science museum of fargo

a study of the social values of cultural buildings

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douglas draeger 2004-2005
north dakota state university
architecture

"SCIENCE MUSEUM OF FARGO:
A Study of the Social Values of Cultural Buildings"

AN UNDERGRADUATE THESIS SUBMITTED TO THE FACULTY OF THE
DEPARTMENT OF ARCHITECTURE AND LANDSCAPE ARCHITECTURE
NORTH DAKOTA STATE UNIVERSITY

By

Douglas R. Draeger

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF BACHELOR OF ARCHITECTURE

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Submitted: May 2005
Fargo, North Dakota

Abstract:

There are certain values that have been assigned throughout history to cultural buildings that are dedicated to the arts and sciences. The result of a search to further understand these values will lead to architectural form and space planning. This Science museum will include traditional spaces along with scientific research facilities that will be used by North Dakota State University. The site for this project is close to the existing NDSU Downtown facility and the Plains Art Museum. The location of this new Science Museum will create a cultural center that will assist in the revitalization of downtown Fargo.

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introduction

figure-1.1

introduction

Topic:

My thesis project is the construction of a Science Museum for the city of Fargo, North Dakota. The museum will have different areas dedicated to permanent displays as well as changing and travelling exhibits. There will be a café to offer snacks and refreshments to visitors. Every effort will be made to accommodate field trips from nearby schools.

The Science Museum will have research facilities to work in conjunction with North Dakota State University. These research laboratories will be used for graduate students from the Geology, Paleontology, and Anthropology departments.

My Intentions:

To give the city of fargo a new and exciting Science Museum that will aid in the re-vitalization of downtown. It will demonstrate that the heart of Fargo's culture exists where its roots began. I want the museum to make a statement; that the key to strengthening communities requires new construction to focus inward. The facility will offer education, entertainment, wonder, and excitement that is associated with Science Museums. By incorporating scientific research facilities to be used by students, the museum will strengthen the bond between Fargo and North Dakota State University.

introduction

Project Objectives:

Sustainability: The typology of a science museum has the responsibility to demonstrate the ability of technology to reduce its own environmental impact. It should take full advantage of natural systems while reducing its need for energy consumption. It should focus on using innovative materials that are designed for a cradle to cradle life cycle with a minimum impact on the environment. The museum should stimulate visitors with both clean air and natural light. I plan to use both the Leadership in Energy and Environmental Design (LEED) and the Minnesota Sustainable Building Guidelines (MSBG) to address the issue of sustainability on a holistic level.

Education: The museum's ultimate responsibility should be educating visitors about the aspects of science.

Innovation: The building should demonstrate the innovative use of materials and construction methods to create an icon that will be associated with the re-vitalization of downtown.

introduction

The site will be accessed from two directions, Northern Pacific Avenue, which is a one-way traveling east, and Seventh Street North. However, access to the site from seventh is directly related to First Avenue North which is a one-way traveling west. The figure below indicates the site location in downtown Fargo.

A row of small deciduous trees marches along the west end of the site. There is also a small patch of grass with deciduous tress, and Ole Tangen Park, also known as Triangle Park, to the east. Direct sunlight can be optimized due to the distance between the site and surrounding buildings on both the south and east sides.

The site was chosen because of the following reasons:

- The current parking lot can be relocated as underground parking, or to a parking ramp constructed nearby.
- The new NDSU Downtown facility is diagonal from the site. By integrating educational facilities into the museum, NDSU will have an opportunity to connect with the new Science Museum.
- The Plains Art Museum is also diagonal from the site. Even though these two museums are at opposite ends of the spectrum, by locating the Science Museum close by, a cultural center will be created for the historic area of Fargo.

introduction

figure-1.2

project description

project description

figure-2.1

project description

Throughout the history of civilization, societies have had cultural buildings that serve for the benefit of its members. These buildings offer education and entertainment for the benefit of the general public. Societies have placed certain values and expectations on these structures. It is this social value that is placed on buildings dedicated to the arts and sciences that will be the focus of the research.

The city Fargo has initiated the Renaissance Zone and Storefront Rehab programs in order to revitalize the downtown area. A new state of the art Science Museum in the heart of downtown will help in this revitalization effort. It will draw families and people of all ages to the historical center of the city.

The size of Fargo has reached the point where it is possible to have facilities dedicated to the education and appreciation for the arts and sciences. It is time for Fargo to have a Science Museum that is dedicated to educating, entertaining, and inspiring its visitors and citizens.

The general spacial elements will include:

- Permanent exhibit spaces
- Temporary exhibit spaces
- IMAX Theater
- Café
- Gift Shop
- Administration
- Office Space
- Mechanical
- Rest Rooms
- Janitorial
- Parking

project description

User/ Client Description

The users of the Science Museum will be the visitors, Staff, and researchers. The visitors' age will have a wide range from preschool to college, as well as families and the elderly. These visitors will not only include the residents of Fargo, but will extend to the surrounding areas and tourists. The staff of the museum will include: administration, guides, retail employees, operational personnel, and custodians.

The clients for the Science Museum of Fargo will be the City of Fargo, and North Dakota State University.

site analysis

site analysis

figure-3.1

site analysis

figure-3.2

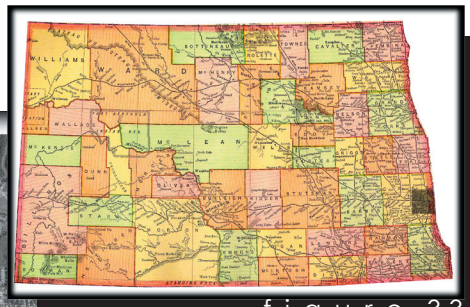


figure-3.3

figure-3.4

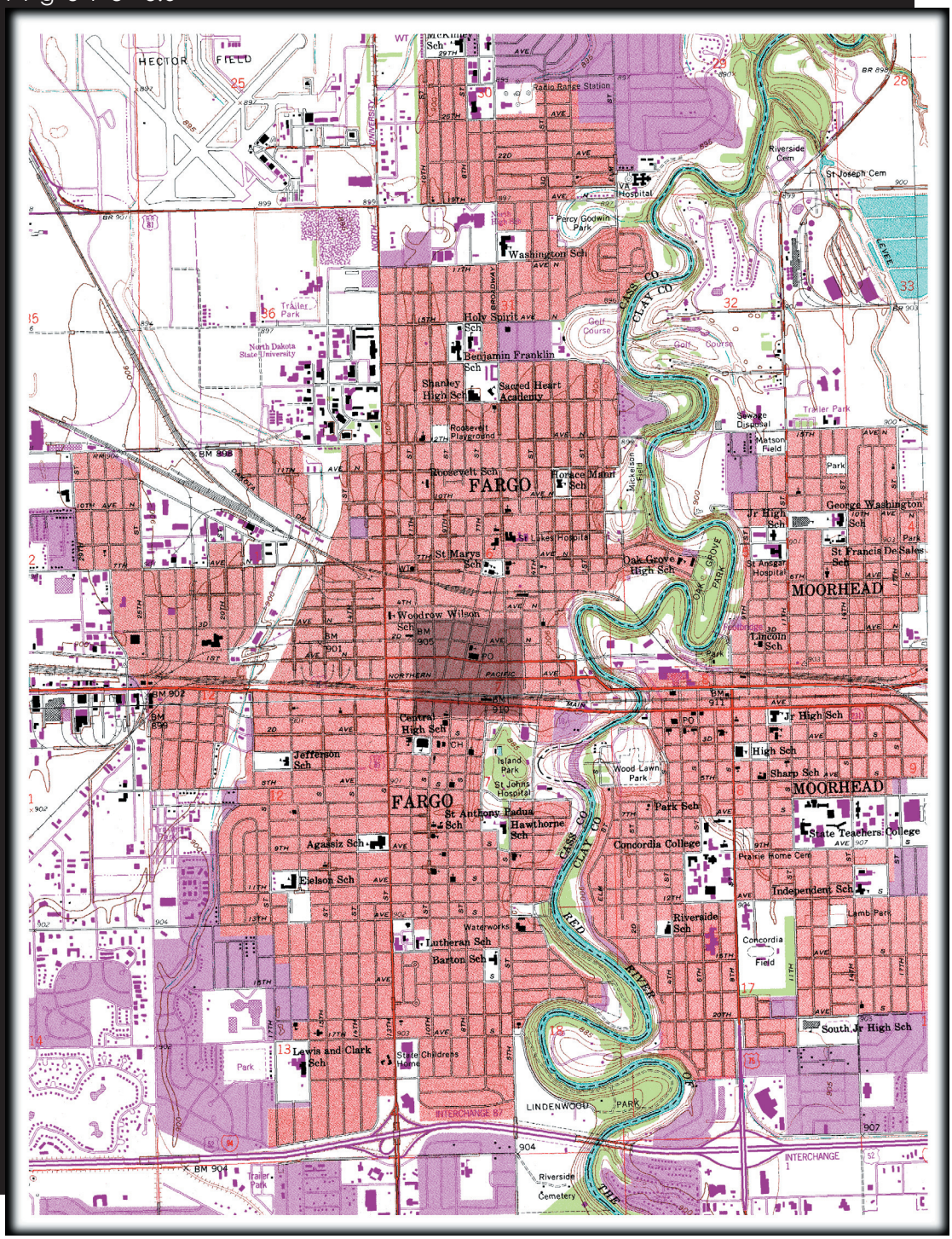
site analysis

figure-3.5

On the opposite page, Figure 3.2 is a topographic and geologic map of the United States With the State of North Dakota highlighted. Figure 3.3 is a county map of North Dakota with the city of Fargo highlighted. Figure 3.4 is an aerial photograph of the city of Fargo. Above Figure 3.5 is another aerial photograph of the downtown area of Fargo with the site highlighted in red.

site analysis

figure-3.6



site analysis

figure-3.7

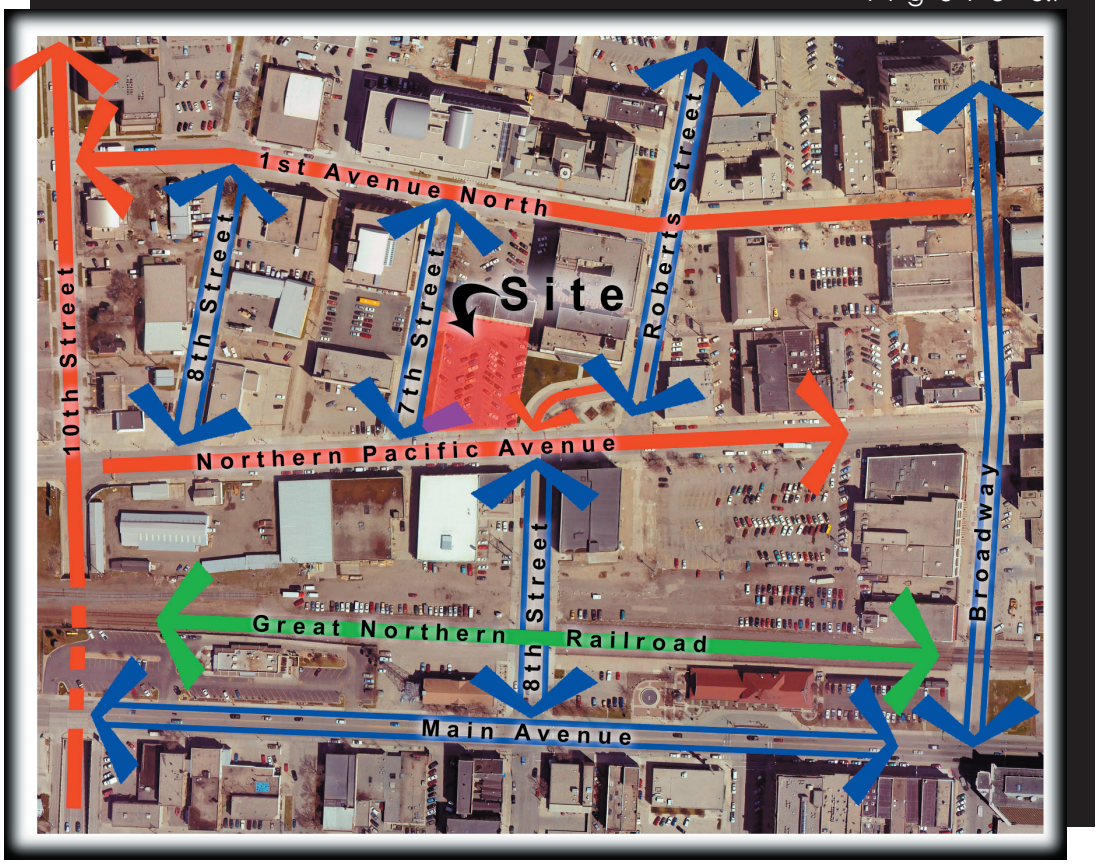


Figure 3.6 on the opposite page illustrates the topography of area. Figure 3.7, illustrated above, shows the traffic patterns for the site. The red arrows indicate one-way traffic, the double blue arrows show two-way traffic, and the green arrow highlights the Great Northern Railroad. The Three major one-way thoroughfares create major problems for the downtown area. These streets are three lanes wide which causes excess traffic speeds. This opposes any attempt to create a pedestrian friendly downtown area. There has been a lot of talk among city leaders to make Northern Pacific Avenue and 1st Avenue North into two-lane streets. This will reduce traffic speeds, increase commercial exposure to traffic, and make it easier to find your way around when driving in the area. Therefore the design of the Science Museum needs to take full advantage of being adjacent to Northern Pacific Avenue, while looking to the future to allow the change of traffic flow.

Climate Information

Average Temperatures:

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
5.9	12.0	25.9	43.0	56.2	65.5	71.1	68.8	57.7	45.7	28.1	11.6	41.0

Average High Temperatures:

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
15.4	21.1	34.6	53.8	68.5	77.4	83.4	81.3	69.4	56.7	36.8	20.1	51.5

Average Low Temperatures:

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
-3.6	2.7	17.3	32.1	43.8	53.6	58.8	56.4	45.9	34.6	19.4	3.1	30.3

Number of Days With Temperatures above 90° F:

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
0.0	0.0	0.0	< 0.5	1.0	2.0	5.0	5.0	1.0	< 0.5	0.0	0.0	14.0

Number of Days Below Freezing:

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
31.0	28.0	28.0	17.0	4.0	< 0.5	0.0	0.0	2.0	13.0	27.0	31.0	179

Heating Degree Days:

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
1832	1484	1212	660	307	93.0	19.0	48.0	239	598	1107	1655	9254

Cooling Degree Days:

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
0.0	0.0	0.0	0.0	35.0	108	209	165	20.0	0.0	0.0	0.0	537

Average Precipitation (in inches):

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
0.7	0.5	1.1	1.8	2.5	2.8	2.7	2.4	2.0	1.7	0.7	0.7	19.4

Days With More Than 0.01 Inches of Precipitation:

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
9.0	7.0	8.0	8.0	10.0	11.0	10.0	9.0	8.0	7.0	6.0	8.0	100.0

Climate Information Cont.

Monthly Snowfall (in inches):

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
9.6	6.1	7.5	3.2	0.1	< 0.05	0.0	< 0.05	0.0	0.6	6.1	7.2	40.4

Average Wind Speeds:

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
12.6	12.4	13.1	13.6	12.9	11.6	10.5	11.0	11.8	12.5	12.8	12.2	12.2

Clear Days:

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
7.0	6.0	5.0	6.0	7.0	6.0	10.0	10.0	9.0	9.0	5.0	6.0	88.0

Partly Cloudy Days:

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
7.0	7.0	9.0	9.0	10.0	11.0	13.0	12.0	9.0	8.0	6.0	7.0	109

Cloudy Days:

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
17.0	15.0	17.0	15.0	14.0	13.0	8.0	9.0	12.0	14.0	18.0	18.0	168

Percent of Possible Sunshine:

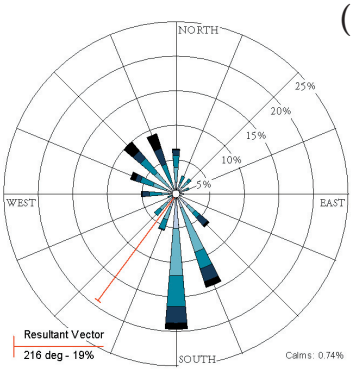
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
50.0	56.0	58.0	60.0	61.0	62.0	71.0	69.0	60.0	54.0	40.0	43.0	57.0

Average Relative Humidity:

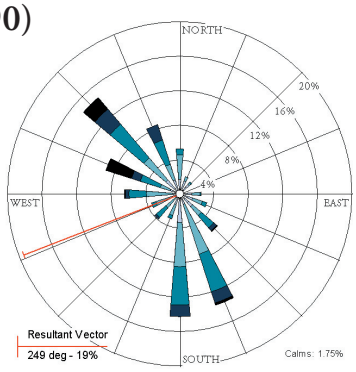
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
57.0	75.0	77.5	75.0	66.5	66.0	71.0	71.0	70.0	69.5	71.0	75.0	77.5

site analysis

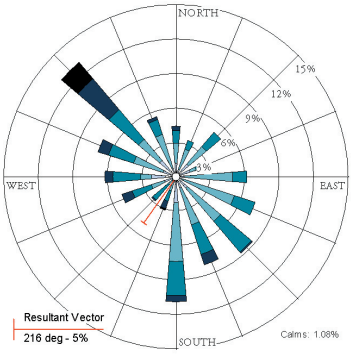
Fargo Wind Roses
(1990)



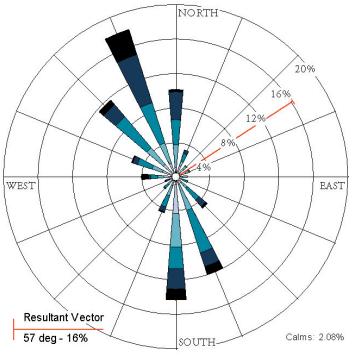
January



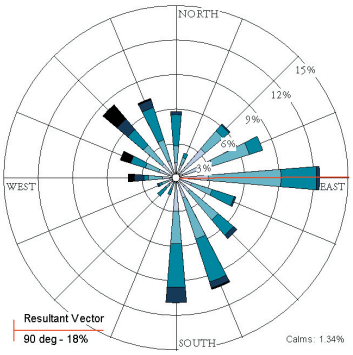
February



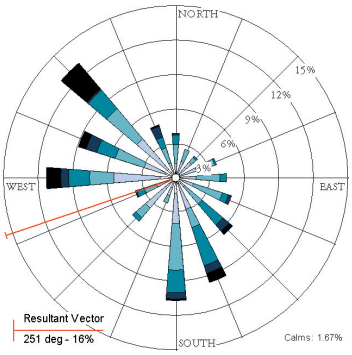
March



April

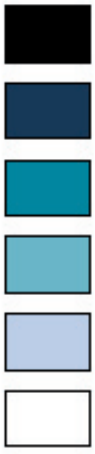


May



June

Wind Speed
(knots)



>= 22

17-21

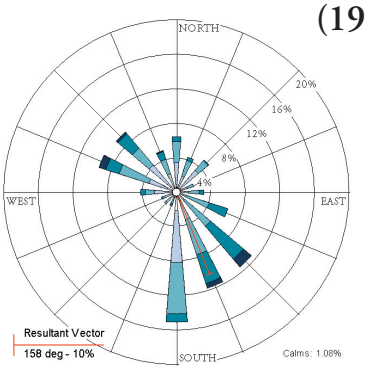
11-17

7 -11

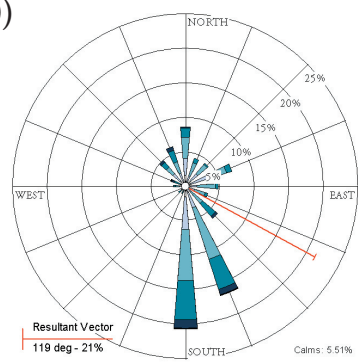
4 - 7

1 - 4

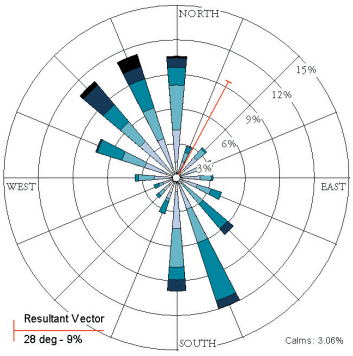
Fargo Wind Roses Cont.
(1990)



