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Program Analysis and Design Requirements for the National Science Center

by

William C. Bullock
W.R. Peter Pittman
Douglas C. Heinen

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This research was conducted to develop facility information for a hands-on exhibit and science center facility. The development of this information uses background and case studies of existing science centers and proposed facilities. Information gathered from site visits to five national science centers shows current state-of-the-art technologies, techniques, or products that relate to science center environments. Overall theme and image, integrated design features, and visual stimulation that a science center should offer are addressed and presented. This research will be used by the National Science Center Task Force at Fort Gordon, GA during design of the new Discovery Center. Science centers, museums, and/or art galleries will also find this report useful in determining or analyzing needs and requirements.

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William C. Bullock, W.R. Peter Pittman, and Douglas C. Heinen

RFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)

College of Architecture
Georgia Institute of Technology
225 North Avenue
Atlanta, GA 30332

U.S. Army Construction Engineering
Research Laboratory (USACERL)
PO Box 4005
Champaign, IL 61824-4005

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FOREWORD

This study was conducted for The Discovery Center, National Science Center, Fort Gordon, Georgia under Intra-Army Order (IAO) DPCA 11-89, dated 20 June 1989, "NSCF Discovery Center Building." The Fort Gordon point of contact was Dr. George J. Fry, ATZH-NSC-D under Commander COL C.F. Rimby.

This research was performed by Professors William C. Bullock and W.R. Peter Pittman, employed by the Georgia Institute of Technology, for the Facility Systems Division (FS) of the U.S. Army Construction Engineering Research Laboratory (USACERL) under Purchase Order CECER-FS-89-428. Dr. Michael J. O'Connor is Chief of USACERL-FS. The work was initiated by the Habitability Team and completed by the Architectural Design and Management Team where L. Michael Golish is the Team Leader. The USACERL technical editor was Gloria J. Wienke, Information Management Office.

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PROGRAM ANALYSIS AND DESIGN REQUIREMENTS FOR THE NATIONAL SCIENCE CENTER

1 INTRODUCTION

Background

The National Science Center for Communications and Electronics is a partnership between a civilian foundation, The National Science Center Foundation (NSCF) and the U.S. Army, represented by the National Science Center Task Force at Fort Gordon, GA. The effort is committed to supporting improved education in science and technology. Lack of educational support in science and technology is a national problem that affects both industry and the Army. This national resource center will stimulate an interest in science and technology in the youth of our nation, will provide facilities for educational research, and will sponsor activities and products to enhance education in communications, electronics, physical sciences, and related mathematics. One activity of this partnership is to construct the Discovery Center, a dynamic facility that will feature over 350 hands-on exhibits representing principles and applications of science and technology, supported by demonstrations and informal educational programs. The Task Force will develop the facility information, including programmatic requirements and functional specifications for the Discovery Center building; the National Science Center Foundation will build and equip the facility. Upon completion, the building will be donated to the Army for operation and maintenance.

The project has high priority with the U.S. Army. It was initiated with a Memorandum of Understanding signed by the Secretary of the Army and endorsed by Public Law 99-145 passed by Congress in November 1985. The program is directed by two distinguished executive committees: the Army's Executive Steering Committee composed of Department of the Army general officers and led by the Commander of the United States Training and Doctrine Command (TRADOC) and the NSCF Board of Directors composed of leaders in business and industry chaired by Harry Gray, former Chief Executive Officer of United Technologies. The Discovery Center, representing a national concern for math and science illiteracy, will be a focal point for educational research in those arenas and will be a dynamic public relations outreach for the Department of Defense. The building must reflect this national focus on high technology.

Construction of the Discovery Center is expected to begin in 1991 with a grand opening scheduled for 1993. Currently, the Task Force is developing design and space requirements. Support is needed to research and identify the design functions necessary for the Discovery Center's mission of presenting technology through the use of interactive hands-on devices. Consideration must be given to the technical needs peculiar to the exhibits; the electromechanical, electronic, telecommunication, and automation requirements. Because the ultimate operation and maintenance of the building will be the Army's responsibility, it is in the government's best interest to develop comprehensive facility information and present these requirements in clear and technically accurate terms.

Objective

The objective of this work was to develop facility information for a hands-on science museum called the Discovery Center. This information generates creative ways to use current materials, technologies, and

approaches to integrate the complex systems and interactive devices within the building; to create a facility that is appealing to the visitor and provides exciting educational opportunities. This information will be used to provide the government's input to the architects contracted by the National Science Center Foundation to design the Discovery Center.

Approach

During the course of this research, the researchers visited five different national science centers: Sci Trek in Atlanta, GA (Appendix A); Ontario Science Center in Toronto, Ontario, Canada (Appendix B); St. Louis Science Center, St. Louis, MO (Appendix C); Children's Museum in Indianapolis, IN (Appendix D); and the Science Museum of Minnesota in Minneapolis, MN (Appendix E). In addition to tours of these facilities and discussions with knowledgeable administrators and employees, researchers photographed each facility, reviewed extensive literature on design and operation of museums nationwide, and examined photographic documentation (Appendix F) collected both by the researchers and by the Task Force (which had extensive slide files on facilities that had been visited previously). Researchers also prepared some artistic renderings (Appendix G). (It should be noted that the St. Louis Center is currently involved in a major new facility redesign and construction project and is in transition between old and new facilities.)

Information the Task Force provided to the researchers (originally prepared by Oak Ridge Associated Universities) was also very beneficial. The Oak Ridge study compiled statistical data on 38 centers* from 16 states. Sci Trek and the Children's Museum in Indianapolis were included in the study; their data is included in this report.

Analysis involved collecting and reviewing related information to determine state-of-the-art technologies, techniques, or products that could be brought to bear on the project. Information was gathered by interviewing National Science Center staff members and other experts, by reviewing existing studies, documentation, technical literature, and by visiting similar institutions and structures for "lessons learned."

*For brevity, all science centers/museums visited will be referred to as "centers," realizing that the distinction between the two may be somewhat a matter of personal opinion.

2 OVERVIEW OF EXISTING SCIENCE CENTERS

Building Aesthetics and Arrangement

Exterior

Exterior building aesthetics are varied and range from existing structures that were converted from other uses to entirely new facilities representing modern architecture. Some are located in natural settings while others are in more urban settings with less open area around them. Most of the centers visited use older converted structures that have been expanded over the years through building additions creating varied architectural styles. This is true for the five-story Indianapolis Center, for instance, which has undergone three building additions since 1976.

The extremes in typical building architecture are represented at one end of the spectrum by the Exploratorium Science Center in San Francisco, which uses a virtual shell of an old exposition building with secondhand furniture to display exhibit items, to the Ontario Science Center, which is a more modern building complex (10 years old) with more contemporary architecture and furnishings. Apparently both the San Francisco Exploratorium and Ontario centers are highly successful. At first glance, this can be perplexing, but after more thought one can conclude that there are other important factors beyond building aesthetics that contribute to the success of these centers.

Entryway aesthetics were generally good with the exception of Sci Trek. The front of the Sci Trek building implies that it is the main entrance. However, the most used and more accessible entrance is at the rear of the building adjacent to public parking. This entryway is not well marked and can be confusing for first-time visitors. It leads to a small information podium where visitors are directed down a flight of stairs and along an open corridor to the center below. The Ontario Science Center has a large, attractive fountain extending across the front of the building. A large sign in front of the building does not necessarily blend with the building architecture, but adds a festive atmosphere through its use of materials and color. (The sign advertises the center's "Sports" exhibit, which is very popular.)

Interior

Interiors of the centers visited were varied in their architecture, arrangement and use of space, and use of color and lighting. The newer building facilities in Ontario and Indianapolis provided more open and expansive interiors reflecting the use of more modern construction techniques and materials. These newer facilities also use strong primary colors with more neutral colors in the exhibit areas. Sci Trek uses a color-coordinated system and spot lights. Gray is used as a background on carpeting and ceiling areas and nonessential parts of displays while colors are used as accents on important parts of displays. This scheme is followed throughout the entire display and museum shop area. The Ontario Science Center uses bright primary colors against both light and dark grey/black backgrounds for exhibit areas. The lighting and color system is not used as consistently as Sci Trek's, however, and there are many variations.

The Indianapolis Center was started many years ago as a traditional museum and retains many of the old interior museum features. The center is now undergoing change, however, and the recent additions have created a much more open and modern look. A number of original collections are still present; newer hands-on exhibits have been added. By retaining some of the old with the new, the facility offers a varied architectural experience and is a good example of the possible interior treatments and ambiences. Exhibit galleries on the five floors are reached by an open atrium ramp. Staff coordinators are assigned

as curator/designers so each gallery provides a different experience. The structure uses an organized color scheme for the atrium, in hallway areas, and in several of the theme rooms. Color and lighting schemes vary widely between galleries.

Theatrical lighting is used in a number of centers to focus attention on the exhibits and items displayed. The premise is one of lighting the task with direct focused light while reducing ambient light levels in the surrounding areas such as ceilings. This creates a dramatic effect similar to a theatrical setting by drawing attention to the lighted displays and away from surrounding less important areas. This approach is also effective in reducing visual clutter by hiding unattractive ceiling elements. These are usually painted dark grey or black and effectively disappear.

Although this lighting treatment is recommended in work environments (to concentrate the worker's attention on the work area and reduce eye fatigue by offering the eye a chance to "rest" when looking away from the task area), it can be overdone and carried to extremes by creating too much contrast between exhibits and surrounding areas indirectly lit. This can result in light levels that are too low in areas such as stairways and ramps, leading to safety problems. Spot lights used for direct light in a number of instances are too bright while others are not positioned properly. This creates eye discomfort for visitors.

Some interiors, such as the St. Louis Science Center, appear to be poorly coordinated in the use of color and materials. The sense of Gestalt (the whole) was lost with a resulting array of juxtaposed exhibit pieces that appeared to have landed in their positions quite by accident. In all fairness it should be noted that the St. Louis facility is in transition and that a new facility is on the horizon, which may help explain the current state of affairs. In several centers, color was not well coordinated and the hue, value, and intensity of colors varies greatly. The St. Louis Science Center does not appear to have an overall coordinated color scheme.

Carpeting was used throughout most of the centers, although vinyl tile is also used in certain areas in St. Louis and Ontario. Dark shades of carpeting are generally used while vinyl floors are of lighter shades. Sci Trek uses a neutral grey wall-to-wall carpeting. Indianapolis installed carpet squares with an inlaid design that was attractive. The staff does not recommend them, however, because they do not withstand rigorous cleaning and constantly have to be glued back down.

The Indianapolis Center makes particularly good use of graphic banners suspended from supports around the lobby and atrium area. These were both decorative and informational. They can be updated at minimal cost and help advertise coming and current attractions.

Exhibits

Exhibits and displays are extremely varied in their design and use of materials, color, and texture. The centers visited appear to be moving away from the more traditional museum aesthetic of "hands-off, behind-the-glass" exhibits to more hands-on interactive displays and devices. The success of the Exploratorium in San Francisco is attributed, in part, to the fact that visitors can handle and try out items on display. Essentially this same philosophy is practiced by the Ontario Science Center. Several of the Ontario exhibits use a unistrut metal system, wooden beams, and other architectural interior elements to create the feeling of a more comfortable space. Large, expansive building spaces can feel uncomfortable, creating a cold and stark environment.

A number of displays were unattractive; they were old and shabby, especially at the St. Louis Center and in certain areas of the Indianapolis Center. One problem was the use of stylistic design elements created through the complicated use of form and color. This visual complexity can quickly become tiresome, dated, and out of vogue. These overly complex visual forms also compete for attention with the important exhibit elements and probably create additional maintenance problems.

The exhibits that attracted attention first were those using sound and/or light and stood out from surrounding exhibits. At Indianapolis, this was perceived as a problem because as some visitors stayed at exhibits, others would "leap-frog" ahead, bypassing important exhibits along the way. In some centers, noise was quite loud, especially in the large exhibit halls, where sounds from machines, electronics equipment (computers), and children all mixed together.

Another interesting observation is that the centers do not want to accept donations of exhibits that are not in keeping with their overall mission and goals.

Visitor Service Areas

The extent to which visitor service areas are well run and efficient probably indicates how well the center as a whole functions for the public. The number of visitors at science centers can be extremely high (as many as 20,000 visitors a day at Indianapolis). The Visitor Service Areas covered below include the following areas: Transportation Dropoff and Parking, Lobby/Ticketing/Information, Coat and Storage Area, Museum Store, Food Service Areas, First Aid Area, Public Toilets, Workshop Apprentice Area, and Public Seating and Rest Area.

Transportation Dropoff and Parking

Private automobile and school bus dropoff areas are provided at the centers visited. These appear readily accessible and clearly visible for vehicle operators. School bus unloading areas are sometimes located in low traffic areas to the side or rear of the building away from the more public entrances. This is true at the Indianapolis Children's Museum, which has a separate school bus entrance, and at Sci Trek, which uses the rear entrance for school groups. Pedestrian entryways are covered but driveways are not covered except at the Ontario center. No bus entryways were observed at the St. Louis Science Center.

Parking seemed adequate at most of the centers, conveniently located a short way from the building and main entrance. Separate employee parking lots with independent entrances to the facilities relieves some of the public parking lot load. The Ontario center has two parking lots totaling 1900 spaces, which is considered adequate.

Lobby/Ticketing/Information

Front door ticket counters are for the most part readily accessible at the centers visited. Sci Trek provided multiple entries, which could be confusing for visitors. The ticket counter faces away from this entrance, which is not ideal. At the St. Louis facility the ticket counter appeared to be too close to the main entrance to provide sufficient queuing area for people waiting to get tickets. The other centers had generous and inviting queuing areas. The St. Louis center ticketing area was not well lighted and did not provide adequate information about the exhibits, admission prices, and related data. A kiosk provided some of this data but was not strategically located. Sci Trek, on other hand, provided good information. Banners at Indianapolis (described earlier) were both useful and decorative information pieces.

Ticketing and information areas were separated at the Indianapolis center and combined at the St. Louis, Sci Trek, and Ontario centers. The advantage of one layout over the other was not apparent. Information areas providing box office and museum scheduling information are provided at all centers visited.

Coat and Storage Area

Pigeonhole storage cabinets for children's school books, coats, and boots are provided at the Indianapolis Center. The Ontario center used shopping carts for school groups to store their coats and books. They do not work well according to center staff and are cumbersome and unsightly. Pull-out locker storage bins were recommended by employees as a possible solution to this problem. Public coat storage rooms were not observed at any center. At Indianapolis, visitors are offered rental strollers for small children. Rental lockers were available at the Ontario center.

Museum Store

All museum stores are accessible to lobby and entryway areas allowing access without entering the museum proper. All appeared to be well lit and created an inviting atmosphere through their design and display of merchandise. Public access was controlled by one entry into the store. At Sci Trek, displayed merchandise was highly visible and accessible to the public for examination through the use of open shelving accessible from two sides. Both the Sci Trek and Indianapolis stores have open layouts. The St. Louis store was a more closed plan and somewhat less inviting. At Sci Trek, the merchandise and display designs are coordinated with exhibits, bringing about an interesting synergistic relationship between store and exhibit areas. As a result, the store became an extension of the exhibit areas and provided a great deal of entertainment for visitors who handled and tried out many of the science-oriented gifts on display. In a sense the boundaries between exhibit and store merged very effectively. The store at Ontario, by contrast, appeared to be more of a separate museum shop.

Food Service Areas

Some form of dining facilities are available at all the centers visited. At Indianapolis, Sci Trek, and Ontario, dining facilities are provided for visitors. Sci Trek's facility provides only vending foods and sack lunch capability, whereas, Indianapolis provides two facilities: a full-service cafeteria and fast food eating areas. An outdoor picnic area is also available. The full-service cafeteria is run by a private enterprise and does not permit sack lunches to be brought into the facility. An indoor sack lunch area is needed according to staff. School groups must eat sack lunches on their bus if bad weather prohibits the use of the outdoor picnic area.

Dining areas at Sci Trek could be considered an extension of the exhibition space. By contrast, the dining areas at Indianapolis are isolated architecturally as separate and independent facility areas. Catering is possible at all facilities visited, however, the adequacy of kitchen facilities to support catering activities was not evaluated.

Food service at the Ontario center is, in the words of one employee, one of the center's worst problems. Apparently visitors complain a lot about the food. This was attributed to the center being a government facility and, therefore, having to take the lowest bid from concession contractors. Five different food service areas are located throughout the center. These different eating areas could probably be combined into one centrally located facility.

First Aid Area

Ontario has a first aid area staffed with a part time nurse. This arrangement seems to work well despite the 1.3 million visitors the center has each year. No first aid areas were observed in the other centers.

Public Toilets

Public toilet areas can require extensive staff monitoring and cleaning. None of the facilities had toilet facilities located near security. There is also an apparent need for changing tables in both male and female toilets for persons with small children. The Ontario center recently added changing tables to its toilet facilities.

Workshop Apprentice Area

The Workshop Apprentice Area is under construction at the Indianapolis Children's Museum. The area will provide teenagers with opportunities for first hand experience in exhibit design and construction. It is being created in an attempt to attract and hold the interest of high school students — the group that usually loses interest in museums. The facility will consist of a carpentry shop and layout and staging areas. The facility interior was designed by local high school students working on a summer intern project. The facility appears to be unique and its potential for success has the Indianapolis staff excited.

Public Seating and Rest Area

Ample public seating was provided in some centers and was almost totally absent in others. The staff at Indianapolis has had requests from nursing mothers for a quiet, out-of-the way seating and rest area.

Exhibition Areas

Exhibit Space

None of the centers visited were single story facilities. Sci Trek, however, had exhibits on the first floor with administrative offices on the second. Most exhibition areas were generic space with the exhibits creating defined interior spaces and atmosphere. These areas included low, fixed partitions or movable partitions. Exhibition areas also included both permanent and temporary traveling exhibitions. Sci Trek and St. Louis chose to use the "black box" aesthetic design approach by highlighting exhibits with direct light. The "black box" approach creates an exhibit space where nothing distracts the visitor from the display. Indianapolis uses some "black box" design but also uses the more traditional museum approach with balanced lighting.

The more recently designed interiors appear to be more consistent in their use of displays that are designed and constructed better. These displays made use of simple forms and graphics that complemented rather than competed with the items being exhibited.

Exhibit Themes

There appear to be two general themes used by the centers researched. The open plan uses strategically located displays and products within a larger open space and incorporates color, texture, and lights to focus attention on the exhibits and away from surrounding ambient and more neutral areas (i.e., walls, floors, and ceilings). The other theme follows a more traditional museum with conventional room and gallery layout and glass case layout display.

The smaller centers such as Sci Trek generally use the more open layout. This is obviously a money saver but also has the advantage of layout flexibility and, as mentioned earlier, can focus attention on display items and away from unattractive surrounding areas of the building. This form of layout was used effectively to communicate a sense of the whole (Gestalt) about the space and the center. The larger centers such as Indianapolis, however, use their more extensive exhibition capability by housing exhibits in separate rooms or exhibition galleries. One notable exception to this is the Exploratorium in San Francisco, which is quite large, and housed in an old facility, but still uses the newer open theme without theatrical lighting to be successful.

The St. Louis center personnel defined the theme areas as "loosely structured" and seemed to strive for inconsistencies between different exhibits in their exhibit gallery. They attempted to arrange the individual exhibits to vary between exciting, passive, mechanical, and other orientations. It was not clear whether they will carry this practice into the design of their new facility. The Ontario center varied their thematic offerings in an attempt to offer something for both young and old.

Temporary Exhibits

The temporary (traveling) exhibits in the centers are generally much more elaborate than the more permanent exhibits. They use better materials, are better designed, and are constructed with well-crafted details. This can be attributed to their newer design and materials and the attempt on the part of the centers to showcase these newer displays in order to attract visitors.

The Ontario center had initially planned to have a certain percentage of new exhibits on display. This has not always worked as planned, but they always try new ideas and improvements to existing displays. One idea that has worked particularly well is the center's Science Arcade. This is an area where they try out new ideas that are not wanted for other display areas. Ironically, this is now the most popular area in the museum.

Exhibit Safety

There was a genuine concern at all centers for the safety of visitors. Staff are always on the lookout for hazards associated with the exhibits. They seem to realize that exhibits must always be designed with maximum safety in mind and that misuse of a display or device must always be considered. The most serious accidents to date have been associated with stairways, ramps, and escalators although no statistics are available. Older patrons and children appear to be the most likely to be injured in these areas.

Theater Facilities

Personnel at all the centers felt that theater facilities provided unique educational opportunities and were needed. St. Louis has an Omnimax; Indianapolis is constructing one. These are considered essential

to study astrological sciences. Indianapolis has a multipurpose theater for community activities and educational activities. The Ontario center has a 500-seat theater for slide and audiovisual programs. All facilities incorporated multipurpose classrooms and/or small theaters for more intimate presentations, lectures, and discussions.

Research and Programs

Volunteer Staff Program

All of the museums visited, except the Ontario center, relied heavily on volunteer staff and support especially on weekends. The Ontario center was able to pay all staff, but felt they could increase their volunteer force twofold. Volunteers serve as "visitor aids" (explainers) and guides, and staff the information desks, stores, collections areas, etc. The friendliness and outgoing nature of these volunteers was noteworthy and they are obviously an essential ingredient to well run facilities.

Educational Outreach Program

The staff at each facility felt that an educational outreach program is an essential part of the mission of their facility and that the purpose of the program is primarily to engage the elementary and high school students of the community. This is especially so at Indianapolis where a new hands-on exhibition facility called the Center For Exploration was built to entice high school students to become involved in museum activities. The 20,000-sq ft (1858-m^2) facility consists of a carpentry shop, satellite video theater, production stage, photography darkrooms, a wet lab, resource areas, and several classrooms and meeting areas. The space is offered to school groups to do special projects (e.g., build floats or stage scenery) and museum projects.

Exhibit Support

Workshop Facilities

Workshop facilities were present at all the centers visited. These generally included woodworking and machine shop capabilities. The centers used their shop facilities extensively, in spite of the fact that most centers contracted out much of the new exhibit construction. The Ontario center does all exhibit research and design in-house. The St. Louis Center develops about half of their exhibits in-house and contract out the other half. Many of the in-house exhibits use repackaged materials that are bought elsewhere or cobbled together from existing displays. The facilities at Indianapolis were very extensive and noteworthy in terms of their layout, design, and management. Effective management and shop safety are critical concerns at all centers.

Installation of Exhibits

Installing new exhibits and moving existing ones for repair or maintenance is accomplished using a variety of dollies, hand trucks, and carts. Forklifts are used for moving larger equipment items. At the St. Louis facility, for instance, forklifts are used to move exhibits from loading docks and warehousing areas to and from the exhibit area. This requires the use of loading docks, freight elevators, and 12-ft (3.65-m) wide corridors to move large equipment and displays. Movable walls were recommended for extremely large items.

