DESIGN STANDARDS FOR A HIGH SCHOOL MUSEUM RESOURCE CENTER

by

REX MILFORD WALLACE JR.

(Under the Direction of C. Kenneth Tanner)

ABSTRACT

A dilemma that educational leaders face in high schools is where to look for visual materials which are easily available for teachers to use without great expense. A solution to this problem is to incorporate a school museum into a high school facility. However, there is a dearth of literature providing standards, guidelines, and other information that educational leaders can use to place a museum in their high school. Therefore, the primary research question for this study was: Will post-occupancy evaluations of existing school museums provide examples of design standards and other information that educational leaders can use to help bring about the changes in educational facilities necessary to place a museum resource center in a high school?

This study employed an investigative post-occupancy evaluation using a facilities assessment instrument entitled Appraisal Guide for a Museum Resource Center Building Program. This appraisal guide represented a model for a school museum. The appraisal guide and site interview questions were used as the framework for the gathering of data in this study.

Two of the museums in this study were described as separate facilities within a high school and three were defined as separate facilities within a school system. One of the three facilities within a school system received the highest percentage score on the appraisal guide for
being closest to the model. None of the facilities in this study had a dark ride, a separate conservation laboratory, an open storage area, or a shop section. All five of the museums in this study had in common the need for more space.

The post-occupancy evaluations of the five school museums in this study described, judged, and explained the performance of each facility. The development of the appraisal guide and its use in the post-occupancy evaluations of the five museums provided examples on an item-per-item basis of design patterns that were adaptable to high schools.

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DESIGN STANDARDS FOR A
HIGH SCHOOL MUSEUM RESOURCE CENTER

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DEDICATION

This study is dedicated to the teachers who continue to instill in their students a love of learning in spite of all the obstacles placed in their way.
ACKNOWLEDGEMENTS

I would like to acknowledge the support and guidance provided by my dissertation committee chair, Dr. C. Kenneth Tanner. I could not have completed this project without his support.

Above all this research study could not have been completed without the curators, administrators and school systems that opened their facilities for me. Originally, this study was conducted with anonymity with regards to identification of facilities and personnel. However, at the close of the study the following people gave their kind permission to use their names:

- Russell Clayton, curator of Museum A
- Jacque Coxe, curator of Museum C (Fulton County Teaching Museum North)
- David Rector, curator of Museum D (Fulton County Teaching Museum South)
- Cathy Loving, curator of Museum E (Atlanta Public Schools Archives and Museum)

I wish to thank each of these individuals and systems for their assistance. In many ways this project is a tribute to the high quality of the work the directors of the five facilities in this study are doing to promote a museum learning environment in the public schools of Georgia.

Finally, I wish to acknowledge the encouragement and support I received from my family. My wife, Patsy Wallace, helped sustain me through a sometimes overwhelming task. Her encouragement, along with that of my son Michael, gave me the incentive to complete this project.
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CHAPTER 1

INTRODUCTION TO THE PROBLEM

Society asks schools to educate students who can think critically, solve complicated problems, and work together with others in a successful manner (King, 1998). A survey of 55 leaders in education, business, and government indicated strong beliefs that children will need these abilities to survive in the future (Uchida, Centron, & McKenzie, 1996). At the 1989 National Education Summit President George H. W. Bush and the nation’s governors established a series of educational goals related to these abilities for the year 2000. These goals specifically stated that all students leave grades 4, 8, and 12 prepared for citizenship, further learning, productive employment; and the ability to master challenging subject matter (U.S. Department of Education, 2000b). However, data obtained by several studies raised doubts about the ability of schools in the United States to help children acquire these skills.

The Third International Mathematics and Science Study (TIMSS) revealed the average scores of American 12th grade students in both mathematics and science were among the lowest of the 21 TIMSS nations (U.S. Department of Education, 1998a). In 1998 The National Assessment of Educational Progress (NAEP) found only 40 % of a sample of 12th grade students were able to perform at or above the proficient level. This meant that 40 % of the 12th grade students in this sample, when reading text appropriate to their grade level, were able to make inferences, draw conclusions, and make connections to their own personal experiences and other readings (National Center for Educational Statistics (NCES, 1998a).

A writing assessment the NAEP gave found that 78 % of a sample of 12th grade students wrote at or above the basic level, 22 % achieved the proficient level and 1 % wrote at the
advanced level. Therefore, 78% of this sample of 12th grade students was able to write an organized response within the time allowed that showed an understanding of the writing task and the audience they were expected to address. In addition, their writing showed some creative thinking and included details that supported the main idea of the piece they were assigned. Students at the proficient level were able to perform the basic level tasks and use precise language and variety in sentence structure within their writing. Also, those students were able to write with few errors in grammar, spelling, punctuation, capitalization, and sentence structure. The 12th grade students in this sample who wrote at the advanced level were able to perform the proficient level tasks and use literary strategies such as anecdotes and repetition to develop their ideas (NCES, 1998b).

The Condition of Education 2000 report suggested the result of these tests raises concerns about the quality of education in the United States at the secondary level (U.S. Department of Education, 2000b). This conclusion was supported throughout much of the United States by political leaders who saw low test scores on standardized tests as indicators of the need for education reform (Chaddock, 1999; Lunenburg, 1992). Reigeluth (1994) agreed there is a need for reform in America's schools. However, he suggested that this cannot be done without major changes in the learning environment provided for students.

Still, the ability of a school system to meet society's demands for education reform depends on the human and physical resources available to it (U.S. Department of Education, 2000b). Herman (1995) said that part of the reason for the inability of some school systems to provide a quality educational experience for its students may be related to the design of school facilities. Other educators agreed with Herman when they acknowledged that the physical environment aids learning (Hawkins & Lilley, 1998). Herman (1995) suggested that student
learning cannot meet the expectations of society because school facilities have not been designed in ways that enhance the teaching and learning of the curriculum.

Castalidi (1994) pointed out that school facilities are fixed and unchangeable structures during a time when American society demands persistently changing results from its educational system. Therefore, educators constantly try to fit educational activities into a structure that is not easily changed. This leads to the creation of an environment where learning and real life experiences do not seem to be connected. Without this connection, it is more difficult to encourage students' interest. Thus, many high school teachers in public schools find that a major part of their task is to motivate their students to learn (Castaldi, 1994; Hein, 1998).

Researchers and educators interested in the learning processes of children in a school setting have noticed that students become more motivated to learn when they are physically involved in the lesson, have hands-on experiences, and can generate their own questions (Field, 1996). Consequently, high school teachers have to plan learning activities geared to the students’ interests and capabilities. Often, this involves making learning fun as well as interesting, allowing students to make choices from a variety of options, and providing opportunities for cooperative group learning activities (Herman, 1995). Teachers using these types of learning strategies are applying the principles of constructivist learning theories. Constructivist educational theory suggests that in any discussion of teaching and learning the focus needs to be on the learner not on the subject to be learned (Hein, 1999). Still, applying constructivist educational theory in a school is difficult since the learning environment in many school systems is not designed to facilitate individual learners. Instead it is set up to "process a mass of students, viewed as a fixed structural unit all at once" (Greenhill, 1999a, p. 68).
An important part of constructivist theories is that children learn by doing rather than by memorizing facts (Kafai & Resnick, 1996; King, 1998). Constructivist researchers and thinkers describe knowledge as something that is created by each individual based on that person’s experience in life (Trotter, 1995). Researchers Piaget and Dewey developed a clear idea of constructivism that could be applied to the classroom. Dewey stressed active learning that engages both children and adults in actual problems or activities. He suggested that since children and adults need to approach new concepts through the manipulation of and experimentation with objects, real-world problems and experiences should be used to guide and motivate learning. Piaget called for teachers to understand the steps in the development of the child’s mind. He believed that the fundamental basis of learning was discovery. In other words, understanding should be built step-by-step through active involvement (King, 1998).

A school that uses the constructivist theories of Piaget and Dewey would include in its facilities the materials and space needed to encourage learners to use both their hands and minds to connect what they are learning with real life experiences (Hein, 1998). The development of this type of connection requires examples. “Examples are the evidence that needs to be explained by any acceptable concept or theory” (Leinhardt, & Crowley, in press, p. 3). Museums through the objects they contain provide examples that can be used to further the goal of developing the ability of students to connect what they are learning with the world around them (Shuh, 1999). Thus, a museum facility provides an environment where the theories of the constructivists can be applied to the education of students (Hein, 1998).

Museums have been connected with education for over 100 years (King, 1998). During much of this time, museums have incorporated the belief that physical interaction with the world, with the learner taking part in the process, leads to situations that require the learner to think
(Hein, 1998). The practical implementation of these constructivist ideas was encouraged even more when, during the 1920s, the role of museum educator was created to work with visitors and school children (King, 1998). This has developed to the point that many museums now identify education as one of their top missions (Carliner, 1995). In order to fulfill this mission they often work closely with schools to provide programs and arrange for visits (Carliner, 1995; King, 1998). Research shows that the brief encounters museum visitors have with exhibitions appear to lead to learning and have some influence on future behavior (Hein, 1998). However, many museums are not being used in ways that realize their full educational potential (King, 1998).

One of the main reasons for this deficiency is that the major contact schools have with museums is through the use of field trips. Field trips are useful and the ideas and questions generated by a field trip can provide the motivation needed for active learning. Children tend to remember field trips because they provide opportunities to connect the lessons learned in the classroom to real life experiences (Duvall & Krepel, 1972; Lankford, 1992). Thus, during the 1998-1999 school year 68 percent of public secondary schools sponsored field trips to art galleries or museums (Carey, Kleiner, Porch, and Farris, 2002). However, many secondary school teachers and administrators do not see field trips as an essential part of their curriculum because visits by school groups have a voluntary aspect to them, and they are not required by their school systems. In some cases teachers believe the costs and time involved in organizing field trips are not worth the effort (Carliner, 1995; Lankford, 1992). Many teachers find they must keep pace with the school clock and calendar, which governs how the curriculum is presented to students and limits the number of opportunities students have to comprehend and master content. Frustrated teachers often face the task of cramming large portions of required material into a fraction of the time needed. Thus, time lost to enrichment experiences such as
field trips is another common complaint of educators (Report of the National Education Commission on Time and Learning, 1994). A study of the Reading Museum’s school loan service supported this view. In the 24 primary and secondary schools that are the beneficiaries of this service, 90% of the teachers said they prefer the Reading Museum loan objects to their schools than requiring them to take a field trip to the facility (McApline, 2002).

An additional concern teachers often express relates to their legal responsibilities during field trips. Conditions outside the school may increase the element of danger for the students. While children may expect more freedom and act differently out of their structured and familiar school environment, field trips often require greater restrictions and more careful supervision on the part of the teachers. Other concerns cited by teachers for not taking field trips include a lack of transportation, large class sizes, course of study requirements, time consumed by routine duties, daily class schedule, and fear that some fundamental teaching may be disregarded (Duvall & Krepel, 1972). On the other hand, museum educators complain that some teachers perceive the museum field trip as a day off from work and fail to monitor their student’s behavior. They have the impression that some teachers think museums are little more than a convenient way to escape the classroom routine (King, 1998). Frankel described situations when classroom teachers enjoyed and participated in museum education planning programs, but then continued to view such programs as supplementary to the regular classes. There was no systemic support for the teaching going on in museums or for the programs that were offered (1996). However, this may be related to the fact that in many projects designed by museums for schools, teachers had very little input in the design of the activities, and museum educators had little understanding of the school curriculum. Teachers often stated that they were not aware of services offered by museum staffs. One study concluded that while many partnerships between museums and
schools had been successful, poor communication was the major factor in museums’ failure to realize their full educational potential (King, 1998). Speltz and Shaugnessy (1990) showed that if this situation is not corrected, the museum field trip will seldom be more than a free day out of school. Their view was that a trip to the museum without any pre-planning and follow-up has little, if any, educational value. They believe the solution to this problem is the development of a close working relationship between the educational departments of a museum and a school. This relationship should produce a program of museum education that is orientated to museum collections as well as to students’ needs (Speltz and Shaugnessy, 1990).

However, museum professionals find it difficult to work closely with a school where the school children's only connection with the museum occurs during a one-time visit. In some cases, this trip included only the highlights of museum exhibits. This tends to trivialize the connection the museum has with the school (King, 1998). Museum professionals know that visual encounters in a museum will strengthen learning experiences. However, these encounters will not promote learning unless they are reinforced (Speltz & Shaugnessy, 1990). In a 1979 study done by the National Center for Education Statistics, 95% of the 1737 museums surveyed offered tours while only 45% offered classes, workshops, or seminars. Of 187 museum/school programs for children, single visit programs were still one of the most prevalent activities. In this situation there were very few programs where the museum experience became a fully integrated part of the formal school curriculum (King, 1998). This state of affairs creates a dilemma for educational leaders. Their perceived problem is where to turn for visual materials that teachers can use and that are easily available without great expense.

Powel (1944) noted that the answer to this problem is to incorporate a museum into the school facility. Dewey (1943) showed his agreement with the need for this type of facility when
he developed a symbolic representation of what he considered an ideal school. In his description Dewey placed a museum on the second floor of a two-story building. He saw the museum as a way to help students connect the learning experiences in the school with the life experiences the student has outside school. He described the role of the teacher as a facilitator who provides learning experiences where the knowledge of the student may be explored, increased and tested (Dewey (1943). This same premise is accepted by many museums today (Greenhill, 1999b).

Dewey (1943) thought a school museum should consist of;

A complete industrial museum, giving samples of materials in various stages of manufacture, and the implements, from the simplest to the most complex, used in dealing with them; then a collection of photographs and pictures illustrating the landscapes and the scenes from which the materials came, their native homes and their place of manufacture (p. 90).

In addition, he suggested that other objects could be used in the museum if they help students understand the connections between art, science and industry. Dewey illustrated this point further by locating his museum so that it served as the connecting point between physical and chemical laboratories, a biological laboratory, and art and music areas (Dewey, 1943).

Strickland (1993) showed her agreement with Dewey's ideas on the usefulness of school museums by pointing out that objects are interdisciplinary and can be used to teach a wide range of subjects. She used pottery as an example of an artifact that can show artistic quality, production technology, religious significance, mathematical proportions, geometric designs, chemical components and geological beginnings (Strickland, 1993). Allen and Felston (1980) indicated that the opportunity to employ artifacts in social studies classrooms is endless, given the many topics and issues studied. Maiga (1995) described the usefulness of the school museum he helped develop as a link between learners and their social, cultural, and economic environment. He portrayed a school museum as a tool which puts students in a situation where
they participate in the creation of the knowledge and information they need to make the
curriculum and learning process more meaningful (1995). Frankel (1996) characterized the
process mentioned by Maiga as essential to a school setting. He said if a teacher can integrate
what a museum has to offer into a curriculum package, the museum program will become
fundamental to that school (Frankel, 1996). Davis and Gardner (1999) pointed out that museums
are "ideally suited for the individually centered learning many schools are currently trying to
achieve" (p.99). The Museum of Reading found that 92 % of the teachers in the schools where it
operated its loan service viewed learning from objects as equal too or more important than
learning from books (McApline, 2002).

Yet, since every museum is different, how a school or school system put a museum into a
facility will be different based on the needs of the community it serves. Each community’s
needs call for particular solutions that cause the programs and philosophies they adopt to be
different. This is not a problem since museums as an organizational form can be adapted to fit
local circumstances (Greenhill, 1999b).

Statement of the Problem

As Hein (1998) mentioned, both formal and informal settings can be places where
learning is facilitated through the use of objects. A school that makes a museum facility part of
its organizational structure must respond to the needs and desires of its constituents in its own
way (Hein, 1998; Levy & Malloy, 1975). According to Shamy (1991), this will not be difficult
since the concept of the museum in a school is something applicable to any educational setting
and adaptable to any part of a school’s curriculum. Therefore, since museums as building types
are distinguished by different characteristics, they can exist within a number of different
architectural enclosures (Shamy, 1991). In many ways it can be said that the size of the artifact
collection of the museum dictates the form of the building (Henderson, 1998). Brawne pointed to this as the reason for the existence of museums and galleries in a considerable array of buildings. He said this occurs because a museum is not a description of a particular type of building but a particular way in which spaces in a building are organized (1982). Therefore, the problem of this study is there is a dearth of literature providing standards, guidelines, and other information that educational leaders can use to place a museum in their high school. If educational leaders decide to proceed with the development of this type of facility, they must begin by answering questions similar to those Hilberry (1983) outlined.

1. What are the museum’s broad goals and objectives?
2. What are the present strengths of the collection and the direction in which it should grow?
3. Who should the audience be?
4. What kinds of programs should be provided?
5. What levels of financial commitment can be made to the project for capital funds endowment and operating expenses? (p.55).

An educational leader who can clearly answer Hilberry’s (1983) questions is ready to discuss design issues with planners and architects. However, available literature does not offer sufficient examples of guidelines or standards that will help educational leaders answer these questions. This is a serious discrepancy since "learning in museums is influenced by the design, the presentation and the physical setting" of the museum (Greenhill, 1999b, p.21).

**Statement of Purpose**

The purpose of this study was to provide examples of design standards and other information educational leaders can use to help bring about the changes in educational facilities necessary to place a museum resource center in a high school. The problem can be solved with the development of a facilities assessment instrument which could be used in a post-occupancy evaluation of a school museum. The purpose of this study was completed when the performance
criteria of this instrument were used as a model and compared with school museums in a metropolitan area.

**Research Questions**

The primary research question which guided this study was: Will post-occupancy evaluations of existing school museums provide examples of design standards and other information that educational leaders can use to help bring about the changes in educational facilities necessary to place a museum resource center in a high school?

Secondary questions which derived from the primary question were:

1. What elements in the design of museums, museum schools, and museums in schools, can be incorporated into a model that is adaptable to public high schools in Georgia?

2. How close are Georgia's existing school museums to the learning environment recommended by the literature?

3. How are the answers to the five basic questions educational leaders must answer before creating a museum reflected in the organization of the spaces in several existing school museums?

**Definition of Terms**

The process of analyzing the relevant data needed to answer the research questions in this study required knowledge of the meaning of the following terms:

1. **Artifacts**-The documents, photographs, and three-dimensional objects stored in museum collections (Carliner, 1995).

2. **Backbone**-The basic wiring scheme that forms a skeleton that connects a computer to the Internet (Helfrich, 1995).
3. **Collection**-The three-dimensional objects, documents, and other artifacts for which a museum has responsibility (Carliner, 1995).

4. **Conservation**- The process by which the condition of an object is stabilized so as to prevent further damage and deterioration (Carliner, 1995).

5. **Constructivist approach to learning**-The idea that “learners are most likely to become intellectually engaged when they are working on personally meaningful activities and projects” (Kafai & Resnick, 1996, p. 2).

6. **Curator**- The person working in museums who has the responsibility for preparing a museum's exhibits (Carliner, 1995).

7. **Design Standards**-The patterns of organization of the spaces within a school or school system so a museum resource center can be added (Alexander, Ishikawa, Silverstein, Jacobson, Fisksdahl-King, & Angel, 1977).

8. **Docents**- Students who help with exhibits, conduct tours and answer visitors' questions (Carliner, 1995).

9. **Foot-candle**-The illumination of a surface one foot away from a source of one candle, equal to one lumen per square foot (Rosenblatt, 2001).

10. **Galleries**-The display rooms of a museum (Carliner, 1995)

11. **Lumen**-"A unit of light emitted by a uniform point source of one candle. The term is used in measuring the level of light on surfaces of art and other objects, and on walls, ceilings and floors" (Rosenblatt, 2001, p. 253).

12. **Lux**-"1 lux is equal to 1 Lumen per square meter" (Rosenblatt, 2001, p. 254).

13. **Museum**-A public or private nonprofit institution existing primarily for educational and aesthetic purposes, that cares for and uses objects; An institution that has at least one
professional staff member, and is open to the general public on a regular basis (Carliner, 1995; King 1998).

14. **Museum Learning**-"Project-enhanced learning utilizing either artifacts or hands-on exhibits" (King, 1996, p.3).

15. **Museum Resource Center** - A facility within a school or school system that cares for and uses objects, promotes museum learning, maintains web sites that advertise the objects in the resource center collection, and coordinates partnerships with museums in the area.

16. **Museum School**- “Projects of a large scope in which a partnership between at least one museum and one school district is formed in order to create a new school that integrates museum learning with the curriculum” (King, 1998, p. 3).

17. **Performance**-"The ability of an environment to support occupant requirements as described by evaluation criteria" (Preiser, Rabinowitz & White, 1988, p. 188)

18. **Post-Occupancy Evaluation**-"The process of systematic data collection, analysis and comparison with explicitly stated performance criteria pertaining to occupied built environments" (Preiser et al., 1988, p.188).

19. **School Museum**- An organized collection of artifacts and information resources that promotes museum learning and exists as a separate facility within a school or as a separate facility within a school system.

20. **Virtual Museum**- An organized collection of artifacts and information resources which are digitized. It may include paintings, drawings, photographs, newspaper articles and many other items (McKenzie, 1997; Anderson, 1994).
Significance of this Study

This study increased the amount of knowledge in the fields of educational planning, design, architecture, and museum education. There is a lack of professional literature describing how the museum can be incorporated into the broader field of education (King, 1998). In the more specialized area of museum education in the secondary school on which this study focused, even less literature is available.

In 1944, Munro said that schools “must add facilities for exhibiting and studying works of art and other visual displays” (1944b, pp. 140-141). However, he pointed out “the precise nature of this type of facility cannot be recommended without much more experimental investigation” (Munro, 1944b, p. 141). Nevertheless, the literature indicated that since Munro made this recommendation, very little research has been done in that direction. Educational leaders searching for museum standards applicable to their school facility may be dismayed by the lack of clarity in the options available and in the analysis of the issues involved (Lord, 1983).

This study initiated new research into what should be the precise nature of the type of school facility recommended by Munro (1944a). As Lord (1983) pointed out, there is a need for a guide to help institutions clarify and then achieve their goals when placing a museum in an existing facility. Preiser et al. (1988) indicated that design guidelines for a facility are often taken from the research of one individual when a study is conducted using the post-occupancy evaluation (POE) format. This study used the methodology of a POE to provide educational leaders with a comprehensive guide to help incorporate a museum into a high school facility museum program.
Researcher Biases

The most common format used in reporting the results of a POE on a facility is a case study (Preiser et al., 1988). Therefore, it was very important to maintain an unbiased perspective while completing a POE of a facility (Yin, 1994). The POE activity required the researcher to examine the personal beliefs and attitudes which could have some impact upon the study (King, 1998). It was essential that biased views not influence the direction of the findings and conclusions of the study (Yin, 1994).

After 24 years of teaching students in 1st through 12th grades, with the majority of experience being in the secondary classroom, I have developed some conclusions which may have some impact on this study.

1. As it is organized today, the American school system is not capable of meeting the demands placed on it by modern day society. Much of the traditional method of schooling has become obsolete. Dewey's idea that learning is an active process is being reasserted (Fielding, 1999). However, this situation will not improve until American school facilities are designed in a manner that encourages the active learning process.

2. High school students learn better when they are able to visualize concepts being taught. The use of historical objects and artifacts in instruction promotes this end. Lecturing by itself is not sufficient at a time when teachers must motivate students. However, a classroom teacher often does not have the time nor the opportunity to gain access to the objects or artifacts that could help in daily classroom instruction.

3. A constructivist learning approach is a useful and successful way to motivate student learning.
Limitations of this Study

This study was conducted using the post-occupancy evaluation (POE) process. A problem with this approach is that a POE which measures and describes a building and its physical attributes may be perceived in different ways by the same people or in different ways by different people at the same time (Preiser et al., 1988). This situation in a multicase format often does not lend itself to scientific generalization. (Yin, 1994).
CHAPTER 2
REVIEW OF THE LITERATURE

Introduction

The literature review for this study was conducted in six areas:

- museum education
- museums in schools
- museum and school design
- design standards for a museum within a school or school system
- post-occupancy evaluations (POEs).

Museum Education

The methods used by society to set aside spaces for learning have changed greatly over the past two thousand years. At the start, teachers and students simply met in a convenient location without educational facilities. Eventually school buildings were used, but they were seen as simple shelters from the elements for both students and teachers (Castalidi, 1994). A study in the 19th century described the shelters provided in the American school system as being very detrimental to the creation of an effective learning environment (Barnard, 1848). This situation led many scholars in the first quarter of the twentieth century to begin to examine the idea that there is a relationship between learning and the design of the instructional spaces within a school. At this time many scholars found that most educational programs were ones in which teachers did most of the talking, while students answered questions (Castaldi, 1994; Kowalski, 1983).
Dewey described this kind of education program in negative terms. He said genuine education comes through experience and this occurs only if the classroom becomes a learning laboratory (Dewey, 1943). One of the ideas Dewey indicated would help schools make classrooms learning laboratories was to include a museum in their schools (Ansbacher, 1998). Dewey's ideas on experience-based learning in a museum setting were put into actual use in the development and organization of the art collection of the Barnes Foundation (McWhinnie, 1994).

In 1939, the General Education Board of New York put Dewey's idea about school museums to work when they made a grant of funds to five art museums for three years, in order to explore the services that art museums could offer secondary schools (Munro, 1944a). Art museums were set up as part of this project in numerous secondary schools in the cities of Buffalo, Chicago, Cleveland, Milwaukee, and New York. The exhibits placed by the museums in the secondary schools were well received by most teachers and students. Many teachers wrote that they wished the collaboration between their schools and the museums could continue on a permanent basis. They hoped the money could be found through appropriations from school funds, museum funds, or through a combination from both sources (Powel, 1944). However, this did not happen and the museums and secondary schools went their separate ways (Munro, 1944b). The lessons drawn from the short time this experiment occurred indicated that making the classroom a learning laboratory requires thinking of the school as something more than just a building. A school facility must provide places where students can actively participate rather than just listen to the teacher lecture (Fielding, 1999; King, 1998; Munro, 1944b).

After World War II the idea that the school environment was important to the educational process began to be the topic of additional research. Eventually, research findings related to the educational environment became more influential in school design (Castaldi, 1994; Kowalski,
1983). Still, school museums are not a part of the design of most educational facilities. The continuing relevance of Dewey’s ideas on experience-based learning to both museums and schools has not made a major impact on the design of educational facilities (Ansbacher, 1998). This may reflect the desire of some school systems to use the basic design of “an impenetrable roof, solid walls, and an adequate mechanical system” (Bradley, 1997, p.1). However, just getting by with the basics in the design of an educational facility ignores the ability of museums to provide students with the exploratory learning experiences advocated by Dewey and other constructivists (King, 1998).

Museums began to emerge as educational institutions when they provided students with exploratory learning experiences. This process was accelerated by the Tax Reform Act of 1969 which designated museums as educational institutions (Carliner, 1995). Consequently, museums were pushed to develop educational programs that met the needs of learners and visitors from different ethnic and socio-economic backgrounds (King, 1998). These changes were significant because they led to an increase in partnerships between museums and schools. Teachers started some youth museums in order to provide the museum learning experience for students. Many school districts assigned teachers to museums as a way to increase coordination between museums and schools (Gelles, 1979). Still, in spite of these efforts, programs where the museum experience was a fully integrated part of the school curriculum did not develop in most school districts. Up until the 1980s and 1990s, most partnerships between museums and schools consisted of museums providing elementary schools with field trip destinations and with materials related to the organized visit. In the 1990s, longer-term museum and school partnerships began to develop (King, 1998). Many of these programs recognized the need for museum educators and teachers to collaboratively design instructional activities. The Institute of
Museum Services outlined twelve conditions which must be met in order to make a partnership between a museum and school successful:

- obtain early commitment from appropriate school and museum administrators
- establish early, direct involvement between museum staff and school staff
- understand the school’s needs in relation to curriculum and state and local education reform standards
- create a shared vision for the partnership, and set clear expectations for what both partners hope to achieve
- recognize and accommodate the different organizational cultures and structures of museums and schools
- set realistic, concrete goals through a careful planning process,
- integrate evaluation and ongoing planning into the partnership
- allocate enough human and financial resources,
- define roles and responsibilities clearly
- promote dialogue and open communication,
- provide real benefits that teachers can use, encourage, flexibility, creativity, and experimentation,
- seek parent and community involvement

(Institute of Museum Services, 1996, pp. 50-59).

The increase of longer-term programs involving museums and schools during the 1980s and 1990s met some of these goals, but museums and schools still found it very difficult to meet all of them. A survey of 440 science education centers in 1994 showed that 75% offered schools one-time programs. About 50% of these institutions offered medium length programs providing classroom support (King, 1998). These percentages indicated that a large amount of work was still to be done to improve partnerships between museums and schools.

Many museum educators expect partnerships between museums and schools to improve when they organize themselves in new ways to include museums in schools or schools in museums (King, 1998). This involves museums and schools joining their many purposes and interests together along a common path. The projects set in motion by the General Education Board of New York indicated the need for this kind of commitment. The museums participating in this project determined that finding adequate exhibition space for museum exhibits in a
finished secondary school building is very difficult. Attempting to improvise and squeeze exhibits into available space limits the effect of those exhibits on visitors and students. In 1944 Powel indicated this situation can be avoided and the greater good of the community served when the purposes and interests of museums and schools can be joined together. Since 1911 the Museum of Reading has been attempting to fulfill this goal with its school loan service (Reading Museum, 2002a). Munro (1944b) thought this could happen only if a high school or school system established a museum liaison office.

**Museums in Schools**

*The Art Museum Comes to the School* provides minimal design standards that can be used to place a museum in a high school (Munro, 1944b). However, since the great majority of available literature on museums in schools focuses on elementary schools, it is difficult to locate additional research that adds to these standards (King, 1998).

The reason for this lack of literature may be the inherent inflexibility of the high school schedule. Elementary schools have much more flexible schedules (Munro, 1944b). Another reason for this lack of literature is that a generally accepted architectural model for the design of a museum does not exist. Every museum is different and the artifacts being included in some museums today have expanded to take in large numbers of the past activities of the human race. Some museums specialize in such diverse areas as fashion, agricultural machinery, and cheese. This makes it difficult to pinpoint exactly how a school facility should be designed or renovated to include a museum (Donzol, 1998; Levy & Malloy, 1975). To find and develop a model of a museum resource center in a high school this study reviewed the literature in museum education, museums in schools, museum and school design and design standards for a museum within a school or school system.
The Buffalo Albright Art Gallery, the Chicago Art Institute, the Cleveland Museum of Art, the Milwaukee Art Institute, and the Museum of Modern Art in New York were involved in a three-year project to bring art museums into secondary schools. The most common suggestion placed in their reports on the project stated that schools need better facilities for the exhibition and study of visual materials. These institutions found visual materials used as teaching aids in the average school to be limited and of poor quality. Munro (1944b) said making the school museum a fundamental part of the building's design would correct this situation. He suggested that this design could be “a distinct room or large alcove; open to classes and casual visitors; easily accessible yet out of the flow of traffic” (p. 141). It should be “well lighted and equipped for various types of exhibits, large and small, flat and solid and walls and tables and in showcases” (Munro, 1944b, p. 141). At John Adams High School in Cleveland, Ohio, a large classroom was donated to provide exhibit space for an art museum. The room had five sections of adaptable cases, twenty feet of linoleum bulletin board, and twenty feet of other wall space (Powel, 1944). In addition to the main exhibit area Munro (1944b) recommended supplemental facilities be provided with wallboards and showcases. He said the showcases need to be secured from unauthorized entry and designed so short and tall students can inspect their contents (Munro, 1944b). The view of the contents in the showcases should not be blocked and should be lighted in a manner that reveals their best qualities. In addition, Munro (1944b) said a school should have picture frames that can be opened at the back so different prints can be exhibited in the school at various times. Along with this Munro (1944b) recommended that schools have display space for flat materials in corridors.

As a framework for a museum resource center building program, Munro’s ideas are useful, but they do not define the criteria for every space in the museum. The future needs of a
school museum must be established at the beginning and maintained throughout the entire process of the design and construction of the school facility. This is necessary to ensure that important aspects of the museum’s needs are not overlooked (Hilberry, 1983). In order to add a school museum, the same care is needed in the renovation of an existing building (Hilberry, 1990; Levy & Malloy, 1975). Therefore, an expansion of Munro’s ideas is needed. Comparing the work of Munro with the ideas of other scholars allows this expansion to occur.

**Museum Design**

Hilberry developed a checklist intended to assist a museum director and staff in preparing a draft for the spaces and special requirements for the new construction of a museum. His checklist is divided into areas labeled as “public services, public galleries, administrative and curatorial staff services, library, collections management services, conservation laboratory, security services, collection storage, general storage and shops“ (Hilberry, 1983, pp. 57-59). The public services area is the space uniting the experience of the building exterior and site with the experience of the galleries and other interior functions. The public galleries are the different areas of the museum that are intended to display the collection of museum artifacts to the public. Administrative and curatorial staff service space pertains to the offices and areas needed to perform the support functions of the museum. The size of the library would depend upon whether it is intended primarily for the use of the staff or the public. Hilberry (1983) recommended the library include space designed for reading and reference, office and work areas arranged for receiving and processing books, and storage spaces allotted for photographs, slides, films and videotapes. The collections management services area consists of spaces designed for shipping and receiving, registration, and a photography studio. The conservation laboratory is the separate space needed to store and examine objects and carry out conservation procedures.
Security services relate to the spaces necessary for guard staffing, staff and police procedures, and alarm systems. Collection storage is the area needed to store and keep the museum collection. General storage would involve the space allocated to storage unrelated to the museum collection and separate from collection storage. Shops would consist of those areas where exhibits could be prepared and maintained (Hilberry, 1983).

Along with space requirements, Hilberry (1983) divided special planning requirements into categories of “site development, movement of the public within the museum, and the movement of objects” (pp. 59-60). Site development concerns how the site of the museum is organized to account for public transportation and parking, deliveries, and landscaping. Movement of the public within the museum entails circulation, handicapped accessibility, security and separation of public and staff areas. The movement of objects refers to architectural accommodations for the safe movement of objects (Hilberry, 1983).

Hilberry (1983) divided the technical requirements on his checklist for a museum building program into the categories of “security, fire prevention and control, conservation and climate control, lighting, energy conservation, pipes and equipment, and construction materials” (pp. 60-61). Security involves the measures necessary to protect the museum collection against theft and vandalism. Fire prevention and control includes the measures necessary to protect the collection against fire damage. In this case, prevention depends on building design and construction, staff procedures, alarm systems, and staff and fire department response capabilities. Conservation and climate control focus on the prevention of photochemical degradation which occurs in objects exposed to improper atmospheric and light conditions. Lighting describes what is necessary to meet the need to see and protect the objects. Energy conservation is concerned with the design factors necessary to ensure efficient energy
usage. The system should be set up so that a balance is maintained between operating economy and proper control. Pipes and equipment make sure that pipes which may leak and equipment which may drip do not threaten collection storerooms, work areas or galleries. Construction materials describe ways of making sure museum areas are not constructed of materials that may harm museum objects (Hilberry, 1983).

Brown, Fleissig, and Morrish (1989) devoted a chapter in their book to design standards for an art museum. They indicated a museum should plan for “public support spaces, exhibition space, technical support areas, administrative support areas and educational spaces” (Brown et al., 1989, p. 140). The public support spaces include “the areas encountered by the visitor on the way to the galleries and other major parts of the building” (Brown et al., 1989, p.140). Exhibition space is portrayed as “the public galleries themselves” (Brown et al., 1989, p. 140). Technical support areas include “storage, workshops for conservation and the preparation of exhibits, and shipping and receiving” (Brown et al., 1989, p. 140). The administrative support areas refer to offices and conference rooms. Educational spaces include lecture halls, auditoriums, art classrooms and libraries (Brown et al., 1989).

In Canada, many communities discovered they could not afford the expense of maintaining a collecting type of museum such as those for which Hilberry, Brown, Flessig and Morrish developed design standards. Alternatively, they chose to develop museum exhibition centers. These centers function as display areas for traveling or temporary exhibits from major museums and as places to display works of regional collectors and artists (Charnetski, 1983). As a way to assist those communities attempting to establish a successful museum exhibition center, Charnetski (1983) developed a list of design standards. In developing his list he used the criteria of “public” and “staff areas” (Charnetski, 1983, p. 272). Public areas are those always under
visual security surveillance when the exhibition center is open to the public. Charnetski (1983) labeled these areas in the following manner:

1. Lobby/reception area
2. Gift shop or sales counter
3. Galleries or exhibition areas
4. Washrooms
5. Cloakroom
6. Lecture/classroom
7. Projection room
8. Kitchenette area (p. 272).

Charnetski described staff areas as spaces, which may be under visual security surveillance during working hours but are always located behind locked doors. Also, these areas are unavailable to members of the public unless a member of the staff is supervising visits (1983). Charnetski (1983) labeled the staff areas in the following manner:

1. Staff Offices
2. Shipping/receiving area
3. 24-hour acclimatization area
4. Loading Area
5. Preparation Area
6. Storage Area
7. Mechanical/power room
8. Caretaker’s closet (p. 272)

School Design

If one compares the design standards for museums described by Charnetski, Hilberry, Brown, Fleissig, and Morrish with the guide for school facility appraisal developed by Hawkins and Lilley, a similarity between the needs of a museum and a school emerges. The appraisal criteria of the guide for a school facility appraisal are the “school site, structural and mechanical features, plant maintainability, building safety and security, educational adequacy and environment for education” (Hawkins & Lilley, 1998, p. iii). The school site explains the criteria needed for selecting a site that fulfills the educational and community needs of the people the
school serves. Structural and mechanical features focus on those parts of a school plant that are basic to its functions. Plant maintainability includes factors needed to maintain a building as nearly as possible in its original state. Building safety and security involves the criteria necessary to maintain school facilities in the safest possible condition. Educational adequacy criteria describe what it takes to determine if a school is adequately serving the needs of its community and school district. The environment for education criteria explains the sum total of the factors that produce the effect the school building has on the learning process (Hawkins & Lilley, 1998).

Since the renovation or construction of museum buildings requires careful and time-consuming attention at every stage of the project, the architects and educational leaders must develop a specific program defining the basic criteria for the spaces in the museum (Hilberry, 1983).

