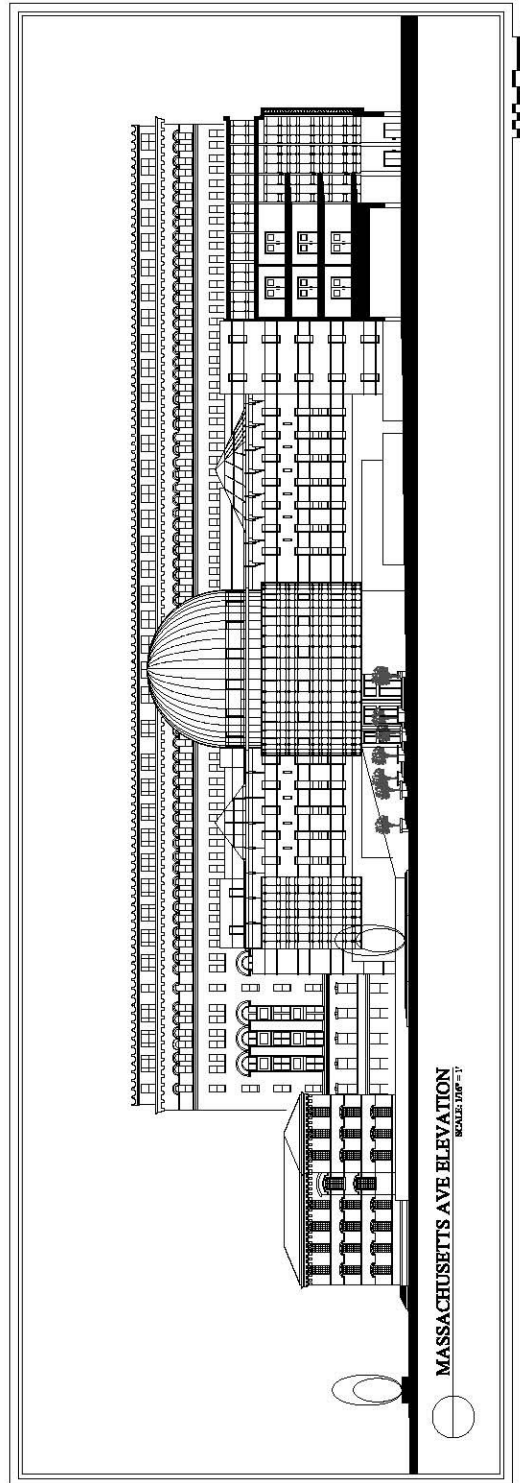
**Figure 67:** Model – Building Front



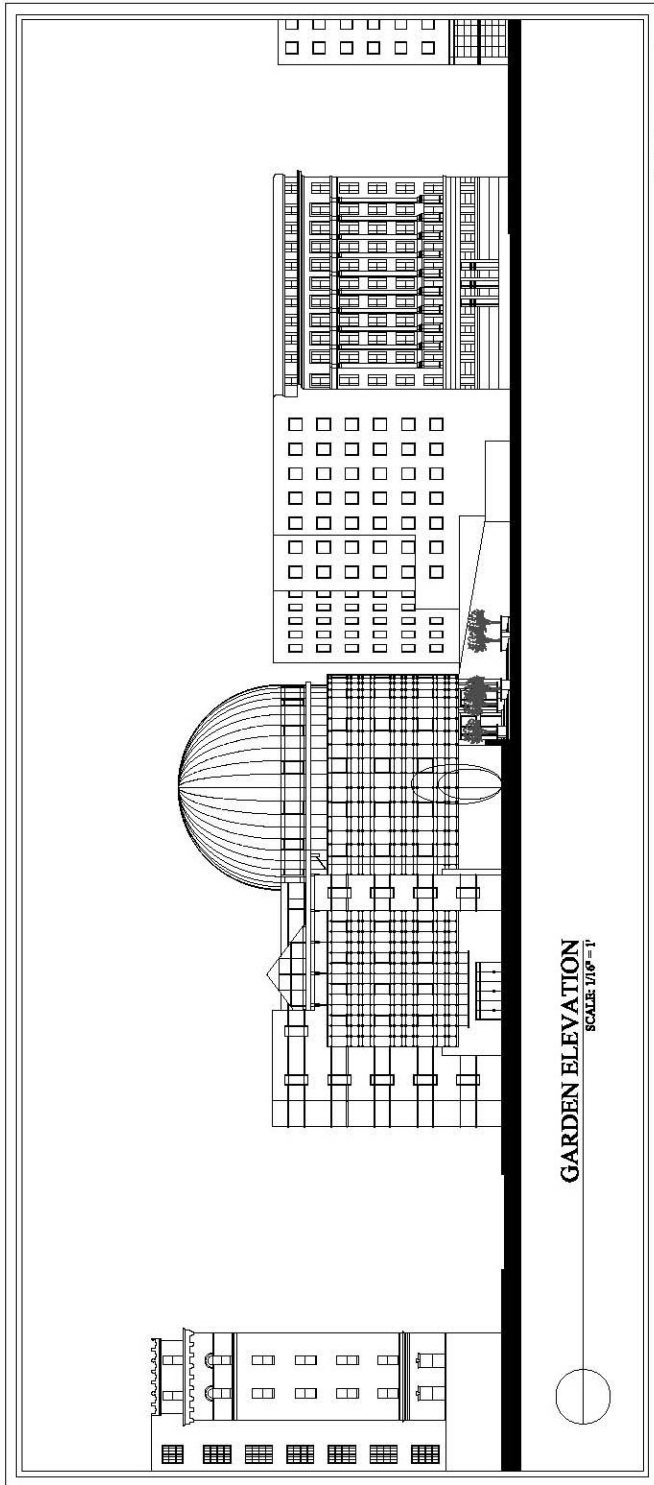
**Figure 68:** Model – Approach from South



