A COMPARISON OF HISTORIC AND MODERN SCHOOL FACILITIES IN RURAL NORTH EAST GEORGIA ACCORDING TO HENRY BARNARDS'S PRINCIPLES OF *SCHOOL ARCHITECTURE*

by

DAVID CALVIN PHILLIPS

(Under the direction of C. Kenneth Tanner)

ABSTRACT

Evolution of public educational facilities in the United States was reviewed for three distinct periods of school architecture: the Agricultural Period (1650–1849), Industrial Period (1850–1949), and the Information Period (1950–1999). Of these periods identified in the review of literature, schools surveyed were originally constructed during the Industrial and Information periods.

The purpose of this study was to determine if historic schools (built before 1956) and modern schools (built after 1985) followed the principles of school facilities from Chapter II in Barnard's *School Architecture* (1848). The survey included 12 research questions categorized under the headings of *Architectural, Classroom, and Resources for Instructor*. The sample of the study included ten historic and ten modern schools paired for comparison in the areas of:

- Minimum airspace per student.
- Ease of movement for students in classroom.
- Unrestricted movement for students in seats.
- Ease of observation of students and movement for teacher in individual classrooms.

The finding of individual pairs of modern and historic schools revealed each set surveyed in Northeast Georgia did conform to the standards set fourth by Barnard. In the final analysis every school surveyed was found to comply with the principals set fourth in 1848. The modern classrooms were significantly larger in square footage per student, but not in cubic feet of airspace, yet for each of these criteria these schools did comply with Barnard's criteria.

INDEX WORDS: School facilities, Historic school facilities, Village school, Old field school, Poor school fund, Agriculture period, Industrial period, Information period

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DEDICATION

I give credit for every success, accomplishment, and award in my life to my Lord and Savior, Jesus Christ. Through the strength given daily from Almighty God, I have been able to complete this work, which I would have never finished on my own accord. Any credit I receive from this work will one day be laid at his feet.

I dedicate this work to several persons who played great roles in my personal development. To my parents, Calvin and Emily Phillips who are the greatest parents on the face of the planet; any failure I have in my life can't be attributed to their parenting. To three loving grandparents Henry and Josie Phillips who have left this world and left me with lessons which I will use until I leave and Bessie Shealy who still blesses with her wit and desire to help others.

I also want to dedicate this work to my loving wife, Cyndee who is truly a helpmate, and our children Courtney and Grayson who always make me proud. Your encouragement and love are more than I deserve.

Lastly I dedicate this work to my grandfather, Albert Curtis (A.C.) Shealy. Not a day passes that I don't think of you. Your lessons, wisdom and love of life, I will never forget, and will always attempt to carry on.

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had to do is say it did. I am sure it did, but you allowed me to see it to its completion. I love you all, and am thankful that you are part of my life.

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CHAPTER 1

INTRODUCTION TO THE PROBLEM

The history of school facilities and their place in our culture is of a somewhat romantic nature. The red one-room schoolhouse, with a bell tower, functioning as a meeting place for a community leaps from a scene in Americana folklore. The first law in the new world, pertaining to education, was passed in the colony of Massachusetts in 1642 and required that students be given instruction in reading. In 1647, the Massachusetts legislature acted again by approving the first law pertaining to school facilities, requiring "every town of over 50 families to establish an elementary school and every town of 100 families to have a Latin grammar school" (History of Education, 1972, p. 69).

Specialized schools, which required unique facilities, were founded in the 1700s and were in place to provide a practical (vocational) education for students. These schools (academies) taught subjects such as business, trade, navigation, and surveying. Benjamin Franklin was one of the founders of such a school. The academy of Philadelphia was opened to students in 1749, and soon were more practical than the more formal Latin Grammar schools.

While school programs were developing nationally, concern was growing for the places where students learn. The seminal work by Henry Barnard (1848) entitled *School Architecture, or Contributions to the Improvement of School-Houses in the United States* addressed the issue. For example, Barnard focused on common errors in school architecture. As Jean and Robert McClintock noted, "architecture designs for schools are among the best sources, short of direct observation, for discovering what actually happens in a classroom" (p. 1). The McClintock's

noted the design of suitable facilities for educating children should take into account "the number, age, and character of the students and the instructional techniques the teacher will employ" (p.2). The McClintock's noted "the differences between individualized instruction, group recitation, the monitorial system, and departmentalized schooling were palpably exposed in the layout of classrooms designed for their use" (p. 2). Our historical perspective of the educational process of yesteryear was noted by the McClintock's to be "rote instruction" and since the opportunity for direct observation of the process of learning has passed into history they propose to use "architectural pattern books and the catalogues for classroom equipment to see precisely what relations between teacher and taught were provided for" (p. 2). They consider Barnard's *School Architecture* to be the source to look to in making this comparison for the past and present day. Consider their thoughts on Barnard's work:

> But Barnard did more than edit a good pattern book, including in it some of his own designs. In doing this task well, in bringing to it a keen sense of architectural judgment and a profound understanding of education, he did nothing less than define the character of school architecture in the United States. He brought architecture and pedagogy into cooperation, and through this cooperation, he determined the characteristic concerns to which the designers of schools must still attend. (pp. 5-6)

Barnard posed a question to the educational establishment in 1848 concerning school facilities and whether they were suitable as places to inspire learning when in Chapter II of *School Architecture* he outlined General Principles of School Architecture. Have we learned the lessons of history from a facilities standpoint or are the General Principles outlined by Barnard ignored today in modern schools?

In Georgia the history of education and the facilities associated with the process can be traced to February 12, 1733 when James Oglethorpe landed at Yamacraw Bluff and established the city of Savannah. Education for the youth of the 114 original settlers of Georgia was not

even considered. Children were needed to work on the farms, alongside their parents. The parents, in the confines of the home, determined the education a child received (Jackson, 1999).

One-room community schools, called "old field schools," were established in abandoned cotton fields and funded by communities; however, instruction was noted to be poor at the facilities. Examples of rustic furniture for a field school are recorded in *A History of Public Education in Georgia*. "The seats were made from split logs with pegs inserted into the round side to add height" (Jointer, 1979, p. x). While education was not a top priority for early settlers of Georgia in 1817, the "poor school fund" was passed by the legislature. These funds would provide minimal education for children; however, most parents possessed the pioneer instinct and refused to allow their children to attend a state funded school (Jackson, 1999). Many times Poor School Funds were turned over by counties to academies. "As late as the 1850s, one out of every five adults in Georgia were illiterate. Throughout the antebellum period, the best educational opportunity went to children whose families could afford to send them to private schools or academies" (Jackson, 1999, p. 164). Simply stated, public school facilities were not an emphasis in Georgia; however, evidence of school planning and examples of architecture still remain from the early days of our history.

On October 13, 1870, free public education was established by an act of the general assembly with the title, An Act to Establish a System of Public Instruction. The bill set the leadership model required by the legislature.

> Section 1. Be it enacted by the General Assembly of the State of Georgia, that the Governor, the Attorney-General, the Secretary of State, the Comptroller-General and the State School Commissioner shall constitute a board to be denominated "The Georgia State Board of Education." Of this board the State School Commissioner shall be the chief executive officer. The clerk of the State School Commissioner, as hereinafter provided for, shall be the clerk of the State Board of Education. He shall have the custody of its records, papers and effects, and keep minutes of the proceedings:

> Provided, That such records, papers and effects, and minutes, shall be kept at the office of the Commissioner, and shall be open for inspection. (Jointer, 1979. pp. 583-584)

John R. Lewis was the initial school commissioner of public education in Georgia; however, he served only one year at his post. In 1873, Dr. Gustavus Orr, state school commissioner, reported to the Georgia General Assembly, "There were no public schools in operation under the general school laws of the state in 1872" (p. xi). Later in the 1870s schools were built in Georgia under the law of 1870. The source of funds for the Common School Fund used to build school facilities was derived from rentals paid by the state-owned Western and Atlantic Railroad, liquor taxes, poll taxes, and licensing of carnivals and shows.

> Sec. 43. And be it further enacted, That for the support and maintenance of the common schools of the State, the poll-tax, special tax on shows and exhibitions, on the sale of spirituous and malt liquor, the proceeds arising from the commutation of military services, all endowments, devises, gifts and bequest made, or hereafter to be made, to the State, or the Board of Education, any ad all educational funds and incomes not belonging to and due the State University, and one-half of the net earnings of the Western & Atlantic Railroad, are hereby apportioned to the State Common School Fund; and it shall be the duty of the State Board of Education to determine the amount which, in addition to the foregoing, should be raised annually by taxation on all the taxable property of the state, and to report annually to the General Assembly the estimate which they may find necessary to support a school in every school district in the state, of at least three months in each year, in the manner provided for in this act, the same to be apportioned in other funds, as hereafter directed. (p. 594)

Statement of the Problem

"A schoolhouse was a work of architecture to the degree that the building itself enhanced the school's performance of its cultural task: to be an emblem for its pupils of high ethical and rational standards" (Barnard, 1970. p. 19). Writers, Jean and Robert McClintock, summarized in the *Architecture and Pedagogy* section of Henry Barnard's (1970) *School Architecture* their feelings on how school facilities influence not only learning, but also the development of future citizens in society.

The study as applied to a sample of rural schools will answer the question: Have we learned the lessons of history from a facilities standpoint or are the General Principles outlined by Barnard ignored today in modern schools? This case study will document the evolution of school facilities in the United States from circa 1800 to the present in the review of literature and showcase in chapter IV historic rural school facilities in Northeast Georgia, which have survived to present day. It will compare rural historic schools to modern rural schools according to Henry Barnard's Principles of *School Architecture*. Some historic schools are still used, as educational facilities while most have been recycled to meet another need in a community outside the realm of education. It is hoped that this record will provide students of a later generation insight into the architectural history of school facilities within our state and will provide a comparison of historic facilities to modern facilities against the standards set by Henry Barnard.

The four categories of research questions, developed from Chapter 2 of Barnard's *School Architecture* were categorized under the headings of Architectural, Classroom, Resources for Instructor and Space for Movement and Ventilation, and literature for use in the study and include:

I Architectural

- Location, Style and Construction of the School
- Yard and External Arrangements

II Classroom

- Ventilation
- Lighting
- Temperature Controls
- Seats and Desk for Scholars

III Resources for Instructor

- Arrangements for Teachers
- Apparatus
- Science
- Library

IV Space for Movement and Ventilation

- Size of Classroom (Square Feet and Cubic Feet)
- Dedicated Ventilation

Measurements was taken in a classroom of each surveyed school to determine cubic feet of airspace and square feet of floor space per student. The data were compared to the minimum standards set by Barnard to determine if the minimum standards are achieved. In addition to the minimum standards proposed by Barnard two tailed t-test were used to determine if there was a significant difference in cubic and square footage in historic schools as a group verses modern schools as a group.

Significance of the Study

The goal of this study is to review the history of school facilities in the United States and collect data from historic and modern rural Georgia school facilities. A comparison of both historic and modern schools from the same geographic area will be made for each of the criteria established in Chapter II of Barnard's *School Architecture*. No evidence of such a historic study has been found either in Georgia or Nationally. The study will shed light on how rural counties have approached the development of school facilities from a historic and modern perspective how these schools will compare to Barnard's work. A by-product of the study will document how communities have maintained the architectural history of community schoolhouses and

how, through a process of evolution, these historic schools have been preserved to be points of interest in rural communities across Northeast Georgia.

Definition and Terms

Quality Engineering – Engineering a more expensive school facility, which will last over time, therefore is cheaper in the long run for the taxpayer.

Village School – Schools built in communities in early America, which offered a basic education

Old Field Schools – School facilities built in the late 1700s and early 1800s on farm fields whose soil was exhausted.

Poor School Fund – The first law pass in Georgia associated with educational facilities.

Agricultural Period – The period of time in the development of school facilities ranging from 1650 to 1849.

Industrial Period - The period of time in the development of school facilities ranging from 1850 to 1949.

Information Period - The period of time in the development of school facilities ranging from 1950 to present day

Limitations of the Study

The study of school sites was limited to Northeast Georgia. The evolution of school facilities was classified as the Agricultural, Industrial and Information Periods as defined by Lackney (1998).

Organization of the Study

This study is organized into 5 chapters. Chapter 1 includes an Introduction, Statement of Problem, Significance of the Study, Definition of Terms and Limitations of the study. Chapter II consists of a review of literature documenting the general history of school facilities in the

United States. The methodology of the study is the topic of Chapter 3. The findings of this dissertation concerning the comparison of historic and modern rural school facilities in Northeast Georgia is detailed in Chapter 4. Chapter 5 summarizes the findings of the study and states a conclusions of the study including implications for educational policy.

CHAPTER 2

REVIEW OF RELATED LITERATURE

A History of School Facilities and Planning in the United States

At the 1998 CEFPI conference Lackney (1998) facilitated a workshop on how school designers and planners "are focusing on the future of society, education and the impact these social forces might have on school facilities and learning environments in general" (p. 1). A part of his presentation focused on "waves" of educational patterns. These waves were presented in the form of a timeline. This review will use his timeline as a baseline from which to operate in reviewing literature concerning the history of school facilities and planning.

The Agricultural Period 1650 – 1849

A first hand account of a one-room schoolhouse and how it functioned in an agricultural community was published in the book *Farmer Boy* (1933) by Laura Ingles Wilder. The story contains a description of the inside of the school facility in which her husband, Almanzo Wilder, began his formal education and was described in the following manner:

> Mr. Course rapped on his desk with his ruler; it was time for school to start. All the boys and girls went to their seats. The girls sat on the left side of the room and the boys sat on the right side with the big stove and wood box in the middle between them. The big ones sat in the back seats, the middle-sized ones in the middle seats, and the little ones in the front seats. All the seats were the same size. The big boys could hardly get their knee's under the desk, and the little boys could not rest their feet on the floor.
> Almanzo and Miles Lewis were in the primer class, so they sat on the very front seat and they had no desk. They had to hold their primers in their hands. (pp. 6-7)

As illustrated by Mrs. Wilder (1933), life in a one-room school was cramped, uncomfortable and cold in the winter; nevertheless, the educational process in the early years of our country was carried on in this rural setting.

The first wave of school facilities was the Agricultural period, which encompassed the years 1650 – 1849. During this time period only 2% of all students lived in an urban setting. Parents could offer their children an education during this time by home schooling, working with other families to establish a community educational facility or sending their children to boarding school (Lackney, 1998). Tanner (2002) stated that, " Education at this time could be summed up by two words – survival and informal" (p. 5).

During this period, the schoolhouse was centered in a community or settlement area. "In essence the entire community, not only school aged children, was served by the school building" (Tanner & Lackney, In Press, p. 7). Families would migrate to an area which offered fertile land and a proper climate which was conducive to farming. Land was cleared, farms were established, and families grew. This growth was associated with two factors. First, was a lack of birth control (with the exception of abstinence), and the second was that a large family could work more land, therefore, increasing agricultural output on the family farm. Regardless of why communities increased in size, the reality was, they did. Parents of growing families realized their children needed basic education skills, and the "Village School" was built (Lackney, 1998).

The first school facility built in Georgia was proposed to General James Oglethorpe by Benjamin Ingham, who landed in Savannah on February 5, 1736 with a group of Moravian settlers who planned to act as missionaries to Indian populations in the area.

> Oglethorpe agreeded to build the school, and Ingham decided to become a teacher in the school. The building was to contain three rooms – one for Ingham, one for the Moravian missionaries and one to be used as the school. The facility was completed by September 20 and was the famous "Irene" School located on an island in the Savannah River about five miles above Savannah. (Jointer, 1979, p. 8)

In the folk humor book, *Georgia Scenes*, Longstreet (1975) gives the following description of a grammar school and plot in the year 1790. The school was located east of

Wrightsborough in the Augusta area. The description was given at the event of the "The Turning Out" of the school master where students would arrive at school early, barricade themselves in the school and not allow the schoolmaster to enter until he capitulated to their wishes. In this case the students were requiring an Easter Holiday. The school was described as:

> A simple log pen, about twenty feet square, with a door-way cut out of the logs, to which was fitted a rude door, made of clapboards, and swung of wooden hinges. The roof was covered with clapboards also, and retained in their places by heavy logs placed on them. The chimney was built of logs, diminishing in size from the ground to the top, and overspread inside and out with red clay mortar. The classic hut occupied a lovely spot, overshadowed by majestic hickories, towering poplars, and strong-armed oaks. (p. 83)

Longstreet (1975) also described the desk and seats of the educational facility as:

> A large three-inch plank, (if it deserve that name for it was wrought from the half of a tree's trunk, entirely with the axe,) attached to the log by means of wooden pins, served the whole school for a writing desk. At a convenient distance below it, and on a line with it, stretched a smooth log, resting on the logs of the house, which answered for the writers seat. (p. 88)

Additionally the floor of the schoolhouse was described in a scene where "The Turning Out" fracas between the Schoolmaster and the boys in question was going on. "The consequence was obvious – Michael's head first took the desk, then the seat, and finally the ground (for the house was not floored,) with three sonorous thumps, of most doleful portent" (Longstreet, 1975, p. 88).

Beginning in the early 19th Century, schoolhouses began to spring up across America. Before this time education was home based. The school facility in an early American settlement was the quintessential one-room schoolhouse, which accommodated students of all ages and grade levels. Its planners may have been an individual (autocrat) or committee, which saw the need for educated children. Little thought was given to what made a facility conducive to learning. The facility had to provide shelter and be lighted (usually with oil lamps). The school was generally erected by the men of the community with readily available natural resources,

which varied depending on the settlements' geographic location. Also, at the school there was a need for water, bathroom facilities, and a teacher. The school planners would secure a site where there was running water (a spring) or a well available. If no one in the community was suitable for teaching, a "search committee" was formed to find and hire a teacher from outside the community. Generally, part of the teacher's salary would include living quarters, which were also part of the "school facilities." If no living quarters were supplied at the schoolhouse, the teacher's housing would have to be provided by the families of the school-age children.

Toward the middle of the 19th Century a movement of educational reform was gathering momentum. Educational leaders Horace Mann and Henry Barnard had fought for organizing education in their respective states in an effort to improve educational outcomes. While Mann focused on passing education reform laws in Massachusetts, Barnard, educated as a lawyer at Yale, not only focused on educational reform laws but called for a reform of educational facilities as well (Schugurensky, 2002).

Barnard documented the need for educational facilities reform in his book *School Architecture*, which was first published in 1848. He summed up his feelings concerning the importance of the schoolhouse when he wrote:

> The schoolhouse should be a temple, consecrated in prayer to the physical, intellectual, and moral culture of every child in the community, and be associated in every heart with the earliest and strongest impressions of truth, justice, patriotism, and religion. (p. 55)

In Chapter 1 of *School Architecture*, Barnard (1970) consolidates reports from the states of Massachusetts, New York, Vermont, Connecticut, and Rhode Island, which give insight to the suitability of school facilities around 1848. The authors Jean and Robert McClintock wrote that these excerpts from the states' reports "explode the easy nostalgia for the rustic one-room school.

Few existing schools could serve as models for the improvements Barnard (1970) considered essential to good education" (p. 31).

Barnard (1970) listed common errors in school architecture, which he observed from the consolidated reports. He observed that schools were built in areas that were noisy, dirty, and dangerous to the students for whom the facilities were designed to serve. Also, these facilities were built with the cheapest possible materials and labor and were too small too house student populations with even a minimal level of comfort.

Lighting in school facilities was found to be poor, also. Windows surrounded classes on three or four sides. Blinds were not present to prevent "cross-lights" or "the distracting influence of passing objects and events out of doors" (Barnard, 1970, pp. 31 – 32).

Barnard (1970) was concerned with the quality of air available for students and noted that proper ventilation was not present in school facilities. He wrote: "The purity of the atmosphere is not preserved by providing for the escape of such portions of the air as have become offensive and poisonous by the process of breathing, which is constantly escaping from the lungs in vapor" (p. 32).

While Barnard (1970) was concerned with inadequate ventilation, he recorded that schools were not sufficiently heated. There were drafts due to imperfect construction in floors, walls, and ceilings. The heating of air produced indoor air pollution from having been previously breathed and was made more "noxious" by the process of combustion of organic materials inside heaters (stoves) and materials which contacted the "hot iron." Also, some students would be overheated due to close proximity to the school facilities heating source while others would be cold. There was no distribution system for heating in most school facilities.

Furnishing of classrooms was also a great concern. Barnard (1970) wrote:

> They are not furnished with seats and desk, properly made and adjusted to each other, and arranged in such a manner as to promote the comfort and convenience of the scholars, and the easy supervision on the part of the teacher. The seats are to high and to long, with no suitable support for the back, and especially for the younger children. The desks are to high for the seats, and are either attached to the wall on three sides of the room, so that the faces of the scholars are turned form the teacher, and a portion of them at least are tempted constantly to look out at the windows, or the seats are attached to the wall on opposite sides, and the scholars sit facing each other. The aisles are not so arranged that each scholar can go to and from his seat, change his position, have access to his books, attend to his own business, be seen and approached by the teacher, without incommoding any other. (pp. 32 – 33)

Barnard (1970) noted facilities were missing basic apparatus inside classrooms, which might include maps, a clock, blackboard, and a thermometer while the outside lacked landscaping which might be pleasant to the eye or trees for beauty or shade. Also missing were implements to maintain cleanliness and neatness such as scrapers and mats for boots, storage areas for coats, hats, books and lunch buckets in the facility. There was no well or area to wash hands and faces nor were there "places of retirement for children of either sex, when performing the most private offices of nature" (p. 33).

After identifying the aforementioned problems with school facilities during the Agricultural Period, Barnard (1970) identified "general principles of school architecture" which should be addressed to overcome the shortcomings of the past and would prepare school for the coming Industrial Society (p. 54). The general principles have been categorized into three areas; Architectural, Classroom and Resources for Instructor.

Architectural Principles

Location-Style-Construction

The location of a school facility should be in an area conducive to learning. It "should be dry, quiet, pleasant and in every respect healthy" (Barnard, 1848, p. 54). It should be located as close as possible to the center of a district in an area which provides a diversity of views, sun,

nature, and shelter from harsh elements. If the location is in a town, the school should be located with access to two or more streets to provide safety as students come and go from school. Sometimes districts may consolidate themselves together in sparsely populated areas and build a facility for older students to assemble for instruction in higher grades while facilities for younger children will be conducted within district boundaries.

The style of the facility should be an inspiration to children and should be well constructed. Barnard (1970) stated:

> No public edifice more deserves, or better repay, the skill, labor, and expense, which may be necessary to obtain this object, for here the health, tastes, manners, and morals of each successive generation of children will be, in a great measure, determined for time and eternity. (pp. 55 – 56)

Yard and External Arrangements

As noted earlier Barnard (1970) recognized that physical activity must be included as part of the daily school routine. School facilities should be located in a pleasant, enclosed, dry site on no less that one-half an acre. There should be trees to provide shade and should have areas designated for use by boys and girls. In larger districts an investment in playground equipment would be needed. During inclement weather a place should be provided for alternate activities of a physical nature. Barnard (1970) suggested that an area such as a basement would be suitable. The classroom should be used for nothing except instruction. Other external arrangements needing consideration was the storage of a suitable fuel supply, a well, and a bell to indicate the beginning of school and the end of recess.

Classroom Size

Barnard (1970) proposed three factors that should be considered in determining the size of a school facility. First, there should be separate entries, one for each sex, and appropriate areas for storing personal belongings and maintaining cleanliness both for personal health and for the

benefit of the building. Having separate areas would maintain high standards and decorum for the scholars.

Second, the size of the classroom should be determined by the following factors. There should be 150 cubic feet of air available per student, and students should be able to move from their assigned areas, to and fro in the classroom without being a disruption to others. They should have enough room in their seat to "engage in their various studies with unrestricted freedom of motion" and the teachers should be able to move about to any part of the room without restriction (Barnard, 1970, p. 56).

Finally, a separate room(s) from the classroom should be set-aside for special purpose. These might include a room for recitation, storage of materials and specialized apparatus, or a library.

Light

Barnard (1970) understood the benefits of a well-lit classroom and suggested that a classroom where all areas were equally lit would be ideal while glare and cross-light or reflection would not be present. Lighting from a northern exposure was ideal for limiting glare; however, it is also less intense. Windows were best used in a format, where the top sash was high and light would be evenly distributed. The base of the window should be four feet from the floor with no windows directly behind the area where the teacher is primarily located to administer instruction. All windows should have proper mechanism so they can be left open at desired heights; they should be furnished with blinds or curtains, and the bottom glass should be of ground glass to eliminate glare and obstruct outside views, which might distract young scholars.

While Barnard (1970) did not associate lighting with the general health of students, some studies have done so. An article summary by Tanner and Jago (2002) gave the following results from findings on lighting and its effects on learning:

> Taylor and Gousie (1980) noted the ill effects of poor lighting on neuron docrine functions, hyperactivity, health, and on task behavior. Hathaway (1994) concluded that under full spectrum fluorescent lamps with ultraviolet enhancement, students developed fewer dental cavities and had better attendance achievement, and growth and development than students under other light. King and Maran (1979) noted several research reports showing that florescent lighting increased hyperactivity among children compared with the use of full spectrum or incandescent lighting. (p. 1)

Temperature

Barnard (1970) wrote that no student should suffer with cold feet or drafts striking the necks or other sensitive areas of a young scholar. The ideal situation was to distribute evenly the heat as uniformly as possible around a classroom.

The best method identified for heat distribution was the open stove vented with a large pipe which promoted efficient combustion of fuel and which was much more economical in the delivery of heat than an open fireplace. A thermometer was necessary to measure the temperature around a classroom to maintain uniformity. Also, the schoolmaster should use the thermometer to track the temperature of the classroom to guard against it becoming overheated and allowing young scholars to exit from a 90-degree environment into a 40-degree environment.

In addition to maintaining temperature, a pan of pure water should be available to place on the iron of the stove to guard against the air becoming too dry. Such conditions create health problems in students and also may damage the school facility and furniture as well.

Seats and Desks for Scholars

The data recorded by Longstreet (1975) and Wilder (1933) documented the condition of the individual seating area for students in the early days of education in the United States, and

Barnard (1970) recognized the need for an appropriate seating arrangement. Barnard (1970) wrote that seating arrangements contributed to the "convenience, comfort and health of those who occupy them" (p. 68). He called for age appropriate seating for students (desks of different sizes). He wrote, "They should be adapted to each other and the purpose for which they will be used, such as writing and ciphering, so as to prevent any awkward, inconvenient or unhealthy positions of the limbs, chest or spine" (p. 69).

Requirements for the seating area included a two-foot long desk, with a top measuring eighteen inches wide. The desktop area farthest from the student would be flat and about four inches wide. The flat area should be grooved for pencil storage and have an indention for an inkwell. There would be a shelf underneath the seat for books and an area to store a slate. The remaining area of the desktop should have a slope of one inch per foot of width. In the event the desk was designed for two students to occupy, there should be a divider to separate the students.

As noted by the earlier authors, seats for students were designed as a one-size-fits-all arrangement. Barnard was appalled by such conditions and wrote that seats should be made available in variable heights. He recognized the suffering students were put through as they sat for hours in a seat without a back and their feet were touching nothing but the air surrounding their bodies. He wrote: "Nothing but the fear of punishment, or its frequent application, can keep a live child still under such circumstances, and even that, cannot do it long" (p. 72). Barnard (1970) also recognized that no matter how well seating arrangements were for scholars the mind could only comprehend as long as the tail could endure. He recommended that during the day students engage in inspections of their seating areas, singing, manual exercise, mental arithmetic and other activities to break up the monotony of the standard school day.

Resources for the Instructor

Arrangements for Teachers

Barnard (1970) recommended that the teacher have a desk of an appropriate size, located at the front of the class on a raised platform. The teacher should be able to survey the entire class but should not occupy this position permanently. A recitation area was recommended and it was preferred that it be in such an area where a scholar could not be disturbed by his classmates.

Apparatus

Barnard (1970) recorded a list of necessary basic apparatus needed to carry on a day's instruction, in addition to a suitable facility. He wrote:

> No schoolroom can be considered complete which is not provided with such fixtures, and means of visible illustrations, as will aid the teacher in cultivating in his pupils, habits of correct observation, comparison, and classification, and in making the knowledge by books orally, accurate, vivid and practical. (p. 74)\

Each classroom should be fitted with multiple blackboards with chalk trays. If only one was available it should be portable. Every desk should have a slate, pencil holder and sponge. A clock in the classroom serves the teacher as a reference for the length of individual lessons as well as a tool for teaching comparative lengths to scholars. Measuring devices should be marked in the classroom as references as well as the points of the compass, which would orient students to the directions of North, South, East and West. Devices for manipulation in counting and geometric shapes are also essential for instruction. Barnard suggested that plates (pictures) of historic scenes and places be purchased to assist in the teaching of history and geography. Considering that such plates might be a great expense, Barnard suggested that several districts share the expense and use of such plates. A magic lantern was also needed and could be used in many areas of instruction to give students an unforgettable visual image, which they would never

forget. To assist in the study of natural sciences, Barnard (1970) suggested that a collection of teaching aids such as minerals, specimens and drawings be assembled. He also suggested that collection of such aids be a student project in an outdoor classroom setting. He wrote:

> Some of the hot days of summer had better been spent in the fields, or the woods in search of the beautiful things which God has scattered over the earth and through it, with a teacher, who has a natural taste for natural science, than in the hot, unshaded schoolhouse of many districts. (p. 77)

Library

Andrew Carnegie is an example of the impact that a library can have on a student. Born in 1835 he immigrated to the United States from Scotland in 1848. (www.pbs.org/wgbh/amex/canegie) Realizing that education was the key to success, Carnegie educated himself by observation and use of public libraries. In 1853 working for the Pennsylvania Railroad as the personal secretary to the superintendent of the railroad, Carnegie desired to learn more about the operation of mechanical aspects of railroads. Seeking to study at the mechanics and Apprentices Library he was denied free membership and was barred from accessing the library. Carnegie battled the denial of membership publicly on the editorial page of the Pittsburgh Dispatch. After waging battle against Col. James Anderson, Carnegie won membership in the library. (www.clpgh.org/exhibit/carnegie.html) In a biography of Carnegie, Joseph Wall noted:

> It was also his first literary success, and for Andrew nothing else that he had known in the way of recognition by others had been quite as exhilarating as this experience of seeing his own words in print. It fed his vanity and at the same time increased his appetite for more such food. At that moment a journalistic ambition was born which he would spend the remainder of his life attempting to satisfy. (Wall, 1989)

Carnegie worked his way up through the ranks of the Pennsylvania Railroad, saving his earnings and investing in the Pullman sleeper car company he became independently wealthy.

Reinvesting his fortune in the Carnegie Steel Company his fortune ballooned to be somewhere over 500 billion dollars. Carnegie believer that his great wealth should be redistributed to provide others to learn just as he had the opportunity. Establishing the Carnegie Corporation to distribute his wealth Andrew placed $125,000,000 under their control. The corporation made grants to communities to build Carnegie library's around the country. The corporation has made grants to build free and public library's throughout America in the amount of just over $43 million dollars since its inception (Andrew Carnegie, 2002, p. 170).

Andrew Carnegie reinforced monetarily what Barnard (1970) believed which was that a school library should be open to teachers, students, and adults in the district. The books should be age appropriate and topical for the district. He wrote of the importance of a library and stated, " for it will open fountains of knowledge without money, and without price, to the humble and the elevated, the poor and the rich" (p. 80).

Space for Movement and Ventilation

Indoor air quality was an important factor in the design of school facilities. Barnard (1970) believed re-breathing air and perspiration in a closed classroom, along with the combustion of fires and lamps, created an atmosphere which was cumbersome to learning. He based his belief on an observation made in a Dublin hospital.