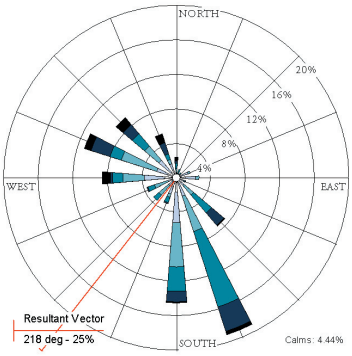
July



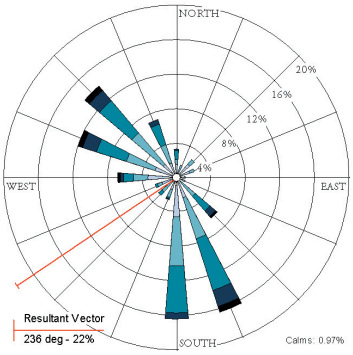
August



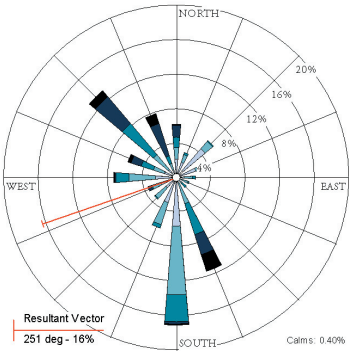
September



October

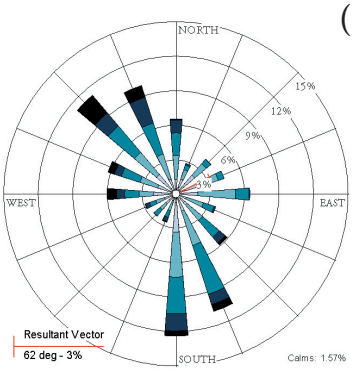


November

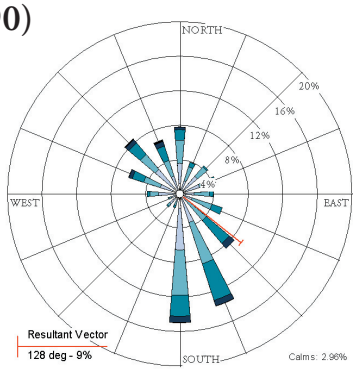


December

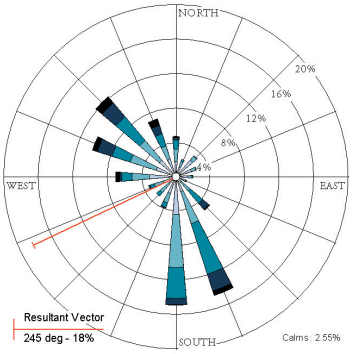
Fargo Wind Roses Cont.
(1990)



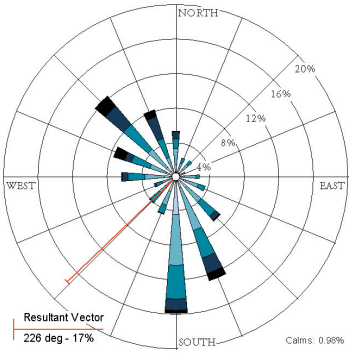
Spring



Summer



Autumn



Winter

Wind Speed
(knots)

- >= 22
- 17-21
- 11-17
- 7 -11
- 4 - 7
- 1 - 4

site analysis

topographic map - figure-3.8

case studies

case studies

figure-4.1

case studies

figure-4.2

Cité des Sciences it de l'Industrie
La Geode
Parc de La Villette, Paris
Design: 1980 - 82
Completion: 1986

When the science center opened in 1986 it was the largest in the world. It has over 430,000 f^2 (40,000m^2) used for permanent exhibits, and over a million square feet (95,000m^2) total. A convention center is also included within the facility. Just outside the is the infamous Geode, pictured to the right, that is home to an omnimax theater system. The building which has a floor plate of 3 hectacres was originally used as a slaughter house from 1950 to 1970. A national competition was held in 1980 for renovation of the current structure. The winning entry integrated the Museum into the urban site if 52 hectacres and incorporated the themes of the museum's program into the Architecture.

Reactions to the site:

Water is a major feature of the site because it is located in northeast Paris at the meeting point of three canals. Water has been integrated in its design through the use of reflecting pools, waterfalls and channels of water. I feel that this is a successful way of relating the exterior of the building to its context.

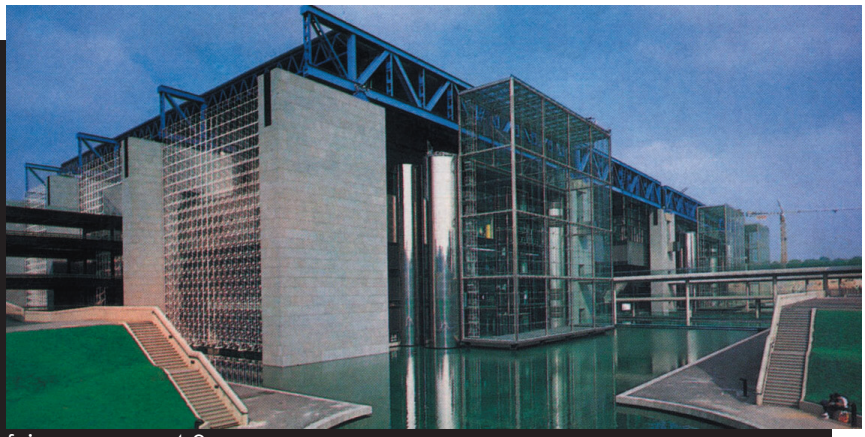
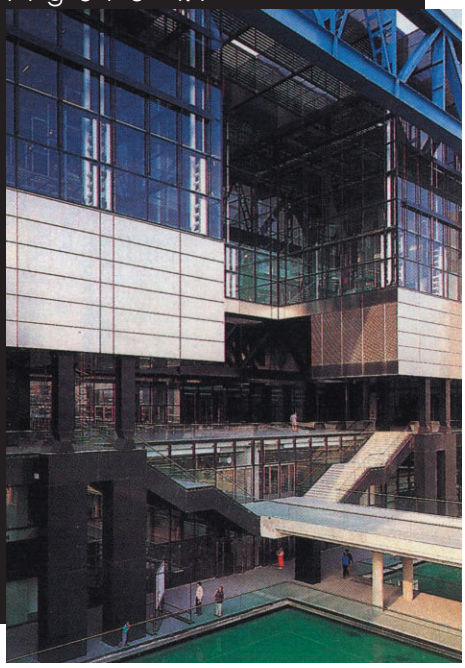


figure-4.3

case studies

figure-4.4



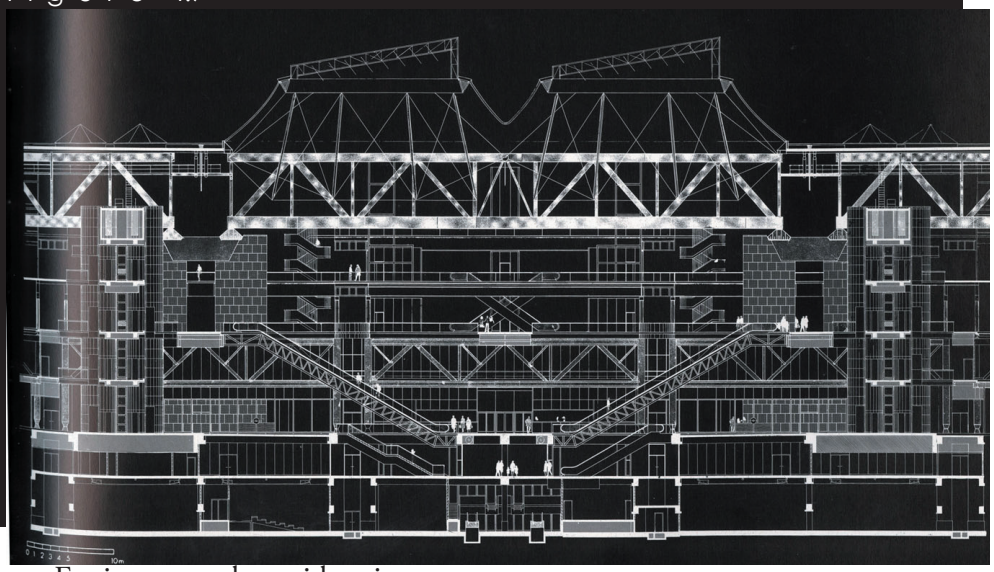
Building design:
Steel trusses that stretch 65 meters have been left exposed and painted a deep cobalt blue which contrast the concrete towers clad in granite. The main hall is treated as a reference point where visitors can perceive the overall space of the museum. The sides are flanked with transparent escalators rising over 50 feet to the main exhibition level. This gives visitors a glimpse of the magnitude of the space and orients them throughout their visit. The Geode is a perfect sphere which houses an ultra modern cinema that totally submerges the spectator in sound and image. Its surface smooth and reflective that catches the sky and the water in the reflection pool around its base. This reflection pool accents and completes the spherical form of the theater. By its symbolic form, its situation on the site and the magical mirroring of its surroundings, the Hemispheric Theater becomes a beacon in the overall plan.

figure-4.5

figure-4.6

case studies

figure-4.7



Environmental considerations:

Natural light plays a key factor in the design of the museum. Three monumental greenhouses constitutes the bioclimatic south facade, connecting the link between outside and inside, between the park and the museum, nature and science. The facade captures and stores heat that can be distributed according to the needs of the museum. Light is also brought into the hear of the building by means of a massive open central ell carved out of the multi layered original structure. Above this well floats a giant cupola consisting of an innovative design of steel cables and stretched Teflon.

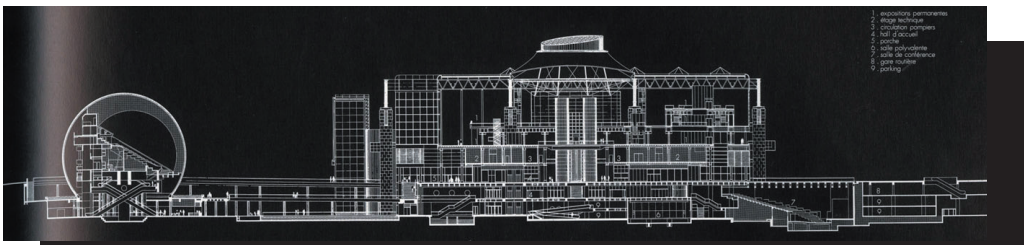


figure-4.8

case studies

Museum of Science and Industry
Tampa, Florida
Completed: 1982
Architect: Rowe Holmes

figure-4.9

The building consists mainly of two rhomboidal forms situated parallel to each other but joined by a common, slanting space-frame roof divided by a linear skylight that corresponds to the separation between the two forms. This structure creates an atrium that provides lots of natural light for the open air museum below. This light is allowed to penetrate through to the enclosed first floor through the use of glazing or "interior light monitors." Two thirds of the building is open causing the building to act more like a pavilion with the exhibitions open to the air below the canopy-like roof. Therefore, the museum consists of three types of spaces; those that are completely enclosed, like the offices and auditorium, the exhibition spaces that are completely open under the canopy, and those that receive natural light through the interior glazing system. The mechanical and electrical components of the building are left exposed and brightly painted to demonstrate the educational value they will offer to visitors.

Reactions to the site:

A grass berm has been added to the north and northeast sides of the building to create a visual and acoustical buffer from the traffic nearby. A practical approach has been made to optimize the natural lighting and cooling effects that are provided by the site.

figure-4.10

case studies

figure-4.12

Environmental Considerations:

Rowe Holmes Associates attempted to utilize every natural system possible in the design of the museum. "An award winning post-oil-crisis essay in energy efficiency" with an open-air design that attempts to cool the majority of the museum using cross ventilation. The application of solar panels were proposed for the south sloping roof, that would supply the museum with 10 to 15 percent of the peak load requirements. Natural lighting was maximized throughout the facility through the use of atriums and interior glazing systems referred to as "pods." The museum made many attempts to minimize the mechanical and electrical demands and maximize the natural systems that were available.

Response to society:

The design by Rowe Holmes Associates helped make the Museum of Science and Industry an "instant, unmitigated success as an institution, outstripping all projections for attendance and income." The museum was so successful that it was unable to keep up with the amount of visitors. The ability of the exhibits to be flexible was being reduced by the quantity of people attending. Just eight years after it opened the board of directors began planning for an addition.

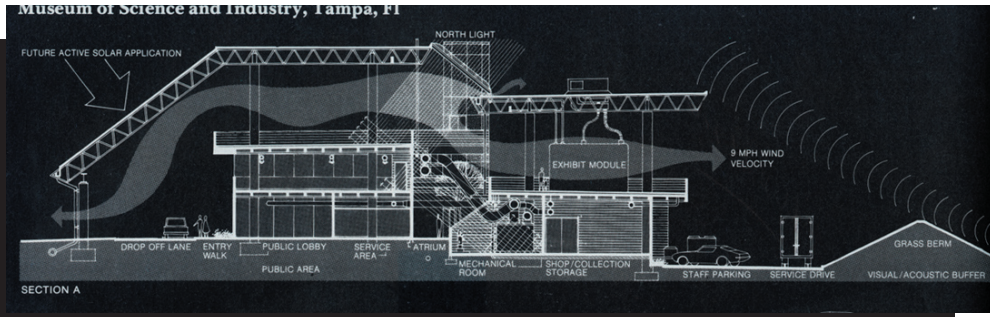
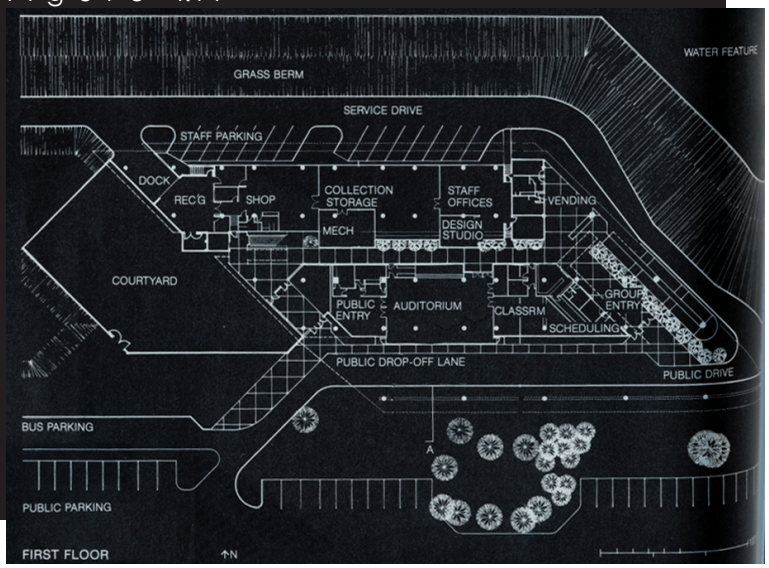


figure-4.13

case studies

figure-4.14



List of spaces:

- Bus Parking
- Public Parking
- Public Drop-off Lane
- Staff Parking
- Courtyard
- Receiving Dock
- Shop
- Collection Storage
- Staff Offices
- Vending
- Mechanical
- Design Studio
- Public Entry
- Auditorium (2)
- Classroom
- Scheduling (2)
- Group Entry
- Lower Level Exhibit
- Upper Level Exhibit
- Administration

figure-4.15

figure-4.16

case studies

Museum of Science and Industry
Tampa, Florida
Completed: 1995
Architect: Antoine Predock

figure-4.17

The museum had outgrown its current facility, but because the original structure was still well liked by the public the museum's directors decided to add on to it instead of starting over. They were convinced that the success of the current museum was due in part because of the architecture. A national search was undertaken to secure "a world-class architectureal minument for Tampa, something that would keep us on the leading edge," as the president of the museum described the evaluation criteria. Antoine Predock's design attempts to draw from the physical form of the existing museum in an attempt to establish a sense of kinship. The monumental Omnimax theater creates the new icon for the addition. Illustrating Predock facination with tectonics, the theater is clad in shimmering stainless steel blue plates in a "sort of deconstructing of the Geode at the City of Science and Industry in Paris's Parc de la Villette." Visitors arrive travelling through the neck of the turtle (illustrated above) which offers glimpses of the theater through the glass curtain wall, then the road takes them meandering through the wetlands, and finally out of the woods to view the full length of the museum before parking. This meandering method of travel is echoed within the circulation patterns within the addition.

figure-4.18

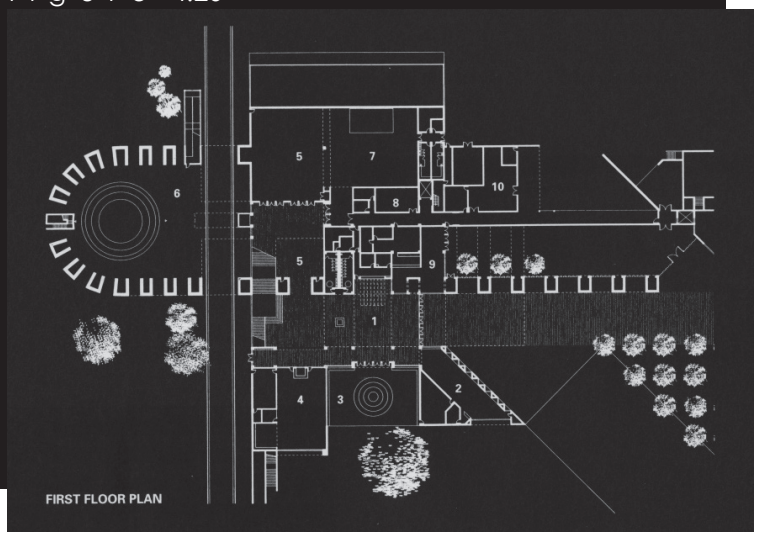
case studies

figure-4.19

To establish a sense of place, Predock has stacked the exhibition spaces around a four story atrium. Each exhibition space is oversized to accommodate large displays. They are arranged so that each one looks to the center atrium so that the visitors are better orientated when the move about the museum. I feel that this a successful arrangement. It allows the visitors to enter the atrium and get a glimpse of all the exhibitions at once. They are able to realize how all the exhibition spaces relate to each other just by looking around. Then, as they move from one to the next, they can look back at the atrium, and other exhibits to get a sense of orientation.

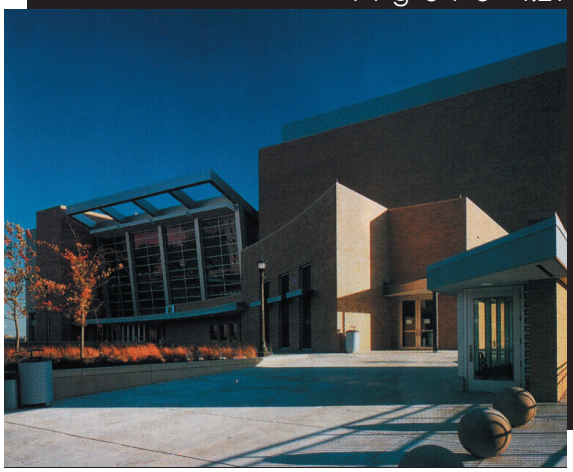
case studies

figure-4.20



case studies

figure-4.21



Science Museum of Minnesota
St. Paul, Minnesota
Completed: 1998
Architect: Ellerbe Becket

I have been to the Science Museum of Minnesota twice before, but I never made a note of how the building functioned. I revisited this museum with the intention of discovering circulation, area relationships, space, structure, and geometry. The large entrance fills you with shock and awe because of its proportions. It is at least a three story space with no relation to the human scale. The large crowd of visitors is the only thing that has any relation to human scale. The large curtain wall is visible in the image above is deceiving because visitors rarely enter from the large courtyard shown. Instead visitors experience the entry from the elevator from the parking ramp. This creates one of the most dramatic entrances available; a large open multi-story atrium accessed from a tunnel. The gift shop is accessible from the entrance without the purchase of admission. The line for tickets is clearly marked and the main function of the space is to process visitors and move them immediately into the first exhibit. The space is so large it almost seems a waste because I only spent 15 minutes standing in line here before moving on.