Educational Outreach Program

Most centers had some form of outreach program and were planning to expand them. The Ontario center has a "circus" that travels extensively to communities across Canada. The circus is now being marketed internationally and can be bought, rented, or leased by other centers.

Exhibit /Graphic Design

Exhibit design is considered a team effort at the facilities visited. Design is usually accomplished by having a larger team contribute initial ideas and suggestions and, as ideas become more fixed, streamlining the team for final design and execution. The staff at Indianapolis starts with a team of nine, including administrative personnel, a subject matter expert, an evaluator, and the building service manager. A smaller team of four actually puts form and design to the exhibit concept. Staff designers produce the appropriate documentation and the exhibits staff and services staff do the necessary fabrication.

The graphic design studios observed have silk screening, photographic, light carpentry, painting facilities including a spray booth and drying area, staging and prop areas, and access to crating and shipping facilities.

At the Ontario Center, it was interesting to note the ratio of maintenance time to time spent on development of new designs. This percentage varied greatly depending on the complexity of the exhibit design. Museum staff estimated that 80 percent of exhibit staff time is spent maintaining electronic exhibits and 20 percent is devoted to developing new ideas. For metal exhibits, the percent of maintenance time to new design development is estimated at 50/50. For wood exhibits, the percentages are 10 percent maintenance and 90 percent new design effort.

Exhibits/Audiovisual and Electronics Studio

According to managers at the St. Louis Center, computers have a life expectancy of about 3 years. The center hires nine electronics people to maintain their exhibits; repair is a constant necessity and can be intense.

Flat wiring under carpeting is used and is recommended by the management as less expensive and more easily changed than a more permanent floor grid wiring system. However, no data was presented to support this position. Dropping wires from overhead was also mentioned as an alternative although they do not use this system.

The Ontario center would like to have no audio/visual exhibits. Instead they want to have exhibits that visitors can see and touch. In their opinion, sound and pictures are abstractions and they always strive for the real thing (i.e., real solutions) whenever possible to demonstrate a particular principle. It was also noted that the downtime on exhibits occurs most frequently with electronic exhibits. The expense of maintaining some exhibits can be more than the cost to redesign them for more efficiency and less maintenance. The message is "do it right the first time."

Painting Facilities

Painting areas observed at all facilities visited included spray booth, drying area, and paint storage areas. These areas provided quick color application for repair and new construction.

Audio/Visual and Electronics Repair and Maintenance Shop

All facilities provided areas for audio/visual and electronics repair and maintenance, parts storage, and audio/visual and electronics equipment storage. These areas received use in proportion to the amount of electronics work done in-house or contracted out.

Exhibit Staging and Clean Assembly Area

All facilities reported areas available for exhibit staging and clean assembly. Frequently, this activity was piggy-backed on other areas such as hallways and storage areas adjacent to workshops. The Indianapolis center had a very generous staging area.

Exhibit Prop Storage Area

The centers visited provide storage to meet a variety of needs including: temporary exhibits; displays to be repaired, crated, uncrated, and shipped; permanent center collections; workshop supplies such as wood and metal; expendable office supplies; spare display parts; spare building parts; and equipment to support evening activities (tables, chairs, portable bar, etc.). The amount of space needed is directly related to the size of the museum and the number of repair and construction activities provided in-house versus those contracted out. Storage space requirements can be extensive, depending upon the individual center. For example, the Indianapolis center has over 12,000 sq ft (1115 m^2) of storage plus an additional 19,000 sq ft (1765 m^2) for permanent collections. The Ontario center does not have enough prop storage space. Wide corridors in the building are currently used for this purpose. Additional storage is available at another facility 1 mile (1.6 km) away. They are constructing a new 100 by 100 ft (30.48 by 30.48 m) storage facility. This will give the center 10,000 sq ft (929 m^2) of storage for their 120,000 sq ft (11,148 m^2) of exhibit area.

Signs and Graphics

Exterior Signs

Exterior building signs are those attached or located adjacent to the facility. This group of signs includes building identity signs and directional signs for pedestrians and motor vehicles. Building identity signs were attached to the building and generally worked well to identify the center. The signs were not always well designed. Their size, style of lettering, and location were not in keeping with the building architecture. This was particularly noticeable on older facilities which attempted to use a more modern type style. At Sci Trek, the building sign is visible from a main thoroughfare, but actually attracts first-time visitors to the wrong entrance (the main entrance is at the rear of the building adjacent to the parking lot). A large sign at the entryway in Ontario is effective, as mentioned previously, but does not fit particularly well with building architecture.

Most directional signs also are not well coordinated with building architecture and site landscaping and, when provided, are not positioned for easy reading from vehicles. At Sci Trek, directional parking signs are particularly confusing. They are hard to read, poorly positioned, insufficient in numbers and can be confused with staff parking signs.

Interior Building Signs

Interior signs are grouped into three types: informational and directional, kiosks, and decorative. Informational and directional signs range from satisfactory to poor. In the facilities visited, these signs were not well designed and were not positioned for easy reading by visitors. Sci Trek had well designed graphics but they were hard to read because of poor placement and lighting. Messages were frequently ignored and the most effective signs were those which, in the opinion of center staff, were "oversized" and/or read "authorized personnel only." The Sci Trek management acknowledged the need to correct this problem. At Indianapolis, signs were not well designed but they were easy to read. There was a lack of consistency in the use of graphic elements, shape, and color of the signs. At St. Louis, few directional and information signs were used.

The Ontario center's staff observations regarding the use of signs by the public is as follows: (1) visitors first use the building architecture whenever possible to find their way by relying on prominent features and landmarks, (2) people ask other people and staff where to go, (3) as a last resort, people look for signs. The center deploys a number of different signs all over the center that use different styles of lettering, shapes, sizes, methods of display, and mounting techniques. A building map that people can read was suggested by one staff member.

Kiosks were used at several locations to provide directional maps: ticket and pricing information; and photographics of center attractions, videos, and coming events. One advantage of this form of information presentation is that a lot of information about the center can be centralized in a relatively small area. This approach was used effectively at Indianapolis by having a free-standing kiosk display unit in the entry lobby to display vivid color transparencies of center exhibit areas, show their location, and provide written information about the various areas. It also featured a video presentation and a computer program describing the activities. This kiosk was used to help attract museum volunteers.

Decorative signs are also used at a number of centers. These consist of either posters or banners to advertise coming attractions or purely for aesthetic purposes. They are typically displayed on walls or hung from ceilings or walls. As mentioned previously, they were used very effectively at Indianapolis. Ontario also used a variety of decorative banners and flags; they use balloons on special occasions to create a very festive and decorative atmosphere.

Building Maintenance and Security

Building maintenance, cleaning, and security were very important to all centers, although some appeared better maintained and cleaner than others. Older material, fabric, carpeting, and similar materials become more difficult to clean over the years. This was particularly evident in St. Louis which is implementing renovation plans that will solve this problem. The newer facilities (Sci Trek, Montreal, and Indianapolis) looked better.

Cleaning

Cleaning is a major undertaking at all the centers, is never ending, and is expensive. It is also very important to visitors (especially ones with small children) to have the building and the surrounding grounds clean. Bathrooms and outside eating areas are particularly problematic and can quickly become unsightly and unsanitary.

The Indianapolis center has a well organized building and grounds cleaning program. The center has three housekeepers and a supervisor on staff. The supervisor also supervises an outside cleaning contractor who does heavier power cleaning such as floors and carpeting. Each week, a walk-through inspection is held with the outside cleaning contractor's crew to provide feedback and to assure that the job is done right. This "white glove" inspection is credited by the Indianapolis staff with keeping the museum well cleaned. Cleaning around building grounds at Indianapolis focuses on the outside eating area and requires one cleaning person all day to pick up trash, wash down spills, and clean tables. Insects are a particular problem and several children have been stung by bees. A pine-based cleaning solution mixed with water is sprayed on trash receptacles to control the insects. Cleaning bathrooms at the Indianapolis center keeps the remaining in-house cleaning staff busy all day keeping paper stocked and emptying the trash.

Heating and Air-Conditioning

Heating and air-conditioning problems often occur in large buildings and especially so for centers with special needs (e.g., computer exhibits or heat-generating exhibits). Providing adequate service to large open exhibit areas and at the same time more personalized service to administrative and staff offices places particular demands on these systems. This problem is further compounded by building expansions over the years that produce a mix of old and new systems and the required ducting and wiring. The Indianapolis facility is exemplary of just such an old and new facility. Their maintenance staff recommends the following: do it right the first time using quality design and equipment, and have a knowledgeable center HVAC employee work directly with the architect/engineer during design and the contractor during construction to make sure the installation is made correctly.

Plumbing

Plumbing was generally adequate in the centers visited. Staff at the Ontario center recommended both plumbing and electrical service be located in diagonal corners of exhibit rooms or halls, rather than using a more elaborate and expensive grid system. As exhibits would change over time, these corner locations of services would be economically accessible. The grid system alternative would not be cost effective as it may not be used to its most flexible conditions.

Security

Security is obviously a serious point for science centers. There are many nooks and crannies in center complexes to monitor. Problems range from simple vandalism to theft of parts of exhibits to more serious malicious activity and the possibility of physical harm. Unfortunately, most public places, centers included, have to deal with a small percentage of the public that is dishonest, malicious, or dangerous. This has led to a variety of methods that are now employed to deter theft and other undesirable activity. These vary from employment of security staff and volunteer "watchers" to video-based security systems and to locked rooms, cases, and physical barriers and signs. In many instances, it appears that lessons learned from displays are less than they could be because close examination and hands-on experience is limited for reasons of security. Centers must constantly balance the need to know with the ability to provide security. This usually equates to the ability of centers to have people available to help monitor displays. A larger staff available to serve as monitors results in more hands-on experience.

All of the centers visited employed personnel to watch exhibit areas. Sci Trek uses "watchers" positioned on a second story balcony to deter shoplifting when large school groups are in the center store. At Indianapolis, a camera security system is used and personnel are assigned to certain exhibits. To deter

"throw away" theft, trash collected in bags by night cleaning crews is discarded at later and irregular times to deter retrieval from the trash. "Anything that does not screw down will be taken," according to staff. To prevent theft or damage, the staff tries to fasten things securely in place. In an ironic twist, Ontario uses an exterior video system to deter theft by employees. No system is used inside.

3 SUMMARY

Most of the centers visited appeared to provide information and exhibits of interest to all age groups. The Indianapolis Children's Museum caters to children, teens, and their families. The new Apprentice Workshop for teenagers at this center was unique among the centers visited. A hands-on wet area was also very popular with children. St. Louis had an effective children's workshop program providing hands-on experience for children and their parents and staffed demonstrations on electricity and other science areas.

At Ontario, the "circus" was a unique specialty making science exhibits available to communities across Canada. The circus is marketed internationally. The "sports" exhibit was unique and extremely popular as were all hands-on exhibits. As one of the smaller centers visited, Sci Trek is a very well-designed and effectively coordinated exhibit and store layout. A restricted area where small children can be exposed to science principles is also popular.

These specialties provide exhibits that cater to a variety of audiences. To have the most outreach and community impact, it is critical that a center identify both the quantities and ranges of the anticipated audiences. The type and display of exhibits is only limited by the imagination of the designers. The facility housing the exhibits can and should have an interactive and exhibitive role as well; it should not only function as a public facility, but also as a learning center.

APPENDIX A:

SCI TREK SCIENCE CENTER TRIP REPORT

Industrial Design Program
College of Architecture
Georgia Institute of Technology
Atlanta, Georgia 30332-0155

(404) 894-4874

October 26, 1989

MEMORANDUM

TO: Dr. George Fry, NSC Task Force
Ms. Mary Ann Zets, NSC Task Force
Mr. Douglas C. Heinen, USACERL
Mr. Elliott Price, Regional Director, GTRI Augusta
Professor John Myers, Assistant Dean/Research
Mr. Louis J. Circeo, Jr., Director Construction Research Center

FROM: William C. Bullock and W.R. Pittman

RE: Trip report on trip to Sci Treck Science Center in Atlanta

Attached is facility information collected during two visits to the Sci Treck Science Center in Atlanta.

WCB:mj

ATTACHMENT

A Unit of the University System of Georgia
An Equal Education and Employment Opportunity Institution

3. EXHIBITS PROGRAMMING DOCUMENTATION

SURVEY OF SCIENCE - TECHNOLOGY LEARNING CENTERS AND MUSEUMS

RESEARCHERS FORM

Name of Facility: Science and Technology Museum of Atlanta (Sci-Trek)

Time Available for Touring the Facility: 2 1/2 hours

Indicate Number of Exhibition Areas Not Covered all covered

GENERAL OVERVIEW OF FACILITY EXHIBIT APPROACH

Approximate percent of Exhibit Units Using:

"Hands On" Approach

Demonstrations with Audience Participation: 20 %

Interactive Computer/Video Devices: 25 %

Simple Controls: 25 %

Group Activities: 20 %

Movies, Tapes, Slides: 15 %

"Look and See" Format: 5 %

TRENDS IN NEW EXHIBITS (Discuss with Museum Staff)

Toward "Hands On": Yes or ____ %

Toward Traditional "Look and See" Yes or very small %

Why? The visitor is much more excited & engaged with hands-on exhibits. These exhibits traditionally receive more responses & attention because they engage & enlighten the senses.

EXTERIOR CONDITIONS

Availability and Cost of Parking: Civic Center parking lot - $3.00/ Adjacent parking lot - $3.00

Traffic Routes: Confusing - downtown area with 1-way streets

Auto entry @ rear of major public street entry.

Quality of Neighborhood: Central city neighborhood - Adjacent residential, commercial offices & vacant old bus terminal.

OVERVIEW OF EXHIBITION AREAS (On following pages)

1 Exhibition Area Theme or Content: Kidspace

Size (sq. ft.): 2,500 No. Exhibit Units: 25 % "Hands On" 100%

Are Explainers Used? Yes Are Demonstrators Used? Yes

How Popular? Museum View very Comment: Popular with parents and kids

"Take Aways" Available (what): A well contained & controlled space for children to have fun & learn & experience the exhibit w/out interfering w/the remainder of the center.

General Appearance and Maintenance:

Other Comments: Junior League involvement. Designed for 3-7 year-olds. Areas are technology, dramatic play, water works, & a resource room for infants and toddlers.

2 Exhibition Area Theme or Content: Hall of Light and Perception

Size (sq. ft.): 8,100 No. Exhibit Units: 29 % "Hands On" 100 %

Are Explainers Used? Yes Are Demonstrators Used? Yes

How Popular? Museum View: Comment: Includes small theater

"Take Aways" Available (what): non-observed

General Appearance and Maintenance: Wonderful use of space and color - direction & orientation is a bit confusing.

Other Comments: Interactive videos, light palette, whisper disc, kalidoscope, sliding gray step, distorted room, look into infinity, etc.

3 Exhibition Area Theme or Content: Hall of Electricity and Magnetism

Size (sq. ft.): 2,025 No. Exhibit Units: 17 % "Hands On" 100 %

Are Explainers Used? Yes Are Demonstrators Used? Yes

How Popular? Museum View: ok Comment:

"Take Aways" Available (what): non observed

General Appearance and Maintenance: Although slick and high-tech in appearance this area is not "contained"

Other Comments: Jacob's ladder and other brightly colored modular units with excellent information regarding scientific principles are well presented.

4 Exhibition Area Theme or Content: Hall of Mechanics

Size (sq. ft.): 5,625 No. Exhibit Units: 16 % "Hands On" 100 %

Are Explainers Used? Yes Are Demonstrators Used? Yes

How Popular? Museum View Good Comment: Unique exhibit topic - not explored elsewhere we visited

"Take Aways" Available (what): non observed

General Appearance and Maintenance: Very good use exhibits, small theater in area

Other Comments: Explores laws of simple machinery - lever, plane, pulley, hoist, screw auger, wedge, wheel and axle. Lifesize sailboat to show use of simple machines.

_____ Exhibition Area Theme or Content: _____

Size (sq. ft.): _____ No. Exhibit Units: _____% "Hands On" _____%

Are Explainers Used? _____ Are Demonstrators Used? _____

How Popular? Museum View: _____ Comment: _____

"Take Aways" Available (what): _____

General Appearance and Maintenance: _____

Other Comments: _____

_____ Exhibition Area Theme or Content: _____

Size (sq. ft.): _____ No. Exhibit Units: _____% "Hands On" _____%

Are Explainers Used? _____ Are Demonstrators Used? _____

How Popular? Museum View: _____ Comment: _____

"Take Aways" Available (what): _____

General Appearance and Maintenance: _____

Other Comments: _____

CENTER/MUSEUM INTERVIEW FORM

GENERAL INFORMATION

Name of Facility: Science & Technology Museum of Atlanta (SciTrek)

Address of Facility: 395 Piedmont Avenue, NW Civic Center Exhibit Hall
Atlanta, GA 30308

Contact Person and Title: Dr. Robert Rathburn, President/Ansley B. Byers Marketing Coordinator

Telephone: (404) 522-5500 Ext. 210

Year Facility Established: Museum foundation began in 1983. Civic Center built in 1965. Museum opened in 10/29/88.

Major Additions: Plan to add planetarium in a year or so. -No- addition 16,000 S.F. will be added for exhibition

Was the Center specifically constructed for this purpose? No

Was it a converted historic building? No

Was it a former world's fair facility? No

Number Days per Year the Center is Open? 310 days. Closed Christmas, Thanksgiving, Easter, and New Years

Hours of Operation: Weekdays 10-5 Mon-Sun Weekends: 2nd Tue. ea. mo. opened til 8pm

General Theme or Purpose of the Facility:
Physical sciences and technology

Target Population Group(s)

Primary Group(s): Families

Secondary Group(s) School groups of all levels.

NOTE: Building is leased from the city for $1 per year. City gets parking revenues. Museum cost $8 million to establish. $2 million for exhibits. SciTrek contracted for the electronic components of the exhibit units but designed and created their own modular housings. The units in Kidspace were created by COSI, Columbus, Ohio. Exhibit ideas from Franklin Institute and a museum in New York. Exploratorium and COSI were happy to cooperate. Museum staff which were hired late in project, evaluated the exhibits and made modifications. Museum was completed in 16 months.

Admission price(s):

Regular adult	$ 5.00	School Group	$3.00/person, no school contracts w/2 week reservations
Regular child	3.00	Other group $15/fam.	1 teacher free entry
Senior citizen	3.00	Combination Ticket	
Special Admissions			
Parking (museum lot)	3.00		

Facility Size and Allocation (square feet)

Total indoor space Available to Visitors: (include exhibits, classrooms, theatres. _____

Indoor Exhibition/Exhibit Area: 21,000

Indoor Staff and Support Areas not open to visitors (offices and maintenance, storage exhibit maintenance, design and fabrication): 40,000

Facility Features (Physical Plant):

Number of Theatres/Auditoriums: 3* Planetarium: 0

Use(s) of Each Theater/Auditorium?: planetarium (e.g., laser shows, movies, lectures, Imax? Omnimax, public events)

	Seating Capacity
Centrum (Hayes Theater) - orientation to the museum	50
1st Union Theater - Energy light films	25
Mechanics Theater - part of mechanics hall exhibit	25

Number of Lecture Rooms, Workshop Rooms, Meeting or Conference Rooms:

Is there a Resource Center?	No
Is there a Computer Lab?	No
Is there a Museum Store in the Facility/	Yes
Is there a Restaurant/Cafeteria?	No
Seating Capacity:	No
Is there an Indoor "Bag Lunch" Area?	Use of vending area
Is there a Vending Machine Area?	Yes

Other Special Physical Features in Facility (e.g., other lab): See note 2

Marketing/Publicity Efforts (1989)

Total Expenditures for Marketing/Publicity:	60,000
Expenditures for Paid Advertising Through the Media:	30,000

Donated or Other Marketing/Publicity Activities:
PSA's, PR officer, 1 Marketing manager

NUMBER OF VISITORS/PARTICIPANTS

Total Number of Visitors/Participants at the Museum/Center (exclude those involved in field visits or other outreach activities outside of the museum/center):

Year	Number	Actual	Estimate	How is the Count
1984	(Opened 10/29/88. Attendance by 11/30/88 - 35,000 tickets)			Obtained? (e.g.,
1985				tickets,
1986				turnstiles, some
1987				estimating procedure)
1988	360,000 (Nov. 88 - Jan - Sept. 1989)			
1989	(Jan-Sept = 290,000)		400,000 estimated	

For 1988, Visitor Information:

(Do Not Double Count)	Recorded Number	or	Approximate Percent of Visitors
Number of School Group Visitors, Total=	400-600 per day	or	_____
Elementary	_____	or	_____
Junior High (10 - 15 years old)	_____	or	_____
Senior High	_____	or	_____
Local Area Residents (within greater metropolitan area)	_____	or	_____
Tourists (outside greater metropolitan area)	_____	or	_____

For the visitors from the "local Area Residents" and "tourists" groups, please estimate the following:

	Est. Percent
age 17 and under	60%
age 18-59	35%
age 60 and over	5%

		Target Audience(s) (Check all appropriate)					
		Pre Schoolers	Elem. School Students	Jr. High Students	Sr. High Students	Non School Youth Groups	Non Youth Groups
	a. Camp-in programs					Girl Scouts	
	b. Classes/workshops	x	x	x	x	x	x
	c. Films and theater shows					x	
	d. Guided tours						
	e. Intern programs						x
	f. On-site lectures/ demonstrations		x	x	x	x	x
	g. Science clubs						
	h. Special events						x
	i. Field trips into the community						
	j. Radio/TV programs						x
	k. Speaker's bureau						x
	l. Tours/travel programs						
	m. Any other*						

*Please describe: _____

_____

_____

EDUCATION PROGRAMS

Types of Education Programs Offered and Target Audience(s).