> Between the years 1781 and 1785, out of 7650 children, 2944 died within a fort-night of their birth-that is, more than *one in three*. Dr. Clarke, the physician, suspecting the case to be an imperfect supply of air, caused it to be introduced by means of pipes into all of the apartments, and in consequence, during the three following years, only 165 out of 4242 died within the two first weeks of their birth-that is less than *one in twenty*. (pp. 57–58 emphasis in the original)

Barnard (1970) proposed a remedy to the problem of stale classroom air by recommending there be two fresh air vents in a classroom of at least twelve inches square. One should be located close to the floor and one high in the room. The ability to close off each

should be available and the high fresh air vent should be connected to the flue in the classroom so that the natural draw of the rising hot air from the chimney would create a draw in the classroom to remove stale air, pollutants from combustion and carbonic acid. Barnard warned that such a system for replenishing air in a classroom would require a " current of warm air" to maintain proper room temperature (pp. 58 & 64).

Conclusion of the Agricultural Period

The end of the Agricultural period of education in the United States saw major reforms in two areas of facilities development. First, there was a revolution of building materials used in building schools. Brick and mortar had begun replacing logs and planks as the exterior shell of buildings; this was a first step in quality engineering. Second, organized school planning was organized by Henry Barnard and his peers. Even though his work was not implemented during the Agricultural period, it would have a lasting effect on school planners and facilities in the coming Industrial Society.

The Industrial Society 1850-1949

Inventions such as Watt's steam engine, Jacquard's loom, and Herman Hollerith's Electric Tabulating Machine created the onset of urban industrialization, which led to the "Industrial Society" (the second wave). Lackney (1998) documents this period of history as running from 1850 – 1949. During the industrial period small schools in rural areas survived; however, many changes took place in educational facilities in more urban areas. Lackney (1998) estimated that as many as 75% of the US population was urban. Lackney used the following descriptive terms to describe social patterns during this period: institutionalized, centralized, standardized, bureaucratic, hierarchy, conformity, mechanized, and specialized. The schoolhouse (or district) was centered on industrialized communities or "the factory." Tanner

(2002) recognized immigration as another factor that led to urbanization of American culture during this period. Tanner and Lackney (In Press) wrote, "During the 1920s, over 200 public schools were constructed in New York City, many if them built with modified repetition of similar plan types and architectural styles, both to reduce cost and shorten design and construction schedules" (p. 13).

With industrialization came the need for a better-educated society. Education provided the business community a better manager to supervise the mill hand. Child labor was common in industry, and many children received only the most basic education before they went to work to help support the family. Even though many children did not finish their formal education, the population concentration in urban areas forced school districts (which acted as planners) along with architects to design and build larger facilities. These larger schools and districts did offer a complete formal education through high school. These schools were multi-roomed so students were no longer subjected to classrooms where all grades were taught. Students could be segregated by grade levels (or ages if needed). These schools were usually located on small sites, and classes would sometimes hold 100 students (Lackney, 1998).

With the onset of industrialization came a change in building materials for urban areas. Factories were built of mortar and brick and would stand for many years. School planners made the shift in building materials during this time. There are still buildings in use today, which were built during the Industrial Period. It should be noted this period starts just after the publication of Henry Barnard's (1970) *School Architecture*; however, many of his beliefs on school facilities either were not discovered or planners of the time disregarded his work.

Schools in Baltimore in the 1850s through the 1880s were good examples of how to warehouse children. Schools were built to accommodate more children; however, due to the cost

of land, sites were small. Many elementary schools were built on a half-acre of land with an additional one-tenth of an acre for a playground. Facilities such as these would contain ten classrooms, and the roof would be pitched (Brubaker, 1998).

In Cleveland, a facility named the Alabama school was being built. The structure was of brick exterior with metal steps on the outside serving as fire escapes for the upper floors. Inside there were three classrooms for each of the three floors. In addition to the classrooms per floor, there were three sets of stairs, one for each classroom. No other rooms were available in the Alabama school. Originally each classroom was designed to house 100 children; however, as settlers migrated west and populations grew, so did the enrollment to the Alabama schools. The enrollment per classroom grew in some instances to 200 students per classroom. The three-story Alabama school, intended to house 900 students, housed up to 1800 students. This was in a school with no halls, cloakrooms, offices or bathrooms. School facility surveys of the time observed, "there was hardly a square foot of waste space in these buildings" (Brubaker, 1998, pp. 2 –3).

The Sterling school was developed in Cleveland in the 1860s and was a definite step in the right direction in the Mid-western city (when compared to the Alabama schools). The Sterling school was a three-story school with six classrooms per floor. Each classroom was bordered on all sides by exterior walls with windows or corridors. On the ground floor there were six egress points from the building, and the second and third floors had six sets of stairs to use passing throughout the building.

In the 1880s, Cleveland schools introduced auditoriums to their school facilities. The Giddings school was a two-story structure with a full attic. The first and second floor featured eight classrooms surrounding the auditorium or " expanded hall." While the school did have an

auditorium, it was observed by school surveyors of the time that the acoustics were quite poor. Later additions of the Giddings School moved the auditorium to the third floor attic in an effort to improve acoustics.

The final facilities innovation in Cleveland was the Memphis School. Built in the early 1900s, it was a two-story structure with an auditorium on the first floor, which was a completely separate space. This isolated all classroom sound from the auditorium and did likewise for auditorium noise.

Site selection by school planners changed in the first 25 years of the 20th Century. School sites were larger, as well as buildings and specialized spaces such as "auditoriums, laboratories, art studios, gymnasiums for physical education, and home art spaces were routinely added to the educational building program" (Lackney, 1998, p. 3). Many of these facility changes can be associated with educational movements in education driven by the likes of John Dewey and Maria Montessori and the development of Carnegie units.

Chicago schools demonstrated how mindsets on site selection changed in the 20th Century. Chicago schools of the time period 1880–1930 reflected what most would consider being standard urban schools. The Thomas Jefferson School was a four story urban looking school built on a small site. Its appearance would fit in well on Broad Street in Athens. Conversely, the Elizabeth H. Sutherland Elementary School had a very suburban appearance. It was a two-story structure with a pitched roof and cupola. Most importantly the Sutherland school was built on a much larger plot. According to Brubaker many urban schools have survived today, having been remodeled as time passed. The rugged exterior construction enabled the facility to stand the test of time. The Sutherland school is still in use today in the Chicago area.

During the 1920s, Professor Nicholaus Engelhardt began revolutionizing how school planners went about their work. Tanner and Lackney (In Press) write, "He did not hesitate to use innovative approaches to solving problems confronting school planners. He developed basic techniques for conducting school facility surveys and he advised methods for making both long- and short-range enrollment projections" (p. 20). Also during the 1920s, a group of planners met to establish the National Council of Schoolhouse Construction (NCSC). In the 1930s they began publishing minimum standards for school construction. While their work was revolutionary, they saw school systems aspiring to the minimum. In 1946 the publication of minimum standards was de-emphasized, and the group began emphasizing good construction principles for school planners (Tanner & Lackney, In Press). Just as Hollerith's Electric Tabulating Machine Company became International Business Machines, during the Industrial Period the NCSC evolved into a much larger organization for school planners, the Council of Educational Facility Planners International (CEFPI).

While Engelhardt was developing minimum standards for schools, school surveys (which included facilities) were being conducted statewide in 1923 and 1924 and were referred to by Jointer (1979) as "Minimum Standards". State school supervisor M.L. Duggan envisioned a report on Georgia schools and facilities and described how this information would be disseminated into the community.

The minimum standards included the following.

> The list will be published in the next annual report. The standard is not unreasonably high and no more than the Georgia parent has the right to expect. Copies should be posted in every county schoolroom in the State and can be secured for this purpose at any time on application to the State Department of Education. To be entitled to a diploma, a school should measure up to the standard in the following particulars:
>
> I.
>
> THE TEACHER
>
> 1. Good Teaching.

2. Good Order and Management
3. First Grade Certificate
4. Full, Neat, and Accurate School Register.
5. Daily Program Posted in Room.
6. Teachers Manual on Desk.

II
GROUNDS

1. Good Condition.
2. Playgrounds.
3. School Garden.
4. Two Separate Sanitary Closets.

III
BUILDINGS

1. Painted Outside.
2. Plastered, or Ceiled and Painted.
3. No Leaks.
4. Windows Without Broken Panes.
5. Cloak Rooms.
6. Good Doors with Locks and Keys.
7. Clean and Well Kept.

IV
EQUIPMENT

1. Patent Modern Desk
2. At Least 20 Linear Feet of Blackboard per Room.
3. Building Comfortably Heated and Ventilated.
4. Framed Pictures on the Wall.
5. Dictionary, Maps, and Library.
6. Sanitary Water Supply.

V
ASSOCIATED ACTIVITIES

1. Manual Arts, Corn, Canning, Poultry, or Cooking Clubs.

VI
SALARY OF THE TEACHER

1. At least $40 per month.

VII
TERM

1. At least seven months.

(Jointer, 1979, pp. 227-229)

With schools moving away from eleventh grade to twelfth grade graduations, there was a need to add additional facilities to all Georgia high schools in the mid 1940s through 1950. In light of published inadequacies of facilities in Georgia and the need to know exactly

what facilities were available, L.O. Rogers was hired to survey the conditions of Georgia's schools and to report back to the State Department of Education.

After long and exhausting work, the panel presented its findings on school building needs in January 1947. A digest of the summary of findings included the following:

- The school houses were in deplorable conditions.
- There were too many schools, especially small ones.
- Negro schools were in worse condition than white schools.
- School systems did not have bonding capacity to construct the needed buildings.
- Very little planning had gone into schoolhouse construction.
- Most of the good facilities were in wealthier districts.
- The 1945 constitution eliminated local tax districts, thereby removing an area of inequality within a county. But the inequalities between counties and cities had not been removed.
- A large portion of state operating funds was being wasted for lack of housing facilities.
- County and city boards needed some incentive to aid in supplying more local funds for construction.
- Local comprehensive studies were needed in each county and city to determine possible consolidations and other plant needs.
- The State Department of Education needed to furnish professionally trained personnel to assist local systems in planning for future needs.
- Legal provisions were needed for the state to underwrite financially the construction of needed schoolhouses. (Jointer, 1979, pp. 364–365)
-

During this time period when the development of minimum standards was being developed nationally and school facility surveys were being conducted in Georgia, new designs in school facilities were manifesting themselves in the Midwest. The "Prairie School Style" was developed, and an architectural design office was opened which came to be known as the "Prairie School Architects." The architects in this firm worked closely with Frank Lloyd Wright (Brubaker, 1998).

The Skokie school, built in 1922 in Winnetka, Illinois, is an outstanding example of an innovative facility in its time. It was a school built with no public monies. It was paid for by way of subscriptions. The facility was rectangular in shape and covered just less than 63,000 square

feet (including court yards). The facility featured an auditorium and gymnasium; two court yards; each with a pool; thirty-three classrooms with windows in each room; and indoor plumbing, sufficient to accommodate the school population. Each classroom had an exit directly to the school grounds and a skylight.

In 1917, the Smith-Hughes act became federal law. The act championed vocational education and funded the establishment of vocational classes in schools (Wheeler, 1948). In the Skokie school, implementation of the Smith-Hughes Act is evident. The school featured vocational classes such as printing, industrial arts, sewing, and cooking (Brubaker, 1998).

In 1940, the Crow Island School was opened in Winnetka. Today, historians consider it the "First Modern School." The firm of Perkins, Wheeler and Will, in association with Eliel and Eero Saarinen in the style of modern architecture, designed Crow Island School. Perkins was a member of the "Prairie School Architects" which was heavily influenced by Frank Lloyd Wright.

Brubaker (1998) sums up the transition created by Crow Island from existing school designs. He stated:

> It certainly demonstrates a new kind of architecture for education. In contrast to the formal, axial, traditional, multistory, heavy masonry institutional buildings of the 1900s through the 1920s, Crow Island was an informal one-story modern school built of modest materials, especially common brick, with a "Clock Tower" (actually the chimney) marking the main entrance. The clock was asymmetrically located on the chimney, a detail that generated much controversy even as the local citizens welcomed modern architecture to Winnetka. (p. 10)

Brubaker (1998) attributes the success of Crow Island to innovative superintendent, Carleton Washburne. Washburne set out to accomplish three goals during the design process of the Crow Island Facility. They were to:

1. Create a significant example of modern architecture.
2. Perform a restudy of Winnketka's educational system.
3. Redirect the learning process and the architecture it generated, recognizing the importance of how to teach and where to teach. (p. 11)

The classrooms in the Crow Island facility were unique. They were designed with the first consideration being meeting the needs of the students. The classrooms are L shaped rooms with the horizontal part of the L serving as a storage room for teachers. Lighting designed for maximum effect, along with window walls, help bring the out of doors into the learning facility. The Crow Island facility served as a model during the building boon of the late 1940s into the 1950s

The Crow Island facility implemented a unique learning environment in the third grade. This unique facility, designed for social studies classes, is used by third grade students as they study pioneer America. The Pioneer Room was part of the plans for Crow Island from its inception, and is a unique facility developed for students to learn about "creative dramatics, arts, crafts, food preservation, folk music and games." (Gould, 1970). Students spend a day in the pioneer room with their teacher experiencing what they have learned in their social studies classes in a hand's-on manner.

Gould (1970) gave this description of what students experience in the pioneer room as they play the roles of a pioneer family. Gould described:

> The very opening of the door is exciting as the children leave their classroom routine and cross a new threshold into a real pioneer home – an exact replica of the interior of an 1840 Illinois home. The massive wood-burning fireplace, the Dutch oven, the butter churn …. are all-authentic. The soft feather bed with the crossed ropes for a mattress, the little cradle and trundle bed are only a few of the properties. One also finds a bench, which becomes a table, a yoke to carry water, and paper-mache wild animals to be hunted by brave frontiersmen. It is in this authentic environment that Winnetka's third grade children come to live and play the lives of their great-grandparents for one very special day. (www.winnetka.k12.il.us/ci/ci_the_pioneer_room.htm)

Conclusion of the Industrial Society

At the conclusion of the years of explosive industrialization in America, school facilities had gone through much change. At the beginning of the period wholesale warehousing of

students had been the norm in many facilities. Outdoor areas were almost non-existent. As time passed, school facilities moved away from being viewed as sufficient if there were one inch of wasted space in a facility to granting students space to move, plan and succeed. Plumbing had been moved indoors, electricity had lighted classrooms, and architecture of school facilities had changed. This concept of change would continue into the next period of educational facilities in the United States.

The Information Society 1950-1999

In 1930 a revolution was set in motion, which would lead to the next great wave in the timeline of educational facilities. Vannevar Bush introduced to the world an electro-mechanical computer, which he named the Differential Analyzer. With his invention, the vision of Charles Babbage came to fruition. In the coming world war, the computer would play a vital role in the development of nuclear weapons through the industrial complex, and our society would start moving from a manufacturing society to an information based (high technology) society.

In World War II, large numbers of GI's were transplanted throughout the world and brought what, this writer believes, is an international mindset back to the United States as a result of their exposure to other cultures. Since World War II was fought on two fronts, it had an effect on American life that World War I did not. The seeds of International Community were planted during this time. The educational time period of Informational Society (the third wave), coupled with the idea of International community, has brought society to the beginning of the development of a global community mindset (Lackney, 1998).

In an article titled "The Search for Meaningful Reform: A Third-wave Educational System," Charles Reigulth (1987) noted:

> As the one room school house, a "first wave" educational system, was appropriate for what Alvin Tofler (1980) calls a first wave agrarian society, so our present, second-wave,

> educational system has a structure and philosophy that were appropriate for a second-wave industrial society… As we enter deeper into a highly technological, rapidly changing, information-oriented society, the present structure of our educational system will become more and more inadequate. A "third wave" system will provide a quantum leap for meeting the changing needs of our society. (pp. 3, 5)

According to Lackney (2002) "educational approaches to accommodate the third wave are not still evident. American education's response to these societal changes can be characterized as a series of tweaks to the conventional system" (2).

School facilities and their planning during this time period have taken several courses. Schools in the early years of the third wave sprang up in suburbia.

> This period was the beginning of a new age of innovation in educational architecture, although many school boards missed the opportunity to create better school facilities they struggled to cope with an ever increasing enrollment. Many schools were built too inexpensively creating poor insulated roofs and walls and poor quality building systems. (Tanner and Lackney, In Press p. 23)

The buildings were community based, and some facilities were shared with the community (playgrounds, gyms, auditoriums). "The new schools in most parts of the nation were no longer classic, traditional, colonial, Georgian, Gothic, or eclectic but were 'modern,' often meaning they were one story and flat-roofed with glass and metal window walls and brick or concrete walls" (Brubaker, 1998, p. 15). Open windows and fans were used to keep children cool. Windows along with the natural light in classrooms began to disappear as economically affordable air conditioning technologies were developed in the 1950s. Too, the lack of development of energy efficient windows, coupled with vandalism, contributed greatly to the replacement of windows and natural light. Florescent lighting replaced incandescent and natural lighting for economic reasons. According to Brubaker (1998), schools in this period were not built economically; they were cheap, lightweight structures. Maintenance and operation cost of these structures would be high in the coming decades.

As these elementary students grew, the 1960s saw an emphasis in high schools. The Ford Foundation founded the Educational Facilities Laboratories (EFL), which gave grants to systems with a desire to develop innovative school facilities. The EFL labs funded research in flexible classroom space (movable and folding walls), investigated how to build schools faster, cheaper and better, researched the use of new media (television), and encouraged the development of new leadership methods, teaching, curriculum and developing school / community relationships.

The concept of open classrooms, a new direction in facility planning can be associated to the EFL labs. Enrollment was growing in the 1960s and school facilities were larger than ever. The concept of open classrooms provided facilities with portable walls so that the shape of the learning environment could change, based on instructional needs. Unfortunately the curriculum and methodology of teaching were centered in the second wave of education. It was noted by Brubaker (1998) that while classroom facilities had changed, teachers, administrators, and architects had refused to change their methodologies of providing instruction and designing new facilities. Another factor of the open classrooms that affected students was the lack of noise-absorbing materials in the buildings. The level of noise and distraction in a building with 6 classrooms sharing the same common air space was, at best, confusing, especially to students who were easily distracted. As Goodman (1995) noted in the *Harvard Educational Review*, "Despite the sometimes impassioned rhetoric of school reform, the ways of educating children have remained remarkably durable over the last hundred years" (p. 1).

While most open classroom schools' facilities now have walls and doors marking unmovable boundaries, an example of an open classroom facility survives in Chicago. The Disney Magnet School near Montrose Harbor was built in 1971. The school is a three-story structure with ninety by ninety foot open rooms on each floor. Each floor has office and teacher

preparation space for faculty members; and at thirty-two years of age, the structure is still functioning as an open classroom, just as it was intended to do in 1971.

During this time, in Georgia, great changes were occurring with resources directly related to school facilities. In 1962, H.B. 1214, a law, which tied school funds to consolidation, was passed by the General Assembly. It funded new school construction at a cost of $10 per square foot plus architects' fees of 10% with contingencies. The Georgia senate followed suit in 1964 with S.B. 180, which tied its monies to consolidation. With growing enrollment of students, Georgia Public School facilities had fallen from a high of 3,205 schools in the early 1940s to 1,915 schools in 1968. Consolidation of community schools and the Supreme Court ruling tearing down the ideal of "Separate but Equal" meant many obsolete facilities were no longer needed (Jointer, 1979).

In the Ninety-sixth Report from the State Department of Education to the General Assembly the following facilities report was given. Of the 1,915 school plants there were 4,382 publicly owned buildings available for use with 31 buildings being abandoned. There were 89 new buildings constructed. Of the 4,440 buildings available, 2,941 were built of fire-resistive materials; 729 were semi-resistive; 503 were built of combustible materials, and 267 facilities were of mixed construction. Of these 4,440 buildings in use in 1968, 179 were constructed before 1921; 307 were constructed between 1921 and 1930; 568 were constructed between the years 1931 to 1940; 535 were constructed between1941 to 1950, and 1,720 were constructed between1951 to 1960 (Jointer, 1979).

The Adequate Program for Education in Georgia (APEG) program under Governor Jimmy Carter (1970) addressed facilities needs in public education. The following recommendation was made to the commission concerning physical facilities:

> Physical facilities are an essential tool in any school's instructional program. The subcommittee specifically studied planning, financing, renovating, and replacing buildings and materials. Particular attention was given to public library and vocational / technical school construction. The subcommittee felt that as in previous state building programs, some local financial participation should be required. Recommendations 81-83 follow:
>
> 81. A permanent planning process should be established to assess the current and future facility needs of each school system.
> 82. The state should adopt a policy of financing 80 percent of the four-year projected capital outlay needs for each school system with each system having sufficient funds available annually to develop the same proportion of physical facility needs. The local school system should provide the local school site plus an amount of revenue generated by a millage rate established by the state Board of Education and applied to all systems in the same manner.
> 83. Separate provision should be made for the construction of both library facilities and vocational-technical schools. In each case recommendations should include assessing professionals, on-site needs, establishing common construction and renovation criteria, generating sufficient funds through the issue of general obligation Bond's and establishing a classification system for ranking construction needs in priority order. (Jointer, 1979, p. 492)

During the third wave of education the development of special school facilities dedicated to specific grades came about. Junior High schools (a mini high school), which usually housed 7^{th} and 8^{th} grade students or 7^{th} – 9^{th} grade students were commonly built. The concept of middle schools began replacing junior high schools. The educational facility was developed around an educational team (cluster) of students and the teachers that would divide the students into classes and manage the educational process of the team. Middle schools were built to accommodate team activities and cooperative learning (and teaching). Middle schools in Georgia were common in the mid 1980s through present day. Some counties have developed the school within a school concept. The largest middle school in the nations exists in Georgia with an enrollment of over 3000 students.

In both junior high and middle schools, specialized classes and facilities have been developed to allow students to experiment and develop interest in skills and careers. Today

many middle schools have agricultural labs, which teach general agriculture, shop, horticulture, teen living (formerly home economics) labs, technology education classrooms, music, chorus, band, art, and career education.

With the rise in student populations in the 1950s and 1960s the decade of the 1970s was a complete reversal of trends with regard to student populations. School enrollments began to fall nation wide. With falling enrollments there were surplus school facilities. Dilapidated buildings could be torn down. School systems still had many facilities which had much use left in them. The course of action for these buildings included:

- Selling the facility.
- Leasing or renting the facility.
- Utilizing the facility for a new educational program.
- Mothballing the facility until needed in the future. (Brubaker, 1998)

Brubaker (1998) noted one negative connotation to falling enrollments and surplus buildings was that the tax paying public was not willing to vote in the affirmative on referendums concerning facility improvements. Deferring maintenance on school facilities in the 1970s created serious problems in the 1980s and 1990s.

Facility planners, architects, school boards and school administrators were caught by surprise in the 1980' when the trend of declining enrollments began to reverse. Suddenly there was a demand for new school facilities. The demand was due to overcrowding, migrating populations, and a demand for better facilities and increased birth rates. Demographic studies in the 1980s projected this trend would continue through the beginning of the twenty-first Century (Brubaker, 1998).

In the 1980s districts began solving migrating population problems with mobile units. The use of these units continues today; however, the attitude toward the use of the units has evolved from a short-term solution of changing populations to a permanent solution.

According Tanner (2000), portable facilities are inadequate from a planning standpoint as well as from a fiscal prospective. Tanner (2000) writes:

> The initial cost of a trailer in the Atlanta area is $9,006.00. Add rental, interest, and maintenance for 10 years from the data below and the monetary cost is $46.000.00 for one unit. Compare this to the 40 + years that a $100.00 per square foot school structure will last. Consider keeping one mobile unit in place for 40 years and the replacement cost is prohibitive ($186,424.00 of your money for one classroom for 40 years without inflation added). (p.1)

The use of mobile units has become so pervasive today that large systems such as Gwinnett County, Georgia are submitting preliminary plans for schools to Georgia facility planners, at the state department of education, detailing the placement of concrete pads. Schools systems are holding grand openings of new schools with mobile classroom parks housing students on the first day of classes.

Gwinnett County opened eight new schools on August 11, 2003. The system is made up of 135,000 students educated on 127 campuses. Their facilities are stretched to the limit. Six of the eight new schools were overcrowded on their opening day and housed students in mobile facilities. At the six new schools there will be over 600 students in such facilities, enough students to warrant another school facility in Gwinnett County. In the metro, Atlanta area, Clayton County reported housing students in 500 mobile units, and Henry County reported students were using 350 mobile units (Davis, 2003).

Factoring in the danger during inclement weather and the cost of portable classrooms will skyrocket when a mobile learning community takes a direct hit from a tornado or straight-line wind (wind shear) and students are in residence at the time.

The Americans With Disabilities Act and its Effects on School Facilities

"After three decades of legislation and litigation, America's public schools are opening their doors to children with disabilities. Inclusive schools are becoming the norm, and equal educational opportunity is now the right of every child. Successfully preparing children who are disabled in company with their non-disabled classmates for full participation in American society first requires that we make our schools accessible" (Ansley, 2000, p. 1).

The decade of the 1990s brought forced change in school facilities in the form of the American with Disabilities Act (ADA). The ADA passed the congress and was signed into law in 1990 by President George H.W. Bush. The law took effect in 1992. It has had a profound effect on school planners who were required by law to provide "accessible" schools, which accommodate both disabled and non-disabled students. What changes did the ADA act require for school facilities accessibility? How were these challenges met?

What exactly did the passage of ADA mean to disabled individuals? "It provides civil rights protections to individuals with disabilities in private-sector employment, public services, public accommodations, transportation, and telecommunications" (LaMorte, 1996, p. 272). Subtitle A of Title II of ADA applies directly to schools and requires that services to students with disabilities be readily accessible and available for their educational use. The ADA has two distinct criteria which affect students. The first is that students receive an "appropriate" education. This means that a school district develops and administers an Individual Education Plan (IEP) for students with disabilities. The plan is developed by school system employees and reviewed by the guardians of the student in question. The second concept is that students should be placed in a "least restrictive environment", which includes the concept of mainstreaming into

regular education programs whenever possible. The concept of "least restrictive environment" has the largest impact on school facilities and planning.

Historically, students with special needs were completely segregated from the general population in educational facilities (special schools). The idea of "Special Schools" created a vacuum in public school facilities, which made it impossible for students with special needs to be served. These schools contained barriers to disabled students such as stairs, inaccessible restrooms, water fountains, and fire alarms that did not give a visual indication to danger. "Prior to the 1970s, most physically and mentally disabled students were, in fact, excluded from public schools or were not identified as disabled" (Otto, 1998, p. 9). According to Kennedy (1999), in 1977 8.3% of total student population in the United States was students with special needs. By 1996, the total percentage of students with disabilities within the school age population had risen to 12% (Kennedy, 1999). According to the National Research Council this totals six million students (National Education Association, 1997, p. 3). The population of students with disabilities is increasing, and so must school facilities to comply with the ADA.

While the case of *Brown v. Board of Education* is considered by most as a measure against racial segregation; it also has bearing on school facilities for the disabled. Chief Justice Warren wrote after the courts' unanimous decision: "We conclude that in the field of public education the doctrine of 'separate but equal' has no place. Separate but equal facilities are inherently unequal" (LaMorte, 1996, p. 297).

The judgment of the Supreme Court not only struck down racial segregation but also dealt a death blow to the concept that those with disabilities could be educated in an environment which was substandard or segregated. The *Brown* case started society on the path which would

lead to the concept of "least restrictive environment" for those with disabilities and new challenges to school designers.

A new concept of facilities design developed by Ronald Mace is Universal Design. The goal of Universal Design was to create areas which would be usable by all people, regardless of ability or disability.

Chicago Public Schools sponsored a universal design competition for developing plans for new schools in 2000. According to Weisman (2000), universal design is planning a structure, which is accessible and comfortable for diverse groups. The diversity of groups would include disabled and non-disabled, young and old, people of different sizes, genders, and languages. Universal design meets ADA compliance and goes beyond the requirements of the law. According to the author, "It is perfectly possible to succeed in meeting the ADA regulations, but to fail in terms of the goals of universal design" (p. 2). An example given by Weisman (2000) for universal design is that he, being a large person, always uses the handicapped restroom whenever he is at an airport, even though the "large stall" was designed for wheelchair bound individuals. His dilemma is what if a handicapped person has to wait to use the "special" stall designed to ADA standards. His unique solution is to make all stalls wheelchair accessible, and the "special" label will be lost (Weisman, 2000). The concept of Universal Design might make for more inclusiveness for students with disabilities; however the cost per square foot and additional needed floor space in a building may increase the cost of building to the point that it is not economically feasible.

Abend (2001) described furniture used in a "Universal Design" classroom as "maximizing comfort and minimizing the potential for injury, eye fatigue, and being free from protrusions and having rounded edges and non-glare surfaces" (p.6). He also wrote that traffic

patterns should be well-removed from areas where students would be learning or traveling on the school campus. His plan was for universally designed schools which exceed ADA standards to be used at night and on the weekends for community based activities (Abend, 2001).

Classrooms, which are versatile both in space and furniture, are well suited to meet the needs of ADA and the needs of students. The Celebration School in Orlando, Florida, is such an example. When visiting a first grade neighborhood (classroom), one will find a ground level complex within the neighborhood. On entry to the room, there are boys' and girls' restrooms and a drinking fountain which meet ADA specifications. The restrooms are for individual use so that students may have privacy. There is one large room which can have several different lessons or groups taught simultaneously. The room has several instructional areas including wet, hearth, art and classroom instruction. Two additional classrooms branch off the main room through double doors. There is also a teacher work/office area in the neighborhood complex.

According to Abend (2001), classrooms may be versatile and not function well for students with special needs. This falls under the coverage of ADA. An example cited was that students with attention deficit disorder need "acoustical separation" to function well. A single classroom with a flat ceiling does not achieve this objective. He points out that classrooms with learning centers (alcoves) within the room or an "acoustically isolated" area may be needed for students who have trouble staying focused on task. He also recognized that having varying ceiling heights in a classroom reduced the acoustical signature (noise) in the classroom. Abend (2001) recognized the following universal design principals, which also parallel present ADA laws.

Travel distances for students should be kept to a minimum. Many special needs students have mobility problems, and travel is very time consuming. Placement of the lunchroom, gym

elective classes, library and elevators should be centrally located. A well-designed facility will consider the travel distances of special needs students. Also, exterior exits should be close to classrooms which contain physically handicapped students. Ideally, designing classrooms with an exit into a hall and to the outside is safest and takes into consideration the need to provide a speedy egress during emergency situations for all students and especially for those with physical handicaps. Well-designed facilities will ease the burden on special needs students when they travel throughout the school.

Special education classrooms should not be located in a central location but should be spread around the school among different grade levels as much as possible. This integration also reinforces the concept and ease of mainstreaming special needs students, thus reinforcing the "least restrictive environment" regulation. Good facility planners will balance special needs classes throughout the school as much as possible.

Facility planners will design schools to accommodate parent involvement. Parents of special needs students need areas in which they will feel comfortable in the school. Centrally located meeting rooms for IEP meetings and adult-only restrooms should be easily accessible to parents.

Facility planners should build into school plans ways to make students less conscious that they are different. In a world of little dignity, school design should not magnify the fact that a student has a disability. Some facility design considerations listed by Abend (2001) which will keep the school system in compliance with ADA standards included:

- Not segregating lab stations designed for special needs students.
- Special seating areas should not be set up so that special needs students are isolated from their class, peers or family to attend a function. The ADA requires that students

be able to view completely any presentation, function or sporting activity. Good facility design will also allow them not to be isolated.

