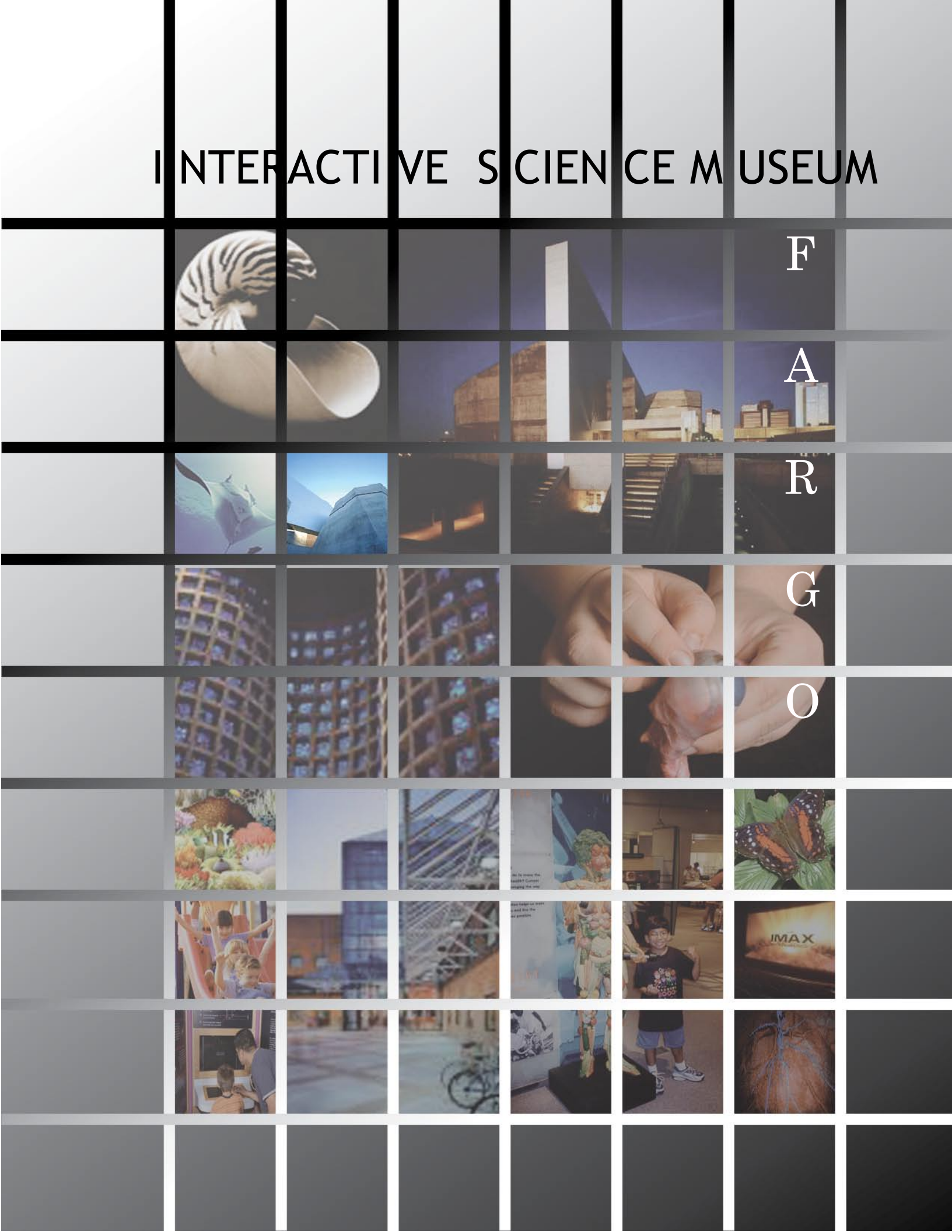
# INTERACTIVE SCIENCE MUSEUM



# FARGO'S INTERACTIVE SCIENCE MUSEUM

A Design Thesis Submitted to the
Department of Architecture and Landscape Architecture of
North Dakota State University

By

Justin Hayes

In Partial Fulfillment of the Requirements
for the Degree of
Bachelor of Architecture

_____
Primary Thesis Critic: Cindy Urness

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Thesis Committee Chair: Don Faulkner

May 2006
Fargo, North Dakota

# Thesis:

# Interactive Science Museum

## Thesis Abstract

The project is an interactive Museum of Science in Fargo/Moorhead. This thesis will examine the question; what general level of scientific literacy is required for life today?

## Statement of Intent

**Project Typology:**

An Interactive Museum of Science that will show how science can be reflected in architecture. This institution would be molded from the exhibits that will be displayed.

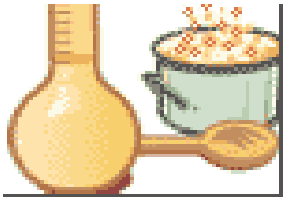
**Theoretical Premise:**

This thesis will examine the question; what general level of scientific literacy is required for life today? Design metaphors, analogies and or tectonics will be developed from the examination.

**Project Justification:**

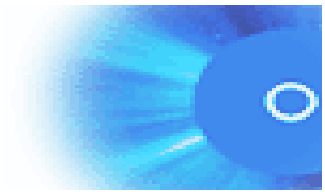
Fargo/Moorhead requires an interactive museum of science to advance the public understanding of the importance, pace and kind of scientific inquiry going on now in the world. We need a place where young and mature minds can gain knowledge of advancing science, and human perception so that we are not left behind.

# PROPOSAL:
# FARGO'S MUSEUM OF SCIENCE



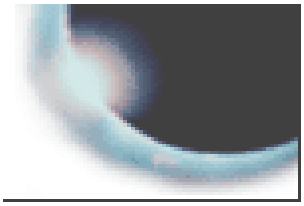
NARRATIVE<><><><><><><><><><><><><><><><><><><><><>

The type of project that I'm proposing is a museum beyond what already exist in the FM area. Such museums in the area include, Plains Art Museum, Heritage Hjemkomst Interpretive Center, Children's Museum at Yunker Farm, and the Fargo Air Museum. A Interactive Science Museum, would be where kids and adults can come and learn what science is about and be a part of the experience. This would be a place where kids come and interact with science differently than only reading extensive mind-numbing school textbooks. The project would feature exhibits and activities beyond what is offered in the area, and create a useful and exciting learning environment.



The museum would be a place that would bring the community and surrounding area together on a level unfamiliar with this area. The interactive science museum would benefit the area with knowledge, tourism, and a sense of prestige that is brought from a project of this type and scale.

My purpose is to design a building that will enhance the Red River Valley. What is needed in the valley is a building in which young and mature minds can interact with science on a hands-on basis, with exhibits in the areas of science, human perception and nature and technology. This project would provide access to, and information about, science, nature, and technology. My goal is to create a place where users can engage in science. The museum will be a hands-on interactive so that children and adults alike will be able to see, hear, and touch science in a way that is not familiar to the Red River Valley area. The integrated activity of science will be revealed through architectural design. The project should reflect technology, of the future. An institution like this will help bring an increased level of knowledge about the changing world, to the Fargo/ Moorhead area.




USER<><><><><><><><><><><><><><><><><><><><>

The project will be design for the use of children ranging from preschool, to young adults, to senior citizens. The project will be owned by investors, but the building will be a public use facility. School children, college students and young and old adults will be visiting the facility on a daily basis. There will be a peak usage of 100 people on a week day, or 300 people per day on a weekend. There will be 75 staff members in total. Parking requirement will include space for buses, and cars. Physical restrictions will be considered and inclusiveness will be addressed.

MAJOR PROJECT ELEMENTS<><><><><><><><><><>

The major project elements of the project would include a restaurant that would be a grill and bar type of environment. Also with in the facility would be an auditorium, several exhibit halls, gallery, gift shop, outdoor garden spaces including water features, and offices. Theater-Imax, classrooms, conference rooms, aquarium, and service area would also be located within the scope of the project.

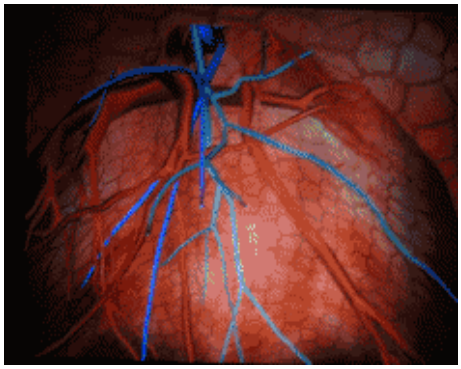
SITE INFO<><><><><><><><><><><><><><><><><><><>

The site is to be located in the Northern Midwest region of North Dakota, specifically the Red River Valley, Fargo located off of 42nd street and south side of I-94.

This site is of interest, because it is located next to an Interstate highway so people passing through will be able to see the project. Not only is it next to the highway, it will be located right next to one of Fargo's main arteries that connects the city, so many people will pass by it. Another reason I chose this site was because, by using this location, people will have to drive through some of the city in order to get the Museum, which would help promote tourism. The area has a number of cultural activities and recreational activities such as the Red River Zoo, Ice Rink, and Baseball Diamonds, that are located adjacent to the site.

Site inventory:

The site is mostly flat, and historically has been farmland. There is an existing shelter belt on the east side of the site. Because there are no sun restrictions, the site receives full sun through out the day.



PROJECT EMPHASIS<>

The major emphasis will be examining the issue of scientific literacy needed for future progressoin of what knowledge about science and the surrounding environment will be researched, and will define what will be required in the region for everyday life. The major interest of intent will be to provide exhibits for users.
Experiencing science, nature, and technology first hand is the outcome.

PLAN FOR PROCEEDING<>

The Research and analysis will be a mixed method, quantitative, qualitative approach. My strategy will be guided by the theoretical premise. Using both qualitative research and quantitative research will be gathered concurrently. Information that will be gathered will be from direct observation, local surveying. The use of direct interview(s) and archival searching will also be done for gathering information

DESIGN METHODOLOGY<>

The design methodology would consist of graphic analysis that would help show the interaction of the different functions of the project to help seek out the best organization. The use of a Interaction Matrix and the Venn diagram would help illustrate the interaction and layout of the building.

## DOCUMENTATION OF THE DESIGN PROCESS◇◇◇

Documentation of this project will involve digital means, photography, modeling, and site photos. Also used will be scanned images from sketch books and other sources.

Schedule of work:

Fall Semester:

27th Oct - Final Proposal due
1st Nov. - Research
11th Nov - Veterans Holiday
18th Nov - Final week of AR 571 Design Studio
23rd Nov. - Rough Draft Thesis Program due to primary
24th -25th Nov - Thanksgiving Break
1st Dec. - Research
8th Dec. - Final Thesis Progam due to pri mary
9th Dec. - Last day of classes site analysis finished
15th Dec. - Program grade due to AR 561 instructor
12th -16th Dec. - Final Examinations

Spring Semester:

10 Jan. - Classes begin, begin schematic development
16 Jan. - Martin Luther King Jr. Holiday
20 Feb. - President's Holiday, Major organi zational layout
6th-10th Mar. - Mid Semester Review, Major wall assembly and structure design
13th-17th Mar. - Spring Break
14th-17th Mar. - Easter Holiday
24th Apr. - Thesis Projects Due at 4:30 on the 5th floor DWTN
25th-26th Apr. - Annual Thesis Exhibits on the 5th flr DWTN
27th Apr. - 4th May - Final Thesis Review
28th Apr. - Draft of Thesis document Due to Primary Critics
5th May - Last Day of classes
8th-12- May - Final Examinations
11th May - Final Thesis Document due at 4:30 in Dept. Office
12th May - Commencement at 5:00 pm

**Previous Studio Experience**

**2nd year**

Fall: Dream Home Project – Bakr Aly Ahmed
Spring: Club house for the Hiawathian Skull Society, Chicago High rise – Ramsey

**3rd year**

Fall: School Project, Bus Stop – McDonald
Spring: Dance Studio, Masonry Research Facility – Martens

**4th year**

Fall: Urban Design Project Minneapolis – Ken nedy
Spring: San Francisco High-rise Project, Marvin Win dows Competition - Kratky

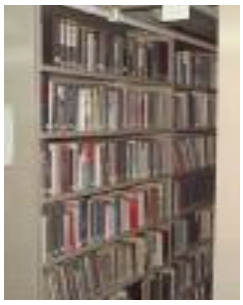
**5th year**

Fall: City Hall on Broadway – Martens
Spring: Thesis

REFERENCE LIST<>


http://scitech.mus.il.us 9/24/2005

Journal of Research in Science Teaching "Technological Novelty and Open Endedness: Two Characteristics of Interactive Exhibits That Contribute to the Holding of Visitor Attention in a Science Museum" Cody Sandifer dept of Physic, Astronomy, and Geoscience, Towson University, 8000 York Road Towson, Maryland 21252-0001 2003 Wiley Periodicals, Inc. Vol 40. No2 PP. 121 -137 2003


American Association For The Advancement of Science "Putting Science in the Hands of the Public" Goery DeLacote 26th June 1998 Science Vol 280 www.sciencemag.org

Science Centers: A Potential for Learning
"Science Centers are educational institutions designed around informal learning activities.
Lee Kimche Science, Vol. 199 20 Jan. 1978 pp270 -273

The National Science and Technology Museum of Taiawan Jui-Chen Yu 1999 by the Society for the History of Technology Technology and Culture 40.1 1999 107-113



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http://www.exploratorium.edu/ © Exploratorium | The museum of science, art and human perception
at the Palace of Fine Arts, 3601 Lyon Street, San Francisco, CA 94123 10/18/2005

http://www.miamisci.org/ ©2005 Miami Museum of Science & Planetarium10/18/2005

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# Table of Contents:

# Summary of Theoretical Premise research

When looking at research based on the scientific literacy needed in todays' world, there is a lot of information that can be reviewed. The information that was looked at in this document pertains to the social science, architectural theory, to even the economics of a museum.