(Check if provided by museum/center)

Rank the 3
Highest in
Number of
Visitors
(a - h)

(LIMIT TO PRE-COLLEGE ONLY)

Does institution offer any of the following services to schools? (Check all that apply)

	On-Site	Off-Site
Career Workshops		
Curriculum materials, kits, software	x	
Classes or demonstrations	x	
Loaned audiovisual materials, exhibits or artifacts		
Tour/class visits for school groups	x	
Science fairs	x	x (planned)
Teacher workshops		
Other		

Specify: _____

_____

_____

_____

Are any of these programs planned jointly with schools personnel?
x Yes ____ No

Does institution have an education advisory committee?
x Yes ____ No

How many teachers per year are normally served through the institution's teacher programs? 80 estimate (August of each year)

Are there school personnel who act in any of the following capacities:

Exhibit development?	____ Yes	x No
Education program planning?	x Yes	____ No
Conducting education programs?	x Yes	____ No
On loan or leave to work at the museum?	____ Yes	x No

EXHIBITION/EXHIBITS INFORMATION

	DEFINITIONS FOR EXHIBITS SECTION
Exhibition Area units	A collection of several exhibit linked by a common theme or focus.
Exhibit Unit	A component focused on a single phenomenon or topic that is part of a larger exhibition.
Permanent Exhibition	An exhibition that has expected life or several years.
Temporary Exhibition	An exhibition developed by or for this facility and planned for display of one year or less.
Traveling Exhibition	An exhibition developed by others that rotates through several museums.

Total Number of Permanent Exhibitions in the Museum/Center in 1988: 4

Average Number of Exhibit Units in the Exhibition Areas: 13-29

Space Dedicated to Temporary Exhibitions (square feet): 1,800

Total Number of Temporary Exhibitions in the Museum/Center in 1988: _____

Average Number of Exhibit Units in the Exhibition Areas: _____

Space Dedicated to Traveling Exhibitions (square feet): 3,000

Total Number of Traveling Exhibitions in the Museum/Center in a Typical year: _____

Average Number of Exhibit Units in the Exhibition Areas _____

Which Exhibitions are the most popular with school age visitors:

School Group	Exhibition Theme or Content	Exhibition Approach (e.g., "hands on" or look and see")
Pre School	Kidspace	Hands-on
Elementary	*light & perception	
Junior High	Hall of Mechanics	Hands-on
Senior High	Hall of Mechanics	Hands-on

20 paid part-time; 200 volunteers; 5 flex-persons

How many Explainers/Guides are Used: 225 Ages: 14-70

What is the Impact of the Explainers: Serve on floor. Were very visible - all wear museum aprons.

How much formal training is given to the Explainers: (2) 1/2 full days on exhibit floors plus classes on safety and security. Additional classes after experience gained. Junior Leaguers work in Kidspace.

What Percent of Explainers are multilingual? non expected in this aspect to grow

How often are Volunteer Expert Demonstrators Used with the Exhibits:

Regularly x Occasionally _____ Never _____

APPENDIX B:

ONTARIO SCIENCE CENTER TRIP REPORT

Industrial Design Program
College of Architecture
Georgia Institute of Technology
Atlanta, Georgia 30332-0155

(404) 894-4874

October 25, 1989

TO: Dr. George Fry, NSC Task Force
Ms. Mary Ann Zets, NSC Task Force
Mr. Douglas C. Heinen, USACERL
Mr. Elliott Price, Regional Director, GTRI Augusta
Professor John Myers, Assistant Dean/Research
Mr. Louis J. Circeo, Jr. , Director, Construction Research Center
Mr. Robert D. Simpkins, Contracting Officer

FROM: William C. Bullock and W.R. Peter Pittman

RE: Report on Trip to Toronto, Canada to Visit the Ontario Science Center

Georgia Tech researchers Bill Bullock and Pete Pittman visited the Ontario Science Center Monday, October 16, 1989 to gather statistical data and information on the design and operation of the center. The visit consisted of meetings with museum staff and administrators, an extensive tour of facilities and review of exhibit areas and photographic documentation of building architecture, exhibits and signs. Point of contact for the trip was Ms. Mattie Howitt, Ontario Science Center, 770 Don Mills Road, Don Mills, Ontario (416) 429-4100, extension 204.

Using the site visit at St. Louis Science Center as an example, information was obtained on the following: 1. General Facility Information; 2. Facility Programming Documentation; 3. Exhibits Programming Documentation; 4. Names of Program Developers, Consultants, Specialists, and Other Involved Personnel; 5. Planning, Programming, Construction and Occupation Time Lines; 6. Lessons Learned Over the Course of the Facility Operation; and, 7. Specialties Used or Developed at Site. Information is provided on these areas in the following pages.

A Unit of the University System of Georgia
An Equal Education and Employment Opportunity Institution

1. GENERAL FACILITY INFORMATION

CENTER/MUSEUM INTERVIEW FORM

GENERAL INFORMATION

Name of Facility: Ontario Science Center

Address of Facility: 770 Don Mills Road

Don Mills, Ontario Canada M3C1T3

Contact Person and Title: Mattie Howitt

Telephone: 416/429-4100 ext. 204

Year Facility Established: 1969

Major Additions:

Was the Center specifically constructed for this purpose? yes

Was it a converted historic building? no

Was it a former world's fair facility? no

Number Days per Year the Center is Open? 364

Hours of Operation: Weekdays 10am-6pm **Weekends:** Fridays 10am-9pm

General Theme or Purpose of the Facility:

Target Population Group(s)

Primary Group(s): General public, school groups

Secondary Group(s)

Admission price(s):

Regular adult	$5.50	School Group	free
Regular child	Youth 13-17/ $4.50 Child $2.00	Other group	
Senior citizen	free	Combination Ticket	
Special Admissions			
Parking (museum lot)	$ 2.00		

Facility Size and Allocation (square feet)

Total indoor space Available to Visitors: (include exhibits, classrooms, theatres.

Indoor Exhibition/Exhibit Area:

Indoor Staff and Support Areas not open to visitors (offices and maintenance, storage exhibit maintenance, design and fabrication):

Facility Features (Physical Plant):

Number of Theatres/Auditoriums:_____ Planetarium:_____

Use(s) of Each Theater/Auditorium?: planetarium (e.g., laser shows, movies, lectures, Imax? Omnimax, public events)

	Seating Capacity
2 small lecture theatres - school programs, other	60
1 mid-size threatre	120
1 Auditorium - school programs, movies, other	480
3 classroom/workshop spaces - school programs, labs	30
planetarium - public demonstrations, star talks	40

Number of Lecture Rooms, Workshop Rooms, Meeting or Conference Rooms:

Is there a Resource Center? yes - staff only

Is there a Computer Lab? no

Is there a Museum Store in the Facility/ yes

Is there a Restaurant/Cafeteria? yes

Seating Capacity: _____

Is there an Indoor "Bag Lunch" Area? yes

Is there a Vending Machine Area? there soon will be

Other Special Physical Features in Facility (e.g., other lab): _____

Marketing/Publicity Efforts (1988)

Total Expenditures for Marketing/Publicity: _____

Expenditures for Paid Advertising

Through the Media: _____

Donated or Other Marketing/Publicity Activities:

_____

_____

NUMBER OF VISITORS/PARTICIPANTS

Total Number of Visitors/Participants at the Museum/Center (exclude those involved in field visits or other outreach activities outside of the museum/center):

Year	Number	Actual	Estimate
1984			
1985			
1986			
1987			
1988			

How is the Count Obtained? (e.g., tickets, turnstiles, some estimating procedure)

For 1988, Visitor Information:

(Do Not Double Count)	Recorded Number	or	Approximate Percent of Visitors
Number of School Group Visitors, Total=	220,000	or	_____
Elementary	_____	or	_____
Junior High (10 - 15 years old)	_____	or	_____
Senior High	_____	or	_____
Local Area Residents (within greater metropolitan area)	_____	or	_____
Tourists (outside greater metropolitan area)	_____	or	_____

For the visitors from the "local Area Residents" and "tourists" groups, please estimate the following:

	Est. Percent
age 17 and under	_____
age 18-59	_____
age 60 and over	_____

EDUCATION PROGRAMS

Types of Education Programs Offered and Target Audience(s).

(Check if provided by museum/center)

Rank the 3 Highest in Number of Visitors (a - h)		Target Audience(s) (Check all appropriate)					
		Pre-Schoolers	Elem. School Students	Jr. High Students	Sr. High Students	Non School Youth Groups	Non Youth Groups
	a. Camp-in programs						
x 1	b. Classes/workshops		x	x	x		x
x	c. Films and theater shows		x	x	x		x
	d. Guided tours						
	e. Intern programs				x		
x 2	f. On-site lectures/ demonstrations		x	x	x	x	x
x	g. Science clubs	x	x	x			
x 3	h. Special events		x	x	x	x	x
	i. Field trips into the community						
	j. Radio/TV programs						
	k. Speaker's bureau						
	l. Tours/travel programs		x	x	x	x	x
	m. Any other*						

*Please describe: _____

_____

_____

(LIMIT TO PRE-COLLEGE ONLY)

Does institution offer any of the following services to schools? (Check all that apply)

	On-Site	Off-Site
Career Workshops		
Curriculum materials, kits, software	x	x
Classes or demonstrations	x	
Loaned audiovisual materials, exhibits or artifacts	x	x
Tour/class visits for school groups	x	
Science fairs		
Teacher workshops	x	x
Other	x	

Specify: ½ year program for Sr. high students to attend Science Center on a daily basis, as their high school, and obtain up to 4 of their regular high school, final year course credits in Physics, Chemistry, Biology, Calculus and Science in Society.

Are any of these programs planned jointly with schools personnel?
x Yes ____ No

Does institution have an education advisory committee?
x Yes ____ No

How many teachers per year are normally served through the institution's teacher programs? 800 estimate

Are there school personnel who act in any of the following capacities:

Exhibit development?	____ Yes	x No
Education program planning?	x Yes	____ No
Conducting education programs?	____ Yes	x No
On loan or leave to work at the museum?	x Yes	____ No

EXHIBITION/EXHIBITS INFORMATION

DEFINITIONS FOR EXHIBITS SECTION

Exhibition Area units	A collection of several exhibit linked by a common theme or focus.
Exhibit Unit	A component focused on a single phenomenon or topic that is part of a larger exhibition.
Permanent Exhibition	An exhibition that has expected life or several years.
Temporary Exhibition	An exhibition developed by or for this facility and planned for display of one year or less.
Traveling Exhibition	An exhibition developed by others that rotates through several museums.

Total Number of Permanent Exhibitions in the Museum/Center in 1988: _____

Average Number of Exhibit Units in the Exhibition Areas: _____

Space Dedicated to Temporary Exhibitions (square feet): _____

Total Number of Temporary Exhibitions in the Museum/Center in 1988: _____

Average Number of Exhibit Units in the Exhibition Areas: _____

Space Dedicated to Traveling Exhibitions (square feet): _____

Total Number of Traveling Exhibitions in the Museum/Center in a Typical year: _____

Average Number of Exhibit Units in the Exhibition Areas _____

Which Exhibitions are the most popular with school age visitors:

School Group	Exhibition Theme or Content	Exhibition Approach (e.g., "hands on" or look and see")
Pre School		
Elementary		
Junior High		
Senior High		

How many Explainers/Guides are Used: 8 weekdays 15 weekends Ages: 19-31

What is the Impact of the Explainers: profound! interpersonal interpretation and communication

How much formal training is given to the Explainers: 1 month + ongoing

What Percent of Explainers are multilingual? ½

How often are Volunteer Expert Demonstrators Used with the Exhibits:

Regularly x Occasionally _____ Never _____

in specific demonstrations only.

2. FACILITY PROGRAMMING DOCUMENTATION

2.1 SUMMARY OF TOTAL BUILDING BUILDING SQUARE FOOTAGES

'A'	Building	Foundation Level	17800	
		Lower Level	24000	
		Upper Level	28500	
				70300
BL	Bridges	Upper & Lower	8000	8000
'B'	Building	Foundation Level	15600	
		Level 2	39700	
		Library	5800	
		Level 4	33700	
		Level 5	158001	
				100600
			179500	179500
			GRAND TOTAL	**358400**

2.2 PERMANENT EXHIBITS

'B'	Building	North Tower	7800	
		South Tower	7800	
		West Tower	6000	
		Lobby (space)	5700	
		Laser	2000	
				29300
'C'	Building	Life	13700	
		Mezzanine	7300	
		Communications	12900	
		Mezzanine	5500	
		Technology	13600	
		Mezzanine	5700	
		Lobby	500	
		Transportation	8300	
		Science Arcade	19200	
		Atom	2400	
				89100
			TOTAL	**118400**

2.3 TEMPORARY EXHIBIT SPACES

'A' Building		2000	2000
'B' Building	Laser Lobby	4300	
	Great Hall	11600	15900
'C' Building	Comm. Gallery	1800	
	Life Gallery	1900	3700
		TOTAL	**21600**

2.4 PRODUCTION

'C' Building

Wood Shop	6500	
Paint Shop	1600	
Silk Screen	1200	
Machine Shop	4800	
Electrical Shop	300	
Shipping & Stores	7700	
Temp. Storage & Access	4700	
Electronics	4000	
Animal Room	900	
		31700
	TOTAL	**31700**

2.5 SUPPORT FACILITIES

'A' Building	Boiler Room	8800	
'B' Building	Nurse	500	
	Library	5000	
	Artifact Storage	7800	
	Security	800	
			14100
'C' Building	Animal Room	900	
	Building Maintenance	4000	
	Grounds Maintenance	2700	
	Green House	1000	
			8600
		TOTAL	**31500**

2.6 OFFICE SPACE

'A' Building	Supervisors & Cash	1000
'B' Building	Purchasing, Accounting	
	Personnel	6300
	Design, Education	7800

		Sr. Mgt. Promotion	6300	
	'C' Building	Production Supervision	1400	
		Science Staff	6000	
		Enterprises	6000	
			TOTAL	**34800**
2.7	FOOD FACILITIES			
	'A' Building	Foundation Level	3000	
		Cafeteria	5200	
		Restaurant/Bar	10900	
				19100
	'B' Building			
	'C' Building	Arcade	1800	
		Life Court	4500	6300
			TOTAL	**25400**
2.8	SOUVENIR SHOP			
	'A' Building		3100	
			TOTAL	**3100**

3. EXHIBITS PROGRAMMING DOCUMENTATION

SURVEY OF SCIENCE - TECHNOLOGY LEARNING CENTERS AND MUSEUMS

RESEARCHERS FORM

Name of Facility: Ontario Science Center

Time Available for Touring the Facility: October 15-16, 1989

Indicate Number of Exhibition Areas Not Covered _____

GENERAL OVERVIEW OF FACILITY EXHIBIT APPROACH

Approximate percent of Exhibit Units Using:

"Hands On" Approach - 60%

Demonstrations with Audience Participation: 5 % 14 demos

Interactive Computer/Video Devices: 15 %

Simple Controls: 35 %

Group Activities: 5 % at exhibits

Movies, Tapes, Slides: _____ %

"Look and See" Format: 40 %

TRENDS IN NEW EXHIBITS (Discuss with Museum Staff)

Toward "Hands On": is increasing _____ or _____ %

Toward Traditional "Look and See" _____ or _____ % is falling

Why? But I don't feel this is best because many newer staff think of this place as the "Hands-On Place"

EXTERIOR CONDITIONS

Availability and Cost of Parking: $2.00

Traffic Routes: Suburban - major arterials & expressways

Quality of Neighborhood: High Rise & Town houses

Lower middle class and lite commercial - IBM ESSO Bell (Headquarters)

OVERVIEW OF EXHIBITION AREAS (On following pages)

1 Exhibition Area Theme or Content: Sport

Size (sq. ft.): 11600 No. Exhibit Units: 30 % "Hands On" 90 %

Are Explainers Used? yes Are Demonstrators Used? yes

How Popular? Museum View very=A- Comment: looks very popular

"Take Aways" Available (what): Brochure (pamphlets) re: sports

General Appearance and Maintenance: Looks good

Other Comments: Acts as playground for young children. Architecture of space is not related to the activities which occur there. Reverse of a "black" box. It is a "light" box with a good bit of natural light. No originally designed as an exhibit space.

On level 2

2 Exhibition Area Theme or Content: Earth/Food

Size (sq. ft.): 7800 No. Exhibit Units: 60 % "Hands On" 60 %

Are Explainers Used? yes Are Demonstrators Used? yes Rock shop

How Popular? Museum View: B Comment: Above average. Popular

"Take Aways" Available (what): none observed.

General Appearance and Maintenance: space chopped up.

Other Comments: Exhibits very interesting although visitor traffic flow could have been better organized. Young adults and parents seemed to enjoy the exhibits.

On level 2

3 Exhibition Area Theme or Content: Space

Size (sq. ft.): 6000 No. Exhibit Units: 46 % "Hands On" 40 %

Are Explainers Used? yes Are Demonstrators Used? yes Planetarium

How Popular? Museum View: B Comment: Above average.

"Take Aways" Available (what): none observed

General Appearance and Maintenance: generally good.

Other Comments: Confusing interior, layout, appears disorganized. The building architecture dictates how the space is used. Appears well maintained expert for brass doors. Unistrut system used to create ceiling and "space environment".

4 Exhibition Area Theme or Content: Communications

Size (sq. ft.): 12900 No. Exhibit Units: 78 % "Hands On" 65 %

Are Explainers Used? yes Are Demonstrators Used? yes TV Paper misc. Printing

How Popular? Museum View B+ Comment: _____

"Take Aways" Available (what): pamphlets/leaflets in printing area

General Appearance and Maintenance: good.

Other Comments: Black box with suspended rectangular florescent light units. Variety of floor materials used: brick, vinyl tile and carpeting. Has a second story exhibit area.

5 Exhibition Area Theme or Content: Transportation

Size (sq. ft.): 8300 No. Exhibit Units: 45 % "Hands On" 15 %

Are Explainers Used? yes Are Demonstrators Used? yes Model making

How Popular? Museum View: C+ Comment: Appeared average +

"Take Aways" Available (what): some pamphlets

General Appearance and Maintenance: Good.

Other Comments: Model building shop on site with full-time 25 yr. veteran model builder on duty. Large number of display cases with models of ships and airplanes. Some interactive displays (approximately 50%).

6 Exhibition Area Theme or Content: Life (Environment/Earth)

Size (sq. ft.): 13700 No. Exhibit Units: 125 % "Hands On" 60 %

Are Explainers Used? yes Are Demonstrators Used? yes Fashion demo Ele. micro. demo

How Popular? Museum View: C- Comment: Appeared less than average.

"Take Aways" Available (what): None seen.

General Appearance and Maintenance: Very clean, lot of open space in center area.

Other Comments: Tile floor throughout. Exhibit design seemed very coordinated. Visited late in afternoon so hard to judge visitor interest. Human body demonstrations very interesting. Has mezzanine area area (see description under # 9).

7 Exhibition Area Theme or Content: Science Arcade

Size (sq. ft.): 19200 No. Exhibit Units: 119 % "Hands On" 80 %

Are Explainers Used? yes Are Demonstrators Used? yes Ele. show Physics lab

How Popular? Museum View A Comment: Very successful.

"Take Aways" Available (what): none observed.

General Appearance and Maintenance: "jumbled" appearence - varied

Other Comments: Black box approach used. Number of display cases with models in entry way. Area has an arcade look. Area composed of "left over" displays that other areas of the museum didn't want. Centrally located snack area. Works well for parents with children that attend. Several platform exhibits not available for wheel chair users. Glitzy look. Sound area (exhibits) fun.

8 Exhibition Area Theme or Content: Technology

Size (sq. ft.): 13600 No. Exhibit Units: 95 % "Hands On" 65 %

Are Explainers Used? yes Are Demonstrators Used? yes Fondry Wood Glass blowing

How Popular? Museum View: B Comment:

"Take Aways" Available (what): Pamphlets at information booth

General Appearance and Maintenance: Good

Other Comments: Utilities "black box" display them with bright primary colors, red, yellow. Interesting tile floor yellow and black pattern. Yellow system used with indirect lighting from canvus panels. Wood posts and corregated metal for supports and surfaces. Low light areas used effectively with computer areas.

9 Exhibition Area Theme or Content: Life Mezz (Environment)

Size (sq. ft.): 7300 No. Exhibit Units: 45 % "Hands On" 30 %

Are Explainers Used? yes Are Demonstrators Used? No

How Popular? Museum View: C Comment: Hard to judge. Appeared average.

"Take Aways" Available (what): none observed.

General Appearance and Maintenance: good.

Other Comments: Had more closed in feeling compared to main floor exhibit area.

10 Exhibition Area Theme or Content: Te (Energy)

Size (sq. ft.): 5700 No. Exhibit Units: 28 % "Hands On" 20 %
Note: 2 classrooms in area.

Are Explainers Used? yes Are Demonstrators Used? yes (Chemistry demonstration)

How Popular? Museum View C- Comment: Same as museum

"Take Aways" Available (what): none observed

General Appearance and Maintenance: O.K.

Other Comments: This area as the Atomic Area is difficult to engage. It does not provide the user a sense of place and importance. Perhaps if more experiments were taking place or being performed by explainers this would help.

11 Exhibition Area Theme or Content: Communication Mezzanine (Forestry and North)

Size (sq. ft.): 5500 No. Exhibit Units: 48 % "Hands On" 35 %

Are Explainers Used? yes Are Demonstrators Used? No

How Popular? Museum View: D Comment: Appeared less than average

"Take Aways" Available (what): none observed

General Appearance and Maintenance: O.K.

Other Comments: Space for exhibits seemed more cramped than main floor exhibit area.

12 Exhibition Area Theme or Content: Atom

Size (sq. ft.): 2400 No. Exhibit Units: 25 % "Hands On" 10 %

Are Explainers Used? yes Are Demonstrators Used? No

How Popular? Museum View: F Comment: Not very popular

"Take Aways" Available (what): none observed

General Appearance and Maintenance: Good.

Other Comments: Due to the fact that exhibits all deal with issues and physics which are "invisible" they are very difficult to engage from an on hand point of view. Therefore, they are not very successful, nor are the exhibits displayed very well. They appear boring and out of the mainstream.