- A school health suite should be designed to maintain student dignity and provide for as wide a range of solutions to health needs as possible.
- Providing the least restrictive placement for special needs students especially in small districts. In urban areas this is easier due to the large number of buildings from which to choose. In small districts providing the least restrictive placement is sometimes difficult. The ADA sometimes impacts small districts harder than large districts because of the reduced number of special needs students verses the needs of facilities to meet their individual education needs.
- Making outdoor play areas in such a manner those students who labor in movement will have pathways to follow and access to events with other students.
- With many schools utilizing natural outdoor learning centers such as marshes, meadows or wood lots, facility planners should take care to ensure that students who have special needs will be able to participate in activities in the outdoor facility. The facility designer must make sure that the student is able to arrive safely at the learning center before participating in activities with peers.
- Great care in planning must be given by facilities designers in the area of building security. Not only must the designers consider how to keep out individuals who might harm a student but also the designer must consider how to contain students whose special needs may cause them to be flight risk. Classrooms where emotionally disturbed or severe autistic children are taught will need to be carefully monitored; having egress points from the school close to their classrooms might give one a

chance to slip away if his teacher were working with another student. Also, storage closets and mechanical rooms where electrical connections or chemicals are stored should be kept under lock and key for the safety of all students.

As principals assume more responsibility overseeing their facilities, they should be conscious of the following standard ADA check points: accessible door knobs, appropriate egress points, accessible light switches, accessible fire alarms with both audio and visible warnings, bathrooms, ramps, seating areas, lab access, water fountains, curb cuts at sidewalks, signage, automatic opening doors, elevators and lifts. These specific requirements can be found in the ADA Accessible Guidelines for Buildings and Facilities.

Maintaining School Facilities

In his book, *The Seven Habits of Highly Effective People*, Covey (1989) identified traits, which predicted if a person would be effective as a leader. Considering one of the jobs of a leader is preserving the assets of an organization, he referred to three kinds of assets and how they are treated through a cause and effect relationship referred to as the P/PC (production vs. production capability) balance. The three assets are physical, financial and human.

Covey (1989) used a lawnmower he purchased as an example of a physical asset. He used it for two years cutting his lawn (Production) without maintaining the mower with the exception of adding gasoline. One hundred percent of the life of the lawnmower was spent in production (P). At the end of the two-year period he noticed the mower was not cutting as well as it had in the previous two years. He delivered the mower to a shop for maintenance and found that the engine of the mower had lost fifty percent of its power. Covey (1989) observed "had I invested in PC – in preserving and maintaining the asset – I would still be enjoying its P – the mowed lawn" (p. 54). He calculated that he spent more of his money repairing the mower than

he would have in regular maintenance. He went on to said, “In our quest for short-term returns, or results, we often ruin a prized physical asset, a car, a computer, a washer or dryer, even our body or the environment” (pp. 54-55).

Covey’s (1989) observations concerning production/production capability can be applied to school facilities and their maintenance. Facilities are physical assets devoted to preparing students to face the world of production.

As noted earlier, the 1950s and 1960s were a time of great growth in the construction of new facilities while the 1970s brought a downturn in enrollments nation wide. This coupled with the Arab Oil Embargo and the general downturn in our national economy placed many school systems in financial straights. During the 1970s, the easy solution to offset economic problems was to delay maintenance and operations expenditures on school facilities. While this was a short-term solution to budget shortfalls long term it was (and is still) an expensive decision. The production of school facilities was exceeding its production capability through deferred maintenance.

The U.S. Department of Education's National Commission on Excellence in Education, published a report in 1983 titled A Nation at Risk, which sent shockwaves throughout the educational community. The report drew conclusions on the effectiveness of classroom instruction and how our students would be able to compete in an international workplace. Several studies completed in the late 1990s concerning school facilities passed similar judgments on the maintenance and upkeep of the schoolhouses in the United States.

The article “School Facilities, Declining Conditions, Declining Opportunities” (1997) published by Policy Perspectives addresses problems facing school systems in maintaining and upgrading facilities. In the opening sentence of the report the following statement gave the

assessment of the group's findings: "Severe overcrowding, combined with crumbling buildings, electrical systems that cannot support technology, and a myriad of other structural problems in many of our nation's schools, has led to renewed attention to designing, constructing, and maintaining school facilities" (p.1). The findings of the study, based on the 1995 General Accounting Office (GAO) report concluded that:

- 33% of all schools needed extensive repairs or replacement.
- $112 billion dollars were needed to bring school facilities to satisfactory condition.
- Urban schools facilities needed more repairs than suburban schools.
- School facilities serving minorities needs were more severe.
- Facilities requiring the greatest need of repairs were least able to afford them.
- Many schools in the northeast were found to have inadequate ventilation and poor indoor air quality.
- Total student enrollment in 2001 was expected to be 54 million students. Student enrollment would require 6000 additional schools to alleviate overcrowding at a cost of sixty billion dollars. (pp. 1-3)

Many schools (31%) built in the 1950s and 60s were built as inexpensively and quickly as possible. Considering the fact that the facilities were intended to serve students for only thirty years and during the 1970s, maintenance was often deferred due to national recession conditions, many schools were at the end of their usable lifespan.

The National Center for educational Statistics released a statistical analysis report in June 2000 titled "Condition of America's Public School Facilities: 1999." The survey was based on results given in a questionnaire by nine hundred and three elementary and secondary schools in the United States. The findings of the report reinforce the 1997 Policy Perspectives report. Key findings in the National Center for Educational Statistics report included:

- One half of the schools surveyed were within five percent of maximum enrollment, while twenty five percent were exceeding their maximum enrollment. (p. Vi)
- Thirty six percent of schools surveyed reported using portable classrooms while twenty percent were using temporary space for instruction. (p. Vii)

- Onsite buildings were not in overall good condition with seventy five percent of our schools needing repairs, renovations and moderation to be classified as good overall condition. (p. B9)
- The average functional age of a main school facility was forty years while the average number of years since the last renovation is sixteen years. (p. Vi)
- A facility in need of repair needed $2.2 million dollars (p. b27) to bring the school to good condition (an average cost of $3,800 per student) (p. b9)
- There is a need of $127 billion needed for schools nation wide to achieve this good condition (p. b29)

The study also reviewed lighting, heating, ventilation, indoor air quality, acoustics (noise control) and physical security of facilities. These factors were listed as environmental factors (p. b-12). Forty-three percent of schools surveyed reported at least one environmental factor in need of upgrading, and sixty-six percent of participants in the survey needed to upgrade in two environmental areas. Schools with higher poverty levels were found to report a negative environmental condition at the rate of fifty five percent while more affluent schools reported at a rate of thirty-eight percent (p. V).

Regular maintenance is a must in protecting the facilities, which house our children as they prepare to enter the world of work. As a society, leaders in education must do a better job in maintaining the production capability of school facilities for the benefit of our children and the taxpayers.

Funding School Facilities in Georgia

Funding for renovating or building school facilities has always been a point of contention considering local property owners were taxed either through ad valorem or issuing Bond's, which were repaid using proceeds from local property taxes. In 1996 the citizens of Georgia approved a constitutional amendment allowing local boards of education to call for a Special Purpose Local Optional Sales Tax (SPLOST). SPLOST funds are collecting for a five-year

period and may be used for specific capital improvements, retiring general obligation bon debt or to pay for new general obligation Bond's for new capital outlay projects.

The SPLOST is a one percent tax and no exemptions are allowed for specific items such as food or beverage items. SPLOST collections may not last for a time period greater than five years. Independent school city systems receive a share of SPLOST funds if the voters of the county pass a SPLOST fund. The proceeds of the funds are distributed based on a ratio of students enrolled in the county vs. city system. In the event that a SPLOST fund exceeds the projected amount need to complete the proposed projects the excess revenue is either used to reduce and indebtedness of the county or is paid in to the general fund of the county and is used to reduce ad-valorem taxes (http://www.doe.k12.ga.us/doe/finances/splost.asp).

Conclusion

In this review of literature a 200 year time frame was covered which documented changes in facilities' materials, planning, laws and maintenance on a National and state level. No trends were set which affected schools in the state or nationally however national and state trends (changes is building materials, architectural styles, school consolidation, etc.) affected north east Georgia schools. The evolution of school facilities is and will remain an ongoing process in the 21st Century on the National and state level, which will affect schools in northeast Georgia.

CHAPTER 3

METHODS AND PROCEDURES

Introduction

The methodology for this study included the identification of ten sites of historic rural school facilities in the Northeast Georgia area. Each site was visited to collect historical data in the form of artifacts such as pictures, documents, renderings and; interviews were conducted with community residents who either attended the historical rural school or had a significant historical knowledge of the school. Data were also collected according to the survey instrument (Appendix A), and from written records and oral history supplied by community residents.

After historical rural sites were identified, contact with community leaders was made through county and local historical societies, local school districts, Internet searches and telephone calls. Upon making an appointment with the facility coordinators visits were made to the sites, where artifacts were documented and photographed. Modern school sites were then identified by using the Georgia School Directory. They were paired with the historic sites according to regional proximity.

After completing the survey on each historic and modern facility, measurements were taken of selected classrooms for square and cubic footage in each surveyed facility. Finally comparison was made of each rural and modern school according to Barnard's (1848) criteria. The minimum principles established by Barnard included the following five specific standards in this study.

- Sufficient square feet for classroom instruction.

- At lease 150 cubic feet of air space per student in classrooms.
- Ease of movement for student and teacher.
- Unrestricted movement for students in seats.
- Ease of observation and movement for students and teachers.

Sample

The survey was administered, and paired classrooms in 10 different rural historic schools were compared with 10 classrooms in modern schools in northeast Georgia (Appendix B). The historic schools were built during the Industrial Period or early Information Period (1956), while those classified, as modern schools were built during the Information Period after 1985.

Data Collection

The data from each paired historic facility and modern rural facility were collected from schools in "like" geographic areas. Measurements were taken of each classroom to determine the square feet and cubic feet of air space to address the issue of space. This measurement applied a constant of 30 students to maintain uniformity among historic and modern classrooms. The constant of 30 students was selected to use in the study as it matched the maximum class size for middle and high schools in Georgia at the time of the publication of this work. The instrument used to survey a typical classroom in each school was developed according to information found in Chapter II of Barnard's *School Architecture* (1848). The survey included 12 research questions categorized under the headings of *Architectural, Classroom, Resources for Instructor and Space for Movement and Ventilation.*

Architectural Questions

1. How does the location, style and construction of the historic school compare to the modern school?

2. Is there a yard and external arrangements available for student use at the historic and the modern school?

Classroom Questions

3. Is dedicated ventilation found in the historic and the modern school?
4. Is there an effective use of lighting in the historic to the modern school?
5. Are temperature controls available in classrooms in the historic to the modern schools?
6. Could suitable seats and desks for scholars available in the historic and modern schools be documented?

Resources for Instruction Questions

7. Are there suitable arrangements for teachers in the historic and the modern school?
8. Are there apparatus available for instruction in the historic and the modern school?
9. Are there dedicated science instructional materials in the historic and the modern school?
10. Is there a library available in the historic and the modern school?

Space for Movement and Ventilation

11. Are the classrooms comparable in size from the historic to the modern schools
12. Is there adequate ventilation for classrooms in the historic and modern schools?

Data Analysis

Information from the survey was read, categorized according to topic, and compared to Barnard's criteria. The historic school and the modern school were then tested according to the criteria. For example, the researcher's response on one criterion could have been "yes" for the historic school, and on the same criterion, could have been "no" for the modern school.

Also, a paired sample t-test was conducted, using SPSS, to determine if there was a significant difference in square feet classroom space in all historic schools and all modern schools. A similar test was conducted to determine if a significant difference existed between each group based on cubic feet of airspace.

CHAPTER 4

SCHOOLS SURVEYS

Introduction

Twenty schools were surveyed and the results compiled into ten comparative data sets. The results of the comparison should reveal if historic or modern schools better follow the School Facilities survey developed by Henry Barnard in 1848.

Comparison Study Number One

Historic Site – Franklin County Trade School- Occupation Date1956

Modern Site – Franklin County Middle School 7th Grade Wing – Occupation Date 2001

Findings

Franklin County Trade School

Franklin County Trade School (Figure 1), (Figure C1) was opened for student occupation in 1956. The school was built to serve as the African American students for Franklin County, under the educational ideal of the day of "separate but equal." After the *Brown* v. BOE decision of 1954 the facility was destined to be used by an integrated population of students in Franklin County. The site became Franklin County Junior High School in 1973, after the Red Hill Community School (built in 1954) was moved to the trade school site, to accommodate the seventh and eighth grade students of Franklin County. The Trade School is unique today in that

Figure 1: Original Entrance to Franklin County Trade School

it is now part of the campus of Franklin County Middle School and was attended by this author in the 1970's when it was Franklin County Junior High.

The brick facility (Figure 2) is located just outside of Carnesville, Georgia in a quiet, rural surrounding. The site is well drained with no water standing for long periods of time, even during inclement weather. The facility is built on a slab. The plot on which the school was located consists of 37 acres. There was a well for drinking water, with bathrooms located inside the building. The facility was designed to serve students of all ages and grade levels.

Figure 2: Example of Brick Detail

The size of an average classroom (Figure 3) in the facility is 625 square feet. The classrooms were standard for their time period. The exterior wall in each classroom had a bank of slide out windows 5'8" tall which ran the length of the classroom. Transom windows were on the hall (interior) wall of the classroom. Each classroom was lighted by six hanging incandescent fixtures which contained one 300 watt bulb per fixture.

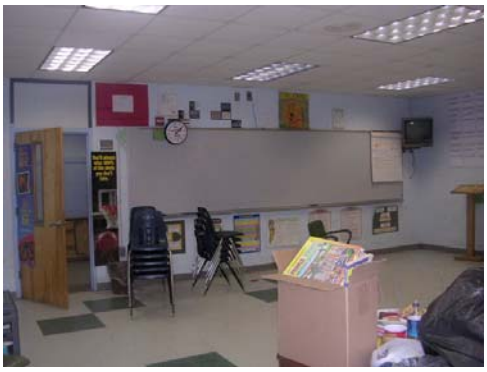

Figure 3: Surveyed Classroom at Franklin County Trade School

Classroom ventilation was achieved through opening the slide out windows, transom windows and classroom door. During the winter, there was no dedicated ventilation for classrooms.

Mechanical temperature controls were available in each classroom. The site used a fuel oil boiler, which circulated hot water to individual classroom radiators. At the top of each

radiator was an opening through which a thermal current flowed. Cranking a mechanical door to cover the opening could block the thermal updraft. There were no thermometer or humidity controls in the classrooms; or was there air conditioning in the school. Each classroom had a fan to promote air circulation.

Classroom furniture included basic metal-bottomed individual student desks, a teacher desk, file cabinet and built-in storage closet. The slope on the student desks met the criteria of one inch of slope per one foot of desktop. Each desk provided a storage area for books. A suitable square footage seating area was provided for each student.

Teachers were able to observe the class from their desk area and could freely move about the room. Teaching apparatus standard for classrooms included a teacher's desk, file cabinet, globes or maps, a blackboard with a chalk tray, a clock, discipline specific tools, science specimens and pictures or posters. Media delivery systems (film) were available, as was a library.

The building was situated on a spacious site; however there is no record of an organized playground and no gym was available. The 37 acres of the campus did provide plenty of room for outdoor activities.

Franklin County Middle School Seventh Grade Wing

The seventh grade wing of Franklin County Middle School (Figure 4), (Figure C2) was constructed in 2000 and occupied in 2001. The brick clad building was an addition to the campus and seventh grade students moved from the original trade school classrooms, which were first occupied in 1956.

Figure 4: Exterior of FCMS Seventh Grade Wing.

The facility has a gym/assembly area, interior restrooms and is served by city water. The facility is built on a slab and is located in a quiet location. The area around the building is flat and an engineered drainage system was installed during construction to assure there is no standing water around the building.

A standard classroom in the facility (Figure 5) contains a floor area of 720 square feet. Both students and teachers have an ease of movement in the classroom. Storage rooms are available on the hall for teachers along with classroom closets. Florescent lighting is used in addition to one small window located in each classroom. Though the natural lighting was not measured in intensity by the author, the effect of lighting provided by the window would be estimated as having a minimal impact at best. The push out style window doubles as a fire exit, according to the Georgia Fire Marshal's Office.

Figure 5: Surveyed Modern Classroom at FCMS.

From an interview with the principal, it was indicated that there is no dedicated classroom ventilation to circulate fresh air for students to breath from the outside of the building. Interviewing a mechanical engineer, who specializes in HVAC design, the author found that all modern buildings have an international code for the introduction of fresh air in facilities, which is set by the American Society of Heating Refrigeration Air-conditioning Engineers (ASHRAE). In schools, the code states that a facility designed for students introduce 20% fresh air into the facility. A school classroom with a HVAC fan circulating 100 cubic feet per minute (cfm) of air would be required by international code to introduce 20 cfm of outside air into the room or rooms served by the HVAC unit. Every person interviewed on modern school sites responded to

the question asked from Barnard's survey concerning fresh air with a no, there was no fresh air mechanism build into their HVAC systems, when in fact there is such a system.

At Franklin County Middle School each classroom contains an HVAC unit, (Figure 4) which uses natural gas in the winter. The teachers in individual classrooms control each HVAC unit, however a complaint among teachers interviewed was that the units are quite noisy. The units do not contain dedicated humidity control equipment.

Standard age appropriate desks, which contains a bookrack in each unit for storage of personal items are available for students. Individual desks do not slope at one inch per foot as recommended by Barnard. Each student does have a seating area with two feet of clearance per student.

The entire classroom is visible from the teacher's desk and teacher movement is possible without causing a disruption to the class. The teacher's desk is not located on a raised platform. Additional teaching apparatus such as marker boards with trays, maps, computers, posters, media delivery systems and scientific specimens (in specified science classrooms) are available.

A library is available for student use. There is also a practice field for football and soccer teams to use. A pavilion is located in the wooded area behind the school, as well as a " Ropes" course for student and community use.

Comparison Statistics for the Franklin County Trade School and Seventh Grade Wing of Franklin County Middle School

Table 1

	Historic School	Modern School
Site	Franklin County Trade School Occupation Date 1956	Franklin County Middle School Occupation Date 2001
Square feet in classroom	625 square feet 20.83 square feet per student *	720 square feet 24 square feet per student *
Minimum of 150 cubic feet airspace per student	Yes, 260 cubic feet per student * 7,812.5 cu. ft. total	Yes, 228 cubic feet per student * 6,840 cu. ft. total
Ease of movement for Students	Yes,	Yes
Unrestricted movement for students in seats	Yes	Yes
Ease of observation and movement for teacher	Yes	Yes

* @ 30 students per classroom

Comparison Study Number Two

Historic Site – Hartwell Elementary School – Occupation Date 1934

Modern Site – Hartwell Elementary School – Expected Occupation Date 2004

Findings

Hartwell Elementary School (Original Construction)

Hartwell Elementary School (Figure 6), (Figure C3) is a historic structure located in the center of Hartwell Georgia. Today the building, which is a listed on the National Historic Register, is being remodeled and will be incorporated in the campus of the new Hartwell Elementary School. First occupied in 1934, students in the near future will again walk on the original red oak floors. The facility served white students in grades one through eight.

Figure 6: Main Entrance to Hartwell Elementary School.

Hartwell Elementary was a state of the art school built during the great depression. Steam radiators served each classroom and indoor toilets were included in the facility. City water served the students in 1934. The building exterior is brick veneer and the sub floor is built on pillars. The facility is located in a quiet residential area on a 7.311-acre lot. The plot is flat and the possibility of problems with standing water were possible, however the basement of the gym showed no unusual wear due problems caused by standing or seeping water over 70 years of use.

The ceilings in each classroom are 12 feet high. Classrooms each have a small, built-in bookshelf and storage area. Based on the observations of the author and shape and size of the classroom, student movement and observation of the classroom was no problem for the teacher. In each classroom there is a large bank of windows (Figure 7), which make for abundant natural

lighting in all classrooms. There is one chimney in the facility, which served the original coal burning and natural gas boiler for the steam heating system. Controlling the steam radiators was a mechanical process achieved through using a manual valve to curtail or increase the flow of water through the radiators. Presently the school is served by HVAC for heating and cooling. There is a thermometer in each classroom for controlling the HVAC system; however, there was no historical evidence that classrooms used a thermometer to control the steam system.


Figure 7. Window Bank @ Hartwell Elementary

Classroom ventilation was achieved through the window bank in each room, which were not sealed. The facility used an attic fan system in the halls, which ventilated the classrooms. Each classroom also has a transom door window and three transom windows located in the interior hallway walls of each class.

The layout of the classrooms was suitable for students and teachers. It appeared that teachers would be able to monitor students with ease. There was a black board and chalk tray present in each class. Maps and globes were available for students to use in appropriate classes. There was not a library in the school when it opened.

The average classroom at Hartwell Elementary (Figure 8) consists of a floor area of 609 square feet. The surveyed classroom had a cubic airspace of 7,308 feet of air for students. The walls were covered with plaster. Lighting had been changed from incandescent to florescent at some time in the past, however the writer


Figure 8. Surveyed Classroom at Hartwell Elementary.

was unable to determine when the change was made. There were no desks, which would have been original to 1934 in the classrooms to survey; however, based on the size of the classrooms a conservative estimation can be made that students had sufficient seat space and teachers could observe the entire class and move about without causing disruptions.

The gym at Hartwell Elementary School (Figure 9) easily seated seven hundred students and parents for athletic events. The gym also had a large stage, which could be used for assemblies, plays or town meetings. Dressings rooms were available in the split-level down stairs under the stage and there are also stage right and left storage rooms for the stage area. There is no record of a playground on the original site, however it would be a safe assumption that a facility of this caliber would have had basic playground equipment for student use.

Figure 9. Gym at Hartwell Elementary.

Hart County Elementary School (New Construction)

The new construction on the site of Hartwell Elementary school grounds is located behind and adjoined to the original facility built in 1934. The new facility (Figure 10), (Figure C4) is built to serve all students in the kindergarten through third grade. Fourth and fifth grade students will be housed in the original facility, on which renovations will start in the near future.


Figure 10. New Construction at Hartwell Elementary School

Although the new facility will not be occupied until the fall of 2004, the facility's director for Hart County Schools granted the author permission to visit and survey the site. In contrast to the historic facility, each classroom in the new construction area will have only one three foot by three foot window for natural light. There is also an exterior exit door with an additional three by three window. Classroom illumination will be provided almost entirely by florescent lighting. It is a huge change from the 1934 construction. Classrooms in the new section (Figure 11) contain 838 square feet of instructional space. Classrooms will have suitable space for students and teachers and will provide for ease of movement for both.

Figure 11. Modern Classroom at Hartwell Elementary School.

Ventilation in the facility will be provided exclusively by the HVAC system (Figure 12). The windows in each classroom are sealed. The heating side of the HVAC unit uses natural gas to provide combustion for heating purposes. Individual room controls are present in each classroom.

Figure 12. HVAC Unit at Hartwell Elementary

The classrooms are of a size to provide a suitable space for students and teachers to have individual space. Classroom fixtures have not been purchased and could not be surveyed. Teaching apparatus such as marker boards and trays will be available along with modern media presentation systems.

One negative in the construction of the new facility on the Hartwell Elementary plot is that the new facility consumes more of the precious land resource available. The site is

completely surrounded by streets lined with single-family dwellings, with no ability for expansion without purchasing land and closing city streets.

Also included in the site is a library, which will also serve as the distribution center for media throughout the facility. A new playground is planned on the limited space allowed and the gym will also be remodeled.

Comparison Statistics for Hartwell Elementary and the New Hartwell Elementary Addition

Table 2

	Historic School	Modern School
Site	Hartwell Elementary School Occupation Date 1934	Hartwell Elementary School Occupation Date 2004
Square feet in classroom	609 square feet 20.3 square feet per student *	837 square feet 27.9 square feet per student
Minimum of 150 cubic feet airspace per student	Yes, 244 cubic feet per student * 7,308 cu. ft. total	Yes, 251 cubic feet per student * 7,533 cu. ft. total
Ease of movement for Students	Yes,	Yes
Unrestricted movement for students in seats	Yes	Yes
Ease of observation and movement for teacher	Yes	Yes

* @ 30 students per classroom

Comparison Study Number Three

Historic Site – Bond's Academy School - Occupation Date 1890

Modern Site – Danielsville Elementary – Occupation Date 1994

Findings

Bond's Academy

According to a local community historian, the Bond's Academy School (Figure 13), (Figure 14), (Figure C5) was built in 1890 on the site of the old Shiloh Church, which was built in 1869 and burned in the 1889. At that time the church deeded the property to a group of trustees for the Academy. The facility has withstood the test of time and several substantial modifications (Figure 14). The clapboard sided school is located in the Shiloh community of Madison County, 8 miles north of Danielsville just off of Highway 29. Many families in the area had a grandparent and, or parent attend the academy (which is the case for the researcher's family).

Figure 13. Bonds Academy School

Meeting with a community coordinator for the facility, which is now owned by the Jones Chapel United Methodist Church, the facility survey was administered and a discussion on the history of Bond's Academy ensued. Originally, the facility served the students in the community and offered a plan of study for students in the first through eleventh grade. According to the community source, a spring

Figure 14. Rear Entrance to Bonds Academy School.

served the students for drinking water in the days of his father's attendance and a well served the school when he attended in the early 1940's. The school was a two-story building with five rooms on the first floor when it first opened and was attended by the researcher's grandfather. In 1939, when attended by the researcher's father, the facility had been modified and functioned as a single story school. The bathroom facilities serving the students, were outhouses located in different areas on the school plot (separated for girls and boys). Today, the facility serves the local Boy Scouts of America troop in the community. Based on the interview with the community member and family members, classes at Bond's Academy were numbered around 25 students per classroom in the early 1940's.

The pillars supporting the facility were built of stones, which were probably gathered from the site. The area would have been quiet in the day of the operation of the school and the slope of the site provides for water drainage away from the building.

Measurements made in one of the three remaining classrooms revealed dimensions of 23' x 22' with a ten foot ceiling. Total square footage in the classroom was 506' with a cubic feet measurement of 5,060'. Applying the constant measure used in the study of 30 students per classroom, each student would have had 169 cubic feet of air space surpassing Barnard's recommendation of 150 cubic feet by 12.6%.

It would appear to the researcher that crowding would have been a problem in the small classrooms, however when a question was asked concerning classroom overcrowding the community coordinator of the facility responded, "we had plenty of room to have school." Based on his remembrance of his school days there was plenty of room for students and the teacher to complete the task of instruction. He also remembers always being under the watchful eye of his instructor. There was neither library nor dedicated storage rooms in the facility. One

of the five first floor classrooms was converted into a lunchroom in 1942 for students, however there was no kitchen. Students brought their own lunches.

In 1890, when the school was opened, the facility was lighted by natural light. There is no evidence of supplemental lighting being used, however an assumption could be made that if such lighting were used it would have been in the form of oil lamps. Electricity was run to the structure, probably during the late 1920's according to the community member. In1939, when the researchers father was enrolled at Bond's Academy, the building was electrified and each classroom had two incandescent bulbs hanging from the ceiling for lighting. Of the three remaining classrooms on the site all have windows on at least two outside walls of the classroom.

Heating of the facility was accomplished by individual coal burning stoves in each classroom (Figure 15). The stoves were ventilated through a system of flues connected to two chimneys in the facility. The last principal of the school, who also served as a teacher in her first year of service to students in Madison County, recalled a morning when a student bumped the stove and the pipe fell from the ceiling to the floor. She recalled the rest of the lessons of the day concerned cleanliness. Memories of students in the school do support the idea of humidity being controlled in the classroom by having a pan of water on the stove in a classroom. In the summer ventilation was accomplished using the large double hung windows in each classroom and the

Figure 15. Classroom Stove at Bonds Academy.

transom windows above the doors. The walls of the facility as well as the floors and ceilings were tongue and groove. The construction was very tight for its day. There is no insulation in the facility. When the community coordinator was asked about interior climate conditions during the changing seasons, he responded that they were never hot or cold. Also the community coordinator never remembers a thermometer being present in the classroom. The students simply adapted to the climate changes and dressed accordingly. There was no dedicated ventilation as suggested by Barnard to bring fresh air into the building during winter months. Considering the facility was constructed of wood and was not insulated, it can be assumed that stagnant air in the facility would not be a concern.

Classroom furniture was available to measurement and document at Bond's Academy. Turn of the century desks were found in the facility, which matched up, in likeness with desks in the Madison Graded School (Figure 51), which is described later in this chapter. While the community coordinator did not know if desks (Figure 16) were original to the opening day of the facility, they were well worn and well preserved. The tops of the desks did slope at the rate of one inch per foot as recommended by Barnard and they did have a dedicated storage area for students.


Figure 16. Desk at Bonds Academy School.

According to the community contact person for the facility, a former teacher and the author's family members, teacher arrangements within the facility were sparse at best. There was a teacher desk in each classroom, a globe, and blackboards in each classroom. There was one clock in the entire school. There were no maps available for either instructional purposes or

geographic plates. One teaching apparatus in each classroom, where lower grade students were taught, was a pointer stick and an alphabet, which ran across the top of each blackboard. A unique characteristic found among some of the students who attended Bond's Academy in the late 1930's throughout Madison County is that they can said the alphabet as quickly backwards as they can forwards. This is due to the use of a teacher apparatus in the facility. The first grade instructor at Bond's Academy used the alphabet posted in her classroom to teach memorization. The teachers finished the alphabet (….x, y, z) then she would said the alphabet in reverse (z, y, x …..) reciting the lesson backwards while pointing at each letter with the pointer. Based on the memory of former students there were few specimens used in science or geology and there was not a library available in the school.

The entire area around the school was undeveloped and there was much room for play. There was no playground equipment available. According to former students at the facility, the children entertained themselves while enjoying recess.

Danielsville Elementary

Located in the county seat of Madison County is Danielsville Elementary School (Figure 17), (Figure C6). The facility is located on the edge of town in close proximity to Madison County Middle School and Madison County High School. Students in kindergarten through fifth grade are taught at Danielsville Elementary. The site for the school is located on 21 acres of land. Currently Danielsville is utilizing 6 mobile classrooms on the site. Presently the Board of Education is considering a redistricting plan, which, if passed, will relieve the growth the school

Figure 17. Danielsville Elementary School.

recently has experienced. Presently the school accommodates five hundred and sixty students within the facility and mobile classrooms.

Grade levels within the facility are arranged in a pod layout. They are grouped together in common areas of the facility. The classroom surveyed (Figure 18) covered an area of 864 square feet and contained 8,510 cubic feet of air space. A fifth grade classroom with 30 students would accommodate each student with 283 cubic feet of individual air space, almost doubling Barnard's recommendation of 150 cubic feet per student. Sixty percent of the classrooms in the building have an exterior exit. The classrooms in the building without a dedicated exit have a classroom adjacent to it with a dedicated exit.


Figure 18. Danielsville Elementary Classroom

Florescent and natural lighting enhancement, provide lighting in the classrooms. A majority of classroom's exterior walls are windowed (Figure 19) with a bank of windows located toward the ceiling of each classroom. Barnard recommended that the bottom of windows be located a minimum of four feet from the floor. The windows in Danielsville Elementary are located seven feet from the floor to the bottom of the window. The classrooms did gain natural lighting from the windows, however students can view very little of the outside world. The windows are sealed so they provided no outside ventilation for individual classrooms.


Figure 19. Danielsville Elementary Interior Window

Ceiling heights in the building are nine feet ten inches above the floor. Interior walls are concrete block with brick covering the outside of the building. The exterior walls are insulated and the facility is constructed on a slab. The site has a gym, which serves as an auditorium and has a very attractive library for students and faculty to use. The site is served by city water and sewer utilities.

Heating and cooling was attained in the facility by individual HVAC units for each classroom. Electricity is used as an energy source for each side of the unit. Each classroom has a thermometer for the control of the HVAC unit, however there was no individual humidity control system for each classroom. The HVAC system does circulate fresh air into the classroom from outside as required by international codes.

Student furniture in classrooms varies in style depending on the grade level being taught. Desktops (Figure 20) for students are not sloped at the one inch per one-foot ratio recommended by Barnard. Teacher arrangements are suitable and teachers are able to view the entire classroom from any area. Normal teaching apparatus such as marker boards and trays, maps, globes, science specimens and critical discipline materials are observable throughout the building.