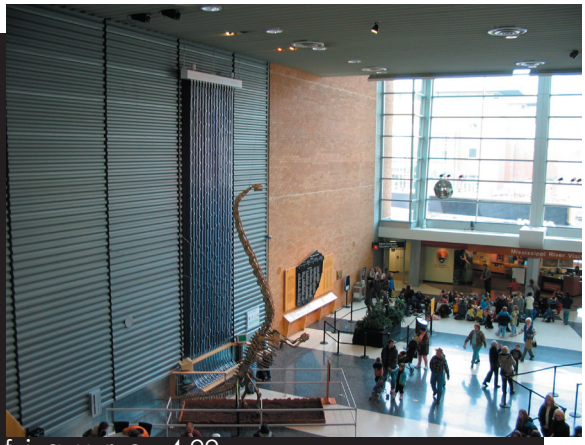


figure-4.22

case studies

figure - 4.23

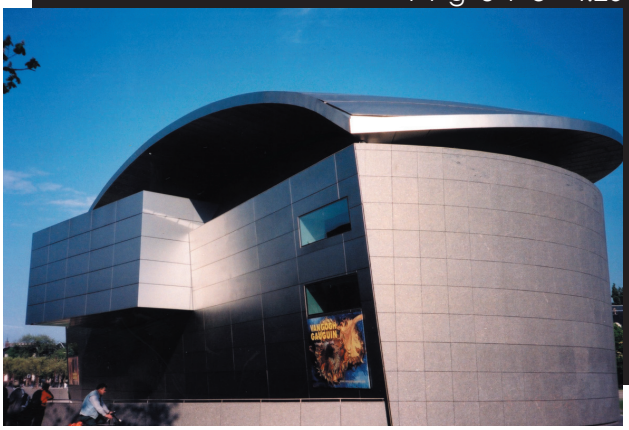
Where it is necessary to move large groups of people to exhibits which are on 5 different floors, the use of stairs is practically required. I feel that they handled the vertical circulation very well in this museum. Wide ornamental stairs were used in the main atrium shown in figure - 4.23. This gives people greater orientation by having the ability to visually relate themselves to the other floors and spaces. When walking on the stairs shown below, a different musical note is played for each step as you walk down them. The musical notes are played through the use of the organ pipes in the wall. These stairs give excellent views to the outside, which give visitors a better sense of orientation when travelling between floors.

figure - 4.24

figure - 4.25

case studies

figure - 4.26



Van Gogh Museum
Amsterdam, the Netherlands
Completed: 1999
Architect: Kisho Kurokawa

A very well laid-out, very well-planned art museum. It remains compact while still being airy. Able to display hundreds of works of art in a limited space while still handling heavy usage with ease. The original building is a rectangular affair with open galleries on four floors anchored around an open staircase and elevator. This ability to look across spaces to another side of the building and up and down to different floors only serves to enhance the masterful use of limited square footage. The recent addition shown in figure - 4.26 was opened in 1999 to mark Van Gogh's 200th birthday. This building continues the light, open feeling of the earlier museum, but with elegant, gentle curves instead of wide rectangular blocks. Its facade is titanium and brownish-gray stone.

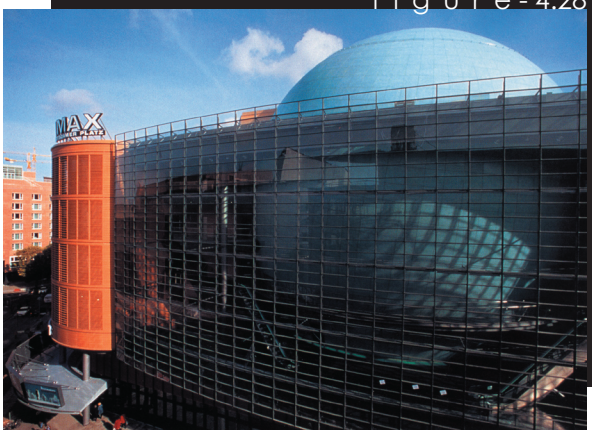
A shallow pond acts as a sunken plaza element next to the building, and can be appreciated from the promenade inside the annex. The Print Room is housed in an aluminium "cube" that juts out from the building. This geometric element refers itself to the modernist block that is the Rietveld building. The Kurokawa addition has fast become a darling for photographers with its simultaneously slick and somber titanium and stone facade.

figure - 4.27

The Rietveld and Kurokawa buildings are linked by the transitional space called the Node, so they appear as independent objects from the outside. Martien van Goor, whose firm also helped renovate the Rietveld building, designed the node.

case studies

figure-4.28



Potsdamer Platz IMAX Theatre
Berlin, Germany
Completed: 1998
Architect: Renzo Piano
Building Workshop

Located at the center of the urban project developed by Daimler-Benz on a large urban site as part of the reconstruction of the Potsdamer Platz in Berlin, The IMAX Theatre is a 15,600 square meter mixed-use building comprising of an IMAX theater, a restaurant, and retail spaces. The three floors of retail spaces on which the theater rests are related to a covered shopping street placed between adjacent building while a three-story restaurant in the rotunda faces the Marlene Dietrich Platz.

The 440 seat theater is housed in a sphere of 36 meters in diameter that is integrated inside of the urban envelope of the building. The spherical volume of the theater raises above the building making it a landmark from a distance.

figure-4.29

As part of the general architectural and sustainability concept, the atrium is naturally ventilated.
It is roofed by a long-span hollow steel structure that is offset from the sphere in order to allow natural light penetration, natural ventilation, and the 'reading' of the continuity of the sphere between inside and outside

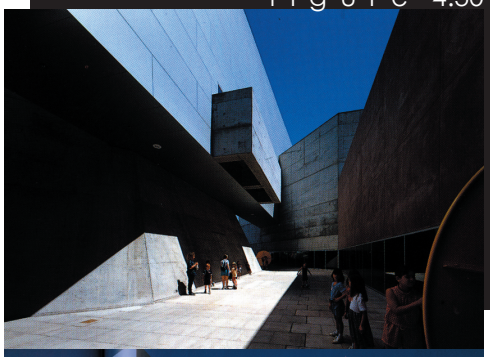
case studies

figure-4.29

Arizona Science Center
Phoenix, Arizona
Completed: 1997
Architect: Antone Predock

The science Center is situated along a major traffic route leading into the center of Phoenix; there are residences to the east, a convention center to the west, relocated historic houses to the north, and warehouses to the south Also close by are a civic center, a symphony hall, and a history museum. The museum does not provide parking, it is available off of the site. This museum is a modern structure that is adjoining a historic district.

figure-4.30



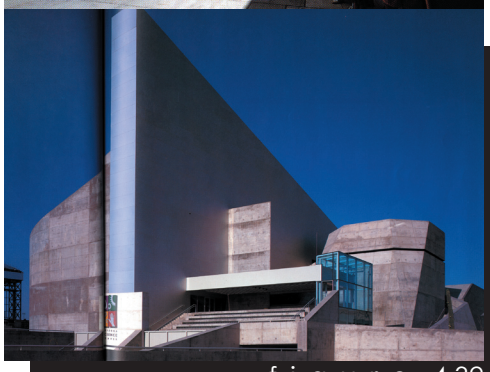


figure-4.31

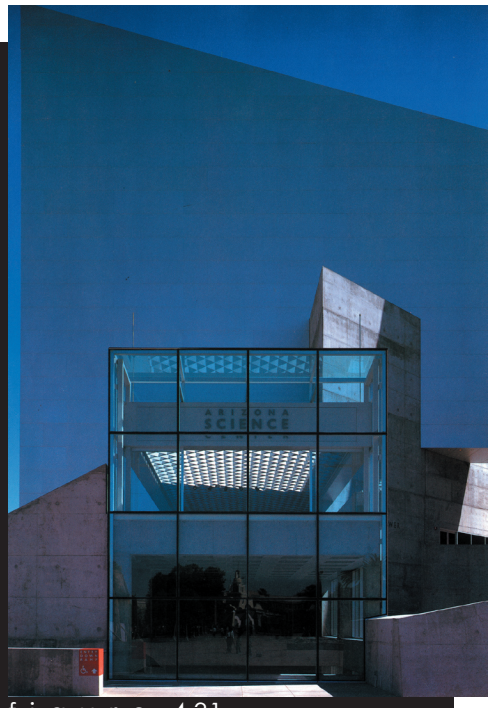


figure-4.32

case studies

figure-4.33

The building's exuberance is inspired by the specific nature of this place. The resulting architecture is a highly processional and participatory journey, beginning with a descent into the coolness of the earth at the entry courtyard and sheltered light transition in the lobby, and culmination in a celebration of the sky in the peak gallery with celestial viewing terrace (Predock 1997). The route through the architecture starts from the courtyard at the entrance and then descends into the bowels of the earth. Passing through the indirect light of the vestibule, it culminates in a celebration of the vault of heaven, represented by the observation terrace set on top of the building. (Ghirardo 1999).

figure-4.34

figure-4.35

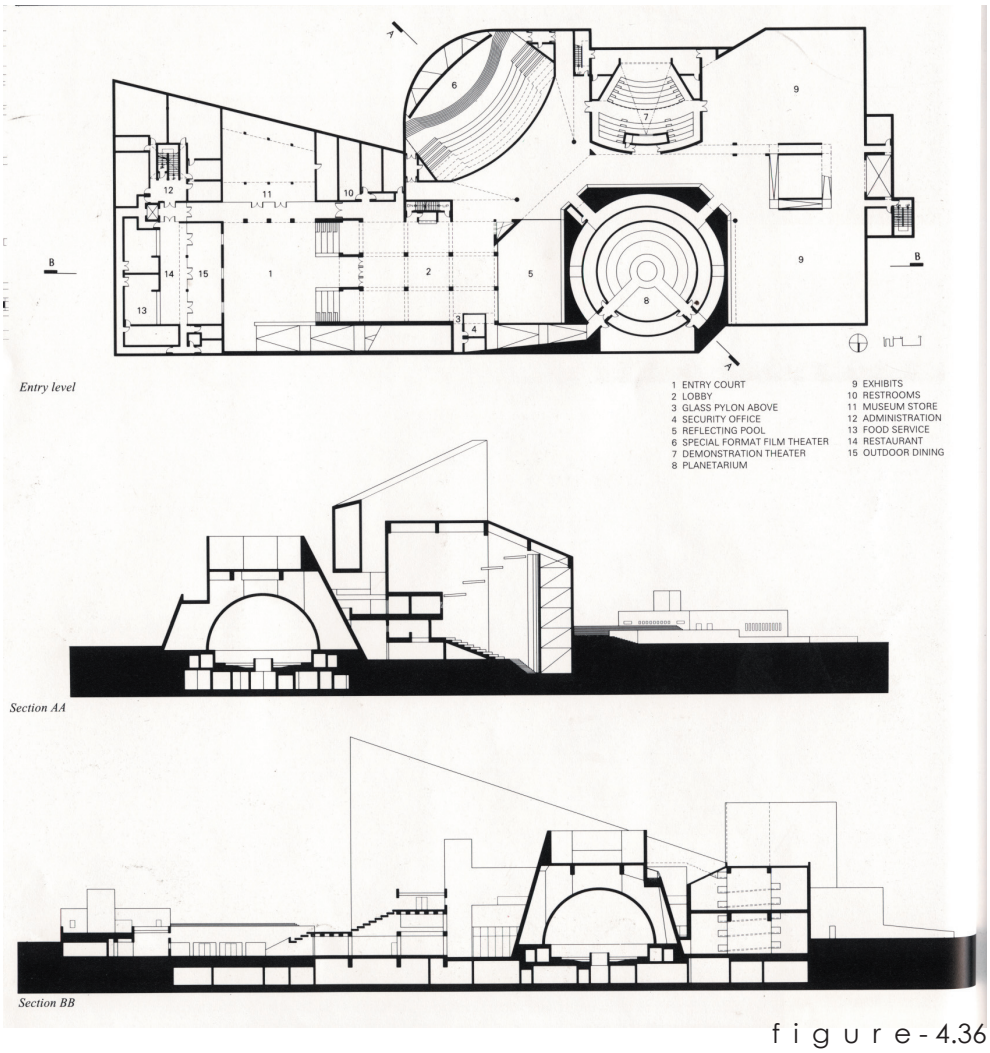

Entry level
1 ENTRY COURT
2 LOBBY
3 GLASS PYLON ABOVE
4 SECURITY OFFICE
5 REFLECTING POOL
6 SPECIAL FORMAT FILM THEATER
7 DEMONSTRATION THEATER
8 PLANETARIUM
9 EXHIBITS
10 RESTROOMS
11 MUSEUM STORE
12 ADMINISTRATION
13 FOOD SERVICE
14 RESTAURANT
15 OUTDOOR DINING
Section AA
Section BB

figure-4.36

case studies

Oregon Museum of Science and Industry
Portland, Oregon
Completed: 1998
Architect: Zimmer Gunsul
Frasca Partnership

figure - 4.37

figure - 4.38

Positioned amidst intersecting freeways, warehouses, railroads, the Oregon Museum of Science and industry courageously stakes its claim in a most unlikely quarter of Portland. Separated from the downtown area by the Willamette River and surrounded on three sides by old industrial buildings, the science museum becomes set apart with its crisp modern forms.

Portland's General Electric Company donated the 18-acre site, complete with an 80-year old power plant. An old black generator was left inside the museum to display the buildings rich history with the area. This gives the building a connection with city, and establishes a sense of place and belonging with the visitors of the area.

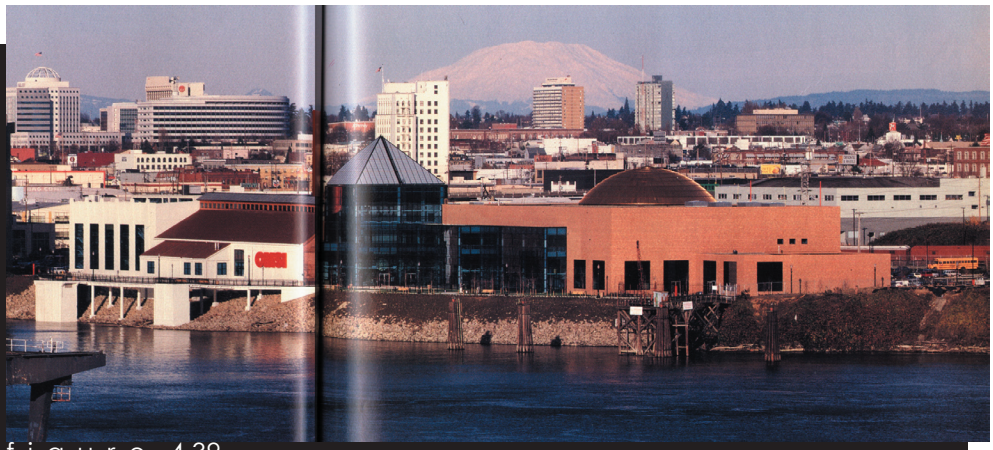


figure - 4.39

case studies

Best Indeterminate Facade Showroom
Houston, Texas
Completed: 1975
Architect: James Wines

figure-4.40

SITE, the company started by James Wines, was commissioned in 1972 to develop a series of showrooms for Best Products Co. the nation's largest catalogue showroom merchandiser at the time. The jagged edges and brick veneer gives the building the appearance of being somewhere in-between construction and demolition. This building is an exploration of ideas outside of formal content. It uses the facade of the building to display the deviation from the norm while maintaining the overall shape and form of the typical department store.

figure-4.41

program requirements

program requirements

figure-5.1

program requirements

Spacial Summary

Public Spaces

Entrance Lobby	2,200 SF
Bus Drop-Off	3,000 SF
Ticketing Area	600 SF
Queuing Area	500 SF
Office	100 SF
Public Toilets (6) @ 800 SF	4,200 SF
Coat Check	300 SF
Book and Gift Shop	2,000 SF
Office	150 SF
Toilet Room	125 SF
Storage Room	700 SF
Classrooms (2) @ 1000 SF	2,000 SF
Café	
Cafeteria (200 people)	3,800 SF
Kitchen	1,500 SF
Freezer	300 SF
Storage	200 SF
Receiving Area	800 SF
Public Toilets (2) @ 600 SF	1,200 SF
Storage Room	300 SF
Employee Locker Room (2) @ 1500 SF	3,000 SF
Employee Entrance	200 SF
Sub-Total	**27,175 SF**

Spacial Summary Cont.

Exhibition Spaces

IMAX Theater	5,000 SF
Indoor Exhibits	
Red River Valley Exhibit	3,000 SF
Physical Science Exhibit	3,000 SF
Paleontology Exhibit	3,000 SF
Human Body Exhibit	5,000 SF
Temporary Exhibits	8,000 SF
Exterior Exhibit	2,000 SF
Curator's Office	250 SF
Assistants Office	200 SF
Storage	150 SF
Sub-Total	**29,600 SF**

program requirements

Spacial Summary Cont.

Staff Spaces

Administrative Offices -	
Exhibition Director	250 SF
Storage	50 SF
Exhibition Developer	250 SF
Storage	50 SF
Administrator's Office	250 SF
Storage	50 SF
Board of Directors Office	250 SF
Storage	50 SF
Accountant's Office	250 SF
Storage	50 SF
Conference Room	400 SF
Storage Room	100 SF
Kitchenette	100 SF
Security Office	250 SF
Security Viewing Room	250 SF
Computer Equipment Room	500 SF
Employee Lounge	500 SF
Toilet Room	150 SF
Storage Room	150 SF
Sub-Total	**3,900 SF**

Spacial Summary Cont.

Support Spaces

Shipping and Receiving	1,200 SF
Office	200 SF
Toilet Rooms	150 SF
Loading Dock	800 SF
Break Room	250 SF
Storage Room	100 SF
Janitorial (3) @ 250 SF	750 SF
General Storage	10,000 SF
Building Maintenance	200 SF
Grounds and Maintenance	200 SF
Fire Control Room	100 SF
Total Mechanical (10%)	8,765 SF
HVAC Area	8,215SF
Administrators Office	250 SF
Toilet Room	150 SF
Storage Room	150 SF
Sub-Total	**31,480 SF**

program requirements

Spacial Summary Cont.

Public Spaces	27,175 SF
Exhibition Spaces	29,600 SF
Staff Spaces	3,900 SF
Support Spaces	31,480 SF
Sub-Total	92,155 SF

program requirements

Performance Requirements

Public Spaces

Entrance Lobby: This is the main entrance to the museum. This space should serve as a reference point for visitors because it is the first thing they see when the enter the facility. By orientating the spaces around this, the visitors will have a better sense of direction whenever this space comes into view. In order to offer direction to the visitor, signage is an important aspect for this space. However, large utilitarian signs will take away from the quality of the space. As an alternative, graphics that suggest movement should be incorporated into the design. The design of this space can set the character for the rest of the museum. It needs to command attention on the inside as well as the outside. This is typically done by having multi-story open areas with glass curtain wall systems and exposed structural members. There should be enough room to hold receptions of up to 250 visitors. During school field trips this area should be flexible enough to allow the students to eat lunch in this area. The will be large mechanical demands for this space because of its size and function.

Bus Drop-off: The site plan needs to allow for a safe entrance for any visitor arriving on bus. Buses will come on a regular basis, from the Fargo Metro Area Transit, or in large numbers from schools during a field trip. The bus drop-off area needs to allow for large groups of visitors to reach a safe point away from traffic. The visitors should never have to cross a main traffic route to enter the museum if they are using the designated drop off area.

program requirements

Performance Requirements Cont.

Ticketing Area: This is the first place every visitor comes to. It needs to be easily recognized as the beginning of the science museum experience. The theme of this area should To relate to the theme of the entrance lobby. Clear signage will be an important aspect of this space.

Queuing Area: It should be able to quickly process long lines. An opportunity exists for a second line to accommodate regular visitors that have yearly passes to reduce wait times. Pamphlets and brochures should be made available to visitors as they wait in line to help expedite the entrance process.

Office: A small office should be located nearby, for administrators to answer any questions that cannot be answered by the front desk. This area is where ordering and other administrative activities occur and should be out of view.

Public Toilets: These need to be accessible to everyone. They should be located near the entrance lobby but away from the main circulation.

Coat Check: This will simply be a secure place for visitors to store their overcoats. It can be artificially lit.

Gift Shop: This as an area where for patrons of the museum can purchase educational material, souvenirs, and general purpose material. It should be located near the exit, because visitors will visit this area on their way out. The entrance should be carefully designed so that it attracts the visitor's attention. The gift shop should be kept up to date with supplemental material for both the permanent and temporary exhibits. The theme of the gift shop should compliment the theme of the museum to help create unification.