4. NAMES OF PROGRAM DEVELOPERS, CONSULTANTS, SPECIALISTS AND OTHER PERSONNEL.

1. Ms. Mattie Howitt
   Administrator Assistant to the Director General
   770 Don Mills Road
   Don Mills, Ontario M3C 1T3
   416/429-4100

2. John Vosknil
   Coordinator of Exhibits
   770 Don Mills Road
   Don Mills, Ontario M3C 1T3
   416/429-4100

3. Taizo Miake
   Director of Design, Education & Production
   Sudbury, Ontario 1965-1975
   705/675-2933

4. James Bell
   Exhibit Developer
   Manager of Science Circus
   Manager of Promotion & Communications
   TVO
   2180 Yonge Street
   Toronto
   416/484-2600

5. Tom Kasanda, B.I.D.
   Technical Manager
   International Marketing
   770 Don Mills Road
   Don Mills, Ontario M3C 1T3

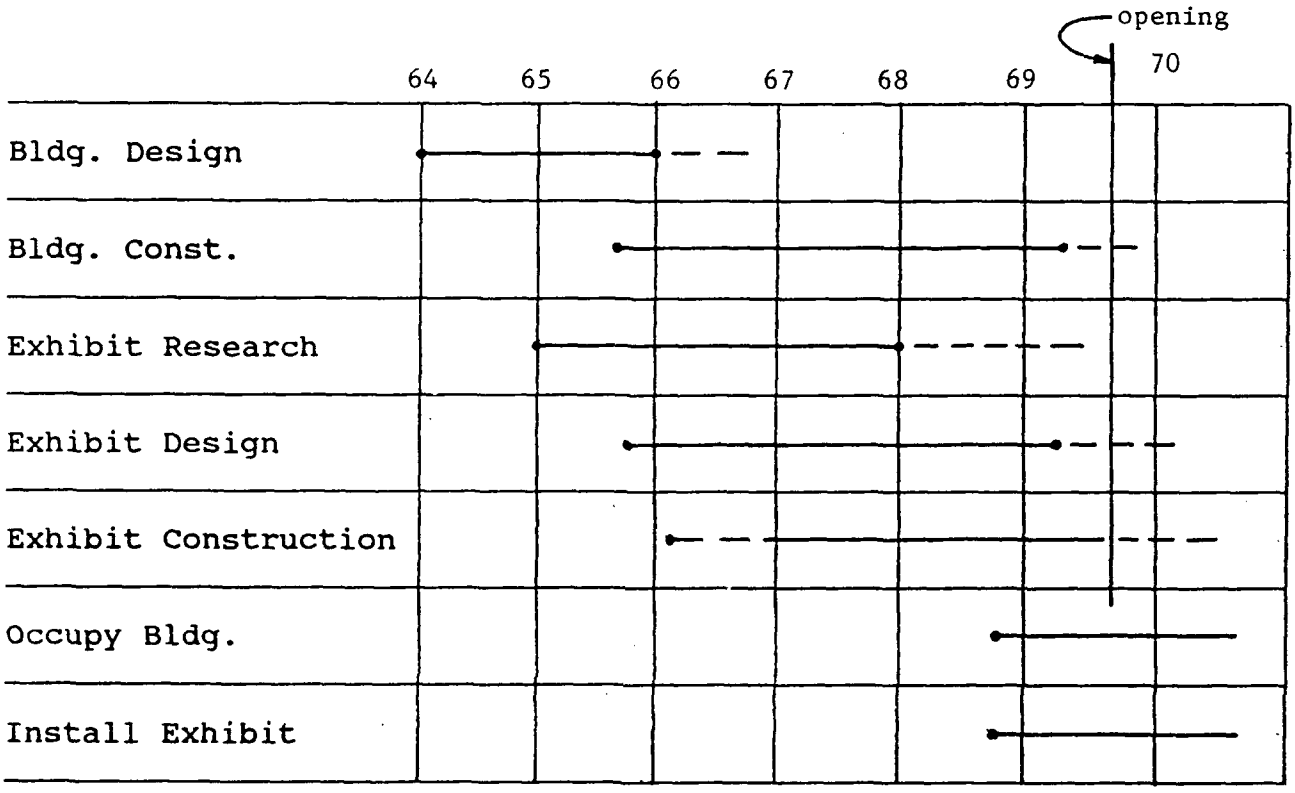
6. Egan Tancre
   Chef des ventes,
   Marketing International
   770, Chemin Don Mills
   Don Mills (Ontario)
   M3C 1T3

7. Michael Chisholm
   Exhibit Draftsman
   770 Don Mills Road
   Don Mills, Ontarios M3C 1T3

8. Ben Verburgh
   Model Maker
   770 Don Mills Road
   Don Mills, Ontari M3C 1T3

5. PLANNING, PROGRAMMING, CONSTRUCTION, and OCCUPATION TIME LINES.

SPECIALITIES USED OR DEVELOPED AT SITE.



6. LESSONS LEARNED OVER THE COURSE OF THE FACILITY OPERATION

6.1 Building Aesthetics

6.1.1 Exterior Aesthetics

The Ontario Center was built approximately ten years ago. The building has an attractive large fountain in the front that was a part of the building's original cooling system. The building is in surprisingly good condition for its age and appears particularly well maintained. A gala sign out front lends a festive atmosphere to the complex.

The building was originally designed for use as a Science Center, however, interior use of areas has varied over the years. At present areas not originally designed for exhibits are now used for this purpose. The interior is also well preserved and generally has held up well during its ten years of service. One notable exception was the use of brass for doors and other detailing which is tarnished and looks unsightly.

In general, the interior exhibit areas employ a "black box" approach with spot lights. In the "Sports" exhibit area, however, a "white box" approach was used. This area was not originally designed to be used as an exhibit area and has a good bit of natural lighting.

Exhibit aesthetics were generally good. Theatrical spot lighting was used in most areas with supplemental florescent lighting. In several exhibits and exhibit areas a unistrut metal system, wooden beams and other architectural interior elements were used to create the feeling of a more comfortable space. (Large expansive building spaces can be uncomfortable, creating a cold and stark environment).

6.2 Visitor Service Areas

6.2.1 Transportation Drop-Off

A covered transportation drop-off area is provided at the rear of the building. This is primarily an entry for school groups. There is also and adult drop-off entry way in the same general building location but separated. The Center is considering combining the two since both groups do not generally need the drop off at the same time and this would effect a savings in staff.

6.2.2 Lobby/Ticketing/Information

A free standing ticketing and information unit is provided at the front entry way of the building. One problem is that the ticket area is located too far from the exhibits due to the building design and layout.

6.2.3 Coat Storage Area

Shopping carts are currently used for school groups to store coats

and other belongings. They do not work well according to center staff and are cumbersome and unsightly. Pull out locker storage bins were recommended as a possible solution.

6.2.4 Public Coat Storage Room
Rental lockers are available for the general public immediately inside the front door. This area appeared very spread out and could have been better coordinated with the ticket purchase area.

6.2.5 Museum Store
This was located on the lobby/entry way. The store is currently split into two different areas on either side of the open lobby and could easily be doubled in size. The store appeared to be essentially a souvenir shop and is operated by an outside contractor (lowest bidder). Store merchandise was not coordinated with exhibits and Center themes.

6.2.6. Food Service Areas
Food service is in the words on employee one of the centers worst problem. Visitors complain a lot about the food. This was attributed to the center being a government facility and therefore having to take the lowest bid from concession contractors.

There are five different food service areas located throughout the center. The main cafeteria at the front of the building was originally designed for off-street traffic. However, the building is located too far away from the downtown business district to attract street business and is now used for special visitor lunches and meals. Another food area is located in the middle of the Science Arcade and apparently works beautifully. Parents and teachers can take a coffee break while the children are at the exhibits. There are also another cafeteria and a "beer" garden with outside patio which is quite nice. It was felt that all these different eating areas could be combined into one centrally located facility.

6.2.7 First Aid Area
The center has a centrally located first aid area with a nurse on duty part of the time. Visitors totaled 1.3 million visitors and these arrangements seems to work well. They have had a few broken bones, some sprains and cuts over the years.

6.2.8 Public Toilets
The public toilets in the center are located in out of the way places and are not easy to find. Changing tables were recently added to these areas.

6.2.9 Public Seating and Rest Area
Public seating was not generally provided in exhibit areas. The five eating locations seemed to solve this need.

6.2.10 Parking
The center has two parking lots for 900 and 1000 cars respectively, and this is considered satisfactory. When it rains

they could use more spaces since more people head to the museum when they can't go outside. The parking lots are conveniently located a short distance from the building.

6.3 Exhibition Areas

6.3.1 Exhibit Space

6.3.2 Exhibit Themes
There was a good variety of exhibit themes throughout the Center in keeping with the idea of offering something for young and old alike. The exhibit areas employed the black box/grey box thematic display using accent spot lights.

6.3.3 Temporary Exhibits
When it first opened, the Center had planned to have a certain number of exhibits as "new," the idea being to keep those that worked and were most popular. In practice, this has not always worked out but they are always trying new ideas and to improve existing displays. One area of the Center that has worked extremely well, in fact it is the most popular, is the Science Arcade. This area accepts the cast off exhibits from other areas of the Center plus new and unproven areas that more conservative areas are not willing to try. The researchers talked to several kids in this area that thought it was the most exciting and interesting area in the building. The researchers themselves particularly enjoyed the musical instrument areas.

6.3.4 Exhibit Safety
Suggestions to improve safety was to try and avoid dark corners and on stairs or level changes to provide a change in color so they would be more noticeable.

6.4 Theater Facilities
The Center has one 500 seat theatre for slide and audio visual programs. They do not have and Omnimax (there is one at another location in Toronto already).

6.5 Research and Programs

6.5.1 Volunteer Staff Program
Volunteers are not currently used very much by the Center. It was estimated, however, that the volunteer staff could be increased ten fold.

6.5.2 Educational Outreach Staff Program
The traveling Science Circus is used extensively to travel to communities across Canada. The Circus is now being marketed for rent, lease or sale internationally. This is treated as a teacher on wheels program for school age children.

6.6 Exhibit Support
All research and development for exhibits is done in house by the

up to 20 employees in the Center design studio. The design staff grew as the facility grew over the years. Quick response was cited as a goal of the Center in order to get things working as soon as possible to better serve the public.

Exhibit personnel are very important to the Center. Many are university students who work part time in winter and full time in summer. Student exhibit personnel are employed in on of three capacities depending on experience: Hosts, Senior Hosts and Area Heads. Students are first employed as Hosts and as they gain experience move up. Senior Hosts serve in support roles for the less experienced hosts and helped train them. Area Heads are responsible for key demonstrations in the each exhibit area. In the words of one host "we serve as a sort of buffer and interpreter between the visitors and the exhibits." Hosts moved to a new exhibit area each hour to stay fresh and avoid burnout. All hosts are given training when they are first employed so that they are comfortable everywhere in all exhibit areas of the center. Training includes show training, hall training, psychology training which are essentially discussion sessions taught by the host and heads themselves. Additional time can also be requested for research time in order to read and learn more about a particular exhibit or area.

Exhibit staff meetings are held with hosts and area head the fist 15 minutes each morning to make announcements and to work out problems that arise. This was very important to the exhibit staff questioned and felt it helped them do a better job.

6.6.1 Workshop Facilities

The Center designers and shop personnel designs and builds all its own exhibits. It was noted that using outside services to build prototype designs can be prohibitively expensive.

6.6.2 Exhibit/Graphic Design

The ratio of maintenance time to time spent on development of new designs varied greatly depending on the complexity of the exhibit design. This was noted by comparing primarily exhibits of an electronic, metal and wood nature. For electronic exhibits, it is estimated that 80% of exhibit staff time is spent maintaining the exhibit and 20% is devoted to development of new designs; with metal exhibits, the ratio of maintenance time to new design development is estimated at 50/50; and, for wooden exhibits the percentages are 10% maintenance and 90% toward new design effort. Also, the ratio of electronic to mechanical to other less complicated exhibits is directly related to exhibit staff employment needs.

6.6.3 Exhibits/Audio Visual and Electronics Studio

As a goal, the Center would like to have no audio visual exhibits. Instead they want to have the real stuff that visitors can see and touch whenever possible. Their opinion is that sound and pictures

are abstractions and they always strive for the real thing. i.e., real solutions, whenever possible.

The down time on exhibits is most noticeable in the electronic intensive exhibits. It was noted by staff that the expense of maintaining some of these exhibits can be more that it cost to redesign it for more efficiency and less maintenance. The message is "do it right the first time" according to staff.

6.6.4 Painting Facilities
The center had adequate painting facilities and drying areas for exhibit construction. This in house facility provides quick color application for repair and new construction.

6.6.5 Audio-Visual and Electronics Repair and Maintenance Shop
This area was not observed but apparently is used extensively.

6.6.6 Exhibit Staging and Clean Assembly Area

6.6.7 Exhibit Prop Storage Area
The Center currently does not have enough storage for props. Wide corridors in the building and are currently being used for storage plus another facility one mile away. A new 100' x 100' storage facility is currently under construction. This will give the Center 10,000 square feet for their 120,000 square feet of exhibit space.

6.7 Signs and Graphics
The Center's philosophy regarding signs is to avoid using them whenever possible. There are three levels of communication hierarchy in the Center with regards to frequency of use by visitors: 1) people first use the building architecture to find their way relying on prominent features and icons; 2) people ask other people where to go; and, 3) as a last resort people look for signs. In spite of this, there are a number of different signs all over the Center that utilizing different styles of letters, shapes, sizes, methods of display and mounting techniques.
When staff were asked about signs the replied almost unanimously "people don't read." One suggestion was to make a building map that people could read. In an attempt to solve this problem the Center's map had just been redesigned for the third time. Another problem cited was the complicated building architecture itself.

6.8 Building Maintenance and Security
The Center has a strong commitment to maintenance and this was evident in that the building appeared well maintained and was very clean. It did not show the normal wear evident in other public buildings of this nature. The building cleaning program appears very good.

6.8.1 Cleaning

The Center in kept very clean and the visitor can tell that it is a top priority. Their feeling is that if the environment is clean the visitor will work harder to take care of it.

6.8.2 Heating and Air Conditioning

The Centers heating and air conditioning system was designed during the cheap energy era and as a result the building's heating and cooling zones are very large. They are moving to much more localized zones to be more efficient and thus save money.

6.8.3 Plumbing, Gas and Electrical

It was suggested that plumbing, gas and electrical service be installed when needed in two diagonal corners of each of the large exhibit halls. An electrical grid is not needed and the existing 25 foot high ceiling electrical grid is too high and is not used much. An 18 foot high ceiling would be more accessible and still high enough for exhibits. Flat wiring under carpeting is not used because of a tri-cell system that is sunken into the concrete slab when the building was built.

Some exhibits have been built on decks or platforms but these later had to be modified and a ramp added for access by the handicapped and were not recommended.

6.8.4 Security

The Center has not had major problems with security as far as visitors to the Center are concerned. A video camera system was installed outside to deter employee theft which is a problem.

7. SPECIALTIES USED OR DEVELOPED AT THE SITE

The Ontario Science Center has a very public orientation, providing experiences for all age groups, from small children to senior citizens. The have not attempted to develop narrow focused specialties, but attempt to provide both experiences in leading edge science to basic science educational opportunities. Their philosophy is identical to that of Mr. Oppenheimer who developed the Exploratorium in San Francisco. The main difference was that Ontario, being government supported, did not have to do everything on a shoestring as the Exploratorium apparently did. Their target audience is elementary through high school students.

The Science Circus is a unique specialty developed by the Ontario Science Center. The Circus is essentially a traveling collection of exhibits that is transported by truck to locations throughout Ontario. Over 50 interactive exhibits have been developed for use in this traveling show which includes exhibits on fitness, perception, bionics and many others. Packed in tractor trailer rigs, the unit comes complete with all electrical wiring ready for hook up. The exhibits are well made and some have been on the road for 20 years. It can be rented, leased and/or purchased and is now being marketed internationally. A training program for exhibit personnel is also available. The Circus can occupy from 6,000 to 10,000 square feet with 8,000 being the average.

Cost can range from 3/4 to 1 million dollars with approximately 50% down, including the entire structure, power, wiring, lighting--essentially everything needed to go into operation. Technical Manager of International Marketing, Tom Kasanda, BID is interested in talking to the NSC task force about their needs. One advantage of the circus is that it can be used as a start up kit for developing centers. Having a working "center" on site as a core of a new science center can be beneficial to help sell prospective program donors, according to Kasanda. Another advantage is that a small number of the exhibits can be taken on the road as part of outreach programs. The color scheme used is bright primary colors for placement in a dark room, but customized color schemes are also possible.

APPENDIX C:

ST. LOUIS SCIENCE CENTER TRIP REPORT

ST. LOUIS SCIENCE CENTER
Site Visit, 11 September 1989

Interview with: JEFF BONNER Director of Research and Special Projects

Their process has taken over 20 YEARS.
Acquired PLANETARIUM 6yrs ago: $3 Million FOR COMPLETE RENOVATION by HGA & WALLACEFORD (OF BOSTON).
New Facility:
(178,000sqft gross) (68,000sqft of exhibits)
$34 MILLION INCLUDES EXHIBITS

* One Gallery asked for a "BLACK BOX"

* "VALUE THEATRE" - Interactive voting display

INPUT PER GALLERY - BUILDING
DESIGN STAFF and CONTENT STAFF
Originally 5 persons per gallery. Currently at 2 per gallery

CEO QUESTIONS that need to be addressed:
(1) If we gave you money, can you afford to run it?
Therefore provide CONSERVATIVE ESTIMATES
(2) Depth of Planning? (Note Document).

Conversation with: RALPH WILKE DESIGN EXHIBITS
10 PERMANENT PEOPLE + Overload Workers
50% OUT OF HOUSE
50% DESIGN/DEVELOP IN HOUSE W/45% ACTUALLY BEING CONSTRUCTED IN ST. LOUIS.

* For exhibits, buy the guts and package it in their own exhibit.
* Exhibits have a life expectancy (ie: Aviation rotates every 3 years approximately).
* Flat wire under carpet
* 55sqft per exhibit for interaction (Theatrical Themeing)

* **Consistency in Architecture/Building- Diversity in exhibits** (but constant in each Gallery).

Conversation with: DENNIS WENT - PRESIDENT

Verner Johnson's, MASTER PLAN: Excellent resource and guide

Defining roles: JANUARY 1987 - Architect; July 1987 - PLANS

AUDIENCE AS EXHIBIT DRIVERS: Meaning that you must get the exhibits message across in 25 words or less....or else you have failed.

AUDIENCES

(1) Families
(2) K-8
(3) Adults (w/o Kids)
(4) Members
(5) Minorities
(6) Disadvantaged (Economically & Educationally)
(7) Gifted
(8) Professional Societies

* 9% were school groups, 66% were families thereby suggesting that the Center should be geared to a social activity.

Conversation with: Joe Jakubielski, Construction Administrator for St. Louis Science Center

Contractor, Alberici, has own construction manager.

* (NSC has plans for a BUILDING MANAGER position).*

St. Louis Science Center project cost is $20.6 MILLION for building.

Industrial Design Program

College of Architecture
Georgia Institute of Technology
Atlanta, Georgia 30332-0155

(404) 894 4874

September 5, 1989

TO: Dr. George Fry, NSC Task Force
Mr. Mary Ann Zets, NSC Task Force
Mr. Douglas C. Heinen, USACERL
Mr. Elliott Price, Regional Director, GTRI Augusta
Professor John Myers, Assistant Dean/Research
Mr. Louis J. Circeo, Jr., Director, Construction Research Center

FROM: William C. Bullock and W. R. Peter Pittman

RE: Trip Report on Trip to the St. Louis Science Center, CERL and The Children's Science Museum in Indianapolis

A. St. Louis Science Center
On Monday, September 11, 1989 representatives on the NSC task force Dr. George Fry, Mary Anne Zets and Georgia Tech Researchers Bill Bullock and Pete Pittman visited the St. Louis Science Center, meeting during the morning with representatives Jeff Bonner, Director of Research and Special Projects, Ralph Wilke, Director of Exhibits, Dennis Went, President of the Board and Joe Jakubielski, Constuction Administrator. The afternoon consisted of a tour of the museum.

Jeff Bonner began by reviewing the development and growth of the center. Opening in 1985 with 600,000 visitors, attendance topped one million in 1988. The museum is the only one of its kind in the St. Louis area. Exhibits in the museum are free with a charge for the value theatre which include several theme areas with costumed actors such as the electronic alien research center.

Gallery space is 10,000 square feet. Flexible walls, lighting, and security are very important in operating the center. Two people are assigned to each museum gallery, one designer and one resource or content person. Over 200 volunteers work under the office of Executive Director. Another area coming on line in the near future is an ecological awareness area.

It was recommended that an exhibition master plan be done first before fund raising activities are started. This document is highly important as a fund raising tool to secure corporate support. Bonner mentioned that the planning document would provide answers to three important questions potential corporate supporters would have: 1) If we give you money to build a museum can you afford to run it?; 2) How can you prove to us that you can run it once it is built? (i.e., time scheduling, easements, legal

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requirements and other questions); and, 3) What will we get for our money? He stressed the importance of having possible questions well thought out and answered in advance with a good level of detail before seeking corporate support. Bonner cited an architectural study that was done which provided a good look at alternatives and helped answer a number of questions.

2. Exhibits (Ralph Wilke)
Museum exhibits are procured as follows: 1/2 are contracted out and 1/2 are developed in house. Some are repackaged guts that are bought elsewhere.

3. Accidents
Most museum accidents occur on ramps and escalators.

4. Computers
Computers have a life expectancy of about three years and must then be replaced.

5. Wiring
Flat wiring under carpeting is recommended because it is cost effective is extremely flexible. Floor grids are not recommended because they are not as flexible and can be more expensive. Dropping wires from overhead lights is also a possibility.

6. Moving Exhibits
Dollies and carts are used to move exhibits to and from a warehouse area. A 12' corridor is recommended in order to move large items. A knockout wall can be removed to bring in large items such as cars and airplanes. A loading dock is utilized along with fork lifts and an overhead door to load and unload exhibit items.

7. Exhibit Theme Areas
The exhibit theme areas are loosely structured and may even strive for inconsistencies between different exhibits in the exhibit gallery. The individual exhibits, however, may be choreographed and can vary between exciting , passive, mechanical, and other orientations.

8. Maintenance
Exhibit maintenance is very intense. Nine electronics people are hired to maintain the exhibits.

B. CERL

On Tuesday, September 12, 1989 the NSC task force and Georgia Tech researchers met with Doug Heinen and toured the CERL facilities. The visit consisted of the following events:
1. A brief overview of CERL and its public works effort emphasizing quality of life and quality of facilities.
2. Tour of facilities and the four divisions.
2. Demonstration of computer 4 d by Beth Symonds.

3. Discussion of CERL's Transportable Facility by Habitability Team Leader, Richard Hayes.

The NSC task force was impressed with CERL's diversity and capabilities and discussed the possibility of more collaborative projects. The transportable facility was especially intriguing and it was felt that such a concept might be incorporated into future plans for a "mobile" national science center.

At a wrap up discussion at the end of the day Heinen, Fry, Zets, Pittman and Bullock summarized project deliverables for the remainder of Phase I and Phase II as follows:

* A building model 1/16" or 1/32" as appropriate.
* A mockup of a graphic brochure similar in concept to the previous Discovery Center brochure.
* Drawings depicting interior theme areas.
* A National Science Center Logo Design.
* A written program building document similar to the St. Louis plan.

Emphasis is to be placed on the building program and aesthetic research, not an actual architectural design. In essence, Phase I consists of the Program Analysis, and Phase II is the Facility Design Requirement.