Figure 20. Desk at Danielsville Elementary.

Danielsville Elementary has a suitable fenced playground for students to use. However, there is no shade available to students to give them relief from the sun around the play area.

Comparison Statistics for Bond's Academy and Danielsville Elementary Schools

Table 3

	Historic School	Modern School
Site	Bond's Academy Occupation Date 1890	Danielsville Elementary Occupation Date 1994
Square feet in classroom	506 square feet 16.9 square feet per student *	864 square feet 28.8 square feet per student *
Minimum of 150 cubic feet airspace per student	Yes, 169 cubic feet per student * 5,060 cu. ft. total	Yes, 283 cubic feet per student * 8,510.4 cu. ft. total
Ease of movement for Students	Yes,	Yes
Unrestricted movement for students in seats	Yes	Yes
Ease of observation and movement for teacher	Yes	Yes

* @ 30 students per classroom

Comparison Study Number Four

Historic Site – Chestnut Grove – Occupation Date 1888

Modern Site – Hull Sanford Elementary– Occupation Date 2001

Findings

Chestnut


Figure 21. Chestnut Grove School.

According to unpublished historical documents, the Chestnut Grove School (Figure 21), (Figure C7) was established in 1887 when Floyd Kenny donated land to the Clarke County Board of Education to establish a school for black children. The school stands today on the grounds of Chestnut Baptist Church at the intersection of Timothy Bridge and Epps Bridge Road and is maintained by the congregation of the church. The Chestnut Grove School was listed in the National Register of Historic Places on June 28, 1984.

A re-creation of a survey, furnished to the author by a church member, of Negro Schools in Clarke County revealed that in 1916 there were 14 such schools. Of the 14 schools, four were located in church facilities at the time. The historic survey revealed that 12 of the schools were one room, one was made up of two rooms and one was a three-room schoolhouse. One of the 14 schools contained a cloakroom and six were painted on the exterior. All of the desks at the Chestnut school were homemade, as were the desks, according to the available information of the other 13 schools. Other aspects of facilities surveyed included playgrounds, location, presence of a flower garden and general conditions. Of the eight survey components of the

Chestnut school, the following data was attained. The building was a one-room schoolhouse and was painted. There was no cloakroom and desks were hand made. There was a playground ranked as good, as was the location and general condition of the building. There was no flower garden on the site of the facility.

According to the documents on display at the historic facility, community members built the school out of rough sawed pine lumber and weatherboard siding. The interior of the facility was covered with tongue and grove pine boards on the ceiling, walls and floors. The floors and ceilings were replaced during renovation, as was the hip roof of the school. On completion of the construction of the school, the Board of Education took over the operation of the school. Accorded to unpublished documents, the entire community cooperated in the operation of the school including maintenance and furnishing materials for students such as chalk and books. According to a local historian interviewed by telephone, the school originally served students first through eighth grade. The single room was divided into four areas with classes being held in a separate area for first/second, third/fourth, fifth/sixth and seventh/eighth grade students.


Figure 22. Stove at Chestnut School.

A wood burning pot-bellied heater (Figure 22) was used to warm the un-insulated building. Later the school used coal to fire the stove. Six double hung windows were used to give light and provide ventilation to the students in the single classroom in the structure. Handmade shutters original to the opening of the facility remain today. A student who

attended the school (CIRCA 1934) remembered gathering wood from the forest around the school to burn in the stove. According to the student, lamps were present in the facility but were only used at night. Also inside the school was a kitchen space for heating the student lunches.

According to written history of the school there was no well on the property when it was built (CIRCA 1888). Water was carried, by students, from a neighbor's well for students to use. The historic records reveal that a well was dug at some point in time however an exact date can't be confirmed. The former student interviewed remembers having a well on the property, from which they drew water from in the 1930's. There were also two outhouses, which are no longer present on the property for students' use,

The single classroom (Figure 23) at Chestnut Grove was served by one suspended chimney, located in the center of the building. The chimney was removed and placed on the south side of the facility when church members restored the school. Measurements of the classroom revealed floor dimensions of 34' x 21' with a ceiling height of 12 feet. Total available floor area was 714 square feet and total airspace measured 8,568 cubic feet. A classroom of the standard of 30 students used in the study would have allocated each student a dedicated floor area of 23.8 square feet and a cubic air space of 285.6'.

Figure 23. Chestnut Grove Classroom.

There were no original student desks on display in the schoolhouse. There were two replicas of desks (Figure 24), built to specifications dictated by former

Figure 24. Recreation of Desk at Chestnut Grove.

students on display. The desks were not sloped as recommended by Barnard. As can be seen in the photograph, the back of the seat had the desktop of the desks immediately behind attached. Judging by the size of the desks, young students would have no problem functioning in them; however, there was no record of age appropriate desks being available for students use. The desk (if used by one student) would have provided students with sufficient workspace. Based on the dimensions of the classroom, the author's judgment would be that a teacher could function in the classroom and move about without causing student disturbances.

There was no evidence of a teacher's desk, however the former student interviewed recalled there was a teacher desk and bookcases and other basic furniture available. Students around 1934 did not use slates for written work. Only the chalkboard was used according to the student. The author was not able to determine if slates had been used early on in the history of the school. There were no chalkboards or trays for erasers and chalk. The walls of the building were painted black and functioned as blackboards for students to display written work. Photos of the facility today (Figure 25) show recreations of historic writings left on the chalkboards of the school when it closed in 1956. The students who attended the school (CIRCA 1934) also recalled there were no maps, globes nor a clock in the school.

Figure 25. Recreation of Chalkboard Painted on Classroom Wall.

Based on the lay of the classroom, it is a reasonable assumption that the entire class would have been visible from the desk of the teacher. There is no record if the teacher's desk was on a raised platform.

Outside the school were the church and a wooded area surrounding the facility. There was no playground equipment available in the 1930's nor was there any photographic evidence of playground equipment available during any other eras of the use of the facility. The recollection of the students interviewed was that during recess time students entertained themselves playing kickball, baseball or playing in the woods or around the church and school building.

Hull Sanford Elementary

The Hull Sanford School, (Figure 26), (Figure C8) built just outside of Clarke County in Madison County is located on 70 acres of land in the countryside between Highways 106 and U.S. 29. The site is well drained and appears to be in a rural area, while it is less than ten minutes from downtown Athens. The Architectural Firm of H. Lloyd Hill and Associates designed the school. While not an exact copy of the Danielsville School, located twelve miles to the north in Madison County, the Hull Sanford School bears a striking resemblance to the Danielsville School on both the inside and outside. Housing 460 students in kindergarten through fifth grade, the school is not operating at the capacity of 500 students for which it was designed to house, but will meet its capacity enrollment in the near future.

Figure 26. Hull Sanford School

The typical classroom (Figure 27) size in the

Figure 27. Classroom at Hull Sanford School.

school is 783 square feet of floor space. All ceilings in the building are 9' 10" above the floor. This area allows in a classroom of 30 for students to have a dedicated area of 26 square feet each. The 9' 10" ceilings create an air space of 7,712 cubic feet within the classroom allowing airspace of 257 cubic feet of airspace per student, which exceeds Barnard's recommendation of 150 cubic feet per student. The size of the classroom does allow for unrestricted movement of students and the teacher in the classroom.

Florescent lights serve each classroom and lighting is enhanced by windows (Figure 28) located in the top two feet of wall space in each room. The window bank is 16 feet long. The windows are sealed. Ventilation to classrooms is provided by a total electric HVAC system. Each classroom does have a dedicated HVAC unit, which is controlled in the classroom by individual teachers. The walls of the facility are insulated. 64% of the classrooms have exterior doors.


Figure 28. Classroom Windows at Hull Sanford Elementary.

The size of the site does allow for students and teachers to have room to spread out and explore outside of the classroom. Wildlife in the area is abundant. An outdoor learning center, featuring a butterfly garden, is located outside the large picture windows in the media center, which is in a direct line of site on entering the school.

Student arrangements in the classroom are suitable for the age group served. Desks and


Figure 29. Tables at Hull Sanford School

tables(Figure 29) are of an appropriate size for students, however the recommended slope by Barnard in his 1848 publication is not followed. The students and teachers do have the ability to move around the room without creating a disruption and most classes visited had multiple activities going on simultaneously. The teacher was able to view any area of the classroom from her desk without any problem. Standard discipline specific teaching apparatus was apparent in the facility.

There was a suitable playground on the facility. During the survey the playground was being used by a group of second grade students and was functioning well in allowing the expenditure of energy from the pupils.

Comparison Statistics for Chestnut and Hull Sanford Schools

Table 4

	Historic School	Modern School
Site	Chestnut Occupation Date (CIRCA 1888)	Hull Sanford Elementary Occupation Date 2000
Square feet in classroom	714 square feet 23.8 square feet per student *	783 square feet 26 square feet per student*
Minimum of 150 cubic feet airspace per student	Yes, 286 cubic feet per student * 8,568 cu. ft. total	Yes, 257 cubic feet per student * 7,712 cu. ft. total
Ease of movement for Students	Yes,	Yes
Unrestricted movement for students in seats	Yes	Yes
Ease of observation and movement for teacher	Yes	Yes

* @ 30 students per classroom

Comparison Study Number Five

Historic Site – New Smyrna Academy – Occupation Date 1891

Modern Site – Jefferson City – Occupation Date 2001

Findings

New Smyrna Academy

The New Smyrna Academy was organized in 1891 as a result of the western farmers and grangers alliance movement. Hearing of the movement State Representative T.M. Meriwether organized the Meriwether Alliance-East Wilkes Club in 1884. The organization was one of the first farm clubs in the state. Needing a place to meet, the members decided to build a multifunction (farm club and a school) building on a piece of land donated to the group by Mrs. C.E. Meriwether, wife of T.M. Meriwether. According to unpublished documents provided by the Callaway Plantation, conditions of the deed read, "that whenever this property ceases for two years to be used as either an Alliance Hall, Club Hall, or as a School House the property reverts to Mrs. C.E. Meriwether or her heirs."


Figure 30. New Smyrna School

The members of the Meriwether Alliance-East Wilkes Club met at the Smyrna School (Figure 30), (Figure C9) for several years and decided their organization would be better served if they met at the farms of members. At this time the facility served primarily as a schoolhouse. In 1928, the facility ceased to be used as a school after several Wilkes County Schools were consolidated. According to the original agreement, the land reverted to the estate of Mrs. C.E. Meriwether. The Smyrna Schoolhouse remained part of the estate until 1961 when the surviving heirs gave a quitclaim

deed for the property to the Smyrna Methodist Church. At the church conference in February 1990, the schoolhouse was donated to the City of Washington to be added to the house museums at the Callaway Plantation. On display today in the schoolhouse is the original teacher's desk and a handmade student desk.

The exterior of the Smyrna School facility is clapboard siding. The building is set on piers, as was most construction of its time period. Restrooms (Figure 31) were located on the exterior of the building and replicas have been reconstructed on the site. It could not be determined if the original site was dry, however considering the condition of the facility a reasonable assumption can be made that the location was dry and quiet (based on the rural nature of Wilkes County in the late 1890's).


Figure 31. New Smyrna Outhouse

The one-room schoolhouse (Figure 32) has a total square footage of 693 feet and a cubic airspace of 6,930 cubic feet. A 189 square foot covered porch is attached at the entrance.

A majority of the lighting for the facility was provided by large windows, which are on all exterior walls of the facility. Each window has a set of functioning shutters. An oil lamp was present in the facility and could have been used for supplemental lighting at night or during inclement weather.


Figure 32. Surveyed Classroom at New Smyrna School

The classroom appears to be set up in an orderly manner with the teacher desk located at the front of the room in front of the blackboard. Desks from different periods were present ranging from all wood to cast legs with wood tops and sheet metal bottoms with wood tops. The majority of seating was a bench with backs, which also served as the desktop to the next row of students (Figure 32). The desktop's slope was less than one inch per foot and there was a storage area for books. The benches were all built one size, not accommodating large or small students well. The teachers' desk seemed small by today's standards, however it probably served the teacher well. Directly in front of the teacher's desk (Figure 32) is the original recitation bench where students would sit when reciting their work. Movement by the teacher in the classroom could take place without disrupting the class. Students had adequate space when seated in their assigned areas, if classmates surrounding them were not large. One drawback of bench seating was if a student in the middle of the row needed to exit the row, they would disrupt at least half the scholars on the row.

Heating and cooling the building during this rustic time period was the norm for the day. The large ten double hung windows could be opened to provide ventilation during warm weather. A wood burning stove, (Figure 32) which was served by the one chimney present in the building, accomplished heating of the facility. There was no sign of a humidity control system, however in the winter a pot of water on the stove could have been used to maintain suitable moisture in the atmosphere. The schoolhouse was un-insulated, and there were no cracks in the walls or floors. There was no dedicated ventilation system for use in the winter as Barnard recommended.

There were historic pictures, books, and maps available for student use in the facility. There was also a wood water crock (Figure 33) in the classroom, however the age of the storage unit could not be determined. There was playground equipment in the yard, but the authenticity of the equipment could not be verified.

Figure 33. Wooden Water Crock at New Smyrna School

Jefferson City Middle School

According an official of the Jefferson City Foundation the roots of Jefferson City Schools were established CIRCA 1892. The first facility was a boarding school named the Martin Institute. The Martin Institute later became Jefferson City School. Jefferson City Schools have always been independent, never being joined in any way with the Jackson County Board of Education. Jefferson City Schools had two facilities, which served the students of the city, Jefferson Elementary for kindergarten through fifth grade students, and Jefferson High School, which served sixth through twelfth grade students. In January of 2003, Jefferson City Middle School (Figure 34), (Figure c10) opened its doors to the students of Jefferson, Georgia. In the 2004 year, the school housed around four hundred students.

Figure 34. Jefferson City Middle School

The brick veneered structure is located on 10 acres. Adjacent to the school is Pendergrass Road, the Jefferson City Elementary School and single-family dwellings. Water and sewer services are provided by the city. The building is built on a slab.

Classrooms in the building (Figure 35) adhere to the standards established by Barnard in the requirement that each student have an allotment of 150 cubic feet of airspace. Airspace in a typical classroom at Jefferson allots students 195 cubic feet of airspace each. The classroom measured is a standard classroom in the facility and is 650 square feet, which allowed students a personal area of 21.7 feet of floor space. Ceiling heights in the facility are nine feet in classrooms. While students have space for unrestricted movement, the classrooms were some of the smallest observed for middle school students. As shown in the classroom picture, desks are arranged in threes. Having observed the classroom, the student in the center of the three desks appears to be quite crowded. Observation of student activities is no problem for the teacher from any point in the classroom. There is storage available for each classroom and a suitable library is available for teacher and student use.

Figure 35. Jefferson City Middle School

Florescent fixtures light classrooms in the school. Very little natural light is available. Each classroom has a single window, which measures three by four feet. Also each classroom has an exterior door, which is used in time of emergency.

Heating and cooling in the school is accomplished by standard HVAC systems. The system does allow for the introduction of fresh air per ASHRAE standards. Classrooms walls are insulated and there are no chimneys present in the facility.

Student seating is made of composite plastic materials (Figure 35) and chromed steel. Individual desks accompany each seat and there is a storage area for books and other personal items. Henry Barnard recommended that desks tops slop at one inch per 12 inches of top. The desks at Jefferson City Middle School were not sloped.

While the student population density per square foot is the highest of any of the modern schools, the frequency of available teaching apparatus was also the highest. While not surveying for apparatus in quantity, it was observed that the pupil to computer ratio was quite low. The building principal noted that there are 280 computers available for student use in the school. Jefferson City Middle School has made a commitment to technology as a teaching apparatus (Figure 36). In the facility there are 1.4 students per computer. Also in the school there are many teaching aids, which are readily available. Maps, globes, Internet, marker boards, clocks, dedicated science equipment and specimens are available for use depending on the discipline uses in specific classrooms.

Figure 36. Computers as Teaching Apparatus

Comparison Statistics for The New Smyrna School and Jefferson City Middle School

Table 5

	Historic School	Modern School
Site	New Smyrna School Occupation Date 1891	Jefferson City Middle Occupation Date 2003
Square feet in classroom	693 square feet 23 square feet per student *	650 square feet 21.7 square feet per student
Minimum of 150 cubic feet airspace per student	Yes, 231 cubic feet per student * 6,930 cu. ft. total	Yes, 195 cubic feet per student * 5,850 cu. ft. total
Ease of movement for Students	Yes,	Yes
Unrestricted movement for students in seats	Yes	Yes
Ease of observation and movement for teacher	Yes	Yes

* @ 30 students per classroom

Comparison Study Number Six

Historic Site – Apalachee – Occupation Date 1911

Modern Site – Malcom Bridge Middle School– Occupation Date 2001

The town of Apalachee in Morgan County is the home of the Apalachee Schoolhouse (Figure 37), (Figure C11), (Figure C12). According to Board of Education minutes on display at the facility, the school was completed in 90 days after the bid was let to Mr. E.W. Knott for the amount of $2,590. The structure is built of yellow pine and the roof is covered with tin. The foundation of the structure is comprised of bricks. Originally, the restroom facilities were located outside the structure. There is no record of a water source for the school, however it would be a safe assumption to suggest that a well served the school. The site of the school is a well-drained location and the school is located approximately one quarter of a mile east of Georgia Highway 441.

Figure 37. Apalachee School

When opened, the school served students in the Apalachee community for grades one through eleven. The two-story facility contained three classrooms and a storage closet on the first floor. The entire second floor is an auditorium (Figure 38) and storage areas. The building originally was fitted with a fire escape, which has since been removed. The location was quiet; however just across the

Figure 38. Auditorium at Apalachee

county road (50 yards from the front door of the school) is a train track. The date of the construction of the train track could not be determined. The school closed in 1951 during a move of school consolidations and fell into great disrepair. A member of the community acquired the property and began the laborious process of rebuilding the school to its present condition and it was reopened in 1994. Today the school serves as a museum, GED classroom and community center and is open 24 hours a day, seven days a week.


Figure 39. Surveyed Classroom at Apalachee

The largest classroom (Figure 39) in the Apalachee School is 551 square feet and has a ceiling height of 12'3". The total cubic feet in the classroom is 6,750. A classroom of 30 students would have had 225 cubic feet of airspace per student, which met the standard set by Henry Barnard. A classroom was not in place, however there were several historic desks original to the facility. It would be safe to assume that there would have been an ease of movement for students in the classroom and given the type of original desks on display, students would have had unrestricted movement while in their desk. Aside from the classrooms there were several storage closets and the aforementioned auditorium on the second floor.


Figure 40. Natural Light was in Abundance at Apalachee

There was an abundance of natural light available in the classrooms (Figure 40). Lighting was supplemental at night when the community used the auditorium. According to a community

member a local community leader had purchased a generator, which was powered by his sawmill, and electric lanterns were connected to the generator during night events.

There was no dedicated ventilation other than the double hung windows in the classrooms and transom windows (Figure 41) above the doors and the long hall, which bisected the first floor of the facility. The hallway, often referred to in southern architecture as a shotgun structure or a dog-run provided for ventilation, as it was open at each end to the outside with double doors. There was no insulation in the building to keep out the winter cold or the spring and fall heat. As were most structures of the day, the school was built on a crawl space.


Figure 41. Transom Windows

There were no remaining heating stoves remaining in the building. There were three chimneys in the building and flue connections were easily identified close to the ceiling in each room. There was no evidence of rooms containing a thermometer or any device dedicated to the control of classroom humidity as Barnard recommended.

Student desks on display (Figure 42) were not a shared seating arrangement as seen in other buildings. Each seating unit was totally self-contained. The top of the desk had a slope greater than 1" per foot and the top of the desk raised to allow students to store books and personal effects in the desk. There were also several benches located in the hall and classroom areas of the buildings. There was no documentation, which would classify


Figure 42. Student Desk

the seating as original, however it was of a rustic nature and would have fit into seating expectations of the day.

Because there was no classroom set up in the facility, many observations concerning teacher arrangements are left up speculation. Any location of the teacher's desk in the classroom would have made observation of any of the classrooms an easy task. Blackboards and chalk trays were in each classroom and period maps were on display in the facility. There were also writing slates on display and historic plates were present in the building as well.

Considering the Apalachee School was built in the country, there was a large play area available for students. Shade was available around the school. Also, historic photographs show swings and other playground equipment for student use.

Malcom Bridge Middle School

Students in 1997 first occupied the campus of Malcom Bridge Middle School (Figure 43), (Figure C13), located just out of Watkinsville, Georgia. The total facility is comprised of six wings, which are interconnected. The facility was built from the proceeds of a bond referendum passed in November 1995, by the citizens of Oconee County on a 25-acre plot.

Figure 43. Malcom Bridge Middle School

A middle school design committee of teachers, parents and administrators gathered information from staff and community members concerning the new facility. The committee was commissioned to perform the following functions:

1. Survey and meet with staff on design and specifications.

2. Review and discuss with architects the design and specifications.
3. Visit and review other school plans.
4. Reach a consensus on all major design and modifications.

The report the committee returned to leadership of the Oconee County Board of Education included the following facility design features:

1. Technology capabilities throughout the school building including email, Internet and broadband.
2. All restroom lavatories are visible from halls.
3. Support areas are convenient to all teachers and exploratory and academic areas are separated. Traffic flow patterns should emphasize function.
4. Classrooms are 720 square feet, science labs 850 square feet and other labs are sized as needed.
5. Each classroom has a panic button, which is connected to the intercom system.
6. HVAC systems have classroom thermostats controllable by the classroom teacher.
7. Bus and car riders are separated for safety reasons.
8. The gym is to be designed for educational, sports and community use.
9. Faculty workrooms and restrooms are to be conveniently located throughout the building.
10. Outdoor patio areas are to be strategically located throughout the building.

(http://www.oconee.k12.ga.us/mbms/location.htm)

The exterior of the building is brick veneer with metal roof. The facility is located in a quiet area and grading was completed on the site to ensure water would not stand around the facility. The student's water supply is provided by the local government water system. The local government also provided for sewage removal from the campus.

Windows in the classroom are sealed. Each classroom has a dedicated exit door with window. Florescent fixtures supply classroom lighting.

The facility at Malcom Bridge is designed like most middle schools today with the function of student teams in mind. Classroom teachers have access to standard teaching apparatus including the Internet, video broadcast capabilities, and the media center. Classrooms have discipline necessary teaching aids. The facility also serves connection classes (Figure 44) with courses offered in Agriculture, Art, Family and Consumer Science, Foreign Language, Band, Music Appreciation, Computers, Health and Physical Education.

Figure 44. Agriculture Lab at Malcom Bridge Middle School

The classroom surveyed (Figure 45) in the facility measures 27.5' x 29' which equals a square footage area of 797.5'. With ceilings 10' high a calculation of classroom air displacement of 7,975 cubic feet was attained. The specified classroom is standard for the instruction of math, language arts and social studies. These classrooms well exceed the standards set forth by Barnard and the committee formed to give input to school leaders. According to the teacher interviewed there are no problems with student overcrowding nor is there a problem with student supervision whether the teacher is at his/her desk or moving about a classroom.

Figure 45. Classroom at Malcom Bridge Middle School

Seating arrangements are age appropriate for the students at Malcom Bridge Middle School. Bi-entry desks are used by students throughout the school along with tables capable of

seating six students in independent chairs. These six student tables are not sloped nor do they have a storage area for student materials, a violation of Barnard's survey. The bi-entry desks in the classroom surveyed were not sloped. Also, there is no slot routed into the desktop in which students could place a writing implement.

The classrooms are heated and cooled by individual HVAC systems. There is a thermostat in each classroom, which the instructor controls. Fresh air is introduced into the classroom by way of the HVAC system in accordance to ASHRAE standards.

There is a gym on the site of the school and other athletic facilities. There is no specified playground as called for by Barnard.

Comparison Statistics for Apalachee Schoolhouse and Malcom Bridge Middle School

Table 6

	Historic School	Modern School
Site	Apalachee School Occupation Date 1911	Malcom Bridge Middle Occupation Date 2001
Square feet in classroom	551 square feet 18.3 square feet per student *	837 square feet 27.9 square feet per student
Minimum of 150 cubic feet airspace per student	Yes, 225 cubic feet per student * 6,750 cu. ft. total	Yes, 251 cubic feet per student * 7,533 cu. ft. total
Ease of movement for Students	Yes,	Yes
Unrestricted movement for students in seats	Yes	Yes
Ease of observation and movement for teacher	Yes	Yes

* @ 30 students per classroom

Comparison Study Number Seven

Historic Site –Madison Graded School– Occupation Date 1934

Modern Site –Oconee County High School– Occupation Date 1992

Findings

Madison Graded School

Built in 1895, the Madison Graded School (Figure 46, (Figure C14), (Figure C15) is believed to be the first brick schoolhouse built on the railway between Augusta and Atlanta. Madison, a community, which is known in folklore as the town General William Tecumseh Sherman, found too beautiful too burn in his march to the sea during the Civil War, is a town full of unique architecture. The Madison Graded School is no exception to the architecture of the town. The school was built in the architectural style of Romanesque Revival.


Figure 46. Madison Graded School

The roof of the facility is slate (Figure 47) and the interior walls are plaster. Electricity provided the lighting in classrooms. While most students of the time period were housed in classrooms where students were mixed by grade, the students in Madison were "graded" or separated into specific groups by grade. Later, grades eight through eleven were added (in a separate facility) along with a lunchroom and gym. The facility served the community as a schoolhouse until county schools were consolidated 1957. Destruction of the building was a


Figure 47. Madison Graded School Roof Detail

consideration. In the early 1960's a group organized under the name of the Morgan County Foundation purchased the building from the local Board of Education. Today the Madison Graded School renamed the Madison – Morgan Cultural Center is open to the public hosting plays, art exhibits and serving as a museum
(The Building) (http://www.uncleremus.org/madmorg/Building.htm).

The Madison Graded School was the most ornate of all schools (historic and modern) surveyed. Crown molding adorned the ceilings of each room and pine lumber provided the surface of the floors. Based on photographs and unpublished documents on display, the facility served only white students at the time of its opening.

On opening, the school consisted of 13 classrooms and was built on a foundation and also is situated on pillars. The site is well drained and is located in a quiet neighborhood on approximately 4 acres of land. There are very large trees located today on the grounds of the facility. Original photos of the school show the building towering over the trees on the plot. Grades originally taught at the Madison Grade School were first through seventh. It is not clear how water for students was supplied.

There is a large basement in the facility, which never housed students. However the school janitor, Mr. Moreland (Figure 48) lived in the basement. A section of the school museum chronicled Mr. Moreland and his employment at the Madison Grade School. Mr. Moreland was a black employee of the school and served in many capacities. When questioned the host on duty the day the facility was surveyed, gave an oral


Figure 48. Mr. Moreland.

history of Mr. Moreland's life and times in the Madison Grade School. Based on accounts of students who are still alive today in the Madison area, Mr. Moreland served (CIRCA 1924) Madison Graded School as a fire builder, custodian, recess supervisor, actor, and counselor. Photographs were on display showing Mr. Moreland on the ornate stage in the original theater in a play with the school students. Mr. Moreland had no children but served the students and the facility at the Madison Graded School while living in the basement of the facility.

Classrooms (Figure 49) on first appearance seem to be quite spacious, however after measuring they were found to be 22' x 28'. The height of the ceiling was the highest surveyed at 13'. The height of the ceiling in each classroom creates the illusion that the rooms are much larger than reality. Each classroom at the Madison Graded School contained 616 square feet of floor space and 8,008 cubic feet of air space allotting each student in a class of 30 with 267 cubic feet of air space. The facility today has a model classroom, as it would have appeared in 1895. Students were provided with traditional desk of the period and would have had unrestricted movement while in their seats. Also found in the classroom were original bookcases, slate chalkboards and a teacher desk. The teachers would have no trouble observing the ongoing process of learning in their classroom. Storage rooms were found around the facility and there was one storage cabinet found in each room.

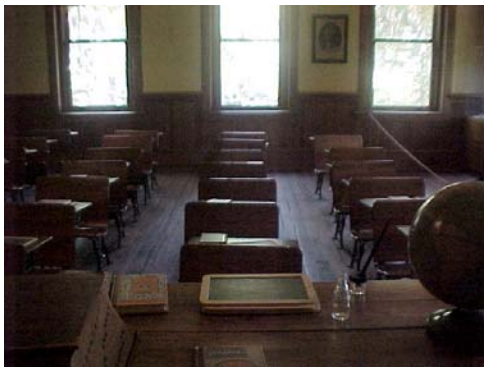
Figure 49. View of Classroom From Teachers Desk

The classrooms at the Madison Graded School were lighted with incandescent lighting as the building was originally wired for electricity. Large windows in the two-story structure also provided lighting. The windows added to the distorted perspective of classroom size, which was

mentioned earlier. Each double hung window in the facility measured 44" x 103" providing a very generous amount of natural light. Each room had a minimum of two windows and corner rooms received the most illumination from natural light. The rooms were very well ventilated considering the large exterior doors, which could be opened, stairwells at which drafts could originate and windows, which were double hung to ventilate the high ceilings in classrooms. Also, classroom doors had transom windows for ventilation.

The heating of the facility was accomplished on a room-to-room basis. Each classroom had a coal-burning stove (Figure 50), which was lighted each day by the school janitor. The pollutants were removed from the building by an extensive system of chimneys. There was no evidence of a thermometer in the classroom, nor dedicated humidity controls. According to maintenance workers on the site there was no insulation in the walls of the facility.


Figure 50. Madison Graded School Classroom Stove

Desks in the facility's classrooms (Figure 51) were what could be considered at the time as state of the art. In the model of a historic classroom arrangement there were 23 individual desks arranged in the room. The desks were the type where the backrest was attached to the desktop behind the pupil. Desks throughout the facility were found in a variety of sizes. Desks were well suited to the size of the students. The tops of the desks were sloped at one inch per one foot. Each desk had a receptacle for ink and also a storage area for books. With the


Figure 51. Madison Graded School Desk

arrangement of seats, students had an area greater than two feet per student as recommended by Barnard. Located in one area of the building today is an extensive display of desks of varying designs, leg styles and other information concerning student seating.

Teacher arrangements were the state of the art in their day. The entire class was easily visible from the raised platform where the teacher desk was positioned (Figure 52). The teacher could easily circulate around the classroom without disturbing the classroom. Each classroom possessed a slate chalkboard with chalk trough, slates, globes, historic pictures and books for student use. There was not a timepiece in the classroom, or science specimens. There was no library in the facility.

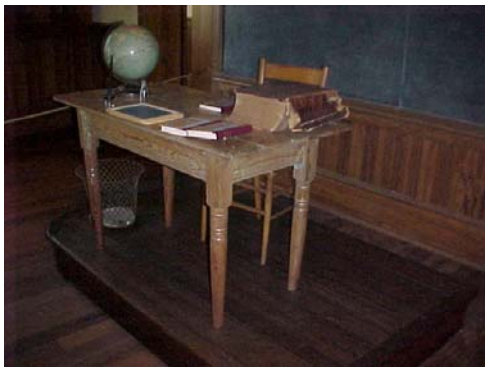
Figure 52. Madison Graded School Teacher Desk

Outside the building there was a yard for children to release excess energy and trees for shade. Photographs on display show a playground with swings and teeter totters on which students could play. A gym was built at a later date and still remains on the site today.

Oconee County High School

Occupied in 1992, Oconee County High (Figure 53), (Figure C16) School is located just outside Watkinsville, Georgia and houses 1,600 high school students. Presently it is the only high school located in Oconee County, however a new high school is due to open in the fall of 2004, which will house ninth and tenth grade students. The new high school


Figure 53. Oconee County High School, Main Entrance

will relieve the student population pressure found today at Oconee County High School. The brick veneer structure was constructed on a slab and is located on a plot containing 84.49 acres. The county provides water for student use in the facility. The facility site is in a quiet area and during inclement weather there is no standing water around the school.