Interactive museums, play an important role in the informal learning process. When looking at this typology of a museum, it is important to remember that the learning that happens here is informal and usually lets the user learn on their own. Science center can become allies in the education reform movement as they help bring together different forms of learning.

The research found here shows that museums have a large affect on the individual user and the way we view and experience a museum. The behavioral senses that are affected when entering an interactive museum are quite different than that of a traditional museum. In research conducted, there has been evidence that three-dimensional, concrete objects have a greater holding power than just abstract (words and pictures) exhibits.

The notable thing different about the learning process in a museum is the conditions and the settings that the learning takes place. In the interactive museum setting, the user is inclined to learn on their own, and discover and interact with exhibits on their own objective.

The economics of a museum are also important to know and understand. Museums do not generally generate a huge amount of revenue, so money must come from different locations. With grants available and public support, museums would have a better chance of survival and prosper. Museums must also set up networks within themselves to keep them connected to neighbor museums.

There are a lot of issues to understand and recognize with an interactive museum. With such important issue such as the types of exhibits to be displayed, to the economics of a museum, each has there own impact on the development of a museum. All these issues were researched and carefully reviewed for the theoretical premise research.

## Research Conducted For Theoretical Premise:

## Putting Science in the Hand of the Public

Goery Delacote comments on how he explains and describes how and why the informal science education movement had become such a notable success. Goery Delacot, holds a Ph.D. in physics from the Ecole Normasle Superiure in Paris, he is also the executive director of the Exploratorium in San Francisco. In this article Mr. Delacote uses his own center as an example that supports the informal science education movement.

A learner-centric approach is one of the key working principles used at the Exploratorium. Scientists, exhibit designers, and teachers (called Explainers) develop a "learner centric perspective as they try to communicate and teach about the world. Frank Oppenhiemer, a physicist, and founder of the Exploratorium in 1969, developed a program called The Explainer, from his early days in Paris. Oppenhiemer used an unorthodox approach to his program, in that he invited younger and therefore less educated students (high school and early college rather than graduates). In addition to his methods, he insisted that individual exhibits be centered on the learner and therefore designed to facilitate individual exploration. This would happen in the exhibits that had the more explanatory and more educational approach.

Evidence for has been provided by comments made by The Explainers, David, Xander, Gabe:

> On the proposal that, active experiences with real objects or phe nomena stimulate further exploration, in the example made by the explainer, "the expansion of metal as it heats up. To actually feel the metal rod expand, you know everyone knows it expand, but know body has been able to observe it, just the fact of observing it makes it more interesting." (David)
>
> On the question that it is not the answer that enlightens but the question: "An exhibit here has a disk that is half black and the other half had broken black lines on a white background, when the disk spins, it trick the photoreceptors in the eye, and the brain processes an illusion of color. This got me to wondering about the brains entire sys tem of storing information." (Xander)
>
> On the realization that in working on the floor, the Explainers learn as much from interacting with people as from interacting with the exhibits themselves:
>
> "I learned to tolerate a lot of my own mistakes. On the floor, you fall on your face a lot in front of a lot who know better. Once at an eye dissection, I got into a conversation with an ophthalmology student. I'd be explaining things, but all of a sudden I was learning new stuff by talking to this guy." (Gabe)

Science centers can become strategic allies in the science education reform movement, as they help teachers integrate formal and non-formal ways of learning about science in the curricula.

DeLacote, Goery. (1998, June 26th). Putting Science in the Hands of the Public. American Association for the Advancement of Science. Science, Vol. 280 www.sciencemag.org

## The National Science and Technology Museum of Taiwan

The importance of a science building is explained in the journal Technology and Culture in the article, "The National Science and Technology Museum of Taiwan". The author explains the how the popularity has increased in the field of science and the different types of museum, but relates all this information to how and why Taiwan needs a science museum.

Two factors account for the increasing popularity of contemporary science museum: first rapid development of science and technology, and the increasing complexity of technological innovations; second, an increase in the number of people seeking learning opportunities outside of school.

Science museums bring together people seeking more knowledge. They, as informal learning places with rich collections, interactive exhibits, and interesting activities, begin to play an important role in promoting technological literacy for all citizens. Although people are becoming aware of the need for technological literacy, schools have not always been effective in applying formal education, sometimes lacking the facilities needed to teach science and technology.

A museum is a communication tool conveying information in many different ways. A museum offers entertainment, while communicating information, and building interest among the public. It also offers stimulating graphics and text for the user. The building provides a space for the display of instruments and material used in science and technology. It gives people a chance to experience hands-on technology firsthand.

Science and Technology museums have rich educational resources for the public and schools alike. Museums give great attention to the detail of the displays. Putting in as much as information as possible. Related activities such as lectures, demonstrations, participatory events, performances, audiovisual material, and they like to attract crowd of people are a part of the experience. Displays are colorful, attractive, and can provide brochures and, guidebooks, and other academic or general publications.

A museum is an educational center that can enhance formal education. They can inspire motivation and interest in subject matter, not normally encountered. It can bring new kinds of entertainment and education into the lives of individuals.

Jui-Chen, Yu. (1999) "The National Science and Technology Museum of Taiwan". Technology and Culture Vol. 40 107-109

## "Technological Novelty and Open Endedness: Two Characteristics of Interactive Exhibits That Contribute to the Holding of Visitor Attention in a Science Museum"

In the research article "Technological Novelty and Open Endedness: Two Characteristics of Interactive Exhibits That Contribute to the Holding of Visitor Attention in a Science Museum" by Cody Sandifer, shows some really good evidence that support interactive exhibits. In his study, he conducted research looking at the factors that affect visitor behavior in a museum could be placed into three broad categories: visitor factors, setting or environmental factors, and exhibits factors.

In his paper he has evidence that says that interactive exhibits attract and hold visitor attention for longer periods of time than traditional exhibits. But in his study, Sandifer looks at certain factors that keep visitors at a particular exhibit longer, and fine tunes our understanding of the type of exhibits that we already know to be more successful in attracting and holding visitor attention. How he measured his results are as follows; measures of visitor attention per exhibition include total time in the exhibition, fraction of the total number of exhibits at which the visitor stops or spends a minimum amount of time, fraction of the total time in the exhibition spent at the exhibits, and amount of time spent at each exhibits. Other exhibition-level indicator of visitor attention include the number of square feet per minute covered by visitors and the percentage of visitors who interact with more than half of the exhibits in an exhibition.

The site for his study was Reuben Fleet Science Center (RFSC). In an earlier study Sandifer determined that visitors spent an average of 47 minutes in the RFSC; the shortest visit lasted 12 minutes, whereas the longest lasted 2 hours and 23 minutes, not included are the 60 minutes that the visitors attended the OMNIMAX movie presentation.

Research into visitor attention at the exhibition level primarily focused on three statistical measures: attracting power, holding power, and average holding time.

The ways in which exhibits attract and hold visitor attention have apparently always been up to the exhibit designers, museum directors, and museum researchers. Large, sound-emitting, or moving exhibits have been shown to attract and hold visitor attention to a greater degree than small, soundless, or static exhibits. In his paper seven characteristics that attract

and hold the attention of family groups are as follow:

- Multisided: the family can cluster around the exhibit
- Multiuser: interaction allows for several sets of hands (or bodies)
- Accessible: comfortably used by children and adults
- Multioutcome: observations and outcomes are sufficiently complex to foster group discussion
- Multimedia: appeals to different learning styles and level of knowledge
- Readable: text is arranged in easily understood segments
- Relevant: provides cognitive links to visitors' existing knowledge and experience

Also reported in his paper was that exhibits that are concrete (three dimensional objects) had greater attracting power than just abstract exhibits (words and pictures only). In a study that was done by Boisvert and Slez (1995) found that exhibit styles 1 (large, novel, and concrete exhibits), 2 (small, concrete and interactive exhibits), 3 (staffed demonstrations) attracted more visitors than exhibit styles 4 (abstract, instruction-driven interactive exhibits) and 5 (abstract, computer bank or book). Holding time was the largest for styles 2 and 3, providing that interactive exhibits work better to enhance the learning process of the user.

Sandifer, Cody. 2003 "Journal of Research in Science Teaching". "Technological Novelty and Open Endedness: Two Characteristics of Interactive Exhibits That Contribute to the Holding of Visitor Attention in a Science Museum Towson University, Towson, Maryland 21252-0001 2003 Wiley Periodicals, Inc. Vol 40. No2 PP. 121 -137

## Philosophical Reflections on Learning in Informal Settings

Interactive Science and Technology Centers in recent years have shown a rise in the number of interactive science and technology centers (ISTCs) around the world. Acccording to a quote in this paper "there are now several hundred centers in the US, 33 in the UK, 31 in Scandinavia, 12 in Spain, 10 in the Netherlands and six in France". These hands-on centers are distinguished from traditional museums in that they are concerned with "the transmission of scientific ideas and concepts rather than the contemplation of scientific objects" a quote from the research artilce. The generic term "science center" is often used to describe such centers in a way that does not differentiate between those centers that focus on science and those that focus on technology.

Indeed, this view that "technology" is often subsumed by "science" bears witness to a more widely held view of technology as applied science. Typically, centers contain exhibits which concern both science and technology and the research carried out within them usually fails to consider such differences." The environment of the ISTC is markedly different from that of other museums in that they contain "a decontextualized scattering of interactive exhibits." As is generally the case with museums and galleries, ISTCs attract a diverse range of visitors: teachers and children on organized school visits; families; children and adults singly or in groups. The ISTC is a place where visitors may indeed come with the express purpose of learning science and technology but it is also likely that a visitor may visit an ISTC simply as a leisure activity in which learning takes place as an incidental or unintended outcome.

Under the idea of philosophy in education all that can be said is that the learning which takes place in ISTCs is the same as learning which takes place anywhere else. What is different, of course, is the situation or conditions under which such learning occurs. The ISTC is an environment for learning that is different from the classroom in that the visitor is presented with a range of objects with which he or she must interact.

Walton, Richard. 2000. "Heidegger in the Hands-on Science and Technology Center: Philosophical Reflections on Learning in Informal Settings". Journal of Technology Education Vol. 12 No. 1, Fall

# A Plan for The Promotion of Small Museum

With the growing importance of small museums, the American Association of Museums has embarked upon an effort to assist in the establishment and reorganization of small museums in the smaller communities.

Project 1 Dissemination of information

There are a few small museums that have trustees who are in touch with the museum movement or who recognize the importance of employing a trained director, and in consequence there are many untrained persons in charge of such institutions. This accounts in large part for the present underdeveloped condition of many museums.

Project 2 Training of Museum Workers

With the implementation of project 1, small museums will have an increase for the need of trained workers, with anticipation, this project would train a number of directors. Directorship of a small museum is specialized work, calling for a range of information, understanding of people and skill in museum techniques.

Project 3 Grants for Salaries

With project 1 and 2 under way, the financial needs may not be meet. In order to bring the demand and supply together, it may be desirable at a later time to make efforts to secure grants to enable small museums to employ directors for three to five years.

Project 4 Public Support of Museums

With the success of project 3, this should equip a number of small museums for community service. Public support is the strongest financial backbone of a small institution, but the success of any museum is securing county or municipal appropriations must depend upon the character of legislations in the state

Project 5 Cooperation of Museum

The life and virility of any museum depends in part upon the relation which it maintains with other museums. Since small museums are more apt to be benefited by help from their near neighbors than that from institutions far away, and since the expense involved in sending representatives to state conferences would be small, it would seem desirable to promote the establishment of state or regional museums organizations.

Coleman, Laurence Vail. 1925. A Plan for the Promotion of small Museums. Science, New Series, Vol. 62, No 1612(Nov. 20, 1925), 458-459

## Museums and tourism: culture and consumption

The growth of tourism has contributed to the radical changes in museums over the past few years is unquestionable; that these changes have been welcomed or even understood by the entire museum community is less certain. Yani Herreman sets out the main issues that must be addressed if we are to have a better understanding of the reciprocal impact that museums and tourism have on each other. The author, an architect, is head of the Promotion and Cultural Action Unit of the Autonomous University of Mexico and former director of the city museums of Mexico and of the National History Museum.

Tourism is precisely one of those worldwide phenomena that have shaken museums– and other cultural institutions – to their very core and on which, oddly enough, museum experts as a group have no clear position. Nevertheless, tourism is a reality that we must learn to live with and for which we must be prepared. To ignore or exaggerate it, to underestimate or overstate its advantages as well as the harm that it can undoubtedly do, will only get in the way of good professional practice which is dynamic, ethical and in keeping with the basic aims of modern museum organization.

As social history and environmental themes have been incorporated into the material shown in museums, and as science and technology museums have become of prime importance, there has been a new trend, not only in the presentation of artefacts but also in the contextualization of displays, that requires new methods and approaches. Collections are being formed along new lines, and a synchronic or diachronic approach is being used more often in exhibitions. However, the most important change of all to have taken place in recent decades is the social approach which most museums today have adopted.

A new concept in the field of museum research is that of experimental ethnography, where the visitor is put in the position of asking or learning about his or her own culture, as compared with others. museums are an ideal means of research and communication that combine knowledge of culture and that of nature, which they interpret and then communicate, through their exhibits, to both local people and foreigners. Museums must be innovative in their professional practice without distorting or distancing it from its traditional objectives, so that it complies with the contemporary needs of the community, of the conservation of the heritage, and, in this case, of tourism. In this regard, it is worth remembering that museums can fulfil the following roles: (a) interpreting and communicating other cultures for the benefit

of the local community, by drawing up and implementing strategic plans of exhibitions; (b) helping the local community to understand other cultures in a socially healthy way; (c)interpreting and communicating the local culture, past and present, for the benefit of tourists and so that they can understand it; (d) acting as educational centres for the local community in respect of introduced cultures; (e) acting as tourist orientation centres in small communities; and (f) developing their role as centres for research into local handicrafts and other skills.

