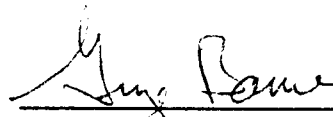


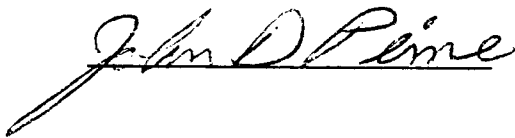
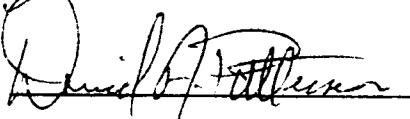
To the Graduate Council:

I am submitting herewith a thesis written by Scott William Medlyn entitled "From Decision to Dedication: A Study of the Practices and Processes of Long Range Educational Facility Master Planning." I have examined the final copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science in Planning, with a major in Planning.



George Bowen, Major Professor

We have read this thesis
and recommend its acceptance:



Accepted for the Council:



Associate Vice Chancellor and
Dean of the Graduate School

From Decision to Dedication: A study of the practices and
processes of Long Range Educational Facility Master
Planning

A Thesis
Presented for the
Master of Science
Degree
The University of Tennessee, Knoxville

Scott William Medlyn
May 1998

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DEDICATION

This thesis is dedicated to my parents and brother
Mr. Ralph W. Medlyn and Mrs. Constance M. Medlyn

and

Andrew C. Medlyn

who have provided me with the countless opportunities and
support needed through my many years

and

to all my friends that supported me despite my constant excuses
of "I am working on it, I promise."

ACKNOWLEDGEMENTS

There are many people that I am grateful for making my time at the University of Tennessee so rewarding. I have benefited greatly from my knowing the faculty and graduate students in the Department of City and Regional Planning over the last several years and hope that these relationships will endure. I am particularly grateful to my thesis committee, George Bowen, David Patterson, John Peine and Jim Spencer for their support and encouragement. They have all read the thesis and the merit of this work is due in no small part to their suggestions.

There are a number of people whose assistance should be recognized. I would also like to thank David Cockrill and Kaatz, Binkley, Jones, & Morris Architects who gave me the opportunity to pursue the topic academically and professionally.

Lastly, I would like to thank my family and friends, from whom I have received generous support during the whole process. Thanks also to the 1997 Tennessee Volunteers for the SEC football championship my final year. Go Big Orange.

Abstract

In this study, a technique for long range educational facility master planning is developed. Previous efforts in this area concentrated on an individual facility basis. The process investigated in this thesis concentrates on a system wide long-range facility master plan. The technique documents current needs and justifications as well as needed information and techniques for constructing the facility master plan. A combination of several methods for assimilating needed components for the facility master plan are investigated and documented. These components are then employed in the construction of the actual system wide facility management program.

The study is based upon the current long range educational master planning efforts by Kaatz, Binkley, Jones and Morris Architects for the Knox County (TN) school system. This information is augmented by the existing literature's proposed theories and programs. The result is a documentation of the processes needed for the effective creation of the long range master plan.

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Chapter I

Introduction

Educational facility planning is a process that involves the creation of a long-term plan for the better management of a community's educational facilities. Through the development and use of standards, guidelines and assessments; existing educational facilities may be better planned for the community's continued use and reuse. The creation of the long range educational facility plan also guides in the creation and management of new facilities thus enabling better management of limited resources. In a time of the "Baby Boom Echo" (i.e.) increased enrollments, finite resources and changing educational needs, long range educational facility planning is an area that communities must approach proactively and professionally.

The Knox County (TN) Board of Education contracted the Architectural and Educational Planning firm of Kaatz, Binkley, Jones & Morris Architects to assist the school system in development of a long range master plan that would serve to guide their capital building and maintenance programs for decades to come. This long-range plan encompassed the assessment of existing facilities from both a functional and physical plant condition. The firm is also developing programmatic and design (i.e. bricks and mortar) guidelines in an effort to approach a level of parity in school construction, renovation and program or function. Based upon this foundation of information the firm will direct an effort to identify long term educational facility master plan.

Using the author's experiences at Kaatz Binkley Jones & Morris, the author has set out the task of determining the key elements and processes needed to be able to begin the educational facility master planning process.

This paper seeks to introduce the necessary components in the educational facility master plan. When investigating the plan, the approach was taken on a system wide basis. Many of the previous efforts have been focused on individual facilities with little or no interaction with other facilities system wide. This paper is a documentation of the efforts deemed the most important in conjunction with the efforts being employed in the Knox County (TN) school district. This approach was then weighed against select theories for individual steps with the planning process according to the literature pertaining to educational facility master planning. It is with a framework of theoretical components with examples used in Knox County that this paper's investigation is constructed.

This paper does not address educational design theory. It does address the necessary components in the educational facility master planning approach with the accepted idea that the physical environment is a fundamental issue in the education of those involved.

In order to address the key issues and questions involved in educational facility master planning, several sources and steps were involved. To meet the need for a comparative base, upon which the existence and methods used can be judged, a literature review was undertaken (in order to research approaches to master planning). The primary source for the actual practice of facilities master planning was the effort being used by the architectural and planning firm of Kaatz Binkley Jones & Morris.

The author worked on the project by Kaatz Binkley Jones & Morris to produce the educational master plan for the Knox County (TN) school system. Based upon this first-hand knowledge, the effectiveness was assessed using different theories.

The author sought to leave out all biases, but as a result of his daily contact, biases may have unintentionally occurred.

Key Issues to be addressed in this thesis are:

- 1) Defining educational facility master planning,
- 2) Addressing the need for the practice,
- 3) Differing methods of constructing the master plan and its process,
- 4) Specialization and its role within the educational master plan approach,
- 5) Institutionalization of educational planning program guidelines,
- 6) Identifying key data,
- 7) Long-range enrollment forecasting methods,
- 8) The idea of capacity and the measurement of it,
- 9) The assessment of the existing physical plant,
- 10) The Data assimilation and analysis, and
- 11) The initial steps in Long Range Master Planning.

Chapter II.

Literature Review

A. Introduction

The collection of literature pertaining to educational physical plant master planning is a myriad of collection ideas regarding the methods and procedures for the master planning of educational facilities. Using a combination of existing theories, approaches and demographic data, this literature review pursues the idea of justifying the existence and use of educational facility master planing. The review investigates proposed construction of the process as well as actual technologies used. The review is broken up into four sections. The initial section of the review addresses differing definitions of the concept of a master plan. The second section reviews the various authors' justifications for the need and method in the educational physical plant field. To supplement the literature's defined need, demographic data from the United State's Department of Education is used to numerically address the need. The third section looks at the differing methods that have been prescribed for a successful master plan. The final section investigates the prescribed structure of the plan. To supplement the literature, the final two sections also address actual methods being used in the case study.

B. The Definition

Educational planning, like its counterpart in municipal and regional planning, is still a relatively new concept. As a result one of the first duties a profession must perform is to establish legitimacy for itself through the process of defining the profession and setting the professional parameters.

Educational planning as a professional definition takes on differing uses depending on those that view it. The following paragraphs reflect the existing literature and its respective author's views on master planning in general and educational master planning in particular.

In his book School House Planning, W. D. McClurklin offers a basic framework that is a practical basis for more involved definitions: "Planning, an essential prelude to decision making, is the process by which essential elements are assembled and arranged to indicate optimum choices involved in a decision". (McClurklin, 1) McClurklin's definition is basic yet it adequately addresses the foundational framework of the practice of planning.

Like McClurklin, Merle R. Sumption uses a theoretical definition, but the author emphasizes the concept of the length/duration of the plan when he explains in his book Planning Functional School Buildings that "the typical long range plan will cover a period of perhaps twenty years, in some cases even more. (The master plan) incorporates the grand strategy of educational planning. It will take into account not only what is but what is to be. (The master plan) will seek a broad base in the total life of the community. It will

look ahead as far as the human eye can see but will be adaptable to unforeseen eventualities". (Sumption, 2)

Agreeing that the master plan is a "(long-range) process of determination of the best solutions to the defined needs" (Strevell, 3), Wallace Strevell and Arvid Burke argue in their book Administration of the School Building Program that the educational master plan's objective is the "acceptance of a long-range program of projects which will fulfill the needs in the shortest possible time with due allowance for other important considerations" (Strevell, 3). But, they warn that these immediate needs should not drive the master plan. On the contrary, they feel that "long range plans should not be confused with preliminary plans but should provide the basis of such preliminary plans". (Strevell, 3)

In an international paper released by the Organization for Economic Cooperation and Development entitled Budgeting, Program Analysis, and Cost Effectiveness in Educational Planning, the concept of alternative solutions or scenarios incorporated into the master plan process are introduced. "(Educators and planners) seek to scan the horizon for a view of what the future or alternative futures, might bring to identify changing goals and responsibility, to draw attention to likely areas of concern or potential imbalance; and to anticipate potential solutions for the problems that might develop once goals and opportunities, and problems and possible solutions, of the education enterprise have been identified. The master planning process should also help to investigate the relative merits of (these) alternative solutions" (Organization for Economic Cooperation and Development, 4)

The use of alternatives, the Organization for Economic Cooperation and Development argues, is with the intention that they will "assist in the development of information and guidelines to such ... questions as to what activities should be undertaken, what programs should be developed, how should funds be allocated, what goals and objectives should officials seek to achieve through their program (and) who should mainly benefit and who should pay." (Organization for Economic Cooperation and Development, 4)

Finally, George O. Weber's book A Basic Manual for Physical Plant Administration uses a historical viewpoint in order to better define the concept of master planning. He believes that the historical view of the rise of the current "master plan ... should be distinguished from the traditional type of master plan that has long been a popular planning tool. Historically, the educational master plan was seldom more than a physical plan. Today, the master plan is a complicated compendium of the school's educational philosophy, academic programs, administrative structure, kind and number of students served, rate of growth and only lastly, the facilities that it will need to accomplish these goals". (Weber, 5)

Combining all of the definitions, the educational facility master plan may be seen as a long-term effort that seeks to chart a course of a reasonable and effective use depending on a great deal of variables and created through a gathering of information and the weighting of the alternatives.

C. The Justification of Planning Needs

The need for educational plans exists. In addition to the literatures' support a brief examination of the United State's history and the changing demographics of the Country will complement this fact. From 1947 to 1962 the United States experienced an unprecedented number of births. This phenomenon, later called the "Baby Boom", has had a profound impact on the nation's educational facilities. According to the Department of Education, at its height in 1957 there were 4.3 million births, a recorded increase of thirteen (0.13) percent from 1947. As these children began entering into the school systems, the educational facility infrastructure throughout the nation could not handle this boom. The births, along with the exponential growth of the suburbs surrounding metropolitan cities, created an increasing enrollment demand on existing facilities. The result was a frenzied period of educational facility construction. However, many of these buildings, while solidly built for the existing demand, failed the demand of future use. Very little planning was able to take place during this fifteen-year period of frenzied educational building. As a result of this lack of planning, many of these buildings were put into place with little regard to demographic trends, future adaptability to demands on existing facilities, periodic changes in enrollments and the idea of community-use facilities.

Today, in Knox County thirty-three (0.33) percent of existing buildings being used for educational purposes were built during this period. This is one out of three, which is an inordinately large percentage considering that the range covers seventy-one years and this period is only fifteen years long, or twenty-one percent (0.21) of total years. These

figures only represent original construction. If additions and renovations taken place during this period in response to the demand are factored in, another thirty-two schools may be included. This is a total of sixty-one out of the eighty-seven buildings used for traditional educational purposes in Knox County. The use today in the environment of the “Baby Boom Echo” is of functionally obsolete buildings serving populations that are not centered in present demographic areas that are growing and outstripping the ability to maintain adequacy.

The “Baby Boom Echo” began in 1977 and continued to 1992. In contrast to the Baby Boom’s peak birth year of 4.3 million, the Echo’s peak of 4.1 million, in 1990, falls short. However, this represented a twenty-five percent (0.25) increase over its inception in 1977. In addition, these birth rates are not projected to taper off. Unlike the original Baby Boom, the Echo’s births are projected to continue to be at or near the 4 million mark. The long-range estimates by the US Census Bureau indicate that in 2010 this birth rate will rise to 4.2 million and by 2020 will be at 4.6 million.

State	1987	Projected 1997	Projected 2002	Projected 2007	Percent Change 1987 to 1997	Percent Change 1997 to 2007	Percent Change 1987 to 2007
Tennessee	824	923	978	984	12	6.6	19.4

Figure 2.1 Enrollment in Grades K-12 in Public and Private Elementary and Secondary Schools, Fall 1987, 1997, 2002 and 2007* (In thousands)

* Figures courtesy of U.S. Department of Education

The numbers have and will continue to have an impact on America’s schools. The growing need is not just a national situation but can be seen on the local level as well. In

Tennessee, the Baby Boom Echo has had a noticeable effect. Numbers generated by the US Department of Education reflect this growth.

Investigation of the numbers in the corresponding tables demonstrates a period of growth and projected growth that must be planned for accordingly.

Figure 2.1 is the latest projections for the entire United States school age population for both private and public elementary and secondary schools.

The data was not available for the 1997 school year. Projections are then for the 1997, 2002 and 2007 school year. As the projections state, the twenty year time period between 1987 and the 2007 study period show a projected enrollment in 2007 to increase nearly twenty- percent (0.20). The fifteen-year projection from 1997 to 2007 will be not quite 7 percent. This will be distributed unevenly with some key states experiencing relatively small growth rates or decline in growth rates while others experience larger rates. This is due to several factors including the economy, quality of education and expenditure per student. However, on the whole, the nation can expect a dramatic increase in total enrollment.

State	1987	Projected 1997	Projected 2002	Projected 2007	Percent Change 1987 to 1997	Percent Change 1997 to 2007	Percent Change 1987 to 2007
Tennessee	241	253	269	293	4.8	15.8	21.4

Figure 2.2. Enrollment in Grades 9 to 12 in Public and Private Secondary Schools, Fall 1987, 1997, 2002, 2007 (In thousands)*

* Figures courtesy of U.S. Department of Education

Figure 2.2 computes the increase that table 2.1 uses, but breaks the analysis and projections to show the increase in grades 9 to 12 in public and private secondary schools.

Once again, the data collection was not done for the school year beginning in the fall of 1997. As a result, the studies projections include the 1997 school year.

The information contained in Figure 2.2 represents a slight (2.0) increase in the 20 year time period in contrast to total population (Table 2.1), but a substantially larger (nearly 10 percent) increase in the second 10 years of the study. Nearly twenty-five thousand more students are expected to enroll in public and private secondary schools. From 1987 to 1997, an increase of forty thousand students is projected to occur nationally.

Figure 2.3 begins the process of breaking down the educational demographic data into states. Because this paper is attempting to demonstrate the necessary elements of an educational long-range facility master plan, using the efforts of Knox County, Tennessee as a basis, the demographic data will be primarily concerned with the state of Tennessee. Figure 2.3 uses high school graduates in public and private schools to measure actual and percent change in numbers graduating. Although experiencing a projected decrease for the 1996-1997 year, (possibly as a result of the end of the periods between the two Baby Booms) the state is projected to experience a long-term increase over the 20 year projected time period.

State	1986-87	Projected 1996-97	Projected 2001-03	Projected 2006-07	Percent Change, 1986-87 to 1996-97	Percent Change, 1996-97 to 2006-07	Percent Change, 1986-87 to 2006-07
Tennessee	45	43	47	49	-2.9	13.2	9.9

Figure 2.3. High School Graduates of Public and Private Schools, 1986-87, 1996-97, 2001-02, 2006-07 (In thousands)*

* Figures courtesy of U.S. Department of Education

Figure 2.4 measures the actual change and percentage of enrollments in public elementary and secondary schools and ranks these states accordingly. The data shown deals exclusively with the 15 states with the largest increase. Tennessee's enrollments are projected to add an additional 61 thousand students over the ten year time period from 1997 to 2007. This constitutes a six percent (.066) growth rate, placing Tennessee ninth out of the top fifteen.

Figure 2.5 breaks down further the format used in table 2.4 by looking only at high school. Again, the data reflects only the top 15 states based on actual change and

(In thousands)					
State	National Rank	Projected Enrollment		Number of Additional students 1997 to 2007	Percentage Change
		1997	2007		
California	1st	5,860	6,780	920	13.6
Texas	2nd	3900	4314	414	9.6
Georgia	3rd	1358	1502	144	9.6
North Carolina	4th	1240	1332	92	6.9
Arizona	5th	832	922	90	9.7
Virginia	6th	1115	1198	83	6.9
Florida	7th	2300	2372	72	3
New York	8th	2902	2965	63	2.1
Tennessee	9th	923	984	61	6.2
Utah	10th	488	543	55	10.1
Colorado	11th	684	727	43	5.9
New Mexico	12th	352	393	41	10.4
Alabama	13th	748	789	41	5.2
Indiana	14th	989	1023	34	3.3
New Jersey	15th	1248	1280	32	2.5

Figure 2.4. Fifteen States With the Largest Enrollment Increases in Public Elementary and Secondary Schools: Fall 1997 to Fall 2007 (In thousands)*

* Figures courtesy of U.S. Department of Education

percentage change. However, Figure 2.5 uses grades 9 to 12 for its measurements.

Tennessee once again is in the national top 15 with a projected increase of 40 thousand students over the next 20 years. Percentage wise this is nearly a sixteen percent (15.8) increase over the projected enrollment of 1997.

State	National Rank	Projected Enrollment		Number of Additional students 1997 to 2007	Percentage Change
		1997	2007		
California	1st	1580	2138	558	26.1
Texas	2nd	1050	1252	202	16.1
New York	3rd	854	984	130	13.2
Florida	4th	619	724	105	14.5
North Carolina	5th	328	417	89	21.3
Georgia	6th	368	441	73	16.6
Virginia	7th	307	367	60	16.3
Massachusetts	8th	255	313	58	18.5
Illinois	9th	561	618	57	9.2
Arizona	10th	227	283	56	19.8
New Jersey	11th	328	374	46	12.3
Tennessee	12th	253	293	40	13.7
Maryland	13th	232	263	31	11.8
Colorado	14th	196	223	27	12.1
South Carolina	15th	186	211	25	11.8

Figure 2.5. Fifteen States With the Largest Enrollment Increases in Grades 9 to 12 in Public Schools: Fall 1997 to Fall 2007 (In thousands)*

* Figures courtesy of U.S. Department of Education

Knox County must be especially diligent in its educational long-range planning. The department of education's numbers in Figure 2.6 for a ten-year study period ending in the fall of 1994 shows Knox County to be the thirteenth fastest growing district in the nation. Others in the list include Miami, New York, Los Angeles, Raleigh, NC and Fort Lauderdale. Knox County was growing faster than Cobb County (Atlanta, Ga.), San Diego, and Jacksonville, Florida. Although this table may be misleading, (the City of

Knoxville and Knox County school systems merged in 1987), the message is clear that the growth exists and that facility planning is needed in the Knox County school system.