**Design Standards for a Museum within a School or School System**

During this study the literature revealed that a variety of museum learning programs exist. This is a reflection of the fact that each community’s needs may call for different solutions. Educational leaders may have to adapt their ideas on implementing a museum learning program in their schools to the needs and desires of the school system’s constituents (Levy & Malloy, 1975; King, 1998). Charnetski pointed out the necessity for this approach in establishing design criteria for a museum facility with his organizational model for a museum exhibition center. He said the areas he listed in his organizational model provide what is needed for a comprehensive exhibition center (1983). However, “depending on the perceived community needs and the activities of the centers, some areas may be increased in size while others deleted from the design criteria altogether” (Charnetski, 1983, p. 275). Therefore,
following Charnetski’s organizational scheme, a model of organization for a museum resource center in a high school represents a standard for which schools need to strive. The degree to which the school comes to meeting the standards set by the model can be evaluated by using a standard form or checklist. The assessment items on this checklist should represent evidence of the existence of the ideal characteristics in the schools physical environment necessary to support the developmental needs of its students (Sanoff, Pasalar, & Hashas, 2001). Preiser, Rabinowitz, and White (1988) indicated that the ideal characteristics used to evaluate the ability of a building to accomplish its educational objectives should come from expectations based on previous experience. They described these expectations as the performance criteria needed to evaluate the ability of an environment to support the requirements of its occupants (Preiser et al., 1988).

Sanoff et al., Hawkins and Lilley provided a framework for organizing assessment checklists for school museums with the forms they designed for post-occupancy evaluations of school facilities (Hawkin, 1973; Hawkins & Lilley, 1998; Sanoff et al., 2001). A facility checklist is a major component of a post-occupancy evaluation (POE). However, a facilities checklist is not an effective part of a POE unless it is set up to appraise “buildings in a systematic and rigorous manner after they have been built and occupied for some time” (Preiser et al., 1988, p. 3). The literature provided examples of six design patterns which can be used in an evaluation of facilities that promote museum learning in a school or school system. They include a separate facility within a school, a separate facility within a system, exhibit areas throughout a school, a museum school, classrooms, and a media center.
Article I: Facility Design Patterns

The Gao School Museum is an example of how design patterns in a school facility support each other to promote museum learning without becoming a conventional museum. In the Gao School Museum, museum learning was applied throughout the curricula in a manner that involved teachers and students in a cooperative inquiry process. This was accomplished by following a design pattern consisting of the placement of exhibit areas throughout the school, and the use of classrooms and the media center (Maiga, 1995).

The museum program in Monroe Township High School is an example of a design pattern for a school museum consisting of a separate facility within a school, along with the use of classrooms. As part of the anthropology and archaeology courses in this high school, students in grades 11 and 12 conducted archaeological field surveys, operated a school museum, and prepared museum exhibits and audio-visual programs for elementary school students (Shamy, 1991). In another case an empty junior high classroom was turned into an art museum (Garry & Shirley, 1981). At the Robert Brent Elementary School, museum learning was conducted in exhibit areas throughout the school and in classrooms.

In another school’s museum displays were placed in the classroom and later placed in the school exhibit halls. At one school a whole classroom was set up to look like a desert. Many of the teachers at this school attempted to integrate museum learning and exhibit development with the traditional curriculum. At Stuart-Hobson Middle School, museum exhibits were created and displayed in the gymnasium. Other students were working on museum exhibits in the teacher’s lounge. Many students were working on exhibits in their classrooms (King, 1998). In one urban school, exhibits were set up on student desks. This developed into a family history museum in a teacher’s classroom (Hickey, 1997). At the New York City Museum School museum learning
activities are conducted in the classrooms. The goal of this school is to maintain a traditional middle school environment and curriculum while pursuing museum learning. Connections are maintained with museums and the activities in the classroom are structured so they are an extension of students’ learning at museums. The Museum Magnet school in St. Paul, Minnesota, maintains both permanent and rotating student exhibits in an exhibit hall (King, 1998).

Museum exhibits can be placed in the media center if alternative areas are not sufficient or if they are not available. In many schools the use of displays of some sort in the media center is a commonly accepted practice (Farmer, 1991). In several Chicago high schools in the 1940s, art exhibits existed in the libraries (Powel, 1944b). In one elementary school an art teacher spearheaded the creation of a multicultural art museum housed in the media center. Through donations and loans the school collected 100 pieces of multicultural artwork by July of 1994. Eventually, the entire school was involved in integrating the exhibit into its curriculum (King, 1998).

Barteluk (1991) stated the development of museum exhibits in the media center often does lead to school wide involvement. This occurs because displays in media centers have to be developed in ways that appeal to a particular student body or audience just as museum exhibits appeal to a community or audience (Boardman & Varty, 1991).

The Henry Ford Academy is a public high school sponsored by the Henry Ford Museum and Greenfield Village and Ford Motor Company. The school day takes place in the buildings of Henry Ford Museum and Greenfield Village, which is near the Ford World Headquarters. The students in the school have access to the artifacts in the museum and use the 78 historic buildings in the village as learning laboratories (Henry Ford, 1999). The goal here was to integrate the school and museum environment as much as possible, but provide as much separation and
security as necessary. The offices and classrooms were visually accessible to museum visitors while still maintaining sound separation and satisfying fire-code issues (Pittman & Pretzer, 1998).

**Article II: Facility Descriptions**

An evaluation of a museum school like the Henry Ford Academy, and other design patterns promoting museum learning, should be organized around how these patterns fit into the design of the whole building (Alexander et al., 1977). This requires a more detailed description of the type of facility created by that design pattern. This description may begin by listing the gross square footage of the facility, date of establishment, date of original construction, date the building was renovated or remodeled, capacity of the building, site acreage of the building, number of floors and classrooms, and finally, the number of exhibits. Hawkins and Lilley indicated the need for obtaining this type of information in an evaluation of school facilities (Hawkins, 1973; Hawkins & Lilley, 1998). Brown et al. (1989) emphasized when planning a building for the visual arts there is a need to have some knowledge of the number of exhibits you expect that building to have in it every year.

The gross square footage of a school facility, such as a museum resource center needs to be evaluated since new forms of instruction require greater amounts of space. The recommended space per student in a high school is 145 square feet (Hawkins & Lilley, 1998). In a school museum the movement of visitors makes it important to plan for the proper amount of square footage. Charnetski (1983) recommended a minimum of 5,000 square feet for a museum exhibition center. Bad planning at the start of the establishment of a school museum can lead to increasing costs for planning and maintenance (Coleman, 1950). Gross square footage is also important because it gives the evaluator a basis for determining a museum's capacity to
efficiently handle visitors. The area provided for a school museum should be such that groups and casual visitors are not interfering with and bumping into each other (Communicating with the Museum Visitor, 1976). Castaldi stated the gross square footage of a school should be extensive enough to insure there is no interference between the educational and community use of the school building. Visitors coming to a museum resource center should not restrict nor impede the normal flow of student traffic within the school facility (Castaldi, 1994). One museum responded to the problem of traffic flow within its facility by hiring a traffic coordinator (Communicating with the Museum Visitor, 1976). However, financial resources may determine the feasibility of this task.

Financial resources become very important when an educational leader is considering remodeling a high school to include a school museum. Remodeling a school for a museum resource center is cheaper than new construction (Levy & Malloy, 1975). Therefore, an educational leader will need to establish the degree of obsolescence of the facility being utilized (Hawkins & Lilley, 1998). Thus, the date of the establishment of the facility becomes necessary information in order for an appraiser to adequately evaluate a school museum. If a school has already been renovated or remodeled, the date this work was done would be important to know to determine if some of the latest ideas and technology have been incorporated into the school museum (Dixon, 1999). However, how much can be incorporated into a school museum will often depend upon the size of the site used for the facility.

The size of a school museum site is important since the planned educational experiences as well as many community functions of a school museum will be enhanced or limited by the adequacy of the site (Sears, 1983b). Many states recommend that the site for a high school should have 30 acres, plus one acre for each 100 students (Hawkins & Lilley, 1998). However,
these requirements may have to be adjusted to ensure that the site is large enough for the special instructional features a museum resource center provides.

Charnetski (1983) advocated making a museum exhibition center a single story facility. This reduces problems that tend to occur as exhibits are moved from floor to floor. Therefore, the number and types of uses of floors, classrooms and exhibits, would be of interest to an educational leader who realizes that his best option is to introduce museum learning by putting exhibits throughout a school. Many museums are placed in buildings with several floors, as are schools. The Getty Center Museum, the Museum of Contemporary Art in San Diego, and the San Francisco Museum of Modern Art are examples of this type of facility (Botta, 1999; Meier, 1999; Venturi & Brown, 1999).

Article III: Exterior Areas

In addition to establishing design patterns and their appropriate descriptions, a model for a museum resource center needs to include details about the exterior areas of the facility. Both Sanoff et al. (2001) and Hawkins (1973) indicated the importance of the exterior areas of a school to the learning environment. Hawkins and Lilley (1998) suggested that the surrounding environment of a school needs to be compatible with the educational needs of the community.

The experience of entering buildings influences the way people feel inside the buildings (Alexander et al., 1977). The transition from the outside to the inside of a building should not be too abrupt, otherwise, “there is no feeling of arrival, and the inside of the building fails to be an inner sanctum” (Alexander et al., 1977, p. 549).

Sanoff et al. (2001) suggested that an abrupt transition from the outside to the inside of a building could be avoided by developing the outdoor spaces surrounding schools. The communications design team of the Royal Ontario Museum revealed that a museum must also be
concerned with the outside spaces of its facility. Their view states the location and environment surrounding the museum building make an impression on the visitor before they enter the door, so it is important that a museum present an attractive and pleasant image from the beginning (Communications Design Team of the Royal Ontario Museum, 1976). Sanoff et al. (2001) in their school building checklist used as a measure of the effectiveness of a building the positive or negative influence of the environment on a visitor when they are moving from the exterior of the building to the interior. Brown et al. (1989) said that the location, scale, and style of a visual arts facility should make an impression on visitors even before they decide to enter the building. Powel (1944) stated museums that look like vast “marble temples” with flights of steps leading to bronze doors and armed guards are seen as unfriendly by the young (p. 13). Hilberry (1983) said this impression could be avoided if the exterior areas of the museum are such that the visitor to the museum does not become aware of a difference between the exterior and interior functions of the museum building.

One of the ways schools and museums can project an attractive image from the moment a visitor enters the school or museum is through landscaping. Alexander et al. (1977) described the use of positive outdoor space as an important aspect of the design of any building. Outdoor space that is not used for a positive purpose gives a negative image to a building. Making outdoor space connect with the interior of the building requires that it be given some degree of enclosure. Surrounding outdoor spaces with trees, hedges, fences, arcades, and walkways accomplishes this goal and helps produce a positive image (Alexander et al., 1977). Hawkins and Lilley (1998) agreed with Alexander about the importance of landscaping in presenting a positive image of a building. In their view, landscaping helps contribute to the usefulness of a school building as a public relations tool. They pointed out that the instructional program would
be enhanced if it contained areas such as nature trails for outdoor learning (Hawkins & Lilley, 1998). Sanoff et al. (2001) in their school building observation form, made one of the performance criteria for the evaluation of the learning environment of a school the existence of outdoor space that can be used for science gardens and other projects. Hilberry (1983) showed the similarity between the needs of a museum facility and a school facility when he described the necessity for landscaping around the exterior areas of a museum. He said the museum experience often begins before the visitor reaches the building and plants, fountains, a sculpture garden, or other outdoor interactive exhibits may be appropriate to begin that experience (Hilberry, 1983). Brown et al. (1989) suggested using an outdoor sculpture garden or courtyard so visitors can be provided with a break from touring museum galleries.

If an educational leader elects to provide space for sculpture gardens inside a museum's security area, they should be enclosed and secure. If sculpture gardens are placed outside a school museum's security area they should be inaccessible from within the galleries (Hilberry, 1994). Additional security is provided if all objects are bolted down on concrete slabs and are properly lighted at night (Brown et al., 1989).

An additional design feature to enhance the exterior areas of a facility is a promenade. These walkways provide links to the main outside areas of a facility. They provide a necessary connection between the exterior and interior functions of the built environment (Alexander et al., 1977). This makes them an important factor in helping students, teachers, staff and visitors discern the traffic patterns or passageways in and around the building (Sanoff et al., 2001; Tanner, 2000b). They often keep students, teachers, and visitors sheltered from the sun and bad weather (Hawkins & Lilley, 1998). Studies show that people visiting a museum also prefer to use promenades or walkways (Bitgood, 1994). Hawkins and Lilley (1998) suggested that
pathways should have sidewalks with a gradient of 1:12 or less and have rest areas available at 30-foot intervals.

Another important area of a school or museum facility which needs to be placed in a model for a POE is the space provided for parking. Parking areas play a very important part in creating a positive influence on people entering a building. This influence can be maintained if the entrance to the parking lot appears to be part of the natural entrance to the building it serves. One way to do this is to ensure people are able to see the main entrance to the building from the entrance to the parking area. In addition to this, the entrance to parking should be marked so that it is visible immediately by anyone looking for the building. Also, visitors should be able to see the exit from the parking area, which leads them into the building. A positive impression is more likely if the parking for visitors is clearly marked from each of the directions of approach to the building (Alexander et al., 1977). One way to meet these requirements is to separate driveways and parking areas into three different groups: “(1) students, (2) parents and visitors, and (3) employees” (Hawkins & Lilley, 1998, p. 23).

However, in spite of this division of driveways and parking areas, school administrators and architects often have a difficult time determining an adequate amount of parking space. The performance criteria used by the National Study for School Evaluation allows the evaluator to determine if the parking areas of a secondary school are of sufficient size to meet school and community requirements (Pace, 1987). Hawkins and Lilley (1998) provided more specific design standards for parking in the materials they developed for a POE of schools. They suggested there should be one space for each teacher and staff member. They indicated the size of this space should be 8-1/2' x 18' or around 300 square feet per car (Hawkins & Lilley 1998). In addition to these criteria, Hawkins and Lilley said the parking spaces in the exterior areas of a
school should be accessible to vans. They believed the spaces for vans should be 8 feet wide with an adjacent 8 foot wide passenger-loading zone (Hawkins & Lilley, 1998). In this situation the performance criteria of the National Study of School Evaluation was less detailed. Their instrument for the evaluation of secondary school facilities provided an area for rating the ability of a school system to make provisions for safely loading and unloading transported students. It was left to the evaluator to determine what sufficient space for this activity is (Pace, 1987).

The National Study of School Evaluation followed the same procedure in detailing their performance criteria for evaluating the sufficiency of the spaces provided for the physically handicapped in a school parking area. In their POE instrument the evaluator was asked to rate the sufficiency of the parking spaces for the physically handicapped. Adequate space was to be defined by the evaluator (Pace 1987). Hawkins and Lilley provided more detailed design standards for parking for the disabled:

1. For the disabled allow at least one space or 2% of the total number of spaces. Each of these spaces should be 12' by 18'.
2. If the parking area is not at ground level, parking should have curb cuts for the disabled (Hawkins & Lilley, 1998, p. 10).

A high school with a museum will have to pay close attention to the performance criteria used in the POE instruments of the National Study of School Evaluation and Hawkins and Lilley. Problems with parking tend to discourage people from visiting a museum (Bitgood, 1994). Special attention should be paid to the areas for unloading and parking buses (Hilberry, 1983). If parking is located in the back of a museum area away from the main public entrance visitors are tempted, and sometimes permitted, to enter through a secondary passage. This defeats the purpose of the main entry space where the museum experience for visitors is supposed to begin (Hilberry, 1990). The communications design team of the Royal Ontario Museum said a museum should have a separate entrance which includes a parking area for buses. Separate
entrances for student groups ensure an orderly arrival for students and prevent interference with visitors (Communications Design Team of the Royal Ontario Museum, 1976).

An excellent way to prevent visitors from interfering with each other is to provide an orientation system. This system can consist of maps, floor plans, directories, information, staff and signs. Neal recommended placing a sign near the entrance that reaches from the floor to the ceiling, describing the location of museum exhibits (1969). Tack boards and displays panels are useful for announcing future exhibits (Charnetski, 1983). Any additional signs should be placed at the entrance to each room of a museum and they should describe the contents of that room. Inside the exhibit rooms each case or panel exhibit should have a large label which describes what is on the case or panel (Neal, 1969).

The Communications Design team of the Royal Ontario Museum (1976) found the availability of a comprehensive orientation system is essential to ensure that visitors appreciate the goals and purposes of the museum. A clear orientation system can reinforce a visitor’s favorable impression of a facility (Brown et al., 1989). This is of major importance in a school building since the community use should not impede the normal flow of student traffic within the building (Castaldi, 1994). In a school museum placed in an empty classroom, signs should point to the information desk (Garry & Curiel, 1981). The Communications Design Team of the Royal Ontario Museum (1976) also suggested the use of specific colors as backgrounds for exhibit title signs at the entrance to museums.

Article IV: Structural Features

The next part of a model for a museum resource center in a high school may involve its structural features. These features, as Hawkins and Lilley (1998) described them, are basic to the functioning of a school facility. However, the literature shows they also are important to the
functioning of a school museum. The most common structural problem in school buildings is roof leakage. This should not happen if the roof of a school is weather proofed and insulated to the maximum extent possible (Hawkins & Lilley, 1998). One of the evaluative criteria used by the National Study of School Evaluation to assess secondary schools is the extent to which the school building has a durable roof with adequate provision for drainage (Pace, 1987). Thus, educational leaders need to pay close attention to the condition of roofs. The importance of this precaution is doubly enhanced if an educational leader has a school museum placed in their facility.

A museum area must have a stable roof, free from leaks. However, the requirements for control of atmospheric conditions in a museum area exceed those of most public buildings. Extra care must be taken in keeping the effects of weather out of the building (Chicora Foundation, Inc., 1994; Hilberry, 1983). An example would be using caulk and other materials to keep out the effects of the weather. This step alone will improve the necessary preservation quality environment by reducing air infiltration, pest access, the heating and cooling load, air pollution and the sources of water vapor. This also may significantly reduce the relative humidity levels, which is important in preventing damage to an artifact collection (Chicora Foundation, Inc., 1994).

Once the methods used to keep the effects of weather out of a building have been evaluated, the design standards for a school museum must include the necessary steps to control the acoustics of the building. Instructional areas are more effective for teaching and learning if an effort is made to control the sound. Research shows that failure to do this will have a negative effect on student learning (Castaldi, 1994). The use of draperies, acoustical tile or other materials helps decrease problems with acoustics in a school (Hawkins & Lilley, 1998).
Evaluators using the evaluative criteria for secondary schools developed by the National Study for School Evaluation are expected to rate the extent to which the corridors of a secondary school are acoustically treated (Pace, 1987).

A quiet room is more conducive to viewing museum artifacts. This situation often is reached in museums with the use of glue-on tiles, planks, suspended ceilings, heavy-textured wall materials, wall carpeting as well as floor carpeting, spray on soundproofing, or small rugs and pillows thrown on the floor. At times museums have used movable acoustic panels to control the sound in large display areas (Levy & Molloy, 1975). In schools the control of internal and external noise levels is important (Tanner, 2000b). Nevertheless, managing the sound in a museum may be even more difficult if there is not enough space available so visitors can circulate among and around artifacts without excessive crowding. Therefore, a museum resource center model must contain planned circulation patterns (Bitgood, 1994).

In many modern buildings disorientation is a big problem. If people have no idea where they are located, they experience mental stress (Alexander et al., 1977). “Psychological theory suggests that the effect of badly laid out circulation has almost as bad an effect on a person who knows a building, as it does on a stranger” (Alexander et al., 1977, p. 482).

Sanoff et al. (2001) supported the importance of carefully planning the circulation patterns in a school with their school building rating scale. This instrument requires evaluators to rate the adequacy of the circulation patterns within and among the learning environments of the school (Sanoff et al., 2001).

The indoor spaces for circulation in a school should be wide enough to allow for movement among learning environments and they should be free of obstructions and bottlenecks (Castaldi, 1994). To facilitate ease of movement within a school building high schools should
have corridor gates or barricades. This quickly communicates which areas of the building are open at any specific time (Hawkins & Lilley, 1998). If a school system does not have circulation patterns planned in this manner students may be exposed to safety hazards (Castaldi, 1994).

A museum cannot function effectively without careful planning of the circulation system (Coleman, 1950). This is because orientation and circulation play a key role in the marketing and public relations activities necessary to gain support for a museum. Museum activities involving education, audience research, exhibit design and visitor services will also be affected by a poorly planned circulation system (Bitgood, 1994). A primary concern of a museum is the visual communication of objects of cultural and scientific interest. If the museum is unable to fulfill this task, it is failing in its purpose (Brawne, 1965). Visitors to a museum should be able to pace themselves according to their interests and needs. They will enjoy their visit more if places to rest are provided as part of the circulation system (Neal, 1969). Along with this, the circulation system of a museum should allow a visitor to arrive at the exhibits they want to see as directly as possible (Communications Design Team Royal Ontario Museum, 1976). This requires enough space be available so visitors can circulate among and around artifacts without excessive crowding. Allowing 20 square feet per visitor is recommended where exhibits are being viewed (Levy & Malloy, 1975). However, this amount of space may not be practical for a school museum.

A study done by the Reading Museum in England indicated schools may have to make adjustments depending on the space available in the facility they are assigned. The 24 primary and secondary schools of this study were loaned objects from the Reading Museum. Consequently, they had to adjust their available space to make room for these objects. 56% of the
exhibits created by the use of these objects were placed in shared school spaces while 44% were displayed in classrooms (Reading Museum, 2002b).

The overriding requirement in developing a circulation system for a museum or a school having a museum in it is the need for clarity. Sanoff et al. (2001) indicated the need for this type of clarity in their POE instrument by requiring evaluators to rate the extent to which the interior circulation routes of a school were clearly identified. Maze-like circulation creates confusion. This can be avoided by placing signs at decision points to enable the visitor to decide on the correct direction (Communications Design Team Royal Ontario Museum, 1976).

Museum exhibits would not interfere with the crowd flow in a high school if they are designed so viewers can quickly understand them. Exhibits of a conceptual nature should be placed in the common areas of the school or other areas where crowd stoppage occurs so they can be absorbed and enjoyed at an individual’s leisure (Communications Design Team Royal Ontario Museum, 1976). Some examples of circulation patterns used in a museum that can be adopted by a school system are:

1. Arterial: A circulation pattern in which the main path is continuous and no options exist for the visitor. The path can be straight, curving, or virtually any shape. The major limitation is the rigidity, which confronts the visitor.
2. Comb: A circulation pattern in which there is a main circulation path and optional alcoves, which a visitor may enter, or by-pass.
3. Chain: This refers to a circulation pattern in which the main path is generally continuous but the path leads to a series of self-contained units which may have a more varied path within them.
4. Star or Fan: This refers to a circulation pattern, which presents a series of alternatives to a visitor from a central area.
5. Block: This refers to a circulation system, which is relatively unconstrained and can be as random or as self-directive as desired by the visitor. (Communications Design Team Royal Ontario Museum, 1976, pp. 109-110).

A school museum may have any one of these circulation systems, but none of them will work properly unless the width of a school’s corridors or aisles are adequate to handle the
additional traffic that a museum resource center will bring into a high school. Display cases may also become a problem in a school if its corridors are not sufficient in size. Hawkins and Lilley (1998) recommended that in this situation display cases should not be more than eight inches from corridor walls. This restriction may place limitations on high schools intending to install museum exhibits in their hallways. In some of the high schools in Chicago where art museums were installed, the corridors were the only feasible space to install the panels on which the exhibition material was to be hung. This meant that exhibitions had to be limited to two-dimensional material in order to meet space limitations (Powel, 1944). Therefore, the design of hallways is of major importance in a model for a museum resource center.

The General Education Board of New York had a problem with the design of hallways when they placed Art museums in secondary schools. In the high schools they used, students were whisked through and not encouraged to stop and look at the walls or exhibit alcoves. There was a fear they would jam traffic or be late for class (Munro, 1944). Neal (1969) recommended that the corridors in a building should be at least seven feet wide if families are expected to visit a school museum. Tight turns, projecting wall units and narrow corridors in the hallways should be avoided (Brown et al., 1989).

In Chicago, freestanding art exhibits were placed in the halls and corridors of several high schools. This was necessary because the Board of Education ruled that walls were not to be marked in any way. Large panels of 4 x 6 feet and 4 x 8 feet were installed in the high schools. These panels were joined and stabilized by an upright panel, 1 x 6 feet, which was weighted by a cement block (Powel, 1944). Munro suggested that the use of panels of this sort is necessary to ensure that the halls and corridors of a school museum are organized in a manner enabling traffic
to flow down them without interference. With this condition fulfilled the learning experience of students visiting the exhibits will be more effective (1944).

Another way to make the learning experience of students in a school museum more effective is to ensure the museum and the facility in which it is housed are designed on their scale. Hawkins and Lilley (1998) said the purpose of the overall design of a school is making it appropriate for the age of its students. Castalidi (1994) said a school should be designed to meet the needs of the people who use it. Sanoff et al. (2001) require evaluators using their POE instrument to rate how well a school building is designed and built to the scale of the children it serves. However, a museum facility in a high school may have to vary from this recommendation since some accommodation may have to be made for elementary school children. This may consist of placing objects at heights so small children can see them (Carliner, 1995).

Carmack and Howard (1998) indicated that superior learning environments are created when partnerships develop between schools, museums, and high school and elementary students. In Austin, Texas, eleventh and twelfth grade science students were teamed with fifth graders to design and build interactive exhibits for the Austin Children’s Museum. In this situation the high school students became positive role models for the elementary school students. However, in some teams the elementary school students assumed leadership roles which increased their confidence level. Teachers in the elementary school and high school used the project to reinforce concepts already planned in the curriculum. Students displayed their exhibits in the museum and watched over them while visitors interacted with them (Carmack & Howard, 1998). In a similar program the anthropology/archaeology students at Monroe Township High School in New Jersey created a school museum and prepared museum exhibits and audio-visual programs
for elementary school students. Elementary school classes and their teachers visit the museum program at the high school and are taught by students in grades 11 and 12 about archaeology and the Native Americans of New Jersey (Shamy, 1991).

Therefore, if a museum in a high school is to have an active educational program involving students from other schools, spaces must be designed so they are on the scale of children, teenagers, and adults. Exhibits should be labeled and directions given in a manner that are easy to understand by the audience for whom the exhibit is planned. Exhibits planned for elementary school students should be at the appropriate heights and labeled with easy to follow instructions on an elementary level (Carliner, 1995). The public service areas of a school museum are some of the first areas an educational leader needs to examine to determine if a building is designed on the scale of its students and visitors.

Article V: Public Service Areas

Hilberry (1983) described the public service areas as spaces that unite the experience of the building exterior and site with the experiences of the museum exhibits and interior functions provided by the museum learning environment. One of the most important public service areas of a museum or school is the entrance area. Sanoff et al. (2001) requires evaluators using their POE instrument to rate how visible the main entrance of a school is to visitors and students. In addition evaluators rate how well the connection between the indoor and outdoor areas of a school campus is established (Sanoff et al., 2001). The entrance area should be a space that creates in visitors a sense of excitement when they enter a museum (Rosenblatt, 2001). Therefore, the placement of the main entrance is one of the important steps planners need to take when developing the plan for a facility. The entrance must be placed so that as soon as people approach a building they see it. If this is not possible some clue should be placed indicating
where the entrance is located. People need to understand their surroundings and familiarize themselves to their surroundings by making mental maps. It is easier to make these mental maps when one building or a part of one building is singled out and treated as a main building common to all. One way to single out the entrance is to ensure it is built higher and more prominent then the rest, so the eye will be immediately directed to it (Alexander et al., 1977).

This also applies to a museum within a school or a separate museum facility. A study of museums indicated that maximum visitor interest is at the entrance to the museum and the lowest is at the exit (Communications Design Team of the Royal Ontario Museum, 1977). The entrance area of a museum often includes general orientation spaces such as a museum store, auditorium, or meeting rooms. In a school the arrangement of spaces should be such that maximum use is permitted while the security of the school’s museum collection is protected (Hilberry, 1983). An additional way to create a positive image is to provide a secure area where visitors can leave their coats and other personal items (Hall, 1987). This requires the entrance area to have attached to it a spacious lobby that is well lighted and well ventilated (Coleman, 1950).

Since low levels of light are sometimes necessary for conservation purposes in a museum, the entrance area to a school museum needs to be treated as a conditioning area where visitor’s eyes are permitted to adjust from high levels of daylight to the necessary low levels. Proper lighting of the entrance to a museum area should ensure that visitors are not placed into what might be perceived as a dark and gloomy atmosphere upon their arrival (Communication Design Team Royal Ontario Museum, 1976). Reduced light levels in the entrance area may allow visitors to notice interesting spaces. Highlighting some surfaces and leaving others less bright has a tendency to guide museum visitors along certain paths (Rosenblatt, 2001). In the lobby or reception area of a museum exhibition center Charnetski (1983) recommended 100-400
square feet of space be provided. However, an additional consideration for an educational leader is how to provide adequate space to accommodate large groups of visitors at key locations (Communication Design Team Royal Ontario Museum, 1976). The capacity recommended for events held in the lobby such as banquet dinners is 10-12 square feet per person, plus entry and circulation space. If large receptions are being held in the lobby area, a capacity of 8-10 square feet per person is recommended (Hilberry, 1994).

Some other considerations as to what should be available in the entrance area of a school museum include areas for public spaces, rest areas, orientation devices, a mini-theatre and temporary exhibit areas. A museum that Carliner described met some of the challenges posed by these considerations, when sculptures were placed so they lined both sides of the walkway that led to the museum door. Facing the doorway through which visitors entered was an area with several stands of free literature, including flyers about upcoming museum activities (Carliner, 1995).

Necessary information that should be available in the entrance area of a school museum is the location of restrooms and other support facilities available to visitors, therefore, avoiding problems in visitor orientation and circulation (Bitgood, 1994). Fewer problems occur when restroom facilities are available in the entrance area or when they are easily accessible from that point (Hall, 1987). The restroom facilities should be sized to accommodate the largest anticipated audience (Hillberry, 1994). Charnetski (1983) laid down the following minimum requirements for the restrooms in a museum exhibition center:

1. Two required
2. Air-conditioned and vented
3. 8ft. high ceiling
4. Ceramic tile floors and walls
5. Provide for handicapped access
6. Preferably locate in hallway off the lobby
7. Provide at least two toilets in each plus a urinal in the men's room

However, many museum facilities exceed these requirements by providing two public and two staff restrooms (Coleman, 1950). In their instrument for a POE of a secondary school the National Study of School Evaluation listed toilet and lavatory facilities for students on each floor and conveniently accessible toilet and lavatory facilities for faculty and administration (Pace, 1987).

The information desk plays an essential role in ensuring visitors are able to get the information they need about restrooms and other parts of the museum facility. The receptionist is often the individual who initiates the actions that help establish an overall positive impression of a school learning environment (Communication Design Team Royal Ontario Museum, 1976).

Many reception areas fail to make this type of impression because the location of the receptionist’s desk forms a barrier. In this situation the desk and equipment of an information desk create an institutional atmosphere, which does not invoke a feeling of welcome. Some suggested ways to avoid this is place a series of welcoming things inside the entrance area (such as soft chairs, a fireplace, food, coffee) and place the information desk so that is not between the receptionist and the welcoming area. If the information desk is placed on one side at an angle, it is easier to walk toward people and greet them (Communication Design Team Royal Ontario Museum, 1976).

In addition to providing part of the welcoming atmosphere, an information desk controls public access to museum exhibits (Hilberry, 1983). Charnetski (1983) suggested that a receptionist desk should be placed so the seated person has a clear view of the museum entrance and can see into the galleries. Obtaining the necessary furniture for an information desk is not difficult. One school museum used an old store display unit as its information desk (Garry &
Curriel, 1981). However, if a separate information desk is not provided, museum materials may be placed in or near the offices of educational leaders so visitors can easily find them. These materials may include background information, an overview of a museum tour, and museum rules, and material for discussion and activities (Strickland, 1993). Having this information available and providing locations where teachers and docents in the high school can meet groups and explain the museum exhibits may make the provision of an information desk unnecessary (Communication Design Team Royal Ontario Museum, 1976).

The need for teachers and docents to meet groups touring a museum within a school becomes more readily apparent in situations requiring access for students and visitors with physical disabilities. All public areas must meet the American with Disabilities Act requirements for wheelchair access and meeting these requirements is usually beneficial to a museum (Hilberry, 1983; Johnson, 1983). Visitors often see a facility that attempts to cater to the comforts of physically disabled individuals as a place where they are treated as respected guests. A facility fostering this impression among individuals with physical disabilities is one that has a minimum of stairs or the installation of elevators, ramps and doorways to accommodate wheelchairs and also has more frequent and accessible seating areas. Ideally, in a facility with these features, physically disabled visitors to a school museum should be able to navigate the routes available by using their own resources (Communications Design Team Royal Ontario Museum, 1976; Hall, 1987; Howie, 1987a). Handicapped access areas should be marked with clearly visible signs. Heavy doors can be a problem even for the able-bodied and may have to be modified to take into account the special needs of elderly individuals with physical disabilities (Brown et al., 1989). For the blind, highly textured surfaces can be used to warn them of hazards. Also, fountains and shrubs are useful for helping the blind become
orientated to the school museum (Johnson, 1983). Audio recordings and Braille labels are additional ways to help the blind become orientated to a school museum (Johnson, 1983; Sears, 1983a). Using sign language and flashing lights are ways to alert the deaf to problems they may have in visiting a school museum (Johnson, 1983).

In addition to modifying the learning environment for the physically disabled, the use of intimacy gradients is another way to make a visitor to a high school museum more comfortable with the environment through which they are moving. Intimacy gradients are the spaces of a building that form a sequence which starts with the entrance and the public parts of the building and then follows into the slightly more private areas, and finally leads to the most private areas (Alexander et al., 1977). Sanoff, et al.(2001) require evaluators using their POE instrument to rate the success of intimacy gradients in providing visual stimulation to visitors. Also, evaluators are asked to appraise how successful the school building is in maintaining the perception that each of the parts of the facility merge together to form a unified structure (Sanoff et al., 2001). As they do in the design of a school, intimacy gradients are an important influence on the arrangement of spaces in museums. Often the effectiveness of a museum is based on its ability to create clearly defined spaces which are easily perceived by a visitor (Sears, 1983b). It is a complex task to arrange spaces in a museum so that a clear fit exists between an object and the space surrounding it. Small objects and large objects can look awkward if the space available to show them is out of proportion to the scale of the object. For example, a small but important artifact may be carefully placed in a small case, therefore, making it look grand by the shape of the surrounding space. If the intimacy gradients are placed properly, visitors should have the feeling of being drawn from one exhibit to the next and have the impression that everything is following a natural pattern (Communications Design Team Royal Ontario Museum, 1976).
Maintaining the impression that everything is flowing naturally may start from a meeting with school museum visitors in an auditorium or meeting room. Museums having active educational programs provide for these in some form (Hilberry, 1983; Communications Design Team Royal Ontario Museum, 1976). Castaldi (1994) considered the size of a high school auditorium adequate if it can seat one half the student body of the school. However, for a visual arts facility, the size of the auditorium depends upon the type of events a school museum schedules. A small classroom that can accommodate 35 people is adequate for a class. A small hall seating 100 people is suitable for a guest lecture. An auditorium with 200 to 300 seats or a larger one with 500 to 600 seats may be necessary if a visual arts facility is planning to schedule many popular events (Brown et al., 1989).

Charnetski (1983) provided design standards for a general activity room in a museum exhibition center. This room should be suitable for classes, lectures, films, and special exhibits. He described it as environmentally controlled and seating 60-100 persons. Other design features he mentioned are 12 foot high ceilings, storage for the furniture and other equipment used in the room, and an area of 1200-2000 square feet (Charnetski, 1983).

The importance of providing adequate space for assembly areas in a secondary school was underscored by The National Study of School Evaluation. The instrument they designed for a POE of secondary schools asks evaluators to appraise the adequacy of the space provided in assembly areas, the sufficiency of the services provided in these areas, and how attractive is the appearance of the meeting areas of the school (Pace, 1987).

However, just providing an auditorium or activity room where visitors can assemble is often not enough to maintain a positive environment. If the school museum is successful, the demand for some kind of food service is likely to grow and providing this service is often a
necessary step to maintaining a positive impression on the museum visitor (Hilberry, 1983). However, the extent of food services available will depend on the kind of program the school or facility offers. Sanoff et al. (2001) suggested a school have inside and outside quiet areas for eating. Charnetski (1983) recommended a kitchenette for a museum exhibition center. He described it as being located off a general activity room. Additional design criteria he listed include having an 8 foot high ceiling, and an area of 60-120 square feet (Chartneski, 1983). If the school cafeteria is to be used, care should be taken to make it into what Hawkins and Lilley (1998) described as a multi-purpose facility. This requires making an effort to create a non-institutional environment. The walls, ceiling, and floor should be decorated so as to create a desirable atmosphere (Hawkins & Lilley, 1998). This occurred in a Chicago High School cafeteria when a textile exhibit was placed in it (Powel, 1944). Hawkins and Lilley (1998) also recommended that a multi-purpose cafeteria contain some exterior dining space, which could be a special area reserved for museum visitors. Further accommodations would need to be made by providing sufficient space to preclude crossing or overlapping of lines for student and museum visitors.

This type of situation has been addressed at the Henry Ford Academy of Manufacturing Arts and Sciences. Since the Academy is located at the Henry Ford Museum, students eat in the museum cafeteria with the staff (Pittman & Pretzer, 1998). Hawkins and Lilley recommended that in the kitchen area of a multi-purpose cafeteria, two square feet should be allocated for every meal served. The serving area should have .5 to .8 square feet allocated per the total capacity of the dining area. In the dining area they recommend 10-14 square feet be allocated for every seated student (Hawkins & Lilley, 1998). Brown et al. (1989) recommended 10-12 1/2 square feet per seat in a dining area for a visual arts facility. Therefore, a school museum that expects to
offer food services must reserve a large amount of space for its visitors, ensuring a comfortable experience for everyone (Brown et al., 1989). The National Study of School Evaluation in its instrument for a POE of a secondary school requires evaluators to appraise how well the dining area of a school meets the needs of its students and faculty (Pace, 1987).