Present social and economic conditions thus require museums to play a more active role. The controversy between the traditional view of museums as remote from and 'impermeable' to the vicissitudes of the 'outside world', and the modern idea of them as being involved in current global trends.

Herreman, Yani. 1998. "Museums and tourism: culture and consumption" Museum International, No. 199 (Vol. 50, No. 3, 1998)

# CASE STUDY SUMMARY


After looking at several case studies ranging from the east coast to the west coast, many similarities, and differences have been noticed. All the museums examined were interactive museums. Some of them catered to kids to where as some appealed to both adults and children.

Some of the museums were built in the 30's and 40's when Neo-classicism was a popular style, others were built at a much later date, leading towards a much more modern design. A few of the museums were built at a time with the Worlds Fair played a big part of Americas development, leading to the institution of many science museums. Also, most of the museums were built in large cities where the population could sustain them.

Many of the museum that were built in the 30's or 40's were pioneers in the science learning field. They created what we know today as interactive science centers and showed us how it was done in the past and what we can do to make them better in the future.

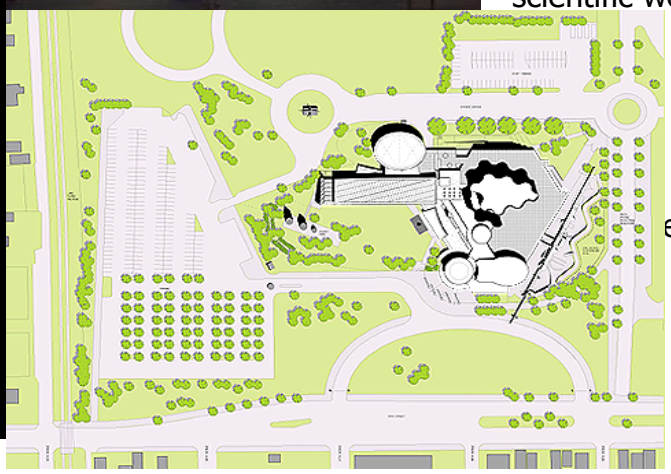
One aspect that I noticed about some of the museum were that many had no sustainable issues that helped the environment. There were some cases were solar energy was gathered and used, then became part of an interactive exhibit.

Some museums feature in new technology that makes them stand out or rise above the rest creating a new type of exhibit such at virtual-reality, or using SGI technology to create a unique theater experience.

All of the museums have wonderful original interactive exhibits ranging from dissecting a cows eye, to being able to tour a German captured sub from WWII. I think one of the main key components of these museum is having an original exhibit, something that nobody else has or can achieve. That's what makes them so popular and with the interactive aspect that enhances the learning experience, the extent to which the user enjoys the museum so much is a combination of all the factors.

## CASE STUDIES<><><><><><><><><>

## New York-Hall of Science • 47-01 111th Street • Queens, NY 11368



Designed by: Polshek Partnership Architects
Project Type: hands-on science and technology center Size: 72,000 square feet, 400 hands-on exhibits Completed: 2004

Built as a pavilion for the 1964-65 New York World's Fairs, the Hall of Science served as a museum from 1966-1981. In 1986, an improved museum reopened with 25,000 square feet of exhibition space, new hands-on exhibitions, and new staff.

Exhibits are grouped into several major areas, including:

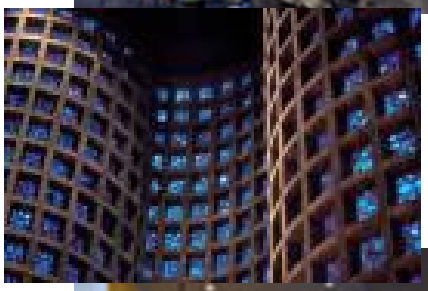
> Seeing the Light: an exploration of color and light, here visitors can cast a colored shadow, blow a giant soap bubble, and more.

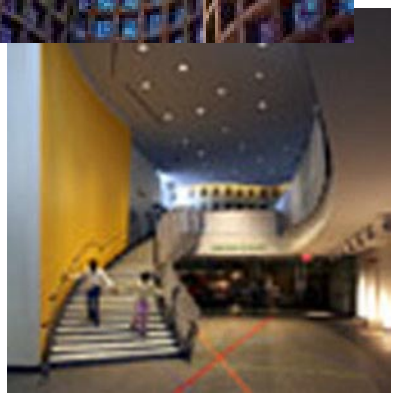
> Realm of the Atom: the world's first 3-D, working model of a hydrogen atom. Other activities that guests can partake include: pedal an airplane propeller, direct a spinning windmill, and examine an 1865 steam engine.

> Hidden Kingdoms -- The World of Microbes: a fascinating look at the world of micro-organisms. A path through a giant eye of a needle leads visitors to the world's largest living collection of tiny creatures. Learn how microbes affect our health and environment.

Exhibits at the museum are interactive, so kids and adults alike will enjoy playing with these scientific wonders. The museum also has tempo rary exhibitions, live demonstrations, videos and films offer families fun and educational experiences. Special weekend workshops and tours are available. The New York Hall of Sci ence introduces a variety of new exhibi tion spaces from the design of the recent expansion. It created a loop circulation that redefines the visitor sequence and provides a

memorable image for this interactive science museum, whose original building housed exhibits on space and space travel at the 1964 New York World's Fair. The new building is a long low volume that extends north from and serves as a horizontal counterpoint to the iconic "Great Hall" of the original Harrison and Abramovitz building. The new building's transparency contrasts with the relative opacity of the cellular concrete frame structure in filled with cobalt-colored, cast glass shards that define the Great Hall. Inside, the new "Hall of Light" is suffused with muted white light, contrasting with the dark exhibit halls of the existing building. A public art installation located at the end of the luminous exhibition gallery takes advantage of the building's orientation and animates its spatial terminus with a continually changing optical experience, which helps to calibrate the visitor's movement along the upper gallery.



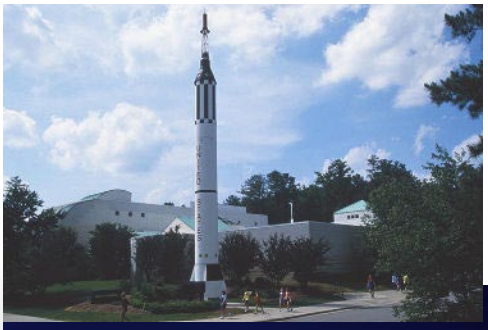


A transparent base, which wraps the northern end of the building, allows passersby glimpses into the Hall's interior and furthers the museum's goal of accessibility. A new landscaped precinct created at the intersection of the new and old buildings houses the renovated Rocket Park and provides outdoor program space for summer camp and science fair activities.

**Awards:**

- Merit Award, AIA New York State, 2005
- BE Award of Excellence from Bentley Systems, 2005
- Cultural Project of the Year, The Con struction Manage ment Association, 2005
- First Prize for Public Building, Queens Chamber of Commerce, 2004
- Award for Excellence in Design, The Art Commission of the City of New York, 2001

New York Hall of Science (architect's drawing)



## Museum of Life and Science • 433 Murray Ave. • Durham, NC 277704

Designed By: Ned Kahn Studios
Project Type: Interactive museum, and outdoor features including a farmyard, playground and wild animal exhibits
Size: 90,000 square feet
Completed: 1992

"Our mission is to create a place of lifelong learning where young children to senior citizens embrace science as a way of knowing about themselves, their community and their world."
- The Museum of Life and Science

The Museum of Life and Science in Durham tries to

create a center of lifelong learning where people from, young child, to senior citizen, to embrace science as a way of knowing about themselves, their community and their world.

The building begun in 1946 as a small children's nature trail center, the Museum has developed into a leading destination for families, groups, schools and leisure visitors from across the state and country. Offering one of the largest Museums Butterfly Houses east of the Mississippi, the Museum is located on 70 beautiful acres with 90,000 square feet of indoor exhibit space and several acres of spectacular outdoor features including a farmyard, playground and wild animal exhibits. The Museum earns approximately 70% of its $4 million operating budget from program fees, admission, and membership and corporate and foundation support.

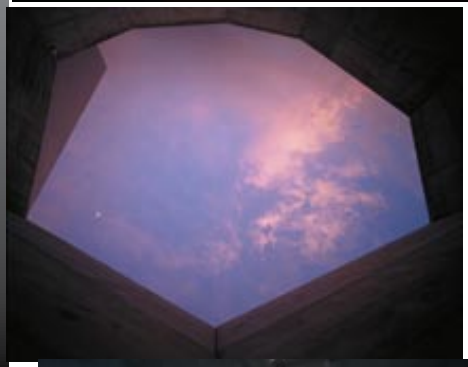
The exhibits are complete with highly interactive state-of the-art demonstrations. The Museum of Life and Science features hands-on experimentation and nature exploration. For example you can sit inside a real Mercury Capsule, watch a baby alligator eat lunch, touch a 13 foot tornado, explore a full-scale Lunar Lander, or investigate global communication in Data Earth.

The museum also has more than 75 animal species from the Carolinas' wildlife, you can also forecast your hometown's weather in our state-of-the-art weather exhibit at the museum

The Magic Wings Butterfly House combines a dramatic three-story Conservatory with the Bayer Crop Science Insectariums and Lepidoptera Learning lab. Inside has hundreds of tropical butterflies in flight, coursing the tropical trees, hovering over nectar-producing flowers in a butterfly meadow, or stopping for a drink by a flowing stream. The tropical year-round 80 degree climate feels good in winter months and refreshingly cool when outside temperatures climb.

At Bayer Crop Science Insectariums, live insects predators, interactive exhibits and special equipment take you on a journey through the insect world. Exhibits illuminate locomotion, thermal regulation of insect life, the strength of a spider filament, the architecture of webs and the role of insects in decomposition and predation.  Take a ride on the Ellerbee Creek Railway through the Museum Nature Park and visit with red wolves and black bears along the way. The Museum also has gift shops and a Caterpillar Café for lunch or refreshments.


## Arizona Science Center • 600 E. Washington St. • Phoenix, AZ 85004



Designed By: Antoine Predock Architect PC
In association with Executive Architect Comoyer-Hedrick Inc.
Project Type: Museum / Art Gallery
Size: 69,800 square feet
Completed: 1997

With a collection of more than 300 hands-on exhibits spread out over four floors, the Arizona Science Center is an ideal way to explore the history of technology. The interactive displays are educational and entertaining and include a simulated airplane flight and a journey through the human body. The exhibits cover a variety of sciences and technologies that appeal to young and old alike.

In addition to the expansive interactive exhibit area, the center includes a giant-screen theater, planetarium with daily shows and a food court with Taco Bell and other restaurants. With elevators serving each floor, elderly and young patrons alike can easily get around the comfortable, air-conditioned facilities.

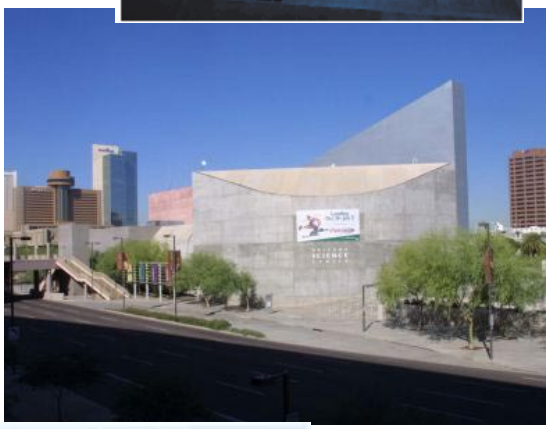
The Arizona Science Center is nestled in the picturesque setting of Heritage and Science Park in historic downtown Phoenix. More than 300 hands-on exhibits provide exploration, education and entertainment for all ages. The Center's dramatic architecture creates fascinating galleries, hallways and terrace space for every type of private event.

Persons are allowed to rent individual floors or the entire facility. When you rent a space you can add-on admission to one of the science centers exhibits, such as, a 5-story giant screen film showing and/or a Planetarium presentation to dazzle your attendees. The Arizona Science Center delivers lasting memories of an interactive unique event experience.

This museum houses exhibition space, a demonstration theater, a special format film theater and a planetarium, along with educational and support facilities. The site is located at the

edge of Heritage Square along a major traffic route into the center of Phoenix.

The building blends, in an abstract manner, influences drawn from geological events with site-specific concerns and urban opportunities. Silhouette and horizon merge with the phenomena of light, water, reflection and mirage. The resulting architecture is a highly processional and participatory journey, beginning with a descent into the earth in the entrance courtyard and transition into sheltered light in the lobby, culminating in a celebration of the sky in the peak gallery with its celestial viewing terrace. By sinking galleries, planetarium, theater and curatorial spaces into the earth, thermal stability and enhanced coolness is assured while setting the stage for the buildings other passive energy responses. The building acts as both an edge and a seam within its context, providing a pedestrian crossover into Heritage Square from the south, while establishing itself as a destination for occupation and exploration with a series of shaded decks, bleacher seats, terraces and courts, which belong as much to the public realm as to the museum itself. The resulting building form is one which is intended to stimulate a multitude of responses: at times these are powerful visceral connections to the desert place, at other times they are as ephemeral as a mirage.



## Exploratorium • 3601 Lyon Street • San Francisco, CA 94123

Designed by Bernard Maybeck
Project Type: Interactive Museum
Size: 110,000 square feet
Completed: 1969

The Exploratorium is located in the Palace of Fine Arts; this playground provides a fun, interactive way to learn about the mysteries of science. Originally it was built as part of 1915 Panama-Pacific Exposition, later rebuilt using reinforced concrete in 1962. Also located in the Palace of Fine Arts is a concert hall, all located in historic San Francisco.

Featured exhibits:

> watching a cow's eye dissection
> testing your sense memory
> examining fruit flies through a microscope
> frolic in a shadow box and blow mega-bubbles
> crawl, slide and stumble through the Tactile Dome, a pitch-black labyrinth that puts non-visual senses to the test
> With "digital surgery," you can create 20 different ghastly countenances from a computerized self-portrait

San Francisco's internationally acclaimed museum of science, art and human perception features over 650 hands-on exhibits. It's a playground for your mind, a scientific funhouse and an experimental laboratory all rolled into one.