Figure 54. Oconee County High School Classroom

Standard classrooms (Figure 54) at Oconee County High School are 24' x 30' which covers a floor area of 720 square feet. The ceiling height in the surveyed classroom measures 132.5" (11.04'). The surveyed classroom contains 7,949 cubic feet of air space, which will allot an individual student in a classroom of 30 students 265 cubic feet of air space. The walls of the classroom are constructed of concrete block and carpet covers the floors of most classrooms.

According to instructors interviewed at Oconee County High School, there is an ease of movement in classrooms for students, and students have unrestricted movement in their seats. The layout of the classroom also provides for easy teacher movement and management of students. At Oconee County High School teachers do not have a classroom assigned as "theirs." Classroom space is budgeted, as demand requires. An example is on the science hall of the facility. There are two labs, which teachers may schedule for use when needed. Planning and communication is required for teachers wishing to complete a lab and organization of student day-to-day schedules must be communicated in advance. Because no teacher is assigned one room, an office is required for teachers to work. In each discipline area there is an office suite for teachers in specific disciplines to share. The suite is complete with a desk for the instructor,

phones, Internet access and computer workstations, restroom facilities and a separate office for the department head (who serves a one year term). Within the office area there are storage areas for materials and also storage is located in each classroom for needed items in specific disciplines.

Lighting is provided from florescent fixtures in the classroom. In each classroom there are two 3' x 4' windows which provide natural light (Figure 55). The windows are sealed and provide no ventilation from the outside.


Figure 55. Interior Window

The building is insulated to maintain a stable environment during the changing seasons. Heating and cooling of classrooms is accomplished by individual heat pumps. To assist in the cooling of the building a two stage cooling is used to circulate water throughout the building. A negative aspect of using a cooling tower is if county water pressure is not maintained the tower will not function as designed. On one occasion the county water system failed and the local volunteer fire department was dispatched to the school to circulate water throughout the system. There is a thermometer located in each class, which is connected to the classroom thermostat. There are no dedicated humidity controls in the HVAC system, which supplements air moisture when the air becomes too dry.

In the interview with faculty members at Oconee County High School, the researcher posed the question, what is the best aspect of your facility and classroom spaces. Both faculty members responded the hall width (Figure 56) was a great design aspect of the school. Measuring the halls they were found to be 14' in width. The educators interviewed felt the width of the halls provided students easier access and movement between classes and eliminated

student conflict due to the fact students were not tightly packed together. Asking if they knew of any study, which would support their hypothesis, they responded their thoughts were based on their professional opinion. Regardless, both the teachers interviewed listed the width of the halls as an important design element at Oconee County High School.


Figure 56. Oconee County High School Hall

The teachers interviewed when the survey was conducted also had comments concerning classroom furniture for students. The age appropriate desk used at Oconee County High School is a bi-entry desk (Figure 57). Students can enter from either side of the desk. The teachers interviewed found this to be a great positive for student movement and classroom management. The slope of the desktops varies throughout the building depending when the desks were purchased. Desks original to the school were not sloped as Henry Barnard recommended, however replacement bi-entry desks purchased as replacements do have the recommended one-inch of slope per one inch of desktop. All desks in the building have a storage area for textbooks.


Figure 57. Bi-Entry Desk at Oconee County High School

Because of the teacher arrangements mentioned earlier in this section (shared classrooms) classrooms are of a somewhat different concerning teachers at Oconee County High School. In every classroom there is a suitably sized teacher desk from which the entire class is visible. Nowhere in the building is a teacher's desk on a raised platform as Barnard recommended nor is there a dedicated recitation area in any classrooms. As far as teacher apparatus, which are

provided in each classroom, they are standard depending on discipline taught. Marker boards and trays along with bulletin boards are available. Poster and prints decorate classrooms shared by teachers of same disciplines. There is a timepiece available in each classroom. There is a well-stocked library in the school, as well as Internet access for student use. There are areas for outdoor kinesthetic activities as well as a gym for student use. The gym is located inside the main building of the facility.

Immediately adjacent to the campus of Oconee County High School is a county civic center. According to the instructors interviewed, the civic center is not owned by the board of education, the county owns it. The facility is available for student use for plays, musicals, concerts and other school events. The county provides the school use of the modern facility at no cost to the school other than maintenance work, which is done after events.

Comparison Statistics for the Madison Graded School and Oconee County High School

Table 7

	Historic School	Modern School
Site	Madison Graded School Occupation Date 1934	Oconee County High School Occupation Date 1992
Square feet in classroom	616 square feet 20.5 square feet per student *	720 square feet 24 square feet per student
Minimum of 150 cubic feet airspace per student	Yes, 267 cubic feet per student * 8,008 cu. ft. total	Yes, 265 cubic feet per student * 7,949 cu. ft. total
Ease of movement for Students	Yes,	Yes
Unrestricted movement for students in seats	Yes	Yes
Ease of observation and movement for teacher	Yes	Yes

* @ 30 students per classroom

Comparison Study Number Eight

Historic Site –Woody Gap School– Occupation Date 1940

Modern Site –Banks County Primary– Occupation Date 1989

Findings

Woody Gap School

The Woody Gap School, (Figure 58), (Figure C17) located in Suches, Georgia, is unique in many ways including its facility. Built in 1940 on the site of the home place of Georgia's Confederate Governor, Joe Brown, the exterior of the building is constructed of granite quarried from within the city limits of the city. Several teachers were working the in the school when the survey was completed and were very knowledgeable in the history of the facility. The school was used to consolidate five one and two teacher schools, which had met in churches throughout the surrounding countryside.


Figure 58. Woody Gap School

Originally the school housed grades one through 11 and today the facility is still in use for student's kindergarten through 12th grade. The school was constructed with the assistance of the Work Projects Administration (WPA) and the laborers employed by the federal government at the end of the Great Depression. Today the school is recognized as the smallest in Georgia with an enrollment of 124 students kindergarten through grade 12. The facility is located 45 miles from Blairsville. Considering the rugged mountain terrain between Blairsville and Woody Gap, it is less expensive to keep the school open rather than bus the students to Blairsville, even with the sparse enrollment. The school began receiving sparsity funding after the Georgia

Legislature designated it an isolated school in 1974. The pupil per teacher ratio in the school is approximately seven to one.

The school is located just up a small hill from a mountain stream and the site of the building is well drained. The school is built on piers with a crawl space under the building and a full basement located under the center of the building. At one time the basement served as the lunchroom, however a separate building has been built for serving students today. The facility is also in a quiet location.

The classroom surveyed (Figure 59) at Woody Gap measured 29' x 23' which computes to a square footage of 667 square feet. A ceiling height of 12' results in a classroom containing 8,004 cubic feet of air space. Applying a standard class size of 30 to the given classroom would allow students 267 cubic feet of air per student. The average class size at Woody Gap is 15 students so Barnard's standards are easily exceeded. The grade structure within classrooms at Woody Gap is also unique in that multiple grades meet simultaneously in classrooms supervised by a single teacher. The kindergarten students are in a classroom to themselves. First and second, third and fourth, fifth and sixth and seventh and eighth grade students meet in the same classrooms. All high school academic classes are segregated by grade. Even in multiple grade classrooms there appeared to be opportunity for easy movement by the instructor and the students around the classroom and in their seats. It was also noted that observation of the entire classroom could easily be attained from any point in the classroom.

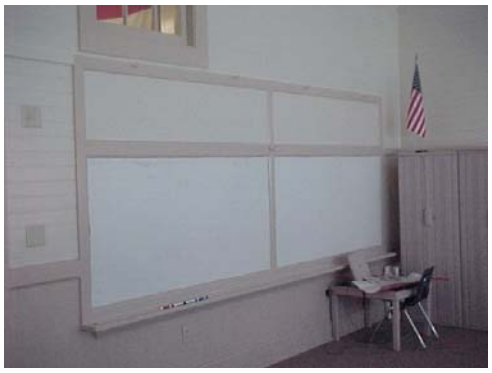

Figure 59. Elementary Classroom at Woody Gap

There was also a well-stocked library (Figure 60) in the school to supplement all grades in the facility.


Figure 60. Library at Woody Gap

Natural lighting was in abundance in all classrooms. Every classroom had four large windows at a minimum and some had more. The exposure of the natural light was from the east or west depending on the time of day. Each classroom had blinds in place to cut down on glare when direct sunlight was shining into the room. Electric lighting provided supplemental lighting for the halls and classrooms.


Figure 61. Chimney and Flues

The building was originally heated by wood burning stoves in each classroom. As time passed the school also used coal, fuel oil, liquefied gas and electricity for heating purposes. Covered flues are visible in classrooms today (Figure 61). The exhaust from the heaters was ventilated through five chimneys, which were back to back (serving two classrooms with each other). In warmer times of the years the double hung windows could be opened for cooling purposes. There are transoms built into the walls and doors (Figure 62) of each classroom, which still function. There was no evidence of humidity controls or a classroom thermometer in the original classrooms.


Figure 62. Transom Window at Woody Gap

Surveying original furniture in the structure was hit or miss at best. All furniture in the classrooms had been replaced over the years with more modern furniture. There were several all-wood college-type desks stored behind the stage in the library, which were original to the first few years of operation of the school. These desks did subscribe to the 1" of slope per 1' of desktop recommended by Barnard. Each of the desks did have a storage area for books with each seating unit.

Teacher arrangements remain much the same today, as they would have been in 1940 when the school opened. Considering the layout of the classrooms a teacher desk located in any position could have provided an easy vantage point for supervision of students. The teacher would have had no problem circulating around the classroom. Some very old teacher desks were found in the building that were still in use, however no one was sure if they were original. It is assumed that a teacher would have had a suitable desk from which to base herself in class. There was no evidence to suggest that teacher desks were on raised platforms for increased visual supervision. There was also no evidence that a dedicated recitation area was in any of the classrooms. The original frames and trays for the black boards remain but they have been replaced with marker boards. There were also numerous maps, pictures and other teaching aids located throughout the school, all of which appeared to be from the time period of the 1940's. There were also clocks, portable black boards, globes, measuring devices, solid geometric shapes and historic plates on display or being used in the school all of which had historic roots in the facility.

According to the school principal there was a well-stocked science department complete with specimens and lab equipment. Also there were bioscopes available for use. Some of the specimens and bioscopes remain in use today.

There is a large area located behind the school with athletic fields today, which was also available to students on the founding of the school. There is a stream running along the edge of the property and there are plenty of trees on the property for shade. There was also playground equipment available for student use.

Banks County Primary

Located just off of Highway 441 in Homer, Georgia is the Banks County Primary School. (Figure 63), (Figure C18) The school was first opened to students in 1989. The school serves children in pre-kindergarten, kindergarten and first grade. The enrollment in the facility is at 400 students who are housed in seven pre-kindergarten, ten kindergarten, ten first grade and 2 special needs classrooms. There are also two mobile units on the campus which are used in the after school program and for ESOL classes. Construction is underway to add 11 new second grade classrooms, which will house students in the 2004-05 school year. There are also art and music classrooms in the facility. The facility is served by county water and city sewer services.

Figure 63. Banks Primary School Entrance

The principal led a tour of the facility and confided that there were two great design aspects about the school. What was most liked about the school was the grade structure. The principal described the facility as small in size because there are only 3 grade levels to which instruction is administered. The second great design aspect is that 75% of the classrooms in the building share movable partisans, which when opened enables teachers to work together in

cooperative activities. The author also observed every classroom has a double sink for student and teacher use and the principal commented it was also a strong design element of the facility.

The exterior of the facility is brick and the building rests on a slab. The area is quiet and bordered on one side by a public library and on two sides by large open areas. Georgia Highway 51 borders the front of the plot. It appeared there is no problem with standing water around the school.

Classrooms at Banks Primary were standard from one to the other in size. The classroom surveyed (Figure 64) measures 31' x 24' and had a ceiling 96" above the level of the floor. The calculations show a total area in a classroom at Banks Primary of 744 square feet. Multiplying the area times the ceiling height of eight feet gave a cubic area of 5,952 cubic feet of air space. Using the student constant of the study shows that each student in a classroom of 30 would have 198.4 cubic feet of unique air space, which exceeds Barnard's recommendation of 150 cubic feet per student.


Figure 64. Banks County Primary Kindergarten Classroom

There is very little natural light in the classrooms of Banks Primary. According to the principal, 20% of the classrooms in the facility have no windows while the remaining 80% have a door with a sealed window. While the survey did not measure the intensity of the light from the one windowed door in classrooms, the author would judge the impact of the window to be minimal as far as providing natural light into the educational space.

Each classroom is served by an individual HVAC system, which is mounted of the roof of the classroom and powered by electricity. On the school grounds is a water-cooling tower, which assisted in cooling classrooms by circulating water through the HVAC units, to the radiator in the tower and back through the units. The HVAC units do circulate air from outside the facility as required by mechanical engineering standards. A thermostat in the classroom is used to regulate the atmosphere in classrooms and a school wide timer is used to regulate heating and cooling at night, over weekends and holidays. As in all modern schools, the exterior walls and ceiling of each classroom are insulated to assist in maintaining the controlled temperature in classrooms. The HVAC system does not have the ability to introduce humidity into the air to maintain a suitable moisture level.

The student furniture in classrooms is age appropriate. A majority of the students have an individual table and chair (Figure 65). The table provides a storage area for books, however it is a flat surface, which Barnard would have discouraged. The principal pointed out that students could reconfigure their desks into tables for group work with little effort. Also located in classrooms is a traditional kidney shaped table with chairs for teachers to work with small groups.

Figure 65. Banks County Primary Student Desk

Teaching arrangements seem to be suitable. Classroom teachers should have no problems monitoring activities from any point in their classrooms. Teacher movement in the classroom will not create a disturbance while monitoring students completing silent work or

testing. The teachers' desks throughout the building are of suitable size, however they are not on a raised platform as Barnard recommended.

Classrooms are full of various apparatus. There are marker boards and trays, bulletin boards, globes, maps and historic pictures. A digital clock is affixed to the intercom speaker in each classroom and is controlled by a central clock. Every classroom has several computer stations, which can be used to administer Accelerated Reading or Star Test or any other tutorial software.

The library in the facility appears to be a focal point in the school. Books were available for students and teacher use along with media materials, software and equipment for classroom use.

Areas for physical activities are numerous at Banks Primary. There are three separate playgrounds, which are age appropriate for students. Two of the areas are well shaded. The third has no shade trees, however it has a pavilion area with picnic tables where students find a break from the sun on hot days. A carpeted gym is also part of the facility. On the day the survey was administered there were 50 elementary girls receiving baton lessons.

Figure 66. Banks County Primary Gym

Comparison Statistics for Woody Gap School and Banks County Primary School

Table 8

	Historic School	Modern School
Site	Woody Gap School Occupation Date 1940	Banks County Primary Occupation Date 1989
Square feet in classroom	667 square feet 22.2 square feet per student *	744 square feet 24.8 square feet per student
Minimum of 150 cubic feet airspace per student	Yes, 267 cubic feet per student * 8,004 cu. ft. total	Yes, 198 cubic feet per student * 5,952 cu. ft. total
Ease of movement for Students	Yes,	Yes
Unrestricted movement for students in seats	Yes	Yes
Ease of observation and movement for teacher	Yes	Yes

* @ 30 students per classroom

Comparison Study Number Nine

Historic Site – Ashland School – Occupation Date 1934

Modern Site – Lavonia Elementary – Occupation Date 1992

Findings

Ashland School House

The Ashland School House is located in the Bold Springs Community in northwest Franklin County. According to community members interviewed, the original facility was a two-story structure built CIRCA 1908. The downstairs consisted of classroom space while the upstairs was an auditorium. The original structure burned in 1933 and the Ashland School House, (Figure 67), (Figure C19) which is located just across the road from the original schoolhouse, opened for classes in 1934. The four-room schoolhouse stands at the top of a knoll and is immediately behind the Ashland Masonic Lodge. The location of the facility on the knoll eliminates any problem, which might occur from water standing around the well-drained site. The schoolhouse was built on pillars made of mortar and stone, which was collected at the site. The exterior of the building was clapboard siding and was recovered in 2002 with vinyl siding. When the facility opened, grades one through seven were taught according to a member of the community, whose husband attended the school. Classrooms were multi-grade with first and second meeting in a classroom together while third through fifth grades shared a classroom, as did sixth and seventh grade students. The school site also had a remaining area dedicated to pupil transportation services. A surviving rock wall (Figure 68) and

Figure 67. Ashland School House


Figure 68. Surviving Rock Wall

steps are still located on the site today where pupils loaded and unloaded school buses. The were no documents showing the date the wall was built, however one of the community members interviewed remembered that student transportation was not an option when the school reopened. Most students were transported to school on foot.

The chief source of lighting was natural light. Oil lamps were available for additional lighting. According to a lifelong member of the community, sunlight provided illumination for the students attending the facility. On days when the weather was inclement, few students would turn out for school. If inclement weather threatened during the school day, students would sometimes be dismissed early. According to community sources, electricity was run into the community in 1939 and at some point in time, which the author was unable to determine it, was run into the school.


Figure 69. Community Room at Ashland School

Of the four rooms original to the facility in 1934, the wall between two of the rooms (classroom and auditorium) have been removed to provide a large meeting area for community gatherings (Figure 69). The surviving classroom which was surveyed measured 28' 5" x 22' 9". The 646 square feet of classroom area has a 12' ceiling and contains 7,758 cubic feet of air space. Applying the standard of 30 students per classroom to these calculations shows that students had 259 cubic feet of air space per student, which well exceeds Barnard's recommendation of 150 cubic feet of air space per student. While there are no remaining classrooms surviving today with furniture

and a teacher's desk, based on observations of other historic facilities there would have been sufficient space for students to have unrestricted movement in their seats and the teacher would have had an ease of observation of students in the classroom facility. There was no library serving the students at Ashland. In fact, the community member interviewed remembered books for use by students were not furnished by the school system. Parents purchased the books, which students used for their studies.

In the winter the un-insulated facility was heated by coal burning stoves (Figure 70). Ventilation of the structure was attained in the warmer months by opening windows and exterior doors. There were no fresh air vents in the ceiling or floor to provide fresh air for students in the winter as Barnard prescribed. Considering the wood construction of the school and lack of insulation an assumption could be made that a buildup of stale air, with which Barnard was concerned, would not be a problem. The community member interviewed did have a recollection of teachers keeping a container of water on the stove to maintain sufficient moisture in the air in the winter, however there was no reallocation of a thermometer being in a classroom.


Figure 70. Coal found on the Ashland School Site

There was no remaining student furniture in the facility. The interview of a student from the period of the 1930's gave a description of desks in the facility being much like historic desks from other facilities surveyed. A desk with the writing top attached to the back of the seat immediately in front was the norm with one exception. The desks were designed to seat two students. The memories of the desks included a storage area for books, however former students could not accurately establish recall of the slope of the desktop.

Teacher furniture was sparse by the description given in the interview. There was no memory of maps, globes, pictures, science supplies or other teacher arrangements or apparatus with the exception of a black board, chalk tray and clock in the school.

As far as the yard surrounding the school there was an area dedicated for play and there was shade available. There was never any playground equipment available for student use.

Lavonia Elementary

Lavonia Elementary School was opened in the fall of 1992 (Figure 71), (Figure C20). It replaced an aging collection of buildings, the oldest of which was first used in 1939 as an educational facility. The facility serves students in grades kindergarten through fifth grade and is located on a 30-acre plot. The exterior of the school is brick veneer and is served by city water. Inside the facility, concrete block construction makes up the walls of the structure. The school is located within one mile of Interstate 85. Due to its location, the school is starting to see an influx of students residing in high-density housing. At the present time enrollment is 512 students, up from 470 students who began the 2003 – 2004 school year in the facility. The school makes use of two double wide mobile units as overflow classrooms at this time. There are plans for adding an additional elementary school in the near future, to reduce the student population at Lavonia and the other two elementary schools in the system. The location of the facility on the site provides for engineered water drainage away from the building. Visually the new Lavonia Elementary has a common thread with the old school built in 1939. Hanging in the bell tower of the new school is the original bell, which was first, installed in the old school in 1939.

Figure 71. Lavonia Elementary

When the survey of the facility was conducted the researcher met with both the principal and assistant principal of Lavonia Elementary School. The specific classroom surveyed (Figure 72) serves kindergarten students. The ceiling height in the classroom is 10'. The dimensions of the room are 28' x 28' which computes to a total area of 784 square feet. With a classroom of 30 students the kindergarten classroom at Lavonia Elementary exceeded the standard of 150 cubic feet of air space per student by 111'. The classroom at Lavonia contains 284 cubic feet of air space per student. The classroom surveyed has no wasted space, in fact there was a reading loft constructed of two by fours so part of the room was two stories. It appeared to the author that there was sufficient room for children to move about the room and the teacher would have easy visual access to students anywhere in the classroom. A storage closet was available for storage in the classroom and additional storage is also available throughout the school.

Figure 72. Kindergarten Classroom at Lavonia Elementary

Each classroom has a window unit which measures 6' x 5'. The window provides some natural light into the room, which enhances the florescent lighting. The lunchroom area was the best-lit area with many windows proving natural lighting from the eastern skies. The main school structure is built around a courtyard, which has

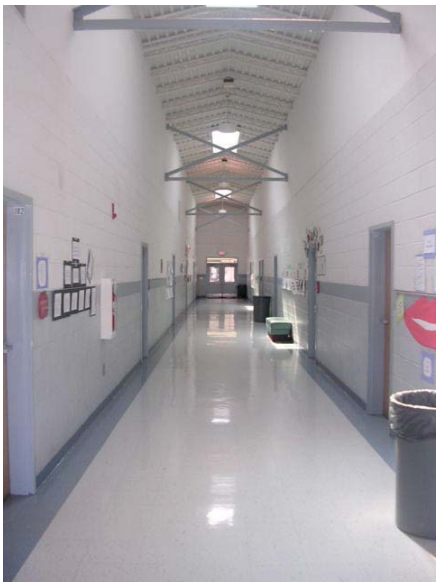

Figure 73. Hall Skylights at Lavonia Elementary

windows on the exterior walls (surrounding the courtyard). The hall area around the courtyard is very well lit and is visible from the main entrance into the facility. Another unusual lighting feature is in the hallways, which project away from the core of the building. The ceiling in the halls reach a height of 20' and are lighted by skylights as well as man-made lighting (Figure 73). The hallways presented a challenge to the school leadership during inclement weather. The Georgia Emergency Management Agency (GEMA) was called into consultation with school officials to evaluate procedures to follow in case a tornado warning was issued. GEMA officials instructed system personal to not follow standard tornado procedures during drills or warnings but to sit students against the interior walls of classrooms instead of hallways. These procedures were developed due to the hallway skylights.

While interviewing the school principal the author posed the question "What is the most important design element of the facility?" The principal responded without hesitation the courtyard area was the most unique design element (Figure 74). Teachers and their students use it for eating lunch, reading, classroom activities or hosting special guests for visits. The courtyard was well kept with attractive plantings on the perimeter and student's artwork gave color to the concrete pad.

Figure 74. Courtyard at Lavonia Elementary

Heating and cooling the classrooms was achieved by an all-electric HVAC system. There is a dedicated system to introduce fresh air into the classrooms, which are standard on modern HVAC systems. Windows in the classroom were sealed so fresh air ventilation was not an option for classrooms by way of the windows. Each classroom has a thermostat and

thermometer, which controls the HVAC system. There was no device incorporated into the HVAC system, which introduced humidity into the air when needed as recommended in the 1848 survey developed by Barnard.

Seating for young scholars varied throughout the building. The kindergarten class surveyed used tables and individual chairs for seating. The age approperate, trapezoid shaped tables were arranged in the classroom as single tables which would seat four students. There were also trapezoid shaped tables pushed together to form a hexagon shape, which would seat six. The seating arrangement did allow student's unrestricted movement in their seats however there was no dedicated storage area for their books. Also in the classroom there were several individual desks, which had an accompanying individual chair for student use. A majority of the seating in the classroom was around the tables. There was no slope on the table or desktops as recommended by Barnard.

Teacher arrangements in the classroom were sufficient for managing and instructing the students. Teacher movement throughout the classroom would be no problem and the entire class was visible from the teacher's desk. The teacher's desk, which was suitable in size, was not located on a raised platform as Barnard recommended, nor was they're a dedicated recitation area in the rear of the classroom. There was a marker and bulletin board available in each classroom. Also the walls were covered with various grade specific teaching materials. The classroom had a timepiece on the wall, a globe and measuring devices for student instruction. In the higher grade classes there were science materials available for use.

Lavonia Elementary has a suitable media center for student and teacher use. As with most elementary schools the media center is a focal point in the school, which has a very welcoming appearance.

Lavonia Elementary has four separate areas dedicated to physical activities. A gymnasium is built into the main building (Figure 75). The gym appeared to be very spacious and there was a stage in the gym so it could double as an auditorium. There were no bleachers in the gym. Seating for assemblies would consist of students sitting on the floor for special activities and for more formal activities, such as promotion ceremonies at the end of the year, chairs would be arranged in the room for seating of students and parents. The gym at Lavonia Elementary was insulated with a type of insulation not seen in any other facility. The insulation was sprayed onto the roof of the structure and was used to dampen noise and retain warm air in the winter. The gym was not air-conditioned. Also at Lavonia Elementary there were three outdoor areas dedicated to physical activities. There were two playgrounds, one for lower grades (K-2) and another for students in the third through fifth grades. There was also a walking track, which was completed in the 2003-2004 school year, and measured one quarter of a mile in length.

Figure 75. Gym at Lavonia Elementary

Comparison Statistics for Ashland Schoolhouse and Lavonia Elementary School

Table 9

	Historic School	Modern School
Site	Ashland School Occupation Date 1934	Lavonia Elementary Occupation Date 1992
Square feet in classroom	646 square feet 21.5 square feet per student *	784 square feet 26.1 square feet per student
Minimum of 150 cubic feet airspace per student	Yes, 259 cubic feet per student * 7,758 cu. ft. total	Yes, 261 cubic feet per student * 7,840 cu. ft. total
Ease of movement for Students	Yes,	Yes
Unrestricted movement for students in seats	Yes	Yes
Ease of observation and movement for teacher	Yes	Yes

* @ 30 students per classroom

Comparison Study Number Ten

Historic Site – Hebron School – Occupation Date 1909

Modern Site – Stephens County Middle School – Occupation Date, Fall 2004

Findings

Hebron School

The Hebron Presbyterian Church was organized in 1796 and met in a log structure until the congregation outgrew its meeting place. James McCarter (who gave the original piece of property) gave the church an additional tract of land on which to build. The church built on the site served the families along the Hudson River until 1883. Presently the new facility built on the second tract in 1883 still serves the community. In 1985 the church, cemetery and schoolhouse were placed on the National Register of Historic Places (Hebron Presbyterian Church Cemetery and School).

The following background information was gathered from the brochure Hebron Presbyterian Church, Cemetery and School. This information demonstrates the evolution of facilities, which led to the construction of the present day school facility, which is a community center and church resource today.

> The Presbyterian Church has long been noted for its commitment to education. Ministers were required to have advanced degrees before ordination and parents desired an education for their children.
>
> With this in mind, Reverend Jon Harrison, Hebron's second pastor, organized a Sabbath School at Hebron, which may have been the first in north Georgia. Both black and white pupils of all ages were instructed in the basics, the classics and the Bible. The log building in use at that time was filled to capacity. Early in his ministry at Hebron, Reverend Groves Harrison Cartledge and his wife, Annie Maria, opened a school on January 17, 1855, and soon had seventy pupils.
>
> John B. Estes, a former student at Hebron, returned near the end of the nineteenth century to teach. He was the first teacher in the state to practice the silent school method, which replaced the traditional method in which all the students practiced their lessons out loud.

> About 1909, it was determined that a new building was needed for Hebron Academy. The existing building was sold to Groves Cleveland Glasure, and moved up the road to be his home. The new building, a spacious two story frame structure, served the community until 1936. At that time, Hebron, with other small schools in this area of Banks County, consolidated into Davis Academy School. The Hebron chapter of the Masons continued to use the upstairs as their meeting quarters.
>
> In the fifty years after 1956, the building was largely neglected. A few repairs were made when the church youth used the building in the 1950's and 1960's as their meeting place.
>
> In 1984, with the school building almost beyond salvation, the Hebron historical society, under the leadership of Anna Belle Little Tabor, began the $100,000 restoration effort (Hebron Presbyterian Church Cemetery and School).

The Hebron Historical Society is very active in the preservation of documents related to the school and the ongoing process or maintaining the integrality of the facility. The book *Hebron Presbyterian Church, Gods Pilgrim People*, was published to serve as a historical record of the facilities. Four interviews were conducted by phone with active members of the historical society (one of which was a student at the school).

The school, (Figure 76), (Figure C21), (Figure C22) built in 1909, was located on a flat area just down a hill from the Hebron Church. The lay of the plot provided drainage into two wooded hollows. The foundation of the structure is built of mortar and stones, which were probably collected at the site. The date of August 1909 is inscribed in the mortar of one of the pillars. According to the student interviewed, who attended the school in the late 1920's, the school was in a peaceful location.


Figure 76. Hebron School

Water for students was retrieved from the well member of he historic society all students and teachers themselves with drink. Bathroom facilities were avail

one of which partially still stands today. One of the historical society members reported that the remaining outhouse was damaged in the last 12 months by a falling tree in the woods surrounding the school.

There were three classrooms in the school. Hebron was the only historic school surveyed which had a removable partition wall. The movable wall divided the classrooms on the first floor. All three classrooms were similar in size. The classroom surveyed was the second story classroom (Figure 78). Its dimensions were 24' x 24' with a ceiling height of 9'. The total square feet contained in the room was 576' and the airspace contained in the room totaled 5,184 cubic feet of air. Applying the constant of 30 students per classroom shows that each student would have had 176 cubic feet of personal air space and19.2 square feet of floor space. A historic photo, on display in the facility, dated CIRCA 1909 showed what appeared to be 77 students in a class picture at the school. In the interview conducted with a former student at the school, the student's memories set the enrollment of first through seventh grade students at 35 to 40 students. When questioned, about the size of the classroom the student recalled there was no problem for students or the teachers moving around the school due to overcrowded conditions in classrooms.


Figure 78. Hebron School Classroom

There was no electricity run to the building while Hebron was used as an educational facility. A majority of the lighting was from natural light, which entered the building through the generous windows on the north side of the building. The student questioned and also historical society members confirmed that oil lamps also were present to provide additional lighting when needed.

The windows in the facility (Figure 79) were double hung which allowed them to be opened at both the top and bottom to create a draft. The walls of the building were not insulated, however were tight in their construction as were the floors and ceilings. All interior surfaces were tongue and groove wood. There was neither dedicated ventilation nor transom windows as Barnard devised in his plans for schools in the facility. Heating in the building was accomplished by a wood-burning stove, on which a pan of water sat in the winter months to assist in moisturizing the air. There was no thermometer in the building so temperature changes were never recorded.


Figure 79. Windows at Hebron School

No desks remain in the structure, however the student interviewed confirmed that desks were available for students. The vivid description matched desks of traditional design, which were well documented at the Madison Graded School (Figure 51). Desks of different sizes were available for students. According to the student, the desks did contain a storage area under the hinged top, however the slope of the desk could not be determined based on the student's memories.

Teacher arrangements and apparatus could be best described as sparse. Each teacher in the school had a desk located at the front of each classroom and a chalkboard and tray. The teachers were able to move about the room easily. The teacher's desk was not located on a raised platform and there was no dedicated recitation area in the rear of the classroom. The students practiced their skills on slates, however there were no pictures, maps, globes or other

teaching aids available. Books were purchased by the students and resold after completion of the intended study. There was no library in the facility.

There were no buildings close to the school other than the church. There was plenty of room for play however there was no playground equipment, according to the historic society members. The former student did remember a pole, which was hung between two forks in trees, on which some children would swing on during recess time.