The demographic numbers reflect the need for long-range facility planning. In addition to the demographic outlook, the cultural and social outlook on planning by many of its experts reflects this growing need. This is especially true when seen in the light of the ramifications of not adopting the long-range facility plan.

Many communities today face pressing educational issues that are being caused by a lack of resources (i.e. overcrowding, failing facilities, bussing). Due to this, many schoolboards do not see the immediate benefit in time or money of master plans.

Boards

School Districts	State	Rank	Enrollment		Enrollment increase, 1984 to 1994	Percent change, 1984
			1984	1994		
New York City	NY	1st	923100	1022534	99,434	11
Dade County	FL	2nd	231277	321615	90,338	39
Los Angeles	CA	3rd	546990	632973	85,983	16
Broward County	FL	4th	127474	199255	71,781	56
Clark County	NV	5th	89627	156348	66,721	74
Palm Beach County	FL	6th	78374	127519	49,145	63
Orange County	FL	7th	78624	118666	40,042	51
Gwinnet County	GA	8th	41096	80220	39,124	95
Montgomery County	MD	9th	88811	117082	28,271	32
Mesa Unified	AR	10th	41746	69160	27,414	66
Fresno County	CA	11th	51258	77023	25,765	50
Wake County	NC	12th	51310	76922	25,612	50
Knox County	TN	13th	26726	52285	25,559	96
Cobb County	GA	14th	56653	80479	23,826	42
Hawaii Dept. of Educ.	HI	15th	161564	183869	22,305	14

Figure 2.6. Twenty-five Districts With the Largest Enrollment Increases: Fall 1984 to Fall 1994*

* Figures courtesy of U.S. Department of Education

may believe that the only fiscally responsible solutions are those that revolve around immediate needs. Also, many boards feel that the time and resources needed for a true comprehensive plan cannot be spared. Compounding the problem is the fact that plans by their very nature can be unpredictable and quickly rendered ineffective due to unforeseen future elements. Strevell and Burke believe that it is this shortsightedness that is the cause of many of the educational hardships that school systems now face. The following in-depth quote illustrates the complex inter-relatedness of environment and its impact on the system in a myriad of ways and areas.

"The advantages of long-range school-building programming can be seen by examining the consequences of planning individual facilities to meet an immediate and obvious need without regard to total needs. Under this narrow concept each project is considered by itself as a replacement of a particular school building or as a new unit to accommodate past or immediate enrollment increases. The spaces provided in the new facility may reflect past educational practices in the locality or they may be based upon standards formulated by others without regard to the future educational programs that will be carried out in the particular facility." (Strevell, 3)

So limited an approach to school-building planning may have serious consequences. It can handicap and restrict the educational process for decades. It can consume resources for marginal infrequently used, or difficult to fully utilize facilities and thereby delay the provision of essential spaces that could be fully and effectively utilized. It can lead to excess space and underutilized buildings. It may result in a shortage of space and overcrowding in other grade levels or areas. It can mean duplication of school and community facilities, poorly located buildings, poorly utilized buildings, financial hardship, and waste. Worst of all, it may cause a deterioration in the quality of education itself by curtailing operating budgets where both annual and capital expanses depend upon the same tax base or by preventing a locality from making necessary improvements or adaptations in its educational program."

It is impossible to anticipate every contingency in planning buildings for long-range use. Yet many mistakes are avoidable. Plans can be conceived to assure adaptability. Many contingencies can be anticipated and plans made for adjusting to them with a minimum of

waste. Many of these undesirable consequences of the piecemeal approach to school building can be circumvented through planning a school-building program before undertaking a specific school-building project". (Strevell, 3)

Strevell and Burke's elaborate view more than adequately addresses the consequences of disregarding the process. The consequences can be used to illustrate the feasibility and cost-effectiveness to school boards.

In his book Basic Manual for Physical Plant Administration, George Weber argues that without the use of a master plan, it will not only be the school board that will have a difficult time managing growth and preparing the physical plant for future use, but also the planners and architects hired to effectively guide limited resources will not be fully utilized. "It is only after such general guidelines have been established that planners can intelligently tackle the more specific issues. Without a comprehensive development plan, school planners cannot properly answer (future) questions, and without good answers, the architects cannot design an efficient building" (Weber, 5)

Like Weber, Sumption feels that the question(s) of the future cannot be accurately predicted, however it is this unpredictability that is the primary reason why communities should plan. "Educational needs and demands change as time goes on. Financial resources available to schools vary in amount over the years and construction costs are subject to periods of extreme variation. In growing communities the population not only increases but it also moves. The movement is usually outward from the center of the population cluster. This movement is also characteristic of many communities exhibiting little or no growth resulting in the economic base of communities that may shift drastically within a decade. When we consider these facts along with the knowledge that school

buildings are usually built to last a long time, the evidence supporting the need for long-range planning of the school plant is convincing" (Sumption, 2)

One of the most impressive justification(s) came from a national council of experts in the field of schoolhouse construction. The report, Guide for Planning School Plants put out by the National Council on School House Construction, strongly defends the use of the master plan for school house construction. "An overall plan preceding the planning in detail of a building or other facility should be developed for each school "system". Such a plan should grow out of long-term enrollment estimates. Maximum enrollment per site permitted by school board policy and careful evaluation of the trends of educational programs which, if continued, may call for additional or highly specialized housing. Even though prediction is admittedly precarious, failure to take long-range view, to plan for future plant needs in light of the best and most exhaustive information presently available is both educationally and financially indefensible". (National Council on School House Construction, 6)

Based upon the existing and projected demographic demand and pertinent literature, it may be conclusively argued that the need for educational facility planning exists. Yet, given the current lack of resources many boards face, the difficulty lies in the approval of the local school governing board for the master plan. Given the demonstrated ramifications, the argument can be made for future long-term efficiency and intelligent resource utilization.

D. Integrated and Nonintegrated Master Planning Techniques

1. Nonintegration

Once the need has been established, the next decision to be made is the nature of the plan. Differing situations demand differing structures but there are two main categories all plans may be classified into based on their use. The first centers on the practice of integration. Within this practice, there are two methods of integration with various levels and interpretations of the two. The first is termed integrated planning. In integrated planning, many participants are involved in the process with the hope of accurately accounting for all variables, whereas nonintegrated planning seeks to minimize input in order to maximize limited time and/or resources. It is at this point, in the discussion of the architecture of the master plan, where a strong divergence by the authors over these two fundamental issues occurs.

Nonintegrated believers feel that efficiency is a key variable in the construction of the plan. Many school boards believe they do not employ master planning techniques because of the cost in time and money to create these plans. The solution, according to the authors that subscribe to the nonintegrated theory, is the centralization of power, with one person or committee making the majority of decisions. The processes can become much more efficient as extraneous variables may be identified and removed. The following authors propose fundamental theories in regards to who should be involved for a successful master plan to be generated.

McClurkin, the biggest advocate for a nonintegrated approach, believes that "another excess that has handicapped school planning is the concept of wide or extensive

participation. The involvement of large numbers of citizens and patrons studying school problems is a commonly sought end in itself, with little regard for the suitability of this means for solving the problem at hand. In the extreme, the weak leader may use the group process as a crutch, abdicate individual responsibility in favor of popular opinion and rely on extensive participation for executive decisions instead of using it wisely in studying and planning." (McClurkin, 1) He goes on to argue that "the value of extensive group involvement lies in its use as a public relations measure, rather than in the contribution of ideas, conclusions and recommendations" (McClurkin, 1)

His solution is to involve limited numbers of participants. "Three agents of the people are of paramount importance in school building planning - the school board, the school superintendent and the architect. They, more than all others combined, determine by their choices and decisions the nature of the facilities that will be bought with a given amount of money. They determine what basic school plant resources the system will have fifty years hence. When these three agents are designated, the community is committed for better or for worse" (McClurkin, 1)

While McClurkin believes in centralizing within the process, Strevell and Burke espouse the idea that an outside client may best synthesize the process. "The key (specialist) in conducting technical studies and developing a long-range program is the educational consultant" (Strevell, 3) They believe that "the best policy is to have the consultant prepare a written report, conducting whatever first-hand investigations (the consultant) considers necessary, such as inspection of the present plant, and to use the school staff to save part of (the consultant's) expense by gathering the major amount of

the factual data under (the consultant's) general direction. Not only will most school systems need the extra labor and experience that a consultant can bring to the situation, but actually the presence of outside talent on occasion is found to vitalize and expedite a survey and to synthesize an acceptable master plan". (Strevell, 3)

In summary the authors believe that it is necessary to understand the limitations of master planning and to be able to produce within these narrow constraints. Many times the "one prerequisite to successful school building planning is a competent educational leader with a through knowledge" (McClurkin, 1) who can understand these limitations and efficiently and quickly produce the master plan.

2. Integration

In contrast to the limited participation of the community, the integrated approach seeks to involve all the factors that will be affected by the plan. The belief is that the more thorough the creation of the plan the less likely the plan will be a static entity that cannot effectively adjust to future trends. Kowalski defended this when he said that "integrated planning approaches are more complicated and difficult to use than non-integrated models, yet they are more precise and typically produce a higher quality of information. Such detailed analysis reduces errors and omissions in facility planning". (Kowalski, 7) It is these omissions that Kowalski basis his counter-argument to nonintegrated planning. "This limited input permits the task to be completed more rapidly - but efficiency has a price. Recognition of the potential problems of nonintegrated approaches (noninput, key factors ignored, hidden/uncounted variables) leads most planning experts to reject them."

(Kowalski, 7) Yet, despite Kowalski's argument of perpetual failure, some authors concede that nonintegrated have had successes. For example, Candoli concedes, the nonintegrated method was successful. However, needs have changed and thus the nature of the master planning environment. "In the past, administrators were given information about technological development to help them be better doers, but their professional needs have changed. Decision-making is now more of a political process than an accounting procedure. The negotiation process is replacing authoritative leadership. Coordination is more acceptable than supervision." (Candoli, 8)

Instead of a product that is created with limited knowledge, but with increased efficiency, the integrated approach believes that decision-maker involvement is paramount to a successful plan. The literature used seems to overwhelmingly support the idea that more is better, even if it costs more in time or money.

Sumption argues that even if a community wanted to centralize the process, it would be nearly impossible due to the information that needs to be handled. "The development of a sound, long-range building program requires the collection and analysis of a vast array of facts and figures. It is obviously not a one-man job. Although the responsibility for formulating the program is often centered in a single person, he must rely on dozens of persons to supply information and give assistance of various kinds. If the contributions of the many people who will be called upon to help are to be of maximum value, it is essential that these people share in the planning. In this way they become more identified with the project and are a powerful force in implementing the program". (Sumption, 2)

He goes on to argue that "long-range school building planning should be a community project. The total process, known as the school survey should be characterized by group activity as opposed to individual study. The conclusions of the study should represent a long-range building program growing out of the efforts of many citizens of the community". (Sumption, 2)

In their report, Planning America's School Buildings, the American Association of School Administrators believe that the nonintegrated approach will not only have negative aspects on the limited participants but also those intended to benefit from the plan. The association believes that "autocratic" planning cannot exist in conjunction with societal ideas of democratic governance.

"Let no one be misled - the process by which a school district arrives at decisions concerning its building program is a vital factor in the kind of educational program provided the children and the youth of the community. In a school district where the superintendent or any other official uses has authority to place himself, and himself alone in the role of educator, planner, architect and contractor, a climate is created that will tend to develop an autocratic learning situation - a situation that is not in accord with the principals and ideals of democracy. On the other hand, in a school district where the superintendent uses his status as a leader to involve others in identifying and solving educational problems, a climate is created that will produce a learning situation reflecting the processes and educational needs of society". (American Association of School Administrators, 9)

Finally, the Council of Educational Facility Planners, sums up the integrated approach in their book Guide for Planning Educational Facilities, when it is stated that "the planning and construction of educational facilities are processes requiring cooperation among a large number of planning team participants. The team includes individuals who specialize in planning and, more recently, individuals who are education specialists. Teachers, administrators and students bring to the planning team an understanding of educational requirements". (Council of Educational Facility Planners, 10)

E. Linear/Nonlinear Master Planning Techniques

1. Linear

The second variable in the design of a master plan is the prescribed method under which the plan will come to fruition. We have now discussed the definition of the long range plan, the question of the need for the plan and even who should be involved in the formulation of the plan, the final step is the problem of formulation itself. There are two basic methods of construction. The first method is the linear approach. Kowalski defined this method when he wrote, "there are two common characteristics to linear planning models. First, the specific tasks to be completed are identified. Second, they are sequenced. (This) paradigm suggests that each phase is a step - a component that must be contributed before moving to the next assignment" (Kowalski, 7)

This method is the predominant method found in the literature. Spanning the length of 50 years, nearly all the literature dealing with educational planning methods emphasizes the sequential method. All of the authors have the same basic format.

Castaldi explains the basics as "a systematic sequential plan of action identifying school plant needs, exploring alternative solutions, and developing suitable options" (Castaldi, 11)

Drake and Roe measure the steps and give the reader a more in-depth generalized approach. "The beginning point in this model is clarifying and articulating the mission and goals of the organization, and the process flows from that point. The logical sequence of getting things done is; goals, plans, actions, and results" (Drake, 12)

Like Drake and Roe's belief in the establishment of goal setting, Sumption feels that goal setting as the key to the process. Once this is set the natural order will occur. "The suggested first step in the formulation of the building program is the establishment of an ultimate goal for the school plant ... After we have established our goal, the next step is the development of a program to achieve it. Once priorities have been established, we find that they naturally form a hierarchy of needs that which can be divided into stages or steps of a long-range plan" (Sumption, 2)

One of the strongest endorsements of the sequential method of linear planning comes from the National Education Association's Committee on School House Planning. In a report distributed by the committee, the NEA felt that "many of the mistakes of the past would have been avoided if there had been a clear conception of the steps that should be taken in planning and constructing school building(s)." (National Education Association, 13)

In summary, Kowalski states "Despite the short comings, linear models prevail as the common mode for planning today. One reason for this continued popularity lies with

the fact that they do serve a purpose. They guide planners through critical steps. For inexperienced planners with limited specialized consultation, a linear model, despite its deficiencies, may prove to be a wise choice." (Kowalski, 7) It is for this ability to guide through critical steps that Kaatz, Binkley, Jones & Morris decided to structure their plan as a linear approach. Although several supporting pieces of information were being gathered or generated simultaneously (i.e. physical plant assessments, program standards, design standards), the approach retains a linear construction.

2. Nonlinear

Nonlinear planning is an idea that is not as widely accepted or practiced according to the literature. It is a process that seeks to free up the process of being dependent on preceding steps to create the master plan. Kowalski, its sole defendant, defines it as "nonlinear planning is not a process of moving forward without a formal structure. Rather, it is a model that does not rely upon the sequencing aspect of linear approaches. Several functions can be addressed at once (in nonlinear) with each major function (having) and association with all other planning functions." (Kowalski, 7)

The need for this type of planning comes in the face of the inefficiency of linear planning. Kowalski's main argument with the linear model is that "the obsession with efficiency (every step must be completed on time) may result in the administrators paying little attention to the needs and wants of individuals who are affected by the planning decisions (i.e. faculty, students, parents)." (Kowalski, 7) Additionally, linear paradigms

do not recognize that resources, prevailing conditions, and needs among school districts vary markedly.

However, he concedes that total nonlinearity is not achievable in the field of educational master planning. "School facility projects, however, usually require more sequencing than other tasks. This is true in large measures because state laws, regulations, and codes often require approvals at various stages of the project. Thus, planning paradigms for school facilities nearly always have some degree of linearity." (Kowalski, 7)

So, he argues that the best course of action is the combination of the two as well as the integration of decision-makers into the process. "A project which is planned by a superintendent, the board and the architect (without additional input) following a step-by-step procedure would be classified as a nonintegrated, linear approach. Historically, this option has been widely used despite the fact that it is likely to produce errors. Beyond potential omissions and errors, nonintegrated approaches spawn negative political byproducts. Taxpayers, teachers and even students do not like being left out of the planning process.

If conditions are appropriate, a highly integrated paradigm that provides flexible planning decisions (i.e. some degree of nonlinear planning) can be extremely effective. But no one option is superior for all situations. The most difficult decisions the administrator must make is to determine which option best fits the conditions surrounding an individual project." (Kowalski, 7)

E. Summary

According to the literature, planning as a process should be widely accepted and practiced. It was viewed by the authors as a necessity rather than a luxury. Its benefit will be seen in the short-term solution as well as the long-term guidance of a school's physical plant. Although methods to be used as well as the level of involvement to be attained vary according to different authors, all stress the need for continued and increased use of the master-planning technique throughout education but primarily in the area of physical plant planning.

Having reviewed the current environment and literature pertaining to educational master planning, the paper's remaining investigation of the process is based upon a general practice of an integrated, linear construction of the plan and planning team. This approach is used by Kaatz Binkley Jones & Morris and is the structure that was found to be the most manageable and effective. Only through the integration of the process can a total picture be created. The situation was of one of total integration but the client deemed the amount used suitable. In addition, the linear approach (Reference Appendix A, "Progress Report") allowed the gathering of information to effectively create the foundation before the master plan began its construction. The following chapters investigate the necessary information and the methods used to attain it. The final chapter will discuss the yet to begin efforts of Kaatz Binkley Jones & Morris to create the educational facility master plan.

Chapter III

The Educational Facility Master Plan Infrastructure

Once the structure and need of the plan have been determined, the next step is the gathering of resources. Subsequent chapters will be dealing with the creation and gathering of much of the data concerning the physical plant in the school system. However, before this can be done, the key elements must be put into place. One of the most important decisions to be made is the process of determining the personnel that are needed. The defining and assigning of roles is one of the critical aspects of the master plan process. The assigning of roles will have already largely occurred during the creation of the technique used to pursue the master plan. If an integrated approach is chosen, then the process involves a great deal more of mediation in order to determine relationships and assignments. The nonintegrated approach has at its head the strong central authority that can more easily dictate the roles and assignments. However, ease does not always translate to effectiveness and the propensity to become out of touch with personnel exists. In the model of integration, the respective people employed will have their specialized preexisting roles (i.e. architectural, engineering etc.) but the extent of input remains to be determined.