The Exploratorium is a cutting-edge, hands-on museum of science, art and human perception that is fun, experimental and awe inspiring. Artists and scientists create unique, interactive exhibits exploring phenomena of the natural world. Designed to spark your curiosity, the Exploratorium features hundreds of exhibits to touch, look through, pick up, and tinker with. The Tactile Dome offers a sensory journey in total darkness. Check out the Exhibit Cam or point the

Roof Cam at the Golden Bridge, Alcatraz, or one of the cool neighborhood views.

Founded in 1969, The Exploratorium's mission is to create a culture of learning through innovative environments, programs, and tools that help people nurture their curiosity about the world around them.

The Museum has over 650 original interactive exhibits, displays, and artwork, the hands-on exhibits explore biology, physics, visual perception, listening, and memory.

Public programs include lectures, performances, live webcasts, art, and film shows.

The museum has hosted more than 250 artists in residence which is a program for local artist to display their work.

Different program through the Exploratorium:
6,000 teachers from 37 states annually participate in Exploratorium-designed workshops,

500 U.S. teachers participate in more than 60 hours of professional development each year. A national model program improves the classroom success of beginning teachers, and Center for Informal Learning and Schools, a partnership with University California Santa Cruz and King's College London, examines the impact of science centers on teachers and school reform.

The Children's Educational Outreach offers free workshops to 5,000 underserved children and families. Explainer Program hires and trains a diverse group of 120 high school students each year. The Osher Fellows Program hosts 4 to 5 resident scholars, scientists, educators, and artists.

Six PhDs staff the museum, for research and evaluation groups. The Museum has about Seventeen million people visit and access www.exploratorium.edu annually, which has over 15,000 pages of original content

Fifty live Webcasts originate each year from the Exploratorium and remote locations.

The Exploratorium occupies 110,000 square feet within San Francisco's historic Palace of Fine Arts, plus offices and exhibit-building shops in adjacent Presidio Buildings.

Facilities include:

- multimedia Learning Center with library
- nine wired classrooms
- life science laboratory
- Phyllis C. Wattis Webcast Studio
- 150-seat McBean Theater
- ample free parking
- machine, wood, and electronics shops
- store and café

The Exploratorium is available for rental for private events during evening hours.

The 2003-04 budget: $27,067,000

399 total employees, 271 full-time equivalent; 33% people of color

an international team of 300 volunteers contributes more than 13,500 hours annually.

When The Palace was completed, (Roman in style although a freely-interpreted, purely romantic conception, and Greek in decorative treatment) its exceptional harmony gave it instant appeal to the public.

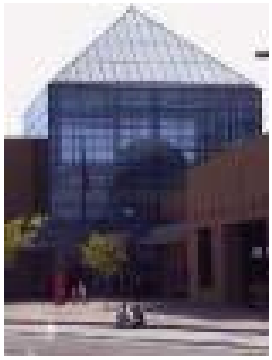
## Sci-Quest - The North Alabama Science Center, Inc. • 102-D Wynn Drive • Huntsville, AL 3

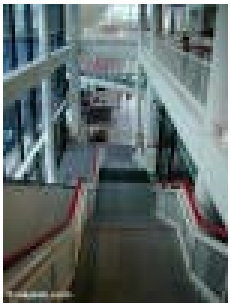

Project Type: Hands-on Science Center
Size: 40,000 square-feet
Completed: 1998

Sci-Quest is a full-scale, state-of-the-art hands-on- center located in Research Park, and has over 120 interactive exhibits supporting basic science principles in Science and to develop an Early Childhood Area offering developmentally-appropriate hands-on, investigative exhibits especially for 4-8 year old children. Support from the Huntsville City School System and the Madison County School System provided two teachers on loan to assist in education program development and delivery. A Jane K. Lowe Charitable Fund grant built two vital classrooms while a TVA grant provided a solar array and exhibit.

In March 2003, the Immersive Theater opened. This interactive, 3D computer laboratory provides stadium seating for 56 students and allows pairs to conduct simulation experiments on touch-screen com puters. It is the first science center in the United States to offer interactivity in an immersive, high-definition theater facility. The Immersive Theater was designed and integrated by SGI. It uses SGI® Reality Center® technology powered by the SGI® Onyx® 300 visualization supercomputer and also features 6.2 surround-sound in a 56-seat interactive 3D environment. Visiting students, from fourth grade to college level, will experience and interact with the world's scientific discoveries using the same SGI® technology that leading researchers depend on for groundbreaking discoveries in medicine, cosmology research and energy.

Sci-Quest is housed in a 40,000 square foot facility with interactive exhibits for people of all ages. At this self-guided facility visitors can whisper over 100 feet, peer into infinity, test gravity and much more. Sci-Quest features a variety of learning experiences in the areas of Chemistry & Materials, Early Childhood, Elect ricity & Magnetism, Engineering, Fluid Dynamics, Physio logy, Waves, Light & Sound, and World Ecosystems & Weather Sciences. In addition to the permanent exhibitions, there are a variety of special traveling exhibits.





## Oregon Museum of Science and Industry • 1945 SE Water Ave. • Portland, OR 97214-3354

Designed by Zimmer Gunsul Frasca Partnership
Project Type: hands-on museum
Size: 219,000 ft2 science museum in renovated power plant
Completed: 1944

The Oregon Museum of Science and Industry (OMSI) is a scientific, educational, and cultural resource center dedicated to improving the public's understanding of science and technology. OMSI makes science exciting and relevant through exhibits, programs, and experiences that are presented in an entertaining and participatory fashion. OMSI is an independent non-profit organization and relies on admissions, memberships, and donations to continue their educational mission, programs, and exhibits.

Originally founded in 1944 and one of the nation's top ten science museums, the Oregon Museum of Science and Industry is a world-class tourist attraction and educational resource. Five exhibit halls and eight science labs offer 219,000 square feet of brain-powered fun through hundreds of interactive exhibits and hands-on demonstrations. OMSI's multi-attraction complex features a big screen OMNIMAX® Theater, the Northwest's largest planetarium, and the USS Blueback, the last fast-attack, diesel-powered submarine built by the U.S. Navy and after serving for 31 years, the last of its kind to be decommissioned.

In addition to enjoying one of the featured exhibits on temporary display at OMSI, you can touch a tornado, uncover a fossil, surf the internet, enter the world of virtual reality, experience an earthquake, or simply experiment on your own in one of our many hands-on labs. OMSI also offers a variety of camps and classes as well as one of the largest outreach programs in the nation, taking innovative science and technology education "on the road" to students, teachers and the public in seven Western states. OMSI is located

on the east side of the scenic Willamette River in downtown Portland.

Although it is staffed with full and part time employees, much of the museum is dependent on volunteers. Volunteers perform many of the same duties as staff members such as greeting visitors, customer service, and performing exhibit demonstrations. Volunteers are comprised of high school and college students, as well as community members.

In 1944, the Oregon Museum Foundation was founded with the mission of establishing an Oregon Museum of History, Science, and Industry. It displayed its first collection of natural history objects at the Portland Hotel. Support for the museum grew over the years and in 1949, a house in NE Portland was donated to establish a museum, and OMSI was born. Within a year, Oregon's first public planetarium opened in the building.

By 1955, OMSI's annual attendance had grown to 25,000 and the need for expansion led to volunteers building a new site at Washington Park, completing the original goal of a hands-on museum (This building is now occupied by the Portland Children's Museum). Attendance continued to grow, and by the mid-80s, 600,000 people were visiting the building every year, which was designed to hold only 100,000. In 1992, OMSI opened at its current site, donated by Portland General Electric, which was complete with a 330-seat dome-screen OMNIMAX Theater (the first in the Northwest) and an expanded 200-seat planetarium.

SPECIAL ATTRACTIONS:

> Auditoriums OMSI contains the Harry C. Kendall Planetarium where computer-aided star and laser light shows are regularly performed.. It is also home to the only OMNIMAX theater in Portland

> There is one big auditorium, with a stage, where regularly scheduled fair exhibits are set up. Some fairs include OHSU's Brain Awareness, Saftey Booths and reptiles.

> U.S.S. Blueback, purchased by OMSI in February, 1994. This submarine was towed to its present location in Portland, Oregon, at a pier right outside the museum and opened to the public since May 15, 1994.


**EXHIBITS:**

OMSI has five main exhibit halls and several enrichment areas within each hall.

**FEATURED EXHIBITS**

The Featured Exhibit is a hall used for temporary exhibits manufactured by OMSI, or brought in from museums around the world.

**TURBINE HALL**

The Turbine Hall is named for the large steam turbine which dominates the floor. It features exhibits about engineering, physics, chemistry, and space travel. The Physics, Chemistry, and Laser Holography labs are connected to the Turbine Hall.

The Turbine Hall has two floors. Present on the main floor are the large exhibits and enrichment areas. On the mezzanine there are smaller exhibits that emphasize properties of physics.

**INNOVATION STATION**

At the innovations station you can try your skills at programming a robot, building an aqueduct to bring water to a model town, or designing your own flying machine. Step inside the Inventors Ball Room and build your own crazy contraptions to send balls whizzing, flying, and bouncing all around. Compare your own hands to the fast, precise moves of two giant robot arms. Then climb high above everything on OMSI's new suspension bridge and get a whole new view of the exhibits below

**CHEMISTRY LABORATORY**

The chemistry laboratory is a hands-on wet chemistry laboratory where visitors can learn about various chemical interactions.

Exhibits include a Van de Graff generator (a static electricity generator), motion detectors, circuits, morse code, magnets, computers that simulate basic properties of physics, and musical instruments.

**VERNIER TECHNOLOGY LABORATORY**

This laboratory investigates the impact of technology on society. While visitors can explore on internet-connected computers, rotating interactive exhibits allow for further learning of common technologies.

**LASER/HOLOGRAPHY LABORATORY**

Staff and volunteers of this laboratory present 30 minute demonstrations where a holgram is constructed. Lasers and properties of light are also investigated in this laboratory.

**LIFE SCIENCE HALL**

The Life Sciences Hall has exhibits about biology, including a collection of preserved fetuses at nearly every stage of development. The adjacent Life Sciences Lab houses a wide variety of live animals, including an 11 foot long Burmese Python named Bubba.

**LIFE SCIENCE LABORATORY**

An African Rainbow Crab In the Life Science laboratory you will find many live specimens. Bubba, the eleven foot long Burmese Python lives here. While Bubba is the most famous resident of this laboratory, there are also a large number of other live exhibits such as rats, walking sticks, chameleons, and other mammals, reptiles, amphibians, and insects.

**EARTH SCIENCE HALL**

The Earth Hall features geology-oriented exhibits. Attached to the Earth Hall is the Paleontology Lab and the Watershed Lab.

**WATERSHED LABORATORY**

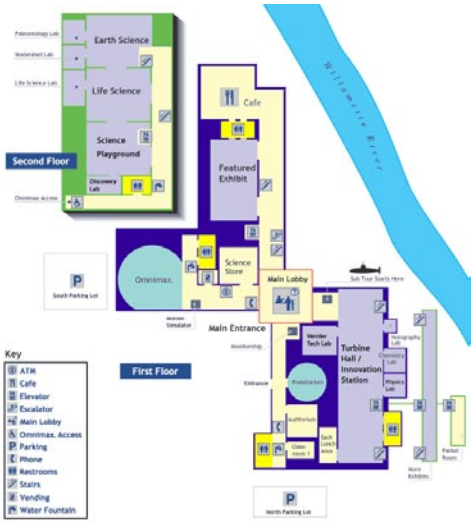
The Watershed Laboratory allows museum visitors a unique experience in constructing an erosion cycle out of a "river on a table". Visitors can learn about the life cycle of Salmon and even investigate microscopic organisms from local waterways through a videomicroscope .

**PALEONTOLOGY LABORATORY**

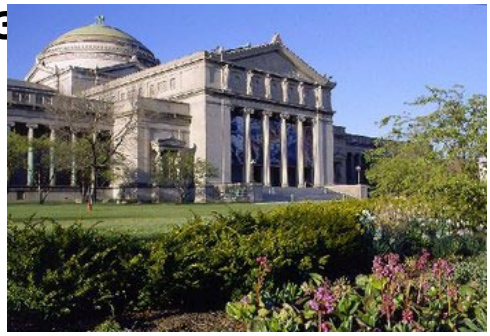
This laboratory is one gigantic discovery laboratory. OMSI Staff Members and Volunteers are hard at work in this space uncovering new fossils and remnants of the past in plain view of museum visitors. Dinosaur bones are excavated here.

## SCIENCE PLAYGROUND AND DISCOVERY LABORATORY

Formerly labeled the Discovery Space for children ages zero through six, this large room resides next to the Life Science Hall on the second floor of the museum. Exhibits in this room include a tent for reading, a theater, a space for parents and infants, and a gigantic sandbox. In the Discovery Laboratory children can make flub- do other hands-on ff member.



## Museum of Science and Industry • 57th Street and Lake Shore Drive • Chicago, IL 606



Designed by: Charles C. Atwood
Project Type: First Interactive Science Museum
Size: 350,000 square feet
Completed: 1933

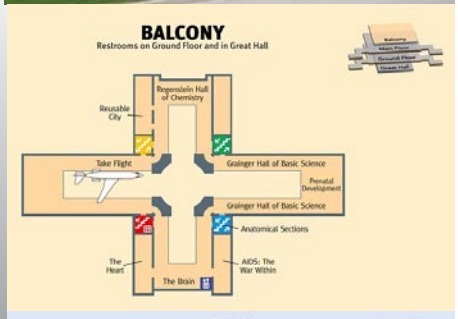
The Museum of Science and Industry is located in Chicago, Illinoise, in Jackson Park, in the Hyde Park neighborhood. It is house in the the only in-place surviving buildng form the 1893 World Columbian Expostion, the former Fine Arts Building. The building, which was intended to be a more permanent structure than the other Exposition buildings, initially housed the Field Museum of Natural History. When a new Field Museum building opened closer to the downtown in 1921, the former site was left vacant.