Nonetheless, a comfortable experience for museum visitors, faculty, and students cannot be provided if provision for the storage and removal of trash from the multi-purpose cafeteria has not been provided. In the instrument The National Study of School Evaluation designed for a POE, evaluators are asked to appraise how satisfactorily the garbage and refuse from a food service facility is disposed (Pace, 1987). Empty food cans and other trash attract flies and create an unsightly and unhealthy atmosphere (Castaldi, 1994). If the trash is not removed from a museum facility, visitors may be discouraged from visiting the museum (Hilberry, 1983).

A school facility needs adequate custodial storage space. The National Study of School Evaluation indicated on their instrument for a POE of a secondary school that this space should consist of a workroom and dressing facilities as well as conveniently located supply closets (Pace, 1987). One recommendation states that custodial closets have a minimum of 36 square feet (Hawkins & Lilley, 1998). A caretaker’s closet for a museum exhibition center should have an area of 100-200 square feet. It also should be air conditioned and vented, placed near the restrooms, and provide a large sink and cupboard for equipment (Charnetski, 1983).

Article VI: Galleries

Museums usually consist of a series of halls or galleries (Hilberry, 1983; Communications Design Team of the Royal Ontario Museum, 1976). Visitors having been made to feel welcome in the public service areas of a museum will be more inclined to investigate them with enthusiasm (Brown et al., 1989). A school museum may not have all the halls or
galleries provided for in a conventional museum, but the design structure should be such that several exhibits can occur at the same time (Munro, 1944b). A design standard for a small museum gallery is 300-900 square feet with a ceiling height of 9-11 feet. A recommended size for a medium museum gallery is 1,000-2,000 square feet with a ceiling height of 11-14 feet. A suggested size for a large museum gallery is 2,000-5,000 square feet with a ceiling height of 14-20 feet (Hilberry, 1994). Charnetski (1983) recommended that a museum exhibition center have two galleries. One, he said, should be 1500 square feet and the other 800-1500 square feet. The standard that Levy and Malloy (1975) employed in designing the exhibition space in museum galleries is 20 square feet per person. Hilberry (1994) suggested that regardless of the amount of space available in a gallery it should be organized around a rectangular floor plan.

However, a certain amount of flexibility is necessary when applying these standards (Brown et al., 1989). One design standard called for using six large wooden panels held by metal uprights to organize the exhibition space in a school museum. (Garry & Curiel, 1981). Still, basic design criteria for galleries are: (a) They should be environmentally controlled located directly off the lobby and have no windows, (b) double doors should be installed that measure 8 feet x 10 feet (Charnetski, 1983), and (c) the doorways to the exhibition areas of the museum galleries should be simple openings without extensive decorations (Coleman, 1950). Nonetheless, once the doorways have been passed through by a visitor, the condition of the floors and walls of the public galleries become important to providing that visitor with a pleasing educational experience.

The use of pine and hardwood floors seems to help provide the necessary positive educational experience for a museum (Levy & Malloy, 1975). Still, these types of floors may not meet the standards necessary for a school facility. Floor surfaces throughout a school facility
should require a minimum of care and be maintained in a non-slip condition (Hawkins & Lilley, 1998). The National Study of School Evaluation placed in their instrument for a POE of a secondary school a place where evaluators could appraise how well the stairs, ramps and landings of a school have been provided with non-slip surfaces (Pace, 1987). Charnetski (1983) recommended that floors in a museum exhibition center be carpeted with industrial heavy-duty carpet. Brown et al. (1989) pointed out the necessity for the floor material in a visual arts facility to be easy to maintain. The National Art Education Association (1993) said the floors of art rooms should consist of materials that require minimum care and maintain a non-slip surface even when wet.

Insuring that floors, walls and ceilings have fixing points is basic in keeping a museum exhibition gallery in the best condition. This is possible since cases and objects can be attached without any need for repair or redecoration between exhibitions (Hall, 1987). However, before placing fixing points it is necessary to know the composition of the walls. If the museum exhibit designer knows if the wall is hollow, plaster, concrete or cinder block, money can be saved that might have been spent on the wrong fasteners, hangers or drill bits (Levy & Malloy, 1975). Knowing the composition of the walls is also helpful since track lighting with zoned dimmer-controlled switches should be placed in the galleries. An additional design feature that should be added along the bottom of gallery walls is wall plugs every 6-8 feet (Charnetski, 1983). Hawkins and Lilley (1998) said that plastered walls are easier to maintain in a school facility if they are protected by good quality paint. However, in a museum facility if painting a wall conflicts with the appearance of an exhibit it shouldn't be done. A major consideration is that the surface materials in the walls of the galleries withstand the constant moving of objects without competing with the visual stimulation provided by the museums exhibits (Brown et al., 1989).
Visual stimulation is an important purpose of a museum (Brown et al., 1989). This is necessary since "Visual diversity helps keep the visitor interested" (Brown et al., 1989, p. 145). Sanoff et al. (2001) indicated in the instruments they designed for a POE of a school that visual diversity is important in the learning environment for a school since it keeps students and visitors interested in what is happening in the building. There is considerable research supporting the view that color will have a stimulating effect on people (Hawkins & Lilley, 1998). Dark walls tend to make huge rooms smaller. Light walls give visitors the impression that a room is larger than its actual dimensions (Neal, 1969). Intense colors should be avoided and neutral colors should be used in exhibition areas (NAEA, 1993). White walls are the most practical backdrop for displaying art (Levy & Malloy, 1975). In using walls for display elements artifacts should not be placed too close to distracting elements such as light switches, grills, etc. (Sears, 1983a).

If a museum is limited to one classroom, using corkboard on a wall from floor to the ceiling is way to provide space for art exhibits (NAEA, 1993). Another study showed that the texture of the walls might have an effect on museum exhibitions. It was found that a stronger texture tends to make space seem smaller (Communications Design Team Royal Ontario Museum, 1976). Levy and Malloy (1975) stated that textures such as carpeting, paneling, pegboard or vinyl are not useful as the backdrops for museum exhibits. Artwork with the appropriate use of lighting is usually displayed in the best manner using slightly textured and uneven surfaces (Brawne, 1982; NAEA, 1993).

This illustrates the point that one of the most important factors in establishing the right atmosphere for a museum exhibit is the quality of the lighting (Communications Design Team Royal Ontario Museum, 1976). Research shows that the correct use of light in a school has an effect on the learning environment in that school (Hawkins & Lilley, 1998). Sanoff et al. (2001)
and the National Study of School Evaluation in the instruments they designed for a POE of a school require evaluators to appraise how well the quality of the lighting in a school supports the learning environment (Pace, 1987).

However, people often complain when they have to work in places without natural light. Alexander et al. (1977) described these places as unfit in which to spend the day. Sanoff et al. (2001) indicated with their facility appraisal instruments, an evaluator must appraise both the qualities of the artificial light and the natural light that exists in the school. Nonetheless, in a school museum standard design practices will not be sufficient since there is a conflict between the need to see museum objects and the need to protect them (Hilberry, 1983). To create this balance it is necessary to focus on the quality of the lighting and not the amount. Therefore, in a school museum the careful use of lighting can enhance artifacts so as to increase visitors’ interest (Communications Design Team Royal Ontario Museum, 1976). The NAEA (1993) recommended that as much natural light as possible be provided when displaying art. At the same time, natural or artificial light can damage some of the objects and materials in a museum. In some cases this damage from light is irreversible and its effects will continue to accumulate over time (Georgia Department of Archives and History, 2000). Some examples of light sensitive materials are “pigments and dyestuffs, textile fibers, paper, wood, and other cellulose materials” (Communications Design Team Royal Ontario Museum, 1976, pp. 159-160). Some materials used to paint vehicles and used as adhesives also can be damaged by light (Communications Design Team Royal Ontario Museum, 1976). Thus, the design problem for most museums narrows down to “one of controlling daylight over certain areas and relating this to an installation of artificial light over the entire volume of the building” (Brawne, 1982, p. 115).
Levy and Malloy (1975) indicated the natural resources of the building itself may help solve this problem by pointing out that “a corner building may have windows on three sides letting in natural light for exhibitions and workshops” (Levy & Malloy, 1975, p. 40). Hall (1987) suggested solving the problem of the control of natural and artificial light by installing three independent lighting systems in any exhibition gallery. They would include:

1. working lights for use during installation, cleaning, maintenance, dismantling, and security patrols after opening hours.
2. emergency lighting to enable visitors to leave safely in case of failure of the main lighting supply, and
3. a display lighting system which should be fitted wherever possible with dimming devices. (Hall, 1987, p. 40).

She also recommended a grid of power sockets be placed around the walls and floor since they are necessary for lighting display cases and for the use of power tools during construction and cleaning (Hall, 1987). Overhead skylights need to be added to these design standards in order to provide an even illumination of the walls (Brawne, 1982). This also may require that dimmers and switches be provided in adequate locations so lights can be adjusted and aimed after artifacts are installed. This affects the cost of a lighting system; however, these costs can be kept down if a control system is in place which allows parts of display, maintenance, and emergency lighting systems to be turned off when they are not needed (Communications Design Team Royal Ontario Museum, 1976). Standards for the installation of a lighting system in a visual arts facility are

1. lights should be at least 36 inches from the wall.
2. art objects should not be warmed by the light.
3. buy the same style canisters for the entire gallery area to avoid a slapdash appearance.
4. arrange the lights to avoid reflections on the surface of art works and shadows cast by painting frames (Brown, et al.1989, p. 149).
Once the mechanics of the lighting system have been established for a museum within a high school, an educational leader will have to decide on the adequate amount of power needed to meet lighting demands. One recommendation is 5 to 15 watts per square foot of space. However, it is important to ensure there is enough power to take care of photographic, television, and other technology needs (Communications Design Team Royal Ontario Museum, 1976).

Another factor an educational leader must take into account is the necessary illumination level. For many museum galleries the recommended level is 20 foot-candles (Levy & Malloy, 1975). Still, this can vary depending on the nature of the artifact. Rosenblatt (2001) recommended the maximum illumination level for the following objects be no more than 50 lux or 5 foot-candles:

1. textiles, tapestries, costumes
2. watercolors, prints, and drawings
3. manuscripts
4. paintings in distemper media
5. wallpapers
6. gouache
7. dyed leather
8. most natural history exhibits, including botanical specimens, fur, and feathers (p. 250).

For objects less sensitive to light Rosenblatt (2001) recommended a maximum illumination level of 200 lux or 20 foot-candles. Some examples of these objects are "oil, tempera paintings, undyed leather, horn, bone, ivory and oriental lacquer" (Rosenblatt, 2001, p. 250). If objects are totally insensitive to light 300 lux or 30 foot-candles is the maximum illumination level. Some examples of these objects are "metal, stone, glass, ceramics, jewelry and enamel" (Rosenblatt, 2001, p. 250).

This will require some planning by an educational leader since the recommended level of illumination in school facilities can range from 5 foot-candles to 110 foot-candles (Hawkins &
Lilley, 1998). However, the use of appropriate display structures with the artifacts a school museum has can make educational leaders’ decisions on lighting easier.

The NAEA (1993) said a display area for a school art facility should consist of wall cabinets, bulletin boards or other materials. Sanoff et al. (2001) acknowledged the need to provide exhibit space in a school where student work can be displayed. In their school building rating scale evaluators are asked to appraise the quality of the spaces available for the display of students work in the halls and the classroom (Sanoff et al., 2001). Tanner also recognized the need to provide space in a school facility for the display of artifacts (Tanner, 2000b). In his design appraisal scale the quality of the spaces available for the display of student’s work, photos, art and artifacts is measured (Tanner, 2000a). However, in addition to providing space for the exhibition of artifacts, a school museum may have to address the security requirements of some of its objects. Objects that have high material value may need to be placed in locked cases (Carliner, 1995).

Sears (1983a) said this is necessary since "Cases protect artifacts and specimens from dust, insects, climate and light as well as from theft and carelessness" (p. 117). Still, there are a number of maintenance concerns in the design of cases. Cases should exclude dust, but the inside should be accessible enough so that internal lighting can be adjusted. These lights should be extremely low intensity incandescent lamps with dimmers so heat build-up can be controlled (Communications Design Team Royal Ontario Canadian Museum, 1976; Hall, 1987). The method of opening cases should not be apparent to visitors. Where this situation cannot be avoided a lock should be visible (Carliner, 1995; Levy & Malloy, 1975). Normally, you should be able to open cases at the front or the sides and it should not be necessary to reach over large areas of the display in order to reach an object. If cases are placed in a room a four-foot working
space between the case backs and the walls of the room should be made available, thus, making it easier to change exhibits (Neal, 1969).

Examples of design standards used for display cases in museum exhibits are:

- large panel units 2 feet wide and 6 feet 10 inches high
- small freestanding shallow case with locking top 4 feet high and 2 feet wide
- free standing exhibit case 5 feet wide and 6 feet 10 inches high
- a continuous gallery wall of cases built around a framework of two by fours (Neal, 1969).

Attention should also be paid to the colors of the cases used in displaying objects. Dark colored cases make light colored materials appear larger and light colored cases make dark materials appear smaller (Neal, 1969).

However, although the previous design considerations are important, a primary consideration in designing a case is to ensure that valuable objects are protected. If fragile objects are knocked over and damaged, the design of the case was faulty (Brawne, 1982). Cases should be designed to prevent accidents and also deter vandalism. The use of shatterproof glass and similar materials in casing objects of great value can help keep vandalism from damaging exhibits. Environmental damage can also be a problem, but can often be prevented by a hygrometer and thermometer near vulnerable objects (Hall, 1987).

Another factor to keep in mind when designing the structures used for display in a school museum is the comfort of the visitor. If cases are arranged in curved lines that take advantage of the traffic flow, visitors experience more enjoyment when visiting a museum (Communications Design Team Royal Ontario Museum, 1976; Sears, 1983a). However, display cases are not the only way museum artifacts can be shown to the public: pedestals and display panels are also important elements of a museum’s supplies (Levy & Malloy, 1975).
Pedestals should be designed so that objects are placed beyond the reach of visitors and at a point where feet or cleaning equipment cannot hit them at floor level (Brawne, 1982). Display panels or a screen system can be described as “all vertical surfaces which are not part of the permanent enclosure of the room,” (Brawne, 1982, pp. 64-65). They usually consist of three types:

- screens needing top and bottom fixing either directly or by means of posts
- screens which are stable because of their geometric arrangement in relation to each other.
- large cupboard-like units which are stable because of their width (Brawne, 1982, p. 55).

However, whatever screen system a museum chooses, it should be adjustable in order to fit uneven floors. At the Albright Art Gallery in Buffalo, New York exhibitions were held in a “large room with a high ceiling, rectangular in shape and having but one opening which served as both entrance and exit” (Powel, 1944, p.34). The proportions of the galleries established in this area were such that small materials could not be shown to the public in a positive manner. A set of screens was used to correct this problem. The height of the screens was 8 feet 6 inches and the widths were 3 feet 6 inches and 4 feet 6 inches (Powel, 1944). In high schools in Chicago most of the exhibit material placed there by the Art Institute of Chicago had to be shown on flat mounts. The material was mounted on 30x40-inch heavyweight pulp board on which there was a covering mat of 30x40-pulp board. The cases used for the exhibition material were 32 inches high, 40 inches long and 4 inches deep. A cover was installed which could be opened at the top of the case and locked. Handles were placed at either end of the cases (Powel, 1944). However, regardless of size, the screens must provide firm fixings for brackets and be able to hold up solid objects or framed materials. There should be provisions for floor fixings, but safety precautions require they be designed to avoid tripping visitors. In addition, for safety and aesthetic reasons,
screens should be designed so electric wiring can be concealed and surfaces can be renewed from time to time with paint or covering materials (Hall, 1987).

Any museum has to consider the possibility that an object may pose safety hazards to visitors and find ways to correct that problem (Carliner, 1995; Howie, 1987c). Some suggested ways a museum facility should be designed to promote safety are:

1. Facilities for eating and drinking should be provided away from areas where dangerous substances are used.
2. Adequate washing and sanitary facilities must be provided.
3. Floors, stairs, passageways and doorways should be clear of obstructions and properly maintained.
4. Ventilation should be sufficient to keep the air odor-free.
5. The air-change rates should be adequate for the purpose of the room.
6. The working temperature should be at or above 16 degrees centigrade.
7. Lighting should be adequate for the type of work carried out.
8. Emergency lighting should be provided where needed.
9. Properly designed seats and tables should be provided for the work in hand. (Howie, 1987c).

These standards may also apply to any facility located within a school. The most important responsibility of educational leaders is to maintain school facilities in the safest possible condition (Hawkins & Lilley, 1998). Sanoff et al. (2001) recognized the importance of this responsibility by devoting a section of their school building rating scale to the degree of safety and security existing in a school. In this section evaluators were asked to appraise the success of a school facility in providing safe indoor and outdoor learning environments for both students and teachers (Sanoff et al., 2001). Howie (1987a) stated poor lighting, steps and inadequate maintenance of flooring were significant factors in a large number of accidents in museum galleries. In another case poor placement of temporary barriers was a factor in accidents. Signs warning the public not to touch objects have been proven to be inadequate. Allowing visitors free access to objects requires careful planning if hazards such as sharp projections are to be avoided. Additional care must be taken to ensure that objects do not pose a physical,
mechanical, or toxic hazard for children. The greatest number of safety precautions has to be taken in areas in which, people tend to congregate, such as near entrances and eating areas (Howie, 1987a). The permanent exhibit area of a high school museum is one of those areas where a number of special safety precautions should be put in place.

Permanent exhibit areas are usually where picture galleries are shown to visitors (Hilberry, 1983). In schools these areas are often set aside for student displays. Their quality can depend upon how much importance educational leaders place on planning schools that meet the psychological and social needs of people (Castaldi, 1994). The NAEA (1993) suggested that a permanent display area be provided in a high school with an art room. The art museums placed in Chicago High Schools had permanent exhibit areas in the corridors, alcoves, or art rooms. In Cleveland, high school art exhibits were installed in locked cases provided by the school (Powel, 1944). Other items that have been used in permanent exhibit areas in some schools are old appliances, old photographs, unusual tools, medical items, old personal care items, advertisements, games and toys (Pershey, 1998). However, if a school facility has the space temporary galleries can be set up for graphic arts and photography.

Exhibit areas of this sort usually contain prints, drawings, and photographs that are small in scale and framed behind glass. It is recommended that since exhibits of this type are very sensitive to light and changes in temperature, no sunlight should be present in these areas (Hilberry, 1983). Depending on the type of school facility, this exhibit area may be set up in conjunction with a photography studio (NAEA). Hawkins and Lilley (1998) recommended that areas which involve photography should be located near the Industrial Arts and Art areas of a school. Castaldi (1994) said areas which involve graphic arts should be located in a shop cluster of a school facility. However, regardless of where it is located, an exhibit area for graphic arts
and photography can be useful to a school museum. Another exhibit area in a school museum also having this kind of use is a textile exhibit area.

Since textiles are sensitive to light and changes in temperature and humidity, they should be exhibited against a painted surface. Lighting and climate must be carefully controlled (Hilberry, 1983). A design standard for this type of exhibit is arranged with two cases so they project from the main part of the wall and simulate the appearance of bay windows. The dress and costume of a Native American and the costume and tools of an early European settler were exhibited in this manner (Carliner, 1995). This can be done in a school museum depending upon the level of financial commitment educational leaders are willing to make to the facility. If more resources are available, an educational leader might want to include a decorative arts exhibit area in the school museum. This area might include everything from jewelry to furniture to horse-drawn carriages (Hilberry, 1983). At the J. Paul Getty Museum a series of rooms are used for the decorative arts galleries (Philip, 1998). Depending upon the space available, a school museum can do the same. However, large open spaces are required if the rooms are intended to be used to display large sculptures.

On the other hand, this amount of space may be difficult to provide in a school facility (Hilberry, 1983). Yet, if they are placed outside, large sculptures may still be used. Carliner (1995) described a museum where sculptures line both sides of the walkway that leads to its door. However, an educational leader who adopts this practice will have to make sure the base that supports the sculpture is strong enough. If sculptures are exhibited inside, the educational leader will need to determine if the floor has the strength to support the combined weight of the base and sculpture (Hall, 1987).
Additional objects besides sculpture may require school museums to use interpretive exhibits emphasizing the social, historical, or scientific importance of an object (Hilberry, 1983). This type of exhibit could be used in areas where students can view displays depicting the activities of various racial and ethnic groups. In the instruments they designed for POEs of schools Sanoff et al. (2001) support the need for this type of display by designing a school building observation form to be used as a basis for developing a first impression of the quality of an existing facility. One of the criteria used to determine if the school forms a positive impression in a visitor's mind is the presence of displays showing the activities of different racial and ethnic groups (Sanoff et al., 2001). Dark rides may be useful for interpretive exhibits of this sort.

In this type of exhibit the visitor “walks or is conveyed through a theatrical sequence” (Hilberry, 1983, p. 57). However, these types of exhibits are highly specialized and may not be possible for many schools. Schools may find it easier to develop interactive exhibits.

These exhibits “contain educational content and place emphasis on the visitor’s experience in manipulating devices rather than observing museum objects” (Hilberry, 1983, p. 57). Many museums choose to "devote more time to the creation of interactive exhibits which promote learning through exploration and play" (King, 1998, p. 15). These museums were some of the first organizations to realize the potential that computer technology created for increasing the involvement of visitors in a learning experience (Kassay, 1995). Often this technology manifests itself in the form of single computers with touch screens near the exhibits they describe (Cooper, 1995). An interactive exhibit in one museum consists of computer workstations that look like those used by brokers in a stock market. Visitors can sit at the workstations and make fake stock purchases and see the results (Carliner, 1995). The Getty
Museum uses "an interactive videodisk of the museum's manuscript collection, which allows
visitors to page through five examples of these delicate and beautiful works through a touch-
screen computer terminal" Kassay, 1995, p. 3). At another museum visitors are able to use a
touch-screen interactive system to design a home (Kassay, 1995). An example of a school
developing a learning activity of this sort occurred at the Museum Magnet School at St. Paul,
Minnesota. Students at this school "participated in an exhibit exchange of handmade artifacts
with children from the Museum Siwalima in Indonesia" (King, 1998, p. 83). The students
created an interactive computer catalogue to accompany the artifacts they sent to Indonesia
(King, 1998). School museums can create activities similar to those of the Museum Magnet
School at St. Paul, Minnesota or they can expand their experience-orientated activities by
providing objects that visitors can touch.

Having touchable objects in a school museum is an asset to public relations. Ninety two
percent of the teachers using the loan service from the Reading Museum let their students touch
the objects. Seventy percent of these teachers stated they expected their students to touch the
museum objects (Reading Museum, 2002b). Studies of museum visitors indicated they tend to
stop and look at exhibits that move or can be made to do something. Visitors also spent more
time touching exhibits they were allowed to handle, while interacting with companions and other
visitors (Atsusi, 1994; Carliner, 1995). However, a major issue of concern is whether or not the
object may be damaged if touched by visitors.

Carliner (1995), while maintaining confidentiality requirements, described the steps a
museum took to protect its objects. A classification system was used to identify how accessible
objects should be to human hands. Objects that required controlled conditions for display were
shown in sealed cases. Objects that did not require a microclimate for display, but could be
damaged by visitors were displayed in the open air. Then, for security purposes, they were placed behind an electronic sensor that let out sound if motion was detected inside the electronic field. Objects that should not be touched by visitors, but if touched would not suffer extensive damage, were placed in the open air behind a fence-like structure. Visitors were allowed to touch objects which could be easily duplicated (Carliner, 1995).

The number of the touchable objects a school museum makes available will depend upon the school or facilities design philosophy and resources. Temporary exhibit areas placed in the school from time to time may satisfy this need. Movable panels are often used for these types of exhibits (Hilberry, 1983).

Article VII: Administrative and Staff Services

In addition to reserving spaces for galleries and exhibits, a model for a museum resource center needs to contain spaces for the administration and staff to work. These offices will generally not differ much from business or academic offices (Hilberry, 1994). Thus, in a school museum, a modification or addition to the space of school administration offices may suffice in providing offices for museum work. Plans should be made for an additional 100 square feet of space for each museum worker working out of the administration offices (Levy & Malloy, 1975). One of the workers could be a curator, the individual responsible for preparing the content of a museum exhibit. Additional office space could also be provided for collection staff members who are the individuals having responsibility for the maintenance and safety of the objects in the museum. Other office spaces could be provided for designers who prepare the plans for the visual presentations of information in museum exhibits, production staff who produce the various elements of the exhibit, and exhibit coordinators who oversee the construction and maintenance of exhibits (Carliner, 1995).
A school system that elects to provide separate office space for a museum, should furnish sufficient area for telephone equipment, photocopiers, office supplies and other museum staff functions (Hilberry, 1983). In a separate facility consisting of a small museum, sufficient space should be provided for a staff of five to eight people. Often in small museums of this sort it is necessary to provide space for only one full time staff person (Brown et al., 1989). This person would probably be the curator or director and his office should contain an area of 120-200 square feet. In a separate museum facility the secretarial area should be located near the director’s office and contain an area of 200-300 square feet (Charnetski, 1983). The design of this office should ensure that activities such as smoking, photocopying and the use of laser printers are kept away from museum collections (Chicora, Foundation, 1994). It is also necessary to ensure the ability of the public or unauthorized students to access staff areas is controlled. One way this has been done is the use of a doorway at the back of an exhibit that says “staff only” and leads to offices used by the employees of the museum (Carliner, 1995, p. 194). If the offices for a museum are combined within a school’s administrative suite, signs should be used so that visitors on museum business will clearly see them. These precautions will ensure the person in charge of the school museum is readily accessible to deal with problems. Hawkins and Lilley (1998) said this type of setup is necessary to ensure the administrative office of a school “sets a tone for an appropriate operation of the building” (p. 37).

**Article VIII: Collections Management Services**

Designing an environment for the appropriate operation of a high school with a museum requires providing space for the collections management services for the museum. These are the spaces that preserve museum collections until they are ready to be exhibited (Hillbery, 1983).
Much of the collection management services of a museum can be performed in a library. Schools often set up exhibits in their library (Barteluk, 1991; Boardman & Varty, 1991). Carliner (1995) described, in a confidential manner, a museum that has a research center for the public which includes archives, manuscripts, photographs, product labels, packages and a 2,600 volume library. Hawkins and Lilley described the part of the school which accommodates media in the same area with library materials as an instructional materials center. They recommend that a library contain 30 square feet of space per seated student equal to 15% of the student body of a school (1998). However, in an instructional materials center containing a school museum, some adjustment to this figure should be made to accommodate visitors. Castaldi recommends that reading space in a library should be adequate for 10% of the enrollment, plus enough computer space for 3-5% of the enrollment. He allocates 1,200-2,000 square feet for a reading room in the library. Still, he points out that this figure may have to be adjusted depending on the size of the school (Castaldi, 1994). A library containing a school museum would need to be built so that it exceeds these minimum requirements, thus better providing for the comfort of visitors.

Still, since visitors come to a museum to look at objects regardless of where the facility is located, it is critical that spaces be provided for the secure shipping and receiving of objects (Hilberry, 1983). At schools and museums this is a problem since many do not provide adequately for the receiving and storage of supplies (Castalidi, 1994; Hilberry, 1990). In their instrument for a POE of secondary schools The National Study of School Evaluation provided a space where evaluators are asked to appraise the ability of a facility to make deliveries in the school with a minimum of interference (Pace, 1987). Therefore, a design for a museum resource center in a public high school must contain adequate shipping and receiving facilities. These facilities should be sufficient enough to allow for the “crating, uncrating, exhibition staging, and
temporary storage for incoming and outgoing objects” (Hilberry, 1983, p. 58). Charnetski (1983) said the shipping and receiving area in a museum exhibition center should contain an area of 600-800 square feet. He also indicated it should have a 12 foot high ceiling, a smooth concrete floor, and 8 foot x 10 foot doors (Charnetski, 1983). Some design standards for the loading dock in the shipping and receiving area are:

1. covered area with clearance for a large trailer truck to back under
2. hydraulic loading ramp
3. provide easy back in for truck
4. provide intercom from outside to reception desk
5. 24-hour alarm to be provided on door which can be deactivated by staff only
6. 12 ft wide x 12 ft deep (Charnetski, 1983, p. 275).

Ideally, a museum should have two loading docks, one 4 feet high and one 2 feet high. The two-foot high dock is suitable for vans and low-bed trucks. The four-foot high dock is suitable for full sized trucks (Hilberry, 1994). For the sake of security, shipping and receiving areas for a school museum need to be located near the service drive of the school. It is easier in this area to make provisions for deliveries from the street of construction materials and loan materials in large crates (Castaldi, 1994; Hawkins & Lilley, 1998). Hall (1987) indicated this requirement also applies to museums.

Convenience dictates that the registration area of a school museum should be near the shipping and receiving area. This space is needed for files, examination of objects, preparation of condition reports, temporary storage, and a computer (Hilberry, 1983). In a museum exhibition center a separate technician's office with an area of 120-150 square feet may serve as the registration area. This small amount of space will probably be sufficient provided the office is located near the shipping/receiving area and the conservation laboratory (Chartneski 1983).

Nevertheless, regardless of its location, Hilberry (1983) stated the registration and cataloging of objects is easier if space for a photography studio is provided in a museum. The
establishment of such a studio indicates the continuing interface between the requirements of a high school facility and a museum. The literature indicated this should be provided as part of a school art program (Hawkins & Lilley, 1998; NAEA, 1993). The NAEA (1993) recommended that a photography studio contain a minimum of 340 square feet. If necessary, this space may include a dark room. Yet, whatever the size recommendation adopted by a school facility, it is also necessary to ensure adequate up-to-date technology is available for the use of the photography studio and other parts of a school museum. The technological revolution arising from the development of information technology and the media has made this a necessary requirement of any kind of museum today (Cerver, 1997). In addition, the fast changing area of digital photography may change the applicable standards for such a facility in the future (Dixon, 1999).

Museums of all sizes now find it is virtually impossible to maintain control of their collections and activities without tools such as the computer (Chenhall & Vance, 1988). The Museum of Reading provides an online catalogue where teachers may view artifacts that are available to loan to their schools (Reading Museum, 2002c). Hawkins and Lilley (1998) indicated the same sort of transformation has occurred in schools today. Computers have become so important that spaces must be designed so they become an integral part of the curriculum in a school. Sanoff et al. (2001) corroborated this development in their school building rating scale. In this instrument they require evaluators to appraise the extent to which a school has been successful in providing technology access to students and teachers. The Dr. Charles Drew Magnet School in Buffalo, New York has been successful in providing access to technology in its learning environments. The school is housed in three separate facilities containing both a museum and a zoo school. All three school sites use large amounts of
computer technology in their operations with fiber optic cabling connecting the museum, the zoo and the three schools together. In 1993, The Buffalo Academy of Science and Mathematics (a local high school) was added to the network. A total of 260 computers were used in the school (King, 1998). In another school students used their available computers to provide virtual field trips for themselves. As part of their assignment they created a guidebook, itinerary, and learning log (Goldworthy, 1997). This growing trend of the use of interactive technology in schools, libraries, and museums makes it necessary to include spaces in the design structure for a museum resource center that can be used to maintain web sites and advertise the objects in a resource center collection (Dixon, 1999).

Museums now use virtual museums to promote their collections and many schools are using the same process as a learning experience (Carliner, 1995; McKenzie, 1997). One high tech museum offers a computer clubhouse as an after school program intended to serve underprivileged youth by providing hands-on experience with computers. It makes artwork created by participants in this computer clubhouse available for viewing on the Internet (Carliner, 1995). In another museum visitors use computers to gain access to a “Virtual Hospital”(Carliner, 1995, p. 224). An activity provided in one museum allows visitors at an Internet station to play a game with a visitor at another station (Carliner, 1995).

Therefore, the design structure of a museum resource center should contain spaces involving students in the process of creating virtual museums (McKenzie, 1997). An added plus to this design criterion is that by coupling physical and online museums, a school museum will be able to extend a unique identity online (Helfrich, 1995; Dixon, 1999). The NAEA (1993) suggested that art room facilities be designed so they accommodate extensive use of computers. They noted that “specialized rooms for work in particular media” need to have in their design
structure spaces reserved for the use of computer technology (NAEA, p. 22). The NAEA (1993) also recommended that planners select studios for “drawing, painting, photography, ceramics, sculpture, printmaking, jewelry, textiles, computers or multimedia” (p. 23). These are all activities in which a museum resource center may be involved (Hilberry, 1983; McKenzie, 1997). However, the amount of space that will be committed to a computer laboratory or a studio in a museum resource area will depend upon the amount of financial support educational leaders are willing to provide. Computer networks require constant care and can be expensive (Helfrich, 1995).

Castaldi (1994) provided some standards for space allocation which can be used to estimate the amount of space the computers used in a museum resource center might take. Usually groups of computers are concentrated in a computer laboratory or studio. The laboratory would have a number of computer clusters, each containing a number of carrels. Each carrel is a student station equipped with one computer and the floor area of this carrel should be about 25 square feet. An L-shaped countertop of about 12 square feet should be built along the adjacent walls of the carrel (Castaldi, 1994). “The height of the countertop should vary from 30 inches for adults and upper-level high school students to an appropriate lower height for students attending middle and elementary schools” (Castaldi, 1994, p. 49). The whole computer cluster should consist of an area of about 400 square feet for eight carrels and related storage space. About 100 linear feet of shelving should be included in each unit cluster for storing supplies and other computer materials. The power requirements of a computer cluster equipped with eight microcomputers would require an independent circuit having a capacity of 30 amperes. Once these conditions have been met, the standard that can be followed for the development of a computer laboratory depends upon the number of clusters that are placed in a museum resource
center. The area required can be found by multiplying the number of clusters by a multiple of 400 square feet. Additional spaces need to be provided based upon who is going to have access to the computers in a museum resource center (Castaldi, 1994).

Once the number of unit clusters has been determined, their location needs to be planned in a design structure for a museum resource center. The preferred arrangement of carrels in a computer laboratory is usually in the shape of a U for a single cluster and a rectangle for more than one cluster. If space is available, an area of about 800 square feet should be selected for a two-cluster computer laboratory and a space of 1200 square feet for a three-cluster computer laboratory. In the storage spaces for these areas special precautions should be taken. A temperature range should be maintained between 50 and 125 degrees Fahrenheit or 10 and 52 degrees Celsius. Storage spaces or shelving for computer disks should not be located near an electric distribution center or near a conductor that is carrying several amperes of current. In addition, an improved lighting system, special furniture, and proper positioning of keyboard, screen, and printer in relation to the person operating the computer are important (Castaldi, 1994).

As Castaldi (1994) pointed out, all light in a computer laboratory should be in the form of indirect lighting. Natural light should be controlled so that it is reflected down from the ceiling. Direct sunlight through windows should be directed toward the ceiling so that the sunlight is diffused throughout the computer laboratory. Computers should not be installed along window walls. Walls should be colored so they reflect light. Dark floors should be avoided in places where computers are located. The chairs used in computer rooms should have five strut pedestal bases avoiding a tendency to tip forward. The back of the chair should be easy to adjust and permit a wide range of movement. The countertop should be large enough so the operator can
move about the major parts of the computer system. A number of electrical outlets should be available within the carrel (Castaldi, 1994). In addition the network wiring, which consists of backbone and wire runs to user groups, needs to be planned (Helfrich, 1995).

If enough space is left over for future expansion, following the design standards described by Castaldi and Helfrich will provide many of the necessities for a computer laboratory in a museum resource center. However, in addition to a computer laboratory another technical area a museum resource center needs is a conservation laboratory.

This is an area where objects can be examined and conservation procedures followed to preserve them (Hilberry, 1983). It may include work areas for various types of objects and special equipment. Charnetski (1983) described two areas that can fit into the definition of a conservation laboratory. They are a preparation/workshop and a 24-hour acclimatization area. The design standards he listed for a preparation/workshop are:

1. located off shipping/receiving area
2. environmentally controlled
3. 12 ft. high ceilings
4. smooth concrete floor
5. fluorescent lighting
6. doors 8ft x 10ft high
7. provide workbench and electrical outlets as anticipated

He suggested that the acclimatization area be located between the shipping and receiving area and the loading dock, with a door 8 feet X 10 feet high, a 12 foot high ceiling, automatic environmental controls, and an area of 200 square feet (Chartneski, 1983). Brown et al.(1989) recommended that a facility where objects are prepared for exhibits be at least large enough so three people can work together in it and have room left over for storage.

The design standards for a school science laboratory seem to be similar to the recommended standard for a museum conservation laboratory. Hawkins and Lilley (1998) said
that 45 square feet of space should be provided for every student working in a science laboratory. Castaldi (1994) recommended a chemistry room contain 1,000-1,100 square feet of space with an additional 200-250 square feet of storage space added. Providing the area is secure, this amount of space may be adequate for the conservation laboratory in a museum resource center.

Article IX: Security

In a conservation laboratory, as well as the rest of a school museum, security is a primary planning and design consideration. As a rule, every point of entry in a museum learning environment should be secure. All exhibit areas should be designed enabling them to be closed, secured, and alarmed during public events being held elsewhere in the school or in separate areas of the museum facility (Hilberry, 1983). The museum area of a school should have security grilles over windows, heavy doors, shutters, or skylights which cannot be unscrewed from the outside (Brawne, 1982). Doors should be fixed with deadbolt locks. Intruder alarms should be installed on all windows and doors. Alarms should automatically notify local law enforcement officials of a break-in. Also, to be effective, they should be designed to suit security and staff procedures, student usage patterns, and staff and police response capabilities (Georgia Department of Archives and History, 2000; Hilberry, 1983). Rosenblatt (2001) recommended that a security system for a museum should have the following devices:

1. closed circuit television
2. magnetic door contacts
3. motion detectors
4. card readers or similar access-control system
5. infrared door shunts
6. electric door strikes
7. guard tour stations
8. panic alarms (p. 252).