Kaatz, Binkley, Jones & Morris' relationship with the plan was two folds. The first was the collection and coordination of much of the information needed in the planning process. The second was the creation of much of this same information. This is an

unusual process in which the educational facility plans were created. In most professional planning relationships, it is the clients that are the source of much of the information needed for the planning process. It is the planning team's job to interact with this client and to help facilitate in the dissemination of this information. Kaatz, Binkley, Jones and Morris found itself creating much of the information and guidelines with oversight by their client (the school system). In a sense there was a reversal of roles in the traditional sense. The client was not producing the information but rather managing it through the adoption of guidelines and standards to be used, while the planning team was the source of information through the assessment of the clients facility and the creation of its guidelines and standards.

To better understand the process of educational master planning and this gathering of information, the key players and their respective duties must be addressed.

The first duty, once the need and structure has been established is the assessment of roles. The assignment will define responsibilities, determine structure and create an atmosphere that is conducive to work production. As mentioned in the previous chapter, much of the structure of the plan can be determined by viewing it in the two categories of linear/nonlinear and integrated/nonintegrated planning. This chapter focuses upon the Kaatz, Binkley, Jones & Morris approach that utilizes an integrated/linear role in their process of designing their facility master plan..

In master planning for the school system there should be a dissemination of responsibility. While one participant should be the director, this person must be placed within a quasi-system of checks and balances.

The way to do this is by the specialization of information. While the engineer's input may be potentially limited, it is only the engineer who can provide this needed information. "Although all participants of the planning team are important to the planning process their levels of involvement shift in response to the need for their services during various stages of project development" (Council of Educational Facility Planners, 10)

The following paragraphs are a list of key participants and their respective duties in the educational facility master plan process. This is not an exhaustive description, but rather an outline of basic responsibility needed for the plan to come to fruition.

The educational planner:

The planner is the administrator of the team. It is the planner's job to be the medium between the collected information and the client. Many educational facility planners are in fact staff members that have been assigned the duty of planner. With little or no experience this method runs the risk of completely mishandling the product thus tainting the final plan. However, since very few if any institutions of higher learning offer any type of study of the occupation, this scenario occurs out of necessity. Other methods have been the assignment of city planners, architects, engineers or elected officials the task of planning. Kaatz, Binkley, Jones & Morris hired a planner educated in city planning in conjunction with an architect to do their planning. This worked effectively due to the fact that architects' views of master planning may tend to be site specific whereas the planner tends to view the system but may overlook the importance of single site specific variables.

The architect:

It is the architect's duty to be able to translate educational programs into facilities that reflect designed spaces that accommodate program standards. The architect also may be involved in the evaluation of existing buildings, the creation of program standards, and the programming of design standards. The architect's evaluation of existing buildings is designed around the functional use of the building as well as the physical shape of the building. The architect grades it according to criteria specifically designed to reflect his/her profession. (Reference Appendix B, "Physical Plant Assessment Sheets")

The engineer:

The engineers are typically support staff that are involved in assessments and creation of design guidelines. Structural, mechanical, electrical and possibly civil engineers should be used especially in design standards and the assessments of the existing facility. They may not judge effective use of space, but rather the infrastructure used to support the educational use of the building. Like the architect, the engineer grades the building according to criteria specifically designed to address issues reflecting his/her profession. (Reference Appendix C, "Physical Plant Assessment Sheets")

Board of Education:

These are the elected officials that are the clients of the master plan. It is usually this board that determines the need for the master plan and also final approval of the plan.

The board acts as the citizen's voice. When time, money or other resources do not permit the involvement of large numbers of private citizens, the board may be substituted. It is also the board's job to adopt or help define the program standards and design guidelines as produced by the staff and its consultants.

The faculty and staff:

It is usually the faculty and staff that are the impetus that demand the master plan process to be enacted. These are the people that are in daily contact with the facility and know better than most the current state of needs. It is with the help of the faculty and staff that consultants (i.e. the architect, planners, and engineers) have the ability to design guidelines and program standards.

While it is extremely important for the planning team to understand its roles and duties, it is even more important for the educational facility planner to understand his/hers. Because the planner is the key administrator, this understanding is crucial to the effective use of resources and personnel. The planner is the one person that is able to see the master plan project all the way through. The planner must handle the following duties in some way or another. This continuity will not only enable the planner(s) to be involved long-term with the process but as a result it lends a sense of validity to decisions that need to be made with the long-term view in mind.

The following specialties of the master plan process must be the responsibility of the educational facility planner. Whether directly or indirectly related, the effectiveness of

the plan is related to the planner's understanding of these key components and responsibilities.

Master plan/capital program:

It is the primary responsibility of the educational planner to create the master plan that will be implemented with the coordination of several different participants. In this role the planner is the repository for much of the information. The planner is the coordinator of many elements and from these elements the process is created and directed. As this repository of information, it is the planner's role to use his or her professional training to decide the important weight in context of the larger overall plan. This is the step that the planner must use to structure the information in synch with the master plan's architecture in terms of the linear/nonlinear, integrated/nonintegrated methods previously discussed. The planner's professional training enables the planner to lead the effort in the creation of the master plan. This is not only for educational facility planning but can also be the case with capital budget programs. Although the participants and their respective information are different the methods are very similar and may be easily bridged for many planners.

Ed Specs/Building programmer:

This is in essence the second step in the process. Through the creation and/or updating of the educational specifications, a set of standards is created which enable the needs to be addressed for individual schools and for the system as a whole. These

educational specifications will later be used as measures upon which the individual facilities may be assessed. More importantly though, it is one of the key determinants in the direction of the master plan. In conjunction with the school system staff and having been approved by the school board, the creation of the educational specifications is the documenting of the desires of the school system's educational program. They are a blue print of the desired educational specifications that a school system would like to construct in order to educate adequately their community. It is the job of the planner to help translate these needs from desires and document them. This will later allow a prioritization to occur that will direct the entire long-range educational plan. Educational specs will be addressed later in this paper.

Project coordinator:

This is the principal activity of the planner. As the Council of Educational Facility Planners notes, "Educational planners are usually the only planning participants that stay closely associated with a project from the (beginning) through occupancy". (Council of Educational Facility Planners, 10) As a result the planner is usually in the best position to facilitate the desires of the owner/client and the abilities of the planning team. Many times, the process (especially in an integrated approach) becomes disjointed. One participant is working outside their scope or outside the plan's scope. The person could be doing someone else's work, they could be doing peripheral work or work totally unassociated with the process. It is the responsibility of the project coordinator to shepherd the process through initial stages and monitor later stages to ensure that proper

methods are being utilized and conducted in order to produce a relevant document.

Many times this position is split and committees overseeing specialized areas of the plan do the coordination. Many experiences support the theory that the fewer the coordinators the project has and the more specialized people employed in the plan the more effective the relationships are. Unless in close contact, in addition to a precise plan, these leadership by committee can quickly become mired in details.

It is one of the duties, then of planners to keep the process moving in an effective manner as possible in order to produce a timely product.

Facility manager:

It is the essence of the plan to be able to adapt. Due to the purpose and design of the long range plan, the decisions contained in the plans are directed toward a long-term process and product. It is the educational facility planner's role as the facility manager to see that implementation occurs as planned and to oversee the extended application of the plan. Few situations will arise that will have been previously covered in the plans and not need the translation of previous decisions for current situations. Thus, it is the planner's job to monitor the responsiveness of the plan. If a trend in educational needs reflects a change in resources, a long-range plan must be able to compensate for unplanned changes. The facility manager's duties then become the translation of the long-range plan to the current trend.

The planner's role as the facility manager allows a long-term relation with the plan that enables the planners to see that the plan does not become obsolete to its environment and that it in fact continues to grow in response to such changes.

Data Collector:

In order to progress into the master planning/capital budgeting phase, it is the planner's job to accurately and efficiently administer/gather the needed data and resources needed for the process. The most time encompassing aspect of the master planning process for educational facilities is the creation and collection of data. It is in essence the quality of the information that dictates the effectiveness and relevance of the facilities plan. If data has been collected ineffectively, sloppily or from sources that are irrelevant, than the entire product may be rendered ineffective before the process has begun. The following chapters are focused on the means and methods that educational planners collect and create their information. They are also the methods found to be the most effective while studying the process of Kaatz, Binkley, Jones and Morris.

In summary, it is only with the careful understanding of the participants and the roles that they play in the process that educational facility planning can occur. Once understood, the infrastructure needed may be adequately put into use. Also imperative is the understanding of the roles such infrastructure must play in the creation of the facility plan. Although those mentioned here may not be all found in other situations, it is crucial that representatives of the majority of the participants of this type of educational planning be present in order for effective and relevant facility planning to be done.

Chapter IV

Educational Program Guidelines

In the next three chapters, this paper will be addressing the most critical of the phases in relation to the master plan's effectiveness and relevance. They may be classified as the information gathering and dissemination phases. Kowalski states that "sound planning is most likely to evolve when it is erected on a solid foundation. This foundation, an amalgam of several key components, does not rely on any single element. Choosing the right planning format is indeed an important decision, but a paradigm by itself is relatively useless. In addition to an effective and relevant model for making decisions, planning also relies upon accurate data that provide the inputs for the process" (Kowalski, 7). This first of the three chapters focuses on the creation and assimilation of accurate data needed in the writing of the educational program standard.

There are many key elements involved in school plant planning. The range includes the assessments of the physical plant, the definition of educational needs, the involvement of key people, and the identifying and gathering of external information needed for facility planning (i.e. zoning, demographic information). All or a combination of these elements must be present in order to successfully create the master plan.

Based on the study case, the two most crucial elements needed for facility master planning are the establishment of educational programs and the evaluation of the physical plant itself. The educational program may be defined as a document stating the desired

curriculum and thus the defined spaces that go with these spaces. What Knox County has done through Kaatz, Binkley, Jones and Morris, is to negotiate desired curriculum and the needed design of rooms as well as these spaces' corresponding square footage.

The educational program is "often used loosely to signify curriculum" (Castaldi, 11). The most basic method of viewing the construction of the educational program is a process of documenting the wants of the school board in regards to educational curriculum and their needed spaces. Kowalski's attempts to clarify educational wants and needs are germane to this creation of the standards. "Frequently, needs and wants are confused. Wants involve motivation - the predisposition to achieve something. Alone wants do not fully reflect needs. In facility planning, wants are usually expressed in performance spec documents." (Kowalski, 7)

These statements of wants usually take the form of "each different student activity, the number of students participating in it, and the nature of the activity itself." (Castaldi, 11) This information comes from the documentation of wants of the school staff for their educational programs. The information is then weighed by the planner and the school board staff against the ability and feasibility of the school system's resources to answer these needs and wants. The two participants in conjunction, then develop a set of program standards that reflect the system's stated needs turned into a set of standards for each function within the educational facility (Reference Appendix D "Program Standards"). However, Strevell and Burke warn "the fact is that whoever decides upon the standards to be used is really making a most important policy decision - a decision which legally should be made by the school board" (Strevell, 3)

However, the educational program application has far reaching consequences. It is often used for more than a list of a subject's wants and needs. Kaatz, Binkley, Jones and Morris used it for primarily two areas. The first was the grading of existing areas while doing physical assessments. The second and most important use was as a program guideline. The program guideline is the set of guidelines that is the paradigm for the educational process and that enables it to be assessed.

One of the most crucial relationships when establishing program guidelines is the triangular shaped relationships that exist between education planners and programmers, the school staff and the elected board. It is the job of the staff to express their desires to the educational planner in order for the planning team to create these program guidelines. These guidelines are then brought before the school board for "public" approval by process of the school board vote.

The educational planner's role is to adequately and effectively gather the needed resources (i.e. the expertise of the staff) along with the needed information (i.e. desired curriculum and the corresponding spaces). There are several methods for gathering this type of information with regards to interaction with the school staff.

Kowalski argues that the questionnaire is the most common. This form usually involves a process of written statements that the reader responds to indicating several levels of agreement or disagreement. These may be either open or closed formats that may or may not allow the reader to respond further to opinions. Kowalski points out that the advantage of these is that it permits wide coverage, is relatively easy to use; tends to be less expensive and allows consistency in the presentation of questions.

The other instrument he highly regards is the interview method. This is similar to the questionnaire but involves direct interaction with the interviewee. The advantages of these are the "opportunity to probe responses, the ability of the assessee to ask questions and the opportunity for assessors to gain added information from nonverbal responses" (Kowalski, 7).

Having weighed these and other choices (job analysis, tests, and trend reports), Kaatz, Binkley, Jones and Morris decided that the most efficient way to gather information was from advisory committees made up of the school staff. The firm believed that the interview or questionnaire method, when asking teachers to submit assumed needs of the present situation, would result in a "pie in the sky" ideals that could not be achieved and would be rejected. They felt that this may be discouraging to those involved thus discouraging any future desire to be involved in the planning process.

The advisory committee of school staff members was made up of people responsible for overseeing the head of each curriculum department, for example, the Math representative, the English, the Special Education, etc. The advantage of using these "subject heads" was that the subject heads were able to input their desired wants according to their overall perceived need throughout the system. This is a much less time encompassing activity than a system-wide integrated involvement and it is designed to be more thorough in its overall scope. The subject head's desires would then be "censored" according to the school system's overall resources and needs by the school staff's advisory committee.

From this information the planner and architect can plan the future uses of the space. For example, Algebra - we all know that Algebra is a math that is taught primarily in high school. The advisory committee would then input the needs of the subject for example the number of desks, overheads, blackboards etc. The planner has an idea of the amount of square footage that the school system would like for each student and for the size of the class based upon program standards articulated by the school staff. So, depending on the future size of enrollment in the school, the space can be designed and all this information assimilated in the educational program. These educational guidelines in the forms of measurements and program spaces (i.e. teacher planning, cubbies, etc.) can then be used as a basis for which to grade the exiting facility's compliance. With the assessment and the enrollment projections coupled, the planner can then get a good idea of the needs in regards to educational facilities individually and later system-wide.

Although appearing to be a simple process, it is in fact it is one of the most difficult of the master planning process. While most planners and architects know little of educational curriculum, they are asked to generate the curriculum's corresponding spaces and use this information to program the facility's ability to effectively educate its population. However, problem may arise when many times, school staffs look to these consultants to define their curriculum. On the other hand there are those staff members responsible for their subject and that have a limited view of the system's needs and have a tendency to push very hard to get the sizes, materials and resources needed to advance their subject. This "pie in the sky" mentality can quickly diminish resources before facilities are even addressed. The result is the planner/architect is once again in the position of

mediator. He/she is not only generating spatial designs and requirements but also must dictate the limits of space so that limited resources are most fairly distributed. Many planners use superintendents, assistant superintendents and other staff to help mediate between the perceived wants and actual needs.

A lot of pressure can be put on this process and consequently effects the product or at least the process. As Castaldi notes, "there is often a dire need to erect a new school without delay. Under such circumstances, both the architect/planner and the board of education are acting expediently and in good faith. But the fact remains that a functional school building meeting needs of a given educational program cannot be planned until such needs are clearly identified through (educational program guidelines). School buildings have a useful life exceeding half a century and therefore should be planned to meet both immediate and long range needs." (Castaldi, 11)

This situation arose in the Knox County master planning when a new middle school had money appropriated, the site picked out and resources committed to it. But the accumulation of the written documentation of program spaces had not been completed. The result was political pressure put on all parties by all the other parties involved. The possible outcomes of such situations can result in rushed ideas and concepts that do not take into account all factors and possibly produce a product that is of little use and possibly detrimental to the effective use of the facility.

Kaatz, Binkley, Jones and Morris designed their Program Standards to be used in conjunction with the Designer's Manual. For each school project, Knox County Schools would provide a definitive Project Program Outline that will be dependent on the Program

Standards. The Project Program Outline addressed specific program requirements for the designer's particular school such as: site, facility, cafeteria complex (cooking / serving kitchen), athletic fields, schedule, budget, special programs, etc.

In addition to programmed spaces the enrollment level for which the school is to be designed was very important to the design and application of the program standards. The specific Enrollment Program Standard (Reference Appendix E, "Enrollment Program Standards) was designed to be the prime determinant of the overall project scope for new schools. These program standards established the number of units of a particular space and the related net square footage. The total NSF for a particular enrollment is multiplied by a grossing factor. This "grossing factor" provides square footage for the common, or non-assignable, spaces necessary (e.g., corridors, utility spaces, etc.). The total gross square footages constitutes the project's Building Program.

The organization of the educational specifications is based on a four-tier relationship of elements (Reference Appendix D, "Program Standards"):

- 1) Utilization: Is a brief statement regarding the intended use of the space.

The first "is usually devoted to matters related to the educational program, including a detailed description of instructional and learning activities" (Castaldi, 11) that will take place in these spaces. This enables the architect and the planner to fully understand what the space will be used for when appropriately designed. It also allows the architect, during

his/her role in the assessment, to accurately measure the performance of the existing spaces in relation to the intended use.

- 2) Space Allocation / Program Requirements: Is a description of type or characteristics of the space and the specific program requirements.

The second is to be used in conjunction with the enrollment standards in that it deals with the “numerical aspects of the architectural problem” (Castaldi, 11). In conjunction with total space, section (2) should address allocation with these spaces. The space allocation and program requirements are one of the most controversial topics of the educational program. This is in fact the main determinant in the cost of the school – total net square feet. The space allocation attempts to address desired size and relationships within this size for each individual curriculum subject. This matter lends itself to great debate of what is desired, what is actually needed and what can be attained. The planner and the architect must be in close contact with the school staff so that each space allocation is defensible. The planner’s duty is the questioning of all things desired and needed to be able to understand the difference between the two in hope of creating spaces that can attain the most with the resources allocated.

- 3) Relationships: Is a definition of key functional internal / external relationships of the space.

This is the measurement of the space's relation to other spaces in its environment. Castaldi notes this section within his section dealing with space allocation. Kaatz, Binkley, Jones and Morris address this separately. Spatial relationships address the placement of the spaces defined in Step (2) throughout the facility. (Reference Appendix F "Relationship Overview") Many times this takes on educational theoretical ideas regarding such issues as the administration of a building through design, effective educational use of facility space and others. However, there are key elements that must be understood by the planner. These would include desired functional groupings (such as classrooms, administrative, etc), safety issues (the placement of egress exits, chemical storage, ADA codes, etc.) and others. While the planner's professional training may preclude him/her from having to make design decisions, the educational planner must still be able to comprehend such issues in order to adequately mediate between wants and needs in the creation of the Program Guideline's Relationships.

- 4) Design Guidelines: Is a key design features / requirements for elements of and within the space.

Castaldi believed that the final section should "describe in detail all of the special features that should be incorporated in the school building". (Castaldi, 11) The special design criteria can quickly become wants and not needs. Although a minor section, the planner must be able to communicate openly with the experts in the design field to be able to mediate these differences.