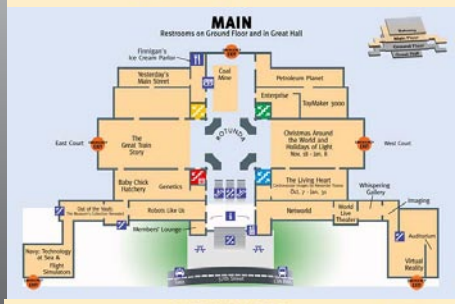
After a few years, the building was selected as the site for a new science museum, by wealthy department-store owner Julius Rosenwald, who insisted his name not appear on the building. The building's exterior was re-cast in stone, retaining its 1893 Beaux Arts look, while the interior was completely rebuilt in Art Deco style. In 1933, while Chicago was hosting the Century of Progress, the new Museum of Science and Industry was opened to the public.

In keeping with Rosenwald's vision, many of the exhibits are interactive, ranging from the Hall of Communications which explains telephony, to the coal mine, which re-creates a mine inside the museum. The museum houses the U-505, the only German submarine captured by the US in World War II, silent film actress Colleen Moore's Fairy Castle and the Transportation Zone which includes exhibits on air and land transportation. The first diesel-powered streamlined stainless-steel trainset, Pioneer Zephyr, is on permanent display.

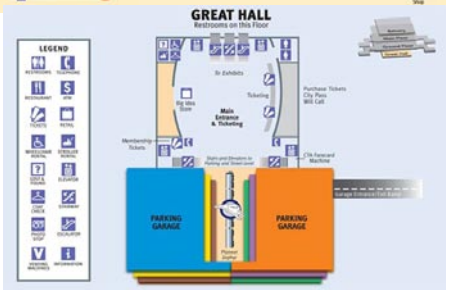
The Henry Crown Space Center at the Museum of Science and Industry includes the Apollo 8 capsule which took Frank Borman, James Lovell and William Anders on the first lunar orbital mission. Other exhibits include an OmniMax theater, Scott Carpenter's Mercury Atlas 7 capsule, a Lunar Module trainer and a life-size mockup of a space shuttle.

In addition to its three floors of standing








exhibits, the Museum of Science and Industry also hosts temporary and traveling exhibits. In 2000, it created and hosted the largest display of relics from the wreck of Titanic. It also hosted Gunther von Hagens' Body Worlds exhibit, a view into the human body through use of plastinated human specimens.

The museum is known for unique and quirky permanent exhibits, such as a walk-through model of the human heart. Due to its age and design, the museum building itself has become a museum piece.

The Museum of Science and Industry, one of the most beloved and visited museums in the world, has origins that are tied to two great World's Fairs and to civic spirit and imagination of Chicago businessman Julius Rosenwald. Rosenwald, then Chairman of Sears Roebuck & Company, was inspired by a 1911 visit with his son to the Deutches Museum in Munich. He returned to Chicago determined to create America's first center for "industrial enlightenment," a vehicle for public science education. With the help of other Midwest business leaders, Rosenwald restored and converted the Palace of Fine Arts, the last remaining major structure from the 1893 World's Fair, into a new type of American museum - where visitors could interact with the exhibits, not just view displays and artifacts. In 1933, the Museum of Science and Industry opened to the public, at the same time as the Century of Progress Exposition.

Opened in 1933, the oldest science Museum of its kind in the Western Hemisphere attracts approximately 2 million visitors per year. In 2003, nearly 330,000 children in school groups and youth organizations visited the Museum.

The Museum is one of the most popular tourist destinations in the City of Chicago, and among seven of the most visited museums in the United States. The one millionth visitor entered the the Museum in 1935, and nearly 160 million visitors have experienced the Museum since its opening in 1933.

>The Museum has over 17,000 member households.

>The Museum has over 350 volunteers.

**Museum Facts:**

First Museum in North America to develop the hands-on, interactive exhibits.
The first museum to have participation of industry in its exhibits.
The largest science museum in a single building in the Western Hemisphere with over 800 exhibits and over 2,000 interactive units located in over 350,000 square feet of exhibit space.

Built in 1893, the Museum building has played a role in two World's Fairs: The World's Columbian Exposition in 1893 and The Century of Progress Exposition in 1933.

**Museum Exhibit Highlights**:

A WWII captured German submarine on the National Register of Historic Places.
A working coal-mine shaft elevator from 1933.
A cantilevered Boeing 727 that visitors can walk through.
A 3,500-square-foot model railroad, one of the largest in the world.
Exhibits on the brain and computer imaging that have garnered awards from the American Association of Museums.
Whispering gallery - acoustically perfect room in "Communications".
Baby-chick hatchery - fascinating live display of newborn chicks.
Human heart model - nearly 20-foot-tall walk-through model.
World's first permanent exhibit on AIDS/HIV.


Collections contain approximately 50,000 Artifacts - many on loan from NASA.
Apollo 8 Spacecraft - first manned spacecraft to orbit the Moon


Aurora 7 Mercury Spacecraft - one of the first manned spacecraft to orbit the Earth
Lunar Module Trainer - Apollo astronauts trained in this mock-up of the Lunar Lander
Piccard Stratosphere Gondola - set an altitude record in 1934
British Spitfire WWII Fighter Plane - one of only a few surviving Spitfires to have flown in the Battle of Britain
Texaco Racer Plane - broke Charles Lindbergh's transcontinental speed record in 1930
999 Empire State Express steam locomotive - set a land speed record in 1893

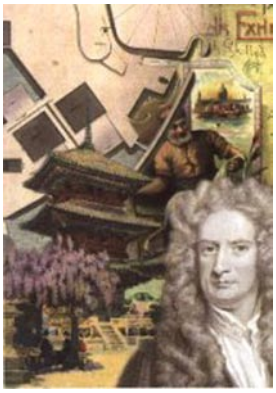
Sears Motor Buggy antique car - sold in 1912 through Sears catalogue
Spirit of America Jet Car - set a land speed record in 1964
1914 Ford Model T - one of the first mass produced cars

**Awards and Accolades:**

- Named one of the coutry's top 50 family attractions by Zagat Survey (2004)
- Featured in the 2005 World Almanac for Kids
- Voted best museum in Chicago by users of Cityse arch.com (2003)
- Named one of the best destinations for travelers by Let's Go Publications (2003)
- Voted best museum in Chicago by Citysearch.com (2002)

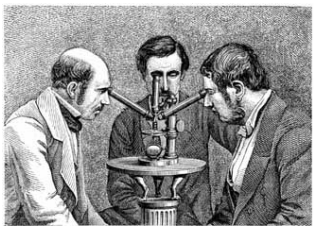
# Historical Context

This project will be very similar to projects that have been performed in the past. In the past, projects of this scale have been performed in major cities. Now with todays' information and technology so easily at hand, it would only seem logical that smaller cities receive such a development. From the earliest version of an interactive science museum, such as that in Chicago, over 70 years ago, to the most modern in New York, there have been many institutions that have catered to ideas on this scale. Many have risen to the challenge and succeed, other have fallen somewhat shy of the goal that was at hand. With most institutions starting out small and then expanding after they have been established for some years. Most of the institutions become social gatherings for events and research, which creates a new breed of people that become addicted to the learning of knowledge.



Social trends for institutions such as an interactive museums have grown over the years. Leading to better exhibits, and higher attendance, museum have themselves grown and become bigger and better places. The public has shown a growing need for learning which has caused these places to become bigger and more popular.

The problem of not having a higher level of scientific literacy plays in important role in our society on three different levels. The first being that on the city scale, and on the level of the red river region, and on the scale of nationwide.



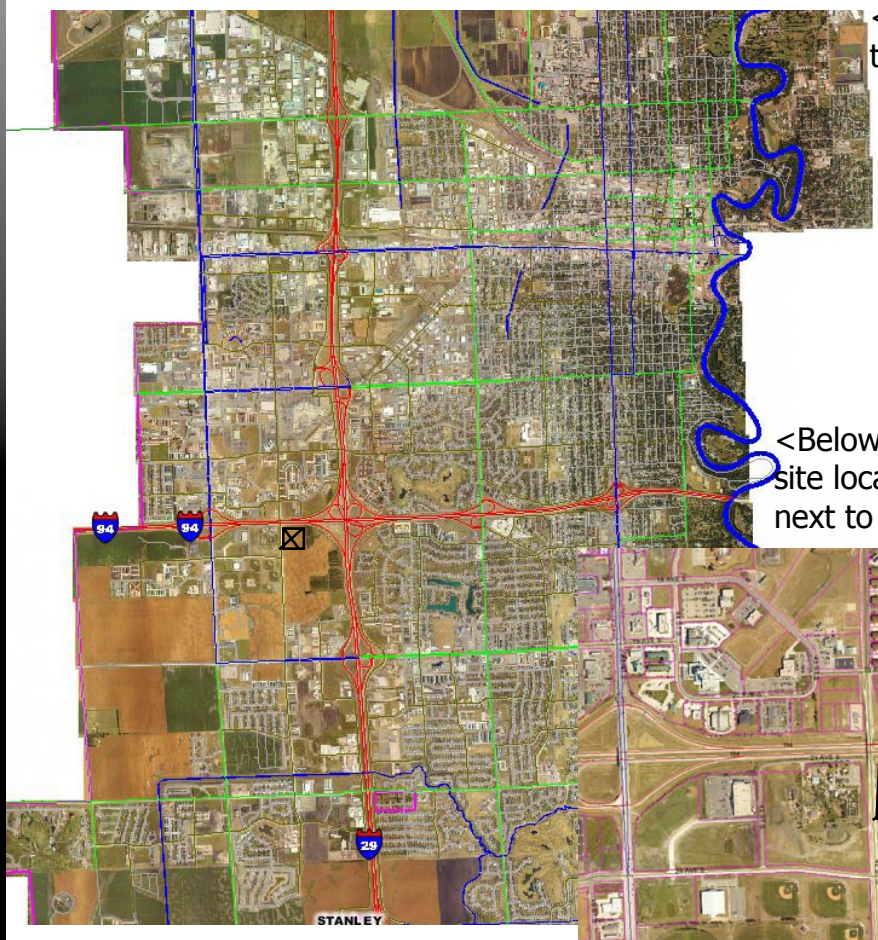
Having a place in our city where we can learn and gain a better understanding of science can only be beneficial. Our society, with in our city can value and understand science in a more intense and gratifying way. Then on the scale as a region, an institute of this magnitude, would be located in a closer proximity for many smaller towns that don't have access to this information. Many local schools and educational facilities would be drawn into the wealth of knowledge and activities that would be closer to the young and eager minds. On the level of nationwide, with a project such as this, it would put the Red River Valley on the map. Proving to the nation that we are capable of achieving the scientific literacy and know how to advance in todays society.

# Site Analysis:

The site that has been chosen is undeveloped. The site is located off of 42nd street and south side of I-94, a plot of land that is currently a field. The main feature of the site would be an existing shelter belt located on the east side, and extends the whole distance. The land is generally flat with little to no standing water except for a slight depression that cuts through the site at a slight angle, but the depression would be no more than 3 feet over about a 100ft distance in each direction.

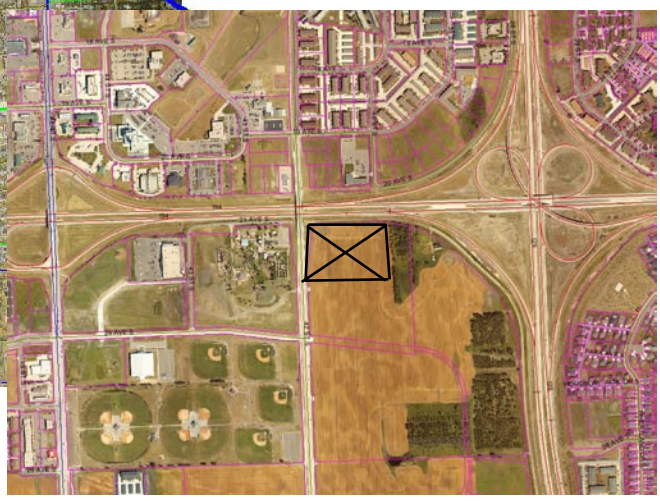
The only shade and shadows currently would be in the early morning when the sun hits the shelter belt and cast shadows on to the field. During the day, the site would receive full sun.

The light, and luminosity would be that of normal everyday conditions, the temperature would be that consistent of the Red River Valley area. Currently there are no built features on this site that would affect wind flow. The shelter belt to the east side would affect easterly flow of wind; the belt is comprised of about 50% dieing trees. The land in the past has been used for crop production. With Interstate 94 directly North of the site, this would cause the sight to be slightly noisy.