However, a system as extensive as this may not be necessary if security personnel or museum resource officers are provided places where they can observe the operation of the museum. This
should help ensure they are familiar with the locations of the exhibits of a school museum and
the other museum activities of the day. If the ability of the security personnel or teachers to
observe exhibits is blocked by obstructions, cases or cabinets should protect exhibits. The use of
railings to keep distance between the object and the visitor may also help in this situation.
Tempered glass around objects is an additional security measure for objects since it offers
resistance to vandalism as well as to accidental breakage of objects (Communications Design
Team, Royal Ontario Museum, 1976). Still, although these precautions will protect the
collection, fire is more damaging to collections than theft or vandalism (Hilberry, 1983).

**Article X: Fire Prevention and Control**

This makes it important to ensure that new museum buildings or improvements to
existing museum buildings should be built using fireproof construction materials or technology
(Charnetski, 1983). In this situation the requirements of a school and museum are similar. A
school should be built with as little use of wood as possible. Concrete and steel are safer
materials and should be used throughout the building. As a further fire prevention measure, the
heating unit for the school or the building needs to be located away from the museum area
(Hawkins & Lilley, 1998). The design of the building should also be such that smoke is not
picked up in the ventilation systems and carried to other parts of the building (Brown et al.,
1989). This safety feature is further enhanced by keeping paints and flammable materials stored
away from museum collections (Hilberry, 1983). In keeping with fire prevention requirements,
the area used for a museum learning environment should have at least two means of exit to the
street. The location of the exits is a key factor in providing for the safety of visitors to a school
museum, but they should be placed to minimize potential use as escape routes for thieves. Still,
exits that lead to an enclosed backyard are not acceptable because they do not provide the
maximum amount of fire safety for visitors (Levy & Malloy, 1975). An electronic fire alarm system should be installed in the building. This system would automatically notify the fire department in the event of a fire. Smoke detectors, fire extinguishers, and a sprinkler system will add security to a museum resource center (Georgia Department of Archives & History, 2000; Hilberry, 1983). These devices are placed in most schools but may have to be concentrated more in museum resource areas (Hawkins & Lilley, 1998).

Article XI: Climate Control

These areas also need to have devices concentrated in them allowing for atmospheric control of a museum facility. This is vitally important to a visual arts facility. In the long run, air conditioning is more important to an art museum than the acquisition of new works of art (Brown et al., 1989). This applies to other types of museums where experience has shown that it is necessary to maintain a constant daily comfortable temperature in order to lessen damage to important artifacts (Hilberry, 1983). This requirement is the same for a school whether or not it has a museum. Hawkins and Lilley (1998) recommended that for the sake of the learning environment a year round comfortable temperature and humidity should be provided throughout the building. One of the performance criteria in the instrument designed for evaluation of secondary schools by The National Study of School Evaluation is that "appropriate temperature levels are easily maintained in all locations" (Pace, 1987, p. 479). Meeting this requirement in a school museum makes it necessary for the central heating and air conditioning system to remain operational 24 hours a day, seven days a week, maintaining an interior temperature of 68-72 degrees Fahrenheit. However, in a museum, humidity is more important than temperature and should be controlled first (Chicora Foundation, 1994). Museum areas have to take more care to maintain humidity levels throughout exhibit areas because of its effect on objects (Hilberry,
The greatest danger comes from excessive humidity, which can cause mold growth, metal corrosion, and chemical reactions in textiles and paper. Extreme dryness can also be a problem since it produces shrinkage and brittleness (Brawne, 1982). Some of this can be avoided if changes in relative humidity do not occur too quickly in museum exhibit areas. Changes in relative humidity that occur over an extended period of time do less damage to objects. Museums generally agree that the optimum range of relative humidity within a museum environment should be from 45% to 65% with 50% as the median target (Communications Design Team Royal Ontario Museum, 1976). This may necessitate a separate control system designed for human comfort in parts of the learning environment of a museum.

Since collections need a more stable environment than do staff offices, meeting facilities, and other areas of the building, a special system for a school museum may have to be designed that covers only the collections and exhibit areas. Hilberry (1994) pointed out that at the start of any museum building program, it must be decided whether the entire building is to be maintained at conservation standards or only those areas containing collection items. The chances of artifacts being damaged is less if the maximum stability of temperature and humidity is maintained in museum galleries, registration areas, preparation areas, collection conservation areas, and collection storage areas (Rosenblatt, 2001). An added advantage of designing a separate climate control system for a museum area in a school is that costs will be reduced (Chicora Foundation, 1994). Offices, workshops studios, and meeting rooms do not need the same kind of careful climate control as other parts of a museum (Hodges, 1983). Costs can also be reduced by using portable humidifiers or dehumidifiers (Hall, 1987). Another alternative is the use of special storage cases for sensitive objects, which has the effect of creating a
microclimate (Hall, 1987). This may reduce the need for precise control throughout the museum collection area (Hilberry, 1983).

The appropriate use of ventilation may also reduce the need for extensive climate control systems. One of the performance criteria in the instrument designed for evaluation of secondary schools by The National Study of School Evaluation is that "ventilation facilities ensure a sufficient supply of properly circulated clean air in all locations" (Pace, 1987, p. 479). This minimizes the potential for mold outbreaks by maintaining air movement through filters. It can also control the number of types of pollutants in the air (Communications Design Team Royal Ontario Museum, 1976). Still much of this can be undone if leaks occur. Therefore, the age of the plumbing should be checked often (Hilberry 1983, Levy & Malloy, 1975).

**Article XII: Collection Storage**

A school’s museum collection can also be threatened if the collection storage areas of a museum are not designed properly. The most common design fault in many museums is the failure to provide for adequate storage space (Hodges, 1983; Hilberry, 1990). Chartneski (1983) said the storage area for a museum exhibition center should have an area of 600-800 square feet. Other design criteria he used for this area are that it should be environmentally controlled, have a 12 foot high ceiling, and a smooth concrete floor (Chartneski, 1983). Brown et al. (1989) described a storage area for a visual arts facility with two rooms. One large room was used for objects that will remain in storage for a long time and the other smaller room was used for objects that will be stored for short periods. However, these standards outlined by Chartneski (1983) and Brown et al. (1989) may have to be adjusted since the space requirements for storage should include the amount necessary for the current collection plus additional expansion (Hilberry, 1983). At a minimum, the storage space should be approximately equal to the square
footage used by all the exhibits in the museum area (Carliner, 1995). Object storerooms or vaults should be arranged for staff use only (Levy & Malloy, 1975).

The environment in which collections are stored is also important since for every 14 degree Fahrenheit rise in temperature, the deterioration rate of paper and other organic materials doubles (Chicora Foundation, 1994). In addition, no ultraviolet or natural light should penetrate the storage area since both are detrimental to the preservation of some museum objects (Brown et al., 1989). Still, the lighting levels in storage areas need to be bright enough to allow staff to work without relying on windows for light. Light fixtures should be placed over aisles, not over shelving. The lamps used should emit low ultraviolet radiation with fewer than 75 microwatts per lumen (Georgia Department of Archives and History, 2000).

Other design standards helping maintain a preservation quality environment in a museum include the floor of the storage area, which should have a concrete floor able to support a load of at least 300 pounds per square foot. Also, artifacts should never be stored in a site that has just been painted nor had its floors sealed (Georgia Department of Archives and History, 2000). Basements and attics should not be used for storage. Attics are often too hot and dry while a basement is often too damp (Frost, 1983). However, if space restrictions require that a basement be used for storage, a water alarm should be installed to warn of leaking pipes or seeping ground water (Levy & Malloy, 1975). In areas where storage of some three dimensional objects is open to the public, preserving objects requires that glass cases should be installed before the public is allowed to see them (Hilberry, 1983).

Sometimes, maintaining a preservation environment requires the storage of museum collection materials in folders and boxes or file cabinets. This area should have a ceiling height of at least 15 feet. The shelving in the storage area of a museum resource center should be bolted
to the floor and braced at the top to prevent a domino effect of toppling stacks. Stacks should be arranged so there are no dead-end aisles. Shelving units should be around support columns so they will not block aisles. A minimum width of 3 feet should be maintained between rows of shelving (Hodges, 1983). Paper and photographic materials should be shelved so they are removed from the floor. Carpeting in collection storage areas is discouraged since it retains moisture, harbors mold, and is difficult to clean effectively (Georgia Department of Archives and History, 2000).

In part of the collection storage area, provisions must be made for a security vault. This area provides special security provisions for objects that are valuable or vulnerable. This could include gems, gold, jewelry, and important records. A related aspect of this need to provide security is inventory control. Things need to be arranged making it easier to monitor access to the collection. Ensuring the collection storage area has very few windows and secure doors aids this process (Hilberry, 1983). Castaldi (1994) proposed a vault of 50-75 square feet. However, for a museum the size of the vault would probably have to be larger.

**Article XIII: General Storage**

The final step in designing the collection storage area is to allow for growth. An additional 30 to 40 percent over the space being used should be available (Georgia Department of Archives and History, 2000). Some of this extra space will need to include storage space for materials unrelated to the museum collection. This general storage area should be separate from the collection storage (Hilberry, 1983). Storage space needs to be provided for the pedestals, citrines, cases, stanchions, display panels, furniture, and other items used in the museum area. Other areas should be provided for the storage of catalogs, posters, annual reports, and other materials used in the museum area. A secure space with good shelving is needed for storage of
audiovisual equipment. Many museums provide storage space for folding tables and chairs, costumes, and other paraphernalia. These are often necessary for the special events connected with the operation of a museum (Hilberry, 1983). In vocational areas, Castaldi (1994) suggested an area of general storage space of 100-125 square feet for each shop. In a museum this can be applied to each exhibition gallery.

**Article XIV: Shops**

Additional storage space is needed for the equipment used to keep up the grounds and fulfill the maintenance requirements for a school museum. This storage area would contain janitorial supplies, damp mops, high efficiency vacuums and other equipment. This type of space may also be included with exhibit preparation and maintenance shops. The work done in these type of shops often requires the use of carpentry, electrical work, sheet metal work, masonry, plumbing, electronics and caring for indoor trees and plants (Hilberry, 1983). Since the vocational programs of many schools have as part of their curriculum instruction many of these skills, a school museums’ exhibit preparation and maintenance shops may be integrated into a school's vocational program. A design standard for these shops might range from 850-2,000 square feet, depending on the needs of the school (Castaldi, 1994).

Some schools use a school store as part of their vocational program. This can be used as a merchandising area to help meet some of the financial costs of a museum (Hilberry, 1983). Charnetski (1983) proposed that a gift ship or sales counter in a museum be provided with an area of 100-400 square feet.
Post-Occupancy Evaluations

For over forty years post-occupancy evaluations (POEs) have been used to evaluate school buildings and other educational environments (Lackney, 2001). This is "an assessment process that can be applied to any type or size of school environment" (Sanoff et al., 2001, p. 6). However, since educational environments are not the same the use of a checklist of appropriate items is an acceptable part of the POE process (Lackney, 2001; Sanoff et al., 2001). The assessment items represent evidence of the existence of ideal characteristics in the educational environment supporting the developmental needs of the students a facility serves (Sanoff et al., 2001). Prieser et al. (1988) described these ideal characteristics as performance criteria. Therefore, in a checklist the difference between the performance criteria and the actual performance of the building is the evaluation (Prieser et al., 1988).

This literature review has identified design standards which may be combined together to form a model of the characteristics of a museum resource center. The design standards of this model may be used as the performance criteria of a checklist that evaluates the effectiveness of existing museums in schools or school systems in promoting museum learning.

Hawkins and Lilley (1998) suggested that the appraisal guide they developed for measuring the quality and educational effectiveness of school facilities is a useful instrument for performing a POE. The standards they placed in their appraisal guide are the performance criteria they use to determine how close a school facility comes to their concept of the ideal learning environment.

They described the features which are becoming commonplace in the ideal educational environment as the following:

1. use of some windows, at least one per instructional area
2. sloped roofs lessening the problems of roof leaks
3. security devices to limit vandalism and break-ins
4. spaces for student dialogue including informal seating arrangements
5. safer playground equipment designed to utilize findings from studies in psychology
6. spaces designed to give students (and teachers) brief interludes from large groups - personal space for occupants of the learning environment
7. telephones in each classroom
8. increased size of classrooms
9. extensive use of carpeting throughout learning areas
10. increased use of color and acoustical treatments (Hawkins & Lilley, 1998, p.6).

Prieser et al. (1988) suggested using rating scales to measure the difference between the performance criteria for the ideal educational environment described by Hawkins and Lilley. They allow "the description and presentation of different degrees of performance that are applicable to a great number of building-performance situations" (Prieser et al., 1988, p. 85). The rating scale Hawkins used in the 1973 edition of his appraisal guide for school facilities determined how close a school facility came to meeting his performance criteria by using an additive scoring method. School facilities were evaluated on the basis of the number of points they received. He allowed up to a maximum of 1000 points distributed among six major categories. The categories and points were divided up in the following manner:

<table>
<thead>
<tr>
<th>Category</th>
<th>Maximum Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. appraisal Criteria for School Sites</td>
<td>100</td>
</tr>
<tr>
<td>II. appraisal Criteria for Structural and Mechanical</td>
<td>200</td>
</tr>
<tr>
<td>III. appraisal Criteria for Building Environment</td>
<td>180</td>
</tr>
<tr>
<td>IV. appraisal Criteria for School Safety</td>
<td>160</td>
</tr>
<tr>
<td>V. appraisal Criteria for Space Utilization</td>
<td>260</td>
</tr>
<tr>
<td>VI. appraisal Criteria for Plant Maintainability</td>
<td>100</td>
</tr>
</tbody>
</table>

Sanoff et al. (2001) did not use a numerical rating scale in their Six Factor School Building Checklist. This assessment tool lets evaluators appraise the overall quality of a school's building design using a rating scale based on a seven-step continuum from very unsatisfactory to very satisfactory. However, they recommended an evaluator wishing to assign a score to each
factor being assessed use a numerical rating scale (Sanoff et al., 2001). The National Study of School Evaluation used this in the instrument they designed to evaluate a secondary school facility. The criteria they used on their rating scale are excellent, good, satisfactory, poor, missing but needed, and not applicable. They assigned the number 5 to excellent, 4 to good, 3 to satisfactory, 2 to poor, 1 to missing but needed and na to not applicable. Still, the National Study of School Evaluation stated that explaining what points on a rating scale means is difficult on an assessment tool of this sort. This is because evaluators must draw upon their professional experiences and make a judgment based upon those experiences (Pace, 1987). Therefore, a rating scale can only measure gross perceptions of the performance of a building (Preiser et al., 1988). Nonetheless, The National Study of School Evaluation did give some examples an evaluator could use as guidelines for assigning a numerical value to the performance criteria in its assessment instrument. If the part of a facility the appraiser is evaluating is the best example the evaluator has seen, the number 5 should be assigned to that performance criterion. If the part of a facility the appraiser is evaluating is good, but not the best, the number 4 should be assigned to that performance criteria. If the part of a facility the appraiser is evaluating is satisfactory the number 3 should be assigned to that performance criterion. If the part of the facility the appraiser is evaluating is poor the number 2 should be assigned to that performance criterion. If the part of the facility on a checklist is necessary, but the school doesn't have it, the number 1 should be assigned to that performance criterion (Pace, 1987). However, in this study the number 0 was assigned to the necessary, but doesn’t have it, performance criterion. This is obligatory to ensure a correct percentage can be used to compare how close a school museum is to the ideal model. If a school museum receives a score of 1 for a non-existent performance criterion a correct percentage will not be calculated, since this would give it credit for an item it
does not have. If the part of the facility the appraiser is evaluating is unnecessary na should be assigned to that performance criteria (Pace, 1987).

The literature indicated that an appraisal guide reflecting the performance criteria for a museum resource center should consist of seventy-five items divided into twelve sections. The rating scale might consist of a variation of the additive scoring method recommended by Sanoff et al. (2001) and used by Hawkins (1973) in his appraisal guide. Since, a general model has not been followed by school museums; an assumption of equal weights for the items in the appraisal guide may be warranted. As the building assessment instruments developed by Sanoff et al. (2001) and The National Study of School Evaluation concluded this reflects the need for educational leaders to pick and choose the parts of the appraisal guide that they believe can be applied to their situation (Pace, 1987). Using the National Study of School Evaluation's scale of one to five to evaluate the performance criteria for a secondary school as a guide, the maximum number of points possible to be awarded for each item in the museum resource center model is 5. Therefore, the total number of points that may be awarded in this appraisal guide is 375.

Based upon a review of the literature in museum architecture, these points should be distributed among the twelve sections as follows:

<table>
<thead>
<tr>
<th>Section</th>
<th>Maximum Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Exterior Areas</td>
<td>20</td>
</tr>
<tr>
<td>II. Structural Features</td>
<td>25</td>
</tr>
<tr>
<td>III. Public Service Areas</td>
<td>40</td>
</tr>
<tr>
<td>IV. Public Galleries</td>
<td>70</td>
</tr>
<tr>
<td>V. Administration and Staff Services</td>
<td>10</td>
</tr>
<tr>
<td>VI. Collections Management Services</td>
<td>30</td>
</tr>
</tbody>
</table>
VII. Security 25
VIII. Fire Prevention and Control 25
IX. Climate Control 25
X. Collection Storage 65
XI. General Storage 25
XII. Shops 15

The closeness of the performance criteria to the situation existing in a school museum may be evaluated using the criteria that the National Study of School Evaluation suggested are needed on a rating scale of a secondary school facility. These are excellent, good, satisfactory, poor, missing but needed and not applicable (Pace, 1987). Since Hawkins (1973) indicated there is a need to ensure the consistency of scores, the instructions for awarding the maximum number of points in each of these categories will follow the examples provided by the National Study of School Evaluation with the exception that the category of missing but needed will be assigned a score of 0 (Pace, 1987).

Thus, an accurate percentage can be taken on a POE of a school museum. A percentage is useful in a POE when easily identifiable differences in space utilization can be found (Preiser et al, 1988). This measure can be found in the model for a museum resource center by adding together the total score of all the sections in the appraisal guide. A percentage results from dividing the composite final score by the total number of points possible. However, before this can be done 5 points should be subtracted from the total number of points possible for each item on the appraisal marked na. This reflects the need to ensure that a school museum is not penalized for performance criteria that could not be reasonably applied to their situation. The
resulting percentage will give educational leaders an indication of how close the museum learning environment they are observing in a school facility corresponds to the environment recommended by the literature.

**Summary**

Since the start of the twentieth century there has been a recognized need to place museums in schools. This resulted from the ability of a museum to foster a constructivist approach to learning in a school facility. Where museums were placed in high schools, their effectiveness was limited by the need for better facilities for the exhibition and study of visual materials.

There is a lack of validated research on what a comprehensive model of a school museum in a high school should be. However, previous research on the evaluation of the effectiveness of school facilities in promoting the learning environment provided a framework on which an instrument could be developed for a POE of a museum in a school or school system. The literature described this framework for a POE of a school facility as an assessment checklist or an appraisal guide (Hawkins & Lilley, 1998; Sanoff et al., 2001).

This review of the literature in museum education, museums in schools, museum design, school design, and design standards for a museum within a school or school system has identified seventy-five items that can be used as performance criteria in a POE of a school museum:

- Landscaping
- Promenade
- Parking
- Signs
- Weather Tight Building
- Acoustics
- Circulation Patterns
- Hallways
- Conservation Laboratory
- Exhibit Access
- Security Personnel
- Sight Lines
- Locks
- Alarm Systems
- Building Construction
- Flammable Materials
A school museum may be appraised based upon its ability to meet the performance criteria of a model educational environment. In this study the model educational environment for the promotion of museum learning in a public high school meets the above seventy-five performance criteria and was described as a museum resource center.
CHAPTER 3
RESEARCH DESIGN AND METHODOLOGY

Introduction

As previously stated, a post-occupancy evaluation (POE) is "the process of evaluating buildings in a systematic and rigorous manner after they have been built and occupied for some time" (Preiser et al., 1988, p. 3). This process identifies problems existing in the design of facilities and provides a framework for the adaptation of a facility to organizational change (Preiser et al., 1988; Sanoff et al., 2001). There are three types of POEs: diagnostic, indicative, and investigative.

The methodology of a diagnostic POE was not adopted for this study because it takes longer and involves methods not necessary to answer the research questions of this study. The goal of a diagnostic POE is "the correlation of physical, environmental, and behavioral performance measures, thus providing a better understanding of the relative significance of various performance criteria" (Preiser et al., 1988, p. 57). The fulfillment of this type of goal would involve the use of formal measurement and statistical analysis (Merriam, 1998). Quantitative research methods of this sort were not applicable to this study since POEs of educational environments are often based on "qualitative impressions of the school environment" (Sanoff et al., 2001, p. 15).

The research criteria in an indicative POE are not explicitly stated before the beginning of the process and this makes it more adaptable to the study of a single facility (Preiser et al., 1988).
The research questions in this study required comparisons of several facilities. Therefore, the methodology of an indicative POE was not used in this study.

The methodology of an investigative POE is similar to an indicative POE since both involve analyzing historical and archival data, submitting evaluation questions to the management of a facility, performing a walk-through assessment that addresses the issues raised by the evaluation questions, and interviewing selected personnel responsible for the facility. However, it differs from an indicative POE because it uses “researched criteria that are objectively and explicitly stated” (Preiser et al., 1988, p. 56). This characteristic makes an investigative POE more reliable for basing decisions on improving the performance of a building (Preiser et al., 1988). An assessment instrument used to make comparisons between different educational facilities needs explicitly stated performance criteria before the analysis begins (Sanoff et al., 2001; Hawkins and Lilley, 1998; Pace, 1987). Therefore, since the methodology of an investigative POE satisfied this requirement, it was used in this study (Preiser et al., 1988).

Identifying the performance criteria in an investigative POE often begins with the use of a "state-of-art literature assessment, and comparisons with recent, similar state-of-art facilities" (Preiser et al., 1988, p. 56). As Sanoff et al. (2001), Hawkins and Lilley (1998), and the National Study of School Evaluation (Pace, 1987) stated, an assessment instrument containing the performance criteria of a facility provides that starting point needed for analyzing the complete environment that a school offers. All three of these groups reviewed the literature for the performance criteria needed for their instruments. This procedure is a necessary part of an investigative POE (Preiser et al., 1988).

Nevertheless, identifying performance criteria for an educational environment using comparisons with similar state-of-art facilities, often is not possible involving schools. As King
(1998) pointed out, "since each community is unique, there is no one educational model that will fit every environment" (p.7). The literature review of this study showed this is also true for museums that exist as separate facilities within a school or as separate facilities within a school system. In this study facilities of this type are described as school museums.

A model for what these school museums should be has not been established. Preiser et al. (1988) stressed that doing an investigative POE of a specialized facility often makes it difficult to obtain state-of-art evaluation criteria within a limited time frame. In an investigative POE of an agricultural science building at the University of Kentucky, evaluation criteria were difficult to find since it was a highly specialized research laboratory (Preiser et al., 1988). Similarly, due to the highly specialized nature of school museums and the lack of guidelines currently available to educational leaders, the performance criteria from this study were obtained from the literature review alone. Sanoff et al., (2001), Hawkins and Lilley (1998), and the National Study for School Evaluation (Pace, 1987) in their assessment instruments used performance criteria derived from values held by individuals, groups or organizations. This is qualitative methodology (Preiser et al., 1988). Preiser et al. (1988) indicated this is the same process involved in POEs of many facilities.

The methods used in conducting POE research on facilities often are incorporated into the framework of a case study (Merriam, 1998; Preiser et al, 1988). Zimring and Rosenheck (2000) stated that using case study methodology in the performance of a POE has a long history. This occurred because case studies are an effective method of documenting the physical performance of buildings. Case studies also are useful in obtaining information on the effect of design solutions on buildings (Vital Signs Project, 1998). The case study of a facility using investigative POE procedures would focus on generating data instead of collecting data
(Merriam, 1998; Rossman & Rallis, 1998). The final result of a case study should be when the researcher gains an in-depth understanding of the existing situation of a particular program (Merriam, 1998).

In order to qualify as a case the phenomenon studied must be “specific, a complex, functioning thing” (Stake, 1995, p. 2). However, in a situation where very little research has been done, a single case design may not be adequate. Educational leaders often need compelling evidence to make a case for a change in a school learning environment (Sanoff et al., 2001). Thus, to provide more powerful answers to the research questions of this study a multiple case design was followed (Merriam, 1998; Yin, 1994).

During the course of this study five school museums were visited. Two of these museums could be described as separate facilities within a high school. Since they were accepted as separate entities in the high schools in which they operate, this definition fits them. The other three facilities visited in this study could be described as separate facilities within a school system. This is an appropriate characterization because they functioned as separate museums that are connected with and operate in conjunction with different schools in their respective systems.

These five facilities were the only ones considered for this study since facilities that are recognized as museums and are operated on that basis for an extended period of time do not exist within most of the school systems of Georgia. Also, these facilities were large enough so an assessment instrument could be used as part of a POE and yield sufficient data from which to draw conclusions. Furthermore, by using these units the researcher was able to make meaningful comparisons in relation to the research questions and the visits to each museum could be
conducted within a convenient time frame for both the researcher and the school systems (Marshall & Rossman, 1989; Merriam, 1998; Preiser et al., 1988).

**The Investigative Post-Occupancy Evaluations of the Five School Museums**

However, before beginning visits to the five school museums in this study an assessment instrument had to be developed which would provide a basis for making comparisons among them. This is only the first step in the performance of an investigative POE of an educational environment (Preiser et al., 1988; Sanoff et al., 2001). The other steps were to discuss the performance criteria with the management of a facility, perform a walk-through evaluation, interview selected personnel, evaluate documents and send interpretative data back to the management of the facility for review.

**Step One: The Appraisal Guide**

The methodology of an investigative POE suggests that the data needed for thorough descriptions of a case may be generated by comparing a model with the design of an existing facility (Preiser et al., 1988). Preiser et al. (1988) described the consideration of building performance criteria in the aggregate as the "Building Performance Concept" (p.31).

Gross (1996) stated that without design standards as a measuring point, an assessment of the ability of a building to meet the needs of its occupants cannot occur. Therefore, to discover the performance criteria needed to form a model of a museum resource center, this study began with a literature review in the areas of museums in schools, school and museum design, museum education, design standards for a museum within a school or school system, and post occupancy evaluations (POEs). The appraisal guide developed from the literature review (see chapter 2 Design Standards for a Museum within A School or School System) provided the design
standards which served as the framework directing the data collected in this study (Rossman & Rallis, 1998).

Charnetski (1983) said a model museum exhibition center cares for and uses objects, promotes museum learning, and coordinates partnerships with museums in the area. However, this definition ignored the impact of the World Wide Web on museums (Helfrich, 1995). Dixon (1999) stated the use of the Web is changing the way that museums present their collections to the public. This indicates that the "Building Performance Concept" of a model school museum needs to expand on Charnetski's definition. Therefore, the appraisal guide used in the POEs of this study represents an expanded concept of what a model school museum should contain. In this study the model presented by the appraisal guide is entitled a “Museum Resource Center”.

However, if an appraisal guide is to be used by other researchers the procedures and rules that are to be followed in using the assessment instrument need to be described (Sanoff et al., 2001; Hawkins and Lilley, 1998; Pace, 1987). Thus, to meet the requirements necessary for a multiple-case study using POE methodology and provide guidelines for future researchers, the sections and items used in the appraisal guide were carefully described. In addition, the procedures and rules for evaluating these items were outlined within the instrument. As an aid to future researchers, appropriate size specifications were recommended.

**Step Two: Discuss the Performance Criteria with the Management of a Facility**

Using the appraisal guide as a representation of the ideal school museum, it was possible to begin the case studies of five school museums in Georgia. The performance criteria used in the appraisal guide were discussed with the management of each facility. These discussions were useful since they raised additional questions about aspects of the facilities which are not
easily observed. Preiser et al. (1998) and Sanoff et al. (2001) both indicated this process is a necessary part of an investigative POE of an educational facility.

**Step Three: Perform a Walk-Through Evaluation**

After discussing the performance criteria for the POE with the educational leaders responsible for the five school museums, a walk-through evaluation of each of these facilities was conducted. The observation procedure followed during this part of the POE can be described as a researcher participant. This is "someone who participates in a social situation but personally is only partially involved so that he can function as a researcher" (Merriam, p. 102).

Direct observation and still photography was used through all the aspects of the walk-through evaluation. Both Sanoff et al. (2001) and Preiser et al. (1988) suggested this process should be followed in a POE. Throughout the observations, a rating scale based on a six step continuum from excellent to “not applicable” was followed (see chapter 2 Post-Occupancy Evaluations). Using the knowledge obtained from 35 years of family experience with school facilities, 24 years teaching grades 1-12 in four different school systems, experience using historical artifacts to enhance teaching, graduate school training evaluating school facilities, museum visits and the literature review of this study a score was assigned to the five facilities on an item-per-item basis. This allowed the description and presentation of different degrees of performance for each of the situations encountered in the school museums (Preiser et al., 1988). As scores were assigned for each item in the appraisal guide, additional notes were taken. These notes, taken within the framework of the appraisal guide, allowed for additional data to be generated on the relevance of the items in the appraisal guide. The 735 photographs taken in the walk-through evaluations of the five museums were useful in identifying attributes that deserved particular attention. Pictures often fulfill this purpose in a POE (Preiser et al., 1988).
As a final aspect of the walk-through evaluation, a percentage score was computed. This percentage shows how close the museum learning environment being observed compares to the model represented by the appraisal guide. It also provides educational leaders with a measure of the success of the adaptation of that facility to an environment not originally designed for museum learning. Preiser et al. (1988) described the computing of percentages as a good method to use in explaining and interpreting aggregate data.

**Step Four: Interview Selected Personnel**

Once the walk-through evaluation was completed, the POE process continued with interviews of selected personnel (Preiser et al., 1988). These interviews were helpful in identifying the common characteristics of museums in schools or school systems. For this to happen, the design of this study had to contain embedded elements. This can be described as an analysis of the sub-units involved in a case (Yin, 1994). In this case, the sub-units were the administrators and maintenance personnel of each of the five museums. The interviews served as a guide in determining how these sub-units affected the decisions about organizing the facility to promote museum learning.

The interviews were semi-structured and were conducted in person, guided by pre-written questions flexible in format. Merriam (1998) recommended this type of interview structure in the performance of a case study. She stressed this type of structure allows new ideas of importance to develop as the interview progresses (Merriam, 1998). The questions used to interview the people working and operating the five school museums were:

1. Describe your relationship with the school museum in terms of job title, responsibilities, and years of association.
2. What is the size of the school system that supports your museum?
3. Describe the school museums’ educational philosophy.
4. Have the schools in the school system developed museum learning units? If so, about how long do they typically last?
5. Describe the collaboration between the museum and the school system. Is it formal or informal? How are resources shared?
6. What responsibilities and processes are unique to the museum and the school system? What activities and processes are shared?
7. How has the museum changed since its creation?
8. Has the school district changed?
9. How is funding for the museum acquired?
10. How did the museum obtain its materials and artifacts?
11. How is the museum program coordinated with events in the rest of the school system?
12. How is the school museum publicized?
13. How will the school museum change to meet future demands?

King (1998) used similar questions to interview museum personnel in the museum schools she studied.

The answers to the site interview questions produced data related to the knowledge of the goals and objectives of each museum and the strength of each museum’s collection. The answers also included information on the groups for which the museum is designed, the kinds of programs being provided, and the level of financial commitment that has been made to the museum. Hilberry (1983) indicated this type of information is needed before a museum facility is created or renovated.

Step Five: Evaluate Documents

As a further supplement to the data revealed by the site interview questions, documents provided by the different museums were examined to provide a historical background on why and how the different facilities developed. Documents that can shed light on the historical development of a facility are often used as part of a POE (Preiser et al., 1988). Historical documents also allow a researcher to gain a broader perspective on the setting in which a facility is located (Taylor & Bodgan, 1998). Since very little has been written about the facilities chosen for this study, the directors of the museums supplied most of the materials.
Step Six: Send Interpretative Data back to the Management of the Facility for Review.

As the last step in the study, all interpretative data was sent back to the management of the five school museums for review. One of the measures of the validity of a case study is to determine whether or not it captures what really exists by taking the data and interpretations back to the people from whom they are derived and asking if the results are plausible (Merriam, 1998). Sanoff et al. (2001) suggested that it is important to obtain comments about the results of a POE from the people who use the building. This procedure should be taken with all the data obtained from an investigative POE of a facility (Preiser et al., 1988). Figure 3.1 consists of the form used to obtain data about the plausibility of the results of this study from the management of the five school museums.

The data obtained from the POE review of each school museum were helpful in determining the validity and trustworthiness of the conclusions of the study. Marshall and Rossman (1989) suggested this would be the result of following this kind of procedure in a case study. The appraisal guide, the site interview questions, the historical documents, and the data returned by the management of the five school museums are all intended to present a chain of evidence which can be followed by a reader. Yin (1994) observed this is necessary to increase the trustworthiness, validity, and reliability of case study research.

Data Analysis Strategies

Data analysis in an Investigative POE has three purposes:

1. Describe the performance of a building and its elements.
2. Interpret the performance and judge its merit.

In this study the appraisal guide developed from a review of the literature fulfilled these purposes. As Yin (1994) described, previous literature may provide the guide which defines a
case and the unit of analysis. In this study the appraisal guide provided a framework through which an item-by-item analysis of five school museums was done. By assigning scores and percentages to explain the data in the aggregate, the closeness of each individual facility to the model museum resource center may be measured. Explanations of the degree of success or failure of each facility in approximating the model were developed from the information taken from the appraisal guide, interviews and historical documents.

Figure 3.1: Post-Occupancy Evaluation Data Review Form

Review of the Data Obtained from a Post-Occupancy Evaluation of a (Museum Name) (Museum Designation in Study)

Please indicate if you agree or disagree with the evaluation of each area as listed below. If you disagree with any area, please indicate or explain in the space provided.

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<thead>
<tr>
<th>Area</th>
<th>Agree</th>
<th>Disagree</th>
<th>Explanation or Comments</th>
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<td>Exterior Areas</td>
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<tr>
<td>Structural Features</td>
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<td>Public Service Areas</td>
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<td>Administration and Staff Service Areas</td>
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<tr>
<td>Collections Management Service Areas</td>
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<td>Security</td>
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<tr>
<td>Fire Prevention and Control</td>
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<tr>
<td>Climate Control</td>
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<tr>
<td>Collection Storage Areas</td>
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<td>General Storage Areas</td>
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<tr>
<td>Shop Areas</td>
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</tbody>
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Additional Comments
With this information educational leaders have examples they can use to adapt their facility to a museum learning environment.

**Within-Case Analysis**

However, a multiple case study requires that two stages of data analysis be used, which include within-case analysis and cross-case analysis (Merriam, 1998). The application of the methodology of an investigative POE on each of the five school museums in this study involved only the within-case analysis, which meant that each museum was treated as a comprehensive case in and of itself.

The within-case analysis of the five school museums in this study was conducted with the goals of describing the performance of the buildings and their elements, interpreting this performance and its merits, and explaining this performance. The comments of the management of the five school museums in this study on the interpretative data sent to them were used in comparison with the data obtained from the other steps of the POEs to formulate a final report. The within-case analysis of each school museum was completed when the researcher was able to provide the reader with detailed descriptions and analysis of the situation existing at each school museum. Merriam (1998) stated these descriptions must be in enough detail to show that the author's conclusions make sense. The methodology of an investigative POE promotes this result because multiple sources are used to obtain data to confirm the emerging findings (Merriam, 1998).

**Cross-Case Analysis**

Once the analysis of each separate case in a multiple case study is completed, cross-case analysis begins. Lloyd (1982) indicated this process is useful if the purpose of a study is to obtain information that could be used in the design of a new facility. In this study the cross-case
analysis began by looking for general explanations which fit each of the individual school museums, even though the facilities in which they are located are different. The next step used in the cross-case analysis of the school museums was to identify the processes and outcomes which are similar to all five facilities and describe how they are qualified by local conditions. Merriam (1998) indicated these are the steps that need to be followed in a cross-case analysis.

Following the completion of the cross-case analysis, the final report of this study states the conditions under which a museum resource center program is found and the conditions in which it is not likely to be found. In this situation the museum resource center can become a vehicle for generalizing to new cases (Yin, 1994).

**Trustworthiness, Validity, and Dependability**

However, a researcher using case studies must convince an educational leader of the trustworthiness, validity, and reliability of his research (Yin, 1994). The methodology of an investigative POE strengthens the trustworthiness of research since it requires the use of documents, interviews, observations and the implementation of an assessment checklist (Preiser et al., 1988). Merriam (1998) described this use of multiple data sources as triangulation. Triangulation is an essential part of the methodology of an investigative POE since a comparison of the data obtained from many sources makes it possible to identify the critical elements in the organization of space in a school museum and get interpretations from them (Merriam, 1998; Sanoff et al., 2001).

The process involved in an investigative POE should also establish the truth-value of the research in a study. The truth value of the research in this study was increased by sending summaries of the findings of each museum back to the participants and asking them to comment
on the summaries. Truth-value was also strengthened by the disclosure of researcher bias in Chapter 1.

Another measure used to establish the truthfulness of a study is dependability. This means the results are consistent with the data collected. Therefore, the cases used in multiple case studies should predict similar results or produce contrasting results, but for predictable reasons (Yin, 1994). This often involves determining if the case remains the same at other times, in other areas, or when people interact in different manners (Stake, 1995). A multi-case design allows these questions to be answered (Merriam, 1998).

If the findings of a research study can be applied to other situations, it can be said to have external validity. One of the goals of this study was to provide educational leaders with information they can use to guide their placement of museums in schools. Conducting POEs of five school museums in Georgia helped reach this goal. A cross-case analysis of these five POES gives readers an idea of what is in these five facilities which can and or cannot be applied to any situation (Merriam, 1998). This makes apparent the usefulness of this study in other situations (Rossman & Rallis, 1998).