Performance Requirements Cont.

Office: The person who is running the gift shop will need a small office to perform various accounting and managerial activities. Careful arrangement will cause the office to obscure from the public, but still allow the staff to keep an eye on the merchandise.

Toilet Room: Unisex

Storage Room: This room need to be large enough to store extra materials for the gift shop floor. The area can be plain and doesn't need finishes. It should allow for the use of various shelving arrangements.

Classrooms: These classrooms will be used primarily for school field trips. Each will have a capacity of 25-35, and will be used to offer supplemental information for the exhibits.

Café: This is the major dining facility for the museum. It will be used by visitors, employees, and researchers. Since this is where all the museum inhabitants come to eat, it needs to be versatile and accommodating. It should be able to offer a wide variety of food and refreshments. Here the main theme of the museum should be emphasized and suspended objects and artwork will create an interesting dining atmosphere. It should be located near the exterior and optimize the use of natural lighting. A multi-level open court area will give visitors a greater sense of orientation. The mechanical demands for this area are important because of the amount of glazing.

Cafeteria: The seating must be versatile and easily moveable to accommodate different varying group sizes. It needs to be functional and serve large groups of people that could be from field trips or other groups. A multi-level cafeteria should be linked to the outside where there can be a balcony for exterior seating.

program requirements

Performance Requirements Cont.

Kitchen: The kitchen used for the café will be utilitarian and functional. Artificial lighting will provide even-lit surfaces required for food preparation. All the surfaces need to be durable and easy to clean. The space needs a direct link to exterior for waste disposal.

Freezer: This will be used to store perishable items. It needs to be accessible from the kitchen. The freezer also needs to be near the receiving area to reduce the distance of delivered items.

Storage: This area will be used for storing the non-perishable food items. The area can be plain and doesn't need finishes. It should allow for the use of various shelving arrangements. The storage area needs to be near the receiving area to reduce the distance of delivered items, as well the cafeteria and the kitchen.

Receiving Area: Typically this area is located away from the main entrance in an attempt to keep the delivery trucks as discreet as possible. This will used for the delivery of goods for the café. The plan should be kept open and flexible, so the workers can optimize the space. Exposed systems will alleviate the cost of finishes, that would damaged during the movement of materials.

Public Toilets: Should be located near the cafeteria and need to be easily seen. They should follow the same theme as the café.

Storage Room: This will be where extra chairs are kept for larger groups. Any extra equipment not being used will also be stored here.

Employee Locker Room: This will be a place to accommodate staff who wish to use alternate means of transportation. All personnel will be assigned a locker where they can store their valuables. The area should be warm and inviting. Cold block walls and concrete floors are to be avoided. Ventilation will be an important function of the mechanical system. Separate male and female locker rooms will be provided to offer additional privacy.

Performance Requirements Cont.

Employee Entrance: This entrance should be kept plain and simple so visitors do not confuse it with the main entrance. It is typically located away from the main entrance and should be near the employee parking.

Exhibition Spaces

IMAX Theater: This could be the centerpiece for the museum. Contained within a spherical room which should be visible from the outside. The shape of the sphere is becoming an icon that defines science museums. It contains the latest state-of-the-art equipment for large screen display and surround sound. This permanent exhibit frequently offers new entertaining and educational films that will be a major marketing tool for the museum. The Spherical shape and steep stadium style seating will give movies the opportunity to fill audience's field of view. The lighting and mechanical systems will be complicated and highly specialized to provide the most control for a wide range of presentations.

Red River Valley Exhibit: This is the exhibit which will make the science museum unique for Fargo. It should explain and display geologic aspects of the Red River and its floodplain, Lake Agassiz, glacial melt, and the history of the Red River Valley. This exhibit needs to be informative as well as entertaining. In order to compliment the text for the displays, there needs to be physical examples, colorful displays, and interactive monitors.

Physical Science Exhibit: This exhibit should show the exciting geology of North Dakota, specifically the rocks and land forms of the badlands. The wonders of physics will also be displayed here. Hands-on and interactive displays will be used to demonstrate the waves, sound, light, weather, pulleys, and so on. These exhibits which educate visitors on physical sciences need to be engaging, entertaining, and educational. The space should be open allowing exhibits to be moved and changed on a regular basis.

program requirements

Performance Requirements Cont.

Paleontology Exhibit: This exhibit will show the fossils of plants and animals of geologic time. The skeletons of dinosaurs and fossils from the Hell Creek Formation in North Dakota should be a primary focus of the exhibit. By bringing fossils that are found in North Dakota, this exhibit will put emphasis on the local area make the science museum a part of the community.

Human Body Exhibit: This exhibit should be geared towards children. It should offer engaging displays that inform the visitor about disease, genes, heart and circulation, anatomy, and other bodily systems. The visitors experience can be personalized if they learn something new about themselves.

Temporary Exhibits: By offering new exhibits on a regular basis, visitors will have a reason to return frequently. This will be a place for travelling exhibits that make their way around the region or country. This space may also be used for science fairs and other temporary displays brought in locally.

Exterior Exhibit: This should be something from the area like a train engine where visitors can wonder through it and learn about its history and relationship to the area. By placing it outside it creates a strong connection between the building and the history of the site.

Curator's Office: This office needs to be in close proximity to the exhibits. It should have large windows that open to the outside. This office should display status and success as visitors come to the resident curator for advice and information.

Assistant's Office: This office should be adjacent to the curator's office and should emphasize the same successful qualities.

Storage: Due to the public nature of these two offices there needs to be a storage room where they can store materials so their offices do not appear cluttered.

Performance Requirements Cont.

Staff Spaces

Administrative Offices: These offices will be approximately the same size, and located in the same area. Each will have a window that opens to the outside, as well as a small storage closet. They need to be located together because of the business relations that they share. They will need located in an area that is separated from the public spaces to keep visitors from wondering into in.

Conference Room: This conference room will be used by the administration, and needs to demonstrate the elegance and professionalism that is expected of the science museum. It will need to have support for multi-media presentations and varying lighting requirements.

Storage Room: This room will store extra chairs that are not currently being used by the conference room. It will also store any electronic equipment that will not be required for the current presentation.

Kitchenette: This will be used to prepare small meals for guests, keep catered meals warm, and store snacks and refreshments.

Security Office: This room will be used for the chief of security. It will need a window with a view to the outside.

Security Viewing Room: This room will be lined with monitors that are linked to various cameras throughout the museum. This room will use artificial lighting that can be adjusted to optimize the viewing of the monitors. There will be added mechanical demands due to the heat given off by the equipment.

program requirements

Performance Requirements Cont.

Computer Equipment Room: This room will have the servers for all the computers in the museum, as well as, all the networking wiring and switches. Some of the interactive displays may be programmed and run from these computers. The mechanical demands from this room will also be larger because of the electronics.

Employee Lounge: This room should be close to the café so employees can order their meal there, and eat it in the lounge. This give employees the opportunity to have a meal apart from the visitors. This room should have windows to the outside, and be filled with plants, and warm materials to give the employees a sense of ownership and comfort. A small kitchen with a refrigerator, microwave, oven, and sink will be used by employees that with to prepare or reheat meals brought from home. It should embody the qualities of home.

Toilet Room: Unisex

Storage Room: A small room is required to store extra chairs and other equipment or decorations that are not being used.

Shipping and Receiving: This is the main shipping and receiving area for the museum. The space will need to be open and flexible with the ability to be expanded if needed. The space can have exposed structure and services to save on costs. The lighting and mechanical will be utilitarian based.

Performance Requirements Cont.

Office: This will be located within the receiving area, so the manager can have a visual connection to the loading dock to confirm shipments. It will be mainly used for record keeping and dispatch informational.

Toilet Room: Unisex

Loading Dock: Will need to be able to accommodate large trucks that may be bringing temporary or travelling exhibits.

Break Room: This room will be used by employees or drivers that wish to take a break or prepare meals that they brought with them. It will need to have a refrigerator, microwave, and sink.

Storage Room: A small room is required to store extra chairs and other equipment or decorations that are not being used.

Janitorial: These small offices will store the supplies needed for the custodians. They will be located in convenient locations on every floor of the museum.

General Storage: This is the storage room for the museum. It will store extra equipment, furniture, decorations, and any other general item that is not being used.

Building Maintenance: An office to supply the needs for the building manager. This room needs to be able to monitor the mechanical system, and should have a window that opens to the outside.

Grounds and Maintenance: This will be a room for storing equipment used to maintain the grass and vegetation on the site.

Fire Control Room: There will need to an area used to monitor the fire detection, and suppression systems. This room can be linked or combined with the building maintenance.

program requirements

Performance Requirements Cont.

HVAC Area: The mechanical demands of some of the exhibits will be very specific. The temperature and humidity of the exhibits must be carefully monitored and maintained. It is necessary to meet these demands in order to be able to accommodate some of the temporary and travelling exhibits. The mechanical room must be large enough to contain all of the large air handling systems, as well as provide space to maintain it.

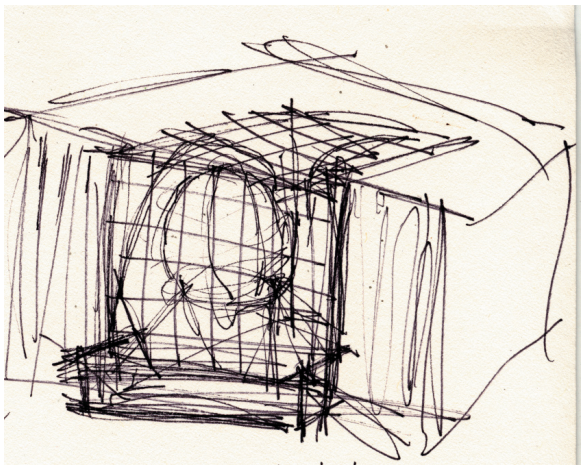
program requirements

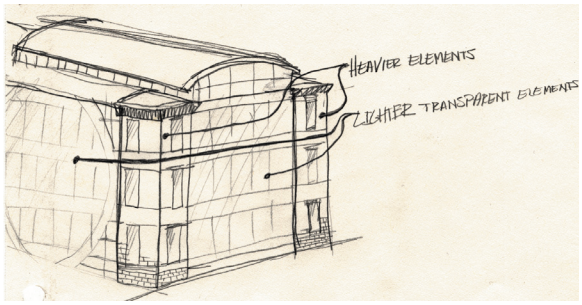
process documentation

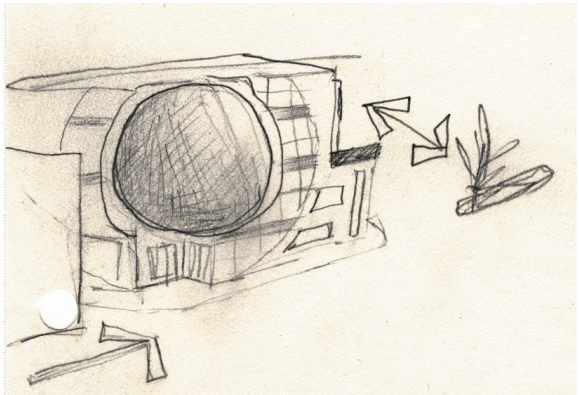
Process Documentation

figure-6.1

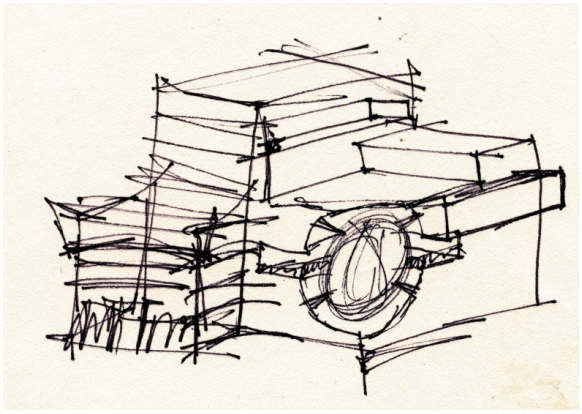
process documentation

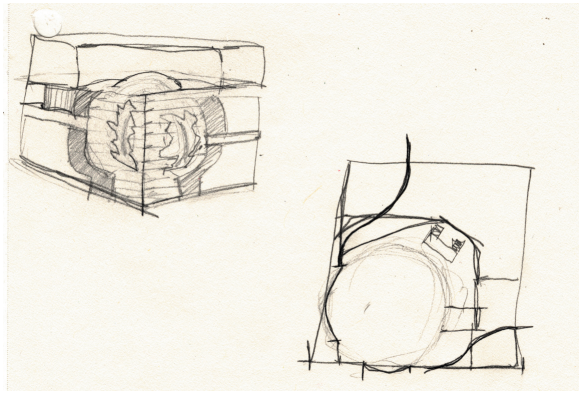


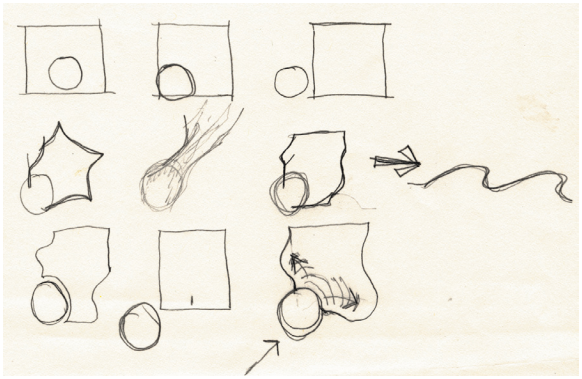




process documentation







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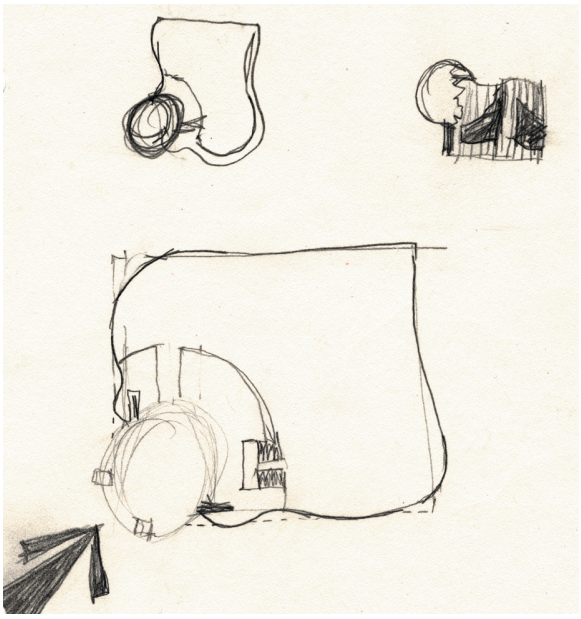

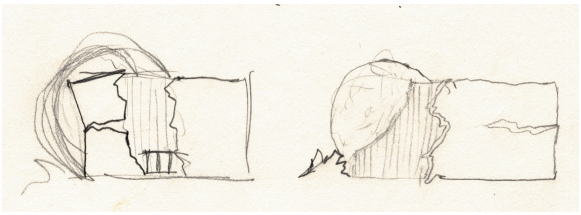

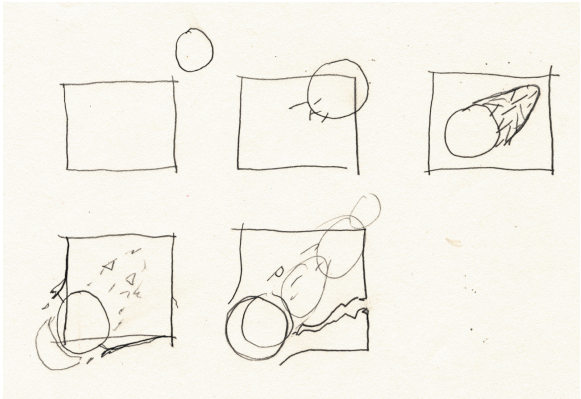

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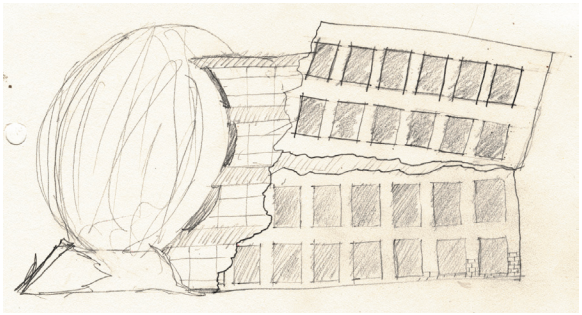

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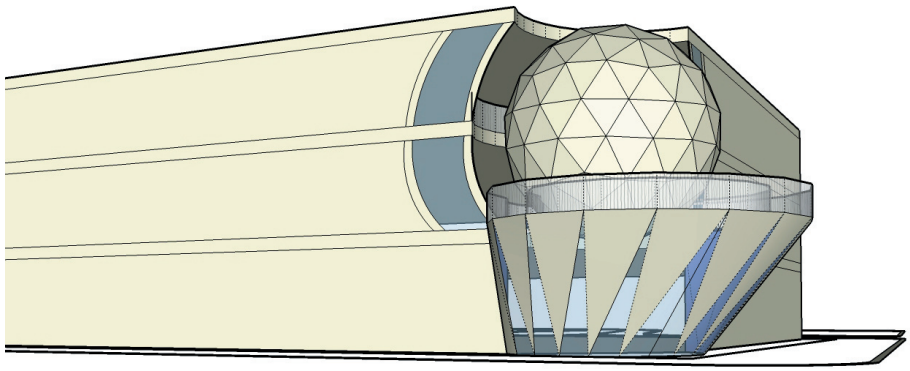

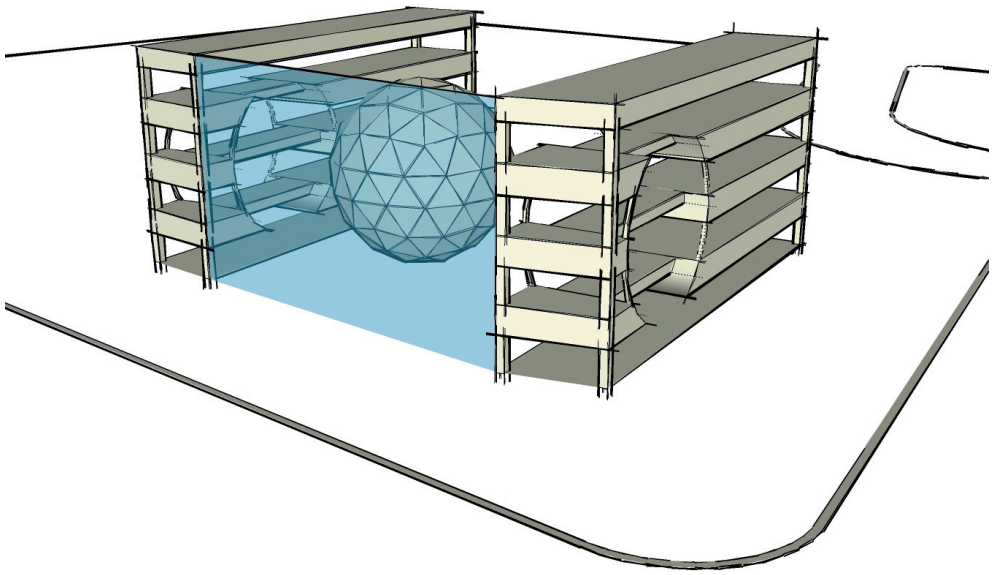

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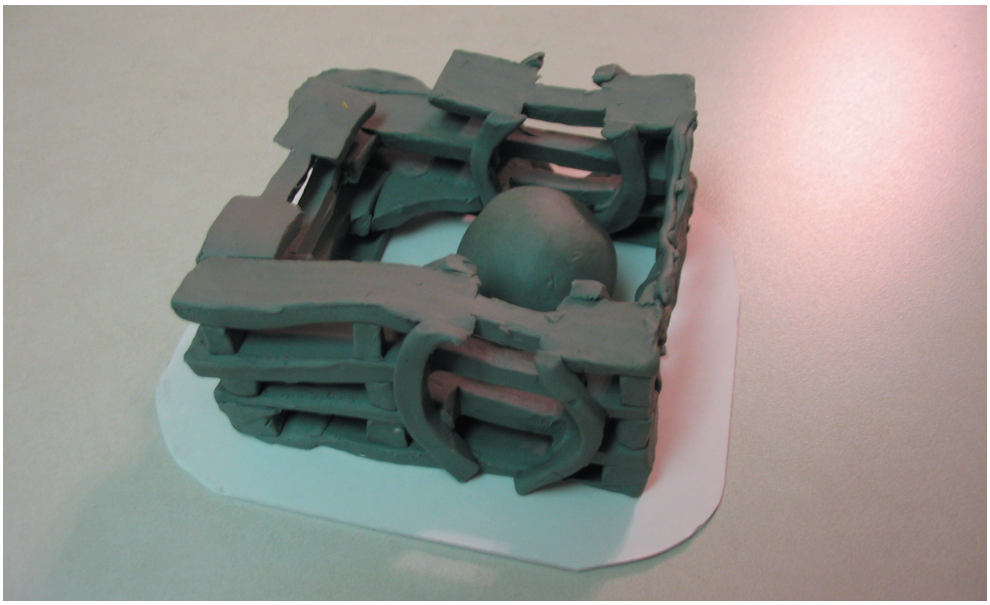