C. Indianapolis Children's Museum

On Wednesday September 13, 1989, NSC Task Force member Mary Ann Zets and Researchers Bill Bullock and Pete Pittman toured the museum with Bill North (Norton ?), Building Services Manager. The tour was extensive, including a public as well as behind the scenes look at the museum and new construction areas.

One new area that was particularly interesting was a workshop apprentice area designed to entice teenagers, that group that usually loses interest in museums, to become involved. Much of the interior design was, in fact, done by several local teenagers as a summer project under the direction of one of the museum workers.

Display: A hanging system of steel struts was added to the building atrium for displaying graphic banners for visual interest and to advertise special events.

Cleaning: Museum cleaning is highly important. Using an in-house cleaning group was recommended. The museum used 3 in-house keepers plus one supervisor. Direct supervision by a museum staff is recommended when outside cleaning contractors are used. A walk through inspection by the museum staff with the cleaning contractor's staff is recommended. This "white glove" inspection is done each week and was credited with keeping the museum well

cleaned.

Security: A camera security system is needed plus people for certain exhibits. To deter theft, trash bags are filled and discarded at later and at irregular intervals into the building dumpster. Apparently a good bit of theft occurs when items are "thrown away" in plastic trash bags to be retrieved later from the trash.

Cleaning the museum's outside picnic area requires one cleaning person all day to pick up trash and wash down spills and clean tables. Bees are a particular problem around dumpsters adjacent to the building picnic area. Children get stung. A Pine-sol/water solution is used to help control by spraying down the asphalt and dumpsters.

Bathrooms: During open hours the in-house museum staff is kept busy all day primarily cleaning and servicing the bathrooms. This includes keeping paper stocked and emptying the trash. Approximately one child visiting the museum every day gets sick in the bathroom area.

Food Areas: The museum has a cafeteria catered by an outside vendor. An indoor sack lunch area is often requested by visitors since food cannot be brought into the cafeteria. There is an outside picnic area but this is a problem on rainy days.

Carpeting: The best carpet grade is recommended in order to withstand cleaning and abuse. The museum uses carpet squares and does not recommend them. They constantly come up and have to be glued back down.

Special Needs: A number of special need were recommended as follows:
1. A changing table for both the mens and womens bathroom. The staff gets frequent complaints.
2. An out-of-the-way lounge area is sometimes requested by nursing mothers.

Light: Very important to show off the exhibits.
Security: Anything that screws down will be taken. Items must be fixed securely to prevent damage being stolen.

Theft: To deter theft trash bags are assembled when cleaning crews leave the building and are discarded later at non-regular intervals. This hinders the retrieval of stolen goods by discarding them in the trash and then retrieving them from the dumpster the next morning.

APPENDIX D:

CHILDREN'S MUSEUM TRIP REPORT

TRIP REPORT

INDIANAPOLIS CHILDREN'S MUSEUM, 13 September 1989

VISITING FROM NSCCE: Mary Ann Zets
Dr. Bill Bullock, Ga Tech
Peter Pittman, Ga Tech

POC: Bill Norton, Building Services Manager, 317-924-5431, ext 3600

PURPOSE OF TRIP: To investigate architectural and building concerns of a developing science center, relating to design, construction, operation and maintenance

1. Bill Norton spent 3 1/2 hours with us touring the building and discussing building-related problems. He came on the project as an electrical contractor with the construction team when the new building was erected in 1976 (see history info sheet in packet). Since then the institution has undergone three additions, the last being a planatarium - 120 seats, Digistar, with copper dome, to open to the public in November. Each construction over-ran projected costs: first major addition estimated as $12 M, totalled $17 M; planatarium estimated at $1M, cost $2 1/2 M. The operation budget is now $8-9 M.

2. The Children's Museum is an old museum, originated by a Lilly family endowment. It has been open free to the public, but will begin charging admission in Jan. 90 for two reasons: to help alleviate the high operating costs (especially electricity and cleaning services) and to serve as crowd control. Some days there are 20,000 visitors, many coming because it is a free thing to do on a rainy, cold, or hot day! Also bus loads of students frequently come unannounced.

3. The 5-story building offers a variety of architecture and exhibit experiences. Because it originated as a museum, there are a number of collections still in evidence, but worked into as many hands-on experiences as possible. They boast a 70-year-old carousel, a real train and train station on the ground floor, and a complete model railroad system. The new director believes in lots of hands-on experiences and is developing strategies to bring in more teen-agers and adults. Many adults visit, but primarily with children.

4. The original building has a central atrium with ramps connecting the five floors. The ramps are made of raw concrete, orginally with an oak railing, but now with a bright yellow metal one. They hang banners, etc. in the middle as promotional eye-catchers. Elevators are available in two places, plus a 10x20 freight elevator with a 9 ft. door. (Warning on freight elevators - watch the load distribution factor. When they first drove the fork-lift in the elevator, the elevator shifted and broke.) The new entrance is also an open atrium with balconies, but with white walls, yellow railings, lots of light and brightly colored banners.

5. Two galleries are two-story, balconied entities: one has an international theme and the other a new approach called Center for

composed of 20 full-time, 10 part-time employees, in addition to numerous visitor aides. There are many nooks and crannies in the museum complex to be monitored. The curator for each gallery has an office built into that area, which helps in keeping track of activities. Various sensors and a sprinking system are throughout the center.

13. The Center for Exploration, the $1 M, 20,000 sq ft gallery now being built to introduce science problem solving to teenagers, is a large two-story area that features a carpenter shop, satellite video theater, a production stage, photography darkrooms, wet labs, resource area, and several classrooms and meeting areas. They intend to offer the space to school groups to do special projects, like built floats, stage scenery, etc. A master teacher and a committee of teens helped design the center this past summer.

14. A separate entrance is designed for school groups. There is an orientation area, coats and storage space, and a resource center for teachers to check out materials to take back to the school.

15. Special presentation areas - the museum features demonstration areas in almost every gallery, with seating for 40-50 and back-up storgae space. They also have a Theater in the Round, 350 seats, for special lectures, demos, etc., and for rental for other special events like fund-raising acitivites, fashion shows, meetings, etc. Because of high usage, the Theater requires constant maintenance - lighting, projection booth, and carpet on steps.

16. Other odd notes:

The front centerpiece greeting visitors is a water-clock, a three story system of tubes and bulbs that tells time by minutes and hours. (See brochure) It is a fascinating piece of technology that was created by an artist in France.

One big fundraiser for them is a Haunted House on the property, about 3500 sq. ft., for Halloween, with earns them about $200,000 per year.

Mr. Norton has a staff of 22, who take care of all exhibit construction and building maintenance.

A "flow pattern" of traffic through exhibits should be evident to the visitor. Visitors have expressed that they feel like they are in a Chinese fire drill, not knowing where best to go or what to do next.

Recommendation: all walls in exhibit areas be "pinable," changeable surfaces.

Carpeting - Mr. Norton does not recommend carpet squares. Although they are changeable, they cannot be easily or quickly cleaned because they can't be cleaned with water. Powder cleaners or foam cleaning is time consuming and not adequate for high traffic areas.

Exploration (a discovery, problem-solving area for teenagers). Mr. Norton said filling a two story space with exhibits created far more cost than expected: example - building substantial and safe balconies was a problem.

6. A space for temporary exhibits is carpeted, has lots of track lighting and security equipment, mandatory for booking traveling exhibits from the Smithsonian, NASA, etc. Science of Sports just moved out, NASA comes in October. Problem: their gallery for temporary exhibits is out of the normal traffic pattern, away from the floor-to-floor ramps; extra effort is necessary to direct people to that space.

7. Storage was a major problem until the last building phase. They now have over 12,000 sq ft of storage, plus 19,000 for collections storage, and 7,000 in the loading dock area. Since they are staffed to do their own construction and maintenance of building and exhibits, a lot of space is required. Significantly, in the first building phase they neglected storage space for expendable needs, such as paper products; wood, metal and carpet for building repair; repair parts; cases of light bulbs; and equipment necessary to support evening activities (tables, portable bar, chairs, etc.)

8. Each gallery is typically designed as a box, with the entire exhibition actually forming the interior design. Science Spectrum was a black box, whereas the natural science area and the "memories" historical area were in light-colored rooms. (NOTE: areas painted black or dark colors require far more electricity for lighting.) Some had open ceilings and others closed ceilings. The museum is a good example of many varieties of treatment and the ambiances created.

9. Exhibits are originated by a team of nine, including administrative personnel, subject matter expert, evaluator, and building service manager. Then a smaller team of four actually put form and design to the exhibit concept. Staff designers produce the appropriate documentation and the exhibits and services staff do the appropriate fabrication necessary.

10. Volunteers are necessary to serve as "visitor aides" (explainers) and guides, manning the information desk, store, collections area, etc. To attract volunteers, a special display features a video presentation, a computer program describing the activities, and brightly lit transparencies of volunteers in action.

11. Food Service -- There are two restaurants in the building, one for fast food, the other a more higher priced cafeteria, both near the entrance and the store. There is no inside area to eat bag lunches. A picnic area is maintained for use in good weather; otherwise, classes eat their lunches on the bus. The picnic area requires a full-time person to clean the area and bug-proof it (yellow-jacket bees present a terrible problem).

12. Security - A new security system with television cameras and sound (announcment) system was recently installed for $200,000.

INDIANAPOLIS CHILDREN'S MUSEUM

Summary of Staff and Job Descriptions

Administration - 12

Administration - Museum Store - 6

Building Services - 20

Protection & Visitor Services - 26

Collections - 17

Exhibits - 14

Education - 32

Development & Public Relations - 18

Total Staff - 145

ADMINISTRATION

NAME	DAYS/HOURS	TITLE	WORK DESCRIPTION
Peter Sterling		Executive Director	
Leslie Clumb	M-F, 9-5	Executive Assistant	Assists Executive Director with daily functions and special projects; general secretarial functions; Minutes for Board, Department Heads and Committee Meetings; Coordinates scheduling of Board Room; Assists with special functions & projects for director, trustees and guild; staff coordinator of youth advisory council and supervises receptionist.
Stephen Sullivan	M-F, 8-5	Deputy Director Museum Operations	Manages financial matters and general operations, including personnel and purchasing.
Jacinth Thompson	M-F, 8:30-5	Secretary to Deputy Director	Handles the Deputy Director's secretarial duties including word processing and data processing and all general correspondence; Prepare final financial reports for dissemination; Provides backup relief for receptionist/operator; In-house coordinator of customer access unit for telephone system.
E. Andrew Bawel	M-F 8:30-5	Controller	Assists Deputy Director; Manages accounting functions; including budgeting, cash control, cost compilation and analysis; Periodic report preparation for investment and overall financial purposes; Troubleshoots computer operations.
Sheila Bradley	M-F, 8:30-5	Cashier Clerk	Cashier; Handles all cash receipts; Switchboard back-up.
Gerianne Carpenter	M-F, 8-5	Receptionist	Handles all incoming telephone calls; provides information to visitors to the administrative offices; assists Executive Assistant and other individuals with clerical functions; handles all petty cash transactions.
Jerri Patton	M-F, 8:30-5	Administrative Assistant - Product Development and Marketing	Assists Product Development and Marketing Manager with daily functions and general secretarial needs. Prepares Minutes for Product Development and Marketing meetings, data processing and word processing of all sales, production and client list files.

ADMINISTRATION
(continued)

NAME	DAYS/HOURS	TITLE	WORK DESCRIPTION
Peggy Powis	M-F, 8:30-5	Product Development & Marketing Manager	Directs museum's product development, testing evaluation, marketing and sales program.
Vicki Wilson	M-F, 8:30-5	Accounting Assistant	Payroll; Employee Benefits; Personnel Records; Work Study/Interns; Application Files and Correspondence; Insurance Invoices.
Jackie Horan	M-F, 8:30-5	Accounts Payables Clerk	Computer entry of accounts payable; Handles all invoices and purchase orders; Gift Shop Invoices; Issues museum credit cards; Switchboard backup; Office Machine Service; Orders gifts and flowers for special staff occasions.
Betty McWhorter (Milestone 1, Inc.)	M&W, 8:30-5	Computer Systems Administrator	Handles routine system back-up; computer training for staff and periodic analysis of disk utilization. Asists staff with software and hardware needs; installation of software upgrades and coordinates all data communications links. Researches and stays abreast of new hardware and software developments.

ADMINISTRATION (MUSEUM STORES)
(continued)

NAME	DAYS/HOURS	TITLE	WORK DESCRIPTION
Mary Toshach	M-F, 9-5	Museum Stores Manager	Manages and operates the Museum Stores. Administers gift shop policies and procedures; Makes merchandise selections and purchases merchandise for the shop.
Peggy Fortino	M-F, 9-5	Assistant Museum Stores Manager	Supervises the shop operations, including supervising volunteers and other staff working in shops. Maintains store appearance and sets up displays.
Ronald Edwards	M-S, 7:30-5	Stock Room Clerk	Supervises the receiving and marking of orders; maintains stockroom order; assists in restocking merchandise on the floor.
Lois Harris	M-F, 8:30-5	Data Entrty Clerk	Enters and processes all purchase orders; reviews and approves invoices for payment.
Sylviane Lunn	T-Th, 9-5	Book Buyer	Purchases books and other publications for Museum Stores; assist in merchandise selection for temporary shops.
Laura Selm	MWF, 9-5	Assistant Buyer	Purchases selected items for the Museum Store; assists in general operations when necessary.

BUILDING SERVICES

NAME	DAYS/HOURS	TITLE	WORK DESCRIPTION
Bill Norton	M-F, 7-3:30	Building Services Manager	Manages all building operations and maintenance.
Jim Fulton	M-F, 7-3:30	Electrician-Lead	Building exhibits and construction; Electrical needs.
Mark Coovert	M-F, 8:30-5	Mechanic- HVAC-Lead	Building mechanical systems; HVAC
Mike Cochran	M-F, 7-3:30	Carpenter	Exhibit and Building Maintenance and construction projects.
Bob Chauvette	M-F, 7-3:30	Carpenter	Exhibit and Building Maintenance and construction projects.
Allen Denmark	T-S, 7-5	Mechanic HVAC	Building mechanical systems - HVAC.
Otis Doxtator	T-S, 7-5	Mechanic-Lead	Building and general systems; Carousel; Set-ups; Exterior.
Larry Finch	M-F, 7-3:30	Mechanic/Painter	Exhibit and building maintenance; Construction Projects.
Bob Gray	M-F, 7-3:30	Carpenter-Lead	Exhibit and Building Maintenance and construction projects.
Jeff Hampton	M-F, 7-7:30	Mechanic	Building and general systems; Carousel; Set-ups; Exterior.
Fritz Herdrich	M-F, 7-3:30	Mechanic/Painter-Lead	Exhibit and Building Maintenance, Construction projects
Steve Kahl	M-F, 7-3:30	Mechanic HVAC	Building Mechanical Systems - HVAC
Bobby Kidwell	M-F, 7-3:30	Mechanic/Painter	Exhibit and Building Maintenance and construction projects.

BUILDING SERVICES
(continued)

NAME	DAYS/HOURS	TITLE	WORK DESCRIPTION
Fay Morgan	T-S, 7-3:30	Housekeeper	General housekeeping
Phoebe Pitman	S-Th, 7-3:30	Housekeeper	General housekeeping
Marvin Pottorff	M-F, 7-3:30	Carpenter	Exhibit and Building Maintenance and construction projects.
Richie Powers	M-F, 7-3:30	Mechanic	Building and general systems; Carousel; set-ups; Exterior.
Linda Stephens	F-T,7-3:30	Housekeeper	General housekeeping.
David Wagner	M-F, 7-3:30	Carpenter	Exhibit and Building Maintenance and construction projects.
Bob Sorrells	M-F, 7-3:30	Carpenter	Exhibit and Building Maintenance and construction projects.

PROTECTION & VISITOR SERVICES

NAME	DAYS/HOURS	TITLE	WORK DESCRIPTION
Ernie Lipple	M-F, 9-5	Protection & Visitor Services Manager	Manages all protection & visitor services functions and operations.
Yvonne Harter	T-S, 9-5	Assistant Manager Protection Services	Manages day-to-day Protection Services operations; Accident/Incident Investigations; Overall building safety and security functions.
Benny Wilson	M-F, 9-5	Assistant Manager Protection Services	Manages dock and receiving areas, Mail; Office Supplies.
Cathy Ferree	T-S, 9-5	Assistant Manager Visitor Services	Manages Visitor Services day-to-day operations; Information Desk and Box Office.
Nathan Amsbury	T-S, 11:30-7:30	Protection Assistant	Security and Safety day-to-day assignments
Johnny Blake	F-M, 7-5:30	Protection Assistant	Security and Safety day-to-day assignments.
Kent Broaden	Su-Th, 11:30-7:30	Protection Assistant	Security and Safety day-to-day assignments.
Leslie Davis	T-S, 7-3:30	Protection Assistant	Security and Safety day-to-day assignments.
Frieda Duff	T-S, 9-5:30	Visitor Services Aide	Staff galleries, carousel, switchboard, toy trains; special assignments.
Sam Francis	F-M, 9:30-7:30	Protection Assistant	Security and Safety day-to-day assignments.
Ernie Jones	Su-Th, 9-5:30	Protection Assistant	Security and Safety day-to-day assignments.
Glen Jones	W-Su, 9-5:30	Visitor Services Aide	Staff galleries, carousel, switchboard, toy trains; special assignments.
Max Knaus	M-F, 6-2	Safety Assistant	Maintains Safety Records; Determines needs and trains personnel in safety procedures.
Bernadette Lauck	T-S, 9-5	Visitor Services Assistant	Handles all Box Office and Information Desk functions.

PROTECTION & VISITOR SERVICES
(continued)

NAME	DAYS/HOURS	TITLE	WORK DESCRIPTION
Lisa Lewis	Th-M, 3:30-11:30	Protection Assistant	Security and Safety day-to-day assignments.
Jesse Matthews	T-S, 3:30 - 11:30	Protection Assistant	Security and Safety day-to-day assignemnts.
Ernestine McCorn	T-S, 9-5:30	Protection Services	Security and Safety day-to-day assignments.
Geoffrey Mukhtar	Su-Th, 9-5	Visitor Services Assistant	Handles all Box Office and Information Desk functions.
	T-S, 9-5	Visitor Services Assistant	Handles all Box Office and Information Desk functions.
Eleanor Myers	Su-Th, 7-3:30	Protection Assistant	Security and Safety day-to-day assignments.
Tony Outlaw	T-S, 7-3:30	Protection Assistant	Security and Safety day-to-day assignments.
Mike Pennell	T-S, 9-5:30	Protection Assistant	Security and Safety day-to-day assignments
Margaret Polley	Su,T-F, 9-5:30	Visitor Services Aide	Staff galleries, carousel, switchboard, toy trains; special assignments
Kerry Price	Su-Th, 3:30 11:30	Protection Assistant	Security and Safety day-to-day assignments.
Mike Scott	T-S, 11:30-7:30	Protection Assistant	Security and Safety day-to-day assignments.
Mark Sutton	T-S, 9-5:30	Visitor Services Aide	Staf galleries, carousel, switchboard, toy trains; special assignments.
Clint Yates	Su-W, 1:30-11:30	Protection Assistant	Security and Safety day-to-day assignments.

COLLECTIONS

NAME	DAYS/HOURS	TITLE	WORK DESCRIPTION
Paul Richard	M-F, 9-5	Deputy Director Museum Programs	Administers Collections, Education and Exhibits Departments and all exhibits and programs.
Renee Wood	M-F, 8:30-5	Secretary to the Deputy Director of Museum Programs	Assists Deputy Director of museum programs and collections staff.
Vallorie Alsup	M-F, 8-4	Curatorial Assistant	Assists curators in cataloging and storage of artifacts.
Karol Bartlett	T-F, 8-4	Educator/Curator Natural Science	Collects Natural Science objects/specimens. Administers Natural Science, Story of Our Earth, Garden Gallery and Ritchey Woods.
Ben Brackett	T,Th,F, 8-5	Registraral Assistant	Assists Collecttions Manager in processing objects
Mary Jane Teeters-Eichacker	M-F, 8-4	Curator/Toys, Dolls & Textiles	Collects toys, dolls and textiles.
Sandra Gay	M-F, 7:30 - 3:30	Associate Curator African-American Materials	African-American materials and exhibitions.
Ron Gibson	M-F, 8-4	Registraral Assistant	Assists Collections Manager in processing objects.
Eileen Hayes	M-F, 8-4	Special Exhibition Coordinator	Coordinates incoming and outgoing exhibits.
Bob Johnson	M-F, 8-4	Educator/Curator American Materials	Collects American made objects; Administers Mysteries in History Gallery, Pastimes, Reuben Wells and Carousel.
Robin Lipp	M-F, 9-5	Collections Manager	Maintains records for all objects in museum; shipping and insurance of objects; all loans of artifacts; Administers educational resource collection and collections storage.

COLLECTIONS
(continued)

NAME	DAYS/HOURS	TITLE	WORK DESCRIPTION
Bob Pickering	T-S, 9-5	Educator/Curator World Cultures	Collects objects from foreign and ancient cultures; Administers Passport to the World gallery.
Theresa Ridgeway	M-F, 8-4	Registraral Assistant	Assists Collections Manager in processing objects.
Judi Ryan	M-W, 9-5	Curator/Special Exhibitions	Special and changing exhibit programs.
Ann Schwab	M-F, 9-5	Librarian/Archivist	Books; manuscripts; periodicals. Library/Archives.
Susie Sogard	W-F, 9-5	Curator/Special Exhibitions	Special and changing exhibit programs.
Myron Vourax	M-F, 9:30 - 5:30	Conservator	Repairs/preserves museum's collections.

EXHIBITS

NAME	DAYS/HOURS	TITLE	WORK DESCRIPTION
John Vanausdall	M-F, 9-5	Exhibit Development Director	Direct exhibit development; Design, Audio/Visual and Computer Programming.
Angie Elliott	M-F, 8:30-5	Department Secretary	Assists Exhibit Development Director and Exhibits staff.
Alex Black	M-F, 7-3	Exhibits Production Manager	Coordination of exhibit production; Exhibit Design.
Randell Beck	M-F, 8-4	Process Artist	Exhibit photography; Graphic Production; Exhibit Design.
Floyd Bennett	T-S, 8-5	Audio/Visual & Electronics Technician	Design, fabrication, maintenance of audio visual exhibit elements.
Joy Johnson Crenshaw	T-S, 7-4	Preparator	Exhibit preparation; Exhibit maintenance.
Sharon Hendrickson	M-F, 8-3:30	Exhibit Designer	Graphic/Exhibit design; Illustrations.
Marc Jennings	M-F, 8-5	Preparator	Exhibit preparation; Exhibit maintenance.
Paul Jones	Su-Th, 8-5	Assistant Audio/Visual & Electronics Technician	Design, fabrication, maintenance of audio visual exhibit elements.
Karen Karg	M-F, 8-5	Preparator	Exhibit preparation; Exhibit maintenance.
David Levine	M-F, 8-4	Programmer/Analyst	Designs and writes computer programs.
Tina Sibbitt	M,Th,F 8:30-4:30	Exhibit Designer	Exhibit design.
Steve Sipe	M-F, 7-3	Associate Exhibit Designer	Exhibit/Graphic design.
Greg Smith	M-F, 7-4	Preparator	Exhibit preparation; Exhibit maintenance.