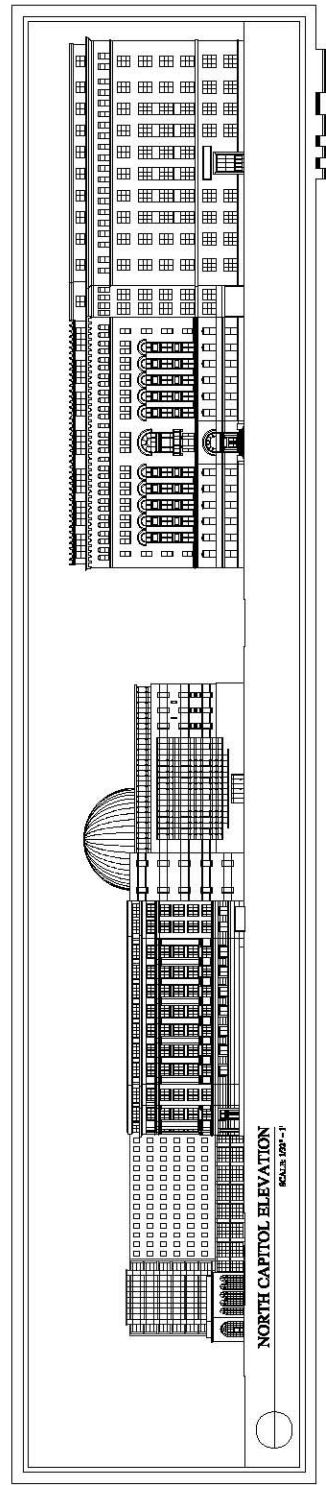
**Figure 69:** G Street Elevation



**Figure 70:** Massachusetts Ave Elevation



**Figure 71:** Garden Elevation



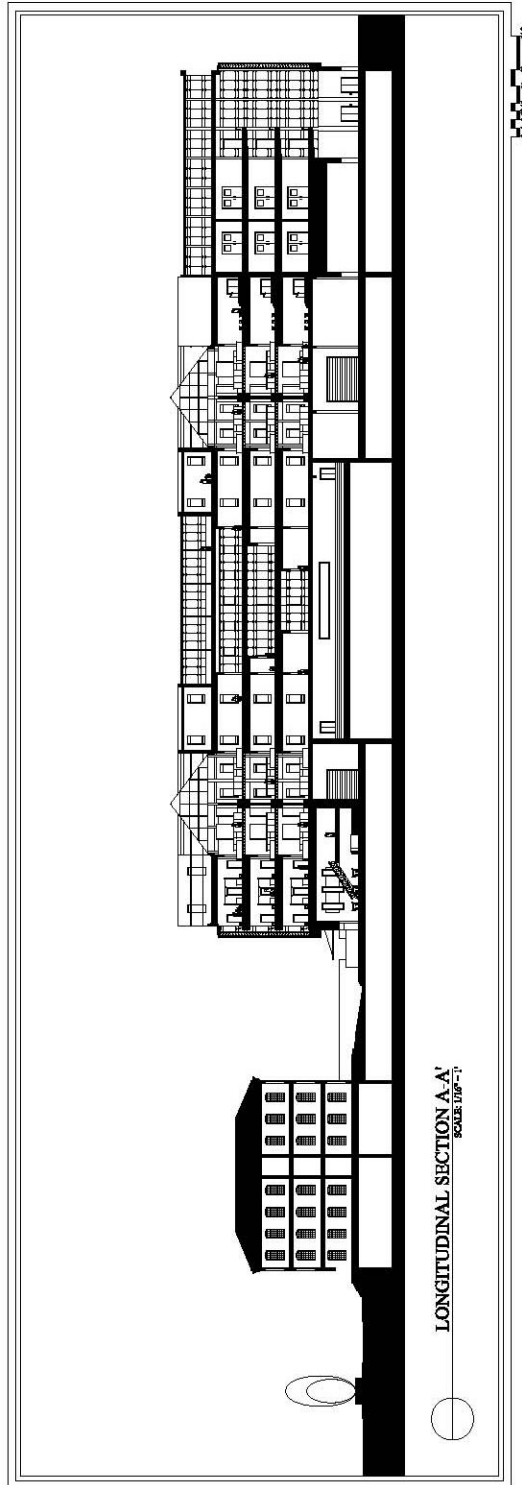
**Figure 72:** North Capitol Elevation

## **Museum Interior**

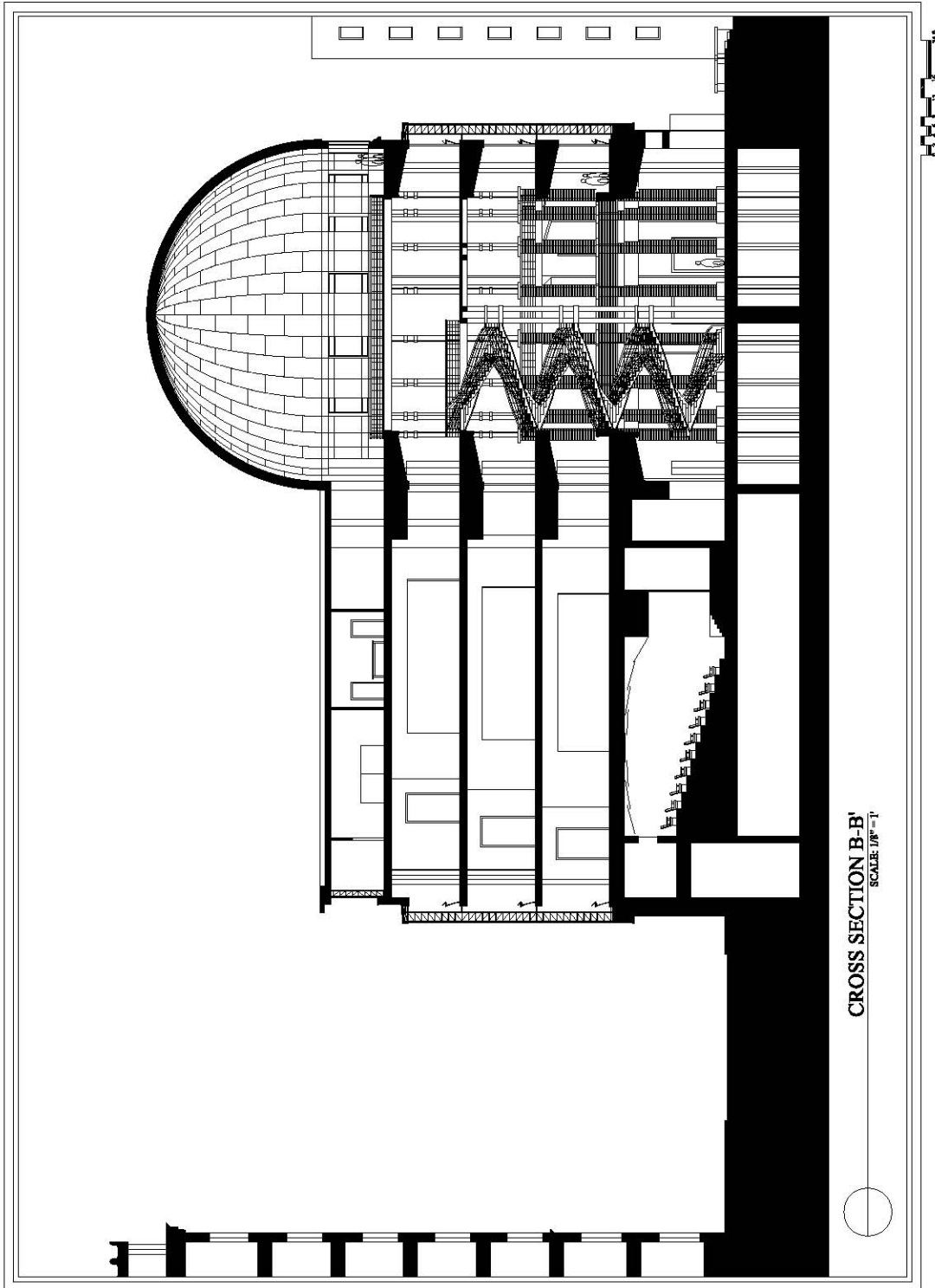
The rotunda is the major space in the museum, with three major functions. The first is to function as a “Gallery of Heroes” that highlights the lives of famous and infamous women scientists. The second is to organize the promenade and connect the two sides of the museum. The third is to architecturally express moving through the three levels of the museum: The inner space level is more enclosed with solid walls separating the ambulatory from the center. The normal space level begins to break down that wall and the outer space level is topped with a dome as a symbol of the universe. You only perceive this dome from the upper level as you reach the top of the museum.