Stephens County Middle School

The Stephens County Middle School (Figure 80), (Figure C23), (Figure C24) facility is being built with proceeds from a Special Purpose Local Option Sales Tax (SPLOST), which was approved by the voters in 1998. The cost of the facility is expected to be in the neighborhood of 18.5 million dollars and is to be occupied in the fall of 2004 housing a projected student population of 1,050 and a maximum population of 1,500 students. A board of education member interviewed stated that the facility is expected to serve the students of Stephens County for a period of 50 years.

Figure 80. Stephens County Middle School

The brick facility is built on a slab and is a two-story structure. The concrete block interior walls are insulated. County water is provided for student use and city sewer services are used to carry wastewater from the facility. The building is built on a graded plot and water removal from the site is attained by way of an extensive engineering effort. The surrounding community is made up of single-family residences, a large cemetery, pastureland and county

recreational facilities. The survey was completed after contacting the administrative team at the present Stephens County Middle School site.

Entering the facility from the main entrance students will find themselves in a large commons area that connects with hallways. This will then disperse students to their designated areas of study. The floors in the hallways of the first floor are terrazzo, with ceramic tiled load bearing columns supporting the floor above. The main hallway leading into the facility was 26' wide. The halls narrow down to 14' (Figure 81) when entering areas of the building where classrooms are present. Fire suppression sprinklers guard the entire structure. Access was gained to the main mechanical room of the facility and was quite impressive.

Figure 81. Stephens County Middle School Hall

The social studies classroom surveyed (Figure 82) measured 26' x 34' and ceiling height in all classrooms are ten feet. The classroom covers an area of 884 square feet and contains 8,840 cubic feet of air space. Applying the constant of 30 students per classroom to the measure reveals each student is provided with 294 cubic feet of air space. This measure almost doubles Barnard's recommendation of 150 cubic feet per student.

Figure 82. Stephens County Middle School Classroom

While desks were not in place, considering the size of classrooms it is an easy assumption to project that there will be no problem for students to move about the classroom nor will they be

overcrowded in their seating area. The room will provide for easy observation of students by the instructor.

Florescent fixtures provide illumination in the facility. Each standard size classroom has a minimum of 2 windows measuring 6' x 6' 8". While Stephens County Middle School classrooms are well lighted, the windows were somewhat of a distraction in some second floor classrooms. Some classrooms on the second floor overlook the roof of single story parts of the building, which created quite an unsightly view of a tarred roof scape (Figure 83). Windows, whose bottoms were located higher on the walls of the classroom, might have been more suitable in these given classrooms.

Figure 83. Stephens County Middle School Classroom View

There is dedicated ventilation in individual classrooms s required by industry standards for HVAC manufactures. The air conditioning system made use of a large water-cooling tower (Figure 84), which aids in the economics of cooling the facility. The windows are sealed however there is a small screened 32 square inch opening at the bottom of each window. Heating in classrooms will be provided by a central HVAC system using electricity as energy sources for the respective systems. There is no dedicated humidity control system to add moisture into the inside atmosphere nor was there a thermometer visible in classrooms.

Figure 84. HVAC Water Cooling Tower

According to a school board member interviewed, teacher arrangements will consist of modern desks and file cabinets, a storage closet and teacher workrooms scattered throughout the facility. Visibility of the class will not be a problem for the teacher, nor will their circulation around the space be a problem. A marker board and bulletin board will be standard in every classroom.

Teaching apparatus include lab tables with overhead mirrors, which will provide students with a bird's eye view of science experiments and specimens, and an area dedicated to computer workstations which contain five network drops in each classroom in the building according to a school official. Also other needed discipline specific tools for teachers will be provided in this new facility. An extensive library is also part on the building with study room built into two walls of the area. An auditorium with a complete stage and backdrop area is built into the school (Figure 85). The sloped seating area will accommodate 1,200 parents or students for plays, concerts or civic and community meetings.

Figure 85. Auditorium at Stephens County Middle School

A gym with a ceiling height of the second floor is part of the campus. The area of the gym was spacious with a seating capacity for 1,300 students.

Comparison Statistics for Hebron Academy and Stephens County Middle School

Table 10

	Historic School	Modern School
Site	Hebron Academy Occupation Date 1909	Stephens County Middle Occupation Date Fall 2004
Square feet in classroom	609 square feet 20.3 square feet per student *	864 square feet 28.8 square feet per student
Minimum of 150 cubic feet airspace per student	Yes, 247 cubic feet per student * 7,308 cu. ft. total	Yes, 295 cubic feet per student * 8,640 cu. ft. total
Ease of movement for Students	Yes	Yes
Unrestricted movement for students in seats	Yes	Yes
Ease of observation and movement for teacher	Yes	Yes

- @ 30 students per classroom

Comparison Among Schools

The surveys completed on the 10 historic and 10 modern schools in Northeast Georgia provided information for qualitative and quantitative analysis. Qualitative questions in the survey included:

Architectural

- How does the location, style and construction of the historic school compare to the modern school?
- Is there a yard and external arrangements available for student use at the historic and the modern school?

Classroom

- Is there an effective use of lighting in the historic to the modern school?
- Is there dedicated ventilation for classrooms in the historic and modern school?
- Are temperature controls available in classrooms in the historic to the modern schools?
- Could suitable seats and desks for scholars available in the historic and modern schools be documented?

Resources for Instruction

- Are there suitable arrangements for teachers in the historic and the modern school?
- Are there apparatus available for instruction in the historic and the modern school?
- Are there dedicated science instructional materials in the historic and the modern school?

- Is there a library available in the historic and the modern school?

Space for Movement and Ventilation

Quantitative questions making up the remainder of the survey are:

- Are the classrooms comparable in size from the historic to the modern schools?
- Is adequate ventilation found in the historic and the modern school?

Qualitative Findings-Architectural

The determining factor in location of historic and modern schools is population. If no school age population is located in a given area then school facilities need not exist. Historic schools in this study were community schools from which students could be easily transported. Considering the rural nature of Northeast Georgia from the period of 1890 – 1956 there were many more schools dotting the countryside than today. An example of schools available for students was found in unpublished school documents in Rabun County, Georgia. The documents provided by the county historic society documented in the year 1914 there were 106 schools in Rabun County. According to the president of the historic society, many of the schools served a very small number of students. It was not unusual for a school during this period to have a student population in single digits. Modern schools are much larger in shear size of the facilities. Modern transportation provided for the consolidation of students into fewer schools, which represented expanding geographic areas of individual counties in Northeast Georgia.

The style of historic schools had some variance in size and construction materials. The most ornate school surveyed in the historic category was the Madison Graded School. Constructed of brick and with a roof of slate, the Romanesque Revival style of architecture set this facility apart from other historic schools in style. It was the only brick structure surveyed built before 1900 and the only facility with a roof covered with non-traditional roofing material

for school facilities in Northeast Georgia. Of the historic schools surveyed, three were constructed with a brick exterior, one had a stone exterior and six had wood exteriors (one of which had been covered with vinyl in 2002).

The style of modern schools varied from school to school. Configurations of modern schools, which were generally more complex than historic schools, can be viewed in Appendix C. All of the modern schools were built on a slab and constructed with a brick exterior. Roofing materials of modern schools varied from asphalt shingles to rubber and metal.

Every school surveyed had some type of yard, playground or athletic facility for students to play or exercise on. Of the schools surveyed, Hartwell Elementary with the historic and modern schools being joined into one, had the smallest area for student play. The lot on which the school sits had been consumed by the phases of construction, which began in 1933. Today very little open area remains of the original 7.311-acre lot.

Several of the historic schools had no organized area for play with equipment however generous space was available around the schools for students release excess energy. In interviews with community members who attended (or had family member attend) Bonds Academy, The Hebron School, Chestnut School and Ashland School, the subjects of the interview assured the author that students were more than capable of entertaining themselves even when organized playground equipment was not available.

Classroom

Lighting in historic and modern schools can be divided into two categories, natural and supplemental. Based on observation while surveying both historic and modern schools there was an obvious difference in how schools were illuminated for students. Historic schools relied on natural light for illumination of classrooms. The oldest schools surveyed were built before

electricity was available on a commercial level in rural communities. Once electrical infrastructure was established in an area, electricity could be run to school facilities. When interviewing community members on several sites, they commented that schools never had electricity and some remembered when electricity became available. Based on these interviews it was obvious to the author that most historic schools relied on natural light for illumination of classrooms.

Modern schools are exactly the opposite from historic schools as far as facility lighting is concerned. The modern schools surveyed relied exclusively on electricity to light classrooms for students. Every classroom surveyed had a window or exterior exit with window, however many times the windows were small in area. The survey did not measure natural light intensity however a conclusion drawn by the author was that natural lighting in modern classrooms was minimal at best.

Barnard's concern for fresh air in schools was well founded and based on observations made by Dr. Clarke in the Lying-in Hospital in Dublin from 1781 to 1785. Barnard's belief that stale air inhibited learning was a conclusion he made, based on the reduction of infant mortality from 33% to 3.8% over a three year period, when measures were taken to introduce fresh air into the hospital facilities.

Barnard called for school facilities to have fresh air vents built into classrooms, which would be used during colder months when air was subject to becoming stale. Warmer months were not a problem considering, classroom ventilation was provided by opening windows. The author was not able to identify a single historic school facility, which had a fresh air induction system to replace stale air as Barnard specified for winter months.

Modern school facilities are tightly sealed, however the author discovered in an interview with a mechanical engineer that fresh air induction systems are required in schools by international code. The code, developed by the American Society of Heating Refrigeration Air-conditioning Engineers (ASHRAE), states that a facility designed for students must introduce 20% fresh air into the facility through the HVAC system. A school classroom with a HVAC fan circulating 100 cubic feet per minute (cfm) of air would be required by international code to introduce 20 cfm of outside air into the room or rooms served by the HVAC unit. The modern school facilities surveyed all met the standard set by Barnard (1970) by way of the ASHRAE code.

Of the 10 historic schools surveyed all had some type of basic temperature control system built into the heating system used in classrooms. Seven of the schools used wood or coal stoves to heat classroom areas. The damper system on each stove is a regulator of air, which determines the rate and intensity of combustion. This basic temperature control did nothing to regulate temperature in the entire classroom. Outside wall areas of classrooms would be prone to be much cooler than areas in the center of the room closest to the stove. Two historic schools surveyed did have boiler systems, which circulated hot water through radiators in classrooms. Hartwell Elementary did have radiators, which had a regulator valve that controlled the rate of flow of heated water through the unit. The Franklin County Trade School used a damper system, which blocked the circulation of air over radiator coils in classrooms.

All modern schools surveyed used either a mechanical bi-metal thermostat or a digital thermostat in classrooms. These units help maintain a stable temperature in modern classrooms.

Of the 10 historic schools surveyed, 8 had either commercial desks in the facility or a community contact provided a description of desks used in the facility, which suggested

commercial seating was used. Two facilities used benches or home made desks for students. At the Chestnut Grove School homemade desks were constructed for students. The desks had no storage area for students and the top was not sloped as specified by Barnard. The New Smyrna School used benches for students, which were all the same size. Movement of students from their seats could cause disruptions of instructional time if student movement was from the center of the bench. Most desks were sized to fit different age students, with the exception of Chestnut Grove and New Smyrna.

Modern facilities used either tables or desk depending on school and teacher preference. Barnard's standard of one-inch slope per foot of desktop was often not followed with modern seating for students. Storage areas were available for students in modern desk while tables didn't provide storage areas. As modern student apparatus has changed over the years most students today carry educational materials in backpacks which function as individual storage areas.

Resources for Instruction

Basic teacher arrangements were available in all schools in the form of a teacher's desk and some type of storage area for materials. In historic schools teacher arrangements were more sparse that in modern schools. The Madison Graded School had the best teacher arrangement of all historic schools surveyed. The teacher's desk was located on a platform to increase visibility and there was a storage unit built into the classroom.

In modern schools teacher arrangements were uniform, with the exception of one school, Oconee County High School. At OCHS teachers are not assigned to a classroom, but are scheduled in available classrooms. There are some teachers who float during the day to available classrooms throughout the school. The goal was to maximize classroom usage. Teachers are provided with department offices for planning.

All historic schools surveyed had a blackboard as the most basic piece of teaching apparatus. The school with the most available apparatus for instruction was the Madison Graded School. A classroom was set up in the school as a "Classroom Museum" had great influence with the author in drawing this conclusion. Available in the classroom at Madison Graded School was a chalkboard with tray, globe, maps, historic plates and photographs, books and slates. No other historic school was so well documented. In interviews with students from other school descriptions of classrooms, which were bare as far as apparatus were concerned, was a common description. A student account from the Chestnut Grove School revealed the only writing area for students was on the chalkboard, slates were not available. The community member, who guided the author through the Bond's Academy School, stated we had a few books and a blackboard for writing; there were no maps, pictures or globes in the facility.

Modern schools are loaded with modern teaching apparatus. The Internet and in house video and satellite video delivery are common across Northeast Georgia. Video projectors and other high tech hardware and software are available in all schools.

There was very little data on dedicated scientific materials available for instruction in historic schools. The one exception was the Woody Gap School in Suches, Georgia. There were scientific instruments in the school, which have been used for the last 50 years (microscopes and bioscopes).

In modern schools there was an abundance of scientific instructional materials available for student use. The type of equipment varied according to the grade level of students taught in the facility.

Library resources were sparse in historic schools. Of the ten schools surveyed only Woody Gap School and the Franklin County Trade School contained a library facility for students.

Modern schools had substantial media center resources. All modern schools surveyed had a media center for student use.

Space for Ventilation and Movement

In historic facilities there was adequate ventilation for students in the spring and fall sessions of the school year. An assumption can be made that in the winter the facilities were kept closed as tightly as possible to conserve heat. Considering six of the historic schools were shrouded in lumber and were not insulated, the point can be argued that there was sufficient air movement in classrooms to provide proper ventilation. There was no way to measure this hypothesis.

Modern classrooms have sufficient ventilation in all seasons of the year by way of international code. The American Society of Heating Refrigeration Air-Conditioning Engineers (ASHRAE) code, states that a facility designed for students introduce 20% fresh air into the facility through the HVAC system. A school classroom with a HVAC fan circulating 100 cubic feet per minute (cfm) of air would be required by international code to introduce 20 cfm of outside air into the room or rooms served by the HVAC unit. The modern school facilities surveyed all met the standard set by Barnard by way of the ASHRAE code.

Quantitative Minimum Standards Established by Henry Barnard

In the comparison of historic and modern schools the author found no differences between either categories of school in the study according to the minimum standards set by Henry Barnard.

Table 11

Size of Classroom	Historical School			Modern School		
Sufficient square feet for classroom instruction	Yes 100%	No 0%	NATD * 0%	Yes 100%	No 0%	NATD * 0%
At least 150 cu.ft. of airspace per student?	Yes 100%	No 0%	NATD * 0%	Yes 100%	No 0%	NATD * 0%
Ease of movement for students in classroom.	Yes 100%	No 0%	NATD * 0%	Yes 100%	No 0%	NATD * 0%
Unrestricted movement of students in Seats.	Yes 100%	No 0%	NATD * 0%	Yes 100%	No 0%	NATD * 0%
Ease of observation and movement for teacher.	Yes 100%	No 0%	NATD * 0%	Yes 100%	No 0%	NATD * 0%

* Not Able to Determine

All historic and modern school classrooms surveyed contained sufficient square footage for classroom instruction. Every historic and modern school surveyed contained at least 150 cubic feet of air space per student. In the comparison, a standard class size of 30 students was set as a constant. Interviews conducted with former teachers, administrators, and students of historic schools revealed that class sizes (based on their memory) were never over 25 students. No interviewee ever stated that his or her classes suffered from overcrowding, which would cause the air space calculation to be incorrect. As noted in Chapter II, Barnard based his concerns about the freshness of air for students on the study completed in a hospital in England in the 18th century, which showed infant mortality rates plummeted when a system of ducts introduced fresh air into the facility. Also as noted earlier were the Alabama schools built in Cleveland intended to house 900, but sometimes 1,800 students were housed in the facility. Barnard recognized the danger of re-circulated air in crowded buildings and desired to assure that the student was able to learn and not inhibited by breathing stale air.

The study did determine there was an ease of movement for students in historic and modern classrooms. One teacher interviewed commented that they must manage book bags, which sometime interfere with traffic patterns in their classroom. However good planning

alleviated the problem. In historic schools there were some assumptions made by the author in classrooms, which no longer contained desks. The author based his findings that 100% of the historic schools had an ease of movement from the knowledge of historic desks measured in the study. There were four basic types of historic seating arrangements, benches used in the New Smyrna School, traditional desks with cast iron legs and the top of the desk attached to the back of the seat in front of a student, home made desks at the Chestnut school and wooden or sheet metal bottomed individual student desks used in the 1940's through the 1990's. Based on the author's knowledge of period furniture and known square footage of classrooms, it was determined that there was an ease of movement for students in classrooms.

A like finding was made concerning unrestricted movement for students in their seats. Based on observations in modern schools of seating arrangements and a knowledge of historic seating options for students it was determined by the author that students had unrestricted movement in their seats.

The last criteria for comparison were ease of observation and movement for teacher in their classroom. Again, in modern classrooms there was no problem determining there was an ease of movement in all classrooms, but in some historic schools the conclusion was drawn based on knowledge of historic seating and total area of the classroom.

Quantitative Findings

The findings were summarized in the ten comparison studies of paired school facilities. The quantitative data were shown at the end of each comparison set in the form of a table. Each table demonstrated the quantitative measures made of individual classrooms and determined if classrooms met the minimum airspace requirement set fourth by Barnard.

In addition to the comparison of data in individual sets, a two-tailed t-test was conducted to determine if there was a significant difference when comparing all historic schools and all modern schools. The areas compared among historic and modern schools were square feet of classroom space per student and cubic feet of classroom space per student. These two measures analyzed by a "paired sample t-test", directly contributed to the findings of tables 12 and 13 in that all of the site questions in each table were directly affected by the measurements of classrooms.

The first t-test run compared the square footage of all historic classrooms and all modern classrooms. The findings are listed below:

Table 12 – A Comparison of Square Footage per student in Historic and Modern Classrooms

	Mean	N	Std. Deviation	Std. Error Mean
Pair 1 Historic	20.7630	10	2.06363	.65258
Modern	26.0000	10	2.37674	.75159

	N	Correlation	Sig.
Pair 1 Historic & Modern	10	-.647	.043

	Paired Differences				
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference	
				Lower	Upper
Pair 1 Historic - Modern	-5.2370	4.03137	1.27483	-8.1209	-2.3531

	T	df	Sig. (2-tailed)
Pair 1 Historic – Modern	-4.108	9	.003

($t_9 = -4.108$; $p = .003$)

The second t-test compared cubic feet of classroom airspace per student in all historic classrooms to all modern classrooms.

Table 13 - A Comparison of Cubic Footage per student in Historic and Modern Classrooms

	Mean	N	Std. Deviation	Std. Error Mean
Pair 1 Historic	245.5000	10	32.39427	10.24397
Modern	248.4000	10	32.82682	10.38075

	N	Correlation	Sig.
Pair 1 Historic & Modern	10	-.247	.491

	Paired Differences				
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference	
				Lower	Upper
Pair 1 Historic - Modern	-2.9000	51.5007	16.2859	-39.7414	3.9414

	T	df	Sig. (2-tailed)
Pair 1 Historic – Modern	-.178	9	.863

(t_9 = -.178; p = .863)

As noted in the two tables, only the square footage per student was significantly different. Modern schools had significantly more space per student than historic schools. No significant differences were found for cubic feet per student.

CHAPTER 5

SUMMARY AND CONCLUSIONS

Introduction

The purpose of this study was to compare historic schools (CIRCA 1956 and before) to modern schools (1985 and after) by using the criteria established in Henry Barnard's *School Architecture* (1848). The study sampled 20 schools, ten modern and ten historic, designated as pairs of each type school. This provided ten comparison sets. The survey included 12 research questions categorized under the headings of "Architectural, Classroom, Resources for Instructor and Space for Movement and Ventilation."

Summary Conclusion

Qualitative Questions

Of the 12 survey questions in the study 10 were of a qualitative nature. A summary and conclusions section is provided below. (Appendix D)

Architectural Conclusions

Question 1. How do the location, style and construction of the historic school compare to the modern school?

- All historic and modern schools were located in suitable areas, close to residential population centers.
- The architectural style of historic and modern schools was varied.

- Wood was used in the exterior construction in 60% of historic schools surveyed. Brick and stone made up the remaining 40% of the schools surveyed. All modern schools were built on a slab with brick exterior.

Question 2. Is there a yard and external arrangements available for student use at the historic to the modern school?

- All schools surveyed had some type of yard, playground or area designated for physical activities.

Classroom Conclusions

Question 3. Is there an effective use of lighting in the historic and the modern school?

- All schools surveyed were adequately lighted for students.
- A majority of historic schools relied almost exclusively on natural lighting for illumination.
- Modern schools relied almost exclusively on florescent lighting for illumination.

Question 4. Is there dedicated ventilation for classrooms in the historic and the modern schools?

- No historic schools were found to have a dedicated ventilation system, which would provide fresh air for students when the doors and windows of the facility were closed.
- Modern schools were found to have dedicated ventilation as prescribed in international standards set by the American Society of Heating Refrigeration Air-Conditioning Engineers (ASHRAE),

Question 5. Are temperature controls available in classrooms in the historic and the modern schools?

- Basic temperature controls were available on all heating (historic and modern) and cooling (modern) devices in classrooms surveyed.

Question 6. Were suitable seats and desks for scholars available in the historic and modern schools?

- Suitable seats and desks were found in historic schools and modern schools, however not all desks and tables surveyed incorporated the one inch rise to twelve inch run on the desktop prescribed by Barnard.

Resources for Instruction Conclusions

Question 7. Is there a suitable arrangement for teachers in the historic and the modern school?

- Suitable teacher arrangements were available in all schools.

Question 8. Are there apparatus available for instruction in the historic and the modern school?

- Apparatus in historic schools was basic and varied among surveyed schoolhouses.
- All modern schools have standard teaching apparatus available.

Question 9. Are there dedicated science instructional materials in the historic and the modern school?

- Very little data was available on dedicated science instructional materials in the historic schools.
- Modern schools had many dedicated scientific instruments and instructional materials available.

Question 10. Was a library available in the historic and the modern schools?

- Library materials were sparse in historic schools. Only two historic schools had libraries available for student use when the buildings were first occupied.

- Modern schools had substantial media center resources. All modern schools surveyed had a media center for student use.

Question 11. Is adequate ventilation found in the historic and the modern school?

- Adequate ventilation was found in all historic and modern schools surveyed based on Henry Barnard's recommendation that each student have 150 cubic feet of airspace in a classroom.
- A paired sample t-test comparing all historic and modern schools revealed there was no significant difference (t_9 = -.179: p=.863) in the cubic feet of airspace in surveyed classrooms.

Question 12. Are the classrooms comparable in size from the historic and the modern schools?

- All classrooms surveyed were found to have a sufficient area for instruction.
- A paired sample t-test comparing all historic and modern schools revealed there was a significant difference (t_9 = -4.108: p=.003) in the square feet of floor space in surveyed in historic and modern classrooms.

Conclusions

Based on the findings of the comparison groups, the study has concluded that the rural historic schools and modern schools surveyed in Northeast Georgia did, in fact, meet the minimum requirements suggested by Barnard (1848). Not only did they meet the minimum standards set forth, all schools passed the minimum in the one area, which was a definite quantitative aspect. Every school surveyed exceeded the 150 cubic feet air space minimum set by Henry Barnard.

Based on the statistical analysis of classroom area in square feet the study did conclude there is a significant difference in the square feet of classroom space when comparing historic and modern schools. The statistical analysis of cubic feet of airspace revealed there was no significant difference in historic and modern classrooms.

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APPENDICES

APPENDIX A

Historic Facility Survey

Name _____ Location_____

Date of Construction _____ Water Source _____

Auditorium or Assembly Area? Yes No Restrooms: Interior Exterior

Type of Reuse _____

Grade Levels Taught: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12

Location – Style – Construction

Exterior Construction _____ Foundation _____

Architectural Style _____

Location is: Dry or Damp & Quiet or Noisy

Size of Classrooms

At least 150 cubic feet of airspace in classrooms per student.	Yes	No	
Ease of movement for students in classroom.	Yes	No	Not able to determine
Unrestricted movement for students in seats.	Yes	No	Not able to determine
Ease of observation and movement for teacher.	Yes	No	Not able to determine
Other Rooms available (Library, storage, etc.)	Yes	No	

Lighting

Natural light for room in abundance.	Yes	No		
Exposure for natural light is from:	North	South	East	West

Windows on two sides of the room. Yes No

Was supplemental lighting available? Yes No

Type of supplemental lighting. _____

Ventilation

Height of Ceilings _____

Insulation Yes No

Construction Details Wood Brick Crawl Space Slab

Can you see through the walls or floor? Yes No

Are chimneys or flues present? Yes No

How many are present? _____

Dedicated Ventilation

Transom Windows Yes No

Fresh Air Vents in Ceiling Yes No

Fresh Air Vents in Floor Yes No

Windows Yes No

Double Hung Single Hung Push Out

Temperature Controls

Type of heating device used. _____

Primary Fuel _____

Was there a thermometer in the classroom? Yes No Not able to determine

Humidity Control Yes No

Other Equipment _____

Furniture

Type of seats _____

Type of Desk _____

Were age appropriate seats and desk available? _____

Seating area was:	Greater than 2' per student Less than 2' per student Not able to determine.		
Tabletop slopes at 1" per 1'.	Yes	No	Not able to determine
A shelf for storage for books.	Yes	No	Not able to determine

Teacher Arrangements

Is the whole class visible from the teacher's desk?	Yes	No	Not able to determine
Was teacher movement possible without disrupting the class?	Yes	No	Not able to determine
Was the teacher's desk on a raised platform?	Yes	No	Not able to determine
Was the teacher desk of a suitable size?	Yes	No	Not able to determine
Was there a recitation area at the rear of the class?	Yes	No	Not able to determine
Was there a blackboard?	Yes	No	Not able to determine
Were maps available?	Yes	No	Not able to determine

Apparatus

Blackboard	Yes	No	Not able to determine
Chalk Tray	Yes	No	Not able to determine
Portable Black Board	Yes	No	Not able to determine
Slates (or other writing materials) for students	Yes	No	Not able to determine
Clock	Yes	No	Not able to determine
Visible standards of distance	Yes	No	Not able to determine

Points of the compass	Yes	No	Not able to determine
Globe	Yes	No	Not able to determine
Tellurium	Yes	No	Not able to determine
Orrery	Yes	No	Not able to determine
Measuring Devices	Yes	No	Not able to determine
Solid Geometric Shapes	Yes	No	Not able to determine
Historic and Geographic Plates	Yes	No	Not able to determine
Science			
Mineral Samples	Yes	No	Not able to determine
Specimens	Yes	No	Not able to determine
Magic Lantern (or other media delivery system	Yes	No	Not able to determine
Library			
Books available for students	Yes	No	Not able to determine
Books available for teachers	Yes	No	Not able to determine
Yard			
Is there an area available for play	Yes	No	Not able to determine
Is there shade available	Yes	No	Not able to determine
Is there playground equipment available	Yes	No	Not able to determine
Is there a gym available	Yes	No	Not able to determine

APPENDIX B

School Site List

Historic Site	Modern Site
Franklin County Trade School	Franklin County Middle School 7th Grade Wing
Hartwell Elementary (Old)	Hartwell Elementary (New)
Bond's Academy	Danielsville
Chestnut	Hull / Sanford
Smyrna Academy	Jefferson City Middle School
Apalachee	Malcom Bridge Middle School
Madison Graded School	Oconee County High School
Woody Gap School	Banks County Primary
Ashland	Lavonia Elementary
Hebron Academy	Stephens County Middle School

APPENDIX C

Renderings of Surveyed School Facilities

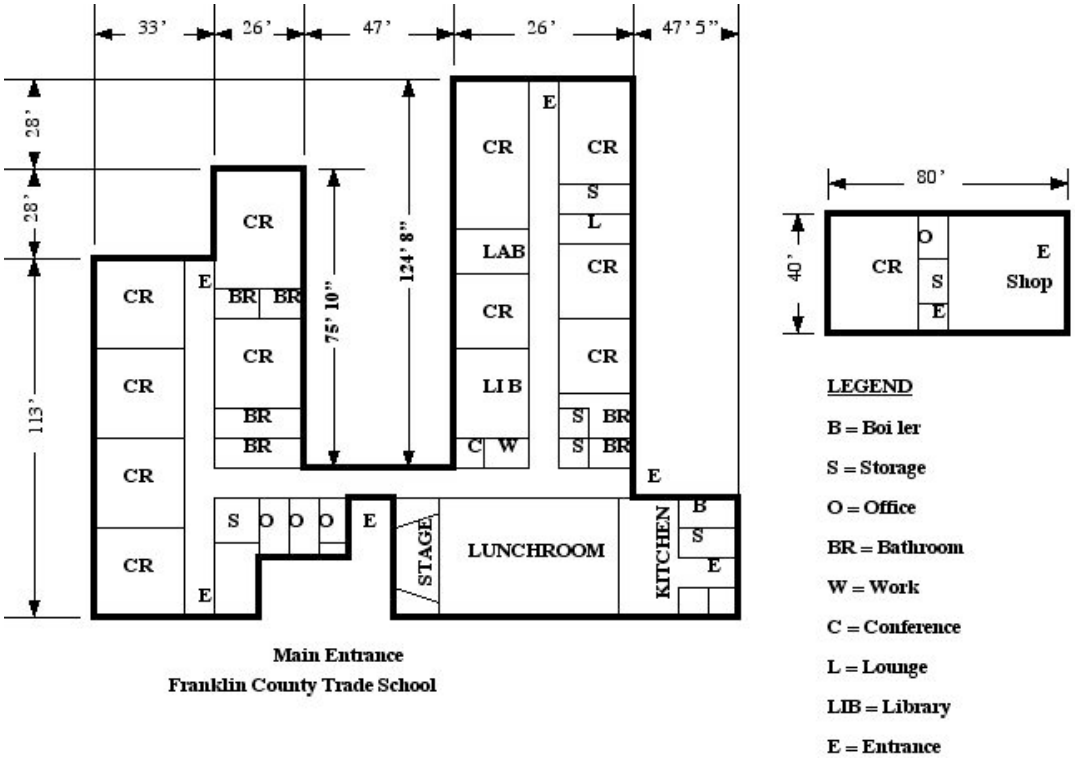

Figure C1. Franklin County Trade School – Occupation Date 1956
Line drawing by David Phillips

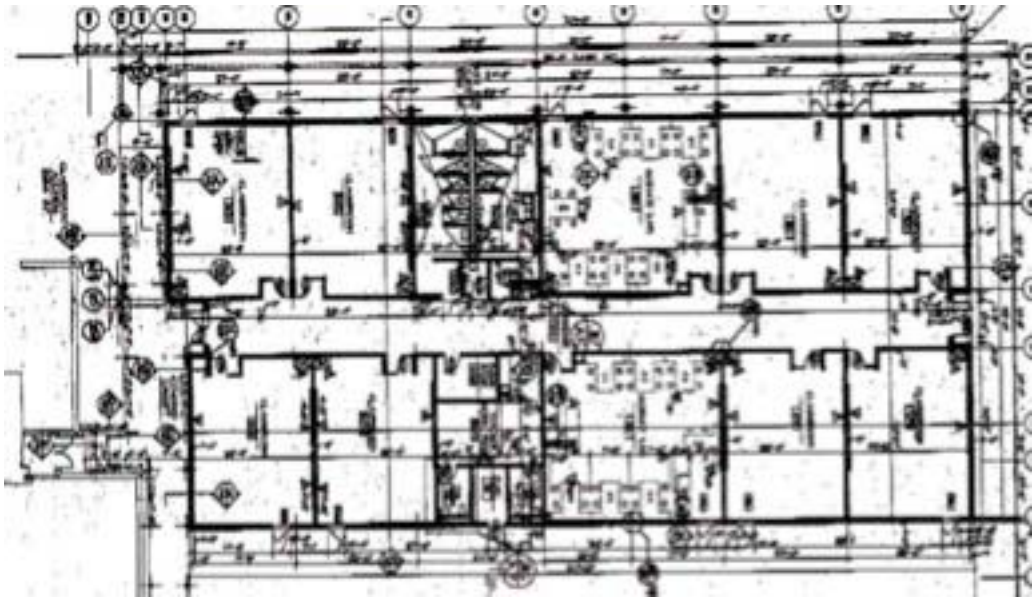

Figure C2. Franklin County Middle School Seventh Grade Wing – Occupation Date 2001
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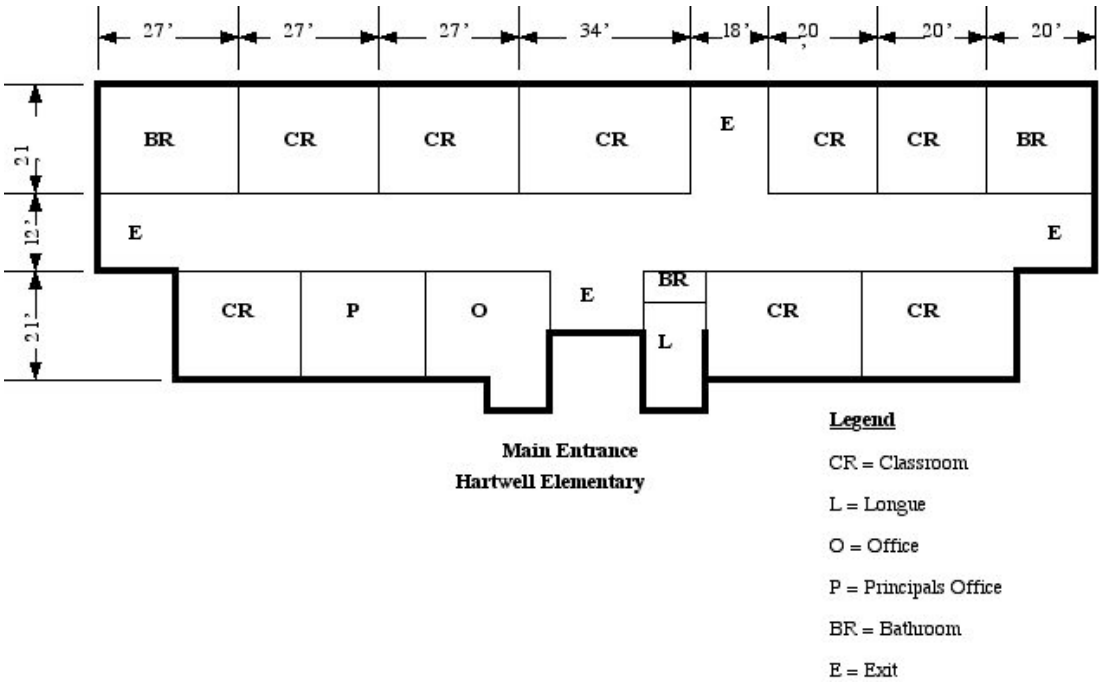

Figure C3. Hartwell Elementary School – Occupation Date 1934
Line drawing by David Phillips.