EDUCATION

NAME	DAYS/HOURS	TITLE	WORK DESCRIPTION
David Cassady	T-Sa, 9-5	Education Director	Department Administration.
Nikki Black	M-F, 7-3	Exhibits Planning Director	Supervises conceptual planning of exhibits. Formative and summative exhibit evaluation. Exhibit team training.
Tammy Durm	T-Sa, 9-5	Administrative Assistant	Office Manager; volunteer recruitment/coordination and non-profit facility rentals.
Karol Bartlett	T-F, 8-4 Sat, 9-5	Educator/Curator Natural Science	Curates Natural Science collection; supervises operation of Natural Science, the Garden Gallery, Ritchey Woods and Story of Our Earth.
Mary Batrich	M-Th, 9-5	Assistant School Services Coordinator	Oversees daily operations of guided and self-guided visits; schedules museum visits and docents; structures and implements guided museum learning experience and aids in the training of volunteer docents and teachers.
Paula Bongen	W-Su, 9-5	Interpretation Coordinator American Materials	Plans/coordinates interpretation in Mysteries in History; trains and supervises volunteers.
Jeanette Booth	M-F, 9-4	School Services Division Head	Supervises and coordinates school services, docent training, teacher workshops and community and school guided visits.
Lee Borinstein	T-Sa, 9-5	Theater/Audio Visual Coordinator	Coordinates and provides support for all programs and activities in Lilly Theater. Coordinates and provides audio/visual support for programs and activities in museum.
Nikki Craig	T-Sa, 9-5	Assistant Museum Programs Manager	Plans and implements school-age classes and camp-ins. Assists with public programs and co-sponsorships. Back-up for Museum Programs Manager.
Kay Cunningham	T-Sa, 9-5	Early Childhood Education Coordinator	Supervises the operation of Playscape; plans and implements preschool members' programs; teacher-parent workshops.

EDUCATION
(continued)

NAME	DAYS/HOURS	TITLE	WORK DESCRIPTION
Larry Gard	T-Sa, 9-5	Theater Manager	Plans and implements performing arts programs for for children and their families. Manages operations of Lilly Theater.
Kay Harmless	M-F, 9-5	Educator/Curator Center for Exploration	Provide leadership in the conceptual development of and the overall responsibility for the Center for Exploration
Renee Henry	W-Su, 9-5	Interpretation Coordinator World Cultures	Plans interpretation in Passport and Ancient Egypt.
Sandy Jessup	T-Sa, 9-5	Interpretation Coordinator/Physical Science	Plans/coordinates interpretation in Science Spectrum, Jenn Theater and Think Tank; trains and supervises volunteers.
Bob Johnson	M-F, 9-5	Educator/Curator American Materials	Curates American Materials collection; supervises operation of Mysteries in History, Pastimes and Reuben Wells.
Mashariki Jywanza	T-S, 9-5	Programs Coordinator	Coordinates Prelude Awards and Prelude Academy. Plans and coordinates Neighbors' StarPoint Program.
Mark Kesling	T-Sa, 9-5	Curator/Educator Physical Science	Supervises operation of Science Spectrum, Jenn Theater and Think Tank.
Sharon Parker	T-S, 9-5	Planetarium Director	Develops programming for the Planetarium.
Robert Pickering	T-Sa, 9-5	Educator/Curator World Cultures	Curates ethnographic artificat collection, supervises operation of Passport to the World and Ancient Egypt.
Leslie Power	T-Th-Sa	Early Childhood Education Assistant	Assists with members class planning and class supervision. Prepare materials for member's classes and assists with planning and execution of Playscape gallery activities.
Ann Ray	T-S, 9-5	Computer Center Coordinator	Coordinates educational programs in the Computer Discovery Center.

EDUCATION
(continued)

NAME	DAYS/HOURS	TITLE	WORK DESCRIPTION
Donna Saul	M-F, 8:30-5	Department Secretary	General secretarial functions; word processing, audio/visual equipment.
Katie Slivovsky	T-Sa, 9-5	Interpretation Coordinator/Natural Science	Plans/coordinates interpretation in Natural Science and Garden Gallery and Ritchey Woods; trains and supervises volunteers.
Francine Smith	T-Sa, 9-5	Museum Programs Manager	Coordinates all programs. Plans and implements classes, Neighbors programs, special events and co-sponsorships.
Michelle Trimble	T-F, 9-5	School Services Assistant	Assists Resource Center Coordinator. Schedules resource material and school tours.
Jackie Velasquez	T-Sa, 8:30-5	WP/Secretary Education	General secretarial functions; mailing lists, word processing, facility usage calendar.
Debbie Wessel	T-Sa, 9-5	Resource Center Coordinator	Exhibit loan service; hospital outreach program.
Katheryn Williams	M-F, 8:30-5	Receptionist	Acts as message r and receptionist. Typing.
Jane Walker Donna Hilgeman Sue Berard Diane Jackson	M-F, School Year Hours	Staff Docent Staff Docent Staff Docent Staff Docent	Provides and implements guided school museum learning experiences. Aids in the training of volunteer docents and teachers.

DEVELOPMENT & PUBLIC RELATIONS

NAME	DAYS/HOURS	TITLE	WORK DESCRIPTION
Margaret Maxwell	M-F, 9-5	Development & Public Relations Director	Manages Development & Public Relations Division, including interpretation of policies, community relations & visitor complaints; acts as liaison with Guild to help plan museum related activities.
Karen Milton	M-F, 8:30-5	Assistant to the Director of Development & Public Relations	Assistant to division and division Director; Aids in division building usage; Coordinates projects of Guild building use. Handles special rentals, capital campaign correspondence and materials; assists with planning and implementing special events and serves as backup for duties performed by Executive Assistant.
Rhonda Allen	M-F, 9-5	Development Assistant	Assists in the special events for donors; Handles corporate rentals; Supervises annual campaign and day-to-day operation of record keeping division; Supervises word processing/data processing clerk and development secretary.
Sue Bogan	M-F, 8-4	Capital Campaign Coordinator	Coordinates activities of capital campaign phases; Updates donor lists and pledge payment schedule; Assists in proposal writing; Supervises research assistant and campaign secretary.
Sandy Cropper	T-S, 8-4	Human Resources Coordinator	Coordinates new staff orientation and all staff training programs. Manages volunteer program, including communication and recognition. Recruits and places volunteers as requested.
George Conis	T-S, 9-5	Media Relations Coordinator	Primary day-to-day museum contact for media; Prepares and distributes media materials; Assists with public relations events; Writes and proofreadss for museum publications; Maintains photo and slide files; Writes and records Kids Line.
Shelley Gorny	T-S, 8-4	Membership Coordinator	Recruits members, answers their questions and complaints; Coordinates member nights, annual meeting and travel opportunities; Oversees members benefits. Implements Meridian Award Program.

DEVELOPMENT & PUBLIC RELATIONS
(continued)

NAME	DAYS/HOURS	TITLE	WORK DESCRIPTION
Mike Hyer	T-S, 9-5	Public Relations Publications Assistant	Gathers and produces articles, releases, monthly listings and mailing lists for public relations materials; Coordinates all Rex appearances, speaking engagments for TCM and the training of speakers.
	M-F, 8-4	Public Relations Manager	Coordinates effective special events, promotions, publications and media relations for museum; Acts as spokesperson for museum; Supervises Media Relations Coordinator, Publications Editor, Graphic Designer Publications Assistant and Secretary.
Sheila Jackson	M-F, 8-4	Graphic Designer/ Photographer	Designs all printed materials, such as posters brochures and signs; Handles in-house photography for division.
Katie Marlowe	M-F, 8-4	Development Manager	Coordinates all fund-raising activities; Plans, organizes and manages annual fund raising events. Identifies sources and raises funds for special projects; Writes grants; Supervises development assistant, membership coordinator and development associate.
Susie Maxwell	M-F, 9-5	Planned Giving Officer	Identifies, cultivates and assists individuals who are major donors and major donor prospects. Co-ordinates activities for President's Club and capita campaign cultivation events for major donors.
Marsha McMullin	T-S, 8:30-5	Public Relations Secretary	Assembles information packets; Answers brochure requests, "how to start a children's museum" request Answers phone calls for public relations department, Maintains master mailing list.

DEVELOPMENT & PUBLIC RELATIONS
(continued)

NAME	DAYS/HOURS	TITLE	WORK DESCRIPTION
Matt Morris	M-F,8-4	Publications Editor	Responsible for all museum printed communication (newsletters, brochures, labels, Tom Tom, building signs, computer screens). Writes articles/stories f museum publications, edits all printed and visual material.
Paulette Persinger	M-F, 8:30 - 4:30	Research Assistant	Collects and prepares background information for pro pect solicitation; Assists in making recommendations for soliciting strategies; Prepares prospect lists. Helps with grant proposals.
Kara Scrougham	M-F, 8-5	Campaign Secretary	Responsible for campaign correspondence and calls, u dating records, assisting in pledge entry and back-up for division secretary for campaign relate activities.
Phyllis Smith	T-S, 9-5	Data Processing/ Word Processing Clerk	Enters and updates memberships; Maintains records on members, donors and prospects; Compiles mailing lists and labels; Produces data processing reports; Produces mailing schedule.
Susie Sogard	M-F, 9-5	Development Associate (P-T)	Solicits funds for special projects; identifies and cultivates corporate, foundation and some individual prospects.
Arlyne Springer	M-F, 8:30-5	Development Secretary	Keeps development records; Enters and acknowledges contributions; Answer phones; Does typing and clerical work for development staff; Provides some clerical assistance for capital campaign.

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Revised 9/88

SURVEY OF SCIENCE-TECHNOLOGY LEARNING CENTERS AND MUSEUMS FOR THE NSCCE PROJECT

CENTER/MUSEUM INTERVIEW FORM

GENERAL INFORMATION

Name of Facility: *Children's Museum*

Location of Facility: *P.O. Box Booo. Meridian Street*

Indianapolis. IN 46206

Contact Person and Title: *Paul Richard. Deputy Director of Museum Program*

Telephone: *(317) 924-5431*

Year Facility Established: *1924*

Any Major Additions [when & square footage]: *Have been in 4 different locations - each larger than the previous. Have been expanding this year - adding a planetarium & center for exploration lab as well as an education ctr. totaling 73,000 sq. ft. (individual footage not available)*

For the Center/Museum Building:

Was it specifically constructed for this purpose? *Yes*

Was it a converted historic building? *No**

Was it a former world's fair facility? *No*

Number Days per Year the Center/Museum is Open: *362*

Hours of Operation: Weekdays: *10-5 Monday-Saturday*

Weekends: *12-5 Sunday*

General Theme or Purpose of the Facility: *Enrich the lives of children through exhibits and programs*

Target Population Group(s)

Primary Group(s): *Families/small groups (92%)*

Secondary Group(s): *School groups/tours (8%)*

*Its previous locations consisted of carriage houses and mansions

Admission Price(s): *None*
Charges only for special programs/ exhibits within museum (ex., carousel ride child - $ .50 adult - $1.00)

Regular adult _____
Regular child _____
Senior citizen _____
Special admissions _____ [promotion with discount]
Parking _____ [for museum lot]

School group _____
Other group _____
Combination ticket* _____ [including other admissions]
*For what: _____

Facility Size and Allocation [square feet]:

Total Indoor Space Available to Visitors: [include exhibits, classrooms, theaters, eating areas, museum store, i.e., all areas open to visitors]	*200.000*
Indoor Exhibition/Exhibit Area:	*140.000*
Outdoor Exhibition/Exhibit Area:	*10.000*
Indoor Staff and Support Areas not open to visitors [offices and maintenance, storage, exhibit maintenance, design, and fabrication]:	*100.000*

Facility Features (Physical Plant):

Number of Theaters/Auditoriums: *1 auditorium and 2 small theaters*
Planetarium: *In process of being built*

Use(s) of Each Theater/Auditorium/Planetarium [e.g., laser shows, movies, lectures, Imax/ Omnimax, public events]	Seating Capacity
- Auditorium - performing arts, film festivals, children's performances, lectures	*350*
- Theater - demonstrations for physics	*80*
- Theater - demonstrations for natural science	*30*
- Planetarium - plan for only planetarium shows at the present time	*140*

Number of Lecture Rooms, Workshop Rooms, Meeting or Conference Rooms: *6*

Is there a Resource Center? *2* *(1 area strictly for staff, 1 area for public)*

Is there a Computer Lab? *Yes*

Is there a Museum Store in the Facility? *Yes* *(3)*

Is there a Restaurant/Cafeteria? *VERY NICE!* *Yes* *(2) one to be opened at the end of the year*

Seating Capacity: *450*

Is there an Indoor "Bag Lunch" Area? *No*

Is there a Vending Machine Area? *No*

Other Special Physical Features in the Facility (e.g., other labs): *Indianapolis Think Tank - (physics lab) Center for Exploration Lab*

Marketing/Publicity Efforts (1987)

Total Expenditures for Marketing/Publicity: *300,000-400,000*

Expenditures for Paid Advertising Through the Media: *None*

Donated or Other Marketing/Publicity Activities: *PSAs, newspapers, grocery bags, plate liners at McDonalds, taxi cabs, table tents at restaurants, parties for doners, billboard on major interstate.*

NUMBER OF VISITORS/PARTICIPANTS

Total Number of Visitors/Participants at the Museum/Center [exclude those involved in field visits or other outreach activities outside of the museum/center]:

Year	Number	[check one] Actual	Estimate	How is the Count Obtained? [e.g., tickets, turnstiles, some estimating procedure]
1983	*1.250.000*		*X*	*People are counted at door by an electronic beem (found to be not that accurate at times)*
1984	*1.350.000*		*X*	
1985	*1.450.000*		*X*	
1986	*1.550.000*		*X*	
1987	*1.650.000*		*X*	

For 1987, Visitor Information:

[DO NOT DOUBLE COUNT]		Recorded Number	or	Approximate Percent of Total 1987 Visitors*
Number of School Group Visitors, Total =		*100.000*	*or*	*6.0%*
Elementary		*80.000*	*or*	*4.8%*
Junior High	*(10-15 years old)*	*17.000*	*or*	*1.0%*
Senior High		*3.000*	*or*	*0.2%*
Local Area Residents (within greater metropolitan area)	*(within Marion County)*		or	*60%*
Tourists (outside greater metropolitan area)			or	*34%*

For the visitors from the "Local Area Residents" and "Tourists" groups, please estimate the following:

	Est. Percent
age 17 and under	*50%*
age 18-59	*47%*
age 60 and over	*3%*

EDUCATION PROGRAMS

Types of Education Programs Offered and Target Audience(s).

[Check if provided by museum/center]

Rank the 3 Highest in Number of Visitors (a - h)		Target Audience(s) [Check all appropriate]					
		Pre-Schoolers	Elem. School Students	Jr. High Students	Sr. High Students	Non School Youth Groups	Non Youth Groups
	a. Camp-in programs			X	X	X	
3	b. Classes/workshops	X	X	X	X	X	X
	c. Films and theater shows	X	X	X	X	X	X
	d. Guided tours	X	X	X	X	X	X
	e. Intern programs						
2	f. On-site lectures/ demonstrations	X	X	X	X	X	X
	g. Science clubs		X	X	X		
1	h. Special events	X	X	X	X	X	X
	i. Field trips into the community					X	
	j. Radio/TV programs						
	k. Speaker's bureau						X
	l. Tours/travel programs						
	m. Any other*						

*Please describe: *Youth apprentice programs*

[LIMIT TO PRE-COLLEGE ONLY]

Does institution offer any of the following services to schools? [Check all that apply]

	On-Site	Off-Site
Career workshops	X	X
Curriculum materials, kits, software	X	X
Classes or demonstrations	X	X
Loaned audiovisual materials, exhibits or artifacts	X	X
Tours/class visits for school groups	X	X
Science fairs	X	X
Teacher workshops	X	X
Other	*	*

Specify: **Offers to the general public: (a) Neighbors Programs - young people living within walking distance to museum. (b) Hospital Outreach Program. (c) Visual & Performing Arts programs designed for young people with physical & learning disabilities.*

Are any of these programs planned jointly with schools personnel?

X Yes ____ No

Does institution have an education advisory committee?

X Yes ____ No

How many teachers per year are normally served through the institution's teacher programs?

200 estimate

Are there school personnel who act in any of the following capacities:

Exhibit development?	X Yes	____ No	
Education program planning?	X Yes	____ No	
Conducting education programs?	X Yes	____ No	
On loan or leave to work at the museum?	____ Yes	X No	*(In future this will be true)*

EXHIBITION/EXHIBITS INFORMATION

DEFINITIONS FOR EXHIBITS SECTION	
Exhibition Area	A collection of several exhibit units linked by a common theme or focus.
Exhibit Unit	A component focused on a single phenomenon or topic that is part of a larger exhibition.
Permanent Exhibition	An exhibition that has an expected life of several years.
Temporary Exhibition	An exhibition developed by or for this facility and planned for display of one year or less.
Traveling Exhibition	An exhibition developed by others that rotates through several museums.

Total Number of Permanent Exhibitions in the Museum/Center in 1987: *10*

Average Number of Exhibit Units in the Exhibition Areas: *40*

Space Dedicated to Temporary Exhibitions [square feet]: *4.000*

Total Number of Temporary Exhibitions in the Museum/Center in 1987: *

Average Number of Exhibit Units in the Exhibition Areas: *15*

Space Dedicated to Traveling Exhibitions [square feet]: *12.000*

Total Number of Traveling Exhibitions in the Museum/Center in a Typical Year: *

Average Number of Exhibit Units in the Exhibition Areas: *15*

**Temporary and traveling is 30 -- could not break down.*

Which Exhibitions are the most popular with school age visitors:

School Group	Exhibition Theme or Content	Exhibition Approach (e.g., "hands on" or "look and see")
Pre School	*Playscape*	*Hands-on*
Elementary	*Nat. Sci./Phy. Sci.*	*Hands-on/look and see*
Junior High	*Nat. Sci.*	*Hands-on/look and see*
Senior High	*Phy. Sci.*	*Hands-on/look and see*

How many Explainers/Guides are Used: * Ages: *12 and up* *(Have to be 12 for young apprentice)*

What is the Impact of the Explainers: *Interpret exhibits for a better understanding. Some explainers are roving and cover entire museum, while others are stationed at specific exhibitions.*

How much formal training is given to the Explainers: *Couple of months of training which is exhibit specific (subject matter). Explainers are evaluated by people who run that exhibit area. Explainers work their way up to the most complex exhibits. (Are assigned color codes according to knowledge level.)*

What Percent of Explainers are multilingual? *Small percent in their passport to the world exhibit (Thai, Chinese, etc.)*

How often are Volunteer Expert Demonstrators Used with the Exhibits:

Regularly X Occasionally _____ Never _____

*12 explainers/guides on an average day, but up to 50 during vacation season, holidays, and weekends.