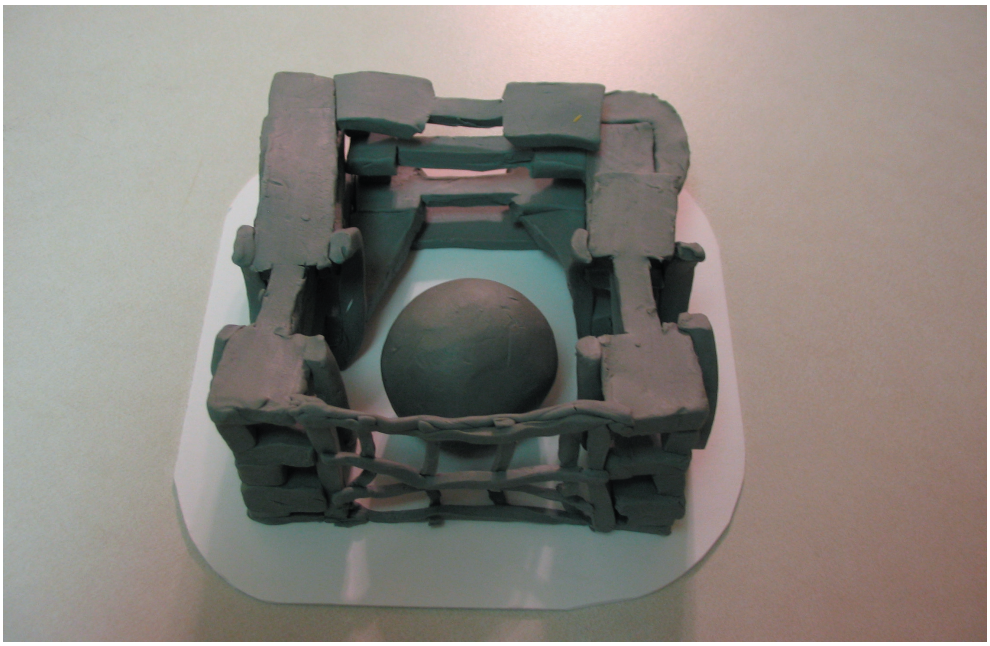

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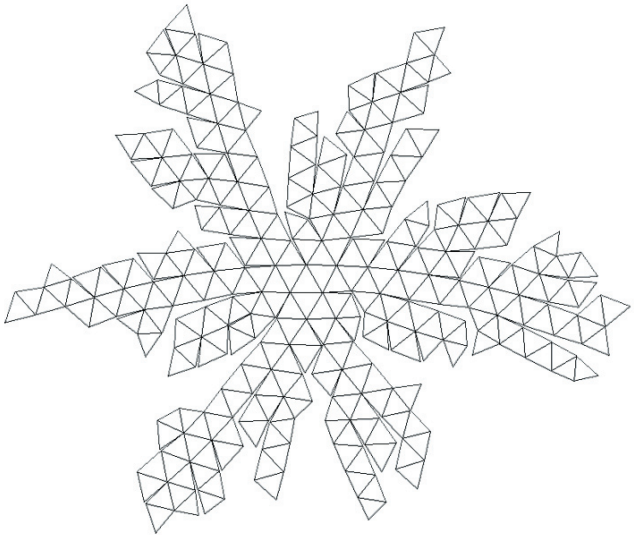

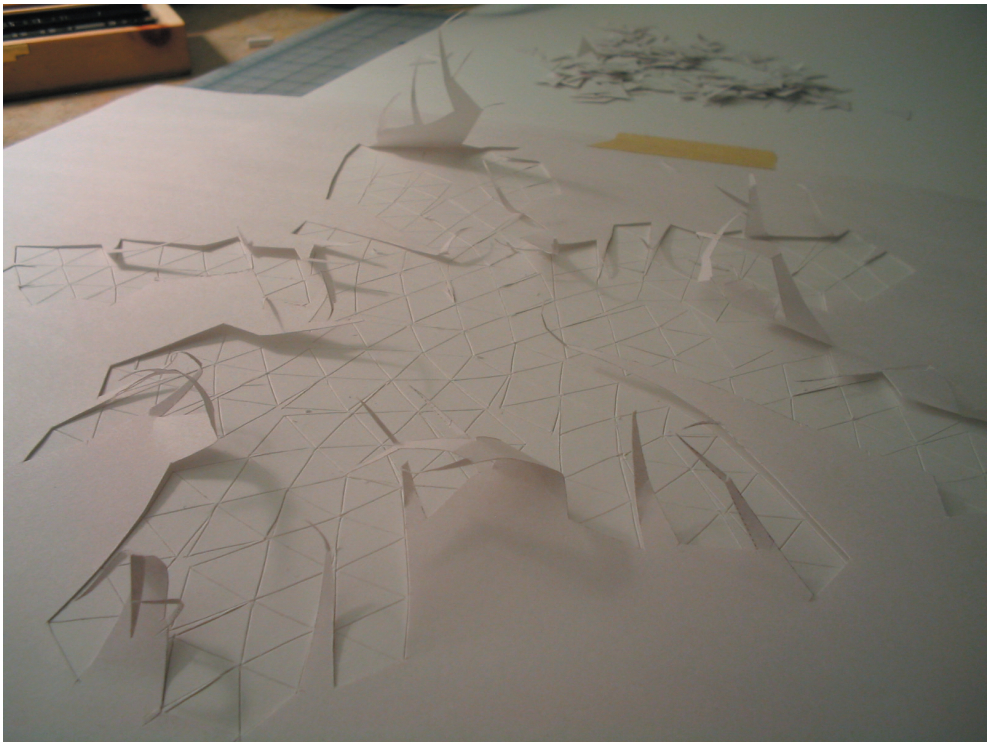

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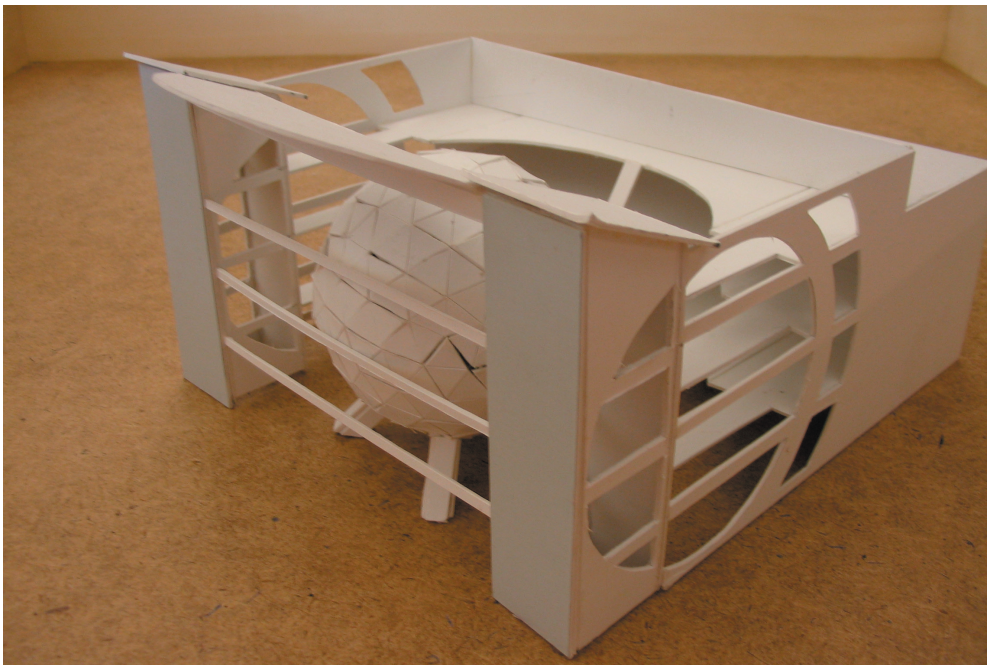

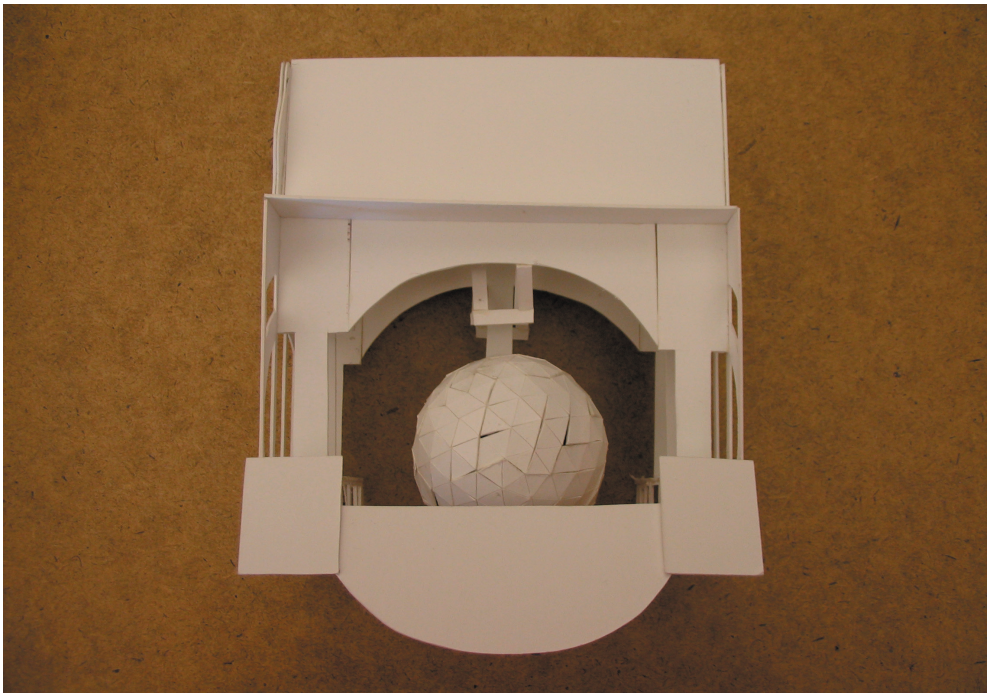

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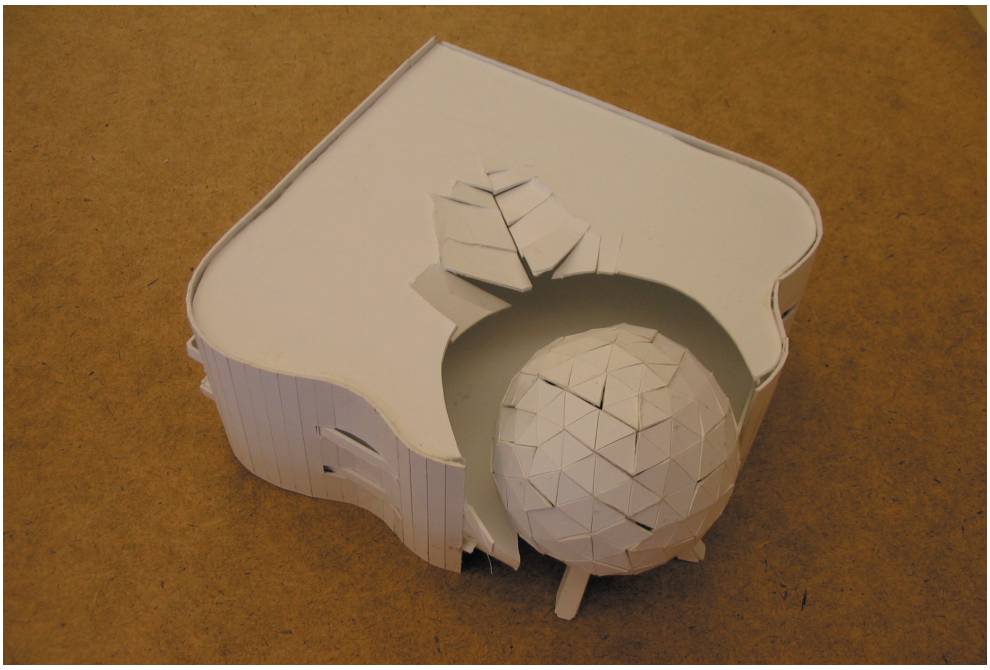

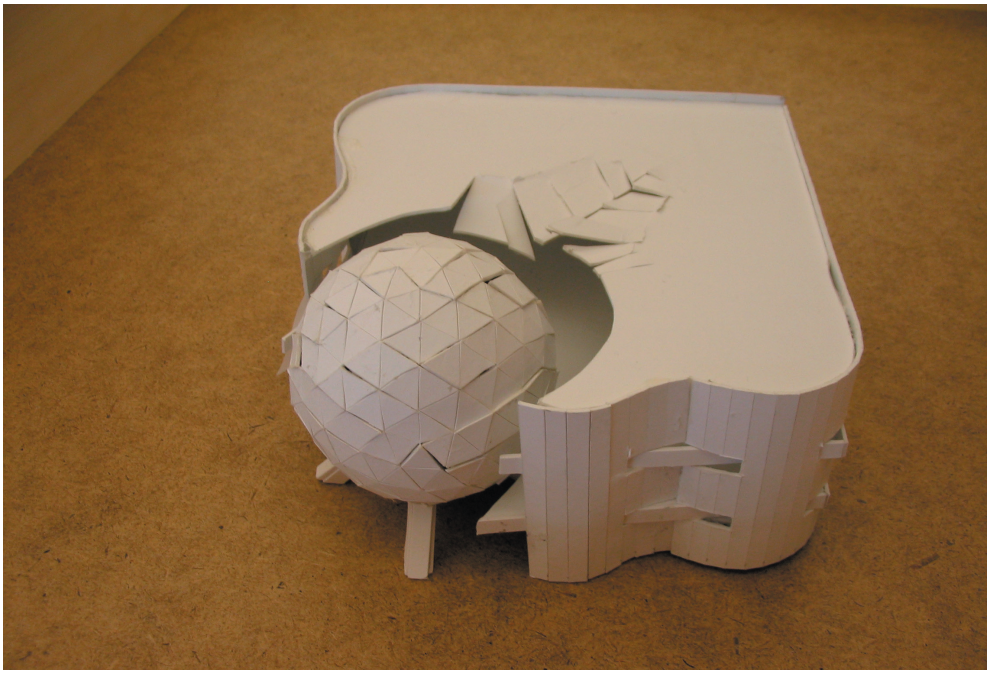

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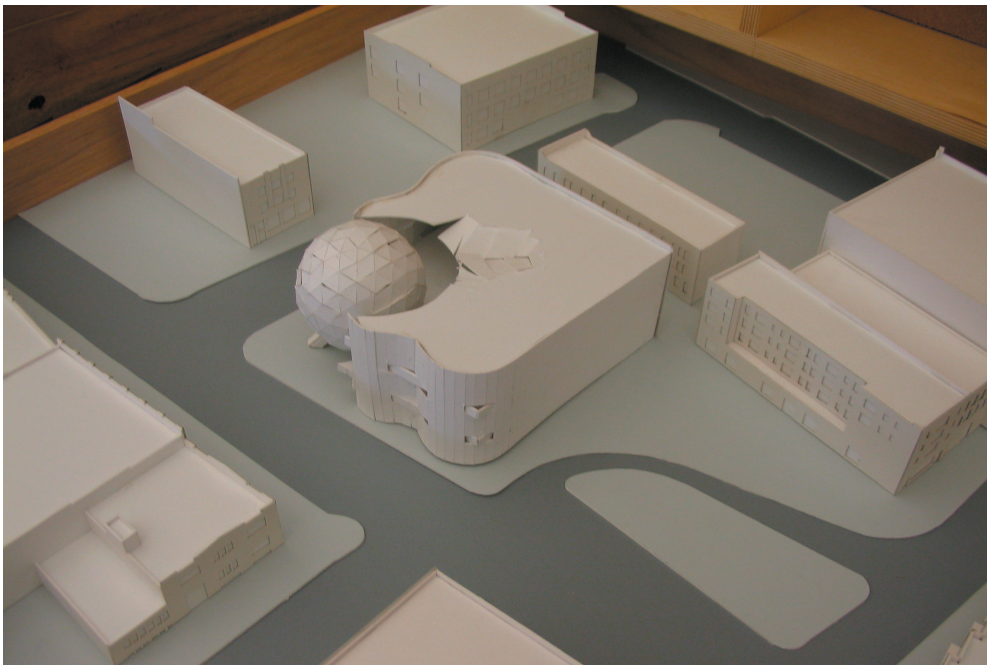

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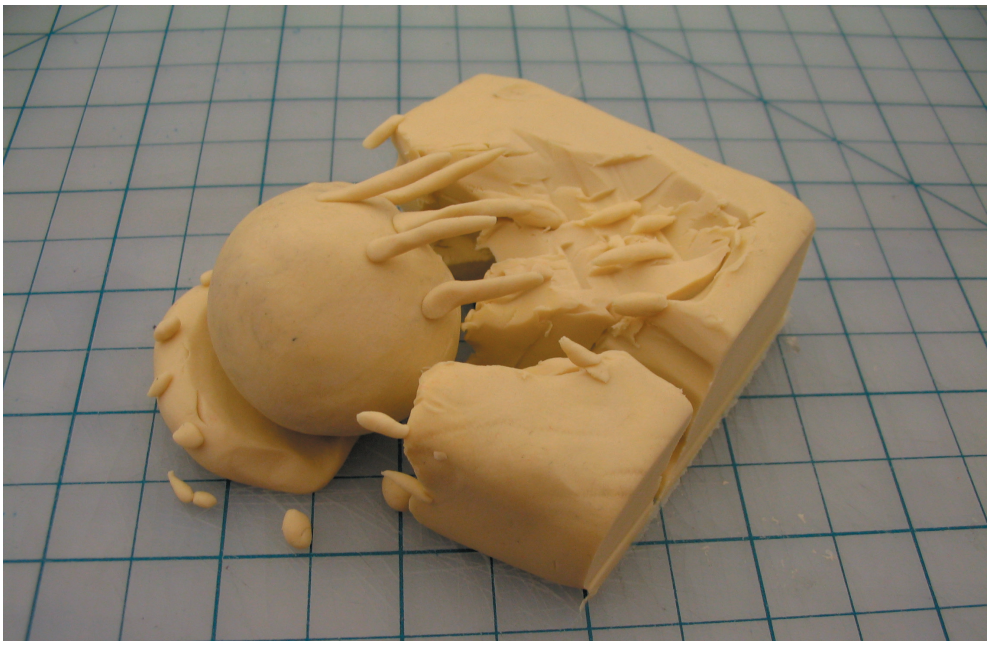