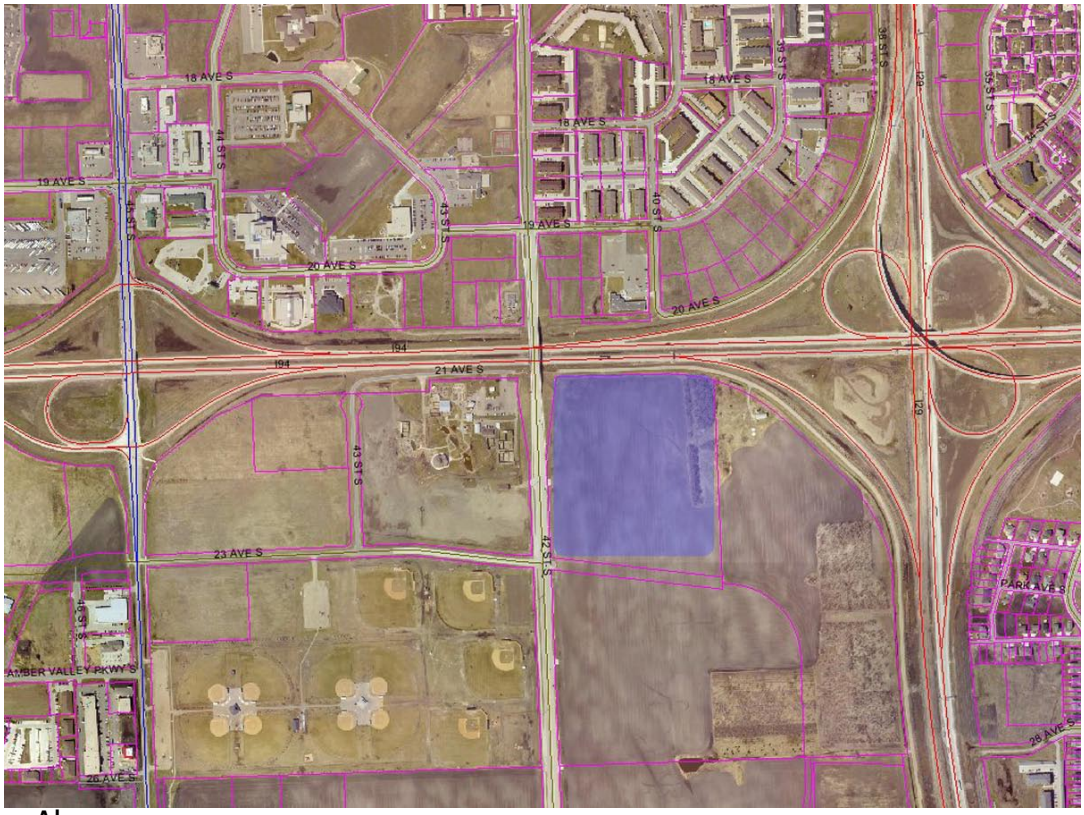



< Left > Overview of the the Red River Valley

<Below > A closer view of the site located south of I-94 and next to 42nd St South.



< Below > Zooming into the site showing boundary lines. The site is located East of the Red River Zoo.

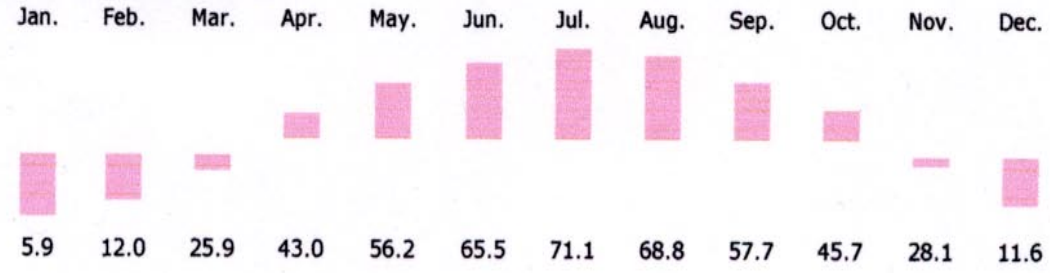



< Above >
To the left is the site. For the project I will not be using the whole site. I will use the shaded area.

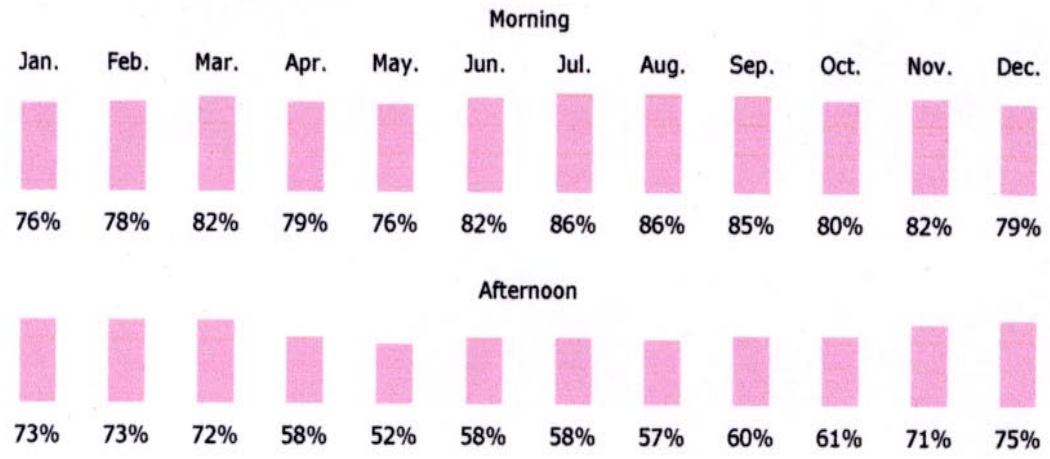
# Fargo Weather History:

| | Temp. (°F) | Relative Humidity (Percentage) | | Extreme Temp. (Days Per Month) | | Rain (Inches) | Cloudiness (Days Per Month) | | |
|---|---|---|---|---|---|---|---|---|---|
| | Average | A.M. | P.M. | Below 32° | Above 90° | Average | Clear | Partly Cloudy | Cloudy |
| January | 5.9 | 76% | 73% | 31 | 0 | 0.7 | 7 | 7 | 17 |
| February | 12.0 | 78% | 73% | 28 | 0 | 0.5 | 6 | 7 | 15 |
| March | 25.9 | 82% | 72% | 27 | 0 | 1.1 | 5 | 9 | 17 |
| April | 43.0 | 79% | 58% | 16 | N/A | 1.8 | 6 | 9 | 15 |
| May | 56.2 | 76% | 52% | 4 | 1 | 2.5 | 7 | 10 | 14 |
| June | 65.5 | 82% | 58% | N/A | 2 | 2.8 | 6 | 11 | 13 |
| July | 71.1 | 86% | 58% | 0 | 5 | 2.7 | 10 | 13 | 8 |
| August | 68.8 | 86% | 57% | 0 | 5 | 2.4 | 10 | 12 | 9 |
| September | 57.7 | 85% | 60% | 2 | 1 | 2.0 | 9 | 9 | 12 |
| October | 45.7 | 80% | 61% | 13 | N/A | 1.7 | 9 | 8 | 14 |
| November | 28.1 | 82% | 71% | 27 | 0 | 0.7 | 5 | 6 | 18 |
| December | 11.6 | 79% | 75% | 31 | 0 | 0.7 | 6 | 7 | 18 |
| **Annual** | **41.0** | **81%** | **64%** | **179** | **14** | **19.5** | **88** | **109** | **168** |

**Average Temperature (°F)**




**Relative Humidity (Percentage)**



## Rain (Inches)

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

## Cloudiness (Days Per Month)

| | January | February | March |
|---|---|---|---|
| Clear | 7 Days | 6 Days | 5 Days |
| Partly Cloudy | 7 Days | 7 Days | 9 Days |
| Cloudy | 17 Days | 17 Days | 17 Days |

| | April | May | June |
|---|---|---|---|
| Clear | 6 Days | 7 Days | 6 Days |
| Partly Cloudy | 9 Days | 10 Days | 11 Days |
| Cloudy | 15 Days | 14 Days | 13 Days |

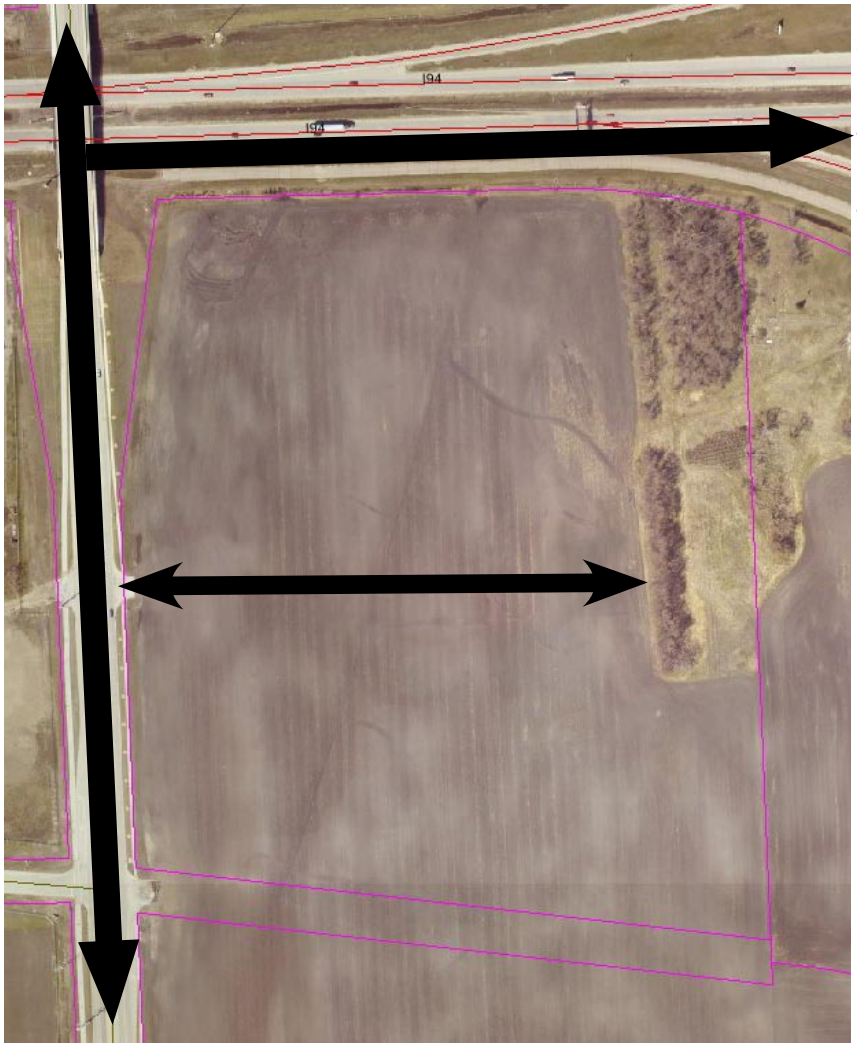
| | July | August | September |
|---|---|---|---|
| Clear | 10 Days | 10 Days | 9 Days |
| Partly Cloudy | 13 Days | 12 Days | 9 Days |
| Cloudy | 8 Days | 9 Days | 12 Days |

| | October | November | December |
|---|---|---|---|
| Clear | 9 Days | 5 Days | 6 Days |
| Partly Cloudy | 8 Days | 6 Days | 7 Days |
| Cloudy | 14 Days | 18 Days | 18 Days |

| | Clear | Partly Cloudy | Cloudy |
|---|---|---|---|
| Days Per Year | 88 | 109 | 168 |

The soil types would be that of typical Fargo which is very clay in base and retains water. The water table would be of typical of Fargo. As of now there are no utilities located on the site. The closest utilities would be located at Red River Zoo located to the west.

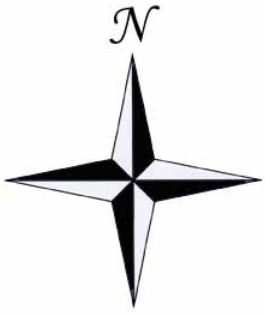
The majority of the vehicular traffic will be located on 42nd St. S, and the access road that would be created to the site.




With the exception of the Interstate traffic, the only other traffic would be the on site traffic.

Plant cover would that of the shelter belt and the grass located around the field.

The only amenity to the site is the shelterbelt on the east side. The site itself is a field along with the land that surrounds it. With my development of the land, I propose that the shelterbelt be reinforced and groomed to be brought up to a better quality.



# Program Requirements:

| **Space** | **Total SQFT** |
|---|---|
| **>Reception Hall** | 12,000 |
| Coat area | 180 |
| Reception / Information desk | 120 |
| Restrooms | 450 |
| **>Main General Gallery** | 4,000 |
| **>Lecture Seminars** | 1,950 |
| Classrooms(4) | 850 |
| Storage | 100 |
| Auditorium | 1,000 |
| **>I-Max Theater**(400seat) | 5,000 |
| **>Science Galleries** | 32,000 |
| Astronomy | 5,000 |
| Chemistry | 5,000 |
| Biology | 5,000 |
| Geography | 5,000 |
| History | 5,000 |
| Physics | 5,000 |
| Storage | 2,000 |
| **>Enclosed Recreation Area** | 3,500 |
| **>Administrative** | 3,550 |
| Offices(8) | 1,200 |
| Employee Lounge | 500 |
| Staff Restroom | 100 |
| Storage | 200 |
| Mailroom | 350 |
| Conference | 200 |
| Larger conference | 800 |
| Kitchen | 150 |
| Copy room | 50 |
| Security | 150 |

**>Shipping and Receiving**_____1,000
Maintenance ----------500

**>Food Court**_____2,000

**>Restaurant**_____2,300
Restroom ----------100

**>Gift shop/Bookstore**_____1,550

**>Library**_____2,000

**>Aquarium**_____2,200

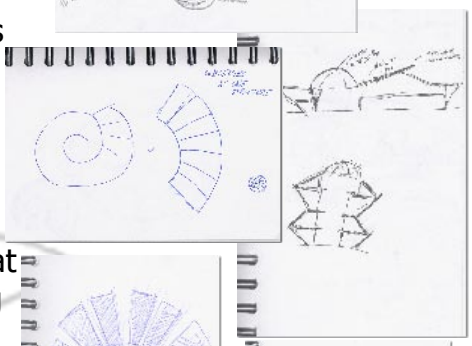
**>Mechanical**_____20% of building__11,820

**>Circulation**_____20% of building__11,820

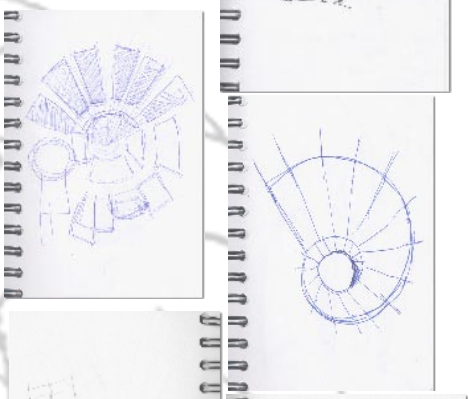
**>Total**_____**=94,740sqft**

# Design Development:

The development of the museum began with a concept of a nautilus shell shape for an interactive museum. After much working through a series of sketches and different ideas about what a museum should be. The concept of a nautilus shell as a museum became more clear.