SURVEY OF SCIENCE-TECHNOLOGY LEARNING CENTERS AND MUSEUMS FOR THE NSCCE PROJECT

ORAU STAFF FORM

Name of Facility: *Children's Museum*

Time Available for Touring the Facility: *4 hours*

Indicate Number of Exhibition Areas Not Covered: *All covered (except for garden gallery located outside museum)*

GENERAL OVERVIEW OF FACILITY EXHIBIT APPROACH

Approximate Percent of Exhibit Units Using:

"Hands On" Approach *60%*

- Demonstrations with Audience Participation: *15* %
- Interactive Computer/Video Devices: *15* %
- Simple Controls: *15* %
- Group Activities: *15* %

Movies, Tapes, Slides: *10* %

"Look and See" Format: *30* %

TRENDS IN NEW EXHIBITS [Discuss with Museum Staff]

Toward "Hands On": _____ or *65-70* %

Toward Traditional "Look and See": _____ or *30* %

Why? *Museum doesn't like term "hands-on", rather it uses "minds-on." It believes in interdisiplinary multiple modes of learning, therefore, it will continue with the same 70/30% ratio.*

EXTERIOR CONDITIONS

Availability and Cost of Parking: *Parking is free. Space is ample during day, but during weekends scarce.*

Traffic Routes: *Located on Meridian (Rt. 31/37) which runs all the way through Indianapolis and is the main route traveling North and South.*

Quality of Neighborhood: *Located in a commercial district outside main downtown area on the outskirts of uptown which is a very affluent area.*

OVERVIEW OF EXHIBITION

1 Exhibition Area Theme or Content: *Natural Science Hall*

Size [square feet]: _____ No. Exhibit Units: *35* % "Hands On" *75%*

Are Explainers Used? *Yes* Are Demonstrators Used? *No*

How Popular? Museum View: *Very, because of Cave* ORAU Comment: *Cave was very innovated*

"Take Aways" Available [what]: *Making tracks - stamped footprints of animals - try to figure out what animals they belong to by going through the exhibition area.*

General Appearance and Maintenance: *Very good*

Other Comments: *Walk through limestone cave was very educational and approach unique. It not only contained many hands-on units therefore "learn by doing" but also placed you in the units environment.*

2 Exhibition Area Theme or Content: *Passport to the World*

Size [square feet]: _____ No. Exhibit Units: *37* % "Hands On" *50%*

Are Explainers Used? *No* Are Demonstrators Used? *No*

How Popular? Museum View: *More popular with adults* ORAU Comment: *Needs more hands-on*

"Take Aways" Available [what]: *Paper on which you write a story pertainng to scenes within a large floor display case.*

General Appearance and Maintenance: *Very nice, looks like something from Disneyland*

Other Comments: *Would be more educational if they used less displays. Displays aren't even really "look and sees", they are merely displays.*

3 Exhibition Area Theme or Content: *Pasttimes*

Size [square feet]: _____ No. Exhibit Units: *30* % "Hands On" *10%*

Are Explainers Used? *No* Are Demonstrators Used? *Yes*

How Popular? Museum View: *Individual playroom pop. w/kids* ORAU Comment: *Would probably be interesting if visited during demo time.*

"Take Aways" Available [what]: *Depends on demonstration*

General Appearance and Maintenance: *Very good*

Other Comments: _____

4 Exhibition Area Theme or Content: *Mysteries in History*

Size [square feet]: _____ No. Exhibit Units: *60* % "Hands On" *85%*

Are Explainers Used? *No* Are Demonstrators Used? *No*

How Popular? Museum View: *Popular w/families* ORAU Comment: *Not good for just children, should have adult accompaniment to benefit from exhibition*

"Take Aways" Available [what]: *None*

General Appearance and Maintenance: *Good*

Other Comments: *Original approach - Provides visitor with clipboards at entrance of exhibition area. They are to fill out the answers to questions. These answers about the past can be found using clues given throughout the exhibition area.*

5 Exhibition Area Theme or Content: *Playscape*

Size [square feet]: _____ No. Exhibit Units: *27* % "Hands On" *100%*

Are Explainers Used? *No* Are Demonstrators Used? *No - monitors present*

How Popular? Museum View: *preschool favorite* ORAU Comment: _____

"Take Aways" Available [what]: *None*

General Appearance and Maintenance: *Very good*

Other Comments: *This playscape area is ideal for the younger children. It contains building blocks, grease boards and a water unit which allows them to "temporarily" get away from the learning mode of the rest of the museum and allows them to relax and recouperate through play.*

6 Exhibition Area Theme or Content: *Toys and Dolls Gallery*

Size [square feet]: _____ No. Exhibit Units: *All display cases of dolls, toys, and trains* % "Hands On" *0%*

Are Explainers Used? *No* Are Demonstrators Used? *No*

How Popular? Museum View: *Trains most pop. of area* ORAU Comment: *Not very educational*

"Take Aways" Available [what]: *None*

General Appearance and Maintenance: *Very good*

Other Comments: _____

#_7_ Exhibition Area Theme or Content: *Science Spectrum*

Size [square feet]: _____ No. Exhibit Units: *60* % "Hands On" *90%*

Are Explainers Used? *Yes* Are Demonstrators Used? *No*

How Popular? Museum View: *Most pop.* ORAU Comment: *Units vary in age appeal, but this area appeals to all ages*

"Take Aways" Available [what]: *None*

General Appearance and Maintenance: *A couple of units need repair*

Other Comments: *Contains an Indiana Bell Think Tank unit, Heart units and Sound units which are the most innovative and best organized than the rest of the museums I've visited (pertaining to these areas only)*

#_8_ Exhibition Area Theme or Content: *Carousel*

Size [square feet]: _____ No. Exhibit Units: *1* % "Hands On" *100%*

Are Explainers Used? *No* Are Demonstrators Used? *No* *(ticket taker & a ride monitor)*

How Popular? Museum View: *Very* ORAU Comment: *Interesting place for a carousel. Children's Museum?*

"Take Aways" Available [what]: *None*

General Appearance and Maintenance: *Very good*

Other Comments: *This area consists of a carousel ride which costs .50¢ for those 12 and under and $1.00 for those 13 and over. Should have displays regarding history of the carousel or hands-on to explain the mechanics of the carousel to make this area more educational.*

#_9_ Exhibition Area Theme or Content: *Indianapolis 500 Mile Race Car*

Size [square feet]: _____ No. Exhibit Units: *1* % "Hands On" *100%*

Are Explainers Used? *No* Are Demonstrators Used? *No*

How Popular? Museum View: *Ave. pop.* ORAU Comment: *Boring*

"Take Aways" Available [what]: *None*

General Appearance and Maintenance: *Good*

Other Comments: *The area merely contains an Indy Car. If this unit were to be educational and a little more worthwhile, it might include a history of how the Indy 500 started, abilities of the car, simulated races on videos. etc.*

#10 Exhibition Area Theme or Content: *Allen Clowes Garden Gallery*

Size [square feet]: _____ No. Exhibit Units: _____ % "Hands On" _____

Are Explainers Used? _____ Are Demonstrators Used? _____

How Popular? Museum View: _____ ORAU Comment: _____

"Take Aways" Available [what]: _____

General Appearance and Maintenance: _____

Other Comments: *Did not visit.*

APPENDIX E:

SCIENCE MUSEUM OF MINNESOTA TRIP REPORT

Site Visit 05 Sep 89 to **Science Museum of Minnesota**

Conversation with: Ms. Harriet Arend - Director of Operations

Operation Hours are: 0930-0900 pm
Attendance People: 825,000 yearly
Continuing Education Classes are big
They make and release film for educational purposes

Suggested improvements to their facility would include:

-One main entrance/exit (ticketing). Currently multiple entrances and exits exist and cause control problems.
-Space for amenities - i.e., coat room, lockers, toilets, etc. These need to be very visible and accessible from public areas not through exhibit areas.
-Classroom/group spaces (flexible rooms - dividable)
For after hours receptions, provide at least standard kitchen rough outs - both plumbing and electrical.

Comments for planning a new Science Center:

-Office & administration area essential!
and should be kept separated from exhibits.
-Employee vs public parking
-Employee spaces - breaks, lockers, etc.
-Cafe is important
-School services-classrooms, teaching areas, etc.
-Have other museums/Science Centers review plans

Conversation with: Mr. Dan Shindelar - Exhibit's Shop Foreman

Comments for planning a new Science Center:
-Column free space
-Numerous electrical options 120/220
-Separate and multiple circuits per exhibit floor
-Electrical grid in floor
-Wall construction should be one that provides easy, multiple anchorage. For example; behind finished wall surface of gypsum or plaster, provide 3/4" plywood full height of wall.
-Unistrut grid in ceiling
-Noise baffles per exhibit
-Power generator for emergency lighting (Emergency Egress)
-HVAC air movement interfered w/by some exhibits. 40% humidity is usually a standard to maintain.

-Lighting - Double track/switched
1 switch = public light level
1 switch = worklighting level
-Maintenance areas;
(1) - Exhibit - 900sqft. Shop for wood, metal, and plastic fabrication.
(2) - Building maintenance and supply
-Provide storage space per exhibit

OPPORTUNITIES for **BUILDING & FUNCTIONS** as **EXHIBIT !!!**

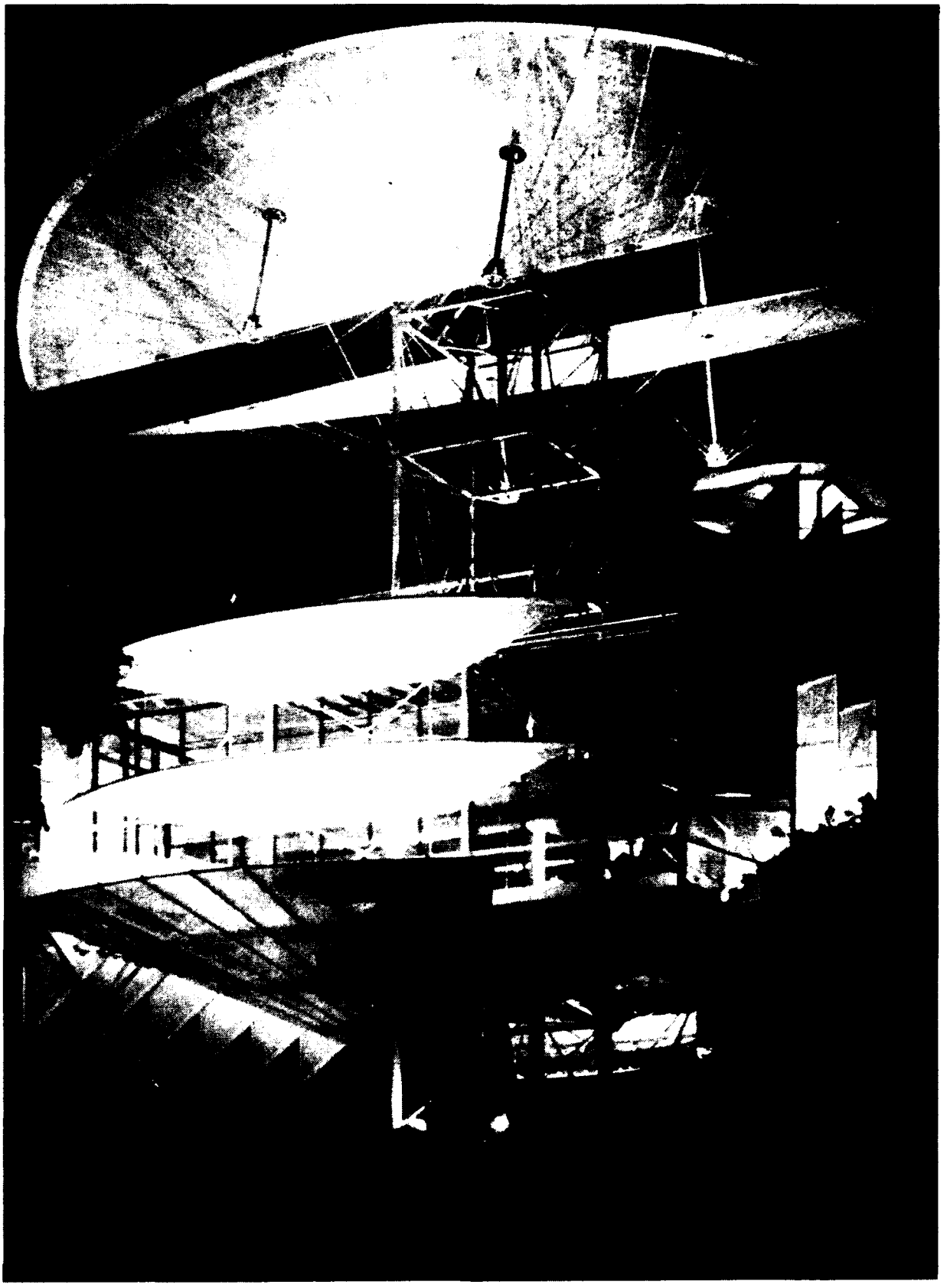
-Entry lobby - large exhibit space
-Area where people buy tickets/membership should act as an exhibit
-Elevator should be an exhibit
-Separate exhibit space from service functions, cafe, bathrooms, store, etc.

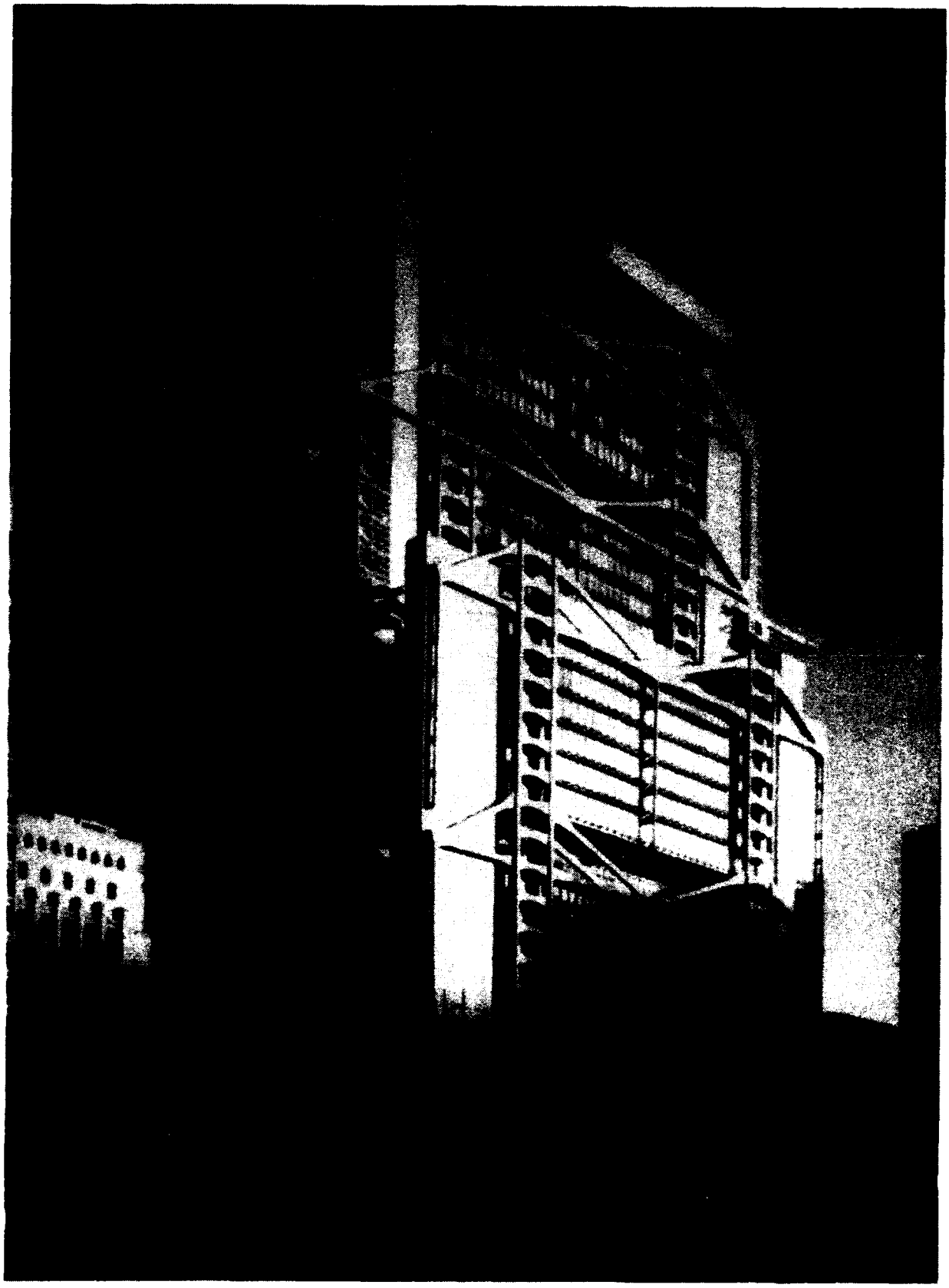
APPENDIX F:

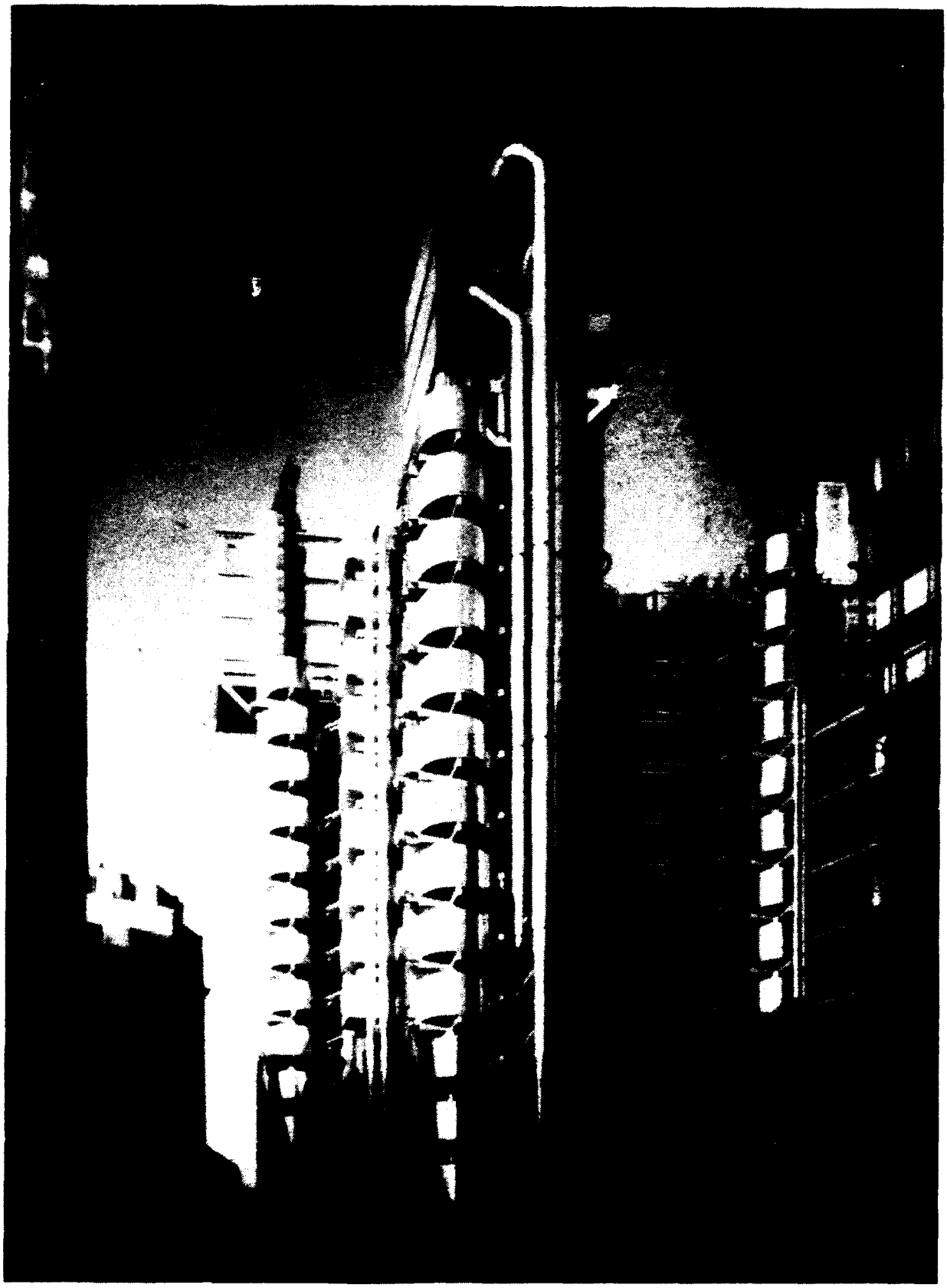
PHOTOGRAPHIC DOCUMENTATION OF VARIOUS CENTERS

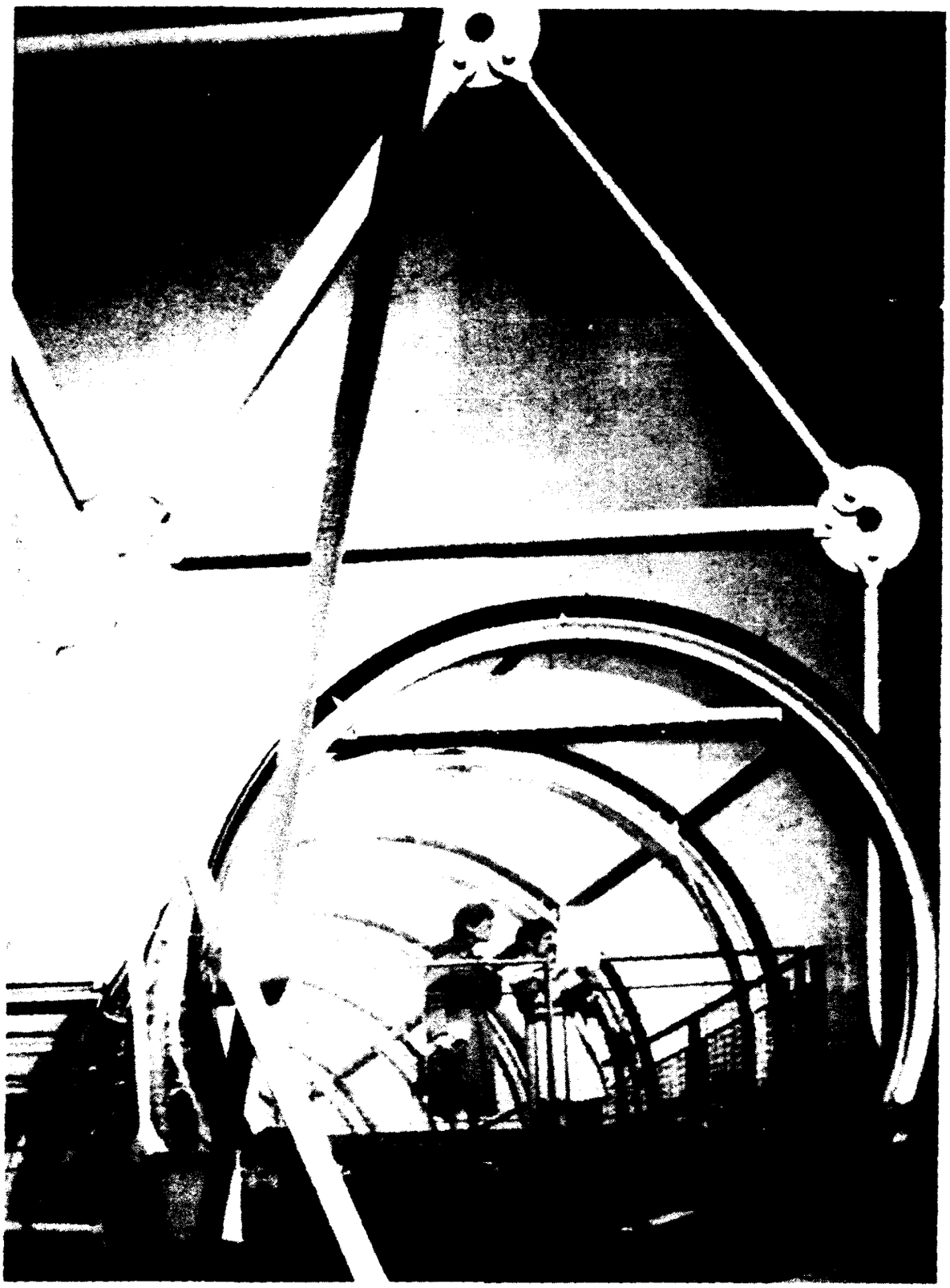
V 'SIONARY IMAGES OF AN EXTERIOR CHARACTER

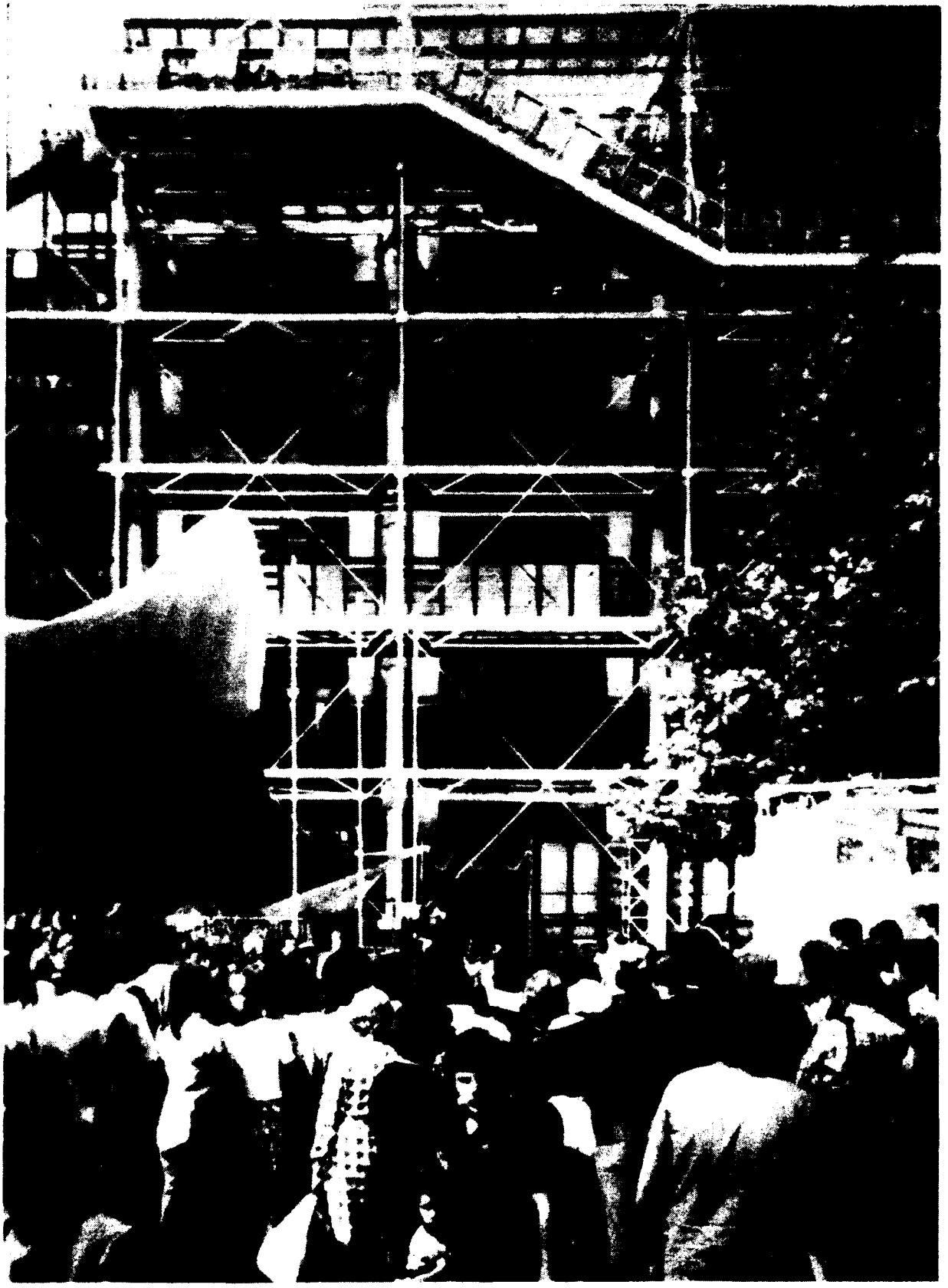
The pictures that follow are samples of images the researchers feel best represent the spirit, quality and character of a structure when the notion of Science Center is addressed. It is important to note that these images are not presented as a typology for "Science Centers"; nor are they to be misread (in certain instances) as centers themselves. Furthermore, the reader should be aware that these structures often exceed the scale, scope of construction, and cost of the proposed research project.