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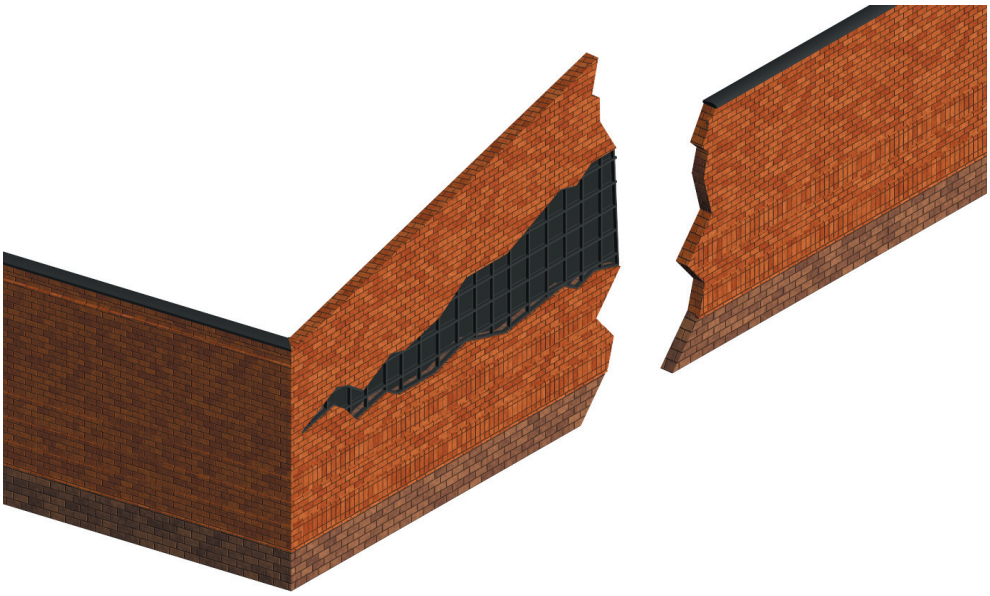

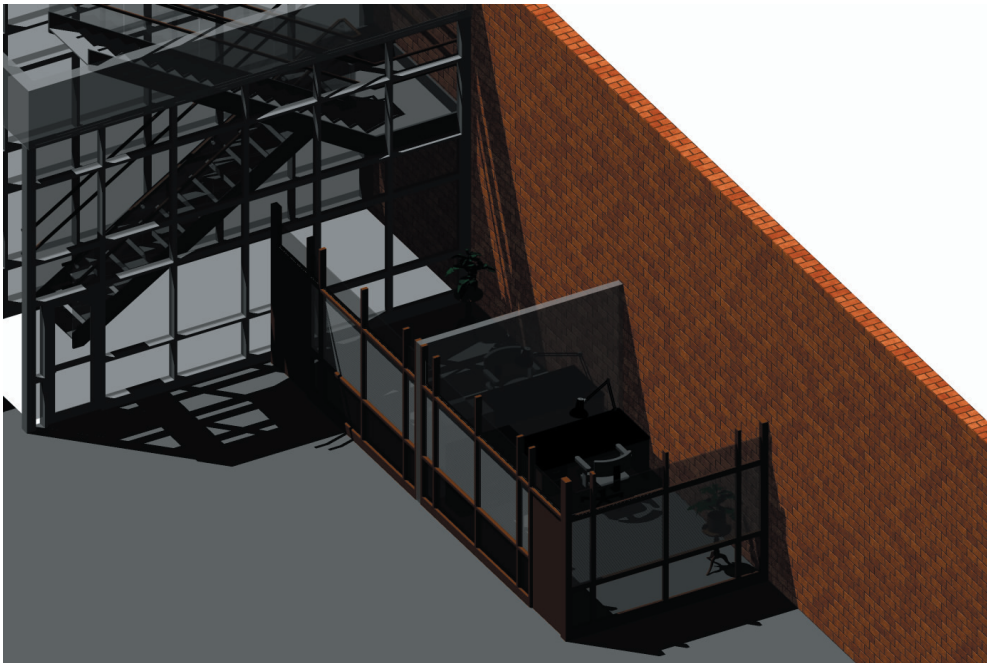

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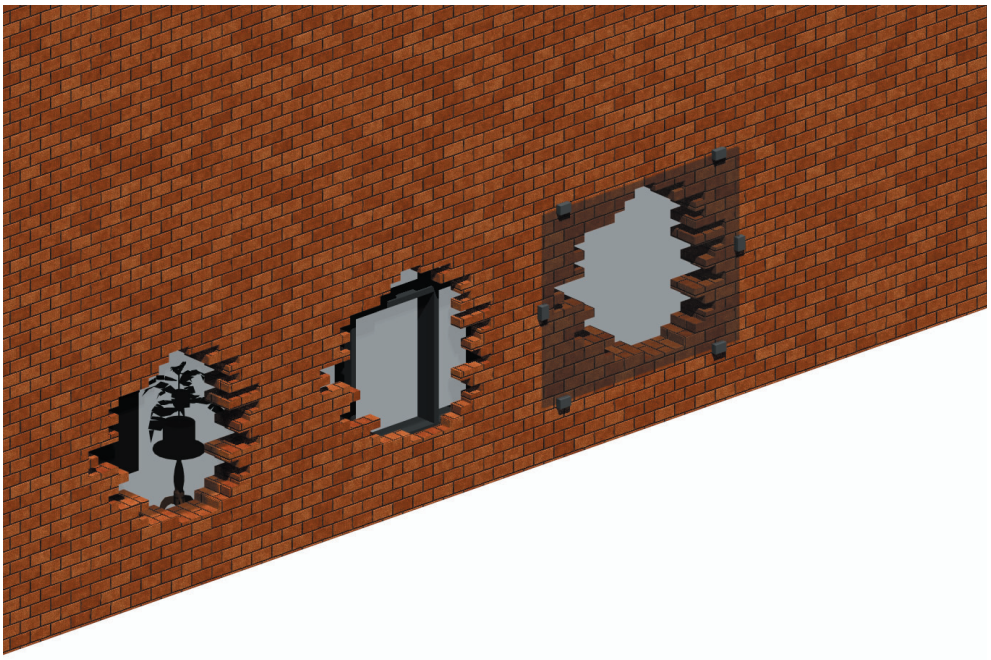

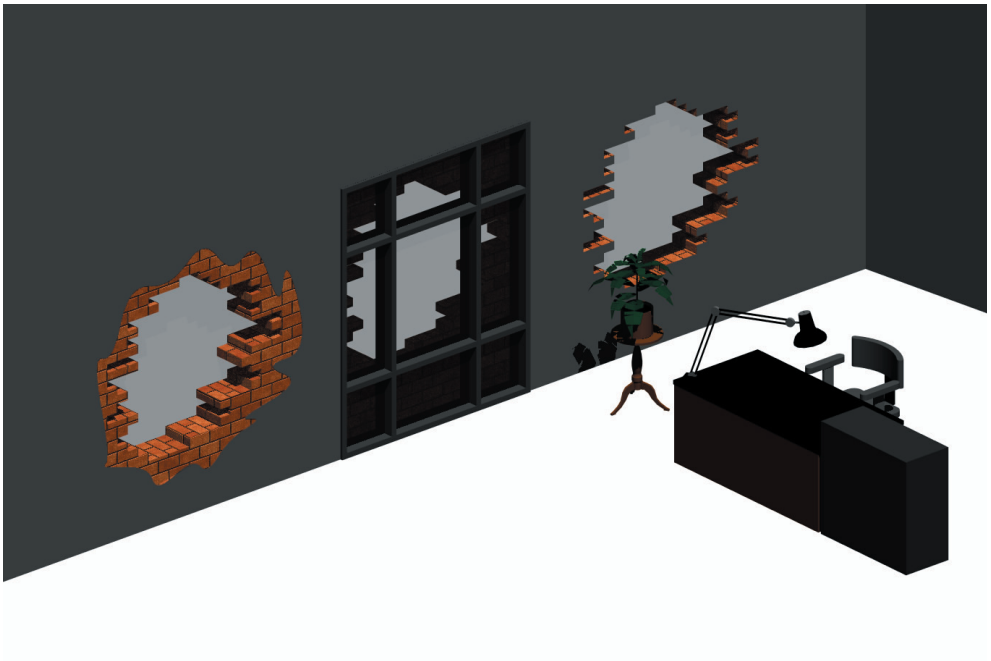

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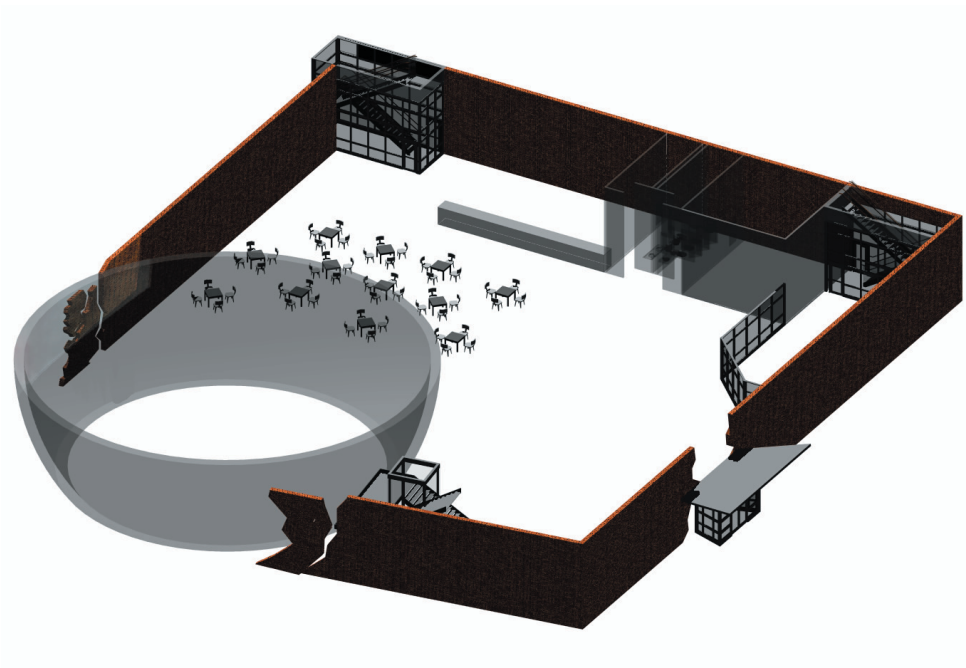

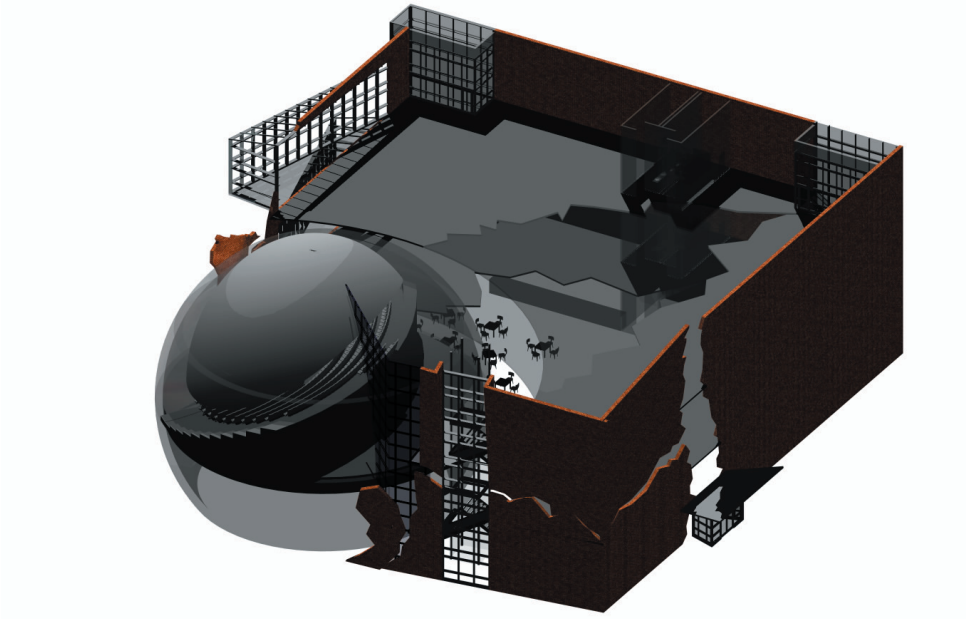

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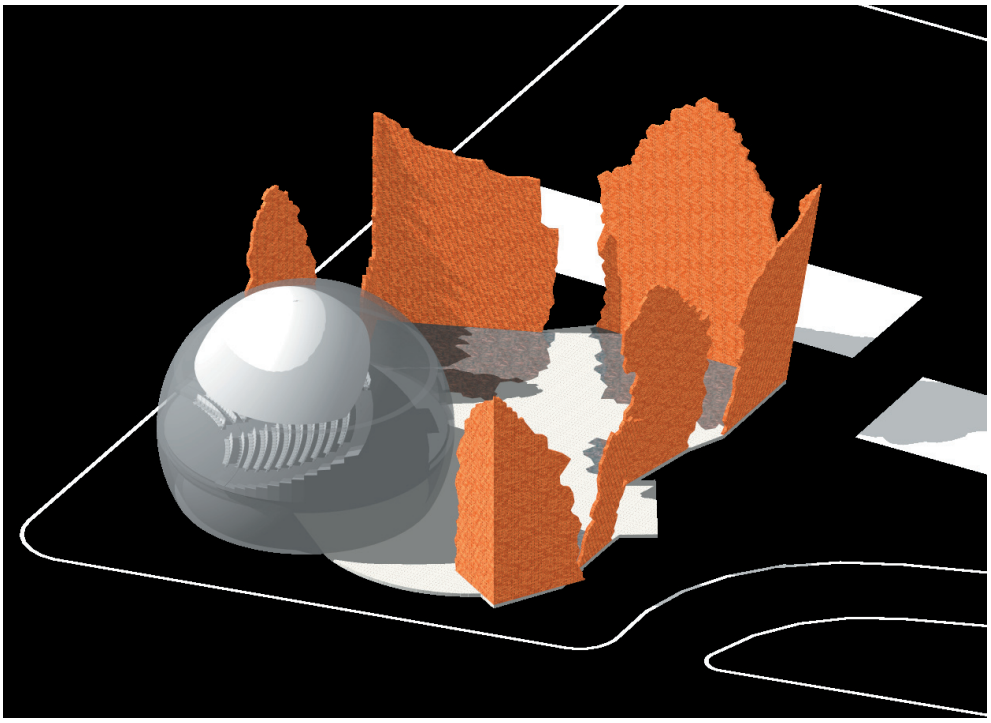
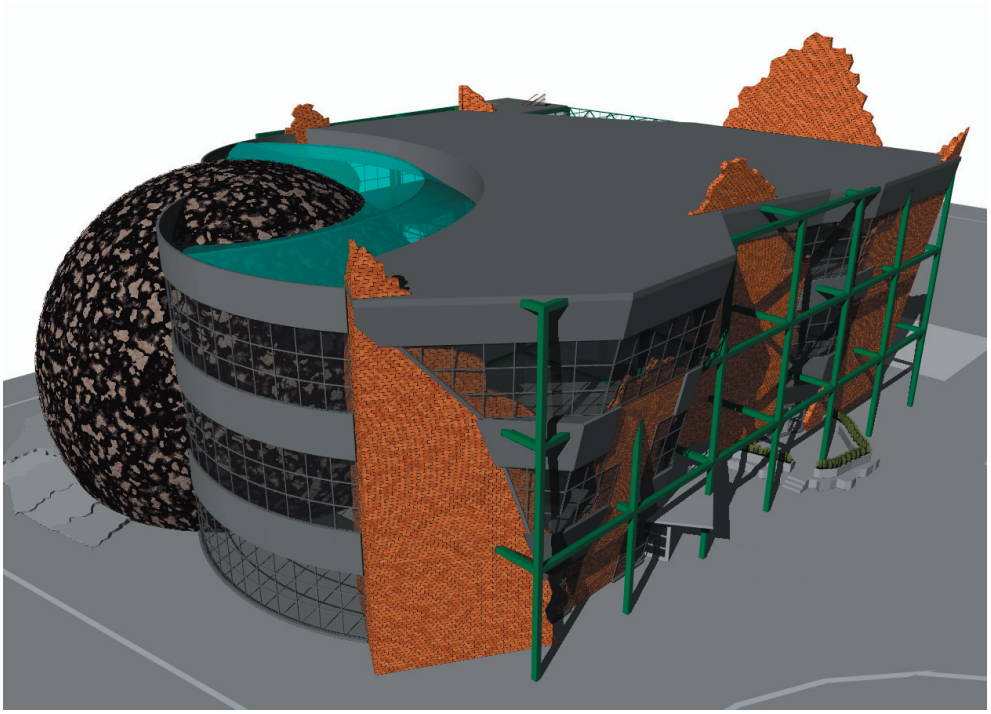




project solution

Project Solution

figure-7.1

project solution

One of the reasons that I decided to do a science museum for my thesis has to do with my past experiences and general fascination with them. As a young adult, I was captivated with the IMAX theater and the interactive displays that demonstrated the wonders of science and nature.

Another reason that I decided to do this project was because I am from West Fargo, and I wanted to give the city of Fargo and the surrounding area a new and exciting Science Museum that will aid in the re-vitalization of downtown Fargo. It will demonstrate that the heart of Fargo's culture exists where it all began. I want the museum to make a statement; that the key to strengthening communities requires new construction to focus inward. The facility will offer education, entertainment, and all the wonder, and excitement that is associated with Science Museums.

I have given my project this title, because there are certain values that have been assigned throughout history to cultural buildings that are dedicated to the arts and sciences. It is these values that I wanted to understand in an effort to assist in the design process. I feel that there are 3 main issues that will make a Science Museum successful. They are:

People
Purpose
Place

People are an important part of Museums. All public places, by nature, are filled with people. An empty museum has a strange and desolate feeling to it. That same museum, filled with people, commotion, and activity makes visitors feel like they are part of the community. If they are visitors to the area, then they feel like they are witnessing the community in action.

The second issue is Purpose. The events and exhibits that the museum displays become the driving force that brings people to the museum. Whether it is marketed through a commercial, a billboard, or a banner on the side of the building, It will be the exhibits that bring people through the doors. If the exhibits are planned effectively then visitors will be able to learn about the history and workings of our planet and its inhabitants. They will leave visitors feeling like their visit was not only fun and exciting, but also had meaning and purpose.

The third issue is Place. By Place I mean that the museum itself needs to relate to its own community. Museums that are remodelled from existing buildings already have this connection with place, because the buildings

themselves have a rich history with the community. This same connection with the site and community is more difficult to achieve with new construction. In some cases this connection with the community evolves over time. What was once strange and new, becomes a symbol that may someday define the city.

The Museum of Science and Industry in Tampa FL experienced instant unmitigated success as an institution, exceeding all projections of attendance and income when it was completed in 1982. It is believed by some that significant architecture played a significant role in its success.

Using this as an example it can be argued that through meaningful architecture, and well planned events and exhibits, the success of this museum will be inevitable.

Site

The Site I've chosen is currently a parking lot in downtown Fargo, on the corner of NP Avenue and 7th Street N. The new NDSU Downtown is just to the Southeast, and the Plains art museum is to the Northwest. I chose this site because it I want to use these two buildings, along with the Science Museum to create a cultural center.

Concept

After looking at some of the following case studies: The Museum of Science and Industry in Tampa, The Geode, which is part of the Cite des Sciences et de l'Industrie in Paris, The Oregon Museum of Science and Industry in Portland, The Potsdamer Platz IMAX Theater in Berlin, the Hayden Planetarium in New York...a common theme was starting to emerge. The theaters in all of these case studies are in the shape of a sphere, which becomes the centerpiece for the building.

With this growing trend in mind, I have been using this spherical shape from the beginning of my design. In some of my first models I wanted the building to portray the movement of the sphere. This would give the Museum a kinetic feeling that would demonstrate movement and energy. From there I did some conceptual sketches and another model to demonstrate the sphere colliding with the building to further portray kinetic energy. In order to make the sphere in one of my models, I unfolded a geodesic sphere in formZ, and used the result which consisted of 320 triangles, which I cut out and folded back into its original form. The unfolded sphere became such a unique shape, I decided then that it should be used as the symbol for the museum.

project solution

Our small group which consisted of Darryl Booker and everyone that had him as a primary or in one case a secondary critic met each week for the first half of the semester. This concept evolved with their help, and then one day with this model, Professor booker cut into it with a scissors, and suggested that the sphere come from the top, and just then we had an epiphany ...why not have the sphere represent a meteor crashing into the building from the sky. This meteor crash becomes very fitting concept for a Science Museum. It can come to represent one of the theories regarding the extinction of the dinosaurs, which might very well be on display in one of the exhibits.

From that point on the impact of the meteor became the driving concept behind my project. And the unfolded sphere became even more fitting as the museum's symbol because of its broken appearance. These sketches here, show some of the earlier ideas of what I thought would happen to a building in the event of a meteor impact. I also went to Home Depot and bought a large sledge Hammer and various bricks, and then I went to my parents in West Fargo and smashed them all to pieces. The idea was to learn what happens to masonry when it is smashed by a large object.