This combination of the four sections of Program Guidelines standards were designed to define the use, characteristics, and quality of a particular space and to further the ability of grading the existing plant.

In summary, Strevell and Burke believe that "Approval of the standards to be used in evaluating existing facilities and planning new ones or changes in available ones is one of the most far-reaching decisions made by the school board. These standards largely define the need for school buildings. They have serious implications for the capacity and utilization of available (space). They fix the future usefulness of new facilities." (Strevell, 3) It is the planner's job to help facilitate the creation and use of this important piece of information into the effective use of the educational facility master plan.

Chapter V

Enrollment Projections

One of the most important factors in the genesis of the master plan is the measurement of a school district's population. There are various methods that are structured towards the measurement of a school system's enrollments. The importance of these methods lies in the defining of the present community as well as the projected community that will be housed in the school system's facilities. This can translate to shifts of resources, the need for new facilities or the closing of existing facilities. Thus, one of the first actions taken in the master planing process is that of determining future use and/or need.

Countless variables go into the study of demographics and the very nature of enrollment predictions, like the master plan, are at best educated guesses. It is for this reason that all the factors and resources that may be available or can be readily usable need to be taken into consideration for the purpose of the elimination of as many possible future errors as possible. Kowalski believed in the importance of the demographic study as seen in his statements: "Demography is the statistical study of human populations with special reference to size, density, distribution and other related figures. For the purposes of school facility planning, projections of school district enrollments are the most important, but certainly not the exclusive, demographic data of interest" (Kowalski, 7)

There are many variables that may affect this data. The most important is the number of births that occurred in the area during a certain time period. All factors holding equal, this will be the number of students what will be enrolling in the school system in a number of years. However, this number may be affected by a host of variables.

Sumption notes these variables that affect enrollment size:

- 1) "The number of children born in the same year who moved into the district in the intervening time.
- 2) The number of children born in the year who have moved out of the district during intervening years.
- 3) The number of resident deaths occurring in the interim to this age group." (Sumption, 2)

He classifies these variables as births mortality and migration. If the school system is using these for kindergarten classes (i.e. first year in the public school system) these groups will be affected further by events occurring within the school itself. An example of some of these events would be:

- 1) retardation
- 2) acceleration
- 3) and the placement in private classes.

Acceleration and retardation refers to the possibility of a child either being withheld from the natural progression advancement to the next grade or the removal of the child to place the child in an age group more suitable to their intelligence. This could be out of the grade level that the child would naturally be in. As a result, the natural

progression of advancing the number of grades corresponding to the number of years can in fact be affected which may discount aspects of the projections.

Sumption's private class addresses the possibility that not all students will be enrolled in the public school systems and will in fact be enrolled in private schools and not need to be planned for in the allocation of resources. One of the most recent issues to affect enrollment projections has its genesis in the legal system. In 1975, many schools began mandatory bussing to equalize racial balances. The results are the cross-district bussing that school districts employ. Many enrollment projections were based upon district populations, however with the advent of this practice, these numbers may not accurately reflect the constituency.

In addition to these factors, there are subsets of community factors that are involved as well as regional, state and national. One of the most influential is the economy. People tend to move where the jobs are and if economic indicators are good than a rise in population will possibly be reciprocated, conversely a decline in the economic situation of a community will most likely see a number of out-migration. As an aside, most school districts receive a majority of their funds from property tax. With an influx of new residents to a system, the need for housing rises and school facility are potentially overcrowded, resulting in the need for more resources. But, development generated need also generates a new tax base and can offset potential costs. Many communities now require by law the developer to donate resources to help alleviate these increases.

Having realized that there are many factors involved in projecting populations, the educational facility planner must gather the needed data and resources. Much of the needed information will be from a collection of agencies and a combination of data.

Many communities with larger school districts are required to complete school projections that offer more than the straight-line extrapolation. Sometimes planning agencies provide the needed data, however, in many cases, these studies are of little use, or are out of date due to their incompatibility with current scope or relevancy to school facilities. The most likely starting point is the US census data. These contain information of not just population size, but also characteristics such as education, income, dwelling units, etc. Depending on when the master planning is being done, the census data can be close to ten years old, which is marginally useful at best - obsolete at worst.

The next source of information may be at the state level. "Virtually all states conduct state-wide population projections. In fact, some states have multiple projections completed independently by several different agencies. Likely resources for such projections are state boards of health, research bureaus in state universities, or specific state government agencies charged with demographic responsibilities". (Kowalski, 7)

The American Association of School Administrators offers several state agencies that may be useful. They note the state health department, which keep records of resident live births. The state department of commerce keeps track of economic data and population by geographic area of the state. The state department of education keeps annual statistical reports, which may entail several state enrollment projects. The

association also lists the state public works department (or transportation) which keeps track of development trends. This is not an exhaustive list, but it is a good starting point.

The most difficult source of enrollment projections is on the local level. Very few communities have the resources to do continually updated projections. Once again, a combination of sources and information may be the best source for projections. All communities over 50,000 are required to have a metropolitan planning organization. However, this does not mean that their data is up to date. The planning agency is still the best source for a wide variety of regional characteristics. However, since many times government census boundaries do not match school districts, other sources will need to be used to augment discrepancies. Many utilities companies sometimes complete population projections. Municipal agencies keep housing data, real estate offices and private agencies keep track of housing and land usage. Chambers of Commerce keeps track of economic trends and indicators and local school districts maintain school census reports, annual age grade reports and permanent pupil records.

Due to the limited amount of time given to Kaatz Binkley Jones & Morris, much of the data used was based upon current or past enrollments in the school system. As a result, the linear regression formulas for Kindergarten through first, and the survival ratios for second through twelfth were employed. These methods will be addressed in more detail later in this chapter.

The gathering of information is one of the most important steps in the creation of an enrollment projection. Many times the planner will not have all the information needed

but the sources must be used as thoroughly as possible to create the most complete picture.

Once the information has been gathered there are several different ways in which to use it to create the enrollment projection. The methods vary depending on use, the level of information and the availability of data. Individual master plans must choose the method that best suits the need of the plan. The following is a look at some but not all of the types of forecasting models used to predict enrollment projections, in addition to an in-depth examination and example of the models used by Kaatz Binkley Jones & Morris Architects in their projections.

"The techniques for predicting pupil population that are most commonly used fall generally into three major categories: "mathematical" methods which make use of past trends in the total population of the area, demographic techniques analyzing separately the trends in the components of population change (such as death, births, migration) and a variety of miscellaneous techniques using symptomatic data to estimate future total population without intermediate estimation of components. (American Association of School Administrators, 9)

Methods of projection:

School census method: One of the most enduring methods, the school census method relies heavily upon population participation. "The school census method utilizes two avenues for distributing surveys designed to collect information about future enrollments: (1) sending questionnaires home with students already enrolled and (2)

advertising in local media that parents with preschoolers (but without children currently enrolled in the school district) request a survey form from the district" (Kowalski 7). The information form can be a simple form requesting address, dwelling ownership, type of dwelling, mother's name, father's name, number of years in residence, father/mother's occupation, etc. This information is compiled into a census for the school district and can be easily broken down into the assigned school districts.

There are several advantages and disadvantages to this type of method. Kowalski points out that the school census technique can be accurate. In addition there are several other advantages, the first being that the cost is relatively inexpensive in that the production and distribution costs are minimal in the school census method. The cards are distributed via the children and local media which donates a certain percentage of time to public service announcements and many school districts have their own printing capabilities enabling production costs to be kept at a minimum. This type of survey can easily be updated annually. Annually updating the survey will produce a feeling of school responsiveness to the community and to the people living there and thus possibly foster a higher rate of participation. These types of census directly address the population that educational planners need. There is no need to draw inferences from extemporaneous data that may not be suitable for projections. Also, once assumptions are used there is always a larger margin of error incurred. The school census may directly bypass this need. School systems may also narrow their focus easier and more accurately using the school census method than other methods. By creating questionnaire for specific districts, one can get a more complete/accurate picture of certain areas than community wide surveys.

For all their advantages, school census methods are very volatile. They depend heavily upon the cooperation of children and the parents of the children that are not in the school system ability to have access to local media. There are little or no enforcement capabilities in school census methods. As a result, rarely is an adequate amount of input generated, thus prohibiting the needed information for the school census method.

Comparison methods: Very rarely used, comparison projections are a method that makes predictions based upon past experiences in similar districts. If a school district believes that there is, or more importantly has been, a different school district that shares or has shared similar characteristics, then the 1st school district can imply changes occurring/have occurred to one will necessarily occur to the other. This method is fraught with inconsistencies and variable that may be unaccounted for in the use of this method. It is not surprising that this method is used rarely by educational facility planners when attempting to determine future enrollment projections.

Cohort survival: One of the simplest and most widely used mathematical models, the cohort survival technique is used to "project enrollments by computing the estimated size of each grade for the next immediate grade year from the size of the present year's next lower grade. That is the enrollment pattern of third grade to fourth grade is used to predict fourth grade enrollment" (Kowalski, 7)

The procedure is usually set over an amount of time (studies have shown that the best ratios reflect periods of 6 to 8 years) and enrollment figures are determined for each year and each grade level. Ratios are determined for each year and each grade level. Ratios are determined for retention rates. A ratio of 1.0 means that there has been no

change, greater than 1.0 reflects an increase in enrollment and lower than 1.0 reflects a decrease in enrollment. This retention ratio is then applied to current year enrollment figures to determine next year's enrollment numbers. For example, a retention ratio from 6th - 7th grades in year one is 1.03 and the enrollment is 765. By multiplying the ratio by the enrollment ($765 \times 1.03 = 787.95$) the numbers in the upcoming 7th grade class will reflect the answer (i.e. 788 students in the rising 7th grade class). As expected, if the multiplier is 1.0 then anything times (1) will produce no change. A multiplier greater than 1.0 will be an increase of $(1.0 + n)(X)$ and anything that is below 1.0 can be represented by $(1.0 - n)(X)$.

This method has several advantages. The first is that, like the school census method, it can be done relatively effortlessly in regards to information gathering. Most schools maintain enrollment numbers per year per grade. So, in essence the accumulation has already been done. The next step is the accumulation of this data over a certain study period. Once again, schools with current enrollment numbers will most likely have kept these same types of records in the past. Thus, the establishment of ratios is applied to a set of information that is a complete population. The speed at which this can be gathered is an asset to the method. Most school systems maintain a database from which this information can easily be downloaded. Computations and projections can be administered within hours - a real benefit to schools with limited resources or time. Another key advantage is the compatibility to school planning. Most school system administrators complete long-range plans that take in to account no more than three or four year projection. Due to lack of dramatic change that can take place in such a short amount of

time, the one dimensional cohort-survival mathematical model is extremely accurate (despite its obvious failure to take into account external variables). Short-term planning by school systems may accurately use the cohort-survival technique.

The disadvantages of the survival technique are exactly what make it attractive, that is, the limited amount of information needed the limited time and the forgoing of much data. Yet it is for these reasons that it cannot be used for long-term planning. The failure to take into account external variables (such as employment, migration patterns, births, deaths, etc.) makes it extremely limited in the amount of time that it can be projected for. Thus long-range planning is not adequately served by the survival method.

Retention Ratio: The retention ration is the mathematical model used when a school district wants to compensate for external variables - namely birth rates. This implies use of data outside of school-system maintained records. The primary source for birth rate data lies with the county or state.

The use of the retention ratio relies upon several key assumptions:

- 1) Children enroll in kindergarten at the same age.
- 2) Accurate data is available for counties.
- 3) The birth data are reported by the county of residence of the mother regardless of where the actual birth occurred.
- 4) The school district has operated a kindergarten program for at least the previous six years.

- 5) There have not been any major policy changes, nor are such changes anticipated in the near future which would affect kindergarten enrollments (ex. The changing of enrollment age).
(Kowalski, 7)

Based on these assumptions, the planner can estimate future enrollments of the kindergarten age and subsequently combined with the cohort survival technique, the respective grades.

The process begins by establishing a base period. This period should be no less than six years. Then the birth rate must be assigned for each year since the base year. Divide the actual kindergarten enrollment of any year with its corresponding birth data to produce a percentage of children enrolled in kindergarten for that year. Do this for each year and get the average of the percentages. With this average know that the average enrollment of children to be (X). Thus, for children not yet enrolled (below the age of enrollment but having been born), the average may be multiplied by the number of births to get an estimate of the projected enrollment. Once again this method can only be used for a period of six to ten years. Obviously, an average cannot be obtained for children not having been born yet, but using other information than birth rates can compensate for this. For example, birth rates can be averaged out to type of dwelling units using census data. So, for a certain district that has a certain number of single family houses that have historically had an average of two children then projections may be used for this method. Employment or economic data can be used to find median income of employed and thus

median age and number of children between certain ages. All of these factors can be used to predict future birth rates and thus future ratios. It is this ability that makes the retention ratio mathematical model so attractive to school districts.

As previously mentioned the key advantage of the retention ratio is the ability to add multiple forms of input. As Kowalski points out "there is one general rule, which is applicable to all planning situations where pupil population projections are used: multiple forms of input produce a more accurate projection. The planner who relies on a single form of input is more likely to miscalculate. A good demographic study of a school district should include information about the general population and the pupil population, and each of these should be the product of myriad sources of information" (Kowalski, 7)

Aside from these methods that take directly into use the school data, there are other demographic areas that can be used to identify enrollment ramifications. Land utilization is one of the most responsive methods. This entails using the information about how the land is being used (concerned primarily with residential use) and its corresponding density. "In using this technique, the number of homes in the city must be counted and to this figure is added the estimated number of probable future homes, based on the number of suitable vacant lots. The average number of children per dwelling is determined. Thus, the average number of children per unit is multiplied by the number of units equals the number of children which can be expected to be in school." (American Association of School Administrators, 9) Using this with retention ratios can give the educational planner a good idea of future enrollments. Other methods include migration studies, shift share techniques, etc.

Kaatz, Binkley, Jones and Morris are modeling their enrollment projections based on a model developed in the Broward County Florida Schools planning team. These methods incorporated the most effective elements of the cohort model along with a linear regression technique. The projections are "generated by using a combination of the Cohort Survival and Linear Regression techniques. Both the kindergarten and 1st grade use linear regression to calculate future projections while grades 2 through 12 use the Cohort Survival technique. According to Broward County the "geographically based Cohort Survival method is considered a very reliable procedure and is utilized by the U.S. Census Bureau for their projections and reports. It uses an "aging" concept, which moves a group or cohort of people into the future and increases or decreases their numbers according to past experience. This method recognizes that there are several uncontrollable factors that will affect projections. These include:

- 1) Changes in the rate of new housing development within the county (i.e., high interest rates or a recession may slow new housing starts and growth) could lead to "over" projections.
- 2) Land regulations that affect development in specific areas.
- 3) Economic conditions (i.e. the creation of jobs usually means families are moving in , this can lead to "under" projections; and
- 4) Immigration. (Brow. County pg. F-4)

The plan goes on to explain that the "model derives a growth factor or ratio for student survival to the next grade based upon previous survival numbers to same grade of

students in that (school district). Five years of historical data (is used) to create the ratio. The ratio is then used to project future students. The projection of kindergarten is more speculative and requires a different approach. Both Kindergarten and first grade are projected using a linear regression technique. Simply put, the linear regression is based upon what the numbers have been for the kindergarten population and the first grade population and the trend is continued into the future." (Broward County, 14)

Linear Regression Formulas for Kindergarten and 1st Grade:

$$P(y)=A + (B * z)$$

where:

$$A = ((IS / 5) - (B * 3))$$

$$B = ((IZ - (3 * IS)) / 10)$$

$$IS = E(x)+E(x+1)+E(x+2)+E(x+3)+E(x+4)$$

$$IZ = E((x)*z)+E((x+1)*(z+1))+E((x+2)*(z+2))+E((x+3)*(z+3))+E((x+4)*(z+4))$$

such that:

P = Projection

E = Enrollment

z = Year of the regression (1 through 5 are histories and 6 through 15 are projections)

y = Year of projection

x = Year of enrollment data

Survival Ratio for Grades 2 through 12:

$$R(q) = \frac{E(q(x)) + E(q(x-1)) + E(q(x-2)) + E(q(x-3))}{E((q-1)(x-1)) + E((q-1)(x-2)) + E((q-1)(x-3)) + E((q-1)(x-4))}$$

where:

R = Survival Ratio

E = Enrollment

q = Grade for ratio to be calculated

x = Year of enrollment data

Projections for grades 2 through 12:

$$P(q(y)) = R(q) * E((q-1)(y-1))$$

where:

P = Projection

R = Survival Ratio

E = Enrollment

q = Grade being projected

y = Year of projection

(Example: Reference Appendix G, "Survival Ratio")

Chapter VI

Physical Plant Assessments

One of the principal tasks of the educational planner before the plan can determine where the school system's future lies is to determine the present state of the educational facility system wide. While program standards and pupil projections deal with the future (i.e. where a school system would like to be and the numbers that it is projected to be), the assessment of the existing physical plant is concerned with the here and now. It is in a sense an inventory of assets and in essence, the true nature of the educational facility plan is geared toward maximizing these assets. Thus this is the information that the long-range plan will most likely be contingent upon.

Many of the authors in the literature reviewed stress this essential step. Kowalski's statement concerning the assessment addresses the fundamental nature of the assessment. "A more specific form of assessment is the school building survey. Here the focus is upon evaluation of a specific structure. The procedure is based upon a uniform rating of existing conditions against some established standards. All assessments, whether for the site or for the building should be based upon both qualitative and quantitative standards. For example, the report should clearly convey if there is an adequate number of classrooms, if the classrooms are of adequate size and if the location and general condition (are) acceptable." (Kowalski, 7)

The Physical Plant Assessment is intended as the initial step towards a comprehensive statement assessing the school system's physical plant condition. It will

provide a standard format with which to document salient characteristics of the individual schools. The format does not provide a level of detail to support design or maintenance decisions but will provide a basis upon which to make more global planning decisions.

The purpose of the appraisal is to measure how well the functional and physical aspects of the building provide for the adequate and efficient use of its space in the pursuit of the educational program. Strevell and Burke noted these purposes when they stated, "The inventory and evaluation of present school plant has several purposes. It determines how much of the program and population may be accommodated satisfactorily in present facilities. Beside the capacity and spatial facilities, the inventory shows where substandard conditions exist. Proper evaluation determines alterations to be made, the outlay amount essential required for upkeep and preservation of plant values, and the degree to which the concept of modernization should be applied" (Strevell, 3)

In a sense, it shares its goal with that of any appraisal, "to see how well the purpose is achieved" (Sumption, 2). However, in order to measure anything, the units of measurement must first be established. Kowalski suggest, "a uniform rating of existing conditions against some established standard(s)". (Kowalski, 7) Kaatz, Binkley, Jones and Morris based their functional assessment grading on the educational program guidelines and standards that were discussed in Chapter 5. For the physical assessment, these standards are based upon professional practice, codes (fire, ADA, etc.) and industry standards.