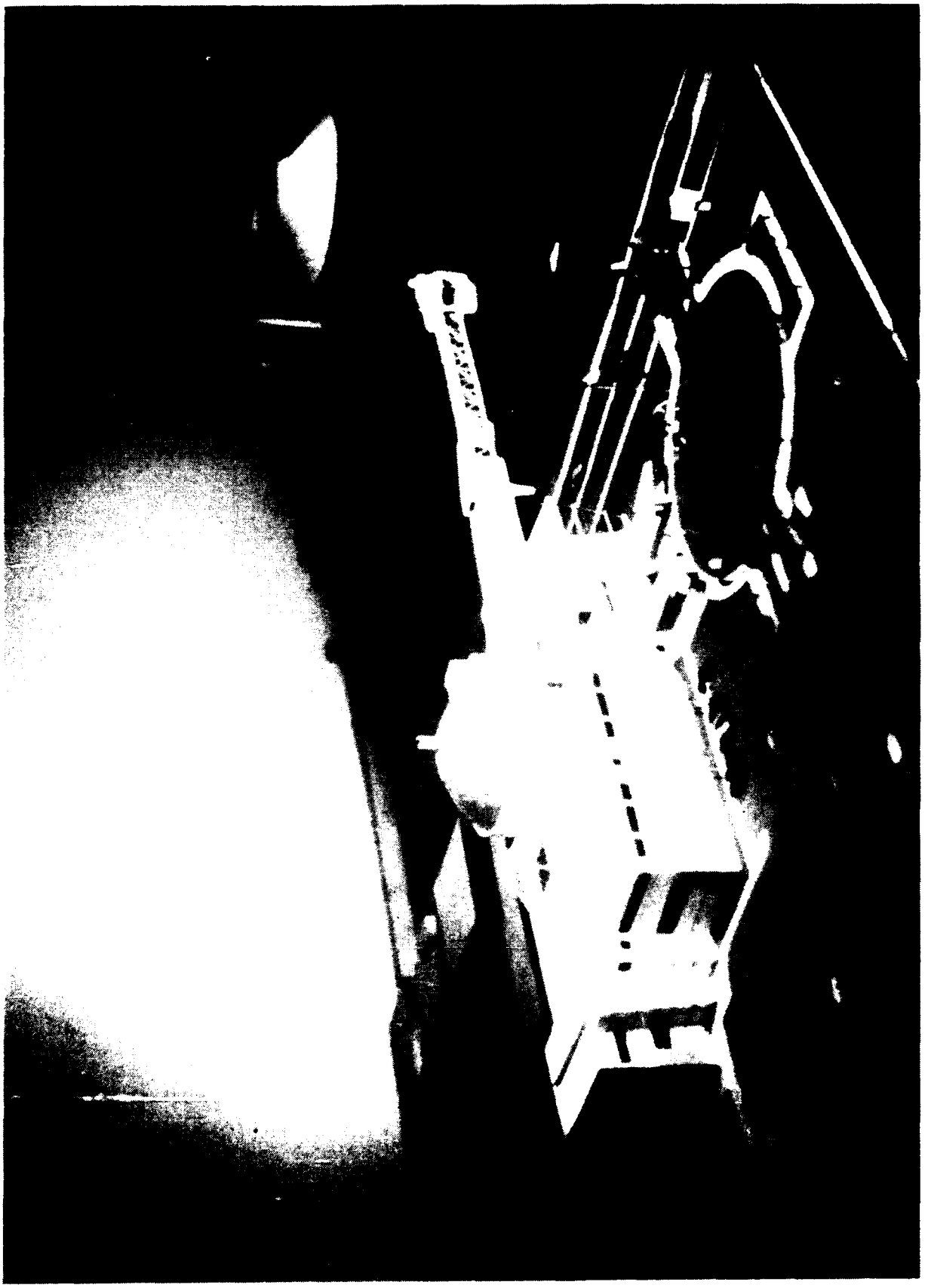




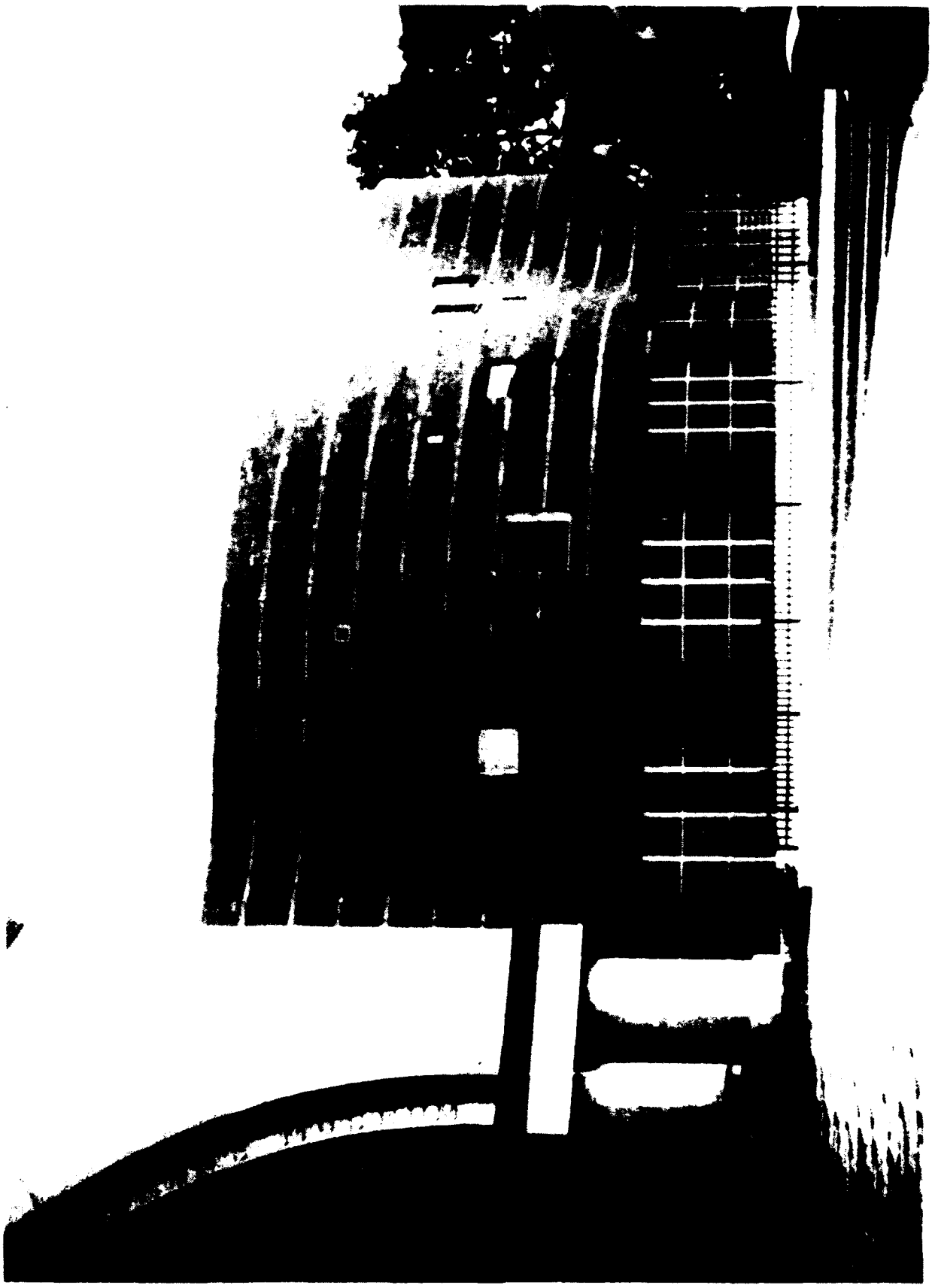




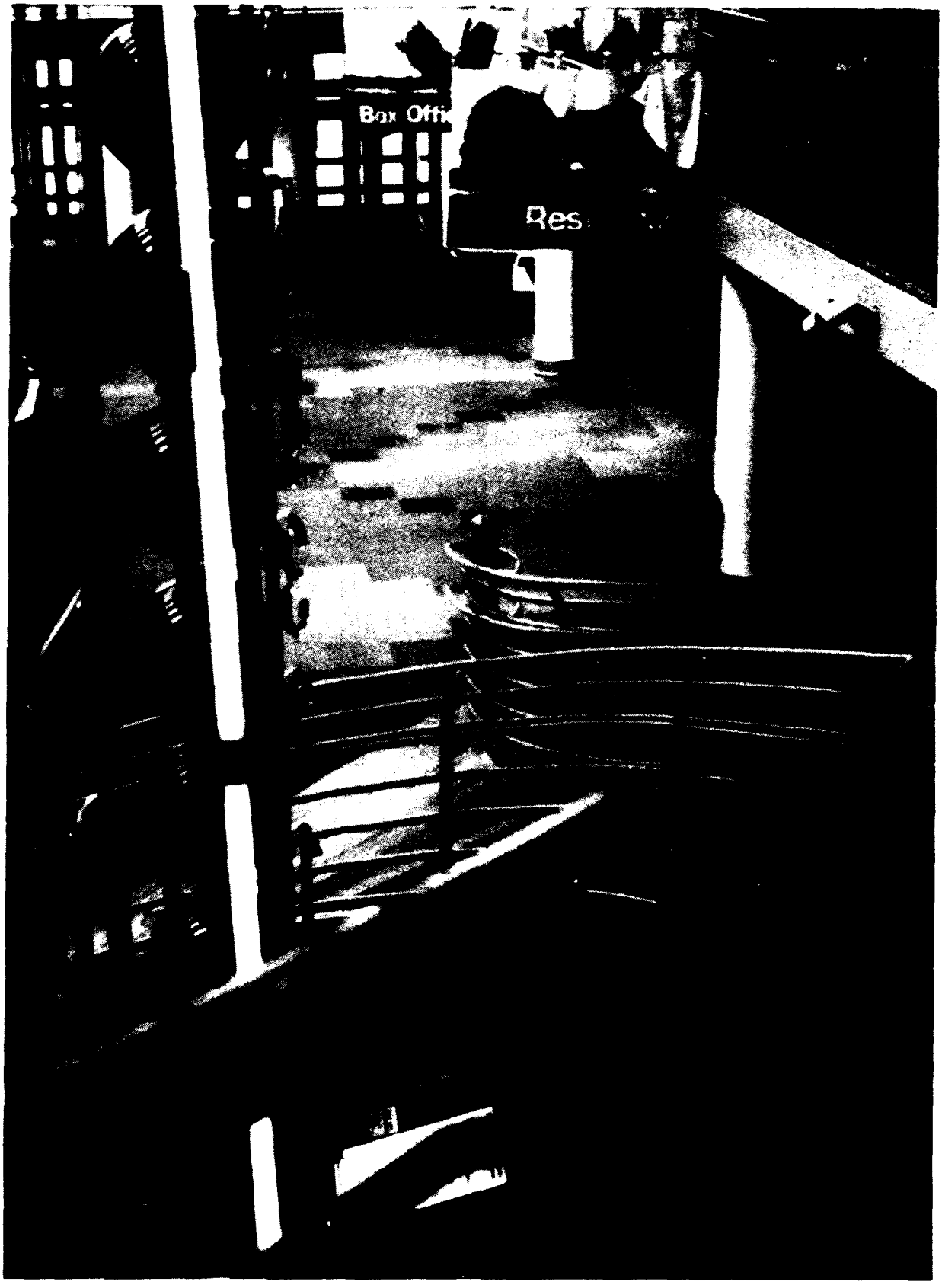




USAF
USAF FORCE




Restaurant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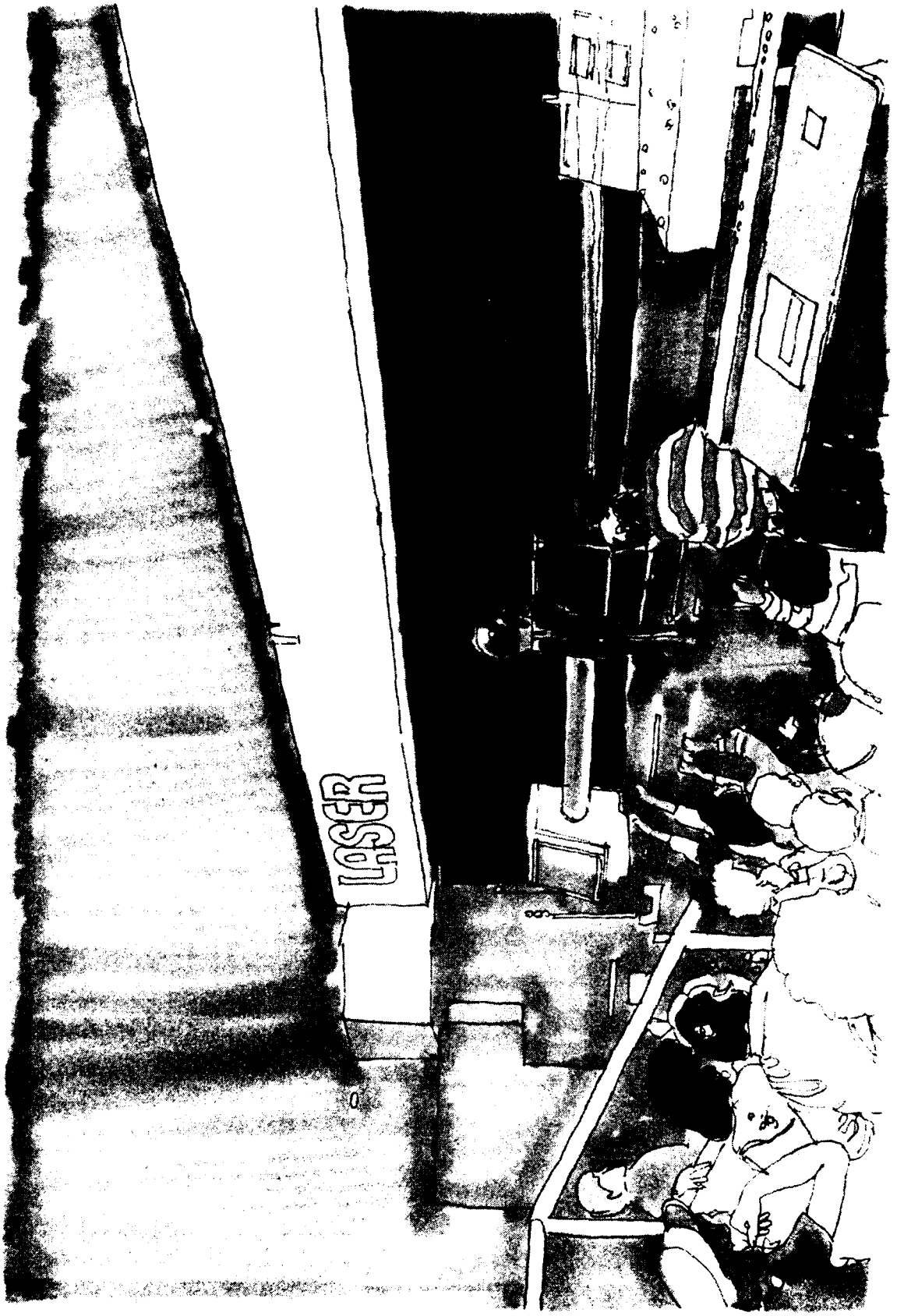
APPENDIX G:

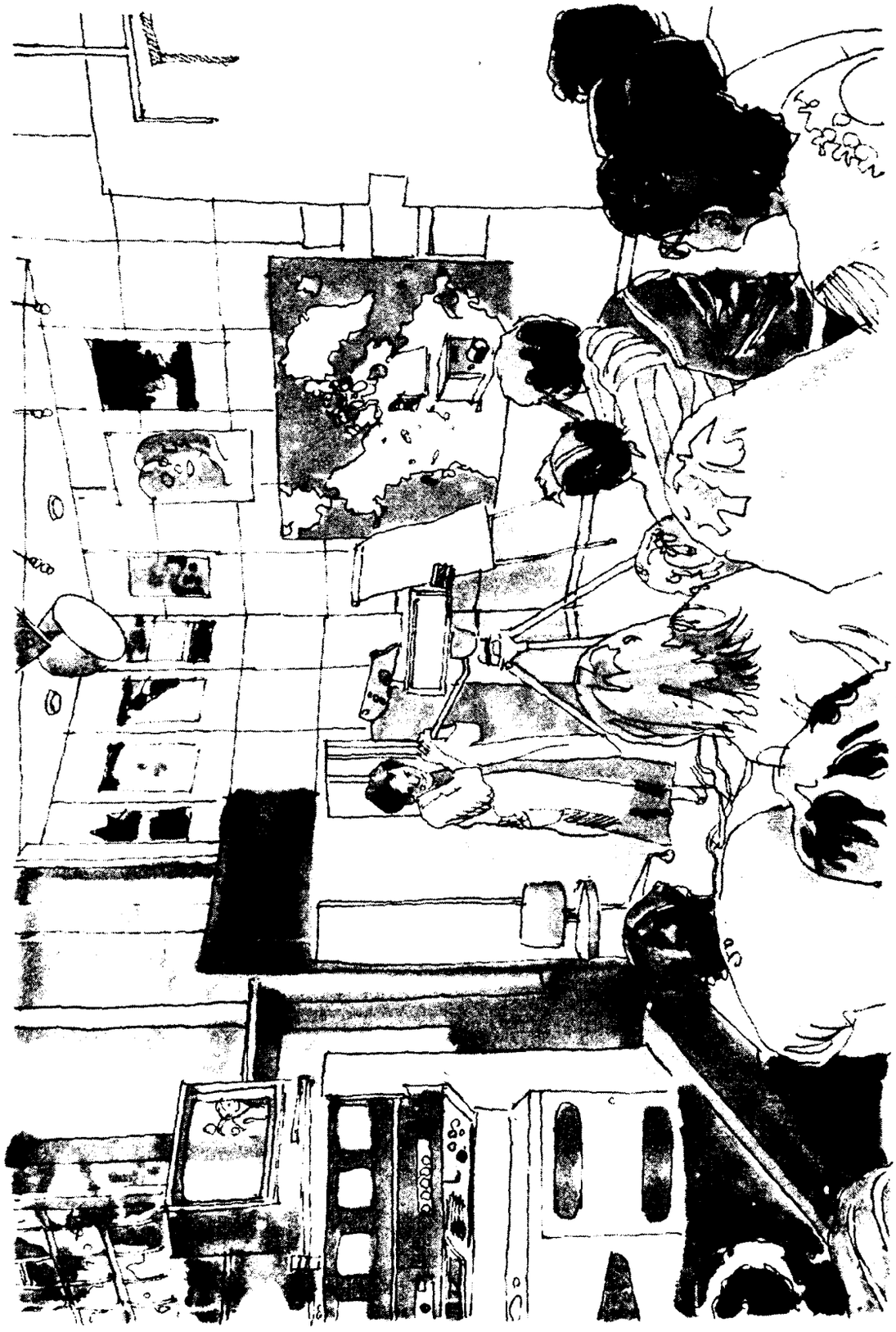
ARTISTIC RENDERINGS

VISIONARY IMAGES OF AN INTERIOR CHARACTER

For a science center to be successful, it is imperative to engage the visitor in a stimulating, creative, hands-on experience. The following pictures show how this experience might take place with a varying number of exhibits and center attractions.

As shown in the pictures representing an image for an exterior spirit, these studies and pictures represent a quality that is vital to the character, emotion, and life of the interior atmosphere. Although the images are generic, spaces and exhibits of this nature are ultimately the most important asset for the success of a science center.


LASER



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