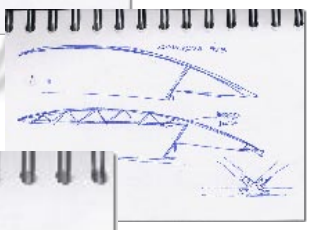


Through the use of a Venn diagram the spatial layout of the museum began to take shape. When looking at several early study sketches the shape of the building was to have a radial design. I also found that it was important to separate certain areas of the building from other areas, as well as it was to locate certain areas by one another. For example, the food court is designed centrally between the exhibits and the enclosed recreational area.

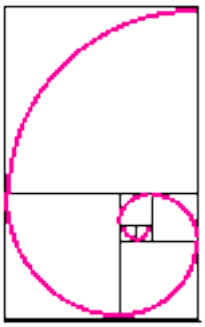


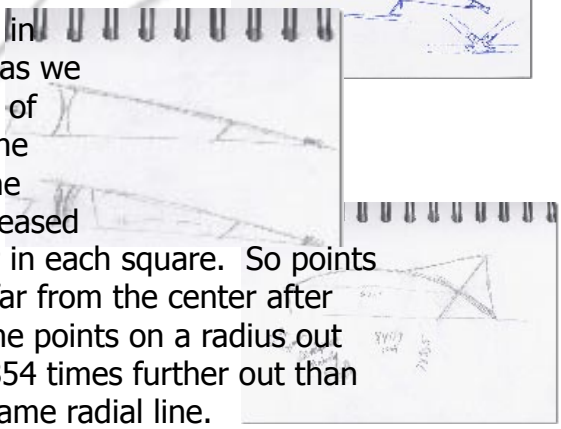
The design of the museum has a pure and smooth design. The structure of the building is composed of these large concrete ribs. The design of these large concrete ribs start at the top of a column and gradually ever-so gracefully immerse themselves back into the ground from which they were conceived.

The design of the building is based of the Fibonacci sequence, also known as the golden ratio 1.618034, and is also called the golden section or the golden mean or just the golden number. In this theory for any length that you start with, multiplying that number by the golden ratio, in a quarter turn, would give the next length. In doing this, the shape of a nautilus shell appears.



Such spirals (naturally found in nature) are seen in the shape of shells of snails and sea shells and, as we can also see, in the arrangement of seeds on flowering plants too. The spiral-in-the-squares makes a line from the center of the spiral increased by a factor of the golden number in each square. So points on the spiral are 1.618 times as far from the center after a quarter-turn. In a whole turn the points on a radius out from the center are 1.6184 = 6.854 times further out than when thecurve last crossed the same radial line.





# Final Design:

Fargo's Interactive Science Museum is designed to be a symbol to the City. The museum will function as a landmark to the city with it's unique shape. The large braces that are highly visible to travelers passing through the city in any direction would actually be an eye catcher, used to bring guest to the museum. Although the museum is located next to the highway, there are currently no on / off ramps on the road that passes by the museum. This would make people that are just traveling through Fargo to have to travel through part of the city in order to get to the museum. This would be beneficial to the city so people are not just stopping at the museum, it would help the economy of the city.

With the Red River Zoo being located adjacent to the Science Museum, and softball diamonds located to the south and west, the idea of have a science museum close to their location was another reason for choosing this site. With all these other interactive activities in the proximity, the people that are already there can follow the trial to the museum. Whether it would be between softball games or after an expedition through the zoo, the science museum would be there ready to show the young and mature minds what science all about, using the best type of learning for almost anyone, because it allows the user "get into" what is being taught.

The building has basically been designed to be viewed from all angles. With that in mind, it made it difficult to locate the part of the building that people tend to think less of, that being the garbage, and shipping / receiving. Along the north side of the building, that is highly visible to interstate traffic, I located a slight retaining wall to block the view of the unsightly yet necessary functions of the building. This area for loading and unloading would be accessed with a service road that runs on the outer perimeter of the site, out of view for aesthetic reasons.

As I mention before, within the site I have developed a trail that leads from the city street, through the site, pass the I-Max Theater which eventually leads the guest to the entrance of the science museum. By creating this path it helps reinforce the use of the outdoor space and gets guest to interact with the museum.

After the travelers are brought through the city, they would enter the site and would approach the main entrance via a bridge. The plaza is the first gathering point to the entrance of the science museum. This area would feature a sundial, outdoor seating for the restaurant, and walkways to the I-Max. The main entrance has a large glass façade this acts as shading devices in many ways. First, the angled glass breaks up the monotonous on the front and creates unique shading on the outside of the building and on the reception hall on the inside. The shading on the glass over the area that would be for the restaurant is designed to block more sun in the later hours when people are there enjoying an evening meal.

Through research I found that it was important that guest be able to journey

through the museum with out having to reach the end of the museum, turn around and walk through the exhibits they have already encountered. So the arrangement of the building allows visitor to the museum to flow through the museum, in a consecutive order. As guests would enter the museum, the reception hall would be the first gathering location with in the museum. This area is large enough to have special gatherings for private and non-private events. The space can also be used for special exhibits or sculptures. The space is large and open with 40ft ceilings and natural daylight filling the room. The main gallery is the first gallery that guest would approach. The gallery would feature seasonal and temporary exhibits. This would keep the museum, and the guest up to date with new information.
Then they would either be able to go to the restaurant, aquarium, or to the exhibit galleries. The restaurant would be "space" themed and would feature an exciting and well decorated grill and bar environment. The lowered sitting would have a view of the aquarium on the opposite side. This would feature rare and exotic species from around the world, and also feature an aquarium tank that guest can walk underneath. The aquarium would feature rare and exotic species from around the world, and also feature an aquarium tank that guest can walk underneath.

The mechanical aspect of the museum was important to take in to account. That is why the main source of energy would be from geothermal source in the ground. The water source for the toilets would come from the rainwater collectors off of the roof that would be stored for later use. Solar panels on the southern roof edge that adjust to the sun angles would also provide energy. The HVAC for the building would be a variable air system that would be separately controlled by each area of the building.

The shipping / receiving is easily accessible from with in the museum and outside. The loading dock would be able to handle either large semi trailers to medium sized trucks to smaller vehicles. This area also has storage for exhibit materials and shipments.

Located under the second floor is a small auditorium that seats about 75 persons. It holds lectures and special events that require digital media. Located behind the auditorium, is a janitor's closet and security office.

On the second floor area the classrooms. Four different classrooms are provide to help teach children about science. Eight offices, and conference rooms are provide for the administrative aspect of the museum. There is one large conference room for very large meetings, and a smaller one for a quick breakout space. The second floor also has the employee lounge and mail room.

The interactive exhibits will feature many different forms of science, and the exhibits will be engaging and fun for people of all ages. From there, the guest would be able to get food, and enjoy it either in the courtyard, or in the seating provided in the lounge area. Here, people would be able to monitor their children while relaxing. If the children would not care to play in the recreational area, they would be able to continue to learn in the library. After the excitement of all the learning and enjoyment

from all the exhibits, guests would then pass on to the gift shop for souvenirs and other entertaining items. People then would be able to leave the museum the same way they entered the building with out having to pass any of the same things they have already encountered.

The walls within the interactive exhibits allow the guest to view and experience science in a 180 degree fashion. As being that science is not defined to just one aspect, but rather that in science, is viewed in many different respects, and in order of one science to work often times another is discipline is working too.
In food court guests are able get food and watch their children play in the recreational area. The type of food served would be quick and easy items such as sandwiches and other nutritional items.

The enclosed recreational area would have playground equipment and other physical activities where children are allowed to run and play. This area also has access to the I-Max Theater via a tunnel underground.

The library would be the next stop along the way the path on the way out. This is an area designated to picking up a book and relaxing, and continuing to educate the young minds.

Then the gift shop is the last spot on the way out. This is where guest would be able to buy souvenirs, clothing and unique items.

The courtyard is located in the center of the shape of the building. This area allows people to go outdoors and provide extra seating and a location for exhibits that may need to be demonstrated outside.

With in the building are panels that are suspended from the joist help absorb sound so the building does not echo from all the noise. They also have an aesthetic quality to them by creating a unique ceiling pattern. The detail shows what these panels are composed of and how they work. They are located throughout the galleries, food court, enclosed recreational area, library, and gift shop.

The structure of the museum is composed of concrete. The large ribs, braces are all concrete. The only element of the structure that is steel are the columns and the joist that span from rib to rib. The roof material is a dull white metal.

I-max theater accessed through either a tunnel that can be located in the enclosed recreational room, or through the front entrance. The theater is sunken into the ground for the reason that I did not want the obtrusiveness of the building to take away from the pureness of the museums' form. The structure of the theater is concrete, and being that it is sunken into the ground, measures such as treating the wall with waterproofing sealant, and drain tiles would be in place.

**SUSTAINABILITY ISSUES:**

**Rain Water Collection** - The entire roof collects rain water and funnels the water with eaves trough to a pipe the sends it to a storage tank located underground.

**Solar Collectors** - Mounted on the southern edge of the building, the solar collectors are motorized to adjust to the angle of the sun year around.

**Lighting** - Overhead light is brought in through skylights. Indirect light is brought in through the windows along the perimeter of the building.

**Geothermal Energy** - The heat within the earth is about the same temperature year around. This can be used to heat the building and cool the building. This system is also helps control the humidity.

**Shading Devices** - The southern edge of the building has an overhang that blocks out the sun. All the windows along the perimeter have shading ledges to block out the sun at higher altitudes.

**Retention Pond** - The pond would control any flood issues around the site, and storm water run off. The pond would also work for wildlife to provide space for habitation.

**Operable Windows** - Windows along the perimeter would be operable to allow natural ventilation. The vertical windows along the front facade would also be operable.

# Think SCIENCE
# Think MUSEUM
# Think FARGO

*-an interactive science museum for Fargo...to enhance our society for the scientific literacy needed in todays world*

## Ground Floor

**1 - THE PLAZA -** The first gathering point to the entrance of the science museum. This area would feature a sundial, outdoor seating for the restaurant, and walkways to the I-Max.

**2 - RECEPTION HALL -** This would be the first gathering location with in the museum. This area is large enough to have special gatherings for private and non-private events. The space can also be used for special exhibits or sculptures. The space is large and open with 40ft ceilings and natural daylight filling the room.

**3- MAIN GALLERY -** This is the first gallery that guest would approach. The gallery would feature seasonal and temporary exhibits. This would keep the museum, and the guest up to date with new information.

**4 - RESTAURANT -** The theme of this restaurant would be "space" and would feature an exciting and well decorated grill and bar environment. The lowered sitting would have a view of the aquarium on the opposite side.

**5 - THE AQUARIUM -** This would feature rare and exotic species from around the world, and also feature an aquarium tank that guest can walk underneath.

**6 - MECHANICAL -** The main source of energy would be from geothermal source in the ground. The water source for the toilets would come from the rainwater collection off of the roof that would be stored for later use. Solar panels on the southern roof edge that adjust to the sun angles would also provide energy. The HVAC for the building would be a variable air system that would be separately controlled by each area of the building.

**7 - SHIPPING / RECEIVING -** Easily accessible from with in the museum and outside. The loading dock would be able to handle either large semi trailers to medium sized trucks to smaller vehicles. This area also has storage for exhibit materials and shipments.

**8 - AUDITORIUM -** A small auditorium that seats about 75 persons. It holds lectures and special events that require digital media. Located behind the auditorium, is a janitor's closet and security office.

**9 - THE EXHIBIT GALLERIES -** This is where all the interactive science exhibits are held. Ranging in, but not limited to Astronomy, Physics, History, Biology, Chemistry, and Geography.

**10 - FOOD COURT -** Guests are able get food and watch their children play in the recreational area. The type of food served would be quick and easy items such as sandwiches and other nutritional items.

**11 - ENCLOSED RECREATIONAL AREA -** This area would have playground equipment and other physical activities where children are allowed to run and play. This area also has access to the I-Max Theater via a tunnel underground.

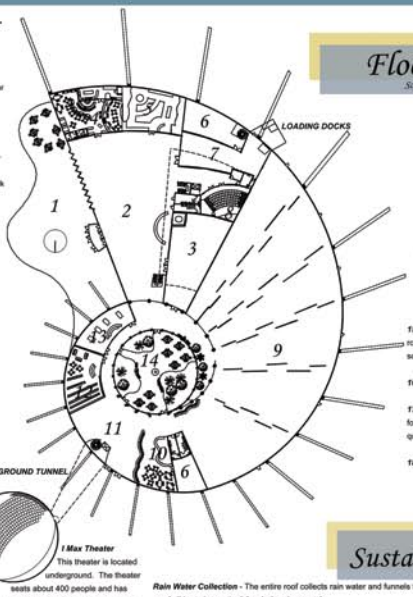
**12 - THE LIBRARY -** An area designated to picking up a book and relaxing, and continuing to educate the young minds.

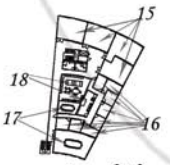
**13 - GIFT SHOP -** A place to buy souvenirs, clothing and unique items.

**14 - THE COURTYARD -** To bring people outdoors and provide extra seating and a location for exhibits that may need to be demonstrated outside.