Once standards were created, the infrastructure of the assessment team must be created. In order to complete an assessment, the right people must be used to complete

the process. Kowalski believes that "school facility assessments are best completed by a team of experts including at least one architect and one educational consultant".

(Kowalski, 7) He believes that "having a range of expertise permits mechanical and structural elements of the school to be evaluated along with the educational dimensions".

(Kowalski, 7) Kaatz, Binkley, Jones and Morris used three experts when assessing the building. These experts were professionally trained and licensed architects and engineers. The engineers were mechanical and electrical specialists while the architecture and structural assessments were done by an architect. Unlike Kowalski's belief that an educational consultant needed to be on-site, Kaatz Binkley Jones and Morris used in place of the consultant the program standards that were created by the planning team and the school staff.

The goal of the assessment is to be able to determine where the school system is in terms of physical plant being able to achieve its educational objective. Sumption believes that these "existing (facilities) should be checked periodically to determine their status in several respects. Among these are suitability for carrying out these school's objectives with the numbers of pupils involved, location, provision for pupil safety and health and economy of operation". (Sumption, 2)

All of these purposes are contingent upon the numbers that the school was designed to serve and the number of students that the school actually serves. The combination of these two is classified as a building's capacity. Thus, one of the key elements of physical plant assessment is the defining of building capacity. "Formal

appraisal includes a planned evaluation of items or details according to definitive standards and also estimates of capacity" (Sumption, 2)

Kaatz, Binkley, Jones, and Morris wanted to involve many of the participants that were actually using the facilities so they sent out a questionnaire (Reference Appendix H "School Plant Survey) that allowed school principals to be able to input into the process of assessing their building. The school plant survey allowed the principal to inform the planning team and the assessment team of his/her perceived current state of his/her facilities.

School capacity is a very difficult thing to measure. It is capacity more than any other measurement that the average citizen can comprehend and discuss. It is the most popular way to measure the effectiveness of schools. Thus, it can be a process that is prone to a lot of external influences.

For example, based upon program standards, in Knox County, the middle schools program guidelines call for approximately 135 gsf per student. Interestingly enough, one school board member found that size allocation to be excessive and questioned the historical precedent of using such a large allocation. Totaling up 10 Knox County middle schools, the average classroom space was found to be 135.25 gsf per student. (See figure 6.1)

Many times there is a state presence that takes the shape of state guidelines. These methods tend to look at absolute sizes and school sizes in terms of net square feet (nsf). Local influences show up in the amount of space per student and amount of seats that are assigned for the value of a school's capacity. Many times the prudent method is a

combination of both. This method has been traditionally set by school boards and not planning teams.

<i>School</i>	<i>Total Building GSF</i>	<i>Total Enrollment*</i>	<i>Gross Square Feet per Student**</i>
Karns Middle [^]	85,204	1,070	79.63
Powell Middle	75,800	877	86.43
Carter Middle	95,000	887	107.10
Cedar Bluff Middle	82,400	738	111.65
Halls Middle	140,000	1,018	137.52
Whittle Springs Middle ^{^^}	79,225	570	138.99
Bearden Middle	163,647	1,097	149.18
Gresham Middle	112,967	738	153.07
South-Doyle Middle	205,000	1,147	178.73
Holston Middle	139,885	576	242.86
Totals:	1,179,128	8,718	135.25

Avg. GSF/Student***

[^] Includes (12) portables at an average of 767 square feet

^{^^} Includes (7) portables at an average of 800 square feet.

* Enrollment numbers current as of August 18, 1997

* *Total GSF/Total Enrollment

*** Average is for 10 Middle Schools assessed by KBJM as of Aug. 21, 1997

Figure 6.1 Knox County Schools – Gross Square Feet Per Student

Once square footage is assigned, the capacity of the building must be defined in order to be able to assess the building using the correct measurement standards. "In any school building survey, the calculation of student capacity for each serviceable building is a prerequisite to long-range planning. To specify the type and size of additional school buildings needed in the foreseeable future, the capacity of all usable existing buildings

must be accurately determined. Thus, the computation of building capacity provides information that is fundamental in the evaluation of the educational adequacy of a building and in the development of a long-range building program." (Castaldi, 11)

As stated earlier, capacity is a term with many variables leading to many different definitions. For example, does the "educational" capacity of a building include non-teaching spaces such as cafeterias, gymnasiums, media centers, etc. All of these are considered crucial to the educational effectiveness of a school. However, when speaking of schools, most measurements are done for classroom space - because that is where over 75 percent of a student's time is spent. Castaldi addressed this dilemma when he noted that "the educational adequacy of a school can be adversely affected by any deficiency in either the number or size of available teaching spaces. Theoretically, capacity represents the largest number of students that can be instructed in a school building without curtailing the desired educational program. To some educators, the capacity of a building is simply the number of students that can be accommodated for "homeroom" purposes. To others, it is the number of students for which the architect originally designed the building." (Castaldi, 11) Whereas, Kowalski agreed with the existing ambiguities, he also argued that it took a more definitive measure when he said, "Assessment of the school facility itself is also an entangled task. Every aspect of the building, from its exterior walls to the size of classrooms to the quality of corridors to the number of restrooms, needs to be included." (Castaldi, 11)

Kaatz, Binkley, Jones and Morris decided to define capacity in a more fundamental manner in order to compare program spaces and existing spaces. Their method was not

by the building size but by the population size. They believed a building's capability of effectively educating a student population is directly related to the physical plant. Thus, the building was measured on the basis of existing population versus the original population the building was designed to serve.

Kaatz, Binkley divided the assessment of the structure into two distinct methods: the effective use of space was measure by the space functional assessment (Reference Appendix B and C "Physical Plant Assessment Sheets") and the physical condition of the building in the physical assessment. Sumption also believed that this is the method for grading when he laid out his method. "Existing plant evaluation instruments may be divided into two main types: (1) those which deal with structural or facility needs, with purposes incidentally stated or implied and (2) those which deal with purposes to be served" (Sumption, 2)

He also notes that in addition to the architectural, structural, mechanical and electrical assessment done that site assessments need to be completed. "Since many phases of present-day education are carried on outside as well as inside a building, our concern is the total school plant, which includes the school site as well as the building." (Sumption, 2)

The program standards are then applied to the existing nsf and the program nsf for a measurement of percent compliant. Based on a rating system of 1-5, the space is "graded on its effectiveness according to the enrollment standards that are found in the program standards. When rating the building and its environment, the assessor takes into account such questions as "How does capacity of the school compare with anticipated

enrollments? Is the location of the plant suitable in terms of environmental conditions, travel hazards incurred in attending the school and accessibility to the pupil population served? Does the structure lend itself to economical and efficient operation?" (Sumption, 2)

The ratings of 1-2 are considered good to fair. These conditions, space or functions are acceptable or deficiencies are minimal such that safety, quality, timeliness, efficiency or costs of operations are not significantly affected. Significant deficiencies of 3-4 are deficiencies of a serious nature that affect safety, quality, timeliness, cost or efficiency to a significant degree. A rating of a 5 is deemed critical. Its deficiencies are of such a critical or severe nature that safety, quality, timeliness, cost or efficiency of operations (student education support, distribution of materials or other services) are adversely impacted or compromised to a major or extreme degree and correction of deficiency warrants special attention. (Reference Appendix I "Completed Physical Plant Assessment Sheet") "Judgments made by evaluators are of two types. These are subjective evaluations, concerned with operational or functional contribution of a feature, which have their base in how effectively overall needs are met. There are also objective evaluations in which features are measured and their suitability judged in accordance with how nearly they meet specifications. (Sumption, 2)"

Once assigned, these ratings reside in a database that enables the planner to recall all the previous assessments in order to be measured against one another. They may also be measured with the other spaces in the building or similar spaces at other schools (Reference Appendix J "Completed Educational Facility Assessment").

The database is an involved collection of data as seen in figure 6.2. (Kowalski, 7)

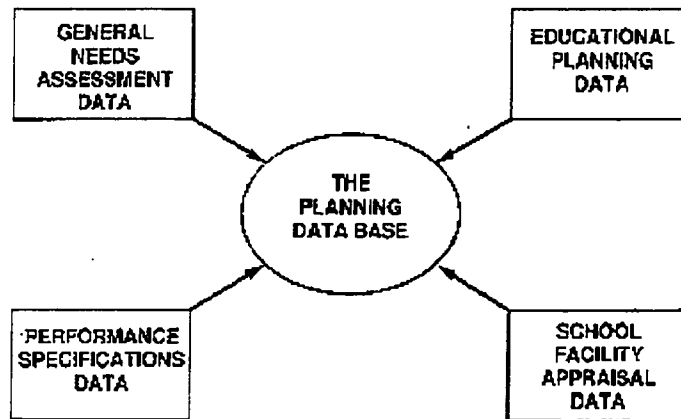


Figure 6.2. The Planning Database

The individual Physical Plant Assessments reside in a database. This database allows queries by school, architectural or engineering disciplines, physical condition item, space / functional item, deficiency rating, etc. This capability facilitates programming, curriculum, enrollment, maintenance and capital budgeting decisions.

By combining all this information a complete picture of independent facilities may be compared to the other facilities designed to regard similar functions (Reference Appendix K, "System Master Plan School Ratings") and to the system as a whole (Reference Appendix L, "System Master Plan Composite School Ratings"). This method enables priority to be set as to which schools are in need of repair, replacement or closure in the system as a whole and not just individually as problems arise when the master plan is developed.

The physical plant assessor can use this same system of grading. Like the space functional assessment, spaces can be graded and compared and contrasted to the building and the system. This grading is very subjective and must be done by professionals that understand the mechanics of a building. Because these are subjective (with the exception of percent compliance), it is this professional training that ensures validity.

Ideally, this "assessment" could be completed in one and a half field days and a half a day to a full report day spent in the office. These durations represent man-days or team days from a multi-disciplined team. Completion of a particular school's overview will vary based on size, age, condition, availability or access to the school, etc. Much of the needed information (key plans, history, etc.) will be available from existing sources. Collection, collation and preparation for each site will require time in advance of the site visit as indicated in the steps taken before the site is visited. Figure 6.3 (Kowalski, 7) demonstrates many of these steps that need to be taken before the sight visit.

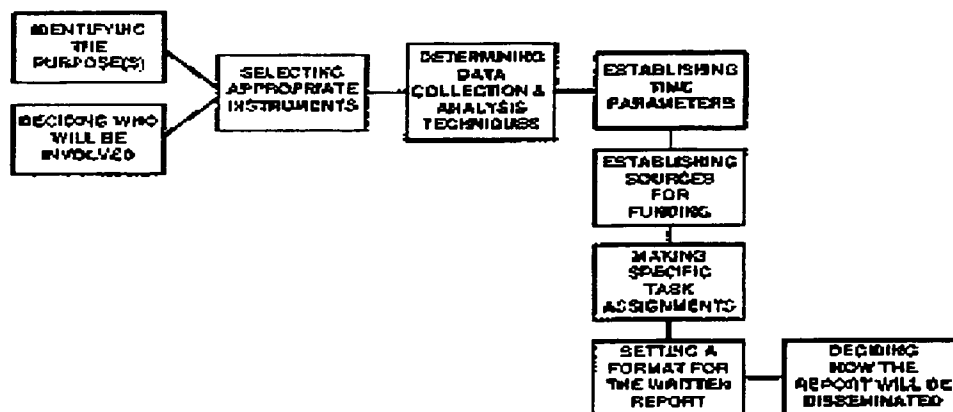


Figure 6.3. Physical Assessment Sequencing

Many of the parameters needed for these steps to be completed need to be assigned before the team visits the site. These will be one-time decisions that need to be decided on a one-time basis so that consistency pervades the process. Parameters such as collection techniques, grading scales, information dissemination methods

In summary, Kowalski warns that, "The temptation to bypass the assessment stages in a facility project are often great. School districts frequently fall prey to time management problems. Put simply, the needs related to facilities become so acute that adequate time can not be allocated for comprehensive planning and detailed studies. The penalties for skipping assessment tasks are confusion, uncertainty and needless errors." (Kowalski, 7) Thus, the planner must make every effort to facilitate the effective and efficient construction of the program standards due to their effects upon other information gathering needs as well as the long-term educational facility master plan.

Chapter VII

Data Assimilation/Creation of the Long Range Plan

The process is now ready to move into the process of formulating an educational master plan. The first step towards realizing this is the formulation of the goal for the entire system. This goal should be geared toward the future where the foreseeable trends have been effectively noted. This can be noted in the development or research into a community land use, population and economic long-range plan. A long range goal will enable the planning team to understand the direction the community is heading for the next several years and consequently the needs it will have in relation to its educational facilities.

Based upon the community's land use plan, the educational planner will be able to "construct a rough land use map of the district or school community representing the (community) as it is foreseen when fully anticipated development is achieved" (Sumption,2).

The foundation constructed in chapters 4,5 and 6 enables the planning team to begin to construct the methods for achieving the educational long-range plan's goals that have been previously dictated by the school system staff and board. The first factor to be taken into account is the enrollment and population data. This data can be imposed upon the land use map and should be found to be according to the corresponding future land use projections that may come from sources previously mentioned (i.e. planning agencies, transportation departments etc.). Based upon the planning team's projected enrollment

and population data coupled with land use projections, noticeable forecasted future needs for educational facilities may be observed. The existing facilities, noted on the land use map, have been assessed according to the school system's educational program standards and have been given ratings indicating their present compliance to the program standards. These numerical assessment grades (Reference Appendix L "System Master Plan Composite School Ratings") enable the planning team and school system staff to prioritize based upon the severity of their rating. As previously noted, the rating is reflective of the perceived effective use. So, the planning team's first priorities would tend to first deal with the schools that scored 4 or 5 in one of the Summary Sheet's four criteria. This prioritization can be superimposed over the land use map in conjunction with the projected population and existing facilities.

After the current situation has been noted on the land use map, several variables must be added to the equation. Some of these variables that must be taken into account are the budget, demographics, time-spans, etc.. What will become of this method is the planning team along with the school staff taking into consideration demographic characteristics (i.e. age, location) and desire (i.e. budget constraints) and decide what is wanted (i.e. elementary, middle, or high schools and site placement).

Once these variables have been added to the land use map and, with the use of the collected data a method to realize the system's goal must be enacted. Realizing that where the school system is and where it would like to be, the planning team must enact a series of procedures. The establishment of procedures is directed toward the development

of "the school community and consistent with the present and projected financial resources of the school district". (Sumption, 2)

Sumption addresses this development of procedure when he notes that "it may be found helpful to list first the site acquisitions, remodeling projects, additions and new construction that will be necessary to achieve the ideal plant of the future. Then in light of the studies of population growth, the proposed educational program and the condition of existing plant, (the planner) sets up tentative priorities for each project. This prioritization will enable the planning team to understand the needed steps to take to meet the school system's proposed future. This prioritization also allows a timetable to be decided as to the development and implementation of the master plan".

"Enrollment projections and space deficiencies are used to calculate the area requirements for existing and new construction in each master plan concept. Phased grade configuration and attendance boundary changes may be necessary to address planning goals and ensure optimal utilization of facilities. Develop budget cost estimates for each concept solution" (Reference Appendix M "Capital Plan Update"). (American School and University, 15)

In our reference, the planning team has noted the deficiencies existing (Karns Middle School) by referencing the Composite Summary sheet (Reference Appendix K). These deficiencies were identified in the assessment phase (Reference Appendix J "Completed Educational Facility Assessment") and were based upon program standards (Reference Appendix D "Program Guidelines") created to serve certain population and enrollment (Reference Appendix E "Enrollment Program Standards") sizes. The

Action/Solution is the pre-master planning solution by the school system. The planning team, based upon their collected data has come up with several feasible alternatives (options). These options enable the school system to save over seven million based upon effective master planning. Now the planning team has the data collected, the projections made and the steps planned. The result of all these interwoven steps and factors is the long-range educational facility master plan.

As the planning team analyzes each solution, alternatives and options that address key issues may be revealed. Refinements and improvements are the natural result of this process. The goal of the planning team is to establish a single direction that best responds to the short and long-term needs of the district.

However, several limitations were found to be inherent in structuring the educational facility master plan as it is proposed in this paper. Based on the approach in this paper and subsequently the design of the master plan, it does not account for several community-wide variables. The limitations stem from the result of master planning for the educational site, system wide. It does not take into account the identity and impact that a school may have to its neighborhood, community etc. in the way of community identity. Rather, this is an approach that may be adapted to account for these types of unaccounted variables.

Another proposed limitation, regarding population projections, holds that these projections must take into account developments and trends outside the county's borders. It is believed that with the spread of influence extending outside of the county's boundaries, that this will have an impact upon the system. However, this may be true for

employment data, regional economic indicators or measures, but it rarely applies to public education. The reason is that the system is primarily concerned with the boundaries that it is responsible for.

If followed closely by the team, the end result will be the effective use of limited resources and intelligent management of existing and proposed educational facilities. Using this layout of the facility master plan, the ingredients necessary for the educational facility plan become quite apparent. This paper sought to address these key factors and the methods necessary for addressing them.

The educational facility master plan is a multifaceted, multi-use document that when implemented and monitored effectively can dramatically effect the future of educational facilities and education within a community. The elements described in the previous chapters are to be skillfully used and consistently remeasured. The relationships are contingent on one another and are the ingredients needed for a successful plan.

In conclusion it may be seen that the quality of infrastructure laid out at the beginning of the plan and the information framework used for the master plan is critical to its effective development. It is this interconnectedness that creates the foundation and support for master planning decisions made to guide a school system through years of preestablished systematic facility management.