Summary

With the methodology of an investigative POE, this study analyzed the state of the facilities of five school museums in Georgia. The case study format is often used in POEs of facilities (Preiser et al., 1988). This study followed that same pattern. The investigative form of POE was chosen for this study because the data needed to answer the research questions required a comparison of the facilities available to several school museums be conducted. To make these comparisons an assessment instrument was needed that contained explicitly stated performance
criteria. Indicative and diagnostic POEs do not provide for the use of explicitly stated performance criteria.

The use of a multiple case design in performing evaluations of the five school museum facilities was essential because of the research questions. Studying only one unit would not generate enough data to make meaningful comparisons between the museum resource center model and existing school museums. Studying five school museums led to the development of the more powerful explanations and descriptions necessary to insure the trustworthiness, validity, and dependability of the cases in this study (Merriam, 1998; Yin, 1994).

In a multiple case study, the two stages of analysis are the within-case analysis and the cross-case analysis. This process was followed in this study by treating each of the five school museums evaluated as a comprehensive case on its own merits (Merriam, 1998). The format of each of the five investigative POEs on the school museums followed the procedure laid down by Preiser et al. (1988). The first step in this process was to develop a set of performance criteria from which to evaluate a facility. As Preiser, et al. (1988) said these criteria are usually developed from goals and objectives held by other groups or organizations. A review of the literature in this study yielded a set of performance criteria that may be said to form a model. This model is labeled a museum resource center. The literature suggested that this model should take the form of an appraisal guide (Hawkins & Lilley, 1998).

The second step in the process described by Preiser et al. (1988) was to discuss the performance criteria for the indicative POE with the management of a facility. In five school museums the different aspects of the appraisal guide were discussed with management and notes taken regarding their knowledge of the problems and successful features of their facilities. Following the discussion with management of issues raised by the appraisal guide, the third step
of the process described by Preiser et al. (1988) began with a walk-through evaluation of the facility. During the walk-through evaluation on an item-per-item basis, the pertinent aspects of the facility were scored using a rating scale, and notes and photographs were taken to identify building attributes deserving particular attention. Then the data gained from the walk-through evaluation was used to compute a percentage score for the facility. This measurement showed how close the school museum came to the ideal environment outlined in the museum resource center model. It also gave educational leaders information they could use in adapting a similar facility to a museum learning environment.

After the walk-through evaluation the fourth step in the process of conducting an indicative POE was implemented by interviewing selected personnel responsible for the operation of the facility. Site interview questions were used for the purpose of determining the reasons for decisions made regarding the use of spaces in the facility. The information obtained from these interviews was supplemented by following the fifth step outlined by Preiser et al. (1988), which is evaluation of documents. Documents provided by the management of the school museums were reviewed with the goal of identifying any historical or archival data that shed light on the organization of the spaces in the facility.

As the last step in the study, all interpretative data were sent back to the management of the school or system museums. This step helped determine whether this study captures what really existed at each of the five school museums. This sixth step also was the last link in the chain of evidence needed to determine the truth, value and consistency of this study.

Once the six steps of the POE were completed, the information was combined to form a report on how each facility corresponded to the museum resource center model developed from
the literature. The report on each facility focused on how the facility differs from the museum resource center model. Merriam (1998) describes this type of report as a within-case analysis.

Once a within-case analysis had been completed for each of the school or system museums a cross-case analysis was conducted using this data. The cross-case analysis involved looking for general explanations that describe why each facility evaluated differs from the museum resource center model (Merriam, 1998). As Preiser et al. (1988) suggested should be done at the end of a POE, recommendations were made on how educational leaders may use the data obtained from this study to plan for the incorporation of a school museum in their own high school or school system.
CHAPTER 4
THE MUSEUMS

Introduction

During the course of this study five school museums were evaluated. Two of these museums are described as separate facilities within a school, since they were accepted as separate entities within the high schools in which they were located. Three school museums were visited that are described as separate facilities within a school system because they functioned as separate museums.

All five of the school museums in this study were located in three school systems in metropolitan areas of Georgia. Permission to use these museums in this study was obtained with the understanding that strict confidentiality would be maintained in reporting the results of each investigative post-occupancy evaluation (POE). Therefore, the five school museums described in this study will be described as museums A, B, C, D, and E.

As previously stated, the purpose of this study was to provide examples of design standards and other information educational leaders could use to help bring about the changes in educational facilities necessary to place a museum resource center in a high school. The literature review indicated a way to fulfill this purpose was to develop a facilities assessment instrument which can be used in a POE of a school museum. This chapter describes the results of the first five steps of the investigative POEs of museums A, B, C, D, and E using the framework of the appraisal guide to provide these examples of design standards and other information. The data obtained from discussing the performance criteria with the management of
a facility, the interviews of selected personnel, the evaluation of documents, and the appraisal guide are placed into two sections entitled History of the Museums and the Walk-Through Evaluation.

**History of the Museums**

**Museum A**

In 1990, Museum A was placed in a high school with a history going back to 1908, when it first opened as an agricultural and mechanical school with 20 students and 5 teachers. In 1933, the agricultural and mechanical school system ended and this school became a public school, and by 1975 was officially recognized as a high school. A new vocational building was added to the facility in 1980, and it became a comprehensive high school. Student growth continued over the years to the extent that at the time this study was conducted, the school served a student body of approximately 3,000 with a staff of over 200.

During the 1986-1987 school term an effort was made to transform the campus grounds into a park-like setting. Brick-lined sidewalks were constructed and additional paved areas were placed so as to ease congestion during class changes. The main school entrance was redesigned to include brick columns and wrought iron fencing. The former boys’ dormitory and later classroom facility received a new façade with four white columns. In addition, the interior was gutted and reconstructed becoming the focal point of the campus. Museum A was established in this building in 1990, and remodeled in 1998. At the time of this study it contained administrative offices, a Board Room, and a museum. Museum A was located on the first floor of the building in approximately three classroom-sized rooms. However, exhibits were placed throughout the first floor of the building and are considered part of a museum-learning
environment. Thus, for the purposes of this study, they were considered an extension of museum A. It was on this facility that an investigative POE was performed.

The Social Studies Department Head at the high school was in charge of museum A. He described the mission of museum A as the preservation of the history and traditions of the high school and the community. He stated that although the school’s curriculum does not have museum teaching units, the administration supported museum A to the extent that when he needed something for the museum, he usually received it. He suggested this is possible because museum A has a separate museum fund. With this money, museum A was able to purchase some of its materials and artifacts, but most items were donated. Museum A was also used for alumni meetings, senior pictures, and Advanced Placement exams. The museum was publicized through a school newsletter and a picture of the old classroom section of the school museum was on the high school’s website.

Photo 1: Classroom Section, Museum A
Museum B

Museum B was located in a high school with an enrollment of approximately 1200 students. The high school was founded in 1924 and renovated in 1988. The facility in which this high school was located had reinforced concrete and brick veneer walls. Located on four floors, including a basement, it had classroom wings stretching from the central entrance. The entrance was enhanced with columns and terra cotta details.

This high school was located in a downtown metropolitan area and surrounded by residential buildings. Also, the design of the school was such that it dominated the surrounding environment. A mural depicting the dignity of manual labor was painted in 1928, and was located in the hallway of the first floor of the school. In 1998, two classrooms on the first floor were organized as a separate museum within this high school. The rooms were described as the archives section.. The mission of museum B was to preserve the traditions and history of the high school in which it is located. In keeping with this mission, ninth grade students used this archives section of the high school as the basis for museum learning units during the first six weeks of the academic year. The media specialists at the high school held the responsibility of maintaining the museum learning environment in the archives area. However, additional artifacts were exhibited throughout the school on the first floor. Many of the artifacts and exhibits placed in museum B were donated by individuals. Therefore, in order to present a complete picture of the state of the museum learning environment created by this high school, an investigative POE was performed on the two classrooms and the other exhibits on the first floor.

Museum C

Museum C was one of two museums operated by a single metropolitan school system in Georgia. Both of the museums were supported by a school system with an enrollment of over
70,000 students within its 77 schools. Museum C was classified as a museum since it was a separate institution that cared for and used objects, had at least one professional staff member, and was open to the general public on a regular basis (Carliner, 1995; King, 1998). The schools in the system associated with museum C contained approximately 45,000 students.

Museum C was located in a historic area on a site used for educational purposes since 1840. Originally the site contained an old elementary school, but at the time of this study, it had been renovated and one half of the facility was allocated to the museum and another half was allocated to an open campus high school. Museum C opened in this facility in 1992. The staff consisted of the curator, museum specialist, and custodian. The curator was assigned the responsibility for the overall operation of the museum, while the job of the museum specialist was to assist the curator. The custodian was given the task of keeping the museum clean and operational.

The curator of Museum C was a former teacher with long experience in education. She maintained close connections to the teachers in the schools near the museum and helped develop and preserve ties to the community served by the museum. Different community groups often met at the museum. Efforts were made to add new programs to the museum offerings each year.

Not only had the curator of museum C developed and supervised museum learning units in the schools near the museum, but she also presented traveling shows that emphasized museum learning themes. Home schooled students and private school students also have used the museum, after paying a small admission fee. Students often were given pre-knowledge tests before their visit to museum C and post knowledge tests as a follow-up to their visit.

In the past, objective surveys were sent to teachers to have them evaluate the effect of the learning environment of museum C on their students. Museum C operated with a budget of
$200,000 a year. Some of this money came from the school system, while a large part was
donated by community groups. The museum was advertised with program guides and brochures,
and had been featured in periodicals, newspapers and the internet.

**Museum D**

Museum D was a separate museum facility located within the same school system as
museum C. However, the design pattern of the facility in which museum D was located was
different from the one prevalent in museum C. The schools in the system associated with
museum D contained approximately 25,000 students.

Museum D was housed in a former school designed in 1929. The museum opened in
1992, and through continued renovation contained 14 exhibit rooms at the time of this study.
The curator of museum D described his responsibilities as expanding the educational and cultural
curriculum and program offerings. He also provided transportation for students to attend
museum programs and built linkages with the community and other museums. The mission of
museum D was to provide the finest museum learning environment for students in grades
kindergarten through 12th. To complete this mission museum D placed special emphasis on
hands-on learning in the form of discovery, inquiry and problem-based learning.

Museum D has been advertised the same way as museum C, through program guides,
brochures, periodicals, newspapers and the Internet. The curator designed museum programs
based on feedback, and trends. Museum D, like museum C received its funding from the school
system and community groups.

**Museum E**

Museum E served as both a museum and an archive for the public school system which
created it. When it was established in 1972 it was the first facility of its kind in Georgia. It
contained items and artifacts relating to the school system it served dating back to 1866. Approximately 7,000 catalogued school annuals were placed in the facility, along with trophies and plaques, theses and dissertations, personnel directories, antiquated textbooks, videos, important autographs, records of major historical events, graduation programs, photographs, slides and negative subject files. Researchers who visited museum E enjoyed access to biographical data on schools, superintendents, and board members of the school system. A large amount of these materials were donated by individuals. Museum E maintained its connections to the school system it served by giving out perfect attendance medals to the high schools and offering tours to students and alumni. As part of this function, it was used for class reunions.

Museum E was located in a building built in 1922. The records center storage was a separate entity located in the same building which worked with the archives and museum part of the facility. The staff of Museum E consisted of a historian archivist, who had the responsibility of collecting, maintaining, and preserving the history of the school system. At the time of this study the school system served over 50,000 students. The archivist often visited other schools, obtained guest speakers, conducted tours, organized cultural diversity workshops, designed the facility web page and helped those researching the history of the school system. When called upon, she also taught units on the history of the school system. The janitorial help was provided by the school system. One janitor was assigned specifically to the museum area. The archives and museum area did not have a separate budget, although staff salaries were paid by the school system. Additional money was raised from consultations, which was paid back into the school system. Also, old school annuals were sold and this money was placed back into the school system.
Originally museum E was located in one room. At the time of this study, the museum consisted of two offices and a large hallway. Museum E was located in a historical area which placed it in a position to network with other museums in the metropolitan area. Future plans for Museum E include using the entire building in which it is located.

Museum E was advertised through television, radio, the Internet, and word of mouth. Often, it provided artifacts used in different movies.

**The Walk-Through Evaluation**

**Point System**

The facilities in this study were awarded points based on the following observations:

- A score of 5 points (excellent) was assigned to the performance criterion if the part of the facility evaluated was the best way to organize that area to promote a museum learning environment.

- A score of 4 points was assigned to the performance criterion if the part of the facility evaluated was a good way to organize that area to promote a museum learning environment, but not the best.

- A score of 3 points was assigned to the performance criterion if the part of the facility evaluated was a satisfactory way to organize that area to promote a museum learning environment.

- A score of 2 points was assigned to the performance criterion if the part of the facility evaluated was a poor way to organize that area to promote a museum learning environment.

- A score of 0 points was assigned to a performance criterion when a facility was missing a necessary part of a museum learning environment.
• A performance criterion that could not be applied to the organization of space in a facility was assigned na (not applicable).

Separate Facilities Within a School

Type of Facility

Table 4.1: Type of Facility Museum A and Museum B

<table>
<thead>
<tr>
<th></th>
<th>Museum A</th>
<th>Museum B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Separate Facility Within School</td>
<td>Separate Facility Within School</td>
<td>Separate Facility Within School</td>
</tr>
<tr>
<td><img src="image" alt="Exhibit Areas Throughout School" /></td>
<td>Exhibit Areas Throughout School</td>
<td></td>
</tr>
</tbody>
</table>

During the walk-through evaluation, museum A was labeled, on the appraisal guide as a separate facility within a school. Museum B also was marked on the appraisal guide as a separate facility within a school. However, since museum B also has artifacts displayed throughout the first floor of the high school in which it is located, the part of the appraisal guide concerned with exhibit areas throughout the school was also marked.

Facility Descriptions

A description of the high schools in which museums A and B were located was marked on the appraisal guide in the manner outlined by Table 4.2. The date of establishment on the appraisal guide applied to the date the museum was established in each facility. The number of classrooms applied to the space reserved for the museum exhibit areas. The rest of the data obtained for this area applied to the entire high school in which each museum was located. The part of the facility descriptions section of the appraisal guide listing the number of exhibits was
left blank, since it was intended to apply only to schools having a separate museum area.

Table 4.2: Facility Descriptions Museum A and Museum B

<table>
<thead>
<tr>
<th>Description</th>
<th>Museum A</th>
<th>Museum B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross Square Footage</td>
<td>3000 square feet</td>
<td>1400 square feet</td>
</tr>
<tr>
<td>Date of Establishment</td>
<td>1990</td>
<td>1998</td>
</tr>
<tr>
<td>Date of Original Construction of Facility</td>
<td>1909</td>
<td>1924</td>
</tr>
<tr>
<td>Capacity</td>
<td></td>
<td>1400</td>
</tr>
<tr>
<td>Site Acreage</td>
<td>84 acre campus</td>
<td>21.4 acres</td>
</tr>
<tr>
<td>Number of Floors</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Date of Renovation/Remodeled</td>
<td>1998</td>
<td></td>
</tr>
<tr>
<td>Number of Classrooms</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Number of Exhibits</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Exterior Areas

Table 4.3: Exterior Areas of Museums A and B

<table>
<thead>
<tr>
<th>Museums</th>
<th>Landscaping</th>
<th>Promenade</th>
<th>Parking</th>
<th>Signs</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>3</td>
<td>2</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>B</td>
<td>4</td>
<td>2</td>
<td>5</td>
<td>3</td>
</tr>
</tbody>
</table>

The exterior areas of museum A and B were awarded points on the appraisal guide in the manner outlined by Table 4.3. Museum A’s scores were based on the following observations:

- The landscaping around the building where the museum was located created a park-like atmosphere.
- Examples of outdoor interactive exhibits or sculpture gardens were missing.
• Museum A had walkways that linked the main outside areas but there were no provisions around the facility that provided shelter from the sun or bad weather.

• Museum A did not have a separate parking area. Anyone wishing to visit museum A had to park in the general parking areas of the high school. However, the parking area was large and spacious. Extra space was available for museum visitors.

• There were no signs to help visitors find the facility.

• Large easily visible signs explaining the exhibits in the museum area were not present.

Photo 2: Satisfactory Landscaping, Museum A

Photo 3: Poor Promenade, Museum A
Museum B’s score on the exterior areas of the appraisal guide was based on these observations:

- The landscaping around the facility presented a park-like atmosphere and accentuated the impression that this was a special building.
- Walkways linked the main outside areas of the high school in which museum B is located. However, shelter from the sun and bad weather was not provided on the outside walkways.
• The parking area at the high school campus in which museum B was located is adequate for school students, staff, and some visitors.

• Signs directing people to the front entrance were not available. However, the architectural layout of this school made this unnecessary.

• The front entrance to this high school was easily identifiable because of the three portals that point to it.

• Within the high school signs were placed in front of the two rooms that contained the main exhibit areas. However, these signs were not a requirement since the main exhibit area of museum B was used more as part of the learning environment for students rather than for visitors.

![Photo 6: Good Landscaping, Museum B](image)
Photo 7: Excellent Parking, Museum B

Photo 8: Satisfactory Sign, Main Exhibit Area, Museum B

Structural Features

Table 4.4: Structural Features of Museums A and B

<table>
<thead>
<tr>
<th>Museums</th>
<th>Weather Tight Building</th>
<th>Acoustics</th>
<th>Circulation Patterns</th>
<th>Hallways</th>
<th>Building on Students Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>B</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>
Museum A was awarded points on the weather tight building and acoustics section of the structural features of the appraisal guide based on these features identified during the walk-through evaluation:

- There was no evidence of leaks.
- The whole area of the school museum appeared to be weather tight.
- The acoustics were well controlled and the building was suitably insulated.
- Suspended ceilings were prevalent through the museum area.
- Heavy textured wall materials were used in the exhibit area.
- Small rugs were spread throughout the facility.
- Glue-on tiles were used on the floors of the museum area.

The other sections of the structural features of the appraisal guide, circulation patterns, hallways and building on students’ scale were evaluated based on the following observations of Museum A:

- The indoor spaces for the circulation of visitors were sufficient enough to allow a great deal of freedom of movement.
- The design of the facility allowed visitors to move through it without disrupting other school activities.
- Rest areas were provided throughout the museum.
- The circulation path in museum A was arterial since the three rooms in the main part of the museum were laid out in a linear pattern one behind the other and the exhibits could be viewed as the visitor circled through each room.
- Spacious hallways were available throughout the museum.
• This museum was designed so that adults, high school students, and elementary students could view the exhibits. However, better directions needed to be posted that elementary students could understand.

![Image of ceiling]

**Photo 9: Excellent Weather Tight Building Maintenance, Ceiling, Museum A**

Museum B’s score on the weather tight building and acoustics section of the structural features of the appraisal guide was calculated based on these observations:

• The two classrooms used in the main exhibit area had a stable roof and there was no evidence of leaks. The area also appeared to be weather tight.
• The acoustics in the two classroom exhibit areas of museum B were such that noise from the outside did not penetrate the area even though school was in session.

• Wall materials were present that provided extra soundproofing.

Museum B’s score on the circulation patterns, hallways, and building on students’ scale areas of the appraisal guide was based on the following observations:

• The exhibits throughout the halls of the first floor and the two self contained museum exhibit areas formed a continuous museum learning environment that could be described as a chain.

• The circulation patterns around the exhibits in the halls and in the two classroom areas were broad and well lit and allowed for a great deal of freedom of movement.

• The hallway on the first floor was large enough for the students to move through it and still have space to enjoy the exhibits.

• The exhibits were at appropriate heights for high school students and other visitors.

Exhibits in the two museum rooms and the halls of the school were organized and labeled so that they could be easily read and understood by visitors.

Photo 11: Excellent Weather Tight Building Maintenance, Ceiling, Museum B
Photo 12: Excellent Circulation Pattern, Museum B

Photo 13: Excellent First Floor Hallway, Museum B

Photo 14: Excellent Building on Students Scale, Exhibit, Museum B
Public Service Areas

Museum A’s score on the museum or school entrance area, restrooms, and information desk of the public service areas of the appraisal guide was based on the following observations:

- The entrance area evoked a welcome feeling once visitors entered the building, but it lacked materials that connected the outside to the inside.
- A painting of an individual who had a historical connection to the school greeted visitors in lobby.
- The lobby was large and plants and other decorations were arranged to maintain a formal yet welcoming atmosphere.
- A hall between the high school administrations’ office and the lobby led to museum A. There were no signs that directly indicated this was the way to the school museum. However, the sensation of being in a museum learning environment was maintained by placing pictures of past leaders on the wall.
- The restroom facilities in museum A were easily accessible in the building and met the recommended minimum design standards of the appraisal guide. Still, the restrooms should be larger so more visitors could use them.
- An information desk was not provided.
- Material explaining the museums to visitors was not available.

The other sections of the public service areas of the appraisal guide, accessibility for persons with physical disabilities, intimacy gradients, auditorium or meeting rooms, food service and trash removal were evaluated based on the following observations of Museum A:
Table 4.5: Public Service Areas of Museums A and B

<table>
<thead>
<tr>
<th>Museums</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Museum or School Entrance Area</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Restrooms</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Information Desk</td>
<td>0</td>
<td>na</td>
</tr>
<tr>
<td>Accessibility for Persons With Physical Disabilities</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Intimacy Gradients</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Auditorium or Meeting Rooms</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Food Service</td>
<td>na</td>
<td>5</td>
</tr>
<tr>
<td>Trash Removal</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>

- All areas of the museum could be accessed by individuals with wheelchairs. Ramps and doorways were designed to accommodate wheelchairs and stairs existed throughout the museum part of the building. Audio recordings and Braille signs were not obvious.

- The intimacy gradients of museum A were such that the exhibits tended to draw visitors step-by-step through the history of this high school.

- It had a meeting room large enough to seat 60 people without damaging exhibits. The room was environmentally controlled and the exhibits placed in this area were secure considering the space available. However, if the school museum added more exhibits into this area, the security of the museum collection could be jeopardized.

- Since museum A was located in a building away from the other facilities of the high school a separate food service was not needed.
• There was easy access to a dumpster and the social studies department chairman and the maintenance staff of the high school made sure that trash was removed from the museum area. Custodial closets provided in other parts of the facility made this job easier.

Photo 15: Satisfactory Entrance Area, Museum A

Photo 16: Satisfactory Hall Entrance, Museum A
Museum B’s score on the museum or school entrance area, restrooms, and information desk was based on the following observations:

- The entrance area of the high school connected the inside and outside learning environment. Part of this connection was established by the statute in the front of the high school.

- The connection between the inside and outside learning environment was further promoted by the exhibits located in the lobby of the high school. Also, a large mural and other exhibits radiated off the lobby and down the hall.

- The restrooms were easily accessible throughout the first floor of the high school where museum B was located.

- Since the major purpose of museum B was to use its artifacts to teach students in the high school, a separate information desk was not needed.

- The administration offices of the high school were located right next to the entrance lobby and signs were placed to identify them. Visitors who sought information could easily obtain this information from these offices. Therefore, a not applicable rating was
appropriate on the appraisal guide for the performance criterion dealing with the information desk.

The other sections of the public service areas of the appraisal guide, accessibility for persons with physical disabilities, intimacy gradients, auditorium or meeting rooms, food service and trash removal were evaluated based on the following characteristics of Museum B:

- The front entrance of the high school that museum B was located in does not provide for the easy access of handicapped individuals. However, once you get to the first floor of the high school handicapped accessibility was easier.
- The two exhibit rooms of museum B were organized so as to allow wheelchair access but Braille signs were not present.
- The intimacy gradients in museum B on the first floor of the high school facility tended to draw people to the exhibits. A feeling of moving from larger to smaller began in the lobby of the high school throughout the hall of the first floor on to the two main exhibits rooms of museum B. Still, the design patterns in the hall without the exhibits were not visually stimulating.
- The auditorium of the high school was located right off the lobby of the first floor. This is an excellent spot for meetings of visitors to the school. Visitors can meet in this auditorium and the security of the museums collection will not be compromised.
- The food service facilities were located away from the museum exhibit areas and would not interfere with visitors examining artifacts.
- The hall where some exhibits of museum B were located was thoroughly clean.
- Custodial closets were located throughout the school.
Photo 18: Excellent Entrance Area, Statue, Museum B

Photo 19: Excellent Entrance Area, Exhibit in Lobby, Museum B

Photo 20: Excellent Entrance Area, Beginning of Mural, Museum B
Galleries

Museum A’s score on the floors and walls, lighting, display structures, safety precautions, permanent exhibit areas, graphic arts and photography exhibit areas, and textile exhibit areas of the galleries section of the appraisal guide was based on the following features identified during the walk-through evaluation:

- The floors and walls were complementary to the other exhibits and did not detract from them.
- Windows were prevalent throughout the museum area and they were covered with shades that block excessive light which may damage exhibits.
- Track lighting was not used, but the lighting that was available reflected positively on the exhibits.
- Bright light was provided where needed in the museum exhibit area.
- Lighting was controlled so that museum exhibits were not damaged.
- Enough natural light was brought in to enhance the perception of many of the exhibits.
The display cases used were close to the recommended case dimensions on the appraisal guide and the exhibits in them were well organized and well laid out.

Table 4.6: Galleries of Museums A and B

<table>
<thead>
<tr>
<th>Museums</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Floors and Walls</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Lighting</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Display Structures</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Safety Precautions</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Permanent Exhibit Areas</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Graphic Arts and Photography Exhibit Areas</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Textile Exhibit Areas</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Decorative Arts Exhibits</td>
<td>5</td>
<td>na</td>
</tr>
<tr>
<td>Large Sculptures</td>
<td>na</td>
<td>5</td>
</tr>
<tr>
<td>Interpretive Exhibits</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Dark Rides</td>
<td>na</td>
<td>na</td>
</tr>
<tr>
<td>Interactive Exhibits</td>
<td>na</td>
<td>na</td>
</tr>
<tr>
<td>Touchable Objects</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Temporary Exhibit Areas</td>
<td>na</td>
<td>5</td>
</tr>
</tbody>
</table>

The display cases were arranged so visitors can easily view the contents without tripping over them or contributing to other types of accidents.
• Adequate working space existed to work on the exhibits in the display structures.
• Some of the objects on display structures needed to be arranged so that visitors cannot
damage them.
• Most of the items in the museum were safely displayed, but some items in the school
museum could be damaged or knocked down by careless visitors.
• Most of the objects were clear of obstructions and were properly maintained.
• The ventilation, lighting, and the working temperature were adequate for the museum
considering the nature of the facility in which it was located.
• The safety precautions were good, but they could be better.
• The part of museum A that was essentially a permanent exhibit area was the old
classroom exhibit. It was well organized and placed so that an individual stepping into
the room immediately received an impression of stepping back into time. It was also set
up so that visitors could walk around and examine all aspects of the layout of the old
classroom from several angles.
• Numerous prints and photographs were exhibited throughout museum A. The procedure
used to take care of them met the requirements of the appraisal guide since they were
framed behind glass and sunlight was not allowed to damage them.
• Textiles in the form of dresses and uniforms were present throughout the museum
exhibition area. All were exhibited in such a manner than sunlight could not damage
them. However, some needed more protection from careless visitors.

Museum A’s score on the decorative arts exhibits, large sculptures, interpretive exhibits,
dark rides, interactive exhibits, touchable objects, and temporary exhibit areas of the galleries
section of the appraisal guide was based on the following observations:
• The boardroom, which was considered part of Museum A, was furnished with antique furniture and covered in oak paneling.

• Porcelain figurines and other historic artifacts were placed in the boardroom in such a way that the presence of a museum learning environment was obvious.

• Large sculptures did not fit the general theme of Museum A, which was to illustrate the history of the high school in which it is located.

• Throughout the museum different artifacts were framed or exhibited in cases that illustrated the social and historical importance of the object in the development of this high school.

• The use of dark rides did not fit the theme of illustrating the history of the high school in which the museum was located. Also, the facility did not have the space needed for an exhibit of this sort.

• The space that existed was used for collections of objects that have to do with the high school’s earlier history. Therefore, manipulating devices for learning did not fit in with the general theme of the museum.

• Visitors to the old classroom exhibit could walk around and touch the desks. Being able to do this preserved an authentic feel of being in a school classroom during the first part of the twentieth century.

• The facilities assigned to museum A did not allow for temporary exhibit areas.
Photo 22: Good Floors and Walls, Wall Museum A

Photo 23: Good Floors and Walls, Museum A
Photo 24: Good Lighting, Museum A

Photo 25: Good Lighting, Museum A

Photo 26: Good Display Structure, Museum A
Photo 27: Good Display Structure, Museum A

Photo 28: Excellent Permanent Exhibit, Old Classroom, Museum A

Photo 29: Excellent Graphic Arts and Photography Exhibits, Museum A
Photo 30: Good Textile Exhibit, Museum A

Photo 31: Excellent Decorative Arts Exhibits, Boardroom Museum A

Photo 32: Excellent Decorative Arts Exhibit, Oak Paneling, Boardroom Museum A
Museum B’s score on the floors and walls, lighting, display structures, safety precautions, permanent exhibit areas, graphic arts, photography exhibit areas, and textile exhibit areas of the galleries section of the appraisal guide was based on the following features identified during the walk-through evaluation:

- The two classrooms used for exhibits in museum B occupied an area from 1000-2000 square feet with a ceiling height of 11-14 square feet. This met the requirements for a medium museum gallery on the appraisal guide.
- The floors and walls did not conflict with the exhibits in the gallery of museum B.
- Light walls were used in the gallery that made the rooms seem larger.
- The floors in the gallery were wood and fluorescent lighting was used that enhanced the exhibits in this area.
- In the gallery wall plugs were placed along tracks so other forms of lighting could be used if needed.
- Excessive natural light was kept out of the museum gallery through the use of vertical blinds.
- Glares or reflections in the museum exhibit areas were not noticed.
- Lights did not warm the art work on display in the exhibit area.
- The display cases used in the museum were set up so that the method of opening cases was not apparent to visitors or locks were visible.
- Adequate working space existed to do work involving different display structures.
- All the display structures used were such that cleaning equipment could not hit them and objects were beyond the reach of visitors.
- All objects that might harm visitors or students were safely displayed.
• Museum B met all the recommended safety precautions on the appraisal guide.
• The two classrooms in which the gallery of museum B was located were its permanent exhibit areas. They displayed artifacts as well as some art work.
• The large mural on the wall of the first floor hall of the high school was a permanent exhibit.
• Graphic arts and photography exhibit areas were placed throughout the gallery. Photographs were framed behind glass so sunlight could not damage them.
• The textiles used in museum B were displayed so that light could not damage them.

Museum B’s score on the decorative arts exhibits, large sculptures, interpretive exhibits, dark rides, interactive exhibits, touchable objects, and temporary exhibit areas of the galleries section of the appraisal guide was based on the following observations:

• The major theme of the exhibits in museum B was the history of the high school it was located in. Consequently, decorative arts exhibits did not fit this theme.
• The large sculpture placed in the front of the high school where museum B is located produced the impression that one was entering a unique learning environment. Interpretative exhibits were used throughout the museum.
• Museum B did not have the space necessary to accommodate dark rides and exhibits where students were engaged in hands on manipulation of objects.
• Museum B had objects that could be touched by visitors. However, that was not their major purpose. In most cases these objects were used as parts of other exhibits.
• Temporary exhibits were located in the display cases along the hall of the first floor of the high school in which museum B is located. They were numerous and could be rearranged at will.
Photo 33: Excellent Floor and Walls, Museum B

Photo 34: Excellent Lighting, Wall Plugs Along Tracks, Museum B
Photo 35: Excellent Lighting, Vertical Blinds, Museum B

Photo 36: Excellent Display Structures, Museum B

Photo 37: Excellent Display Structures In Hall, Museum B
Photo 38: Excellent Display Structures Main Exhibit Area, Museum B

Photo 39: Excellent Art Exhibit, Museum B

Photo 40: Excellent Mural Located First Floor, Museum B
Photo 41: Excellent Photography Exhibit, Museum B

Photo 42: Excellent Textile Exhibits, Museum B

Photo 43: Excellent Large Sculpture Rear View, Museum B
Photo 44: Excellent Interpretative Exhibit, Museum B

Photo 45: Satisfactory Touchable Objects, Museum B

Administration and Staff Services

Table 4.7: Administration and Staff Services Museums A and B

<table>
<thead>
<tr>
<th>Museums</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Offices for Museum Work</td>
<td>3</td>
<td>na</td>
</tr>
<tr>
<td>Public Access</td>
<td>5</td>
<td>na</td>
</tr>
</tbody>
</table>
Museum A’s score on the administration and staff services section of the appraisal guide was based on the following observations:

- A separate office for museum A was not provided. However, there was an administrative office next to the school museum where visitors could obtain information.
- The administrative office was large enough for one person to work comfortably.
- The location of the administrative office next to museum A limited the ability of the public to visit areas of museum A without someone’s knowledge.

**Photo 46: Satisfactory Office, Museum A**

In museum B specific offices were not provided for museum work. The media specialists in the high school were responsible for taking care of the two room gallery. Consequently, the section of the appraisal guide dealing with administration and staff service areas does not apply to museum B.
Table 4.8: Collection Management Services Museums A and B

<table>
<thead>
<tr>
<th>Museums</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Library</td>
<td>na</td>
<td>na</td>
</tr>
<tr>
<td>Shipping and Receiving</td>
<td>2</td>
<td>na</td>
</tr>
<tr>
<td>Registration Area</td>
<td>na</td>
<td>na</td>
</tr>
<tr>
<td>Photography Studio</td>
<td>na</td>
<td>na</td>
</tr>
<tr>
<td>Technology</td>
<td>2</td>
<td>na</td>
</tr>
<tr>
<td>Conservation Laboratory</td>
<td>na</td>
<td>na</td>
</tr>
</tbody>
</table>

The item-per-item analysis of the collection management service areas of museum A led to an award of 4 points while this part of the appraisal guide was marked as “not applicable” to museum B. This evaluation was based on the following features of both Museums A and B:

- Museum A was only one part of a building on an 84 acre campus. Therefore, putting a library, registration area, photography studio and conservation laboratory there would not be practical.

- There were areas near museum A where objects could be loaded and unloaded. Yet, these areas were not close enough to the building to allow for safe shipping and receiving of objects without undue risk.

- The web design class of the high school advertised museum A on the school’s website. However, the website only contained one picture of the school museum and did not give
a viewer a true impression of the large number of objects contained in the school museum.

- Space for technology, a photography studio, a library or research area, a conservation laboratory and a secure place for the loading and unloading of objects in museum B did not exist.
- Since media specialists keep up with the objects in the exhibition area of museum B, a registration area was not necessary.

Security

Table 4.9: Security Museums A and B

<table>
<thead>
<tr>
<th>Museums</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exhibit Access</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Security Personnel</td>
<td>na</td>
<td>5</td>
</tr>
<tr>
<td>Sight Lines</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Locks</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Alarm Systems</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>

The number of points given to Museum A on the security section of the appraisal guide in an item-per-item analysis was based on the following features of the facility:

- An unauthorized individual could not enter the museum without somebody knowing.
- The exhibit areas could be closed, secured and alarmed during other events held in the facility or at the high school.
• Since museum A was a small area of one large building in an 84 acre campus, it would not be cost effective to provide specific security personnel.

• Most of the exhibits were within the vision of a person supervising visitors and those that were not were protected by cases or cabinets.

• Metal doors protected some of the entrances to the facility.

• Museum A could be locked and kept separate from the rest of the building.

• There were alarm systems throughout the building that protected the museum.

• A new alarm system had been installed that would notify local law enforcement officials of a break-in.

Museum B received an excellent score on all five of the performance criteria for security on the appraisal guide. This conclusion was reached based upon the following observations:

• The two main exhibit rooms were closed during public events held elsewhere in the school. Also the main exhibit rooms were secure at other times as well.

• The exhibits were arranged so they could be easily observed and protected by school staff and resource officers.

• The main gallery was kept locked and secured unless it was being used by the high school or visitors.

• The exhibits were tied in to the security system of the school with police protection close by.
Table 4.10: Fire Prevention and Control Museums A and B

<table>
<thead>
<tr>
<th>Museums</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building Construction</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Flammable Materials</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Exits</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Electronic Fire Alarm System</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Extinguishing System</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>

The number of points given to Museum A on the fire prevention and control section of the appraisal guide in an item-per-item analysis was based upon the following observations:

- From interviews and personal observation it was apparent that in terms of fire prevention and control, all that could be done to protect the exhibits in museum A had been done.
- The building it was located in had been built and renovated using fireproof construction and technology.
- Paints and flammable materials were stored away from museum collections.
- There were more than two exits to the street, electronic fire alarm systems were prevalent, and smoke detectors and fire extinguishers were in evidence through the building.
- Since museum A was located in one part of a large building a sprinkler system was not practical.
Museum B received an excellent score on all five of the performance criteria for security on the appraisal guide for many of the same reasons as museum A. The following features of this facility confirmed this analysis:

- The high school was renovated in 1988 using fireproof construction materials and technology.
- All flammable materials were stored away from museum collections.
- Several exits to the street were available.
- The high school had an electronic fire alarm system that automatically notified the fire department in event of a fire.
- There were smoke detectors and fire extinguishers available.
- A sprinkler system was not practical considering the location of the main museum exhibit area in two former classrooms.

**Climate Control**

**Table 4.11: Climate Control Museums A and B**

<table>
<thead>
<tr>
<th>Museums</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human Comfort</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Climate Control System</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Microclimates</td>
<td>na</td>
<td>5</td>
</tr>
<tr>
<td>Ventilation</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Plumbing</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
The number of points given to Museum A on the climate control section of the appraisal guide in an item-per-item analysis was based on the following features of the facility:

- Museum A had a separate climate control system that was used to maintain a steady temperature of 72 degrees Fahrenheit, 24 hours a day.
- Both the comfort of people and the museum collection was secured by the temperature control.
- Museum A did not have sensitive objects that required special storage.
- There was no evidence of mold in museum A.
- There was no evidence of damage done to artifacts by lack of air movement.
- The plumbing in the facility was old, but according to the social studies department head the museum had not had any problems with it.
- There was no evidence of leaks or repairs due to water damage.

Photo 47: Excellent Climate Control System, Museum A

Museum B was different from museum A in that all five of the performance criteria for climate control received an excellent rating. This score was based on the following observations.
• The climate control system in the main exhibit area was the same as that used throughout the high school. This was adequate since the artifacts in the museum exhibits were such that a separate climate control system was not required.