The major galleries are arranged around a thick wall, which is a radial emanating from the rotunda and slices diagonally through the plan. Each panel in the wall represents a specific era and within the thickness of the wall are display cases within which museum curators can arrange a three-dimensional display of artifacts to highlight that era. Along the edges of the main gallery are interactive displays including computer stations that allow visitors to learn more about the various and changing subjects displayed on the wall.

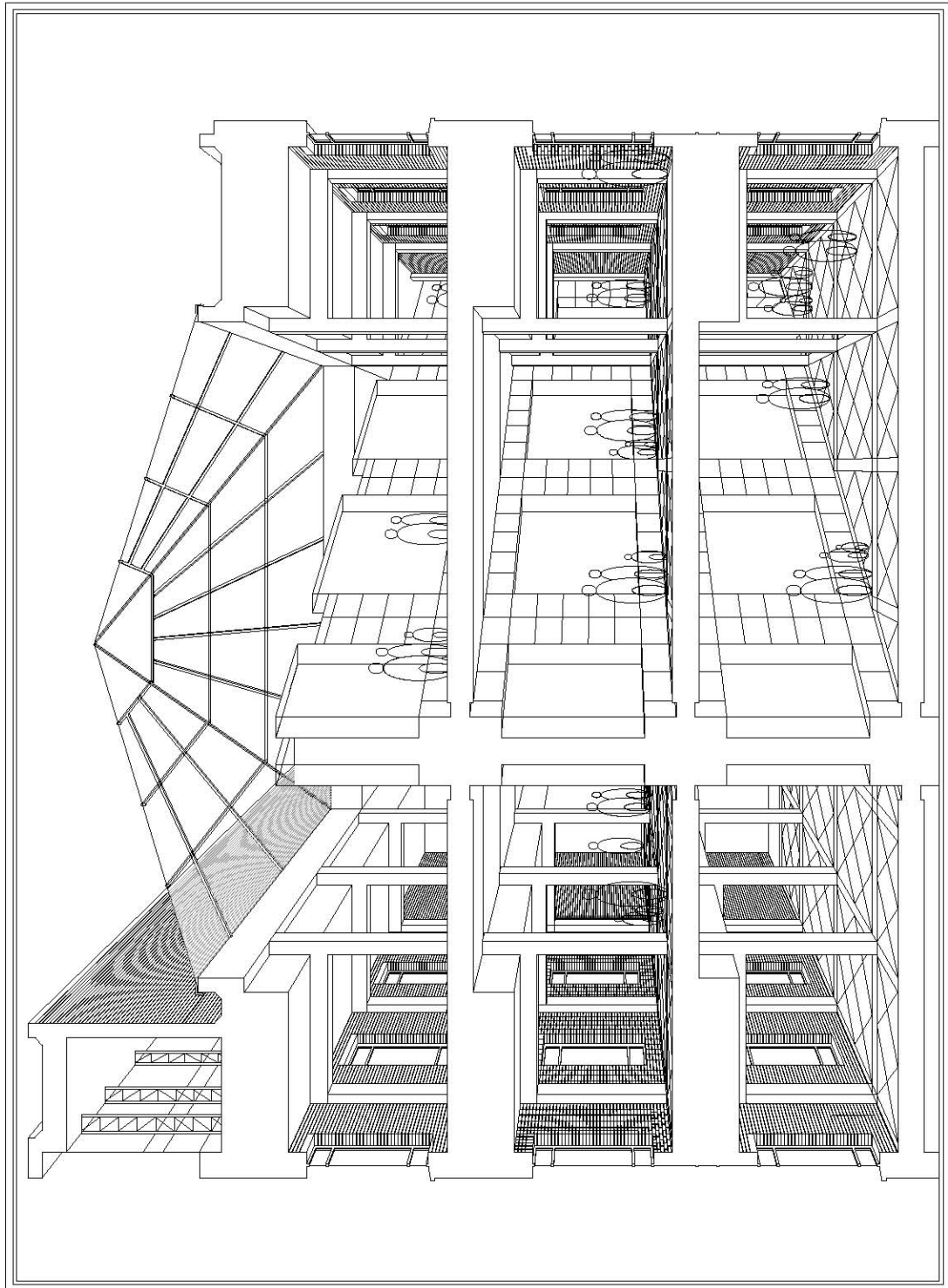




**Figure 73:** Longitudinal Section A-A'



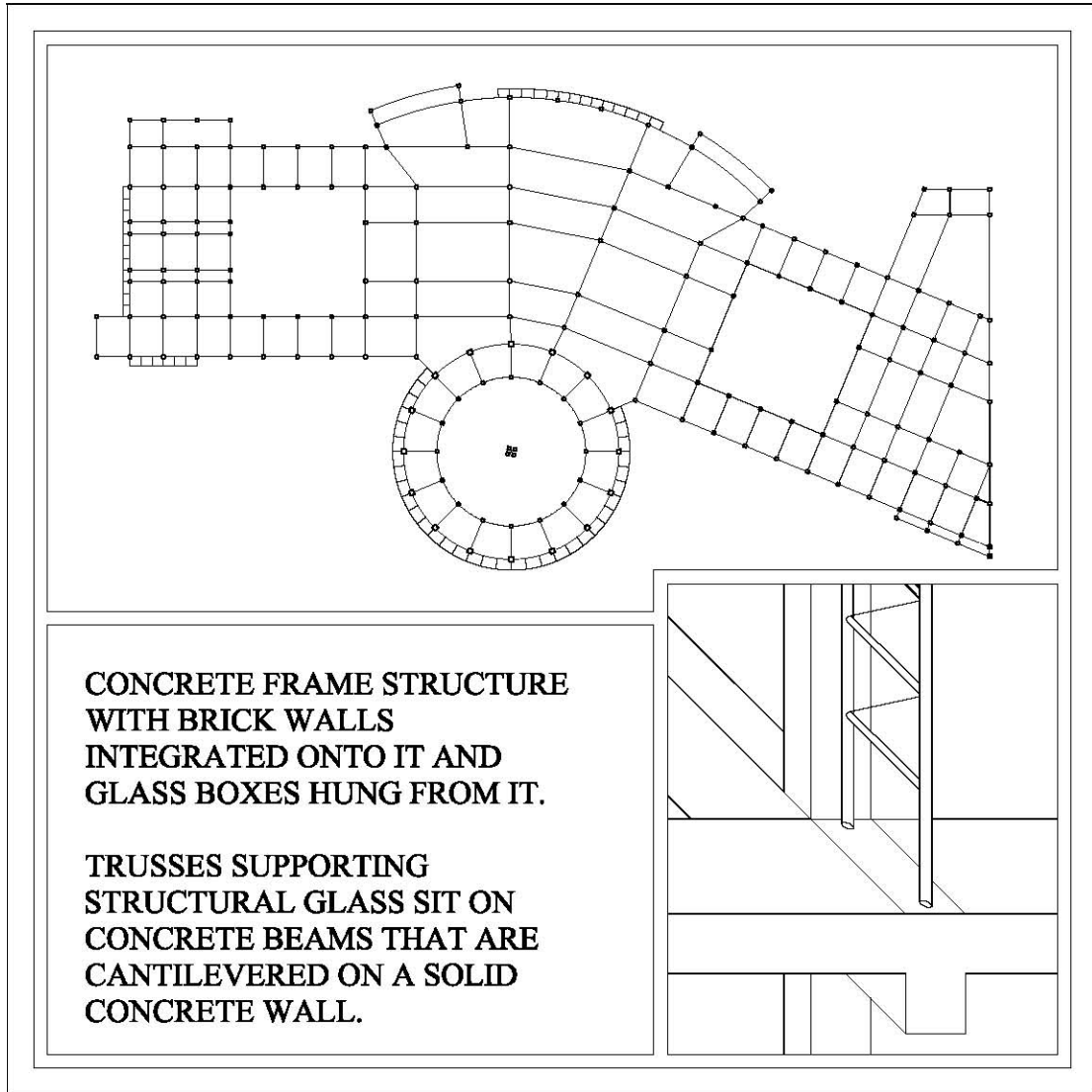
**Figure 74:** Cross Section B-B'