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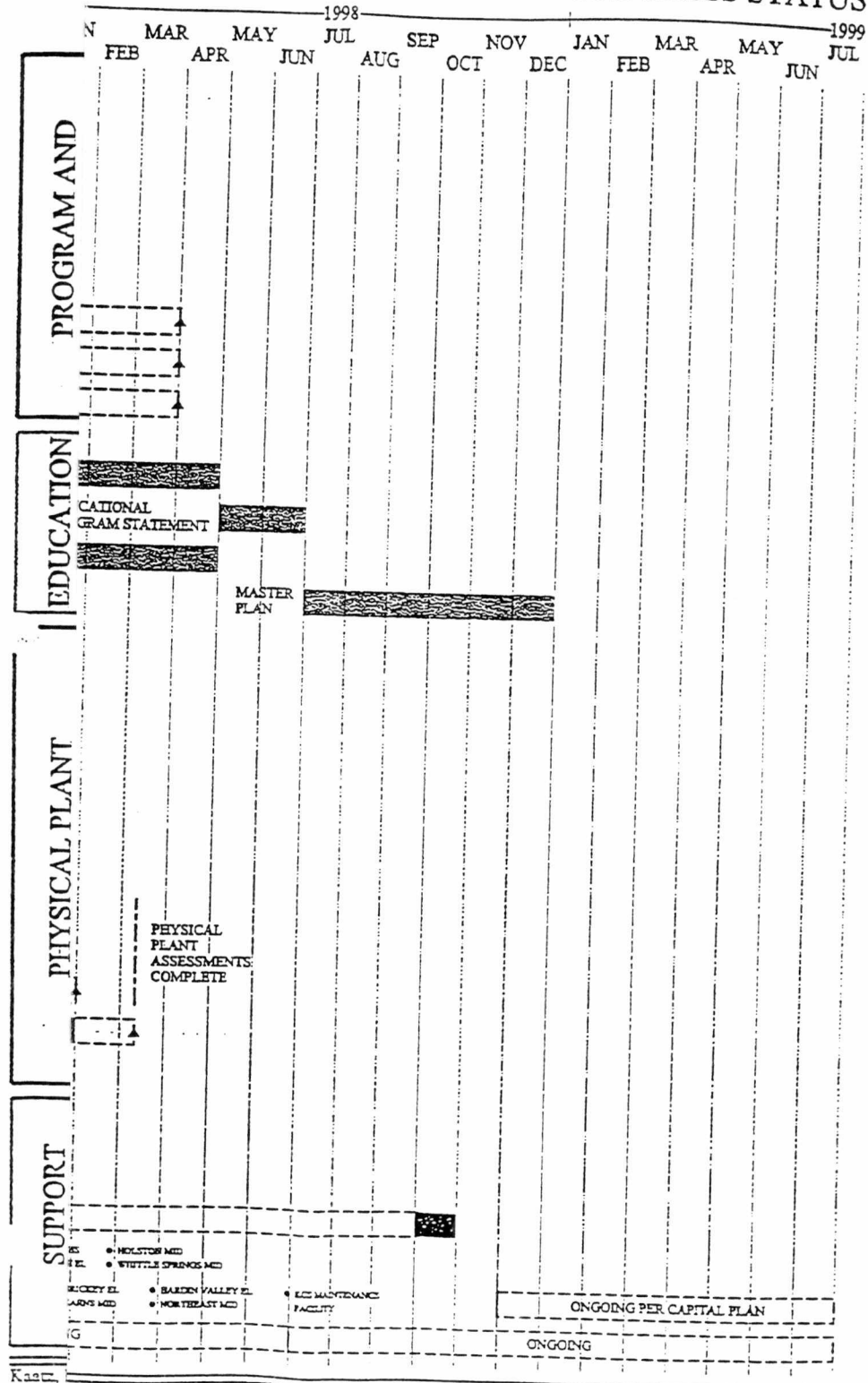
Appendixes

Appendix A

KNOX
SYS

JULY 1997

PROGRESS STATUS



Architects - Engineers - Educational Planners

Appendix B

SPACE / FUNCTIONAL ASSESSMENT SUMMARY

Building:

Function:

Item	Deficiency Rating	Notes / Remarks
<i>Space (Quantity)</i> Current Needs: Department <i>* Department assessment is based on departmental gross square footage</i>		
		$\frac{\text{current s.f.}}{\text{program s.f.}} = \text{percent compliant}$
<i>Space (Quantity)</i> Current Needs: Classroom <i>* Classroom assessment based on individual classroom averages</i>		
		$\frac{\text{current s.f.}}{\text{program s.f.}} = \text{percent compliant}$
<i>Functional:</i> Program Compliance		
<i>Functional Relationships:</i> Intra (Internal)		
<i>Functional Relationships:</i> Inter (External)		
<i>Environment (Quality):</i> Current Needs		
Fixtures / Furniture / Equipment		
Composite Space / Functional Deficiency	5 Critical 3 - 4 Significant 0 - 2 Fair to Good	

PHYSICAL CONDITIONS ASSESSMENT SUMMARYDiscipline: **ARCHITECTURE**

School:

Building / Space:

Item	Deficiency Rating	Notes / Remarks
Roof		
Walls (exterior)		
Windows		
Exterior Doors		
Interior Doors		
Partitions (interior)		
Floors		
Ceilings		
Finishes (general)		
Codes		
Accessibility		
Energy Conservation		
Hazardous Materials		
Fixtures / Furniture / Equipment		
Aesthetics		
Composite Building / Space Deficiency Rating	5 3 - 4 0 - 2	Critical Significant Fair to Good

Appendix C

PHYSICAL CONDITIONS ASSESSMENT SUMMARYDiscipline: **STRUCTURAL**

School:

Building / Space:

Item	Deficiency Rating	Notes / Remarks
Foundation		
Slabs		
Roof Structure		
Exterior Walls		
Interior Walls		
Elevated Floor Structure		
Retaining Structures		
Equipment Supports		
Seismic Compliance		
Miscellaneous Structures		
Elevator		
Hoisting Equipment and Structure		
Composite Building / Space Deficiency Rating	5 3 - 4 0 - 2	Critical Significant Fair to Good

PHYSICAL CONDITIONS ASSESSMENT SUMMARYDiscipline: **MECHANICAL**

School:

Building / Space:

Item	Deficiency Rating	Notes / Remarks
HVAC Equipment		
Steam / Water Distribution Systems		
Controls		
Plumbing , Piping, Fixtures		
Fire Protection		
Special Equipment		
Utilities - Water, Storm Sewer, Sanitary		
Energy Conservation		
Codes		
Composite Building / Space Deficiency Rating	5 3 - 4 0 - 2	Critical Significant Fair to Good

PHYSICAL CONDITIONS ASSESSMENT SUMMARYDiscipline: **ELECTRICAL**

School:

Building / Space:

Item	Deficiency Rating	Notes / Remarks
Primary Service		
Secondary Service		
Emergency Power		
Electrical Distribution		
Branch Circuit Wiring		
Lighting		
Fire Alarm		
Telecom / Auxiliary System		
Codes		
Accessibility		
Energy Management System		
Capacity for Growth		
Computer Accommodations		
Multimedia Retrieval Accommodations		
Composite Building / Space Deficiency Rating	5 3 - 4 0 - 2	Critical Significant Fair to Good

Appendix D

Program Standards - Middle School**General Classroom**

Language Arts, Mathematics, Social Studies, Itinerant Classroom "B"

I. UTILIZATION

This space can serve as the primary instructional location for either of the following: Language Arts, Math or Social Studies class. The Itinerant Classroom "B" is provided for specialized classes and may be used by multiple departments. Location of the Itinerant Classroom "B" will be addressed on an individual basis within a specific school program.

II. SPACE ALLOCATION / PROGRAM REQUIREMENTS

- A. Self-contained room accommodating a maximum occupancy of 30 students. Include a 20 n.s.f. lockable closet space with floor to ceiling adjustable shelving. Assume a minimum room dimension of 22'-0".

III. RELATIONSHIPS (INTER / INTRA) (See Figure No 5G-1)

- A. Language Arts and Social Studies classrooms are to be tangent, utilizing a paneled partition as the common wall.
- B. Locate textbook storage near classrooms.
- C. Locate Science classrooms adjacent to Mathematics.
- D. Provide Meeting Room adjacent to classroom "pods".

IV. DESIGN GUIDELINES: SPACE CHARACTERISTICS / SPECIAL REQUIREMENTS

- | | |
|-----------------------|--|
| A. WALLS: | Masonry block, painted. |
| B. FLOOR: | VCT. |
| C. CEILING: | 2' x 2' Acoustical tile, minimum ceiling height 9'-0". |
| D. WINDOWS: | Provide natural lighting. Provide room darkening window treatment. |
| E. DOORS: | Classroom Entrance; View Window, Wood.
Closet; Solid Wood. |
| F. H.V.A.C.: | Adhere to Mechanical Design/Technical Guidelines.
No special requirements this program space. |
| G. PLUMBING: | None required this program space. |
| H. ELECTRICAL: | (See Figure No. 5G-2 and 5G-3) |

Program Standards - Middle School

General Classroom

Language Arts, Mathematics, Social Studies, Itinerant Classroom "B"

1. **Lighting:** 2' x 4' warm fluorescent fixtures, general lighting planned to reduce shadows and provide adequate visibility for working conditions, non-glare. Simulate or provide natural lighting.
- H. **ELECTRICAL: Continued**
 2. **Electrical Outlets:** Provide a minimum of (6). 120 volt, 20 amp. double duplex receptacles spread around the room. Mount 18" +/- above finished floor to bottom of box.
 3. **Information Outlets:** Provide information outlets (Double Duplex Boxes) with concealed raceways (minimum of 3/4" conduit with less than or equal to (2) 90° bends prior to termination into cable tray or intermediate junction box). Locate outlets around the perimeter of the room. Mount 18" +/- above finished floor to bottom of box.
 4. **Telephone Outlets:** Provide outlets for telephone system for administrative office/ classroom and inter-classroom communication and modem.
 5. **Television Outlets:** Provide minimum of (3) outlets spread around the perimeter of the room. Mount 18" +/- above fin floor to bottom of box.
 6. **Intercom:** Yes.
- I. **TECHNOLOGY:** No special requirements this program space.
- J. **MILLWORK/ CASEWORK:**
 1. **Bookcase:** Minimum (2) units 36"W x 16"D x 42"H, provide (3) adjustable shelves.

Program Standards - Middle School

General Classroom

Language Arts, Mathematics, Social Studies, Itinerant Classroom "B"

- K. FURNITURE** *Not included in construction contract unless noted otherwise;*
representative items may include but are not limited to the following:
- 1. Teacher's Accommodations:** Teacher's Desk.
Teacher's Chair.
Vertical File Cabinets, legal size, 4 drawer, lockable.
 - 2. Student's Accommodations:** Student Desks.
Student Tablet Arm Desks.
 - 3. Technology Related:** Multi-Media Presentation Station.
Computer Tables.
Printer Stands.
Student Task Chairs for Computer Tables.
 - 4. Subject Specific:** As defined by the Instructional Supervisor.
- L. EQUIPMENT:** *Not included in construction contract unless noted otherwise;*
representative items may include but are not limited to the following:
- 1. Subject Area:** Equipment as specified by the Instructional Supervisor necessary to meet the goals of the subject areas taught in this area.
 - 2. Teacher Curriculum and Management:** Equipment provided at the individual instructor level used to facilitate the development of curriculum, the production of materials for student use or classroom management. Such as, but not limited to the following:
 - Multi-media Computer or Laptop System.
 - Color Inkjet Printer.
 - Personal Digital Assistant.
 - 3. Student Technology:** Technology equipment provided at the individual student level for

Program Standards - Middle School

General Classroom

Language Arts, Mathematics, Social Studies, Itinerant Classroom "B"

research, exploration, or production. Such as, but not limited to the following:

- Student Laptops.
- Graphing Calculators for Math.

4. Audio/Visual or Presentation:
deliver instruction.

Equipment provided at the classroom level used to

Such as, but not limited to the following:

- Multi-media Computer Workstation with NTSC Video Output.
- Television, 32" or greater.
- Video Tape Recorder
- Overhead Projection Systems
- LCD Display Panels.
- Stereo System or Cassette Recorders.

5. Technology:
level for research,

Technology equipment provided at the classroom

production, or enhancement of the curriculum. Such as, but not limited to the following:

- Multi-media Computer Workstation(s) with 17" or larger monitor.
- Laser Printer(s).
- Color Scanner.
- Removable Storage for Zip/Jazz Drives; CD-R.
- Graphic Tablets.
- MIDI Keyboards, Synthesizers.
- Headphones.
- Software.

**M. SPECIALTIES/
MISCELLANEOUS/
OTHER:**

1. Single Dial Clock:
center of clock.

12" diameter; mount 7'-6" from finished floor to
with a minimum of 6" from ceiling to top of clock.

2. Markerboard:
- 8" from

(1) Social Studies/Language Arts - 4' x 8', mount 2'
finished floor to bottom of board. Provide Social
Studies with Map Rail including Cork Tack Strip.
Map Hooks and Roller Brackets.

Program Standards - Middle School

General Classroom

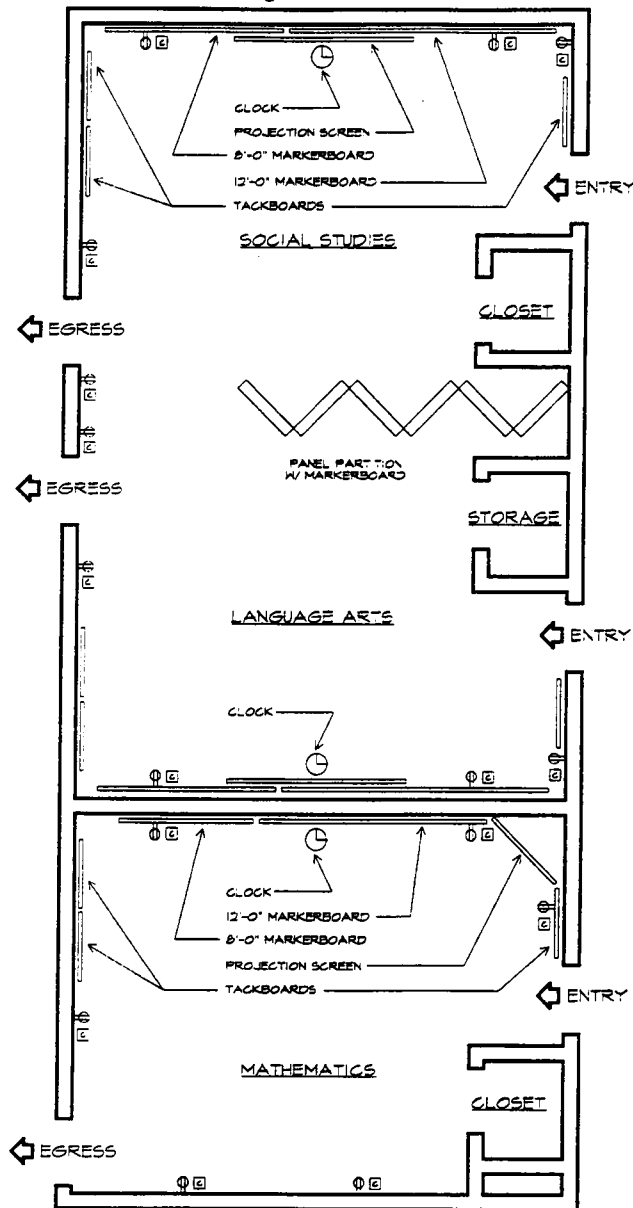
Language Arts, Mathematics, Social Studies, Itinerant Classroom "B"

3. **Markerboard:** (1) Social Studies/Language Arts - 4' x 12', mount 2' - 8" from finished floor to bottom of board. Mount 2'-8" from finished floor to bottom of board. Provide Social Studies with Map Rail including Cork Tack Strip, Map Hooks and Roller Brackets.
4. **Tackboards:** (3) 4' x 4'; mount 2'-8" from finished floor to bottom of board.
5. **Pencil Sharpener:** Mount to finished wood mounting plaque with routed/beveled edges. Affix to wall 40" from finished floor to center of sharpener.
6. **Projection Screen:** Mount to wall 7'-6" from finished floor to top of screen.
Mathematics only - Preference is for screen to be mounted diagonally in corner near teacher's desk.
7. **Maps:** Social Studies only. *Not included in construction contract.*
8. **Globes:** Social Studies only. *Not included in construction contract*
9. **Paneled Partition:** Provide as a common wall between each pairing of Social Studies and Language Arts classrooms. Panels are to provide markerboard surface each face of panel.

Program Standards - Middle School

General Classroom

Figure No. 5G - 1



GENERAL CLASSROOMS

(SUGGESTED LAYOUT - MINIMUM REQUIREMENTS)

* Figures provided by owner are to serve only as examples of program requirements and not solutions.
 Designer maintains full responsibility for all design elements.