• Objects that were sensitive to damage by the climate were protected in storage cases.

• There was no evidence of mold outbreaks or damage to objects that might occur because of inadequate air flow or bad plumbing.

**Collection Storage**

<table>
<thead>
<tr>
<th>Museums</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Closed Storage</td>
<td>2</td>
<td>Na</td>
</tr>
<tr>
<td>Open Storage</td>
<td>na</td>
<td>na</td>
</tr>
<tr>
<td>Lighting</td>
<td>4</td>
<td>na</td>
</tr>
<tr>
<td>Floor</td>
<td>5</td>
<td>na</td>
</tr>
<tr>
<td>Preservation</td>
<td>2</td>
<td>na</td>
</tr>
<tr>
<td>Ceiling</td>
<td>na</td>
<td>na</td>
</tr>
<tr>
<td>Shelving</td>
<td>na</td>
<td>na</td>
</tr>
<tr>
<td>Carpeting</td>
<td>5</td>
<td>na</td>
</tr>
<tr>
<td>Paper and Photographic Records</td>
<td>na</td>
<td>na</td>
</tr>
<tr>
<td>Security Vault</td>
<td>na</td>
<td>na</td>
</tr>
<tr>
<td>Inventory Control</td>
<td>5</td>
<td>na</td>
</tr>
<tr>
<td>Collection Security</td>
<td>5</td>
<td>na</td>
</tr>
<tr>
<td>Growth</td>
<td>0</td>
<td>na</td>
</tr>
</tbody>
</table>
Museum A’s score on the collection storage section of the appraisal guide was based on the following features identified during the walk-through evaluation:

- The collection storage area allocated to museum A was inadequate considering the type of facility in which it is located.
- Museum A’s exhibits were intended to be a permanent illustration of the history of the high school and this type of museum does not require a large amount of storage space. Therefore, it was not necessary for museum A to meet the requirement on the appraisal guide that storage space square footage be equal to all of the square footage used by all the exhibits in the museum area.
- Museum A needed more space in its closed storage area.
- The storage space provided to museum A was set up so only staff could have access to it. An open storage area where some objects could be stored and viewed by the public was not practical considering the nature of the facility.
- The lighting levels in the closed storage area that museum A was supplied were adequate to allow staff to work without relying on windows for light. Still the lack of space did not allow for lighting to be useful in organizing the objects in the storage area.
- The floor of the collection storage area of museum A was concrete and suitable for storing heavy objects.
- Materials in the storage area were stored in folders or boxes.
- There was not enough space to maintain a quality preservation environment in museum A.
• The ceiling height in the storage area was around 10 feet, but the smallness of the storage area made this criterion and the criteria shelving, paper and photographic records, and security vault irrelevant.

• Carpeting was not used in the small storage area provided.

• It was easy to control access to the storage area.

• The doors to the storage area could be locked so that only authorized personnel could use it.

• The growth potential in the storage area was inadequate.

Photo 48: Poor Closed Storage Area, Museum A
Photo 49: Poor Closed Storage Area, Museum A

The performance criterion for the collection storage section of the appraisal guide did not apply to museum B. Objects placed in storage for museum B were usually kept with other school materials. Therefore, the entire section on the appraisal guide concerned with collection storage was marked “not applicable” for museum B.

General Storage

Table 4.14: General Storage Museums A and B

<table>
<thead>
<tr>
<th>Museums</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exhibition Furniture and Equipment</td>
<td>na</td>
<td>na</td>
</tr>
<tr>
<td>Publications</td>
<td>na</td>
<td>na</td>
</tr>
<tr>
<td>Special Events</td>
<td>na</td>
<td>na</td>
</tr>
<tr>
<td>Audiovisual Equipment</td>
<td>na</td>
<td>na</td>
</tr>
<tr>
<td>Grounds and Maintenance Equipment</td>
<td>na</td>
<td>na</td>
</tr>
</tbody>
</table>
The general storage part of the appraisal guide did not apply to museums A and B. In both museums this space was provided in other parts of the high schools where they were located. Consequently, “not applicable” was marked throughout the general storage section of the appraisal guide for both of these museums.

Shops

Table 4.15: Shops Museums A and B

<table>
<thead>
<tr>
<th>Museums</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exhibits Preparation</td>
<td>na</td>
<td>na</td>
</tr>
<tr>
<td>Maintenance and Building</td>
<td>na</td>
<td>na</td>
</tr>
<tr>
<td>Trades</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Museum Store</td>
<td>na</td>
<td>na</td>
</tr>
</tbody>
</table>

In each of the high schools where museums A and B were located the preparation and maintenance of exhibits was done by the vocational program or the maintenance personnel of the school system. Thus “not applicable” was an appropriate rating for the performance criteria of this section of the appraisal guide.

Separate Facilities Within a School System

Type of Facility

Table 4.16: Type of Facility Museums C, D and E

<table>
<thead>
<tr>
<th>Museum C</th>
<th>Museum D</th>
<th>Museum E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Separate Facility Within System</td>
<td>Separate Facility Within System</td>
<td>Separate Facility Within System</td>
</tr>
</tbody>
</table>
During the walk-through evaluation museums C, D, and E were marked as separate facilities within the system on the appraisal guide. As previously mentioned, this was appropriate because each of these museums functioned as a separate entity that operated in conjunction with the school system it served.

A description of the facilities in which museum C, D, and E were located was marked on the appraisal guide in the manner outlined by Table 4.17.

Table 4.17: Facility Descriptions Museums C, D and E

<table>
<thead>
<tr>
<th>Description</th>
<th>Museum C</th>
<th>Museum D</th>
<th>Museum E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross Square Footage</td>
<td>+5000 square feet</td>
<td>+5000 square feet</td>
<td>+5000 square feet</td>
</tr>
<tr>
<td>Date of Establishment</td>
<td>1992</td>
<td>1992</td>
<td>1980</td>
</tr>
<tr>
<td>Date of Original Construction of Facility</td>
<td>Early 1900’s</td>
<td>1928</td>
<td>1922</td>
</tr>
<tr>
<td>Capacity</td>
<td>30-35 in each exhibit room</td>
<td>60 in each exhibit room</td>
<td></td>
</tr>
<tr>
<td>Site Acreage</td>
<td></td>
<td></td>
<td>7.5 acres</td>
</tr>
<tr>
<td>Number of Floors</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Date of Renovation/Remodeled</td>
<td></td>
<td></td>
<td>1980</td>
</tr>
<tr>
<td>Number of Classrooms</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Number of Exhibits</td>
<td>12</td>
<td>14</td>
<td>18</td>
</tr>
</tbody>
</table>

Information detailing the exact gross square footage of the facilities museum C, D, and E was not available at the time of this study. However, each facility was much larger than the 2000 to 5,000 square feet recommended for a large museum gallery on the appraisal guide. The date of original construction of the facility in which museum C was located was not available, but the former school it was placed in has existed since the early 1900’s. The number of exhibits marked on the facilities description part of the appraisal guide consisted of the number of major exhibits.
available in the museums. Numerous additional minor exhibits were not counted. Any blanks left on the facility description section of the appraisal guide existed because that information was not obtainable at the time of this study.

Exterior Areas

Table 4.18: Exterior Areas of Museums C, D and E

<table>
<thead>
<tr>
<th>Museums</th>
<th>Landscaping</th>
<th>Promenade</th>
<th>Parking</th>
<th>Signs</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>2</td>
<td>na</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>D</td>
<td>2</td>
<td>2</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>E</td>
<td>3</td>
<td>na</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

The exterior areas of museum C, D and E were awarded points on the appraisal guide in the manner outlined by Table 4.18. Museum C’s scores were based on the following features identified during the walk-through evaluation:

- Plants and a sculpture were available which gave the museum an attractive appearance from the outside. However, they were not in enough abundance to give the impression that you were now entering a museum.
- The way museum C was laid out did not allow for a promenade.
- Parking spaces were provided to the visitors and staff of museum C. On the other hand, the parking space around the museum was not adequate for large groups.
- There were spaces where buses and vans could park, but it was not obvious as to where they should go.
• A large easily visible sign was present so when anyone entered the parking area, the location of the museum was clear.

• Signs directed visitors to the entrance of the museum.

• Inside the museum signs clearly pointed out the theme of the exhibit rooms.

• Exhibits in cases were clearly labeled so visitors could understand them.
Photo 52: Good Parking, Museum C

Photo 53: Excellent Sign, Museum C

Photo 54: Excellent Sign, Museum C
Museum D’s score on the exterior areas of the appraisal guide was based on these observations:

- The landscaping around museum D gave the building an attractive appearance.
- A nature garden was in the back of the museum, but because of its location it did not make a first impression on a visitor.
- More landscaping was needed to project a museum learning environment outside the building.
- Covered walkways existed outside part of the complex that museum D was located in and sidewalks surrounded the facility. However, the entire front of the facility did not have covered walkways.
- Parking for the staff of museum D was provided out front and there was adequate space for each member of the staff.
- Two parking areas surrounded Museum D and one of those parking areas was designated as the place for buses and vans to park.
- A handicapped area was provided in one of the parking areas.
- Signs were placed inside and outside museum D that made it clear this facility was a museum.
- Large easily visible signs were present that described the contents of the exhibit rooms.

At one of the entrances to the museum a sign was placed that mapped out the entire museum.
Photo 55: Poor Landscaping, Museum D

Photo 56: Excellent Staff Parking, Museum D

Photo 57: Excellent Parking, Museum D
Photo 58: Excellent Bus Parking, Museum D

Photo 59: Excellent Sign Museum D

Photo 60: Excellent Sign, Museum D
Photo 61: Excellent Exhibit Sign, Museum D

Museum E’s scores on the exterior areas section of the appraisal guide were based on the following features identified during the walk-through evaluation:

- Museum E was located within the downtown area of a city which limited the space available for the outside areas of the facility.

- The landscaping around museum E enhanced the appearance of a metallic sculpture placed in front of the building.

- The size of the four story building in which school museum E was located tended to minimize the effect of the sculpture and landscaping around the building.

- The landscaping and sculpture outside the facility produced the impression that the museum experience had begun before visitors entered the building.

- A promenade would not be practical since museum E was limited in its outdoor space by its location in the middle of a city and proximity to an interstate highway.

- Reserved parking space for staff was provided around museum E and the parking area was surrounded by a protective fence.
• Parking space for visitors in the front part of museum E was limited, so visitors had to park in the street. This problem was further aggravated by the fact that this street also was used by the residents of the city for parking.

• Specific parking for the disabled was not available in the part of the building that contained the entrance to the school museum.

• Secure parking space for buses was limited.

• A sign was used at the entrance of museum E. However, the sign was placed in such a manner that it appeared insignificant in relation to the overall size of the building. It also was not noticeable until visitors actually reached the entrance of the building.

Photo 62: Satisfactory Landscaping, Green Space and Sculpture, Museum E
Photo 63: Poor Parking, Staff Parking and Unloading Area, Museum E

Photo 64: Poor Parking, Reserved Staff Parking, Museum E

Photo 65: Poor Parking, Street Parking, Museum E
Structural Features

Table 4.19: Structural Features of Museums C, D and E

<table>
<thead>
<tr>
<th>Museums</th>
<th>Weather Tight Building</th>
<th>Acoustics</th>
<th>Circulation Patterns</th>
<th>Hallways</th>
<th>Building on Students Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>5</td>
<td>5</td>
<td>4</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>D</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>E</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>

The final results of the analysis of the performance criteria involving the structural features of museum C was based on the following features identified during this study:

- The roof was relatively new since it had been replaced when the museum was correcting asbestos problems.
- The building where museum C was located appeared to be weather tight.
- In the walk-through evaluation no evidence of leaks or damage to exhibits was found.
• Several tours could be conducted through the museum at one time without noise interfering with each group.

• External noises did not seem to penetrate into the facility.

• Tiles, carpeting and panels were used throughout the museum.

• The circulation spaces were broad and well lit and allowed for a wide range of freedom of movement. However, in exhibit rooms only one classroom of students could be accommodated at a time.

• The circulation pattern in the museum could be described as a star or fan in combination with a block. This was because the auditorium contained numerous exhibits and the rest of the exhibits radiated from it.

• Visitors could circulate in a random or self directed method if they so desired.

• In some of the exhibits visitors could circulate among them without excessive crowding.

• However, in many of the hall exhibits the circulation of large groups was a problem. This was based on the observation that the hallways were not large enough to allow visitors some personal space along with the numerous exhibits in the halls.

• Panels were used in the hallways in a manner that allowed good visibility and still provided space to move from one learning environment to the next.

• In the museum seats were available for children, teenagers, and adults.

• Most of the exhibits were placed so that they could be easily observed by younger children.

• A few exhibits were placed in such a manner that only larger children would be able to observe them.
Museum D’s scores on the structural features section of the appraisal guide was based on the following observations:

- The roof was replaced when the museum opened and no problems were observed with it during the walk-through evaluation.
- There was no evidence of leakage or damage to any of the artifacts.
- Tiles, suspended ceilings, textured wall materials and acoustic panels were used in the museum.
• Children visited the museum during the walk-through evaluation and the sounds from the auditorium were not loud and distracting in the exhibit rooms.

• The circulation pattern in museum D could be described as a star or fan in combination with a block. This was based on the observation that the exhibit rooms all branched off from the central area of the auditorium and the visitors circulated in a random or self-directed method if they so desired.

• Halls were broad and well lit and rest areas existed on both floors of the museum.

• Visitors could circulate among and around artifacts without excessive crowding.

• The hallways were large enough to allow two lines of students to pass at the same time without difficulty.

• The panels used in the museum were of a size that did not interfere with circulation.

• Most of the exhibits were built on a scale accessible to elementary and high school students. However, some of the exhibits were placed in positions making it difficult for elementary school students to see.

Photo 69: Excellent Hallway, Museum D
Photo 70: Excellent Hallway, Museum D

Museum E’s score on the structural features of the appraisal guide was based on these features identified during the walk-through evaluation:

- There was no evidence of leakage around the exhibit areas of museum E.
- The whole exhibit area was free of excessive moisture.
- The office area and the archives area were set off from the rest of the facility by thick security doors and walls.
- The rooms in the office area and the archives area were renovated to the extent that outside noises did not interfere with the activities in each area.
- The indoor spaces in the museum exhibit area were broad enough for people to pass each exhibit without problems. Two classrooms of students could be accommodated without excessive crowding.
- The circulation patterns in the facility were organized so the museum did not interfere with other activities.
• The circulation pattern used in the museum exhibition area followed a block format. This description was appropriate because visitors to the museum exhibit area could visit the exhibits in a random manner.

• The hallways in the first floor of the facility where museum E was located were wide and spacious. Therefore, the exhibits that were placed in the hallways did not obstruct the movement of visitors.

• The exhibits were designed so elementary students, high school students, and adult visitors could examine them.

Photo 71: Excellent Weather Tight Building, Ceiling, Exhibit Area, Museum E
Photo 72: Excellent Weather Tight Building, Secure Door, Archives, Museum E

Photo 73: Excellent Hallway, Museum E

Photo 74: Excellent Building on Students Scale, Exhibits, Museum E
Public Service Areas

Table 4.20: Public Service Areas of Museums C,D and E

<table>
<thead>
<tr>
<th>Museums</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Museum or School Entrance Area</td>
<td>5</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Restrooms</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Information Desk</td>
<td>na</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Accessibility for Persons With Physical Disabilities</td>
<td>4</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Intimacy Gradients</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Auditorium or Meeting Rooms</td>
<td>5</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>Food Service</td>
<td>0</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Trash Removal</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>

Museum C’s scores on the museum or school entrance area, restrooms, and information desk of the public service areas section of the appraisal guide was based on the following observations:

- The entrance was organized in a manner that made it clear the museum experience began there.
- Tables, chairs, and paintings were arranged so visitors could feel relaxed on entering the museum.
- The reception area was large enough for groups to meet and congregate. This space was well above the recommended allocation on the appraisal guide.
• It was only necessary to open doors in the side of the reception area to move into the main auditorium.

• The restroom facilities were easily accessible from the entrance area and met all the recommended design standards on the appraisal guide.

• The security of museum C was such that individuals cannot enter the facility unless a member of the staff lets them.

• There were spaces for flyers throughout the museum.

• An information desk was not necessary in museum C.

The other sections of the public service areas of the appraisal guide, accessibility for persons with physical disabilities, intimacy gradients, auditorium or meeting rooms, food service and trash removal were evaluated based on the following observations of Museum C:

• The hallways and doors of museum C were wide enough for people with wheelchairs to get through.

• A bathroom was provided for physically disabled individuals and ramps were available so handicapped individuals did not have to deal with chairs.

• Audio recordings were not available for visitors, and Braille signs were not used.

• Although intimacy gradients performed their function well from the entrance area to the auditorium of museum C the design of the rest of the facility was such that one did not have the feeling one was being drawn from one exhibit to the next.

• Outside of the auditorium the sequence of being drawn from larger to smaller and from public to private spaces was not there.

• The auditorium met or exceeded all the recommended allocations of space on the appraisal guide.
• The auditorium was capable of seating three hundred students.

• There was storage space in the auditorium for the equipment used in museum C.

• Maximum use was being made of the space in the auditorium while still maintaining the security of a large number of exhibits.

• No food service of any type was available for the comforts of visitors and groups.

• The custodian quickly removed trash to convenient disposal areas.

• Custodial closets were conveniently located in areas that facilitated the work of keeping the museum clean.

Photo 75: Excellent Entrance Area, Front View, Museum C

Photo 76: Excellent Entrance Area, Rear View, Museum C
Photo 77: Excellent Auditorium, Front View, Museum C

Photo 78: Excellent Auditorium, Rear View, Museum C

Museum D’s score on the museum or school entrance area, restrooms, and information desk of the public service areas section of the appraisal guide was based on these features identified during the walk-through evaluation:

- It was difficult to identify from the outside the main entrance to the museum.
- Judging from the orientation materials supplied in the museum, the main entrance was intended to be the area where the office is located.
- The first thing one saw upon opening the front door by the office area was a painting. Furthermore, exhibits were placed in this office area for immediate viewing. A map of
the museum was placed on a table in front of the painting. A statute is in the front lobby and signs directing visitors to other parts of the museum were placed on the wall where visitors could easily see them.

- In the museum office a large reception area was provided where visitors could get directions and help.
- Directions to the restroom facilities were provided in the entrance area and clear signs directing visitors to the restrooms were posted.
- Restrooms were provided specifically for small children and older visitors.
- All the recommended design standards on the appraisal guide were met or exceeded by the restrooms in museum D.
- A separate information desk was not provided at museum D. However, museum materials were near the administration offices and the main office reception area was located so visitors can easily find them.

The other sections of the public service areas of the appraisal guide, accessibility for persons with physical disabilities, intimacy gradients, auditorium or meeting rooms, food service and trash removal were evaluated based on the following observations of Museum D:

- Although, most of museum D was accessible to handicapped individuals the basement floor exhibits were not.
- Handicapped individuals who wished to get to the lower floor exhibits in museum D had to enter by the back basement doors which were not easily accessible from the top floor of the museum.
- In the first floor of museum D there was adequate space for wheelchairs to move through the facility. Ramps and doorways were designed to accommodate wheelchairs.
• Braille signs were not posted and audio recordings of exhibits were not available.

• The intimacy gradients of museum D had the effect in some areas of drawing people to the learning environment.

• In the case of the staircase between the first floor and the basement of museum D the use of murals combined with the facility give the impression that everything is flowing naturally. However, the lack of variations in the heights of the ceiling in the first floor did not maintain this image throughout the whole facility.

• The auditorium and two meeting rooms in museum D met or exceeded all the recommended allocations of space on the appraisal guide.

• In museum D the areas where snacks were provided were clearly marked and snacks could be obtained away from the museum exhibit areas.

• Large custodial closets were provided in museum D that met or exceeded the recommended design features on the appraisal guide.

Photo 79: Good Entrance Area, Museum D
Photo 80: Good Entrance Area, Painting At Entrance, Museum D

Photo 81: Good Entrance Area, Museum Diagram, Museum D

Photo 82: Good Entrance Area, Directional Signs, Museum D
Photo 83: Good Entrance Area, Exhibit, Museum D

Photo 84: Excellent Information Desk, Office Reception Area, Museum D

Photo 85: Satisfactory Intimacy Gradients, Staircase, Museum D
Photo 86: Excellent Auditorium, Museum D

Photo 87: Excellent Meeting Area, Museum D

Photo 88: Excellent Meeting Area, Basement, Museum D
Museum E’s score on the museum or school entrance area, restrooms, and information desk of the public service areas section of the appraisal guide was based on these features identified during the walk-through evaluation:

- The entrance area of museum E did not project the image that the starting point of the museum experience begins here.
- From the entrance area there was easy access to male and female restroom facilities and met the recommended minimum design standards of the appraisal guide.
- An information desk was placed at the entrance to the facility.
- A security guard was assigned to the information desk and directed visitors to museum E as well as other areas of the facility.

The other sections of the public service areas of the appraisal guide, accessibility for visitors with physical disabilities, intimacy gradients, auditorium or meeting rooms, food service and trash removal were evaluated based on the following observations of Museum E:

- Handicapped access was good throughout the exhibit area of museum E.
- Braille signs were not posted and the front entrance area was not set up to accommodate wheelchairs.
- In parts of museum E the impression existed that the visitor was being drawn from one exhibit to the next.
- In the hall areas of museum E there was not enough variation in ceiling heights to produce the impression that you were being drawn from one exhibit to the next.
- The meeting room of museum E was part of the office area of the curator of the museum.
- The meeting room of museum E had a large amount of space although not enough to meet the recommendations on the appraisal guide. There was adequate space for approximately 10 to 20 people.
- The food service area of museum E consisted of a comfortable kitchenette which staff and some visitors could use. This kitchenette met or exceeded the recommendations on the appraisal guide for such a facility.
- A member of the janitorial staff was assigned specifically to keep the museum area clean. There was no evidence of any trash being left in the museum area.
Photo 91: Poor Entrance Area, Museum E

Photo 92: Excellent Information Desk, Museum E

Photo 93: Excellent Food Service, Kitchenette, Museum E
Museums C’s score on the performance criteria floors and walls, lighting, display structures, safety precautions, permanent exhibit areas, graphic arts and photography exhibit areas, and textile exhibit areas of the galleries section of the appraisal guide was based on the following observations:
• Each of the exhibit rooms in museum C met the requirements on the appraisal guide for a small museum gallery while the auditorium met the requirements for a large museum gallery.
• Each gallery could be closed off with standard classroom doors.
• The floors and walls in the facility were used in a manner that did not conflict with the exhibits.
• White walls were present throughout the museum.
• The lighting on the floors and walls enhanced each exhibit.
• Both artificial and natural light were used to enhance the effect of the exhibits on visitors.
• In the auditorium arched palladium windows and shutters controlled the amount of natural light that reached the exhibits.
• Natural light was allowed to enter the entrance area of the museum.
• In the exhibit rooms windows were covered so that excessive light did not enter and damage artifacts.
• Glare or reflections were not evident throughout the museum.
• In some cases the lighting in the exhibits was too dark and produced a gloomy image.
• The display structures in museum C were designed and organized in a manner that met or exceeded the requirements on the appraisal guide.
• Locks were visible if the method of opening display cases was apparent.
• There was not enough working space between some of the display cases in many of the exhibit rooms.
In the museum the floors, stairs, passageways and doorways were free of obstructions and maintained well. The working temperature was good and lighting was adequate for a museum exhibition center.

A sufficient number of seats and tables were available to accommodate visitors and any museum work that might be necessary.

Objects that might harm visitors or students were safely displayed.

Overall the permanent exhibit areas of museum C were well organized.

A brochure provided by the museum gave the details of what each permanent exhibit is supposed to display.

The prints, drawings and photographs in museum C were all framed behind glass and sunlight was not present near them.

The textile exhibits were placed where they could not be damaged by sunlight and were protected from injury by visitors or students.

Museum C’s score on the decorative arts exhibits, large sculptures, interpretive exhibits, dark rides, interactive exhibits, touchable objects, and temporary exhibit areas of the galleries section of the appraisal guide was based on the following observations:

Museum C used furniture and other items to enhance the perceptual image of many of the artifacts in its collection.

Life size portraits of Presidents and First Ladies were displayed in a manner that complimented the museum learning environment and performed the same function as large sculptures.

Interpretative exhibits were found throughout museum C. In one exhibit visitors were expected to analyze the effect of different artifacts on the changes that occurred in the
United States in the 1930s. In another exhibit visitors were expected to analyze the importance of different historical works by different authors.

- Considering the amount of space taken up by other exhibits in the museum, space for an interpretative exhibit involving dark rides was not available.

- Interactive exhibits that allowed the visitor to manipulate devices were not provided. However, this requirement was fulfilled in part by allowing students to use the museum court room for mock trail competitions.

- Most of the exhibits in museum C contained items that were not intended to be touched by visitors. On the other hand, in the courtroom students were allowed to touch artifacts and be involved in the process. Also, some touchable objects were available in other parts of the museum.

- Most of the exhibits in museum C were permanent exhibits but temporary exhibits were placed in the facility occasionally.

![Photo 94: Good Display Structure, Flat Wall Exhibit, Museum C](image-url)
Photo 95: Good Display Structure, Screen Exhibit, Museum C

Photo 96: Good Display Structure, Case Exhibit, Museum C

Photo 97: Excellent Permanent Exhibit, Log Cabin, Museum C
Photo 98: Excellent Textile Exhibit, Museum C

Photo 99: Excellent Decorative Arts Exhibits, Entrance Area, Museum C

Photo 100: Excellent Decorative Arts Exhibits, Presidential China, Museum C
Photo 101: Excellent Large Sculptures, Presidents and First Ladies, Museum C

Photo 102: Excellent Interpretative Exhibit, 1930s, Museum C

Photo 103: Satisfactory Touchable Objects, Courtroom, Museum C
Museum D’s score on the performance criteria floors and walls, lighting, display structures, safety precautions, permanent exhibit areas, graphic arts and photography exhibit areas, and textile exhibit areas of the galleries section of the appraisal guide was based on the following features revealed during the walk-through evaluation:

- The floors and walls of the 14 exhibit rooms and auditorium were arranged so they did not conflict with the artifacts displayed on them.
- Light walls were used throughout the exhibit rooms, halls and the auditorium except in rooms set up to reflect special themes and messages.
- The wooden floors throughout the first floor of museum C enhanced the historical aspects of each exhibit.
- In some of the exhibit rooms lighting was controlled with dimmer switches. This allowed dark and light areas to be used to enhance many of the exhibits in the museum.
- Appropriate natural light was allowed to enter the museum and it improved the perception of some exhibits. However, in situations where museum artifacts could be damaged natural light was not used.
- Lights were sometimes used to highlight special areas in each of the exhibit rooms.
- Lights were arranged so visitors would not encounter glare and art objects were not warmed by them.
- In most of the display cases the method of opening them was not apparent to visitors. However, in situations where visitors were able to determine how to open a display case locks were visible.
- The floor fixings of the display structures were designed so they would not trip visitors.
- A four foot working space was not provided for some of the case backs and the wall.
• Museum D met or exceeded the recommended safety precautions on the appraisal guide.
• Dangerous substances were kept stored safely away from museum exhibits.
• Sanitary facilities were provided and obstructions were removed so that clear movement was easy through the museum.
• The ventilation and air-change rates were excellent.
• Properly designed seats and tables were provided to meet the needs of the museum.
  Directions were placed in museum D that made it easy to find each permanent exhibit area and signs were placed describing the nature of the artifacts in each room.
• Art and photography were displayed throughout museum D. They were framed behind glass and kept out of areas where sunlight might damage them.
• Art and Photography exhibits were arranged in a manner that enhanced the theme of several of the galleries.
• The Textile Exhibits in museum D were well protected and kept in cases away from the light. Also, they were placed in a manner that caught the eye of a visitor.
  Museum D’s score on the decorative arts exhibits, large sculptures, interpretive exhibits, dark rides, interactive exhibits, touchable objects, and temporary exhibit areas of the galleries section of the appraisal guide was based on the following observations:
  • The African art collection in museum D formed an important function in enhancing the theme of a permanent African-American History Exhibit.
  • Large sculptures and other objects were used to enhance an exhibit dealing with the 1996 Olympics.
  • Museum D had numerous interpretative exhibits that emphasized the social, historical, or scientific importance of an object.
• A dark ride was not a practical exhibit for museum D since it would occupy too much of the available space in the facility.

• Museum D contained two excellent interactive exhibits.

• A transportation exhibit was set up so that visitors were involved in hands on problem solving experiences. In a native North American exhibit students used a computer containing interactive touch screen video.

• Touchable objects were found throughout museum D.

• Most of the exhibits in museum D were permanent with little space left over for temporary exhibits.

Photo 104: Excellent Walls, Museum D
Photo 105: Excellent Floors, Museum D

Photo 106: Excellent Lighting, Light Fixture, Museum D

Photo 107: Excellent Lighting, Exhibit Room, Museum D
Photo 108: Good Display Structure, Case Exhibit, Museum D

Photo 109: Good Display Structure, Screens, Museum D

Photo 110: Good Display Structure, Pedestals, Museum D
Photo 111: Good Display Structure, Flat Mount, Museum D

Photo 112: Excellent Art Exhibit, Museum D

Photo 113: Excellent Photography Exhibit, Museum D
Photo 114: Excellent Textile Exhibit, Museum D

Photo 115: Excellent Decorative Arts Exhibit, African Art, Museum D

Photo 116: Excellent Decorative Arts Exhibit, African Art, Museum D
Photo 117: Excellent Large Sculpture, Olympics Exhibit, Museum D

Photo 118: Excellent Large Sculptures, Olympics Exhibit, Museum D

Photo 119: Excellent Interactive Exhibit, Native Americans, Museum D
Photo 120: Excellent Interactive Exhibit, Computer With Interactive Touch Screen Video, Native Americans, Museum D

Photo 121: Excellent Interactive Exhibit, Transportation, Museum D
Photo 122: Excellent Permanent Exhibit, School House, Museum D

Museum E’s score on the performance criteria floors and walls, lighting, display structures, safety precautions, permanent exhibit areas, graphic arts and photography exhibit areas, and textile exhibit areas of the galleries section of the appraisal guide was based on the following observations.

- The main exhibit area of Museum E consisted of a large museum gallery which covered an area of 2000-5000 square feet. The ceiling height of the main exhibit area was about 9-11 feet but a cramped atmosphere did not prevail in this part of the facility.

- The use of wood floors and light colored walls in museum E’s gallery enhanced the appearance of the exhibits in the area.

- The use of appropriate lighting increased the attractiveness of the exhibits in museum E. Natural light was kept out of the exhibit area of museum E.

- The lights inside the museum exhibit area did not damage art objects and glares or reflections were not prevalent on objects.

- The method of opening the display cases in museum E was not apparent to visitors and when it was locks were visible.
• The exhibits were designed so visitors did not trip over them.
• Furniture was used to display many objects and this gave the museum exhibit area an antique appearance.
• Some of the objects on the furniture were not placed beyond the reach of visitors and not enough working space was provided between the case backs and the wall.
• Museum E met or exceeded all the recommended safety precautions on the appraisal guide.
• In Museum E’s permanent exhibit area some historic art work along with other artifacts was displayed.
• The prints, drawings and photographs in museum E’s exhibit area were small in scale, framed behind glass and away from damaging light and changes in temperature and humidity.
• The purpose of museum E was to exhibit the history of the school system it served. Therefore, the performance criterion dealing with textiles did not apply to museum E.

Museum E’s score on the performance criteria decorative arts exhibits, large sculptures, interpretive exhibits, dark rides, interactive exhibits, touchable objects, and temporary exhibit areas of the galleries section of the appraisal guide was based on the following features revealed during the walk-through evaluation:
• The pieces of furniture in the museum were used to support its main theme of illustrating the history of the school system.
• Museum E had sculptures in the main exhibit area and a large sculpture outside.
• The sculptures inside the museum were well protected from accidental damage.
• There were exhibits throughout museum E that emphasized the historical importance of objects in the history of the school system it served.

• A dark ride was not applicable to museum E since the space available for an exhibit area did not allow for it. This was also true for interactive exhibits in the gallery of museum E. Still, exhibits where students manipulate objects might be possible in the hall area where museum E was located.

• Museum E had touchable objects that consisted of books and records that visitors could examine.

• Some objects in museum E were not protected by cases but they were intended to be observed by visitors and not touched.

• Museum E had space for temporary or permanent exhibit areas in the halls of its facility.
Photo 124: Good Display Structure, Museum E

Photo 125: Good Display Structures, Museum E.
Photo 126: Excellent Art Exhibit Area, Museum E

Photo 127: Excellent Photo Exhibit Area, Museum E

Photo 128: Excellent Large Sculpture, Museum E
Photo 129: Excellent Interpretative Exhibits On Pedestals, Museum E

Photo 130: Good Touchable Objects, Records And Books, Museum E

Photo 131: Satisfactory Temporary Exhibit Area, Hall, Museum E
Museum C had a large office area for a curator and a museum specialist. This facilities score on the administration and staff services of the appraisal guide was based on the following features of these two areas:

- In the office area there was plenty of space for equipment, supplies and some museum work.
- The recommended space allocations on the appraisal guide were met or exceeded by this office area.
- To limit the public’s access to the office area it was only necessary to close one door.
In the administrative center of museum D the curator and museum specialist had separate office space. This facilities score on the administration and staff services of the appraisal guide was based on the following analysis of this area:

- The office space in museum D met or exceeded all the recommended space allocations on the appraisal guide.
- Space was provided for all office equipment.
- A 200 square foot or more reception area was provided to meet visitors.
• The design of the facility was such that by keeping other doors locked all visitors must go through the front office door.

![Photo 135: Excellent Office Area, Museum D](image1.png)

Museum E had a large office area that exceeded the recommended square footage of the appraisal guide. This facilities score on the administration and staff services of the appraisal guide was based on the following features of this area:

- The office space was adequate for office supplies, equipment and museum work.
- Within the office a meeting area was provided for groups visiting museum E.
- The office door was securely locked and the ability of the public to access the office was not possible without permission.

![Photo 136: Excellent Office Area, Lobby, Museum D](image2.png)
Photo 137: Excellent Office Area, Museum E

Collections Management Services

Table 4.23: Collection Management Services Museums C, D and E

<table>
<thead>
<tr>
<th>Museums</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Library</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Shipping and</td>
<td>0</td>
<td>na</td>
<td>2</td>
</tr>
<tr>
<td>Receiving</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Registration Area</td>
<td>5</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Photography Studio</td>
<td>na</td>
<td>na</td>
<td>3</td>
</tr>
<tr>
<td>Technology</td>
<td>na</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Conservation Laboratory</td>
<td>na</td>
<td>na</td>
<td>3</td>
</tr>
</tbody>
</table>

The score awarded to museum C on the item-per-item analysis of the collection management service areas of the appraisal guide was based on the following observations:

- One of the permanent exhibits featured Georgia writers. A place to sit was provided where visitors could read and examine some of the artifacts in this exhibit.
• Books in the main office were available for visitors to examine
• A secure area for the packing and unpacking of objects in museum C did not exist. This function was usually performed at the most convenient door.
• The office of museum C performed the functions of a registration area. This was possible because the office contained space for files, the examination of some objects, the preparation of reports and a computer.
• Considering the space available, the mission and the size of the collection in museum C a photography studio was not necessary.
• Technology in museum C was used mostly for administrative tasks.
• The size of museum C’s artifact collection and the facility it was located in did not allow for a large amount of space for computers
• Finding space for a separate conservation laboratory would be difficult in museum C.
• The functions of a conservation laboratory were provided by the maintenance staff of the school system museum C served.

Photo 138: Satisfactory Library, Sitting Area Reading Exhibit, Museum C
Museum D’s score on the performance criteria of the collection management service areas section of the appraisal guide was based on the following observations of the facility:

- Museum D did not have a library but it was the depository for the archives of the school system it served.
- The collection in the archives focused on memorabilia of the school system including school board meetings, PTA scrapbooks and school annuals.
- Museum D operated with several other school programs in the same facility in the middle of a residential area. Consequently, a secure location for the shipping and receiving of objects could not reasonably be provided.
- A registration area was provided with the use of the museum office and the archives part of the facility.
- Considering the organization of space in museum D, a photography studio was not needed.
- A large amount of technology was provided for the use of students, visitors, teachers and staff in museum D.
- At the time of the walk-through evaluation of museum D, computer use was being expanded and increased.
- A computer lab was being installed which was intended to be used as an integral part of the museum learning environment.
- The computer lab was set so that natural light did not reflect directly onto the computers.
- The chairs used in the computer lab had the five-strut pedestal base that permitted a wide range of movement.
• Wiring was being arranged at the time of the walk-through of museum D which allowed for future expansion of technology use.

• The working space between the computers in the lab in museum D was limited.

• In the offices, computers were well placed and staff members had plenty of space to work.

• In one of the galleries of museum D, where meetings were often held, TV and video were used to complement the learning environment.

• The work a conservation laboratory does was often performed by the maintenance organization of the school system.

Photo 139: Good Technology, Combination Computer Lab and Exhibit Room, Museum D

Photo 140: Good Office Technology, Museum D
The analysis of the performance criteria on the appraisal guide involving the collection management services of museum E was based on the following observations:

- Museum E did not have an organized library, but a large amount of office space contained numerous records which could be used by visitors to research information and examine different artifacts.

- A separate secure area for packing and unpacking objects did not exist in museum E. However, the large office area provided a place where some objects could be examined in relative security.

- The large office complex provided to museum E was the registration area of the facility and the computers and equipment placed in this area made this process easier.

- Museum E did not have a separate photography studio, but the large amount of office space where the curator works on the website of the facility and the large amount of storage available for all equipment needed to photograph objects performed the same function.
• At the time of the walk-through evaluation it became apparent that the use of computers in a laboratory format would not be practical for museum E. However, technology was used extensively in the office complex of museum E.

• A large screen TV was used to complement the learning environment in the exhibition area of the museum.