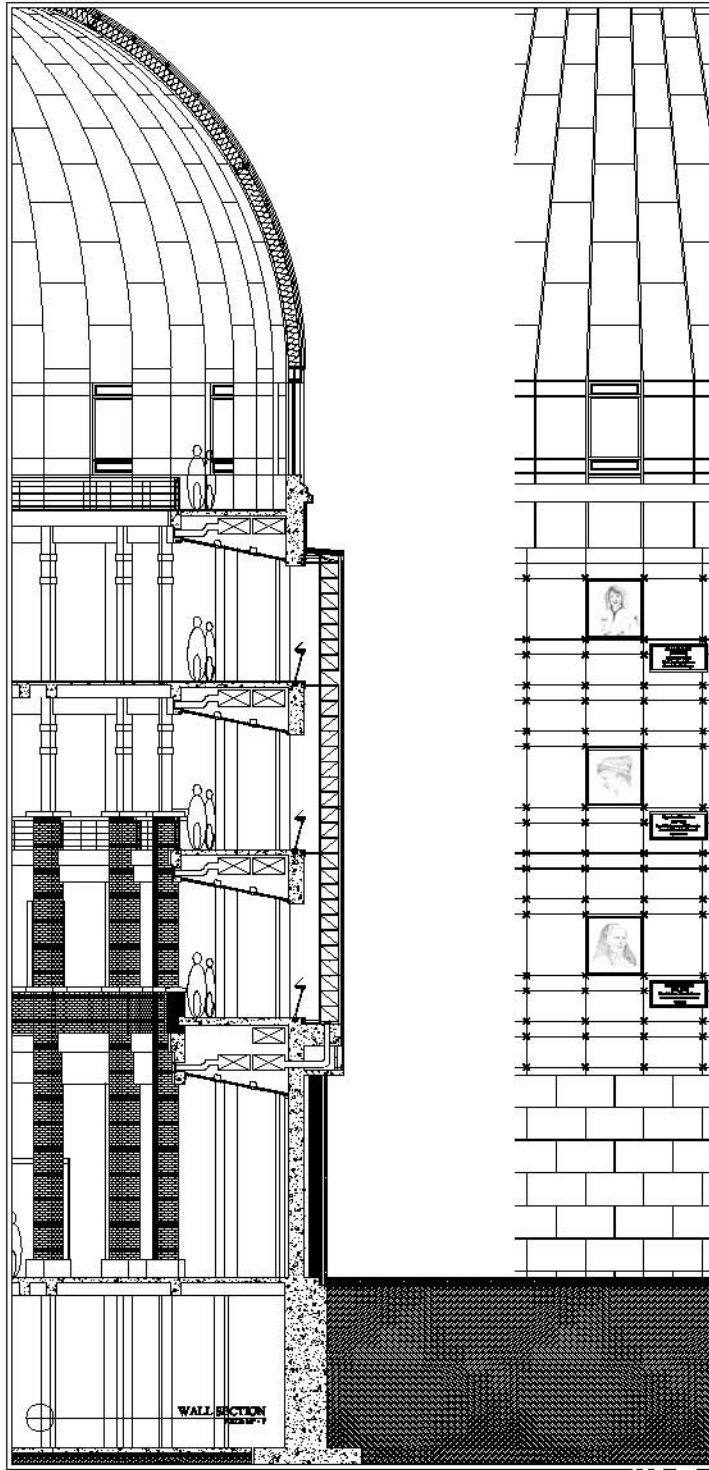
**Figure 75:** Section

## **The Structure and Details**

The structural glass boxes are attached to a site-cast concrete frame via steel tube trusses. Sun control where necessary is achieved through perforated metal planes spanning between the trusses, horizontally on the southern side of the building (facing the plaza) and vertically on the western façade. These planes act like blinds in the fully open position in that they successfully reduce solar gain while allowing maximum transparency for visitors who are looking out from the inside. From the outside, the boxes retain the sense of transparency implied by unobscured glass boxes, which is a metaphor for making public the achievements of women scientists.



**Figure 76: Structure**



**Figure 77:** Section Detail

## *Conclusion*

Although women's history has increasingly become a topic of study, there is still much to be done in order for the contributions of women to be considered as an important part of the history of all of humankind rather than as a special subset of the same.

Although this thesis explored many difficult architectural problems including but not limited to: how to design a very large building for a very large site, the role of a monumental building within a city of monuments, how to deal with contextual buildings of vastly differing scales and questions of preservation of the Gales School, the most important part has been the exploration of how to create a building that, like many women, responds to the many societal and contextual pressures yet still manages a clarity of purpose. Like those women who have succeeded in their lives by striking a balance between simultaneously following and breaking the rules, the Museum of Women and Science strives to a "good neighbor" from an urban point of view while still allowing its message to be understood.