Appendix E

Enrollment Program Standards

Middle School: 1000 Student Enrollment Building Program Summary

Administration	5,521
Guidance Suite	2,350
Clinic	880
Special Education	11,420
Talented and Gifted	1,100
Language Arts	11,100
Mathematics	11,100
Social Studies	11,100
Science	21,060
Teacher Work Areas	3,450
Art	4,470
Music: Choral/General	3,200
Music: Band	6,720
Intro. to Technology	4,382
Physical Education	20,790
Media Center	8,140
Health	2,000
Cafeteria Complex	10,580
Building Maintenance	5,390
Miscellaneous	6,420

.....
Grossing Factor (x) 1.35

Mini-Auditorium	5,110	x 1.35 =
Multi-Purpose Room	10,810	x 1.35 =
Auxiliary Teaching Area	1,500	x 1.35 =
Music: Orchestra	3,570	x 1.35 =
Computer Lab (2)	3,450	x 1.35 =

Enrollment Program Standards

Middle School: 1000 Student Enrollment

ADMINISTRATION	ABBREVIATION	UNITS	NSF/UNITS	NSF SUBTOTAL
Reception	Recept.	1	1000	1000
Principal's Office	Prin.	1	240	240
Asst. Principal's Office	Asst.Prin.	3	192	576
Disc. Stud. Waiting	Disc.Wait.	1	75	75
Mailroom	Mail.	1	150	150
Faculty Lounge	Faculty	1	450	450
Workroom	Work.	1	440	440
Staff Toilets*	St.Toil.	4	40	160
Conference Room	Conf.	1	320	320
Storage*	Stor.	1	100	100
Record's Vault	Records	1	120	120
Bookkeeper's Office	Bookk.	1	120	120
Attendance Office	Attd.	1	100	100
In-school Suspension	I.S.S.	1	900	900
I.S.S. Unisex Toilet*	I.S.S Toil.	1	50	50
Itinerant Office	Itin.	6	120	720
			Total NSF	5,521

GUIDANCE SUITE	ABBREVIATION	UNITS	NSF/UNITS	NSF SUBTOTAL
Waiting Area	Wait.	1	235	235
Guidance Classroom	Guid.	1	875	875
Counselor's Office	Couns.	3	100	300
Conference Rm.	Conf.	1	220	220
Work Room	Work.	1	440	440
Storage*	Stor.	1	60	60
Clerical	Cler.	0	220	0
			Total NSF	2,130

CLINIC	ABBREVIATION	UNITS	NSF/UNITS	NSF SUBTOTAL
Cot Area	Cot	4	200	800
Toilets - Unisex*	Toil.	2	40	80
			Total NSF	880

* Reference General Space Characteristics

** Reference General Classroom Program Standards

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Enrollment Program Standards

Middle School: 1000 Student Enrollment

SPECIAL EDUCATION	ABBREVIATION	UNITS	NSF/UNITS	NSF SUBTOTAL
Resource Classroom	Res.	4	900	3600
Teacher Office	Teach.	4	100	400
LRE Classroom	L.R.E.	1	1000	1000
Teacher Office	Teach.	1	100	100
Storage*	Stor.	1	100	100
CDC Classroom	C.D.C	2	1000	2000
Teacher Office	Teach.	2	100	200
Storage*	Stor.	2	100	200
Toilet/Shower	Toil./Shwr.	2	80	160
Laundry	Laund.	2	80	160
Classroom "A"	Itin.-A	4	375	1500
Teacher Office	Teach.	4	100	400
Classroom "B"***	Itin.-B	1	900	900
Teacher Office	Teach.	1	100	100
Psychologist Office	Psych.	1	150	150
Storage*	Stor.	1	50	50
OT/PT Office	OT/PT	1	100	100
Storage*	Stor.	1	50	50
Meeting Area (see Misc.)	Mtg.	1	170	170
Staff Toilets*	St.Toil	2	40	80
			Total NSF	11,420

TALENTED & GIFTED	ABBREVIATION	UNITS	NSF/UNITS	NSF SUBTOTAL
Classroom	T.A.G.	1	900	900
Teacher Office	Teach.	1	150	150
Storage*	Stor.	1	50	50
			Total NSF	1,100

LANGUAGE ARTS	ABBREVIATION	UNITS	NSF/UNITS	NSF SUBTOTAL
(6,7,8th grade) Classrooms**	lang.	12	900	10800
Textbook Storage*	txt.stor.	3	100	300
			Total NSF	11,100

* Reference General Space Characteristics

** Reference General Classroom Program Standards

Enrollment Program Standards

Middle School: 1000 Student Enrollment

MATHEMATICS	ABBREVIATION	UNITS	NSF/UNITS	NSF SUBTOTAL
(6,7,8th grades) Classrooms**	Math.	12	900	10800
Textbook Storage*	Txt.Stor.	3	100	300
Total NSF				11,100

SOCIAL STUDIES	ABBREVIATION	UNITS	NSF/UNITS	NSF SUBTOTAL
(6,7,8th grades) Classrooms**	Soc.St.	12	900	10800
Textbook Storage*	Txt.Stor.	3	100	300
Total NSF				11,100

SCIENCE	ABBREVIATION	UNITS	NSF/UNITS	NSF SUBTOTAL
(6,7,8th grades) Classrooms	Sci.	12	1350	16200
7th and 8th grade lab	Lab	4	960	3840
General Storage*	Gen. Stor.	12	50	600
Chemical Storage	Chem. Stor.	2	60	120
Textbook Storage*	Txt.Stor.	3	100	300
Total NSF				21,060

TEACHER WORK AREAS	ABBREVIATION	UNITS	NSF/UNITS	NSF SUBTOTAL
Teacher Work Area	Tchr. Work	3	1150	3450
Total NSF				3,450

ART	ABBREVIATION	UNITS	NSF/UNITS	NSF SUBTOTAL
Classrooms	Art	2	1540	3080
Kiln/Clay	Kln/Clay	1	100	100
Teacher Office	Teach.	2	120	240
Gallery	Gallery	1	250	250
Storage*	Stor.	2	400	800
Total NSF				4,470

* Reference General Space Characteristics

** Reference General Classroom Program Standards

Enrollment Program Standards

Middle School: 1000 Student Enrollment

MUSIC: CHORAL/GENL.	ABBREVIATION	UNITS	NSF/UNITS	NSF SUBTOTAL
General Music Classroom	Gen.Mus.	1	1000	1000
Vocal Rehearsal Area	Voc.Reh.	1	1400	1400
Teacher Office	Teach.	2	100	200
Music Storage*	Mus.Stor.	1	100	100
Music Lab	Music Lab	1	350	350
Practice Rooms	Pract.	2	75	150
Total NSF				3,200

MUSIC: BAND	ABBREVIATION	UNITS	NSF/UNITS	NSF SUBTOTAL
Instrument Rehearsal "A"	Inst.Reh."A"	1	2000	2000
Instrument Rehearsal "B"	Inst.Reh."B"	1	1400	1400
Practice Room	Pract.	4	80	320
Ensemble Room	Ensem.	2	300	600
Instrument Storage	Inst.Stor.	1	1200	1200
Mus/Equip Stor: Teach Work	Eq./Tch.Wk.	1	800	800
Teacher Office	Teach.	1	200	200
Storage*	Stor.	1	200	200
Total NSF				6,720

INTRO TO TECHNOLOGY	ABBREVIATION	UNITS	NSF/UNITS	NSF SUBTOTAL
Classroom/Lab Modules	Clrm./Lab Mod.	12/ 23	730 / 64	1460/1472
Video Production	Video	1	300	300
Audio Production	Audio	1	100	100
Manufacturing	Manuf.	1	350	350
Storage*	Stor.	2	200	400
Control Room	Cntl.	1	100	100
Teacher Office*	Teach.	1	100	100
Total NSF				4,382

* Reference General Space Characteristics

** Reference General Classroom Program Standards

Enrollment Program Standards

Middle School: 1000 Student Enrollment

PHYSICAL EDUC.	ABBREVIATION	UNITS	NSF/UNITS	NSF SUBTOTAL
Concession Stand	Conc.	1	350	350
Gymnasium: Seat 1500	Gym	1	11600	11600
Teach Office (Toilet/Shwr)	Teach.	2	200	400
Laundry	Laund.	1	200	200
P.E. Equipment Storage	Eq.Stor.	1	1200	1200
Storage*	Stor.	1	240	240
Dressing Rm/Shwr/Toilet	Dress.	4	1000	4000
Chair Storage*	Chr.Stor.	1	100	100
			Total NSF	18,090

MEDIA CENTER	ABBREVIATION	UNITS	NSF/UNITS	NSF SUBTOTAL
Conference Room	Conf.	1	300	300
A.V. Equipment Storage	A.V. Stor.	1	400	400
Main Resource Center	Res.Cntr.	1	5600	5600
Librarian Office	Libr.	2	200	400
Print/Media Library	Pr./Med.	1	400	400
Production Area	Prod.	1	300	300
Workroom	Work	1	400	400
Professional Library	Pro.Lib.	1	200	200
Staff Toilet*	St.Toil.	1	40	40
General Storage*	Stor.	1	100	100
Classroom	Libr. Clrm	0	900	0
			Total NSF	8,140

HEALTH	ABBREVIATION	UNITS	NSF/UNITS	NSF SUBTOTAL
Classrooms (Inc. Storage)	Hlth.	2	1000	2000
			Total NSF	2,000

* Reference General Space Characteristics

** Reference General Classroom Program Standards

5/7

Enrollment Program Standards

Middle School: 1000 Student Enrollment

CAFETERIA COMPLEX	ABBREVIATION	UNITS	NSF/UNITS	NSF SUBTOTAL
Dining	Din.	1	5000	5000
Food Prep	Prep	1	1200	1200
Table/Chair Storage*	Tbl./Chr.Stor.	1	200	200
Serving Area	Serv.	1	2000	2000
Dish Room	Dish.	1	540	540
Freezer/Cooler	Frz./Clr.	1	600	600
Non-food Storage	Non-fd. Stor.	1	350	350
Manager Office	Mgr.	1	100	100
Toilet/Lockers	Tlt./Lkrs.	1	140	140
Receiving	Rec'g.	1	200	200
Dry Storage	Dry Stor.	1	250	250
			Total NSF	10,580

BUILDING MAINTENANCE	ABBREVIATION	UNITS	NSF/UNITS	NSF SUBTOTAL
Mechanical Room	Mech.	1	3160	3160
Electrical Distribution	Elec.Dist.	1	1050	1050
Electrical Closet	Elec.Cl.	4	40	160
Custodial Workroom	Cus.Wkrm.	1	120	120
Custodial Closet	Cus.Cl.	4	50	200
Housekeeping Storage	Hkp'g.	1	500	500
Yard Storage	Yard	1	200	200
			Total NSF	5,390

MISCELLANEOUS	ABBREVIATION	UNITS	NSF/UNITS	NSF SUBTOTAL
Student Toilets*	Toil.	10	500	5000
Meeting Rooms	Mtg.	3	240	720
Main Technology Dist. Center	Main Tech.Dist. Cntr.	1	400	400
Inter. Technology Dist. Center	Inter.Tech.Dist.Cntr.	4	75	300
			Total NSF	6,420

Student Toilet NSF/Unit is an average. Actual NSF/Unit is dependent on male/female fixture ratio.

* Reference General Space Characteristics

** Reference General Classroom Program Standards

6/7

Enrollment Program Standards

Middle School: 1000 Student Enrollment

OPTIONAL PROGRAMS	ABBREVIATION	UNITS	NSF/UNITS	NSF SUBTOTAL
Mini-Auditorium	Aud.	1	2500	2500
Platform	Platform	1	2000	2000
Storage*	Stor.	1	300	300
Piano Storage	Piano	1	150	150
Control Booth	Cntl.	1	160	160
Total NSF				5,110

Multi-Purpose Room***	House	1	8000	8000
Platform	Platform	1	2000	2000
Storage*	Stor.	1	500	500
Piano Storage	Piano	1	150	150
Control Booth	Cntl.	1	160	160
Total NSF				10,810

*** Included only when auxiliary teaching and mini-auditorium are not included in program.

Auxiliary Teaching Area	Aux. Tch.	1	1500	1500
Total NSF				1,500

Orchestra Rehearsal	Orch. Reh.	1	1250	1250
Practice Room	Pract.	4	80	320
Ensemble Room	Ensem.	1	300	300
Instrument Storage	Inst.Stor.	1	800	800
Mus./Eq. Stor.: Teach Work	Eq./Tch.Wk.	1	500	500
Teacher Office	Teach.	1	200	200
Storage*	Stor.	1	200	200
Total NSF				3,570

Computer Lab	Comp.Lab.	1	1350	1350
Storage*	Stor.	1	200	200
Teacher Office	Teach.	1	150	150
Technology Distribution	Tech.Dist.	1	100	100
Total NSF				1,800

* Reference General Space Characteristics

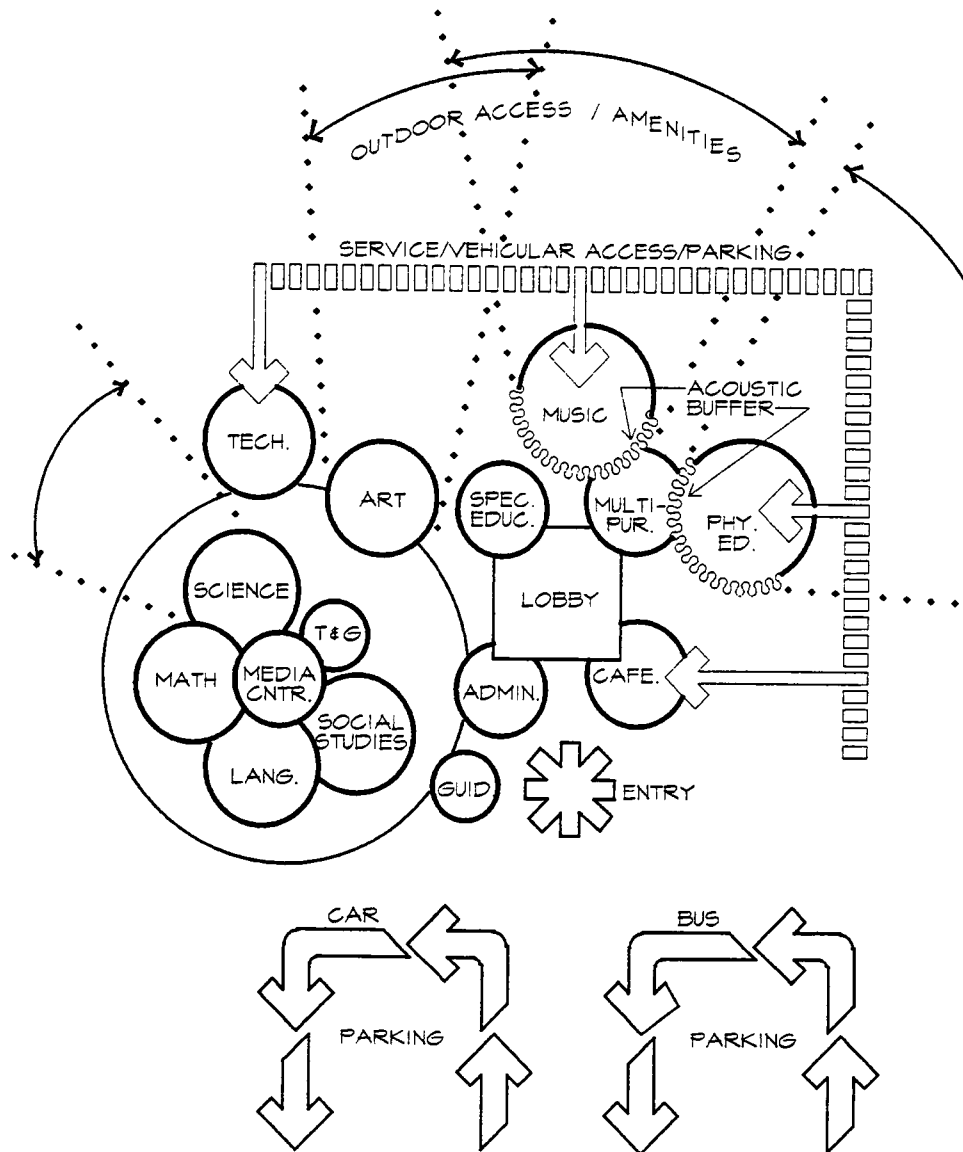
** Reference General Classroom Program Standards

Appendix F

Program Standards - Middle School

Relationship Overview

Figure No. 5A - 1



* Figures provided by owner are to serve only as examples of program requirements and not solutions.
Designer maintains full responsibility for all design elements.

Appendix G

Example of Survival Ratio for Grades 2 through 12

	Year				
	1	2	3	4	5
2	75	81	82	73	54
3	55	56	57	68	69
4	65	76	47	58	59
5	60	61	52	53	89
6	70	66	62	58	74
7	75	66	67	88	84
8	80	71	77	73	59
9	55	56	82	63	69
10	65	76	72	53	79
11	60	81	77	78	74
12	70	81	82	58	64

G
r
a
d
e

Survival Ratio for the Rising 5th Grader

$$R(q) = \frac{E(q(x)) + E(q(x-1)) + E(q(x-2)) + E(q(x-3))}{E(q-1)(x-1) + E(q-1)(x-1) + E(q-1)(x-2) + E(q-1)(x-3)}$$

$$R(q) = \frac{59 + 58 + 47 + 76}{68 + 57 + 56 + 55}$$

$$R(q) = \frac{240}{236}$$

$$R(q) = 1.0169$$

Projection for 4th Grade for Year (6)

$$P(q(y)) = R(q) * E((q-1)(y-1))$$

$$R(q) = 1.0169$$

$$E((q-1)(y-1)) = 69$$

Thus the projected enrollment for year (6) for grade (4) is:

$$P(q(y)) = (1.0169)(69)$$

$$P(q(y)) = 70.169415$$

Appendix H

SCHOOL PLANT SURVEY

Date: 4/11/96
 School Name: KALNS Middle
 Principal: RON THOMAS
 Grade Structure (please circle): K-2 3-5 K-5 6-8 9-12 Other
 Year Built: 1973-74

Addition(s): NONE (year(s))
 Temporary Building(s) 10 classrooms - 2 m.m.t. 6e added
 Renovation(s): NONE (year(s))

Total number of students: 1086 Number that are physically handicapped: _____

Number of Areas Inaccessible: 2 upstairs storage rooms

Students per Grade: Pre-K _____ K _____ 1 _____ 2 _____
 3 _____ 4 _____ 5 _____ 6 366
 7 397 8 343 9 _____ 10 _____
 11 _____ 12 _____ Resource. _____
 LRE: _____ CDC: _____

Classes per Grade: Pre-K _____ K _____ 1 _____ 2 _____
NONE ROOMS 3 _____ 4 _____ 5 _____ 6 12
 7 12 8 11 Resource. _____
 LRE: _____ CDC: _____

7th science 3 math 3 social studies 3 lang.arts 3 other 1
 8th science 3 math 3 social studies 3 lang.arts 3 other 1
 9th science _____ math _____ social studies _____ lang.arts _____ other _____
 10th science _____ math _____ social studies _____ lang.arts _____ other _____
 11th science _____ math _____ social studies _____ lang.arts _____ other _____
 12th science _____ math _____ social studies _____ lang.arts _____ other _____

Shops (if applicable): Yes N/A No ____ If no, please explain.

Teacher Work Area: Yes ____ No ✓ If no, please explain. *Too Small*

Teacher Lounge: Yes ____ No ✓ If no, please explain. *Too Small*

Teacher Office: Yes ____ No ✓ If no, please explain. *Too Small*

Physical Education/Outdoor Play Area: Yes ____ No ✓ If no, please explain.
Way To Small

Athletic Fields: Yes N/A No ____ If no, please explain.

Practice Fields: Yes N/A No ____ If no, please explain.

Stadiums: Yes N/A No ____ If no, please explain.

Kitchen: Yes ____ No ✓ If no, please explain. *we have no kitchen.*

Cafeteria: Yes ____ No ✓ If no, please explain. *much too small*

Restrooms: Yes ____ No ✓ If no, please explain. *NEED ADDITIONAL RESTROOMS*

Storage: Yes ____ No ✓ If no, please explain. *HAVE NONE AT THIS TIME*

General Storage: Yes ____ No ✓ If no, please explain. *INADEQUATE*

List any other special classes or programs offered requiring special needs/spaces which cannot be met within standard classroom spaces. _____

Are any of the above or additional programs planned for the near future? Yes ____ No ____

If yes, please list.