At my midterm review I was still using this idea which shows only 2 of the walls being cracked and leaning. There was something about this that was bothering me...this was my idea of how the building would react. It did not necessarily represent what someone else might imagine, or what actually would happen, and then during the review another epiphany occurred... why not use my brick study as the floor plan. Use the random broken pieces as the original building and then just connect them with a curtain wall construction. This idea made so much more sense to me, and I got really excited about my project, even though it meant redoing everything and practically starting over.

I tried to use materials to differentiate between the original building and the post-impact reconstruction. I used traditional materials like brick and concrete to represent the existing crumbling building, and more modern and transparent materials to represent the construction used to repair the building.

Broken Material

For broken material, the exterior walls are composed of masonry cavity wall construction with rigid insulation in the airspace to increase its R-value. The reason I decided to use this masonry pattern for the walls, was to represent a cross-section through the earth. By doing this I had hoped to achieve a visual connection with the building to the earth and nature. The walls have the same

brick pattern on the inside as they do on the outside. This is done to help portray the same exterior concept on the interior as well. The Walls for the kitchen area of the Planet Cafe and the offices are made of a combination of textured and plain glass to allow the materials and concepts behind them to be easily recognized.

The broken floor that connects to the masonry walls is precast concrete to represent an older, more traditional material.

Rooftop seating and landscaping shown here, occur only where the masonry wall intersects with the roof. Creating a visual relationship with the crumbling masonry walls and the rooftop garden.

Connection Material

For the connection material, the curtain wall construction that joins the masonry walls consists of 4'-0" glass panels that are simply bolted to the exterior of the wall. After several studies of how to make openings in the walls, I felt that the simplest solution was the best. I would like to challenge the traditional way of attempting to put windows and glazing features within the masonry wall. I could not even imagine the complexity that would result from a widow frame attempting to follow the broken edge of the masonry wall.

There is a product currently on the market called PowerGlass. It is made by a company by the name of XSunX. They make glass that has almost the same transparent features of regular glass, and is able to convert energy from the sun into electrical energy.

Another company, Pilkington, currently makes a product called Activ self-cleaning glass. It is a coating applied to glass that uses the sun to break down, loosen and destroy dirt, which is then removed by the rain which comes off in sheets and leaves the glass spot free.

Currently these are two different products, but I would like to incorporate the union of them into the design of the curtainwall construction.

The flooring used tie together the traditional concrete floor pieces is pre-cast translucent concrete. LitraCon currently makes this product, and it has the same strength of traditional concrete, but with the help of embedded glass fibers, it can become somewhat transparent, allowing light to pass through and displaying the outline of figures on the opposite side.

The glass atrium and curtainwalls are used to create a subtle physical connection with the meteor. This encloses the building, but still allows the meteor to appear like a separate object.

project solution

All of the materials used to connect the broken fragments of the impacted building and the meteor are transparent, to some degree.

Structure

The structural grid that supports the entire building becomes a unifying element that brings order to the building. Where long-span joists are used to open up the floor plan, square patches are used in the floor to represent the missing structural member. This happens again on the exterior corner to allow the sidewalk to pass underneath. The grid then becomes continuous throughout the building. It is also continued into the courtyard through the use of paving stones to help visually connect the building to the site. The structural members are painted a bright orange-red to represent the explosion that occurred from the impact of the meteor.

Vertical Transportation

With exhibits on second and third floors as well as the roof, there is a need for moving mass amounts of people vertically. Wide ornamental stairs are a great solution for this. They allow visitors the ability to experience the space as they climb and turn their way to the next level. I decided to challenge the tradition method of putting the egress stairwell into a shaft made up of CMU blocks, and instead, I pulled it away from building and made it completely out of glass. Using this stairway as vertical transportation the visitor achieves orientation by being able to relate to the surrounding buildings as they travel from floor to floor, and right here it gives the visitor a 180° view of the street and surrounding buildings.

The main elevator is positioned within the ornamental U-shaped stairs. This will give visitors in the elevator the same experience as those on the stairs.

IMAX

The second floor encompasses the IMAX theater, but is pulled back to create a distinct separation from it. The entrance to the theater is a single walkway that spans this gap between the second floor and the meteor. This is done to create a linear progression that takes the visitors from the museum, and into the foreign object.

project solution

Sustainability

For sustainability, I decided to take a cutting edge approach. I felt that this would be an appropriate response for a Science Museum, where the building itself begins to not only contain scientific exhibitions, but also incorporates scientific breakthroughs in its material and construction.

The PowerGlass mentioned before will be used to help the support the electrical needs of the building. To offset the heat lost through the glazing, concrete floors are used as a thermal mass to store and release solar heat gain.

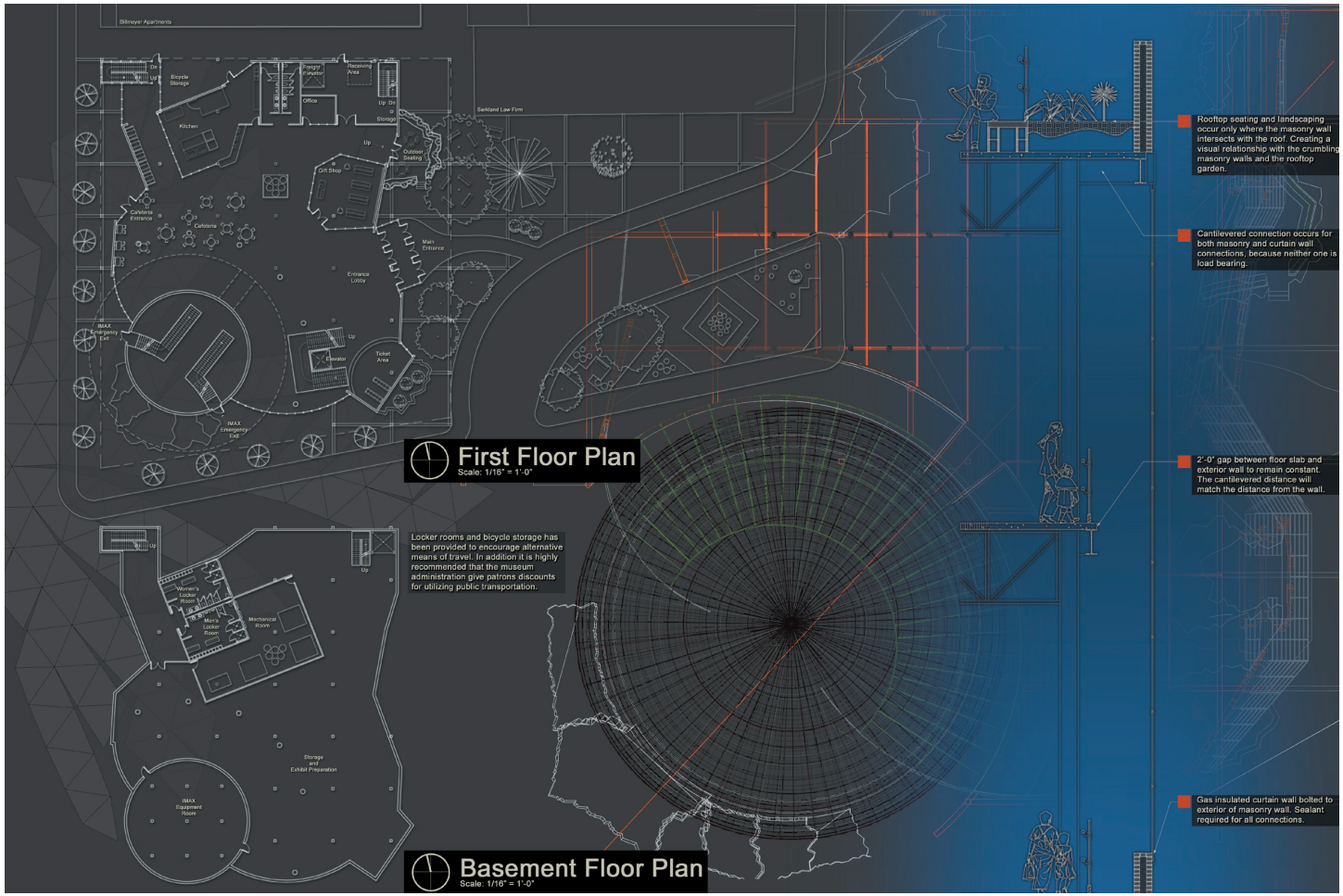
LED lighting will be used throughout the building. LEDs are Light-Emitting-Diodes that last far longer and consume a fraction of the energy of conventional lighting. Sylvania currently makes a can lighting fixture called AquaLED that uses this technology, and it looks similar to this.

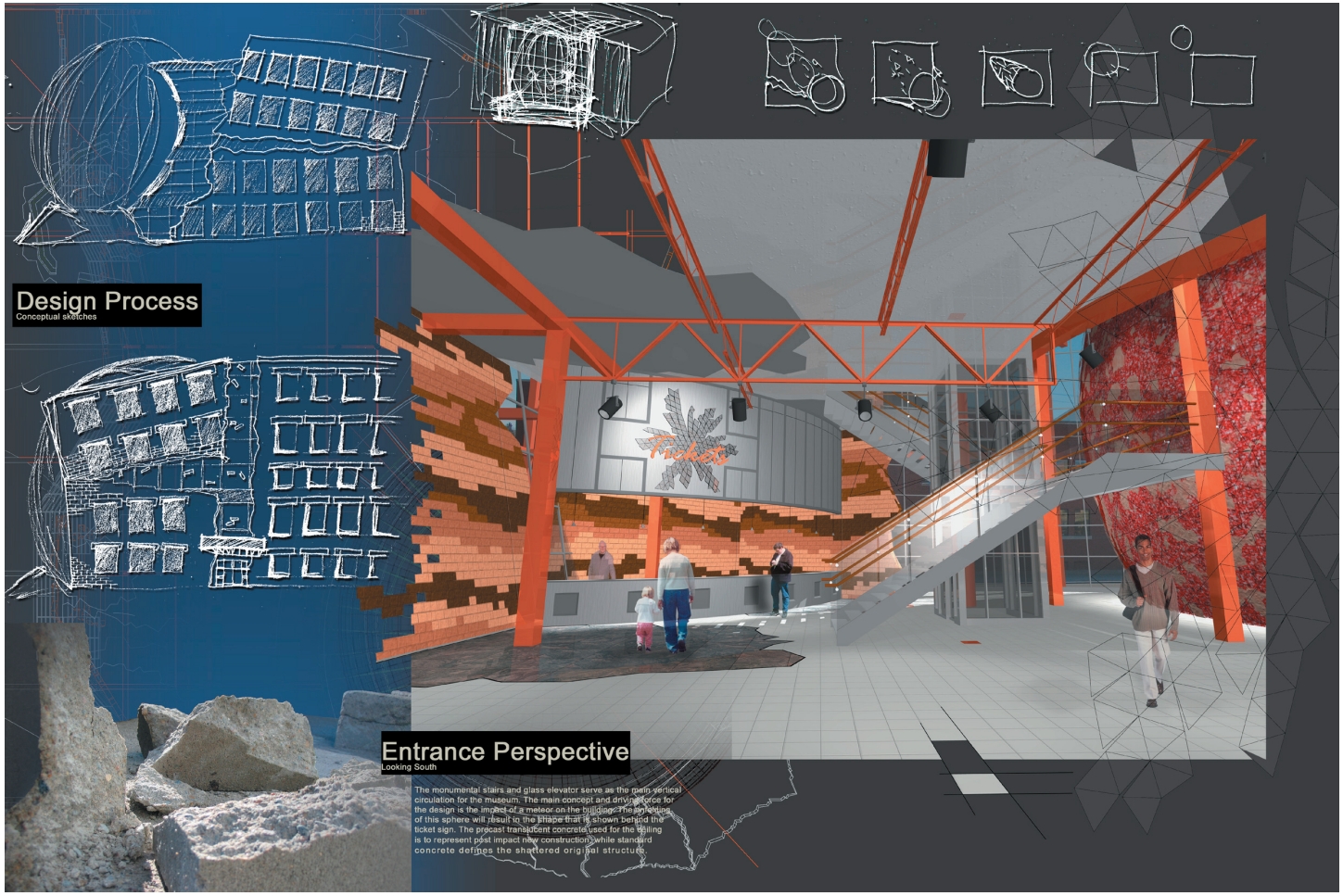
Locker rooms and bicycle storage has been provided to encourage alternative means of travel. In addition it is highly recommended that the museum administration give patrons a discount for utilizing public transportation.

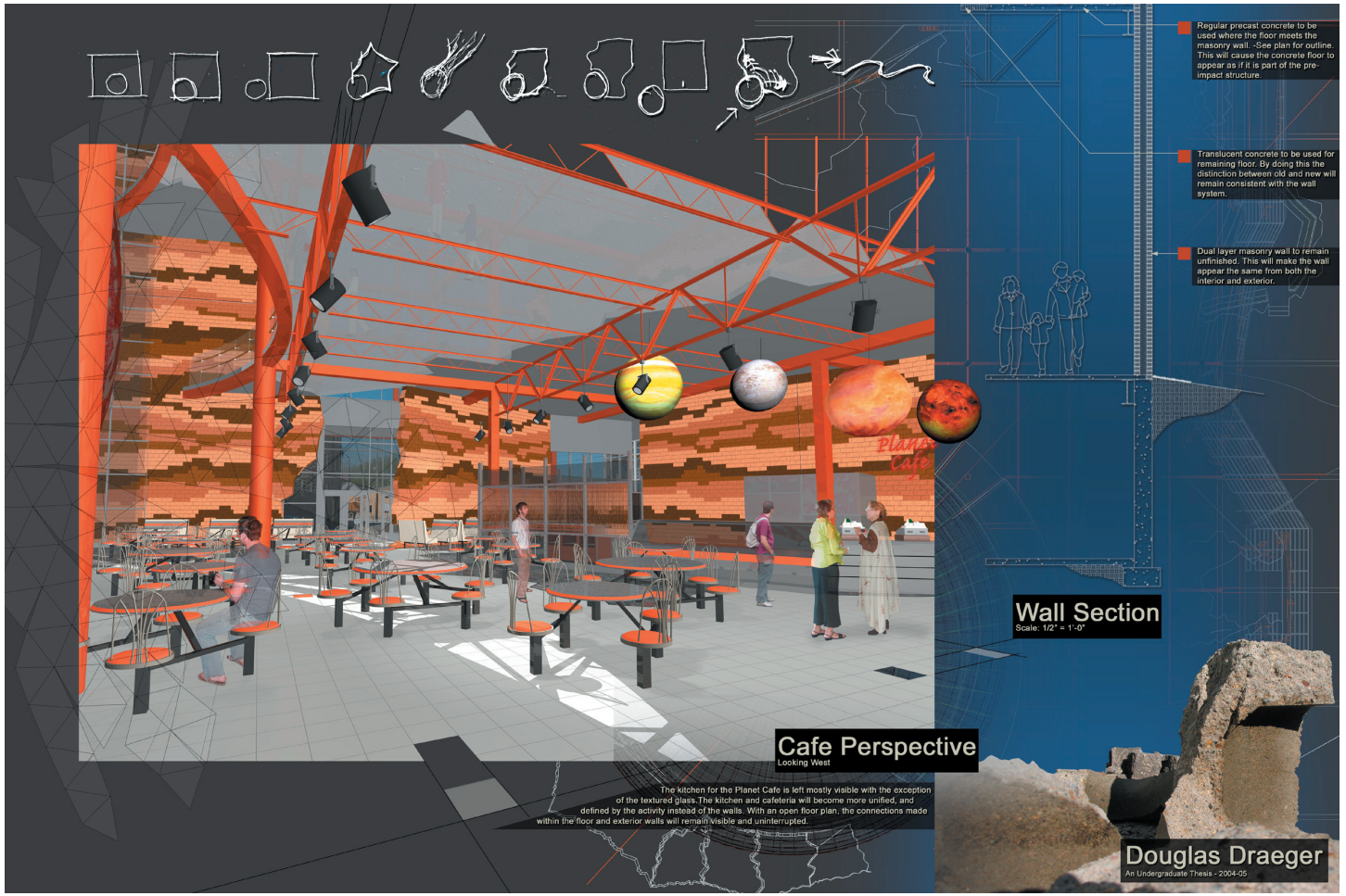
project solution

project solution


Exterior Perspective
Looking East on the corner 7th Street and NP Avenue
The main concept behind the design of the Science Museum is to take the IMAX theater, which is in the shape of a sphere, and use it to represent a meteor crashing into the building. The idea of using a meteor is fitting for a science museum, since a direct connection can be made from the dinosaurs on exhibit and current theories of extinction. The masonry walls represent the existing building, which is why they are crumbling, tilting, and reeling from the impact. The bright orange structure is colored to represent the intense explosion caused by the collision. To provide consistency, the structure and masonry are exposed on the outside as well as on the inside. It is the organizing structural grid that holds this building together since the walls are no longer capable of providing structural support. This grid is continued in the ground plane through the use of pavers in the plaza. The glazing consists of a Power Glass curtain wall system that reconnects the broken masonry walls, as well as convert energy from the sun into electricity. The glazing system is also responsible for connecting the building with the meteor through the use of the curtain wall system and skylights above the center atrium. The layered brick pattern that makes up the walls is used to suggest a strong connection between the building and the earth by illustrating similar qualities.
Exterior Perspective
Looking West from the roof of NDSU Downtown

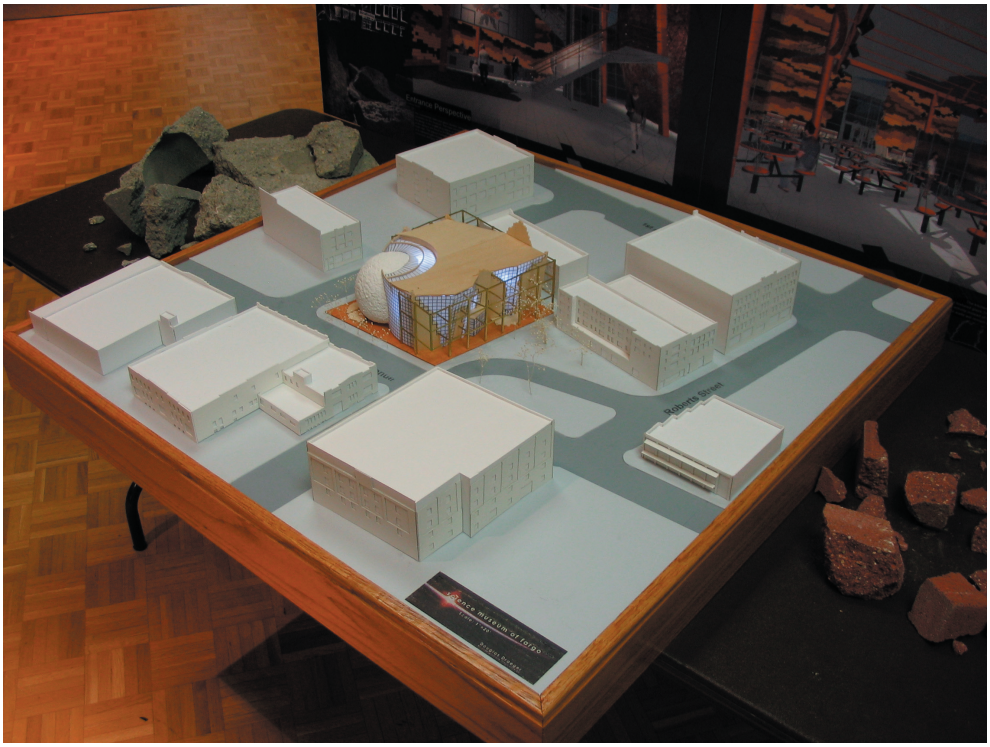

Billmeyer Apartments
Bicycle Storage
Freight Elevator
Receiving Area
Office
Storage
Kitchen
Sentand Law Firm
Outdoor Seating
Gift Shop
Cafeteria Entrance
Cafeteria
Main Entrance
Entrance Lobby
IMAX Emergency Exit
Elevator
Ticket Area
IMAX Emergency Exit
First Floor Plan
Scale: 1/16" = 1'-0"
Locker rooms and bicycle storage has been provided to encourage alternative means of travel. In addition it is highly recommended that the museum administration give patrons discounts for utilizing public transportation.
Women's Locker Room
Men's Locker Room
Mechanical Room
Storage and Exhibit Preparation
IMAX Equipment Room
Basement Floor Plan
Scale: 1/16" = 1'-0"
Rooftop seating and landscaping occur only where the masonry wall intersects with the roof. Creating a visual relationship with the crumbling masonry walls and the rooftop garden.
Cantilevered connection occurs for both masonry and curtain wall connections, because neither one is load bearing.
2'-0" gap between floor slab and exterior wall to remain constant. The cantilevered distance will match the distance from the wall.
Gas insulated curtain wall bolted to exterior of masonry wall. Sealant required for all connections.