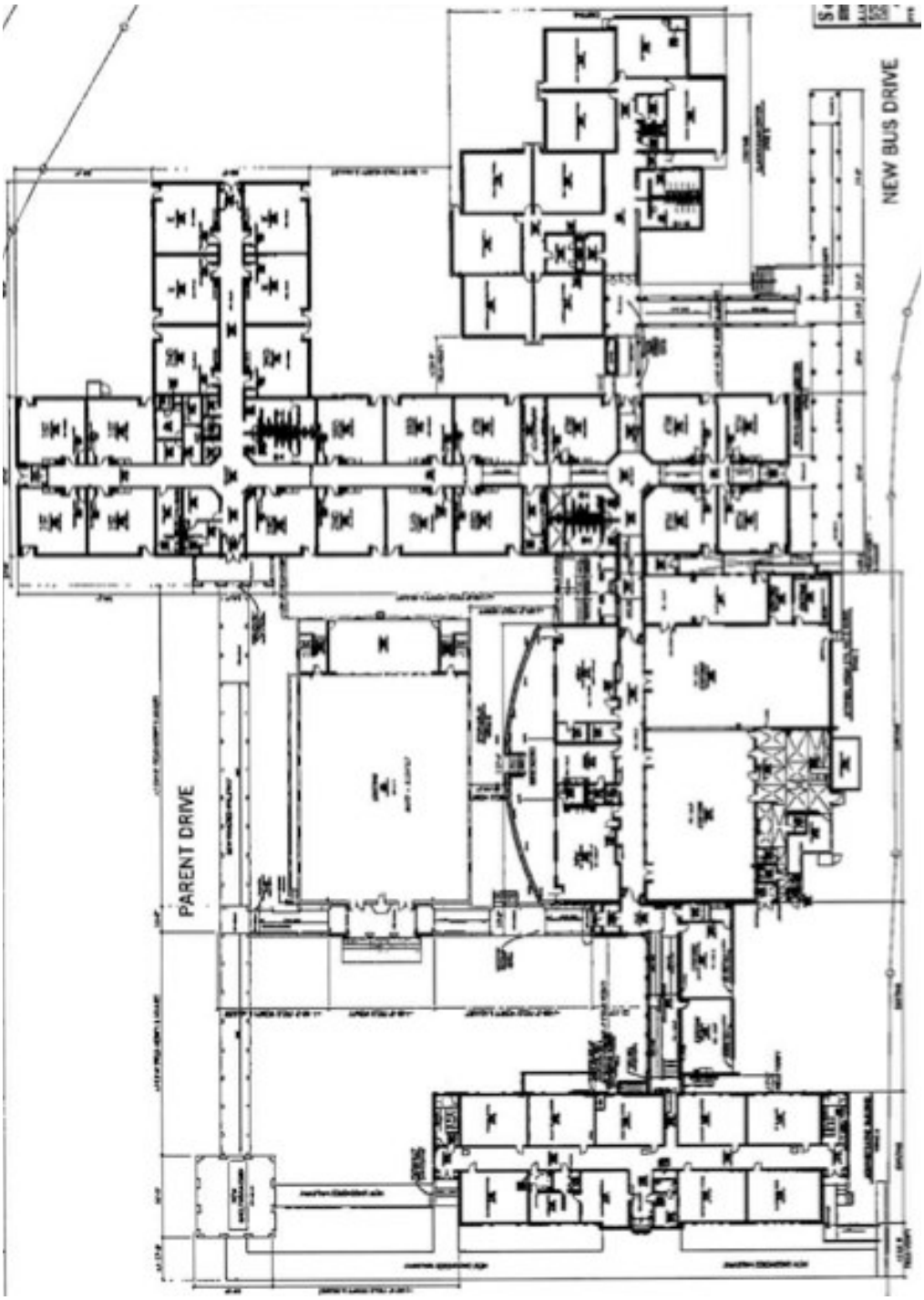

Figure C4. Hartwell Elementary School – Occupation Date 2004
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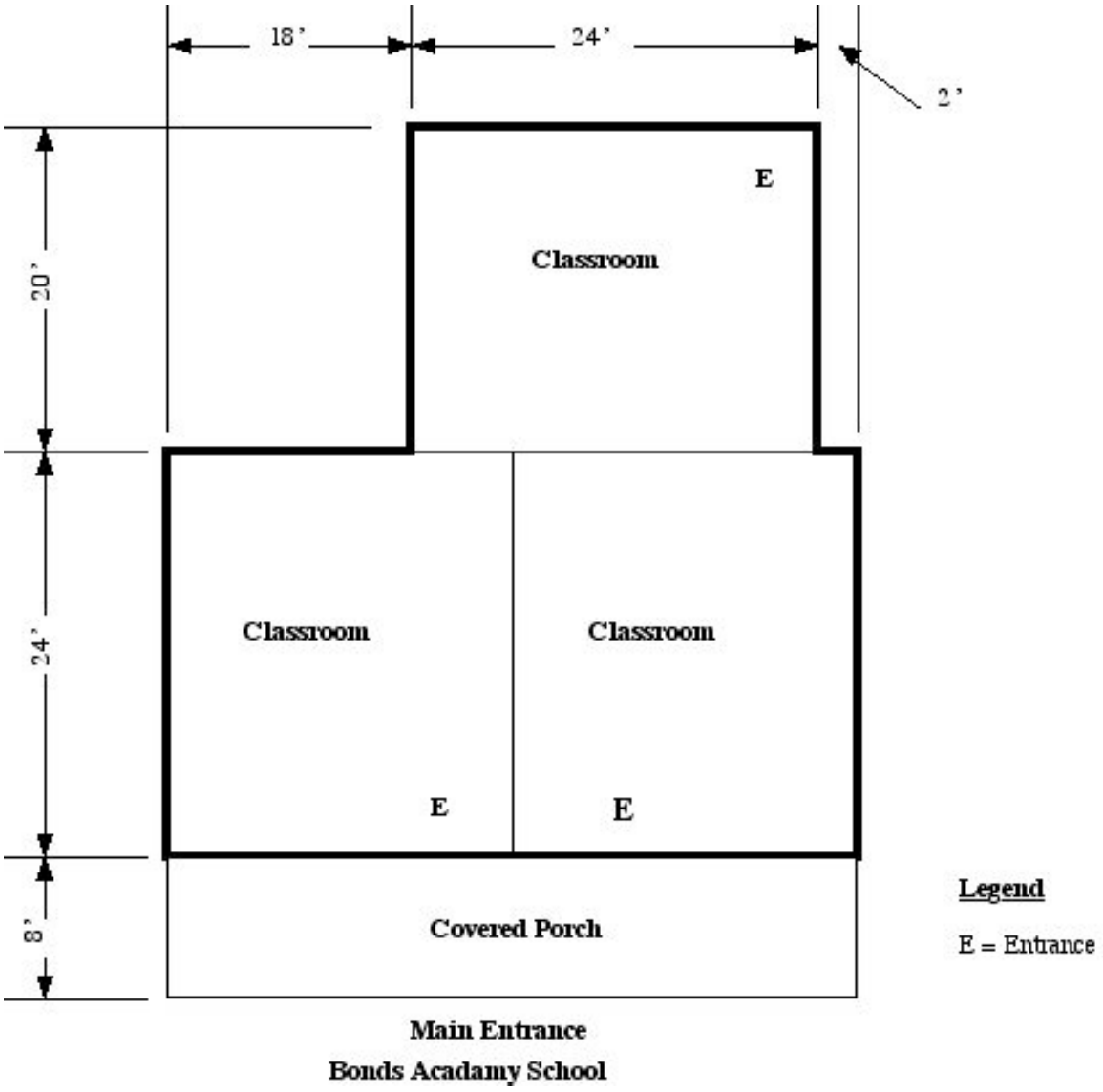

Figure C5. Bonds Academy – Occupation Date 1890
Line drawing by David Phillips.

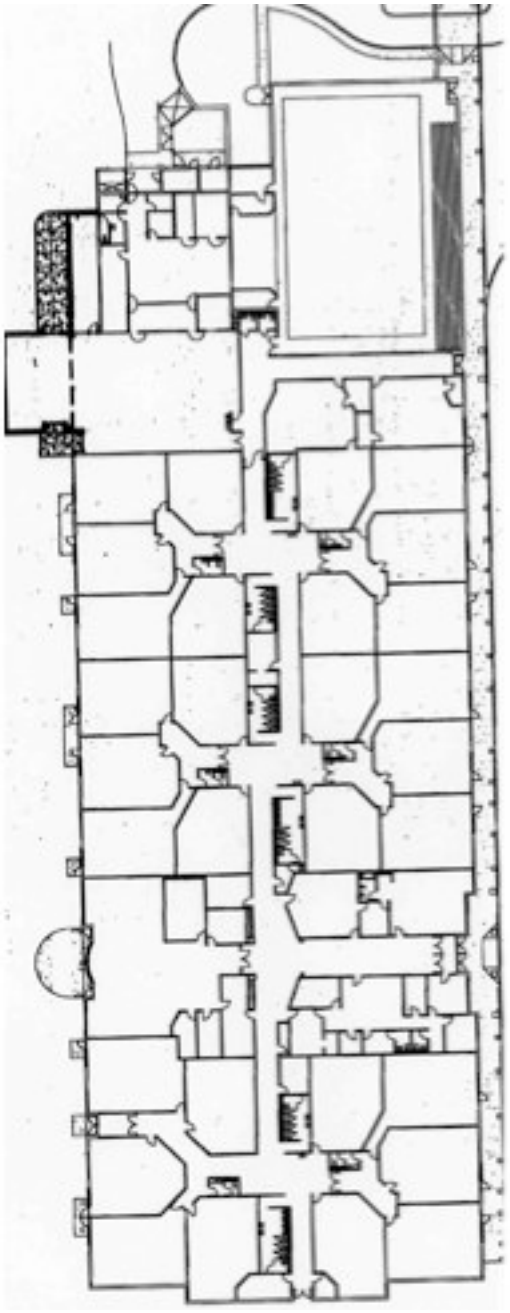

Figure C6. Danielsville Elementary – Occupation Date 1994
Permission to reproduce plan granted by H Lloyd Hill Architects

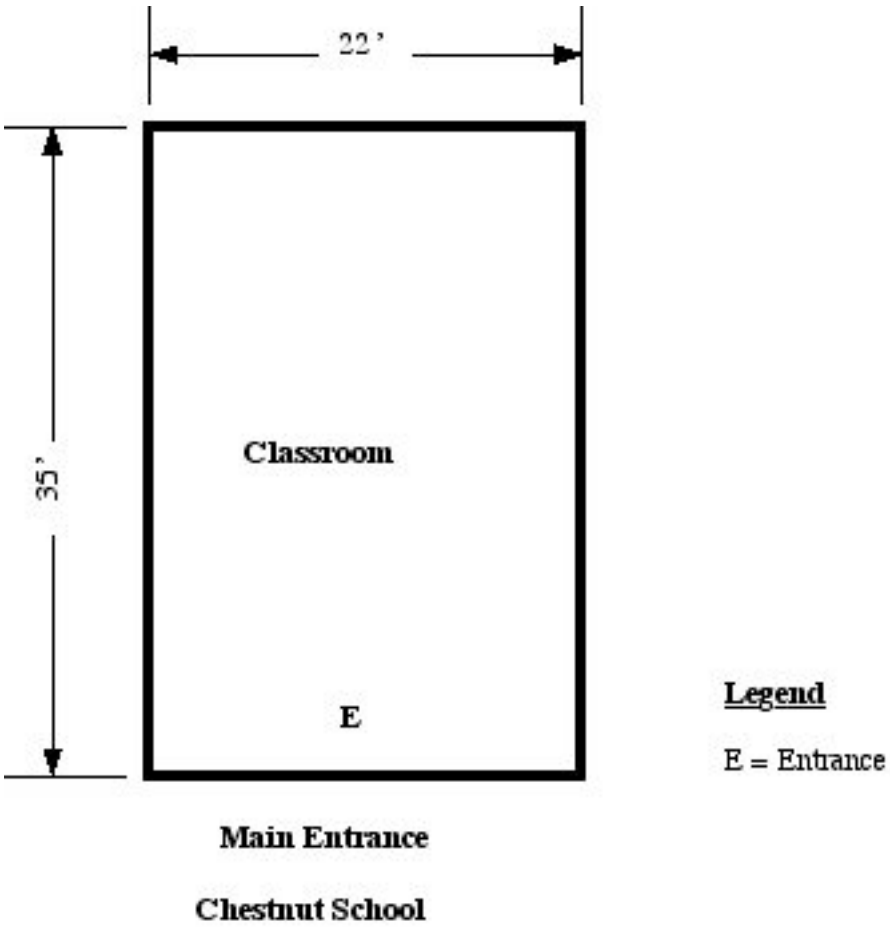

Figure C7. Chestnut – Occupation Date 1888
Line drawing by David Phillips.

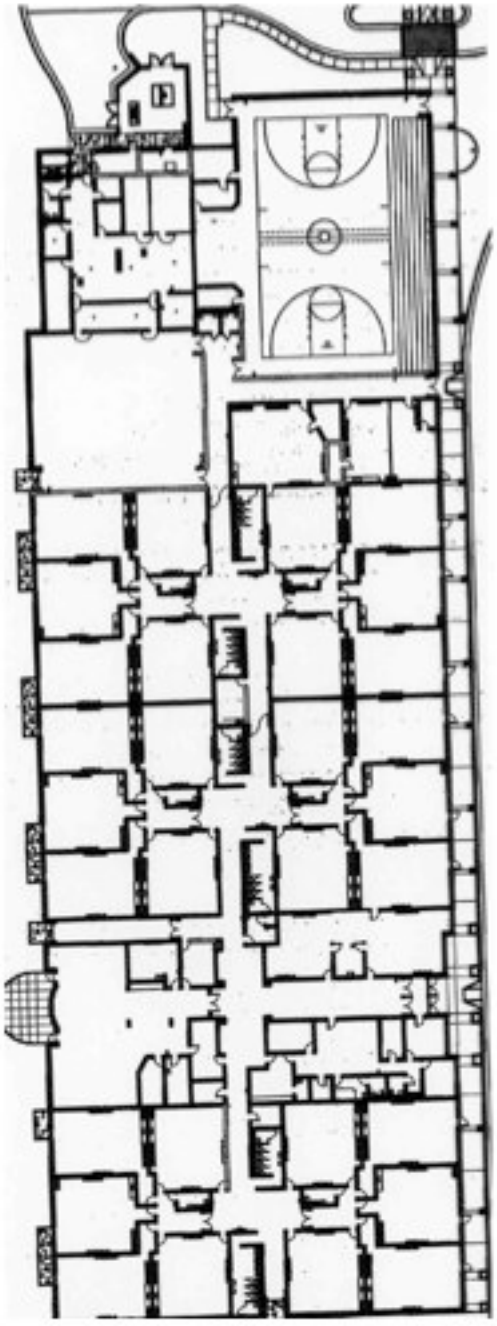

Figure C8. Hull Sanford Elementary – Occupation Date 2001
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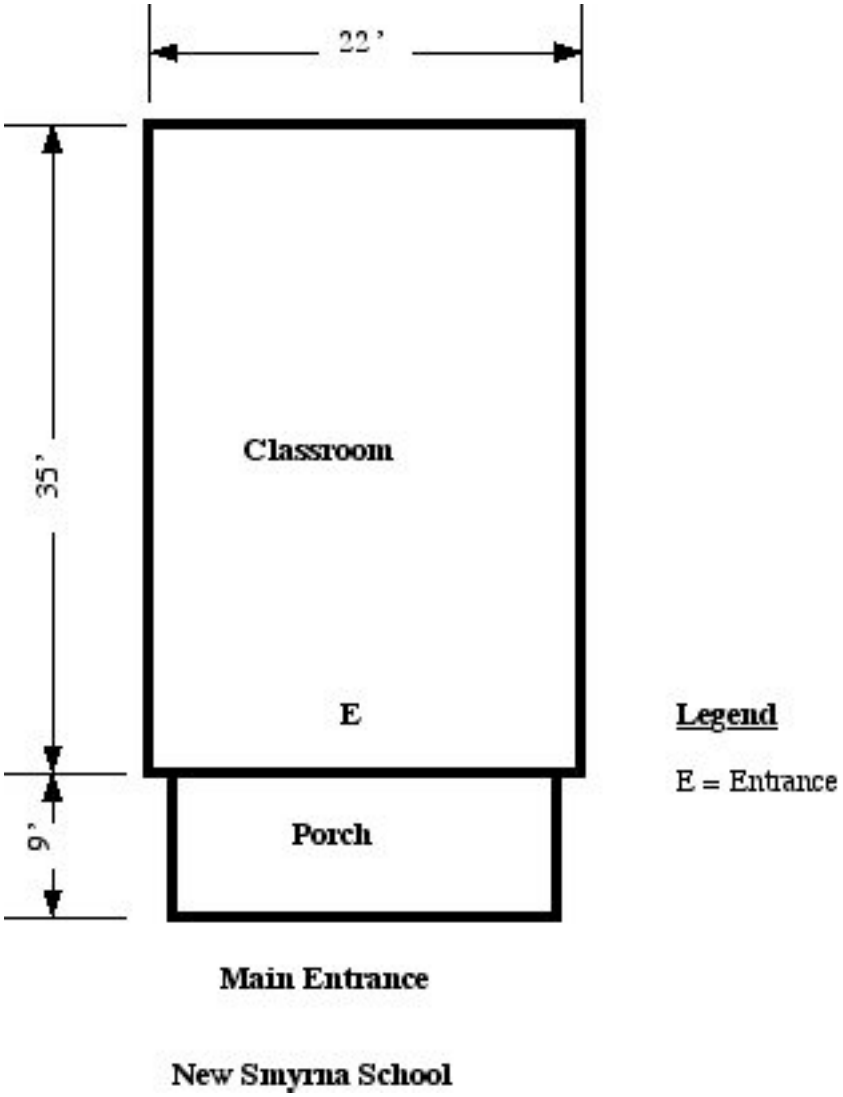

Figure C9. New Smyrna School – Occupation Date 1891
Line drawing by David Phillips.

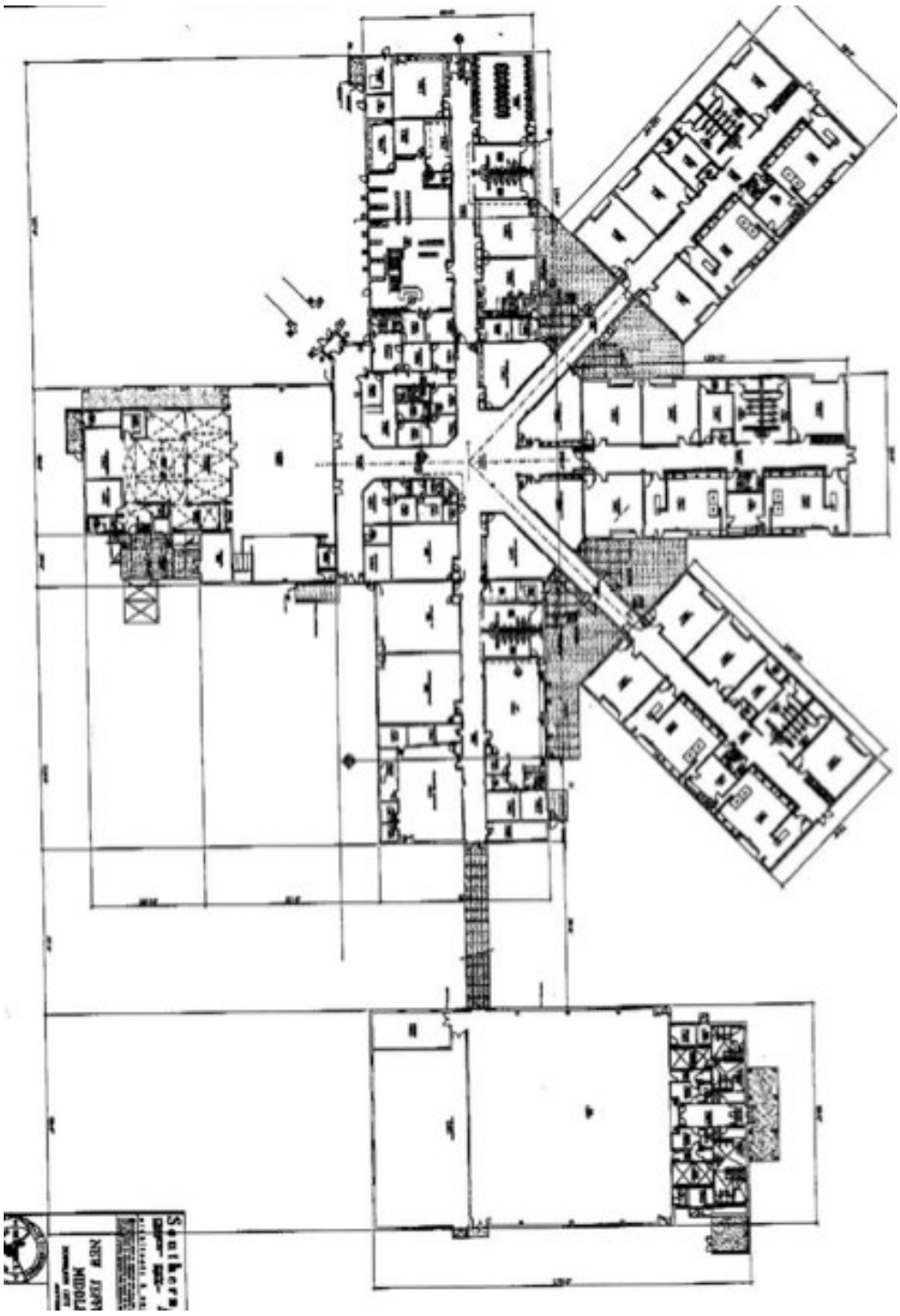

Figure C10. Jefferson City School – Occupation Date December 2001
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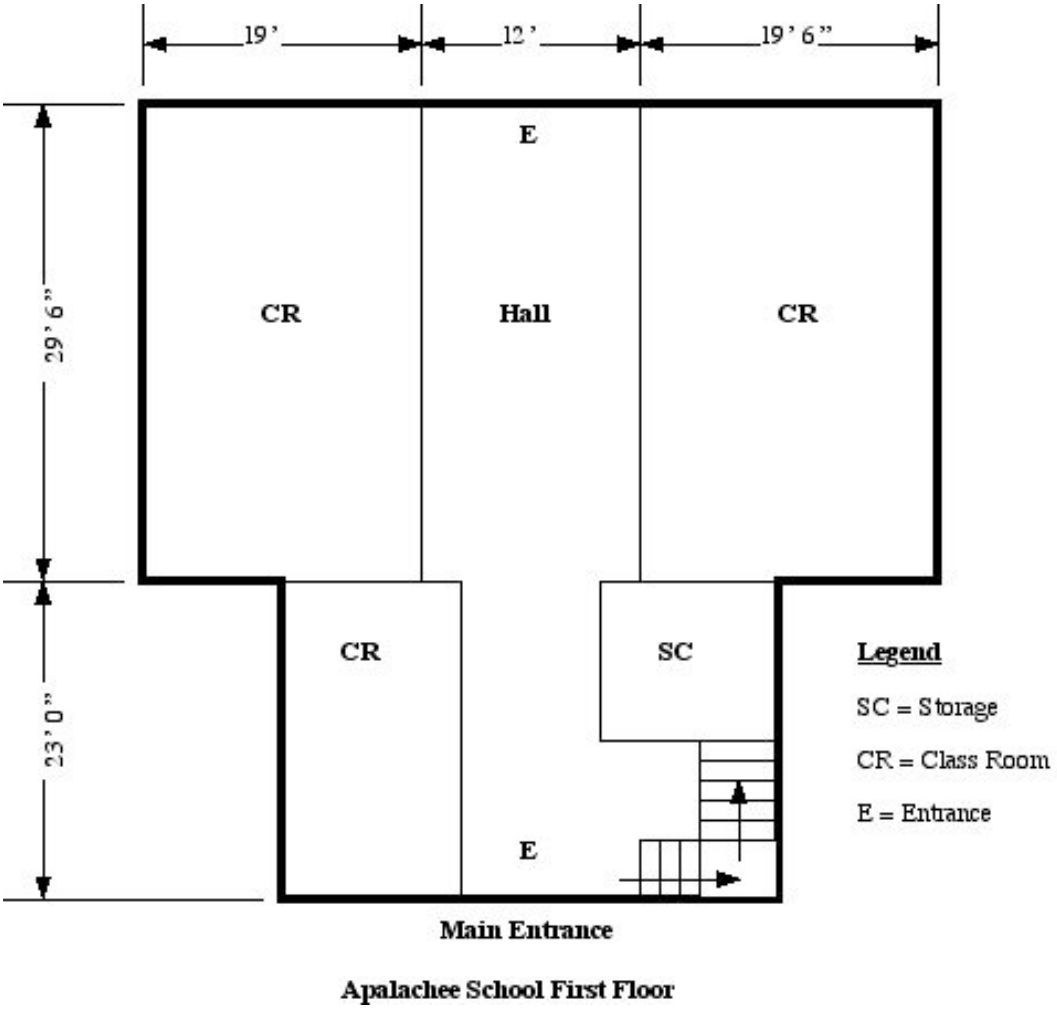

Figure C11. Apalachee School, First Floor – Occupation Date 1911
Line drawing by David Phillips.

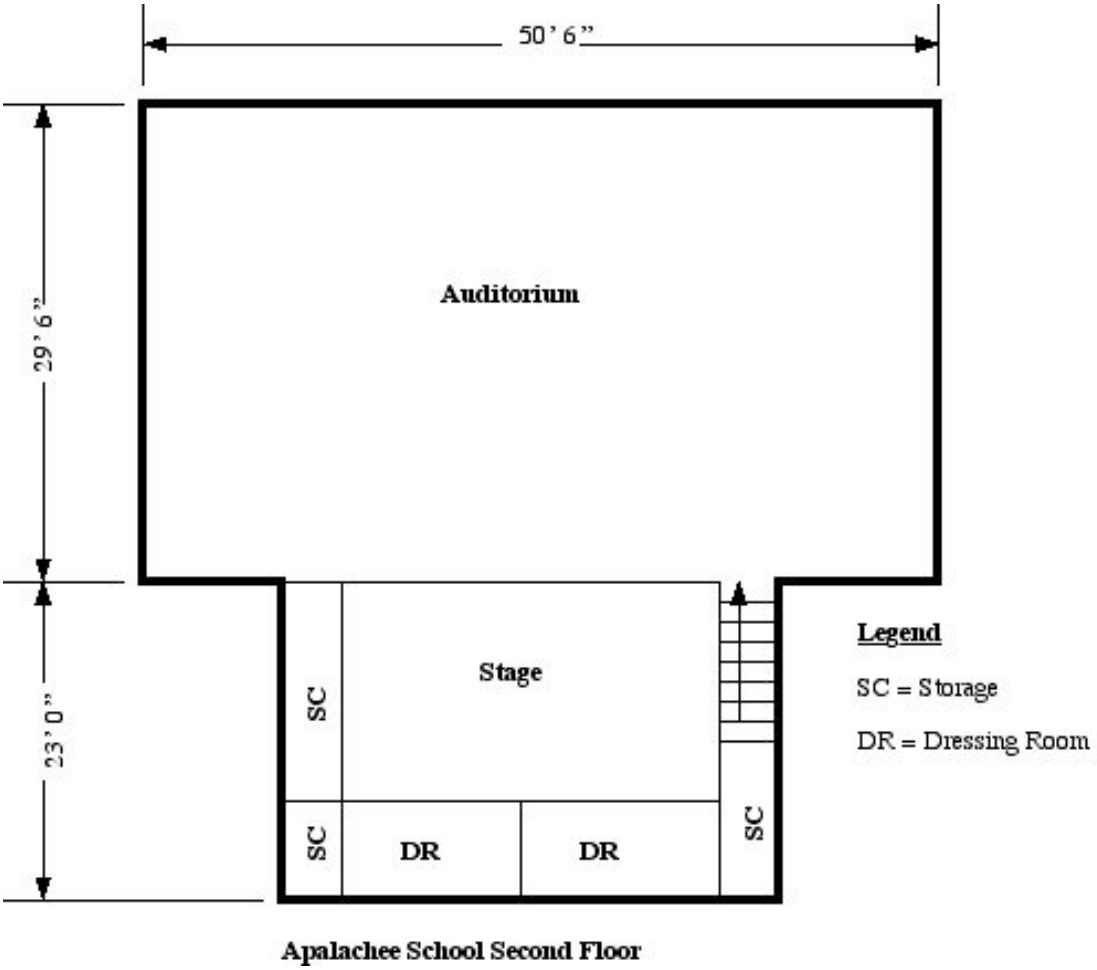

Figure C12. Apalachee School, Second Floor – Occupation Date 1911
Line drawing by David Phillips.