• A separate conservation laboratory was not provided in museum E. However, the five storage areas along with the large office complex fulfilled that function. These areas, combined, far exceeded the recommended space allocation on the appraisal guide of 1300-1350 square feet for a conservation laboratory.

• There was adequate space for a large number of people to work in the storage areas of museum E. Nonetheless, the only environmentally controlled area was the office complex of museum E.

Photo 142: Satisfactory Library Space, Organized records, Office, Museum E
Photo 143: Satisfactory Technology, Main Exhibit Area, Museum E

Photo 144: Satisfactory Conservation Laboratory Space, Storage, Museum E

Security

Table 4:24: Security Museums C, D and E

<table>
<thead>
<tr>
<th>Museums</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exhibit Access</td>
<td>5</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Security Personnel</td>
<td>5</td>
<td>na</td>
<td>5</td>
</tr>
<tr>
<td>Sight Lines</td>
<td>5</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Locks</td>
<td>5</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
Museum C’s score on the performance criteria of the appraisal guide involving security was based on the following observations:

- All exhibits areas in museum C could be closed, secured and shutoff when needed.
- The windows in the exhibit areas had shutters or security devices were attached to them.
- All the exhibits were within the vision of security personnel or teachers, and where they were not, cases and cabinets protected objects.
- No one could enter the doors of museum C unless a member of the staff admitted them.
- At the time of the walk-through evaluation all doors were secured and locked.
- Sensors were placed throughout the facility that protected it against break-ins.
- The alarm system in the museum would summon the police in 2 or 3 minutes.

The analysis of the performance criteria involving the security of museum D was based on the following features:

- All exhibit rooms can be closed and locked if necessary.
- Most of the windows on the museum had shutters that maintained the security of the museum.
- In some areas of the museum more security was needed on the windows.
- The staff of museum D performed the function of security personnel.
- Most of the exhibits in museum D were within the vision of museum personnel and those which were not were protected in cases or cabinets.
• Some objects did not have needed protection.

• Most of the doors that allowed access to the museum area were fixed with deadbolt locks. However, a few doors did not have deadbolt locks on them.

• Video cameras and alarm systems were installed throughout museum D.

• An alarm system was set up that notified local law enforcement officials of a break-in.

The analysis of the performance criteria involving the security of museum E was based on the following features:

• Heavy doors and secure windows in the main exhibit area of museum E prevented unwanted intrusions from both the inside and out.

• It was easy for the security guard in the facility too observe what was happening in the hall and main exhibit area.

• The exhibits in the main exhibit area could be easily observed by the curator and security personnel when in use.

• Only personnel with the appropriate keys were allowed into the exhibit areas.

• An alarm system was installed in the facility and police response time was in a matter of minutes.

Fire Prevention and Control

Table 4:25: Fire Prevention and Control Museums C, D and E

<table>
<thead>
<tr>
<th>Museums</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building Construction</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Flammable Materials</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Exits</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>
Museum C’s score on the performance criteria of the appraisal guide involving fire prevention and control was based on the following features identified in the walk-through evaluation:

- The renovations done to the old elementary school that became museum C were done using fireproof construction materials and technology.
- Flammable materials were stored away from the exhibits in the custodian’s closet.
- Several exits from the museum led to the street.
- Museum C had an electronic fire alarm system that notified the fire department automatically of problems.
- Ways to extinguish fires in the museum were available. However, they were not readily observable.

The analysis of the performance criteria involving fire prevention and control design patterns of museum D was based on the following observations:

- Museum D’s facility was in good shape and well maintained.
- The facility was renovated using the latest construction materials and technology.
- Any materials that might harm the museums exhibits were stored away from them.
- More than two means of exit to the street were provided.
- The facility had a fire alarm that notified the fire department automatically in the event of a fire.
• Fire extinguishers were placed throughout the museum and the fire inspector came yearly and drills occurred monthly.

Museum E’s score on the performance criteria of the appraisal guide involving fire prevention and control was based on the following observations:

• The building renovations in the facility where museum E was located were made using modern fireproof construction materials and technology.

• The paints and flammable materials in museum E were kept away from the museum collection.

• The facility where museum E was located had several exits to the street.

• Fire alarms, smoke detectors, and extinguishers were installed throughout the facility.

Climate Control

Table 4.26: Climate Control Museums C, D and E

<table>
<thead>
<tr>
<th>Museums</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human Comfort</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Climate Control System</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Microclimates</td>
<td>5</td>
<td>5</td>
<td>na</td>
</tr>
<tr>
<td>Ventilation</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Plumbing</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>
The item-per-item analysis of the way space was organized to maintain climate control in museum C was based on the following observations:

- At the time of the walk-through evaluation the temperature maintained in the museum was comfortable.
- The people working in museum C were not having any problems with the temperature maintained in the facility.
- The climate control system in museum C maintained a temperature that protected the artifacts year round.
- Special storage cases were used for sensitive objects.
- There was a constant flow of air and no evidence of excessive moisture in the facility.
  There was no evidence of mold outbreaks.
- There was no evidence of any sort of problem with the plumbing.

Photo 145: Excellent Ventilation, Shaft, Museum C

Museum D’s score on the performance criteria of the appraisal guide involving climate control was based on the following observations:
• During the walk-through evaluation the temperature in each of the exhibit rooms was comfortable.

• The temperature of the museum was maintained at a comfortable temperature year round.

• Sensitive objects in museum D were protected by the good ventilation of the museum exhibit rooms.

• Objects in museum D were protected by the good ventilation of the museum exhibit rooms.

• In exhibit rooms air was circulating well and mold outbreaks were not noticeable.

• The plumbing was relatively new and problems with it were not evident.

Photo 146: Excellent Ventilation, Shaft, Museum D

The analysis of the performance criteria involving the climate control design patterns of museum E was based on the following features identified during the walk-through evaluation.

• The environment inside the main exhibit area of museum E was very comfortable for visitors.
A separate climate control system maintained a comfortable temperature year round.

The objects exhibited in museum E were such that special storage cases that maintained a microclimate were not needed.

There was no sign of any damage to the artifacts displayed in the museum exhibition area.

Air appeared to be circulating well in the museum exhibit area.

The plumbing in the area reserved for the artifacts had been updated and old steam radiators removed.

## Collection Storage

<table>
<thead>
<tr>
<th>Table 4.27: Collection Storage Areas Museums C, D, and E</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Museums</strong></td>
</tr>
<tr>
<td>Closed Storage</td>
</tr>
<tr>
<td>Open Storage</td>
</tr>
<tr>
<td>Lighting</td>
</tr>
<tr>
<td>Floor</td>
</tr>
<tr>
<td>Preservation</td>
</tr>
<tr>
<td>Ceiling</td>
</tr>
<tr>
<td>Shelving</td>
</tr>
<tr>
<td>Carpeting</td>
</tr>
<tr>
<td>Paper and Photographic Records</td>
</tr>
<tr>
<td>-------------------------------</td>
</tr>
<tr>
<td>Security Vault</td>
</tr>
<tr>
<td>Inventory Control</td>
</tr>
<tr>
<td>Collection Security</td>
</tr>
<tr>
<td>Growth</td>
</tr>
</tbody>
</table>

The item-per-item analysis on the appraisal guide of the way collection storage areas were organized in museum C was calculated based on the following features:

- The closed storage space in museum C was inadequate. The available storage space did not come anywhere close to the requirement on the appraisal guide that the storage square footage should be approximately equal to the square footage used by all the exhibits in the museum area.
- The design patterns used in museum C did not allow for the setting aside of space for open storage.
- All the artifacts in museum C were shown to visitors with none placed in storage.
- The lighting levels in the storage space were bright enough to allow staff to work in the area.
- Light fixtures were not placed over shelving
- The storage space in museum C did not have a concrete floor.
- Some of the materials used in museum C were stored in folders and boxes.
- The ceiling height of the storage space in museum C was not 15 feet but it was adequate considering the items stored in this area.
• The shelving in the storage area behind the stage in the auditorium in museum C was braced well and movement in the storage area was not obstructed.

• Carpeting was not used in the storage area of museum C.

• Paper and photographic records were shelved and removed from the floor throughout the storage areas in museum C.

• Considering the organization of spaces prevalent in museum C a security vault was not necessary.

• Items of high value in museum C were very secure in the cases designed for them.

• The doors that led to the main storage area of museum C can be observed easily from most parts of the museum. However, they were not locked and the people in the museum office could not watch these doors from their location.

• The security of the objects in this storage area was excellent taking into account that there were no windows and doors except for those at the main entrances.

• The storage space available in museum C did not allow for growth.


Photo 147: Poor Closed Storage, Museum C
The analysis of the performance criteria involving the collection storage areas of museum D was based on the following features identified during the evaluation of the facility:

- Museum D had several closed storage areas. The largest area was located in the basement of the facility. Other closed storage areas were located behind the auditorium and some exhibits. The basement storage area was also the place used as the archives of the school system.
- All storage areas were set up for staff use only.
- The large amount of closed storage space available in museum D was not equal to all the square footage used by all the exhibits in the facility.
- The design patterns used in museum D did not allow for the setting aside of space for open storage.
- The light in the main storage area of museum D was bright enough to enable staff to work without relying on windows.
- Light fixtures were placed over the aisles not over shelving and the light was of a low intensity.
- The floor of the main storage area was concrete, unpainted and able to support large loads.
- In the closed storage areas of museum D museum collection materials were stored in folders, boxes and file cabinets.
- The ceiling height of the main storage area met the requirements of 15 feet on the appraisal guide.
- The shelving in the main storage area was braced well and was strongly supported.
• A minimum width of 30 or more inches was maintained between the rows of shelving in the main storage area.

• Carpeting was not used in the storage areas.

• Paper and photographic records were shelved and removed from the floor.

• The main storage area of museum D can only be accessed by one secure door.

• The windows in the main storage area were secured and protected by outdoor grilles.

• The collection storage areas of museum D did not allow for growth.

Photo 148: Satisfactory Closed Storage, Museum D

The analysis of the performance criteria involving the collection storage areas of museum E was based on the following observations:

• Museum E had five closed storage areas scattered through the facility. The space provided in the closed storage areas was many times that used by all the exhibits in museum E.
• Considering the design patterns prevalent in museum E open storage was not practical. Opening the storage areas up to the public would not be possible without a major reorganization of the facility.

• The lighting levels in four of the five storage areas were bright enough to enable staff to work and lights were not placed over shelving.

• One of the storage areas did not have lighting.

• The floors in the storage areas of the lower levels of the facility consisted of concrete.

• Records and artifacts were not stored in areas which had just been painted or had their floors sealed.

• Most of the artifacts available to museum E were stored in folders and boxes or file cabinets. However, at the time of the walk-through evaluation, some had not been stored in a manner that helped preserve them.

• The ceiling height in some of the collection storage areas of museum E did not meet the requirement of 15 feet.

• Some of the storage areas in museum E were chosen simply on a space available basis.

• In some storage areas shelving was not used.

• The shelving in the archives area of museum E was bolted to the floor braced at the top and followed the recommendations of the appraisal guide.

• The shelving in many of the storage areas of museum E was arranged so it did not obstruct the ability to enter or leave these rooms. Still, the shelving in many of the storage areas of museum E was not as carefully arranged as it was for the archives section of the facility.

• Carpeting was not used in the storage areas of museum E.
• The paper and photographic records used by museum E were shelved and removed from the floor.

• Museum E had excellent security areas where valuable objects could be placed under lock and key if necessary. This space was far in excess of the recommended space for a security vault in the appraisal guide of 50 to 75 square feet.

• It was easy to monitor access to some of the collection storage areas of museum E. However, some of these areas were more difficult to control access to than others. Still, even in these rooms one had to go through different offices of the school system to reach them. Also, most of these storage areas had secured doors and lacked windows.

• Museum E had a large amount of storage space, but most of this storage space was taken up with large numbers of artifacts that had not yet been cataloged or used in a museum exhibit. Museum E could still use additional storage space for the huge number of artifacts available to it.

Photo 149: Excellent Closed Storage, Museum E
### General Storage

#### Table 4.28: General Storage Museums C, D, and E

<table>
<thead>
<tr>
<th>Museums</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exhibition Furniture and Equipment</td>
<td>na</td>
<td>3</td>
<td>na</td>
</tr>
<tr>
<td>Publications</td>
<td>5</td>
<td>4</td>
<td>na</td>
</tr>
<tr>
<td>Special Events</td>
<td>na</td>
<td>4</td>
<td>na</td>
</tr>
<tr>
<td>Audiovisual Equipment</td>
<td>na</td>
<td>4</td>
<td>na</td>
</tr>
<tr>
<td>Grounds and Maintenance Equipment</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>
Museum C’s score on the performance criteria of the appraisal guide involving general storage areas was calculated based on the following observations:

- The storage space in museum C was used for both collection storage and general storage. Therefore, it was not necessary to evaluate the space used for these three criteria since this had already been done in the collection storage part of the appraisal guide.

Publications about museum C were stored in the facility and there was substantial space to do this.

- Substantial storage space was provided for the janitorial supplies and other equipment used in the museum.

The analysis of the performance criteria involving the general storage areas of museum D was based on the following observations:

- Some storage space was available for exhibition furniture and equipment. However, more space was needed.

- A large amount of space was provided in the storage area for catalogs, posters, annual reports and other materials used in the museum areas.

- Some space was available to store the paraphernalia needed for special events. On the other hand, there was no room for growth in this area.

- Storage space was provided for audiovisual materials throughout museum D with good shelving.

- Storage space was provided throughout museum D for the grounds and maintenance equipment it used.
The first four performance criteria of the section of the appraisal guide assessing general storage did not apply to museum E. This was based on the observation that the large storage areas in museum E were devoted to the artifacts and materials that were part of the museum’s collection. Only the performance criteria concerned with grounds and maintenance equipment applied to museum E. This was deduced from the large amount of space in the facility for the storage of janitorial supplies.

Shops

Table 4.28: Shops Museums C, D, and E

<table>
<thead>
<tr>
<th>Museums</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exhibits Preparation</td>
<td>na</td>
<td>na</td>
<td>na</td>
</tr>
<tr>
<td>Maintenance and Building Trades</td>
<td>na</td>
<td>na</td>
<td>na</td>
</tr>
<tr>
<td>Museum Store</td>
<td>na</td>
<td>na</td>
<td>na</td>
</tr>
</tbody>
</table>
It was found from interviews and the walk-through evaluation that the shop section of the appraisal guide could not be applied to museums C, D, E. The functions described in the appraisal guide of the performance criteria relating to exhibits preparation, maintenance and building trades, and museum store were all roles handled by school system personnel separate from the facilities.

Summary

This chapter described the results of the first five steps of the investigative POEs of five school museums. Two of these facilities can be described as separate facilities within a school and three as separate facilities within a school system.

All five of these facilities were analyzed using the framework of the appraisal guide with the goal of providing examples of design standards and other information that educational leaders can use. The total score awarded to each facility was determined by an item-per-item analysis following the model represented by the appraisal guide. The closeness of a school museum to the model museum resource center was estimated by examining the number of criteria on the appraisal guide that applied to it and calculating a percentage score. The percentage score was obtained by dividing the number of possible points by the total points awarded to the school museum. This score, along with the number of performance criteria that can be applied to a school museum, represents how close that facility is to a model situation, considering the nature of the facilities in which it was located. Thus, the larger the number of performance criteria that can be applied to a school museum and the higher the percentage score, the closer that facility is to the model represented by the appraisal guide.

Table 4.29: Final Score School Museums
Therefore, of the two separate facilities within a high school examined in this study, it was difficult to conclude which is the closest to the model represented by the appraisal guide. Museum B has the highest percentage score, but museum A has more criteria that can be applied to the facility in which it is located. This difference can be accounted for by the nature of the facility in which each museum is located. The high school in which museum A is located has a large 84 acre campus with numerous buildings on it. The high school in which museum B is located performed most of its functions in one large building. Thus, museum A’s total score on the appraisal guide represents how close to the model it is for a facility located in one of a number of buildings on a large campus. Museum B’s total score represents how close it is to the model for a school museum located in a high school where most of its functions are centered around one large building.

On the other hand, of the three museums used in this study that exist as separate facilities within a school system, museum D is the closest to the model represented by the appraisal guide. This is based upon the conclusion that museum D has the highest number of performance
criterion on the appraisal guide that can be applied to its facility and the highest percentage score.
CHAPTER 5

FINAL REPORT

Step Six: Send Interpretative Data back to the Management of the Facility for Review

Preiser et al. (1988) said the validity of the information obtained from an investigative post-occupancy evaluation (POE) can be tested by sending the interpretative data back to the management of the facility for review. Sanoff et al. (2001) recommended this step be used in an evaluation of schools.

Research showed this step is necessary because data collection in POE’s has been hampered by seasonal conditions, inaccessible respondents or building areas. At times the difference between a planned POE and an actual POE resulted in the need to dispense with some of the collected information (Preiser et al., 1988). Therefore, after a review of the data obtained from this study by the management of the five museums, the score of each facility on the appraisal guide was adjusted to account for conditions that may have hampered the collection of information. These adjusted scores provided more reliable design standards which can be used by educational leaders with similar facilities to promote museum learning.

Museum A

The management of museum A agreed with the scores on the appraisal guide except in the public service and security areas. Management comments with regard to the public service areas were that the restrooms were fine and an information desk was provided for visitors. Still, this did not necessitate a change in the score awarded to museum A for this category since larger restrooms were needed to handle significant crowds visiting the museum.
Several desks in museum A could have qualified as an information desk. However, in the walk-through evaluation it was not immediately obvious as to which one was available for information. Therefore, museum A’s score on the appraisal guide on the public service areas of the appraisal guide was increased by two points. This indicated the need to make an information desk more obvious to visitors.

On the security section, museum A’s management pointed out that the museum does not have its own separate alarm system. However, the alarm system used in the facility that contained museum A was scored on the appraisal guide. Thus, an adjustment to the score in this area was not warranted. With the award of 2 points to museum A for the information desk section of the public service areas, the museum’s final score was increased in the manner outlined by Tables 5.1, 5.2.

Table 5.1 Adjusted Score for Public Service Areas of Museum A

<table>
<thead>
<tr>
<th>Public Service Areas</th>
<th>Adjusted Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Museum or School Entrance Area</td>
<td>3</td>
</tr>
<tr>
<td>Restrooms</td>
<td>4</td>
</tr>
<tr>
<td>Information Desk</td>
<td>2</td>
</tr>
<tr>
<td>Accessibility for Persons With Physical Disabilities</td>
<td>4</td>
</tr>
<tr>
<td>Intimacy Gradients</td>
<td>5</td>
</tr>
<tr>
<td>Auditorium or Meeting Rooms</td>
<td>4</td>
</tr>
<tr>
<td>Food Service</td>
<td>na</td>
</tr>
<tr>
<td>Trash Removal</td>
<td>5</td>
</tr>
</tbody>
</table>
The change in Museum A’s percentage score from 81.1 to 81.9 reflected a slightly more accurate assessment of the state of the design standards used in this facility.

Museum B

The management of museum B agreed with the scores on the appraisal guide in all areas. However, additional information revealed by management was:

- The media center in the high school provided closed storage space for the museum.
- The high school had a school store.
- The museum was used to orient new ninth graders to the school during the High School Transition Program.

However, the media center and the school store were not considered an active part of the museum and the use of the museum to orient new ninth graders had already been considered in the evaluation of the facility. Therefore, the scores on the appraisal guide were not changed.
Museum C

The curator of museum C said that the walk-through evaluation missed several items and that many changes had been made since this study began which should be incorporated into it. The curator pointed out:

- New landscaping had been added since the walk-through evaluation.
- The museum was well maintained with exceptional parking.
- The museum served students K-12 and not all exhibits were for young students.
- A large amount of technology had been added since the walk-through evaluation.
- The museum had an adequate extinguishing system with direct lines to fire and police.
- The climate control system met all the requirements for a traveling Smithsonian Exhibit which included:

  Light, temperature and humidity must be adjustable to specified levels when required. Standard levels are 68 to 72 degrees Fahrenheit, and 45 to 50 percent relative humidity. Light levels may be specified between 5 and 15 footcandles. Direct sunlight should be diffused or eliminated to prevent fading of panels and photographs (Smithsonian Institution Traveling Exhibition Service, Host an Exhibition, 2003).

Therefore, to increase the validity and trustworthiness of the conclusions of the study regarding museum C, an additional walk-through evaluation of the facility was conducted.

The second walk-through evaluation of museum C found that the landscaping around the museum had improved considerably. This raised the score on the exterior areas of the appraisal guide 2 points.

The award of 4 points on the appraisal guide for the parking around museum C was not changed. This was based on the observation that the parking around museum C was better than average.
The final score on the exterior areas of museum C was increased in the manner outlined by Table 5.3

**Table 5.3. Adjusted Total Score Exterior Areas Museum C**

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Landscaping</td>
<td>4</td>
</tr>
<tr>
<td>Promenade</td>
<td>na</td>
</tr>
<tr>
<td>Parking</td>
<td>4</td>
</tr>
<tr>
<td>Signs</td>
<td>5</td>
</tr>
</tbody>
</table>

The score museum C received on the structural features of the appraisal guide was increased by one point. This was based on the curator’s information that many of its exhibits were not used for younger children and they were not directed to these exhibits. Thus, the final score on the structural features of museum C was increased in the manner outlined by Table 5.4.

**Table 5.4. Adjusted Total Score Structural Features Museum C**

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weather Tight Building</td>
<td>5</td>
</tr>
<tr>
<td>Acoustics</td>
<td>5</td>
</tr>
<tr>
<td>Circulation Patterns</td>
<td>4</td>
</tr>
<tr>
<td>Hallways</td>
<td>5</td>
</tr>
<tr>
<td>Building on Students Scale</td>
<td>5</td>
</tr>
</tbody>
</table>
The score of museum C on the public services of the appraisal guide was adjusted by one point in the second walk-through evaluation. This was based on the observation that new exhibits were added involving Presidential china that did improve the feeling of being drawn from one exhibit to the next. The affect of this adjustment on the score of the public service areas of museum C is outlined by Table 5.5.

**Table 5: 5 Adjusted Total Score Public Services Area**

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Museum or School Entrance Area</td>
<td>5</td>
</tr>
<tr>
<td>Restrooms</td>
<td>5</td>
</tr>
<tr>
<td>Information Desk</td>
<td>na</td>
</tr>
<tr>
<td>Accessibility for Persons With Physical Disabilities</td>
<td>4</td>
</tr>
<tr>
<td>Intimacy Gradients</td>
<td>3</td>
</tr>
<tr>
<td>Auditorium or Meeting Rooms</td>
<td>5</td>
</tr>
<tr>
<td>Food Service</td>
<td>0</td>
</tr>
<tr>
<td>Trash Removal</td>
<td>5</td>
</tr>
</tbody>
</table>

The second walk-through evaluation led to an improvement in museum C’s score on the galleries section of the appraisal guide. Interactive exhibits had been added that allowed students to push buttons and obtain information about historical figures and the number of touchable objects had increased. These new exhibits raised museum C’s score on the appraisal guide by 5 points. The score on the temporary exhibit areas of museum C remained the same since it would not be possible to increase these without the addition of more facility space. The final score on the galleries section of museum C was increased in the manner outlined by Table 5.6.
Table 5.6: Adjusted Total Score Galleries Museum C

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Floors and Walls</td>
<td>5</td>
</tr>
<tr>
<td>Lighting</td>
<td>4</td>
</tr>
<tr>
<td>Display Structures</td>
<td>4</td>
</tr>
<tr>
<td>Safety Precautions</td>
<td>5</td>
</tr>
<tr>
<td>Permanent Exhibit Areas</td>
<td>5</td>
</tr>
<tr>
<td>Graphic Arts and Photography Exhibit Areas</td>
<td>5</td>
</tr>
<tr>
<td>Textile Exhibit Areas</td>
<td>5</td>
</tr>
<tr>
<td>Decorative Arts Exhibits</td>
<td>5</td>
</tr>
<tr>
<td>Large Sculptures</td>
<td>5</td>
</tr>
<tr>
<td>Interpretive Exhibits</td>
<td>5</td>
</tr>
<tr>
<td>Dark Rides</td>
<td>na</td>
</tr>
<tr>
<td>Interactive Exhibits</td>
<td>5</td>
</tr>
<tr>
<td>Touchable Objects</td>
<td>5</td>
</tr>
<tr>
<td>Temporary Exhibit Areas</td>
<td>3</td>
</tr>
</tbody>
</table>

The second walk-through evaluation revealed an extensive increase in the use of technology in museum C. Technology was added that gave presidential figures and other historical models speaking capabilities. A train exhibit was improved by the addition of a moving engine. Considering the limited space museum C had for these innovations, this was an excellent use of technology. Therefore, museum C received an additional 5 points on the appraisal guide. This also increased the number of criteria that applied to museum C from 61 to 62. The final score on collections management service area of museum C was increased in the manner outlined by Table 5.7.
The second walk-through evaluation system revealed that museum C has an extinguishing system with direct lines to fire and police. Therefore, the museum's score on the fire prevention and control section of the appraisal guide was increased by 3 points. The effect of this increase on the score of museum C is illustrated by Table 5.8.

Table 5.7: Adjusted Total Score Collections Management Service Area Museum C

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Library</td>
<td>3</td>
</tr>
<tr>
<td>Shipping and Receiving</td>
<td>0</td>
</tr>
<tr>
<td>Registration Area</td>
<td>5</td>
</tr>
<tr>
<td>Photography Studio</td>
<td>na</td>
</tr>
<tr>
<td>Technology</td>
<td>5</td>
</tr>
<tr>
<td>Conservation Laboratory</td>
<td>na</td>
</tr>
</tbody>
</table>

After the second walk-through evaluation the total score of museum C was adjusted in the manner outlined by Table 5.9.

Table 5.8: Adjusted Total Score Fire Prevention and Control System Museum C

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building Construction</td>
<td>5</td>
</tr>
<tr>
<td>Flammable Materials</td>
<td>5</td>
</tr>
<tr>
<td>Exits</td>
<td>5</td>
</tr>
<tr>
<td>Electronic Fire Alarm System</td>
<td>5</td>
</tr>
<tr>
<td>Extinguishing System</td>
<td>5</td>
</tr>
</tbody>
</table>
Table 5.9. Adjusted Total Score Museum Resource Center Museum C

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Criteria</td>
<td>75</td>
</tr>
<tr>
<td>Non-Applicable Criteria</td>
<td>13</td>
</tr>
<tr>
<td>Applicable Criteria</td>
<td>62</td>
</tr>
<tr>
<td>Possible Points</td>
<td>310</td>
</tr>
<tr>
<td>Points Awarded</td>
<td>272</td>
</tr>
<tr>
<td>Percentage Closeness to Model</td>
<td>87.7</td>
</tr>
</tbody>
</table>

The change in museum C’s percentage score from 83.6 to 87.7 is a reflection of the improvements that were made since the first walk-through evaluation. These improvements moved museum C closer to the ideal model represented by the appraisal guide.

Museum D

The curator of museum D disagreed with the scores awarded to his facility in the exterior areas, public service areas and collections management service areas on the data review form. The information he supplied was:

- The entrance doors were decorated to fit the seasons of the year.
- The staff made daily rounds to ensure that the grounds were clean and inviting to visitors.
- All public areas were wheelchair accessible
- Wheelchair access to the stage was with a wheelchair lift.
- Hearing impaired devices were used and arrangements were made to meet the needs of persons with disabilities.
- The Archives area served as a reference for museum visitors researching the school systems historical and archival information.
• In the Archives there was space for files, examination of objects, preparation of condition reports, temporary storage and a computer.

Still, the information provided by the curator did not change the score of museum D on the exterior areas of the appraisal guide. A park-like atmosphere was present at the front of the museum. However, more work was needed to produce the impression that the museum experience had begun before the building was entered.

Museum D’s score on the appraisal guide was adjusted by one point on the structural features of the appraisal guide. The change became necessary when additional literature revealed that not all the exhibits in the museums were designed for young children and they were not directed to them. This change in museum D’s score is illustrated by Table 5.10.

Table 5.10: Adjusted Score Structural Features Museum D

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weather Tight Building</td>
<td>5</td>
</tr>
<tr>
<td>Acoustics</td>
<td>5</td>
</tr>
<tr>
<td>Circulation Patterns</td>
<td>5</td>
</tr>
<tr>
<td>Hallways</td>
<td>5</td>
</tr>
<tr>
<td>Building on Students’ Scale</td>
<td>5</td>
</tr>
</tbody>
</table>

The information provided by the curator led to an adjustment in the score of museum D on the public service areas of the appraisal guide. The score for accessibility for persons with physical disabilities was increased by 2 points. This is illustrated by table 5.11.
Table 5.11: Adjusted Score Public Services Area Museum D

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Museum or School Entrance Area</td>
<td>4</td>
</tr>
<tr>
<td>Restrooms</td>
<td>5</td>
</tr>
<tr>
<td>Information Desk</td>
<td>5</td>
</tr>
<tr>
<td>Accessibility for Persons With Physical Disabilities</td>
<td>4</td>
</tr>
<tr>
<td>Intimacy Gradients</td>
<td>3</td>
</tr>
<tr>
<td>Auditorium or Meeting Rooms</td>
<td>5</td>
</tr>
<tr>
<td>Food Service</td>
<td>3</td>
</tr>
<tr>
<td>Trash Removal</td>
<td>5</td>
</tr>
</tbody>
</table>

The curator of museum D said the archives area had performed many of the functions of a library. This information led to an adjustment in the score of museum D on the collection management service areas of the appraisal guide by one point as illustrated by Table 5.12.

Table 5.12: Adjusted Score Collections Management Service Area Museum D

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Library</td>
<td>4</td>
</tr>
<tr>
<td>Shipping and Receiving</td>
<td>na</td>
</tr>
<tr>
<td>Registration Area</td>
<td>3</td>
</tr>
<tr>
<td>Photography Studio</td>
<td>na</td>
</tr>
<tr>
<td>Technology</td>
<td>4</td>
</tr>
<tr>
<td>Conservation Laboratory</td>
<td>na</td>
</tr>
</tbody>
</table>
The curator of museum E disagreed with some of the scores on the appraisal guide and asked for an additional interview to correct what she regarded as missed data. Therefore, another interview was held with the curator of museum E and some adjustments were made to the score of museum E based on the information provided.

The curator said a large amount of parking was available in the back of the building and a promenade did exist starting from the back parking lot. She further added that the buses usually parked in the back and the drivers required pre-set appointments, so they knew where to park. She believed the sign in the front of the building was adequate for advertising the museum.

During the walk-through evaluation in the first visit to museum E, it was apparent that there was a large amount of parking in the back. However, since the museum occupied only a small part of the building it was not clear in the first visit how this parking was connected to the operation of the museum. These parking areas were not specifically reserved for museum visitors and a large part of the space was occupied by the vehicles of individuals who worked in the building. Although the promenade from the back and side of the building was covered and did provide some protection from the weather, it was located in such a way as to appear not to be connected to the museum. However, the curator gave the information that it was used for protection to enter the museum during bad weather. Still, it would not protect those entering the facility from the front entrance. Therefore, the evaluation of the exterior areas of museum E was adjusted by adding the category promenade and awarding the facility 4 points.

Also, the score on the performance criteria dealing with parking was increased by 2 points. These changes are illustrated by Table 5.12.
Table 5.12: Adjusted Score Exterior Areas Museum E

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Landscaping</td>
<td>3</td>
</tr>
<tr>
<td>Promenade</td>
<td>4</td>
</tr>
<tr>
<td>Parking</td>
<td>4</td>
</tr>
<tr>
<td>Signs</td>
<td>2</td>
</tr>
</tbody>
</table>

The curator of museum E added information during the second interview related to the public service areas of the museum. The large hallway outside the exhibit rooms was the point that connected the inside with the outside of the building. Tour groups were greeted there and the numerous portraits in the hallways were used to emphasize the history of the building. In the walk-through evaluation the connection between the inside and outside of the building was not apparent because of the space the stairs in the front of the building occupied and the information desk. Still, this deficiency in the facility was made up by having tour groups greeted as they entered the building. Consequently, museum E’s score on the entrance area was increased by 1 point.

Museum E’s score was adjusted by 3 points on the performance criteria auditorium or meeting rooms. This was based on the curator’s information that the meeting area of the family resource center on another floor of the facility was used for visiting groups and a large gym was also available for this purpose. The family resource area seated 200 visitors. These changes and others to the public service areas of the appraisal guide are illustrated in Table 5.13.
Table 5.13: Adjusted score public service areas museum E

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Museum or School Entrance Area</td>
<td>3</td>
</tr>
<tr>
<td>Restrooms</td>
<td>5</td>
</tr>
<tr>
<td>Information Desk</td>
<td>5</td>
</tr>
<tr>
<td>Accessibility for Persons With Physical Disabilities</td>
<td>4</td>
</tr>
<tr>
<td>Intimacy Gradients</td>
<td>4</td>
</tr>
<tr>
<td>Auditorium or Meeting Rooms</td>
<td>5</td>
</tr>
<tr>
<td>Food Service</td>
<td>5</td>
</tr>
<tr>
<td>Trash Removal</td>
<td>5</td>
</tr>
</tbody>
</table>

The management of the school system on the feedback form described museum E as an excellent research facility for document research on school segregation and the history of the school system. The curator said that parts of the museum were set up to help individuals research the history of different schools. This additional information necessitated an adjustment to the score of museum E on the library area of the appraisal guide by one point. The curator also pointed out that technology had been put in place that helped individual researchers look for school history. This increased the score of museum E in the technology area of the appraisal guide by one point. Both of these changes in the collection management service areas of the appraisal guide are illustrated by Table 5.14.
Table 5.14: Adjusted score collection management service areas museum E

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Library</td>
<td>4</td>
</tr>
<tr>
<td>Shipping and Receiving</td>
<td>2</td>
</tr>
<tr>
<td>Registration Area</td>
<td>5</td>
</tr>
<tr>
<td>Photography Studio</td>
<td>3</td>
</tr>
<tr>
<td>Technology</td>
<td>4</td>
</tr>
<tr>
<td>Conservation Laboratory</td>
<td>3</td>
</tr>
</tbody>
</table>

The curator of museum E disagreed with the score on the alarm systems performance criteria of the section of the appraisal guide dealing with security. She believed the alarm system was not adequate because it was not separate from the alarm system that covered the entire facility. She also believed that museum E should have a separate electronic fire alarm system. Still, since few school museums inside a facility shared with other school programs had a separate fire and security alarm system, the score of museum E on the security section of the appraisal guide was not adjusted.

The curator of museum E believed that a higher score should have been given for the collection storage areas of museum E. She said that all objects were secure and only the curator could access them. Still, the area assigned to museum E was laid out in a manner that made it difficult for the curator to personally secure access to all storage areas. Thus, museum E’s score in the collection storage areas was not changed.
Revised Final Scores School Museums

The information provided by the feedback of the management of all five museums led to a reassessment of the closeness of each facility to the museum resource center represented by the appraisal guide. Museum A’s was found to be .8 percentage points closer. Museum B’s closeness to the model did not change. Museum C’s score was increased by 4.1 percentage points. Museum D’s score was adjusted 1.25 points. And Museum E’s score was increased 3.7 points. These changes are illustrated in table 5.15.

<table>
<thead>
<tr>
<th>Museum</th>
<th>Total Criteria</th>
<th>Non-Applicable Criteria</th>
<th>Applicable Criteria</th>
<th>Possible Points</th>
<th>Points Awarded</th>
<th>Percentage Closeness to Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>75</td>
<td>24</td>
<td>51</td>
<td>255</td>
<td>209</td>
<td>81.9</td>
</tr>
<tr>
<td>B</td>
<td>75</td>
<td>33</td>
<td>42</td>
<td>210</td>
<td>198</td>
<td>94</td>
</tr>
<tr>
<td>C</td>
<td>75</td>
<td>13</td>
<td>62</td>
<td>310</td>
<td>272</td>
<td>87.7</td>
</tr>
<tr>
<td>D</td>
<td>75</td>
<td>11</td>
<td>64</td>
<td>320</td>
<td>288</td>
<td>90.0</td>
</tr>
<tr>
<td>E</td>
<td>75</td>
<td>11</td>
<td>64</td>
<td>320</td>
<td>278</td>
<td>86.8</td>
</tr>
</tbody>
</table>

Each change represents a more reliable measure of the closeness of each museum to the museum resource center model.
Findings

However, these scores did not materially change the conclusions reached after the first five steps of the POE’s of museums A, B, C, D and E were completed. This could be explained by the decisions made when the museums were created. As previously stated, these decisions were summarized in terms of five basic questions:

1. What are the museum’s broad goals and objectives?
2. What are the present strengths of the collection and the direction in which it should grow?
3. Who is the audience?
4. What kinds of programs should be provided?
5. What levels of financial commitment can be made to the project for capital funds endowment and operating expenses? (Hilberry, 1983, p. 55).

The management of museums A, B, C, D and E began to answer these questions when it was decided that each museum would be placed in a facility not originally designed to promote museum learning. Therefore, none of these museums were described as museum schools (King, 1998). Thus, the scores obtained by each museum on the appraisal guide during the POE process were a measure of the success of the adaptation of that facility to an environment not originally designed for museum learning.

Museums A and B

Reflecting the flexibility of the appraisal guide, the number of performance criteria that did not apply to museums A and B was large. This situation occurred because they were museums within a school and had limited objectives. This would no longer be true if management decided to increase the goals and objectives of each museum and made the commitments necessary to fulfill them.

A number of changes an educational leader could make to a facility like museum A’s are:

- Organize exhibits so they will appeal more to elementary school students.
• Add restrooms big enough to accommodate large crowds.
• Label the information desk and place it so visitors can easily ascertain its location.
• Provide audio recordings and Braille signs.
• Provide an additional meeting room away from the museum area. This would give more security to the artifacts in the museum.
• Install track lighting and more wall plugs.
• Place objects on display structures that well protect them from careless visitors.
• Provide a separate office for museum work.
• Reserve an area for the safe loading and unloading of objects.
• Place computers in the exhibits area.
• Install new plumbing.
• Provide more storage space.