Design Process
Conceptual sketches
Tickets
Entrance Perspective
Looking South
The monumental stairs and glass elevator serve as the main vertical circulation for the museum. The main concept and driving force for the design is the impact of a meteor on the building. The penetration of this sphere will result in the shape that is shown behind the ticket sign. The precast translucent concrete used for the ceiling is to represent post impact new construction while standard concrete defines the shattered original structure.


Regular precast concrete to be used where the floor meets the masonry wall. -See plan for outline. This will cause the concrete floor to appear as if it is part of the pre-impact structure.
Translucent concrete to be used for remaining floor. By doing this the distinction between old and new will remain consistent with the wall system.
Dual layer masonry wall to remain unfinished. This will make the wall appear the same from both the interior and exterior.
Wall Section
Scale: 1/2" = 1'-0"
Cafe Perspective
Looking West
The kitchen for the Planet Cafe is left mostly visible with the exception of the textured glass.The kitchen and cafeteria will become more unified, and defined by the activity instead of the walls. With an open floor plan, the connections made within the floor and exterior walls will remain visible and uninterrupted.
Douglas Draeger
An Undergraduate Thesis - 2004-05

project solution

project solution



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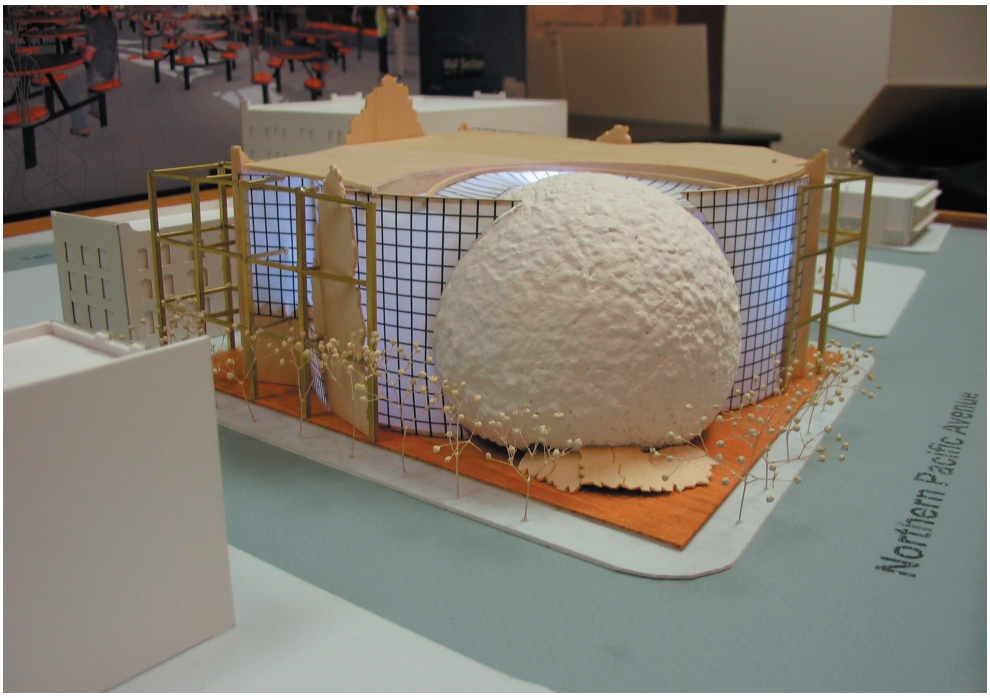

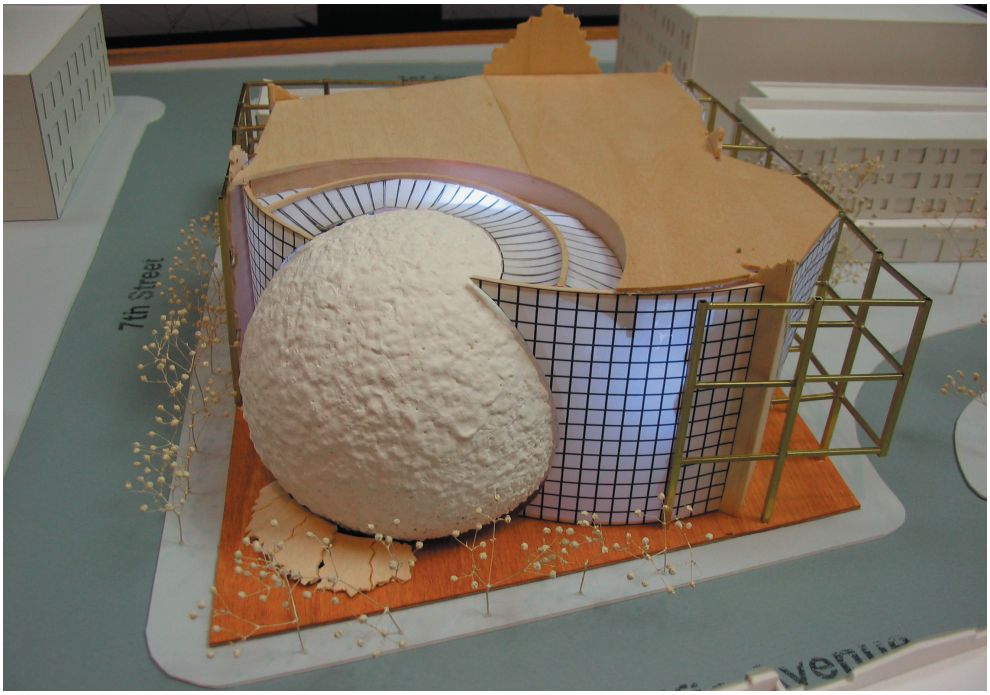

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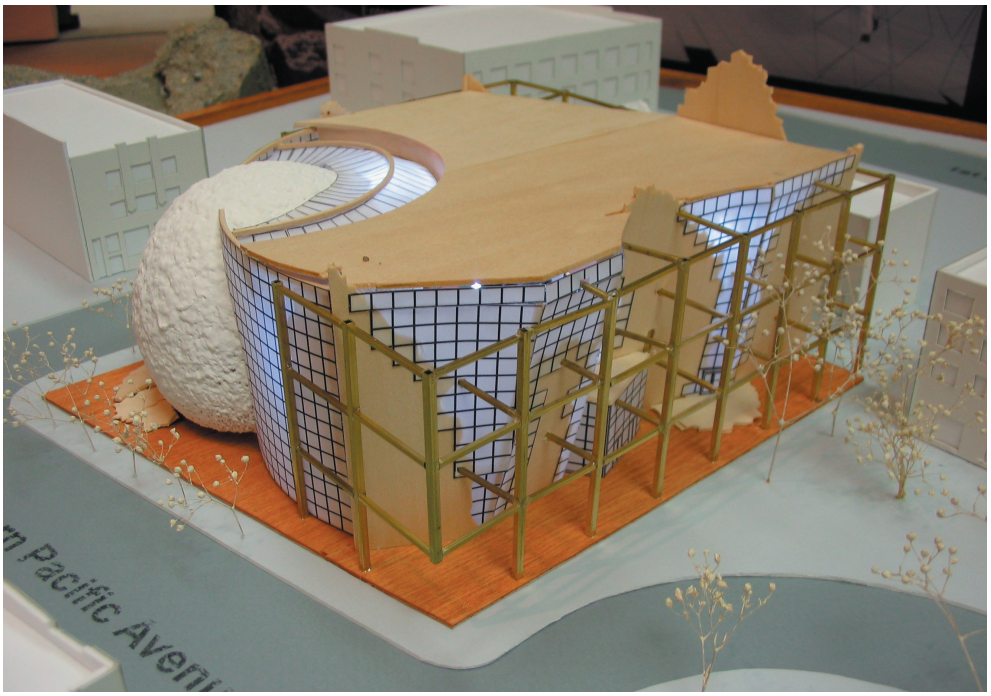

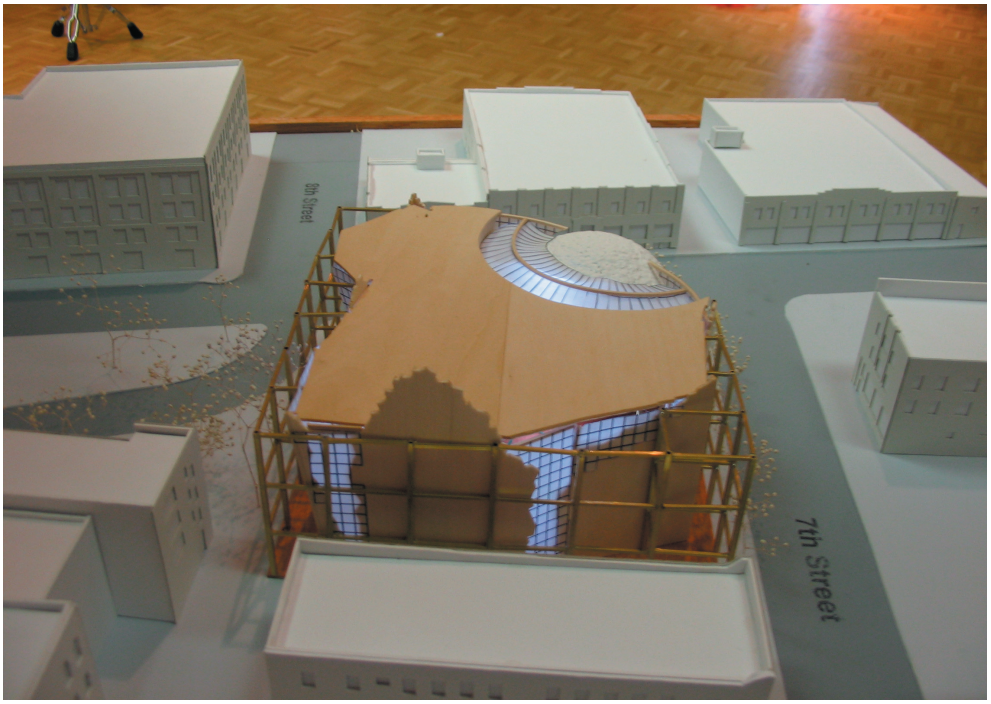

references

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figure-8.1

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figure-9.1

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STATEMENT OF INTENT

The city of Fargo is known as a fine place to raise a family. Couples are choosing to settle in Fargo because of the low crime rate, low unemployment rate, and free flowing expressways. Since the oil embargo of 1973-74, the demographics of Fargo began to change. It is growing in an outward direction, creating the groundwork for traffic congestion and suburban sprawl. Through the Renaissance Zone and Storefront Rehab programs the city is revitalizing the downtown area in order to mitigate the effects of suburban sprawl, and embrace the historical culture of the city.

A Science Museum with research facilities located in a new building near the Plains Art Museum and North Dakota State University's downtown campus will create a cultural center for the people of Fargo and its visitors. The location will assist in revitalizing the downtown area and create a community center to draw the people back into the heart of the city. This will increase commerce for the unique businesses that make up downtown Broadway. The museum will be able to work with the university to educate visitors on the latest scientific and technological breakthroughs through the use of field trips, exhibits, and movies. Development of the museum will be a joint venture between the city and the University. The scale of the project will be determined by case studies, and other research. Additionally it will be able to accommodate the future of Fargo's growing population through the use of master planning and expansion studies.

Public buildings that entertain and educate the public have existed as long as civilization. The project will explore the reason why cultures have felt the need to have these buildings, and what major sociological purpose they serve for cities. The knowledge of why the earliest societies developed these types of buildings will have a profound influence on the design and location of a Science Museum for the city of Fargo, North Dakota. The underlying premise of the design is that historical cultural building types and their social value can inform current design solutions for similar projects in the present. By this it is meant that historical typologies can instill certain cultural values that move forward in time as architecture advances.

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PROPOSAL

A. Building Typology:

My thesis project is the construction of a Science Museum for the city of Fargo, North Dakota. The museum will have different areas dedicated to permanent displays as well as changing exhibits. There will also be a café to offer snacks and refreshments to visitors. Additionally the museum will have research facilities to work in conjunction with North Dakota State University.

B. Theoretical Basis or Unifying Idea:

Throughout the history of civilization, societies have had cultural buildings that serve for the benefit of its members. These buildings offer education and entertainment for the benefit of the general public. Societies have placed certain values and expectations on these structures. It is this social value that is placed on buildings dedicated to the arts and sciences that will be the focus of the research.
The city Fargo has initiated the Renaissance Zone and Storefront Rehab programs in order to revitalize the downtown area. A new state of the art Science Museum in the heart of downtown will help in this revitalization effort. It will draw families and people of all ages to the historical center of the city. Scientific research facilities incorporated into the museum will assist in the expansion of North Dakota Sate University Downtown. These research facilities will offer additional resources to the Paleontology, Anthropology, and Geology departments. State and federal grants offered for research in these fields will support in the construction, maintenance and operational costs of the museum.

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PROPOSAL

D. User/ Client Description

The users of the Science Museum will be the visitors and Staff. The visitors' age will have a wide range from preschool to college, as well as families and the elderly. These visitors will not only include the residents of Fargo, but will extend to the surrounding areas and tourists. Users of the research facilities will be the professors, researchers, and students from North Dakota and abroad. The staff of the museum will include: administration, guides, retail employees, operational personnel, and custodians.

The clients for the Science Museum of Fargo will be the City of Fargo, and North Dakota State University.

E. Major Project Elements

- Lobby
- Reception area
- Restaurant / Café
- Gift shop
- Exhibit spaces
- IMAX Theater
- Research Labs
- Office Space
- Administration
- Classrooms
- Rest rooms
- Mechanical
- Janitorial
- Parking

PROPOSAL

F. Site Information

The Science Museum of Fargo will be located in the downtown area of Fargo, North Dakota. The site lies on the northeast corner of Northern Pacific Avenue and Seventh Street North. The Plains Art Museum is located to the northwest on Seventh Street North. North Dakota State University Downtown, home to the Art, Architecture, and Landscape Architecture Departments, is located to the southeast on Northern Pacific Avenue.

The site is approximately half an acre (22,000 square feet), which is currently being used as a parking lot. The land has an appraised value of $168,000. There are 40 people and 28 housing units on the block that the site is on. (U.S. Census Bureau)

The site will be accessed from two directions, Northern Pacific Avenue, which is a one-way traveling east, and Seventh Street North. However, access to the site from seventh is directly related to First Avenue North which is a one-way traveling west.

A row of small deciduous trees marches along the west end of the site. There is also a small patch of grass with deciduous tress, and Ole Tangen Park, also known as Triangle Park, to the east.

Direct sunlight can be optimized due to the distance between the site and surrounding buildings on both the south and east sides.

The site was chosen because of the following reasons:

- The current parking lot can be relocated as underground parking, or to a parking ramp constructed nearby.
- The new NDSU Downtown facility is diagonal from the site. By integrating scientific research facilities into the museum, NDSU will have an opportunity to expand the downtown campus.
- The Plains Art Museum is also diagonal from the site. Even though these two museums are at opposite ends of the spectrum, by locating the Science Museum close by, a cultural center will be created for the historic area of Fargo.

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PROPOSAL

G. Project Emphasis

The project will focus on:

- Using historical social values to inform the building's design solution and functions. By discovering the social values that cultural buildings provide for the public, the building itself can respond to these values and more effectively serve public.
- Providing the city of Fargo with a technologically advanced Science Museum that will create an icon for the downtown area. A Science Museum should employ the latest technological breakthroughs of the time.
- Using sustainable design practices. By using these practices the Science Museum will be energy efficient and environmentally friendly.

H. Plan for Proceeding

1. Design Methodology

The architectural form and space relationships will be derived through the research of the social values placed on cultural buildings of previous societies.

The Science Museum is located next to the historic district of Fargo, and therefore, must be responsive to style of the buildings nearby. At the same time, this building type allows for the design of a modern, state of the art building that can serve as an icon for Fargo.

2. Documentation of the Design Process

A Journal of sketches and conceptual ideas will be kept throughout the thesis process. All drawings from schematic design, design development, and presentational drawings will be saved. A selection of these drawings will be later added to the final thesis program to illustrate the design process.

PROPOSAL

3. Schedule

Fall Semester 2004

Week 1 [October 4 - October 8]
October 7 – Thesis Proposal due
October 7 – Program cover sheet due
Research

Week 2 [October 11 – October 15]
October 14 – Return critic preference slip
Literature search

Week 3 [October 18 – October 22]
October 21 – Primary and Secondary Critics Announced
Document case studies
Literature search

Week 4 [October 25 – October 29]
Define major project elements
Literature search

Week 5 [November 1 – November 5]
Periodical search
Collect site information

Week 6 [November 8 – November 12]
Periodical search
Organize Site information
Work on draft thesis program

Week 7 [November 15 – November 19]
Final week of Arch 571 Design Studio
Work on draft thesis program

Week 8 [November 22 – November 26]

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PROPOSAL

November 24 – Draft Thesis Program due to Primary Critic
Review program with primary critic

Week 9 [November 29 – December 3]
Work on final program draft

Week 10 [December 6 – December 10]
December 9 – Final thesis Program due to Primary Critic
Work on final program draft
Week 11 [December 13 – December 17]
Final examinations

Week 12 [December 20 – December 24]
Research

Week 13 [December 27 – December 31]
Research

Week 14 [January 3 – January 7]
Research

Spring Semester 2005

Week 15 [January 10 – January 14]
January 11 – Classes begin
Site analysis and model
Schematic design
Start weekly reviews

Week 16 [January 17 – January 21]
January 17 – Martin Luther King, Jr. Holiday
Schematic design

Week 17 [January 24 – January 28]
Schematic design

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PROPOSAL

Week 18 [January 31 – February 4]
Schematic design

Week 19 [February 7 – February 11]
Schematic design

Week 20 [February 14 – February 18]
Start design development

Week 21 [February 21 – February 25]
February 21 – President's Day Holiday
Design development

Week 22 [February 18 – March 4]
Design development
Week 23 [March 7 – March 11]
March 7 – March 11 – Mid-semester Thesis Reviews
Design development

Week 24 [March 14 – March 18]
March 14 – March 18 – Spring Break
Design development

Week 25 [March 21 – March 25]
Presentation Drawings

Week 26 [March 28 – April 1]
Presentation Drawings

Week 27 [April 4 – April 8]
Presentation Drawings

Week 28 [April 11 – April 15]
Presentation Drawings

Week 29 [April 18 – April 22]

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Presentation Drawings

Week 27 [April 25 – April 29]
April 25 – Thesis Projects due at 4:30 PM in the Memorial Union Ballroom
April 26 – April 27 – Annual thesis exhibit in the Memorial Union Ballroom
April 29 – Draft of thesis document due to Primary Critic

Week 28 [May 2 – May 6]
May 6 – Last day of classes
Review Thesis Documents with Primary Critic

Week 289 [May 9 – May 13]
Final Examinations
May 12 – Final Thesis Document due at 4:30 PM in the department office

4. Previous Studio Experience

Fall 2001
- Skull of Lucy
- Mountain Retreat
- Copenhagen School of Architecture

Spring 2002
- Downtown Fargo Pocket Vest Park
- Prairie Green – Passive Solar Home Design
- CBA – NDSU Business College
- Montréal Footbridge – School-wide Competition

Fall 2002
- Aging in Place - assisted living residential units
- NDSU Arboretum and ecological enrichment center

Spring 2003
- 2nd Presbyterian Church of Fargo – Masonry Competition
- Children's Center for the Arts

Fall 2003
- Urban Design – Fargo, ND

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Spring 2004

- Medium Density Housing – Marvin Windows Competition
- Bioclimatic Skyscraper – San Francisco, CA – Flad Competition
- Design-Build Kite Project

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I would like to give credit to Professor Darryl Booker and our group of students that met with him every week during the first half of spring semester. Without their input and collaboration, this thesis project would not have been as successful. I would also like to thank my family and fiance for all of their support throughout this process.