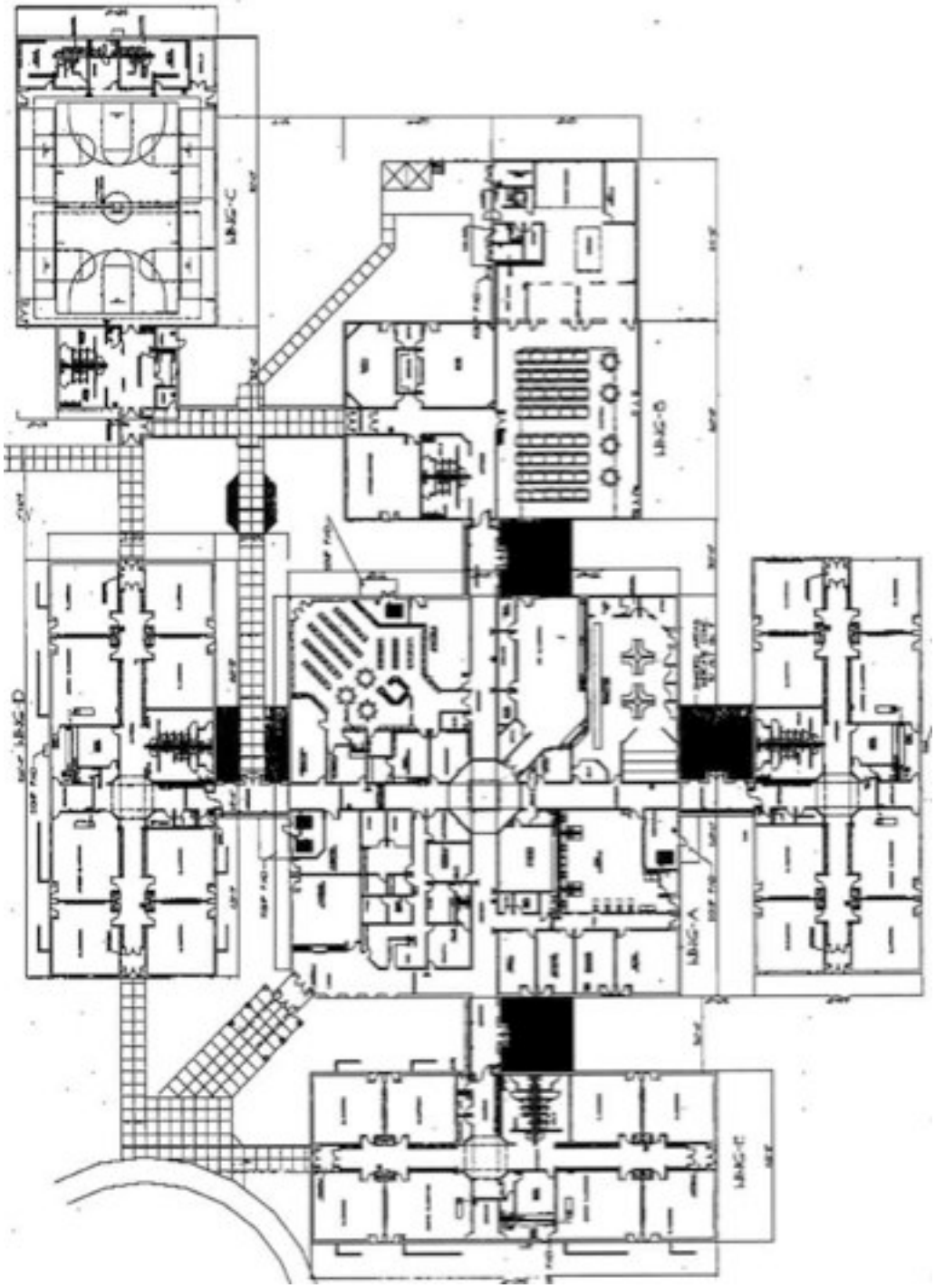

Figure C13, Malcom Bridge Middle School – Occupation Date 2001
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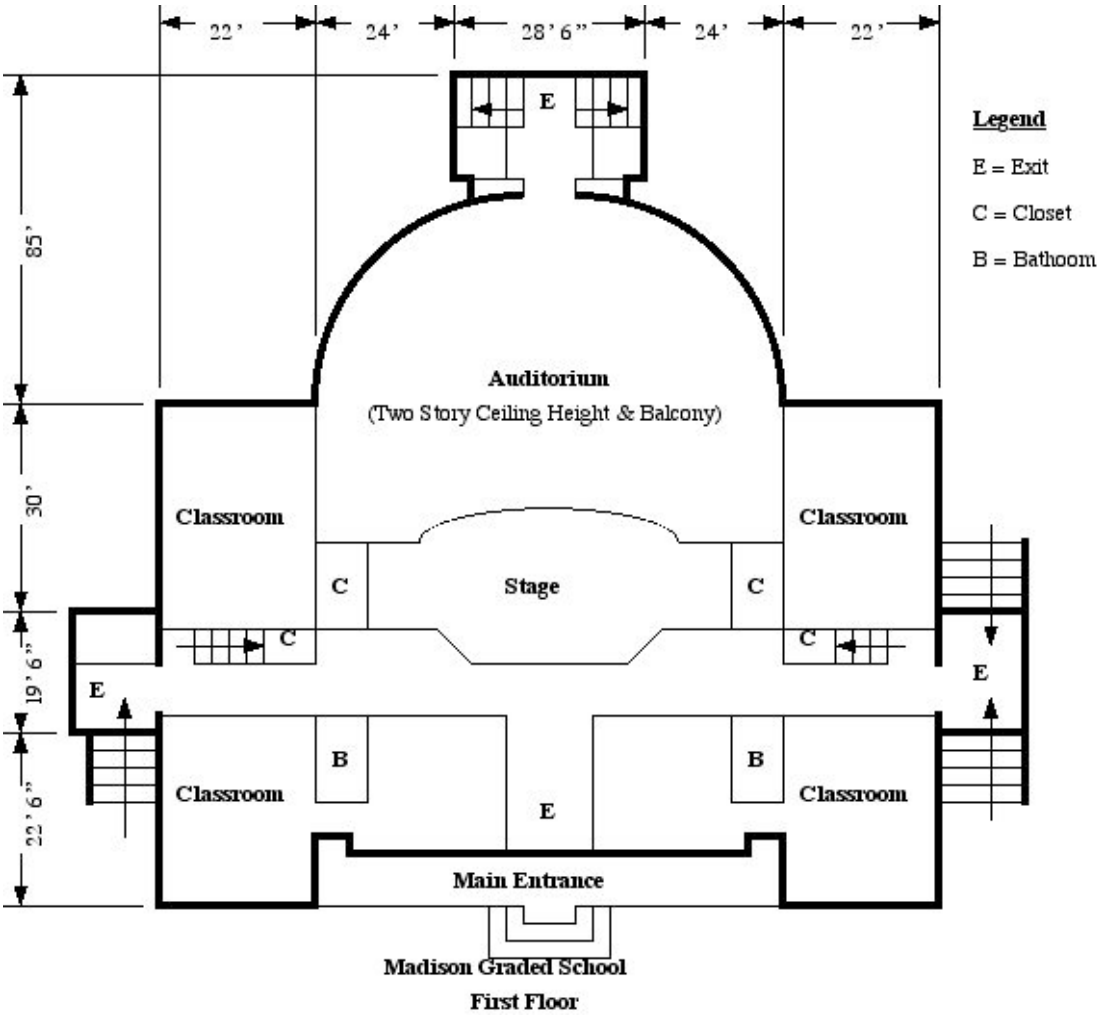

Figure C14. Madison Graded School, First Floor – Occupation Date 1934
Line drawing by David Phillips.

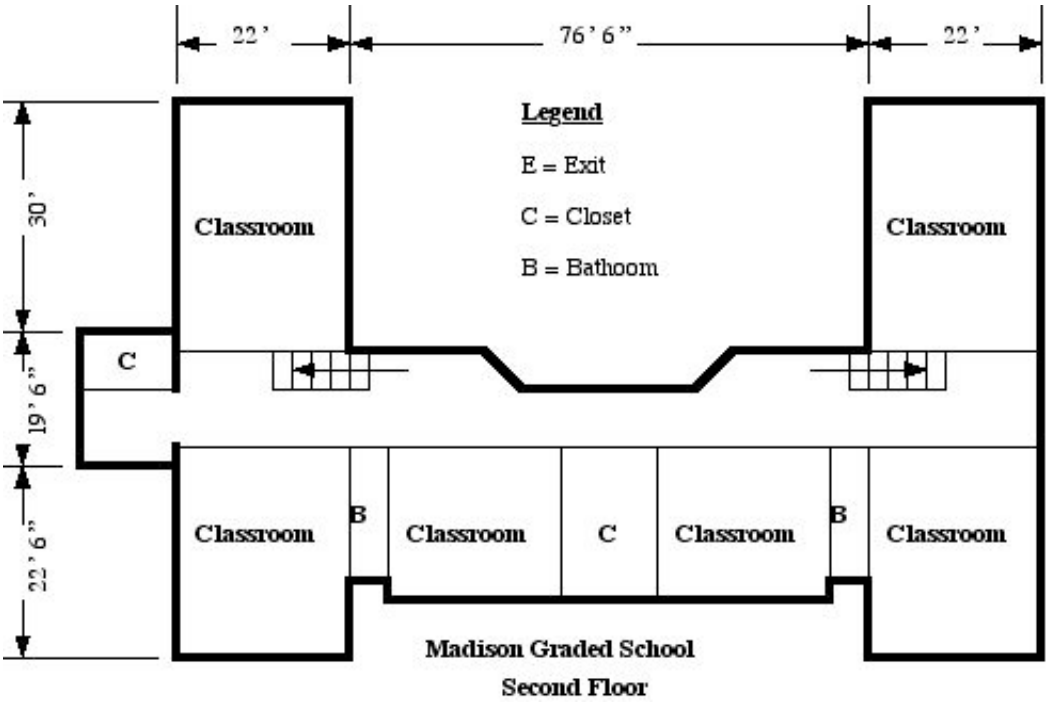

Figure C15. Madison Graded School, Second Floor – Occupation Date 1934
Line drawing by David Phillips.

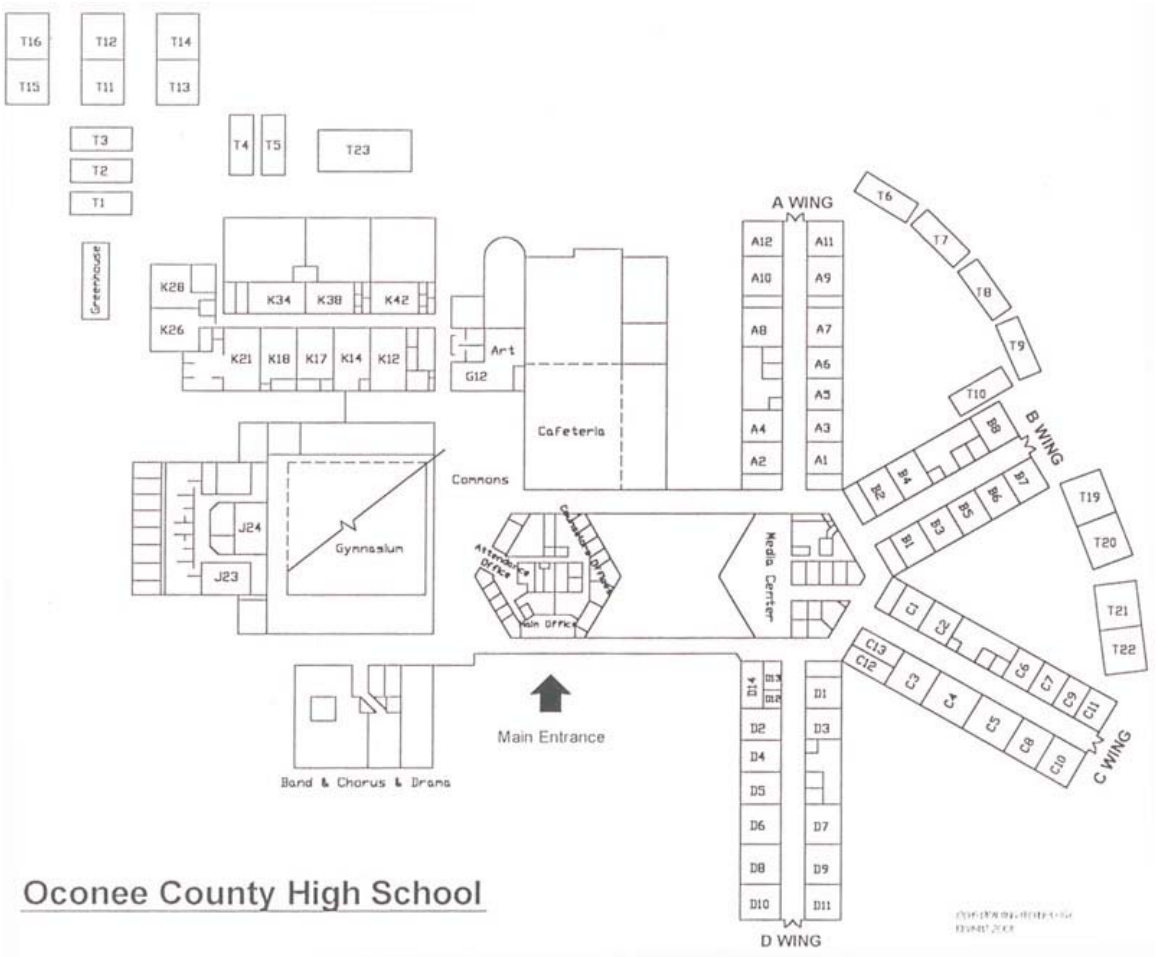

Figure C16. Oconee County High School – Occupation Date 1992
Permission to reproduce plan granted by Oconee County BOE

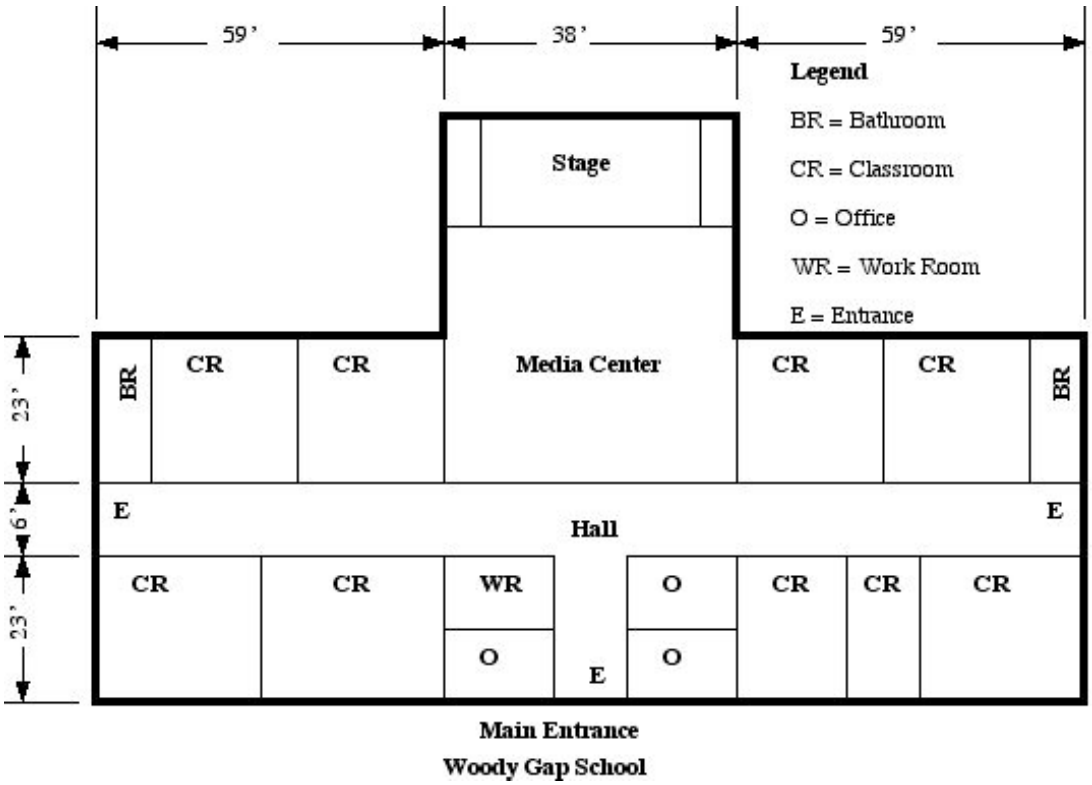

Figure C17. Woody Gap School – Occupation Date 1934
Line drawing by David Phillips.

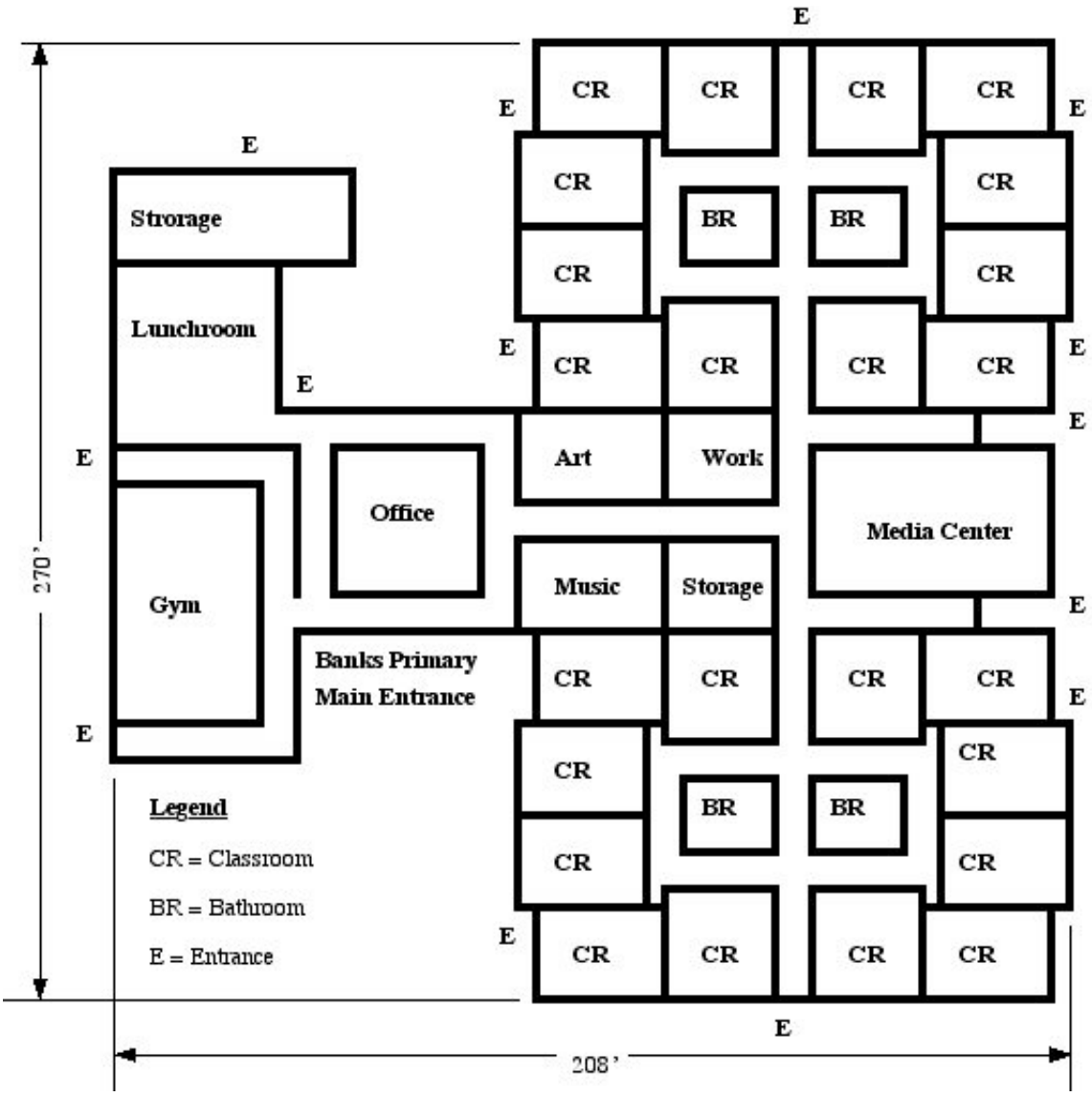

Figure C18. Banks County Primary – Occupation Date 1989
Line drawing by David Phillips.

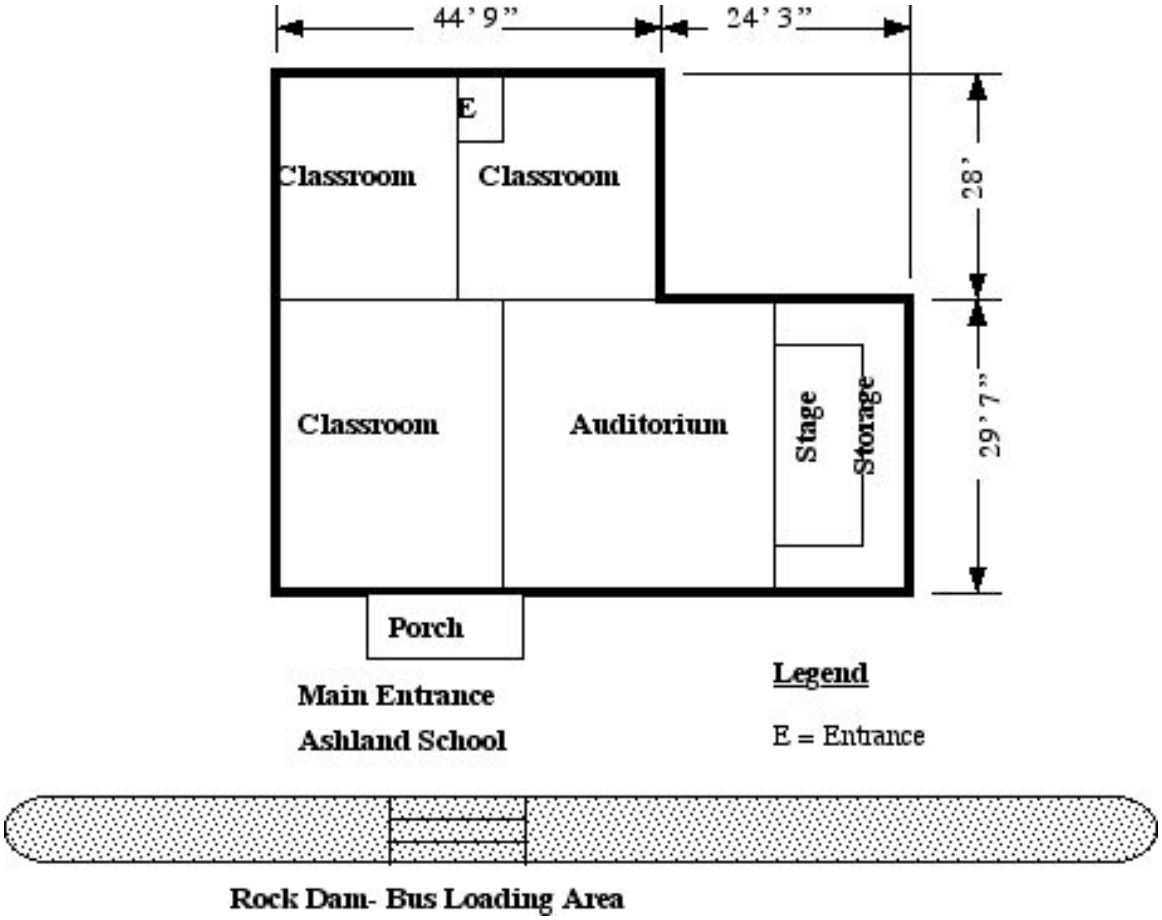

Figure C19. Ashland School – Occupation Date 1934
Line drawing by David Phillips.

Figure C20. Lavonia Elementary – Occupation Date 1992
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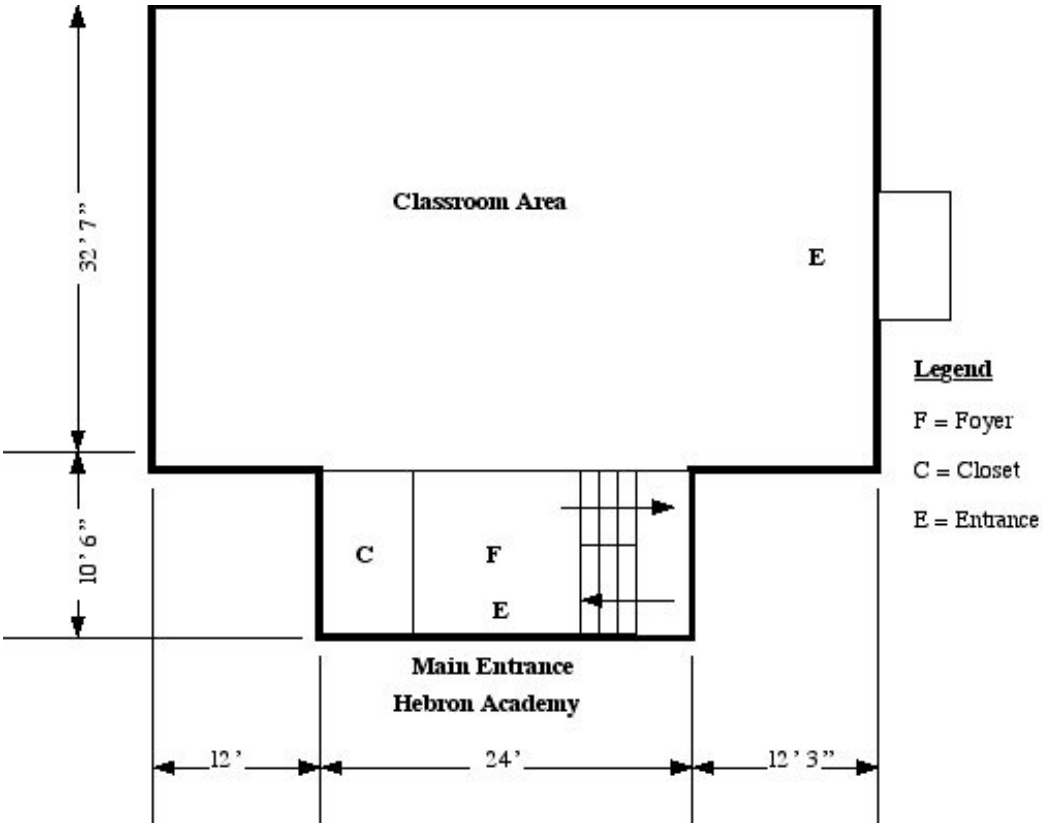

Figure C21. Hebron School, First Floor – Occupation Date 1908
Line drawing by David Phillips.

Figure C22. Hebron School, Second Floor – Occupation Date 1908
Line drawing by David Phillips.

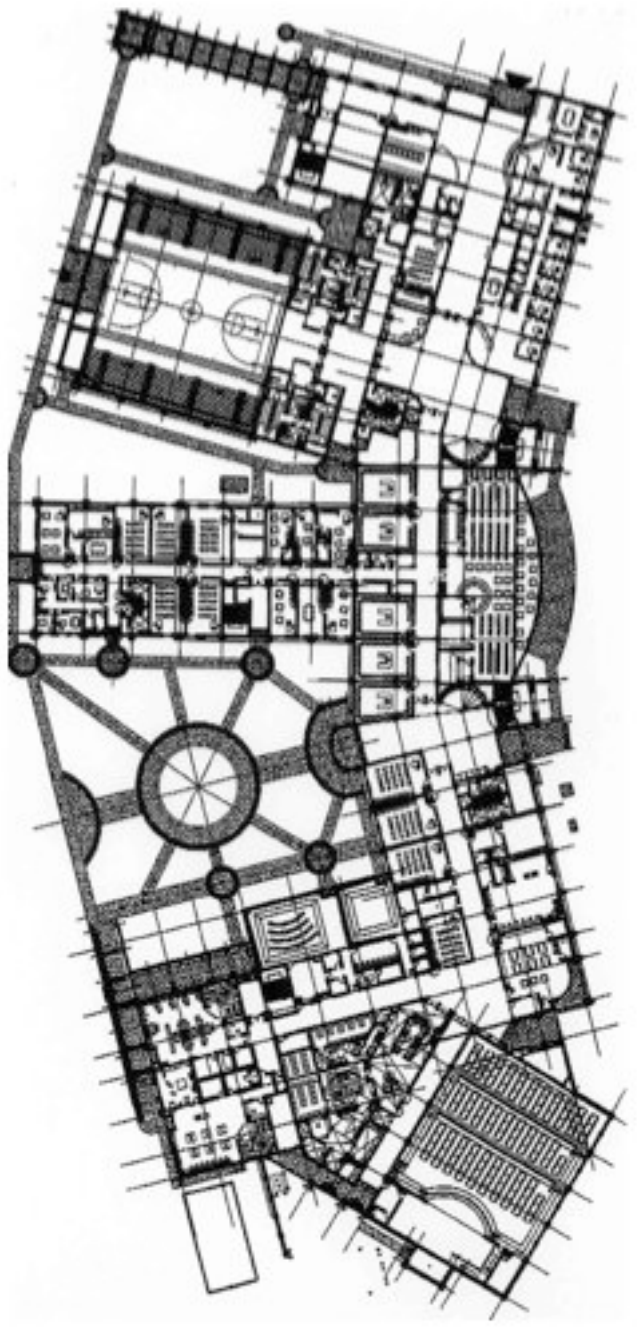

Figure C23. Stephens County Middle School, First Floor – Occupation Date 2004
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Figure C24. Stephens County Middle School, Second Floor – Occupation Date 2004
Permission to reproduce plan granted by J W Buckley Architects

APPENDIX D

Summary of Observations by Author

Comparison	Historic	Modern
1	Outstanding: Madison Graded School Substandard: Franklin County Trade	Outstanding: Oconee County HS Substandard: Hartwell Elementary
2	Outstanding: Woody Gap School Substandard: Hartwell Elementary	Outstanding: Banks Primary Substandard: Hartwell Elementary
3	Outstanding: Chestnut Grove Substandard: Bonds Academy	Outstanding: Danielsville Elementary Stephens County Middle Substandard: Jefferson City Middle
4	Outstanding: Hebron Academy Substandard: Bonds Academy	Outstanding: Danielsville Elementary Hull / Sanford Substandard: Hartwell Elementary
5	Outstanding: Hebron Academy Substandard: Bonds Academy	Outstanding: All met ASHRAE Substandard: All met ASHRAE
6	Outstanding: None Substandard: All	Outstanding: All met ASHRAE Substandard: All met ASHRAE
7	Outstanding: Hartwell Elementary Substandard: None	Outstanding: All Substandard: None
8	Outstanding: All Substandard: New Smyrna School	Outstanding: All Substandard: none
9	Outstanding: Madison Graded School Substandard: None	Outstanding: All Substandard: None
10	Outstanding: Woody Gap School Substandard: Chestnut Grove	Outstanding: Stephens County MS Substandard: None
11	Outstanding: Woody Gap School Substandard: Chestnut Grove	Outstanding: Oconee County HS Substandard: None
12	Outstanding: Woody Gap Franklin County Trade Substandard: All Others	Outstanding: Oconee County HS Substandard: None