## Floor Plans~

*Scale 1/32" = 1'-0"*




Second Floor

**15 - CLASSROOMS -** Four different classrooms are provide to help teach children about science

**16 - OFFICES -** Eight offices

**17 - CONFERENCE ROOMS -** One large room for very large meetings, and a smaller one for a quick breakout space.

**18 - EMPLOYEE LOUNGE & MAILROOM /**

### *Fargo's Interactive Science Museum:*

Fargo's interactive science museum will be a place for children and adults to come and learn about science. The exhibits will feature many different forms of science, and the exhibits will be engaging and fun for people of all ages. As guests would enter the museum, they would first encounter the reception / information desk. Then they would either be able to go to the restaurant, aquarium, or to the interactive exhibit galleries. From there, the guest would be able to get food, and enjoy it either in the courtyard, or in the seating provided in the lounge area. Here, people would be able to monitor their children while relaxing. If the children would not care to play in the recreational area, they would be able to continue to learn in the library. After the excitement of all the learning and enjoyment from all the exhibits, guests would then pass the gift shop for souvenirs and other entertaining items. People then would be able to leave the museum the same way they entered the building with out having to pass any of the same things they have already encountered.

With today's advanced society, it is crucial that Fargo is not left behind. This interactive science museum will bring the Red River Valley and surrounding area to the 21st century and beyond. The museum will bring a status of excellence for Fargo, and prestiege well earned.

***I Max Theater***
This theater is located underground. The theater seats about 400 people and has I - Max capabilities. By placing the majority of the theater underground, the obtrusiveness of the theater would be minimal, so not to take away from the pureness of the museum.

## Sustainablity Issues

***Rain Water Collection -*** The entire roof collects rain water and funnels the water with eaves trough to a pipe the sends it to a storage tank located underground.

***Solar Collectors -*** Mounted on the southern edge of the building, the solar collectors are motorized to adjust to the angle of the sun year around.

***Lighting -*** Overhead light is brought in through skylights. Indirect light is brought in through the windows along the perimeter of the building.

***Geothermal Energy -*** The heat within the earth is about the same temperature year around. This can be used to heat the building and cool the building. This system is also helps control the humidity.

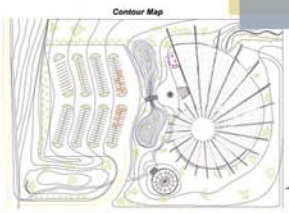
***Shading Devices -*** The southern edge of the building has an overhang that blocks out the sun. All the windows along the perimeter have shading ledges to block out the sun at higher altitudes.

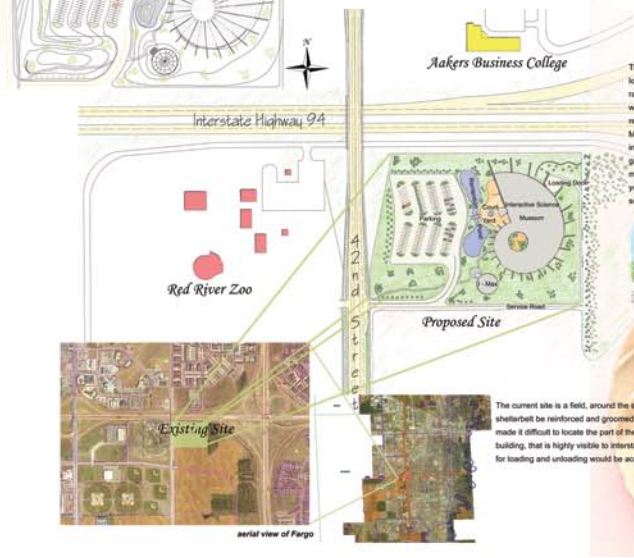
***Rentention Pond -*** The pond would control any flood issues around the site, and storm water run off. The pond would also work the wildlife to provide space for habitation.

***Operable Windows -*** Windows along the perimeter would be operable to allow natural ventilation. The vertical windows along the front facade would also be operable.

## Site Plan ~

***Contour Map***





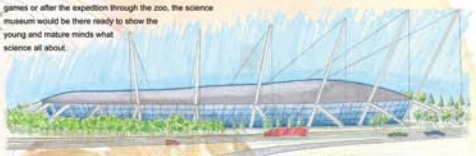

*aerial view of Fargo*

The current site is a field, around the site is a field to the south, and located on the east side is a shelter belt. With my development of the land, I propose that the shelterbelt be reinforced and groomed to be brought up to a better quality. The building has been designed to be viewed from all angles. With that in mind, it made it difficult to locate the part of the building that people tend to think less of, that being the garbage, and shipping and receiving. Along the north side of the building, that is highly visible to interstate traffic, I located a slight retaining wall to block the view of the unsightly yet necessary functions of the building. This area for loading and unloading would be accessed with a service road that runs on the outer perimeter of the site, out of view for aesthetic reasons.

## Sectional Perspective

Panels that are suspended from the joist help absorb sound so the building does not echo from all the noise. They also have an aesthetic quality to them by creating a unique ceiling pattern

The reason for chosing this site falls on many reasons. The first and formost reason for this site is location. The site is located along one of the cities main pathway. Interstate 94 is located to the north of the site, however there is not an on / off ramp, the building would be highly visible to travelers passing through from any direction. The astonishing view of the building would draw in travlers with curiosity about the building. In that aspect, the travelers would be drawn through the city. The next reason for chosing this site relates to its location again. The Red River Zoo would be located adjacent to the Science Museum. Also in this area the softball diamonds are located to the south and west. With all these other interactive activites in the proximity, the people that are already there can follow the trial to the musuem. Whether it would be between softball games or after the expedition through the zoo, the science museum would be there ready to show the young and mature minds what science all about.



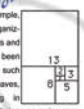
VIEW FROM I-29 OFF RAMP ON TO WEST BOUND I-94

Within the site I have developed a trail that leads from the city street, through the site, pass the I-Max Theater which eventually leads the guest to the entrance of the science museum. By creating this path it helps reinforce the use of the outdoor space and gets guest to interact with the museum.

# The Fibonacci Series with Numbers and Nature

The Fibonacci sequence known as the ***golden ratio*** 1.618034 is also called the ***golden section*** or the ***golden mean*** or just the golden number. Here is a spiral drawn in the squares, a quarter of a circle in each square. The spiral is not a true mathematical spiral (since it is made up of fragments which are parts of circles and does not go on getting smaller and smaller) but it is a good approximation to a kind of spiral that does appear often in nature. Such spirals are seen in the shape of shells of snails and sea shells and, as we can also see, in the arrangment of seeds on flowering plants too. The spiral-in-the-squares makes a line from the center of the spiral increased by a factor of the golden number in each square. So points on the spiral are 1.618 times as far from the centre after a quarter-turn. In a whole turn the points on a radial out from the center are 1.618⁴ = 6.854 times further out than when the curve last crossed the same radial line.

Naturally occurring in nature, this simple, yet very sophisticated means of organizing, is a part of every day life for plants and animals. Fibonacci sequences have been noted to appear in biological settings such as the branching patterns of leaves, grasses, and flowers, branching in blood vessels and trees, the arrangement of pines on a pine cone, seeds on a raspberry, and spiral patterns in horns and shells. The scales on the surface of a pineapple are arranged in two interlocking spirals, eight spirals in one direction, thirteen in the other; each being a Fibonacci number.

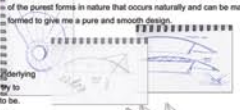



## Concept and Process

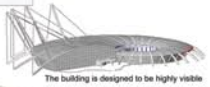
When beginning to work with a concept for an interactive museum, I thought about many different organizations and ideas about how a museum should function. I also thought about what an interactive museum should look like and appear to the public.

Some of the ideas that I was working with were leading me to radial designs with main activities in the center and galleries located off to the side. My design was starting to take shape when I realized the relationship that I needed between certain areas. After much deliberate work with sketches and Venn diagrams, the processes lead me to scribble a snail shell.

I knew I found my concept. The next step was to figure out the final shape of my idea. As it works out, my idea for an interactive science museum is based on one of the purest forms in nature that occurs naturally and can be mathematically formed to give me a pure and smooth design.



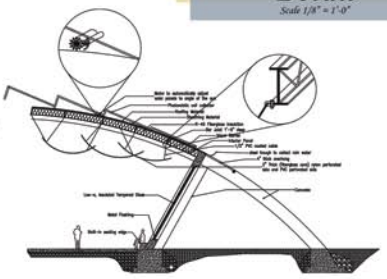
After I had figured out the concept and the underlying principle of my design, the next step was to try to figure out just how big this building needed to be. Working with the nautilus shell for a design was slightly difficult when thinking in terms of structure. That was when I decided that in order to achieve the smooth and pure form of my building, concrete was the choice. I designed these large concrete ribs that start at the end of a column and gradually ever-so gracefully immerse themselves back into the ground from which they were conceived.



The building is designed to be highly visible from the major interstates that cut through the city. This is achieved by the the large 137 ft concrete braces that appear to be holding the buildings roof by cables. However, the large braces do not act with any structural support and give the building a sculptural appearence, and helps make the building a landmark for Fargo.

## Detail

*Scale 1/8" = 1'-0"*



Solar Collectors

***The Main Entrance.***

The large glass façade acts as a shading devices in many ways. First, the angled glass breaks up the monotonous on the front and creates unique shading on the outside of the building and on the reception hall on the inside. The shading on the glass over the area that would be for the restaurant is designed to block more sun in the later hours when people are there enjoying an evening meal.

Trials on the site allow the guest to interact with the site and the building.

## Interactive Exhibits

Exhibits for the museum will be hands-on, and computer interactive. There will also be exhibits that will only require users to look and listen to what the exhibits have to explain. The fun and interaction of the children and the adults with the exhibits will make the environment fun and exciting. With a wide variety of exhibits ranging in the field of science the museum will give Fargo a new place to go on a regular basis. The science museum will bring the scientific literacy of Fargo to a new level.

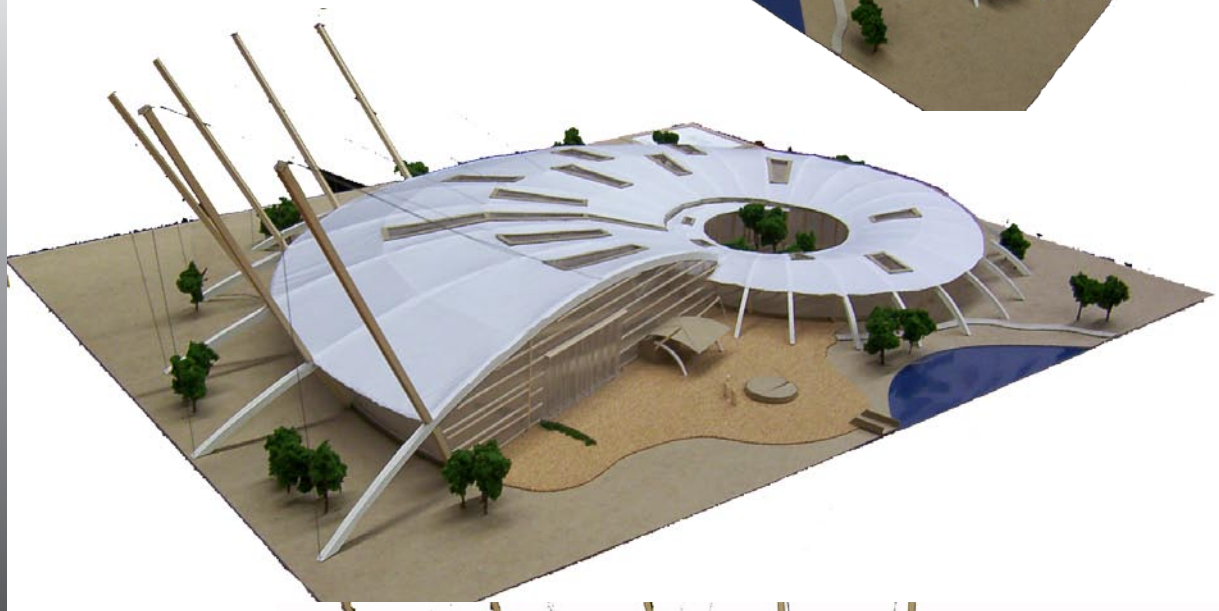
***Aquarium***




***Food Court***

FIFTH YEAR THESIS PROJECT SPRING 2006

JUSTIN HAYES



# References:


http://www.azscience.org/

http://www.exploratorium.edu

http://www.northcarolinatravels.com

http://www.ncmls.org

http://www.nyhallsci.org/

http://www.omsi.edu/

http://www.scienceworksmuseum.org/

http://www.sci-quest.org

http://www.msichicago.org

http://www.mcs.surrey.ac.uk/Personal/R.Knott/Fibonacci/fibnat.html#spiral

Rosenblatt, Arthur. 2001. Building Type Basics for Museums John Wiley and Son

http://www.mbiproducts.com/products/specifications.aspx?ProductID=4000-1010P

Ramsey/Sleeper (2000). Architectural Graphic Standards: Student Edition (9th ed.). John Wiley & Sons, Inc.

Rubenstein, Harvey (1996). A Guide To Site Planning and Landscaping Construction (4th ed.). John Wiley & Sons, Inc.

Brown, G.Z. and DeKay, Mark (2001). Sun, Wind & Light: Architectural Design Strategies (2nd ed.). John Wiley & Sons, Inc.

Ambrose, James (2000). Simplified Engineering For Architects and Builders (9th ed.). John Wiley & Sons, Inc.

http://www.odpm.gov.uk/index.asp?id=1139866

http://www.sustainabletable.org/intro/dictionary/

http://www.sustreport.org/issues/intro.html

# Program Appendix:

Site maps provided from http://www.ci.fargo.nd.us/
gis imaging located on the webpage. 11/04/05 , 4/22/06

Graphs and Data provided by: CityRating.Com
http://www.cityrating.com/cityweather.asp?city=Fargo 11/06/05

# Justin Hayes

HOMETOWN

It’s only the beginning