Some improvements that could be made to the facility housing museum B are:
• Install ramps or other devices in museum B to make the front area of the school more wheel chair accessible.
• Move the exhibit rooms to areas closer to the first floor lobby exhibits. This follows the recommendation of Alexander et al. (1977) that the spaces of a building should begin with the entrance and the most public part of the building and lead to the more private parts.
• Place additional touchable objects in the museum.

Some changes an educational leader could make to improve facilities similar to museums A and B are:
• Make a stronger connection from the outside to the museum learning environment inside each facility by setting up outdoor interactive exhibits and sculptures.
• Make visitors to both facilities more comfortable by providing outdoor shelters from bad weather.
• Post signs that direct visitors to each museum.
• Set aside parking spaces for museum visitors.

Museums C, D, and E.

Over 80% of the criteria on the appraisal guide applied to museums C, D, and E. This was a result of the function of the increased goals and objectives of a separate facility within a school system. However, if management decided to widen the scope of the mission of the museums, their scores would continue to increase.

Some improvements an educational leader could make to a facility similar to museum C are:

• Mark off areas for buses and vans and set aside areas for large group parking.
• Arrange lighting in a manner that does not produce a gloomy image.
• Provide more space for visitors to sit and examine books and artifacts.
• Provide space for the loading and unloading of objects.
• Supply more storage space with a concrete floor and a ceiling height of at least 15 feet.
  Arrange storage space so the access to the area is controlled.
• Store the museum collection materials in folders, boxes and file cabinets.

Some changes that could be made to a facility like museum D’s are:

• Provide covered shelters close to the front entrance.
• Improve access for visitors with physical disabilities to the basement floor exhibits.
• Use large sculpture or some other exhibit to help identify exactly where the main entrance is located.
• Use murals on the first floor as well as along the staircase and basement to maintain the sense that everything is flowing naturally.
• Add more touchable objects.
• Place a separate registration desk in another area of the museum away from the office.
• Organize the computer lab to provide more working space.
• Place more protective devices on the windows.
• Place deadbolt locks on all doors.
• Make sure all objects can be easily observed by museum personal in the facility.
• Protect all objects not intended to be touched by visitors from accidental damage.
• Find more closed and general storage space.

Some improvements an educational leader could make to improve the museum learning environment in a facility like museum E’s are:

• Display signs so people coming from the interstate highway can see them.
• Place additional sculptures or other exhibits in the front area of the building.
• Post signs indicating handicapped access areas.
• Put more exhibits in the halls to give the impression that everything is flowing naturally in the museum.
• Provide space for additional touchable objects, temporary exhibit areas, decorative arts exhibits, and interactive exhibits.
• In the collection storage area increase and improve lighting, store more of the materials in boxes and folders, provide more shelving and obtain more storage space.
Some changes that could be made to museums C, D, and E in their facilities are:

- Add more outside interactive exhibits or sculptures.
- Add more devices to aid the physically handicapped.
- Provide more working space around display structures.
- Add areas where visitors can obtain snacks.
- Provide more secure space for the loading and unloading of objects.
- Provide more space for additional exhibits.

**Museums A, B, C, D, and E**

The POEs of all five museums in this study revealed deficiencies in the learning environment of each facility. However, as previously stated, some of these deficiencies were inherent to the type of facility each museum was assigned. Museums C, D, and E were separate facilities within a school system and had more comprehensive goals and objectives than A and B. This was reflected in the increased number of criteria on the appraisal guide that pertained to them. However, this study identified several design patterns that were common to all.

All five of the museums in this study had in common the need for more space. Therefore, some of the criteria on the appraisal guide did not apply to them because they were not able to make the necessary investment in space and money. None of the facilities in this study had dark rides. This probably resulted from the large amounts of space and expensive technology needed for these theatrical sequences (Naversen, 2003).

Another performance criterion on the appraisal guide which would require an investment in space and money was a separate conservation laboratory. None of the museums in this study had this. Museum E had space that could be used for such a function, but it was not organized with that purpose in mind.
None of the school museums in this study had the space for an open storage area. Therefore, all artifacts were exhibited in the museums at all times.

This lack of space was also the reason the school museums in this study did not have designated separate collection storage and general storage areas. This also may have been the result of a lack of understanding of the need to do this.

Also, this was the reason why the shop section of the appraisal guide did not apply to any of the museums in this study. The shop section of the appraisal guide could be said to apply to none of the museums. The school systems in this study took care of all the functions pertaining to shops. Therefore, depending upon the goals and objectives educational leaders select for their school museum, this area may be dispensed with.

**Significance of this Study**

The facilities assessment instrument designed from the literature review in the POEs of five school museums in Georgia provided design standards which are adaptable to the characteristics of different facilities in Georgia. Each of the five facilities in this study presented their own unique challenges to the establishment of a museum learning environment. These challenges were created by the limitations imposed upon the museums by decisions made at their establishment.

Therefore, curators and other management had to adapt to these limitations in attempting to provide a museum learning environment. The appraisal guide made allowances for the need to adapt to the environment by not counting performance criteria which could not be applied to that facility.

Consequently, the POEs of each museum did what they were supposed to do, which was:

1. To describe the performance of a building and its elements.
2. To interpret the performance and judge its merit.

**Implications for Further Research**

It has been recognized that schools needed to add facilities that promote museum learning. This study through the POE process provides educational leaders with rare examples of design standards and other information that they can use in adapting an educational facility to museum learning. It provides examples of options available and an analysis of the issues involved.

Through the literature review and POE’s of five school museums, it showed the elements in the design of museums, museum schools, and museums in schools, which can be incorporated into a model for a museum resource center.

This study increased the small literature base discussing the incorporation of museums into high schools. Standards and guidelines are provided in this study which educational leaders can use to place a museum within their high school. If these guidelines are followed, they will impact in school systems the fields of educational planning, design, architecture and museum education.

However, the design standards and other information gained by the five POE’s in this study should be seen as a basis for discussion and consensus-building by the educational leaders responsible for shaping school environments (Sanoff, et al. 2001). This study provides educational leaders with guidelines and standards they can use to help create a museum environment in their high school or school system. Yet, the literature base for this topic is very small. Thus, some of the design standards and other information provided in this study may be eliminated or expanded upon. Nevertheless, this is a task for future research.
REFERENCES


APPENDICES
### APPENDIX A: PHOTOGRAPH DESCRIPTION AND SUBJECT EVALUATION

<table>
<thead>
<tr>
<th>Photo Number</th>
<th>Description and Subject Evaluation</th>
<th>Museum</th>
<th>Page Number</th>
</tr>
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<tr>
<td>1</td>
<td>Classroom Section</td>
<td>A</td>
<td>111</td>
</tr>
<tr>
<td>2</td>
<td>Satisfactory Landscaping</td>
<td>A</td>
<td>119</td>
</tr>
<tr>
<td>3</td>
<td>Poor Promenade</td>
<td>A</td>
<td>119</td>
</tr>
<tr>
<td>4</td>
<td>Good Parking</td>
<td>A</td>
<td>120</td>
</tr>
<tr>
<td>5</td>
<td>Good Parking</td>
<td>A</td>
<td>120</td>
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<tr>
<td>6</td>
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</tr>
<tr>
<td>7</td>
<td>Excellent Parking</td>
<td>B</td>
<td>122</td>
</tr>
<tr>
<td>8</td>
<td>Satisfactory Sign, Main Exhibit Area</td>
<td>B</td>
<td>122</td>
</tr>
<tr>
<td>9</td>
<td>Excellent Weather Tight Building Maintenance, Ceiling</td>
<td>A</td>
<td>124</td>
</tr>
<tr>
<td>10</td>
<td>Excellent Circulation Pattern</td>
<td>A</td>
<td>124</td>
</tr>
<tr>
<td>11</td>
<td>Excellent Weather Tight Building Maintenance, Ceiling</td>
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<td>125</td>
</tr>
<tr>
<td>12</td>
<td>Excellent Circulation Pattern</td>
<td>B</td>
<td>126</td>
</tr>
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<td>13</td>
<td>Excellent First Floor Hallway</td>
<td>B</td>
<td>126</td>
</tr>
<tr>
<td>14</td>
<td>Excellent Building on Students’ Scale, Exhibit</td>
<td>B</td>
<td>126</td>
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<td>15</td>
<td>Satisfactory Entrance Area</td>
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<td>Good Meeting Area</td>
<td>A</td>
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<td>18</td>
<td>Excellent Entrance Area, Statue</td>
<td>B</td>
<td>132</td>
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<td>19</td>
<td>Excellent Entrance Area, Exhibit in Lobby</td>
<td>B</td>
<td>132</td>
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<tr>
<td>20</td>
<td>Beginning of Mural</td>
<td>B</td>
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<td>21</td>
<td>Exhibit in Hall</td>
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<td>22</td>
<td>Good Floors and Walls, Wall</td>
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<td>Good Display Structure</td>
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<td>Excellent Permanent Exhibit, Old Classroom</td>
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<td>139</td>
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<tr>
<td>29</td>
<td>Excellent Graphic Arts and Photography Exhibits</td>
<td>A</td>
<td>139</td>
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<tr>
<td>30</td>
<td>Good Textile Exhibit</td>
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<td>140</td>
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<td>31</td>
<td>Excellent Decorative Arts Exhibits, Boardroom</td>
<td>A</td>
<td>140</td>
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<td>32</td>
<td>Excellent Decorative Arts Exhibit, Oak Paneling, Boardroom</td>
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<td>Excellent Floor and Walls</td>
<td>B</td>
<td>143</td>
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<tr>
<td>34</td>
<td>Excellent Lighting: Wall Plugs Along Tracks</td>
<td>B</td>
<td>143</td>
</tr>
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<td>35</td>
<td>Excellent Lighting: Vertical Blinds</td>
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<td>36</td>
<td>Excellent Display Structures</td>
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<td>Excellent Display Structures in Hall</td>
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<td>Excellent Display Structures Main Exhibit Area</td>
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<td>-------</td>
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</tr>
<tr>
<td>39</td>
<td>Excellent Art Exhibit</td>
<td>B</td>
<td>145</td>
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<tr>
<td>40</td>
<td>Excellent Mural Located First Floor</td>
<td>B</td>
<td>145</td>
</tr>
<tr>
<td>41</td>
<td>Excellent Photography Exhibit</td>
<td>B</td>
<td>146</td>
</tr>
<tr>
<td>42</td>
<td>Excellent Textile Exhibits</td>
<td>B</td>
<td>146</td>
</tr>
<tr>
<td>43</td>
<td>Excellent Large Sculpture Rear View</td>
<td>B</td>
<td>146</td>
</tr>
<tr>
<td>44</td>
<td>Excellent Interpretative Exhibit</td>
<td>B</td>
<td>147</td>
</tr>
<tr>
<td>45</td>
<td>Satisfactory Touchable Objects</td>
<td>B</td>
<td>147</td>
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<tr>
<td>46</td>
<td>Satisfactory Office</td>
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<td>148</td>
</tr>
<tr>
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<td>Excellent Climate Control System</td>
<td>A</td>
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<td>Excellent Permanent Exhibit, School House</td>
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<td>Good Technology, Combination Computer Lab and Exhibit Room</td>
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<td>Satisfactory Conservation Laboratory Space, Storage</td>
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APPENDIX B: APPRAISAL GUIDE FOR A MUSEUM RESOURCE CENTER

BUILDING PROGRAM

Developed by Rex Wallace

Name of Observer: _____________________ Date: ________________

School System: ________________ School Name: _______________

Type of Facility: ___Separate Facility Within School ___Museum School
___Separate Facility Within System ___Classrooms
___Exhibit Areas Throughout School ___Media Center

Facility Descriptions: (Complete as appropriate for your facility.)
- Gross Square Footage _______ Capacity_______
- Date of Establishment _______ Site Acreage _______
- Date of Original Construction _______ Number of Floors _______
- Date of Renovation/Remodeled_______ Number of Classrooms_______
- Number of Exhibits _______

Recommended Allocations of Space:
145 sq ft per student in a separate facility
5,000 sq ft minimum for an exhibition center within a school
On a school site a minimum of 30 acres plus one acre for each 100 students.

References:
(Botta, 1999; Brown, et al. 1989; Charnetski ,1983; Castaldi, 1994; Communicating with the

Comments:

Instructions:
This guide is intended to provide educational leaders with a basis for orderly thinking about the spaces and special requirements needed to put a museum resource center in their high school or school system. Fill in the information on the museum learning environment that you are observing. If museum learning is occurring in several different places, examine them as a group. In schools where museum learning is limited to a media center, classroom’s or exhibit areas throughout a school, make your inspection based on how well the museum learning environment is supported by the design of the school.
Score the design patterns in the following manner:

a. If the design pattern is the best example you have seen in a facility assign the number 5 to that criteria

b. If the design pattern you are evaluating is good but is not the best example you have seen assign the number 4 to that criteria.

c. If the part of a facility the appraiser is evaluating is satisfactory the number 3 should be assigned to that performance criteria.

d. If the part of the facility the appraiser is evaluating is poor the number 2 should be assigned to that performance criteria.

e. If the part of the facility on a checklist is necessary but the school doesn't have it O should be assigned to that performance criteria.

f. If the part of the facility the evaluator is evaluating is not applicable na should be assigned to that performance criteria (Pace, 1987).

Score design patterns on the basis of the number of points awarded for each item. The allowance for points is placed at the top of each section. When finished, add the total combined score of all sections and then divide it by the total number of points possible. This percentage indicates how close the museum learning environment you are observing corresponds to the facilities recommended by the literature.

Total Score ________________

Percentage ________________

References:
(Pace, 1987)

Section I: Exterior Areas
These spaces relate to the outside areas of the museum. If the museum is located within a school facility base evaluations on how the external areas of the school support the museum program.

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1. **Landscaping**
Plants, fountains, sculpture gardens, or outdoor interactive exhibits are present. The visitor has the impression that the museum experience has begun before they reach the building.

Recommendations:
For security reasons all outside objects should be bolted down on concrete slabs and properly lighted at night.

2. **Promenade**
These are walkways that link the main outside areas providing shelter from the sun and bad weather.

Recommended Allocations of Space:
- Sidewalks should have a gradient of 1:12 or less.
- Rest areas should be available at 30-foot intervals.

3. **Parking**
Parking for buses and vans is provided to accommodate school groups and other community groups.

Recommended Allocations of Space:
1. One space for each member and staff member
2. Minimum space per car 8 1/2' x 18' or 300 sq ft per car
3. Disabled 2% of the total number of spaces. Curb cuts if the parking area is not at ground level.
4. 2% of parking spaces van accessible or 8' wide with an adjacent 8' wide passenger-loading zone.

4. ** Signs**
Directions and instructions are available directing visitors to the front entrance of the school or museum area.
Large easily visible signs are available.
Signs are placed before rooms informing the visitors of the content of the room.
Each case or panel exhibit has a large panel label

**References:**
Section 2: Structural Features
The following features of the building structure are basic to the functioning of a school museum.

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<th>Excellent</th>
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5. __________ Weather Tight Building
The museum area has a stable roof, free from leaks ensuring collections will not be damaged.

6. __________ Acoustics
A separate facility or a museum within a school is designed to control internal and external noise levels. The structure of the building is well insulated.

Recommendations:
Some acoustical materials to look for are glue-on tiles, planks, suspended ceilings, heavy-textured wall materials, wall carpeting as well as floor carpeting, spray on soundproofing, or small rugs and pillows thrown about the floor. Movable acoustic panels can be used as needed to break up large display areas.

7. __________ Circulation Patterns
Indoor spaces for circulation of visitors in the museum areas is broad and well lit allowing for freedom of movement. Exceptions should be made for exhibits that can be damaged by too much light. In areas requiring low lighting, small floor lights should be arranged for safety purposes. Objects must be able to be securely moved to and from storage or display. For facilities within a school, circulation patterns are organized so visitors can easily move to the museum area without disruption of other school activities. Enough space should be available so visitors can circulate among and around artifacts without excessive crowding. Rest areas should be provided if a large number of exhibits is available. If exhibits are placed throughout a school, examine how students and visitors are able to conveniently view these exhibits.

Some examples of circulation patterns to look for are:
1. Arterial: A circulation pattern where the main path is continuous and no options exist for the visitor.
2. Comb: A circulation pattern in which there is a main circulation path and optional alcoves that a visitor may enter or by-pass.
3. Chain: A circulation pattern where the main path is generally continuous but leads to a series of self-contained units having a more varied path within them.
4. Star or Fan: A circulation pattern, containing a series of alternatives to a visitor from a central area.
5. Block: A circulation system, which is random or as self-directive as, desired by visitors.

Recommended Allocation of Space:

20 sq. ft for each visitor

8. Hallways
Passageways should be large enough to allow visitors or students personal space when moving within the school or separate museum facility.

Recommended Allocation of Space:

Hallways should be more than seven feet in width

Standards for exhibiting in hallways and corridors:
Panel sizes 4 x 6 ft and 4 x 8 ft
Upright panel 1 x 6 ft

9. Building on Students’ Scale
The museum facility is designed and built on the scale of the students it serves. Some accommodations are made for adults, depending on the mission of the school museum. If other schools visit a school museum in the system some accommodation is made for elementary school children. Seats are available for children, teenagers and adults. Exhibits are labeled and the audience for whom the exhibit is planned has directions given in a manner that is easy to understand and follow. For example, exhibits planned for elementary school students are at the appropriate heights and are labeled with easy to follow instructions written on an elementary level.

References:

Section III: Public Service Areas
These spaces unite the experience of the building exterior and site with the experiences of the museum exhibits and the interior functions provided by the learning environment.

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10. Museum or School Entrance Area
This is a friendly space that connects the outside and inside worlds and evokes a ‘welcome’ feeling. Museum orientation materials or meeting rooms are usually placed here. Visitors to the museum are encouraged to enter here, as this is the starting point of their museum experience. Large Sculpture and Architectural Elements can be placed here. Orientation areas are provided
where visitors or students can be directed throughout the museum area. This could consist of tables with flyers about upcoming museum activities, meeting rooms, or open areas where student docents meet visitors and direct them to the museum.

Recommended Allocation of Space in the Lobby or Reception Area

- 100-400 square feet
- Banquet Dinners held here 10-12 sq ft per person
- Large receptions held here 8-10 sq ft per person

11. _________Restrooms

Restroom facilities are available in the entrance area or they are easily accessible from that point. The restroom facilities are sufficient to accommodate the groups of visitors.

Recommended Minimum Design Standards:

1. Two required
2. Air-conditioned and vented
3. 8 ft high ceiling
4. Ceramic tile floors and walls
5. Handicapped access provided for
6. Located in hallway off the lobby
7. At least two toilets in each plus a urinal in the men's room

Recommended Minimum Allocation of Space:

- 200-300 sq ft

12. _________Information Desk

If a separate information desk is not provided, museum materials are arranged in or near administration offices so visitors can easily find them. Student docents could be assigned to assist at this point.

13. _________Accessibility For Persons With Physical Disabilities

Access for the handicapped is provided throughout the museum facility. All public areas must meet the Americans with Disabilities Act requirements for wheelchair access. Spaces are provided where physically challenged students can work in the museum learning environment. Audio Recordings are available at exhibits. Braille Signs are posted. The use of flashing lights and sign language is apparent. Elevators, ramps and doorways are designed to accommodate wheelchairs. A minimum of stairs exist.

14. _________Intimacy Gradients

The design patterns form a sequence from larger to smaller and from public to private spaces. The effect is one of drawing people to the museum learning environment. Visitors should have the feeling of being drawn from one exhibit to the next and have the impression that everything is flowing naturally.
15. **Auditorium or Meeting Rooms**
The location of these facilities will depend on the school or facilities museum program, but the arrangement of these spaces permits maximum use while preserving the security of the museum’s collections. These facilities are environmentally controlled. They have storage space for the furniture and equipment used in the facility.

Recommended Allocation of Space:
- School Auditorium - should seat one half the student body of a school.
- Separate Museum Facility - 200-600 seats should be provided if large numbers of activities are scheduled.
- Ceilings are 12 ft high

**General activity room** –
- Seats 60-100 persons
- Area 1200-2000 square feet
- 12ft high ceilings recommended

16. **Food Service**
The extent of food service facilities available will depend on the kind of program the school or facility offers. When full cafeteria facilities are not available, snack machines are available for visitors or groups to use. However, this might not be practical within a standard school setting. All items are consumed in an appropriate area away from the actual exhibit areas. Foods services are accessible without visitors going through the museum exhibit area.

Recommended Allocation of Space Cafeteria:
- Kitchen Area: Minimum 2 sq ft per meal served
- Serving Area: Minimum .5-. 8 sq ft per capacity of dining area
- Dining Area: Minimum 10-14 sq ft per seated student

Recommended Allocation of Space Kitchenette:
- Located off the general activity room
- 8 ft high ceiling
- Area 60-120 sq.ft

17. **Trash Removal**
Space is available so waste products can be easily removed.

Recommended Allocation of Space Custodial Closet:
- Located near restrooms
- Minimum 36 sq. ft
- Preferred size 100-200 sq. ft

Recommended Design Features:
- Air conditioned and vented
- Large sink and cupboard provided.
References:

Section IV: Galleries
The museum learning environment you are observing may not have all of these galleries, but there should be space so that several exhibits can occur at the same time.

Recommended Allocation of Space:
  Located directly off the lobby
  20 sq ft per person should be provided in exhibit areas.

Small museum gallery:
300-900 sq ft with a ceiling height of 9-11 ft.
Medium Museum Gallery:
1,000-2,000 sq ft with a ceiling height of 11-14 ft.
Large Museum Gallery:
2,000-5,000 sq ft with a ceiling height of 14-20 ft.

Recommended Design Features:
  Rectangular floor plan
  No Windows
  Double doors installed in the entrance.
  Doors measure 8 ft X 10 ft
  Doors have extensive decorations

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18. **Floors and Walls**
Walls and floors should not conflict with works displayed in successive exhibitions. Walls have slightly textured and uneven surfaces. Wall textures, such as carpeting, paneling, pegboard or vinyl is not recommended for museum exhibits. Track lighting is placed along the walls with zoned dimmer-controlled switches. Wall plugs are 6-8 ft apart on the bottom of the walls.

Recommendations:
Dark walls will make the rooms seem smaller.
Light walls will make the rooms seem larger.
19. **Lighting**
Fluorescent lights, incandescent lights, reflector lights and projector lamps are used in the museum to increase the effect of exhibits on visitors. Natural light can be brought into exhibits. However, natural light should only be used in cases where it will not damage the museum’s artifacts.

Suggested Design Features:
- Working lights for use during installation, cleaning, maintenance, dismantling, and security patrols after opening hours.
- Emergency lighting to enable visitors to leave safely in case of failure of the main lighting supply
- A display lighting system which is fitted with dimming devices
- The entire gallery has the same style canisters

Recommended Allocation of Space:
- Lights are at least 36 inches from the wall.
- Lights do not warm Art objects
- Lights are arranged so viewers do not encounter glare or see reflections

Recommended lighting levels:
- 5 - 15 Watts per square foot of space
- Illumination level: 5-30 foot-candles depending on the nature of the object

20. **Display Structures**
The method of opening display cases is not apparent to visitors. Locks are visible if the method of opening the display case is apparent. A four-foot working space is between the case backs and the wall. Floor fixings should be designed so that visitors will not trip on them.

Recommended Case Dimensions:
- 2 feet wide and 6 feet 10 inches high
- Four feet high and 2 feet wide
- Six feet wide and six feet 10 inches high

Pedestals are designed so that objects are placed beyond the reach of visitors and feet or cleaning equipment cannot hit them at floor level

Recommended sizes for screens in areas with high ceilings:
- Height: 8 ft 6 inches
- Width: 3 ft 6 inches and 4 ft 6 inches.

Recommended size for flat mounts:
- 30x40 inches
Recommended case size for flat exhibits:
   32 inches high,
   40 inches long,
   4 inches deep.

21. __________ Safety Precautions
   Objects that may harm visitors or students are safely displayed.

   Recommended Safety Precautions:
   1. Facilities for eating and drinking are provided away from areas where dangerous substances are used.
   2. Adequate washing and sanitary facilities are provided.
   3. Floors, stairs, passageways and doorways are clear of obstructions and properly maintained
   4. Ventilation is sufficient to keep the air odor-free.
   5. The air-change rates are adequate for the purpose of the room.
   6. The working temperature is set at or above 16 degrees centigrade.
   7. Lighting is adequate for the type of work carried out.
   8. Emergency lighting is provided where needed.
   9. Properly designed seats and tables are provided for the work in hand

22. __________ Permanent Exhibit Areas
   These are used to display art donated to the school or facility. They may be provided for the exhibit of students’ work. The art department also may have some of these types of areas.

23. __________ Graphic Arts, and Photography Exhibit Areas
   These areas contain prints, drawings, and photographs small in scale, framed behind glass, and very sensitive to light and changes in temperature and humidity. No sunlight should be present in these areas.

24. __________ Textile Exhibit Areas.
   Textiles are sensitive to light and to changes in temperature and humidity. They should be exhibited in front of a painted surface. Lighting and climate must be carefully controlled.

25. __________ Decorative Arts Exhibits.
   This includes items from jewelry to furniture to horse-drawn carriages.

26. __________ Large Sculptures
   These require large open spaces and can be exhibited outdoors. They may be placed in the Entrance Area.

27. __________ Interpretive Exhibits
   These exhibits emphasize the social, historical, or scientific importance of the object.
28. _________ **Dark Rides**
This is an interpretative exhibit where the visitor walks through or is conveyed through a theatrical sequence. These are highly specialized and may not be possible for many schools.

29. _________ **Interactive Exhibits**
These contain educational content and place emphasis on the visitor’s experience in manipulating devices rather than observing museum objects.

30. _________ **Touchable Objects**
Many school museums may not be in a position to allow this, but if allowed they should be objects easily replaced.

31. _________ **Temporary Exhibit Areas**
The number of these will depend on the design philosophy and resources of the school or facility. They may have movable panels or permanent areas for these types of exhibits.

**References:**

**Section V: Administration and Staff Services**
The design of this space will depend upon the purpose, function, and activities of the facility being observed..

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32. _________ **Offices For Museum Work**
Classrooms, school administration offices or Media Center offices may be substituted for separate office space for smaller museum facilities. Space is provided for telephone equipment, photocopier, office supplies, and other museum staff functions. Photocopiers and laser printers are used in an area away from museum collections.

Recommended Space Allocations:
Lobby: 200 sq ft
Office: 100 sq ft of space for each person working out of the office
Recommended Space Allocations for a separate facility:
Curator or Directors office-120-200 sq ft
Secretarial office-200-300 sq ft

33. __________ Public Access
The ability of the public or unauthorized students to access staff areas is controlled.

References:

Section VI: Collections Management Services

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34. __________ Library
This can be the school media center or a part of a separate facility. Accommodations are provided for visitors

Recommended Minimum Space Allocations:
In a school enough space is provided for 10% of enrollment

35. __________ Shipping and Receiving
A secure area for packing and unpacking objects is provided. Exhibition staging and temporary storage for incoming and outgoing objects are available. Space is provided so large vehicles can make deliveries if needed. There is easy access from the service drive to the storage area.

Recommended space allocations:
Area- 600-800 sq ft
12 foot high ceiling

Recommended Design features:
Concrete floor
Doors 8ft. x 10 ft.
Two loading docks: 2 ft high and 4 ft high

Loading Dock Design Features:
Covered area with clearance for a large trailer truck to back under
Hydraulic loading ramp
Easy back-in for truck
Intercom from outside to reception desk
24 hour alarm on door which can be deactivated by staff only
12 ft. wide x 12 ft. deep
36. **Registration Area**
Space is provided for files, examination of objects, condition reports, temporary storage, and a computer. This could be arranged by allocating space in classrooms, administration offices, media center offices, or a separate office area. Software should be installed on registration area computers that help keep track of the delivery and return of museum materials.

Recommended space allocations:
- A minimum of 120-150 sq. ft.

37. **Photography Studio**
This should be a place where objects can be photographed regularly for registration, condition reports, insurance, conservation, and publication on a virtual museum. Facilities may include a studio, darkroom, storage for equipment and supplies, storage for objects being photographed and slides, negatives, and prints.

Recommended Space Allocations:
- Photography studio: A minimum of 340 sq. ft

38. **Technology**
The technology provided for students and teachers and museum staff may consist of spaces with computers, compact disks, programs, learning packages, Internet connections, television, and video. In a school the media center may contain these materials.

Items to look for:
1. Computers are placed within the museum learning environment in a manner that complements teaching and learning.
2. Computers appear as an integral part of the museum learning environment. An example would be using the computers for virtual museum development.
3. The teacher, museum staff, or media center specialist can easily view all computer screens from one location. The best alternative would be to provide a separate computer lab for the museum.
4. All light (artificial or natural) is in the form of indirect lighting.
5. Natural light is controlled so that it is reflected down from a reflective ceiling.
6. Direct sunlight through windows is directed toward the ceiling, using venetian blinds or their equivalent, so that the sunlight is diffused throughout the room.
7. Any chair used by museum staff with computers has a five-strut pedestal base so that it does not have a tendency to tip forward. The chair has a back that is easily adjustable, that permits a wide range of movement, and that has a swivel seat.
8. The countertop or table upon which the computer and related equipment is large enough so that the major components of the computer system used by the operator can be moved about.
9. Wiring is available that can be used to provide Internet access and computer networking.
10. There is evidence of pre-wiring for future expansion and use of computers.
Recommended Space Allocations:
- The basic computer cluster: 400 sq ft
- Computer laboratory: 900 to 1,000 sq ft or more

39. Conservation Laboratory
A separate space is needed in which to examine objects and carry out conservation procedures. A complete laboratory may include work areas for various types of objects and special equipment. Science laboratories where museum work can be done may be counted.

Recommended space allocations:
- 45 sq. ft for each worker
- 1300-1350 sq. ft total.
- At a minimum it should be large enough for three people to work in it.

Recommend design features:
- 8 ft x 10 ft high doors
- 12 ft high ceiling
- Located off shipping/receiving area
- Environmentally controlled
- 12 ft. high ceilings
- Smooth concrete floor
- Fluorescent lighting
- Workbench and electrical outlets are provided

References:

Section VII: Security
Security is a primary planning and design consideration in a museum learning environment. In general every point of entry in a museum learning environment should be secured.

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40. Exhibit Access
All exhibit areas are designed so they can be closed, secured, and alarmed during public events being held elsewhere in the school or in separate areas of the museum facility. The area where the school museum collections are has security grilles over windows, heavy doors, shutters or skylights, which cannot be unscrewed from the outside.
41. __________ Security Personnel
Spaces are provided where security personnel or museum resource officers can observe the operation of the museum.

42. __________ Sight Lines
Exhibits are within the vision of security personnel or teachers. Where they are obscured, cases or cabinets protect objects.

43. __________ Locks
Locking and keying systems are available that are designed to accommodate staffing and building usage patterns. Doors leading to the museum area are fixed with deadbolt locks.

44. __________ Alarm Systems
Intruder alarms are installed on all windows and doors. Alarms automatically notify local law enforcement officials of a break-in. Alarm systems are designed to suit security and staff procedures, student usage patterns, and staff and police response capabilities.

References:
(Brawne, 1982; Communications Design Team, Royal Ontario Museum, 1976; Georgia Department of Archives and History, 2000; Hilberry, 1983; Rosenblatt, 2001)

Section VIII: Fire Prevention and Control

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45. __________ Building Construction
New buildings or improvements to existing buildings are built using fireproof construction materials or technology.

46. __________ Flammable Materials
All paints and flammable materials are properly stored away from museum collections.

47. __________ Exits
The area of the museum learning environment has at least two means of exit to the street. Access to enclosed backyards is not acceptable.

48. __________ Electronic Fire Alarm Systems
This type of system should notify the fire department automatically in the event of a fire. This applies to a school as a whole or a separate facility.

49. __________ Extinguishing System
A way to protect the collection from damage in case of a fire is available. This includes smoke detectors, fire extinguishers, and a sprinkler system.
References:

Section IX: Climate Control
A museum’s environment requirements for control of atmospheric conditions exceed those for most public buildings. It is necessary to maintain a constant daily comfortable temperature where museum learning is operating to lessen damage to important artifacts.

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50. ___________ Human Comfort
A separate control system is used that maintains museum temperatures designed for human comfort.

51. ___________ Climate Control System.
In areas where the museum collection is located, a central heating and air conditioning system remains operational 24 hours a day, seven days a week, year-round; maintaining an interior temperature of 68-72 degrees Fahrenheit and a relative humidity between 40 and 45%.

52. ___________ Microclimates
Climate control is maintained by using special storage cases for sensitive objects.

53. ___________ Ventilation
It helps to minimize the potential for mold outbreaks by providing adequate passage of the air through high efficiency filters and by maintaining air movement.

54. ___________ Plumbing
The age of the plumbing should be checked. If it is of an age that pipes may start to leak and equipment may start to drip, the museum collection may be threatened.

References:

Section X: Collection Storage
The space requirement for storage includes the amount necessary for the current collection plus additional expansion. At a minimum, storage space square footage should be approximately equal to the square footage used by all the exhibits in the museum area.
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55. **Closed Storage**
Object storerooms or vaults should be arranged for staff use only. This could include a basement. If artifacts are being stored in a basement, check for a water alarm to warn of leaking pipes or incoming ground water.

56. **Open Storage**
In areas where storage of some three dimensional objects is open to the public, glass cases need to be installed to permit visibility while ensuring security.

57. **Lighting**
Lighting levels should be bright enough to enable staff to work without relying on windows for light. Light fixtures should be placed over aisles, not over shelving. Any lamps used should emit low ultraviolet radiation with fewer than 75 microwatts per lumen.

58. **Floor**
This area has a concrete floor able to support a load of at least 300 pounds per square foot. Records or artifacts are not stored in sites, which have just been painted, or had their floors sealed.

59. **Preservation**
As far as possible, museum collection materials are stored in folders and boxes or file cabinets. Acid-free paper is used with all paper artifacts.

60. **Ceiling**
The ceiling height is at least 15 ft. Standard high-density shelving requires this minimum height.

61. **Shelving**
The shelving in the storage area is bolted to the floor and braced at the top to prevent a domino effect of toppling stacks. Other types of shelving may have to be used in the museum learning environment you are observing. Stacks are arranged so there are no dead-end aisles. Shelving units are around support columns so that they will not obstruct aisles. A minimum width of 30 inches is maintained between rows of shelving.

62. **Carpeting**
This is discouraged in storage areas. Carpeting retains moisture, harbors molds, and is difficult to clean effectively.

63. **Paper And Photographic Records**
These are shelved so they are removed from the floor.
64. **Security Vault**
This is the area where special security provisions are made for objects that are valuable or vulnerable. This might include items such as gems, gold, jewelry, or important records.

Recommendation Space Allocation:
50-75 sq ft minimum

65. **Inventory Control**
Rooms are arranged in the collection storage area so that it is easy to monitor access to the collection.

66. **Collection Security**
The storage area has secure doors and very few windows.

67. **Growth**
The storage area is set up to allow for growth. An additional 30 to 40 percent over the space being used is available.

**References:**

**Section XI: General Storage**
Storage space is needed for materials unrelated to the collection. These rooms should be separate from collection storage.

Recommendation:
100-125 sq ft for each exhibition gallery

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68. **Exhibition Furniture and Equipment**
This meets the storage requirements for the pedestals, vitrines, cases, stanchions, exhibition or display panels, and furniture used in the museum area.

69. **Publications**
This meets the requirements for storage of catalogs, posters, annual reports, and other materials used in the museum area.

70. **Special Events**
Here are stored the folding tables and chairs, costumes, and all the paraphernalia needed for periodic social functions.
71. Audiovisual Equipment
A secure space with good shelving is needed. This function may be provided within the media center of a school.

72. Grounds and Maintenance Equipment-
A storage area is provided for janitorial supplies and other equipment used for maintenance of the museum facilities, grounds, and equipment. Part of this equipment should be damp mops used in cleaning and high efficiency vacuums.

References:
(Castaldi, 1994; Georgia Department of Archives and History, 2000; Hilberry, 1983)

Section XII: Shops
The facility may have separate exhibit preparation and maintenance shops or they may be part of the general school vocational program.

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73. Exhibits Preparation
Carpentry will be required for the installation of temporary exhibitions. The facility you are observing may have a separate area for this or these areas may be provided in the vocational program of the school.

Recommended Space Allocation:
Depending on the nature of the facility between 850-2000 sq ft per shop.

74. Maintenance and Building Trades
Some museums will have separate areas for maintenance, supply storage, carpentry, electrical work, sheet metal work, masonry, plumbing, electronics, locksmith work, and/or caring for indoor trees and plants. In schools, they may be supplied in the vocational program of the school. Display materials may be improvised here.

Recommended Space Allocation:
Depending on the nature of the facility between 850-2000 sq ft per shop.

75. Museum Store
This is a merchandising area to sell students work. If a separate museum store does not exist the school store may perform this function.

Recommendation:
100-400 sq. ft.
References:
(Castaldi, 1994; Charnetski, 1983; Hilberry, 1983)
APPENDIX C: SITE INTERVIEW QUESTIONS

1. Describe your relationship with the school museum in terms of job title, responsibilities, and years of association.

2. What is the size of the school system that supports your museum?

3. Describe the school museums’ educational philosophy.

4. Have the schools in the school system developed museum learning units?

5. If so, about how long do they typically last?

6. Describe the collaboration between the museum and the school system. Is it formal or informal? How are resources shared?

7. What responsibilities and processes are unique to the museum and the school system? What activities and processes are shared?

8. How has the museum changed since its creation?

9. Has the school district changed?

10. How is funding for the museum acquired?

11. How did the museum obtain its materials and artifacts?

12. How is the museum program coordinated with events in the rest of the school system?

13. How is the school museum publicized?

14. How will the school museum change to meet future demands?
APPENDIX D: POST-OCCUPANCY EVALUATION DATA REVIEW FORM

Review of the Data Obtained from a
Post-Occupancy Evaluation of (Museum Name)
(Museum Designation in Study)

Please indicate if you agree or disagree with the evaluation of each area as listed below. If you disagree with any area, please indicate or explain in the space provided.

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Additional Comments