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## *Endnotes*

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- <sup>1</sup> Gerda Lerner, "New Approaches to the Study of Women in American History," Nancy Cott, ed. *History of Women in the United States: 1. Theory and Method in Women's History (Part I)* (London: D.G. Saur, 1992), 2.
- <sup>2</sup> Ibid, 3-4.
- <sup>3</sup> Ibid, 5.
- <sup>4</sup> Ibid, 5-10.
- <sup>5</sup> Victoria Newhouse, *Toward a New Museum* (New York: Monacelli Press, 1998), 14.
- <sup>6</sup> Nikolaus Pevsner, *A History of Building Types* (Princeton: Princeton University Press, 1976), 111-112.
- <sup>7</sup> Ibid, 114.
- <sup>8</sup> Newhouse, 15.
- <sup>9</sup> Kevin Walsh, *The Representation of the Past: Museums and Heritage in the Post-modern World*. (London: Routledge, 1992), 176.
- <sup>10</sup> David Lowenthal, *The Past is a Foreign Country* (New York: Cambridge University Press, 1985) 197.
- <sup>11</sup> Pevsner, 127.
- <sup>12</sup> Ibid, 127.
- <sup>13</sup> Ibid, 124.
- <sup>14</sup> John Illingworth, "Ruskin and Tradition: The Case of Museums," in *The Lamp of Memory*, ed. Michael Wheeler and Nigel Whitley (Manchester, England: Manchester University Press, 1992), 44.
- <sup>15</sup> John Ruskin, *The Seven Lamps of Architecture* (London: Routledge, 1907), 186.
- <sup>16</sup> Newhouse, 220-1.
- <sup>17</sup> Jeffrey K. Ochsner, "Understanding the Holocaust through the U.S. Holocaust Memorial Museum," *Journal of Architectural Education* 48(May 1995), 246-7.
- <sup>18</sup> Susan Crane, *Museums and Memory* (Stanford, California: Stanford University Press, 2000) 5.
- <sup>19</sup> Thomas, Froncek, ed. *An Illustrated History: The City of Washington*. New York: Alfred A. Knopf, Inc., 1977.
- <sup>20</sup> Ibid.
- <sup>21</sup> Ibid.
- <sup>22</sup> Ibid.
- <sup>23</sup> Ibid.