Please list the number of staff:

Administration 3 Regular Classroom Teachers 41
Spec. Ed. 5 Librarian 1 P.E. 2 1/2 Music 2
Art 3 Food Service 6 Voc. N/A
Custodial 4 1/2 Secretarial 3 Teacher Asst. _____
ISS 1 Other 1 Guidance

Please list the number of assistants: - All staff listed above

Administration _____ Regular Classroom Teachers _____
Spec. Ed. _____ Librarian _____ P.E. _____ Music _____
Art _____ Food Service _____ Voc. _____
Custodial _____ Secretarial _____ Teacher Asst. _____
ISS _____ Other _____

Please list New Classrooms (type) and other spaces (specify) needed to accommodate

PRESENT NEEDS:

Band, music, P.E., Auditorium, Cafeteria, Kitchen, Locker Room

Probably 20 classrooms or more for future enrollment increase, I want the
B.E.P. REQUIREMENTS; Library Enclosed

Appendix I

SPACE / FUNCTIONAL ASSESSMENT SUMMARY

2/11/97

Building: Karns Middle**Function: General Classrooms**

Classrooms

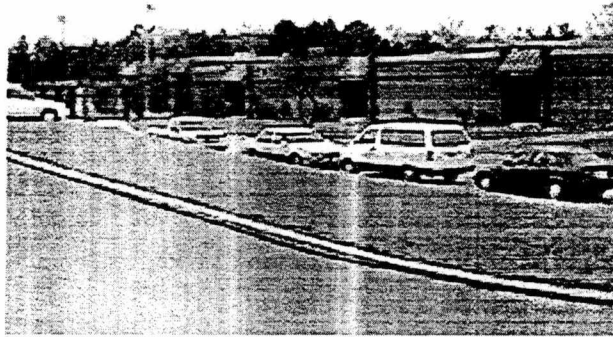
Item	Deficiency Rating	Notes / Remarks
<i>Space (Quantity)</i> Current Needs: Department <i>* Department assessment is based on departmental gross square footage</i>	NA	
		$\frac{\text{current s.f.}}{\text{program s.f.}} = \text{percent compliant}$
<i>Space (Quantity)</i> Current Needs: Classroom <i>* Classroom assessment based on individual classroom averages</i>	1	
		$\frac{882 \text{ avg. current s.f.}}{900 \text{ program s.f.}} = 98 \text{ percent compliant}$
<i>Functional:</i> Program Compliance	3	No storage or meeting rooms.
<i>Functional Relationships:</i> Intra (Internal)	3	Former open plan - arrangement into "suites" allows students to rotate within suite for four disciplines; circulation tight.
<i>Functional Relationships:</i> Inter (External)	1	
<i>Environment (Quality):</i> Current Needs	3	Minimal acoustic privacy.
Fixtures / Furniture / Equipment	3	Some furnishings/ equipment outdated.
Composite Space / Functional Deficiency	3	5 Critical 3 - 4 Significant 0 - 2 Fair to Good

Appendix J

FACILITY SYNOPSIS:

2/11/97

School: **Karns Middle**
 Address: 2925 Gray Hendrix Road
 Knoxville, TN 37931
 Telephone: 539-7732



Year Constructed:

1974

Renovations/Additions:

None

Total GSF:

76,000

Site Acreage:

24.0**Function / Capacity:**

Building Designation	Function	Capacity	Dept. G.S.F.	Room N.S.F.
1974	Administration		1399	
1974	Cafeteria Complex	Seating: 252	5380	
1974	Art		4280	
Portables	Classrooms (7th-8th)	Subtotal: 12		767 avg.
1974	Computer Lab		911	
1974	General Classrooms	Subtotal: 25		882 avg.
1974	Music (Band, Choral)		4400	
1974	Special Education		4145	
1974	Media Center	Seating/reading: 25	4641	
1974	Physical Education	Seating 340	7694	

SITE DESCRIPTION

(Acreage, Topography, Parking, Amenities, Circulation, Landscaping, Fire Hydrant Location, etc.)

School: Karns Middle

The Karns Middle School site is a continuous 24 acre tract along the north side of Gray Hendrix Road that also fronts on Oak Ridge Highway at the north corner. The site is gently rolling except at Gray Hendrix Road where a slight ridge has been cut leaving a steep bank up to 8 feet high between the road and the parking lot across from the building. The site overall slopes gradually to the north. A driveway enters from Oak Ridge Highway and extends across the front of the building, forming the main drop-off parallel to Gray Hendrix Road. Two driveways connect this to Gray Hendrix and access the main parking lot between the drop-off and the road. The southwest end of the site (left of the building) is occupied by the Karns High School practice fields.

Site circulation is congested at peak times and many conflicts exist. Oak Ridge Highway is heavily traveled and has no signal. Gray Hendrix Road (upon which all traffic must exit) has no turn lanes, no shoulders, and poor sight lines in both directions. There is very limited queuing for autos coming from Gray Hendrix, delaying through traffic. Busses drop-off in front of the school while autos drop-off beside them and in the parking lot, requiring students to cross the bus lane. Service traffic is accessed by the same driveway, but typically at different times.

The site has ample green space on all sides of the building, but is limited on the front and rear because of the narrow site. A large inventory of mature and smaller trees exists around the building. Site amenities include an enclosed courtyard with picnic tables, benches, a hard surface play court and paved track. A paved path leads to a pedestrian bridge over Oak Ridge Highway connecting to the high school.

BUILDING DESCRIPTION

2/11/97

School: Karns Middle**Architectural:**

The main school facility is a continuous single story building mass built in 1974. A modern design, it incorporates solid panels of brick veneer and sloped standing seam metal copings with large glass areas at entrances and featured areas.

The administration area is at the front of the building between the two covered entrances. To the right, classroom suites (originally open plan, each suite has been partitioned into four classroom areas) form the perimeter of the rectangular wing around a core housing the partially open media center, faculty areas, toilets and an open courtyard. To the left of the entrances is the cafeteria complex which backs up to the gymnasium, allowing a portion of the cafeteria to be used as a stage facing the gym by relocated a folding partition (in poor condition) and some curtains. The gym floor is about 3 feet lower than the rest of the building. At the same level as the gym, the music classrooms are behind the gym.

Interior finishes are vinyl tile floors in corridors and classrooms; wood floors in the cafeteria. Restrooms have ceramic mosaic tile, quarry tile in the kitchen/serving area. Carpet is located in the administration area and the media center. The gymnasium floor is parquet wood. Wall bases throughout the facility are appropriate to the floor material. Ceilings are typically acoustic tile.

Structural:

The building is slab on grade with load bearing block walls and partitions. The roof is steel bar joist with metal deck.

Mechanical:

The building is heated and cooled using roof top package heat pumps. These units were replaced in 1996. The locker room is heated and ventilated only.

Potable water service to the building enters in the mechanical/electrical/storage room near gym. Domestic water is heated electrically.

Exterior fire protection is provided by two fire hydrants located along the front drive.

Large potable water piping in the building is galvanized steel. incoming water pressure is 160 PSI and is reduced to 70 PSI for building use.

Electrical:

School has two main electrical distribution points. One located in mechanical room adjacent to cafeteria (2000A, 244/430v/.3 /4w) and one in mechanical room above library (1600a, 2771-180v/3 /4w). Most panelboards are located in these two areas with others located in closet near library, on stage in gymnasium and in the kitchen.

All interior lighting, except gymnasium, is provided by fluorescent light sources. Gymnasium and exterior lighting provided by H.I.D. sources. Emergency and exit lighting fixtures are fed through

BUILDING DESCRIPTION

2/11/97

School: **Karns Middle**

all emergency generator set.

Building's mechanical units are connected to the Energy Management System.

Edward's Fire Alarm System. Peripheral devices include duct-mount smoke detectors, individual smoke detectors and manual pull stations. Notification is provided by audio signaling devices.

Rowland Intercom System: Central switchbank in office with classroom speakers and call-in stations.

Basic Security system consisting of motion detectors and entry stations.

ACCESSIBILITY SYNOPSIS

2/11/97

School: Karns Middle

This report indicates issues of inaccessibility and non-compliant design elements normal to a facility of its age, having been designed before current accessibility codes. The report indicates that there are no designated parking spaces and there is no accessible route to the exterior recreational facilities. Non-compliant elements include protruding elements (showcase), ramps and handrails, door hardware, maneuvering clearances at some locations, drinking fountains, restroom floor space, stalls, grab bars and accessories, signage and no visual alarms.

OBSERVATIONS

2/11/97

Discipline: **ARCHITECTURE / SITE**School: **Karns Middle**

The site provides adequate room for the current needs of the school but limited expansion space for the future without compromising current parking or recreation areas. The school provides a pleasant aesthetic and good image as a community school, yet has inadequate core and support space for the current student population, one-third of which occupies portable classroom space

Site circulation is congested at peak times and many conflicts exist. Oak Ridge Highway is heavily traveled and has no signal. Gray Hendrix Road (upon which all traffic must exit) has no turn lanes, no shoulders, and poor sight lines in both directions. There is very limited queuing for autos coming from Gray Hendrix, delaying through traffic. Busses drop-off in front of the school while autos drop-off beside them and in the parking lot, requiring students to cross the bus lane. Service traffic is accessed by the same driveway, but typically at different times.

The building is in good condition overall, however, the built-up roof has reached the end of its serviceable life and has a recent history of leak problems. Roof drainage is fair, with some minor ponding in limited locations. Metal coping panels appear to be in good condition. The brick veneer is in good condition with some staining at limited locations. Some repair/repointing is needed at the covered walkway piers and at the tops of piers flanking the windows. The gymnasium floor is wood in need of repair/refinishing. Wall bases are in need of minor repairs in several locations.

OBSERVATIONS

2/11/97

Discipline: **STRUCTURAL**

School: **Karns Middle**

No major problems noted.

OBSERVATIONS

2/11/97

Discipline: **MECHANICAL**

School: **Karns Middle**

The building is not sprinklered. No backflow preventer is installed.

Plumbing fixtures do not meet ADA requirements.

All heat pump units were replaced in 1996. It was reported that the building is not connected to the county-wide energy management system.

On the day of the site visit, RTU 8,12,14,18 and 23 had heavily frosted connector coils.

Service sinks in janitor closets did not have vacuum breaker.

The kitchen is a serving kitchen. The kitchen dishwasher is provided with a hood. The ovens did not have hoods.

ASSESSMENT LEGEND

DEFICIENCY RATING

Critical Deficiencies Rating: 5

Deficiencies are of such a critical or severe nature that safety, quality, timeliness, cost or efficiency of operations (student education support, distribution of materials or other services) are adversely impacted or compromised to a major or extreme degree; correction of deficiency warrants special attention.

Significant Deficiencies Rating: 3-4

Deficiencies of a serious nature that affect safety, quality, timeliness, cost, or efficiency of operations to a significant degree.

Fair- Good Rating: 0-2

Conditions, space or functions are acceptable or deficiencies are minimal such that safety, quality, timeliness, efficiency or cost of operations are not significantly affected.

Note: Regarding the Space (Quantity) item of the Space Functional Assessment Summary, a general guideline used for the deficiency rating is as follows:

<u>Percent Compliant</u>	<u>Deficiency Rating</u>
< 60	5
61-70	4
71-80	3
81-90	2
91-100	0-1

SPACE / FUNCTIONAL ASSESSMENT SUMMARY

2/11/97

Building: **Karns Middle**Function: **Administration**

Administration

Item	Deficiency Rating	Notes / Remarks
<i>Space (Quantity)</i> Current Needs: Department <i>* Department assessment is based on departmental gross square footage</i>	5	$\frac{1399}{\text{current s.f.}} \div \frac{7300}{\text{program s.f.}} = 19 \text{ percent compliant}$
<i>Space (Quantity)</i> Current Needs: Classroom <i>* Classroom assessment based on individual classroom averages</i>	NA	$\frac{\text{current s.f.}}{\text{program s.f.}} = \text{percent compliant}$
<i>Functional:</i> Program Compliance	5	Lacks most program spaces: principal's toilet, mailroom, workroom, conference room, storage, record's vault, offices for facilitator, bookkeeper, special
<i>Functional Relationships:</i> Intra (Internal)	4	Very cramped due to lack of program area. Inadequate waiting area.
<i>Functional Relationships:</i> Inter (External)	2	Good location. Visual control of front entrance could be better.
<i>Environment (Quality):</i> Current Needs	2	
Fixtures / Furniture / Equipment	2	Worn, yet functional.
Composite Space / Functional Deficiency	5	5 Critical 3 - 4 Significant 0 - 2 Fair to Good

SPACE / FUNCTIONAL ASSESSMENT SUMMARY

2/11/97

Building: **Karns Middle**Function: **Art**

Classrooms

Item	Deficiency Rating	Notes / Remarks
<i>Space (Quantity)</i> Current Needs: Department <i>* Department assessment is based on departmental gross square footage</i>	3	$\frac{4280}{\text{current s.f.}} \div \frac{6034}{\text{program s.f.}} = \frac{71}{\text{percent compliant}}$
<i>Space (Quantity)</i> Current Needs: Classroom <i>* Classroom assessment based on individual classroom averages</i>	NA	$\frac{\quad}{\text{current s.f.}} \div \frac{\quad}{\text{program s.f.}} = \frac{\quad}{\text{percent compliant}}$
<i>Functional:</i> Program Compliance	2	Includes 3 classrooms, shortage of storage.
<i>Functional Relationships:</i> Intra (Internal)	3	Storage in connecting hallway restricts access between rooms.
<i>Functional Relationships:</i> Inter (External)	1	
<i>Environment (Quality):</i> Current Needs	2	
Fixtures / Furniture / Equipment	2	Worn, yet functional.
Composite Space / Functional Deficiency	2	5 Critical 3 - 4 Significant 0 - 2 Fair to Good

SPACE / FUNCTIONAL ASSESSMENT SUMMARY

2/11/97

Building: **Karns Middle**Function: **Cafeteria Complex**

Cafeteria Complex

Item	Deficiency Rating	Notes / Remarks
Space (Quantity) Current Needs: Department <i>* Department assessment is based on departmental gross square footage</i>	5	$\frac{5380 \text{ current s.f.}}{14216 \text{ program s.f.}} = 38 \text{ percent compliant}$
Space (Quantity) Current Needs: Classroom <i>* Classroom assessment based on individual classroom averages</i>	NA	$\frac{\text{current s.f.}}{\text{program s.f.}} = \text{percent compliant}$
Functional: Program Compliance	3	Minimal kitchen area - satellite from Karns Intermediate.
Functional Relationships: Intra (Internal)	3	Circulation conflicts with tray return/serving.
Functional Relationships: Inter (External)	2	
Environment (Quality): Current Needs	3	Noisy - poor acoustic dampening.
Fixtures / Furniture / Equipment	3	Worn, yet functional. Minimal in kitchen. Acoustic accord. partition between cafeteria and gym in poor/failed condition.
Composite Space / Functional Deficiency	4	5 Critical 3 - 4 Significant 0 - 2 Fair to Good

SPACE / FUNCTIONAL ASSESSMENT SUMMARY

2/11/97

Building: **Karns Middle**Function: **Classrooms (7th-8th)**

Classrooms

Item	Deficiency Rating	Notes / Remarks
<i>Space (Quantity)</i> Current Needs: Department <i>* Department assessment is based on departmental gross square footage</i>	NA	$\frac{\text{current s.f.}}{\text{program s.f.}} = \text{percent compliant}$
<i>Space (Quantity)</i> Current Needs: Classroom <i>* Classroom assessment based on individual classroom averages</i>	2	$\frac{767 \text{ avg. current s.f.}}{900 \text{ program s.f.}} = 85 \text{ percent compliant}$
<i>Functional:</i> Program Compliance	3	No storage or meeting rooms except newest unit has storage/teacher planning.
<i>Functional Relationships:</i> Intra (Internal)	3	Cramped due to lack of program area.
<i>Functional Relationships:</i> Inter (External)	4	Removed from main building. Poor access to toilets. No covered access from main building.
<i>Environment (Quality):</i> Current Needs	2	
Fixtures / Furniture / Equipment	2	
Composite Space / Functional Deficiency	3	5 Critical 3 - 4 Significant 0 - 2 Fair to Good

SPACE / FUNCTIONAL ASSESSMENT SUMMARY

2/11/97

Building: **Karns Middle**Function: **Computer Lab**

Classrooms

Item	Deficiency Rating	Notes / Remarks
<i>Space (Quantity)</i> Current Needs: Department <i>* Department assessment is based on departmental gross square footage</i>	5	$\frac{911}{\text{current s.f.}} / \frac{2768}{\text{program s.f.}} = 33 \text{ percent compliant}$
<i>Space (Quantity)</i> Current Needs: Classroom <i>* Classroom assessment based on individual classroom averages</i>	NA	$\frac{\quad}{\text{current s.f.}} / \frac{\quad}{\text{program s.f.}} = \quad \text{percent compliant}$
<i>Functional:</i> Program Compliance	5	No storage, teacher office, technology distribution or work area. Lab only.
<i>Functional Relationships:</i> Intra (Internal)	3	Cramped due to lack of program area.
<i>Functional Relationships:</i> Inter (External)	2	
<i>Environment (Quality):</i> Current Needs	2	
Fixtures / Furniture / Equipment	4	Outdated equipment - apple II c (pre-mac) 286 and 386 pc clones.
Composite Space / Functional Deficiency	5	5 Critical 3 - 4 Significant 0 - 2 Fair to Good

SPACE / FUNCTIONAL ASSESSMENT SUMMARY

2/11/97

Building: **Karns Middle**Function: **General Classrooms**

Classrooms

Item	Deficiency Rating	Notes / Remarks
Space (Quantity) Current Needs: Department <i>* Department assessment is based on departmental gross square footage</i>	NA	$\frac{\text{current s.f.}}{\text{program s.f.}} = \text{percent compliant}$
Space (Quantity) Current Needs: Classroom <i>* Classroom assessment based on individual classroom averages</i>	1	$\frac{882 \text{ avg. current s.f.}}{900 \text{ program s.f.}} = 98 \text{ percent compliant}$
Functional: Program Compliance	3	No storage or meeting rooms.
Functional Relationships: Intra (Internal)	3	Former open plan - arrangement into "suites" allows students to rotate within suite for four disciplines; circulation tight.
Functional Relationships: Inter (External)	1	
Environment (Quality): Current Needs	3	Minimal acoustic privacy.
Fixtures / Furniture / Equipment	3	Some furnishings/ equipment outdated.
Composite Space / Functional Deficiency	3	5 Critical 3 - 4 Significant 0 - 2 Fair to Good

SPACE / FUNCTIONAL ASSESSMENT SUMMARY

2/11/97

Building: **Karns Middle**Function: **Media Center**

Media Center

Item	Deficiency Rating	Notes / Remarks
<i>Space (Quantity)</i> Current Needs: Department <i>* Department assessment is based on departmental gross square footage</i>	5	$\frac{4641}{\text{current s.f.}} \div \frac{10706}{\text{program s.f.}} = \frac{43}{\text{percent compliant}}$
<i>Space (Quantity)</i> Current Needs: Classroom <i>* Classroom assessment based on individual classroom averages</i>	NA	$\frac{\quad}{\text{current s.f.}} \div \frac{\quad}{\text{program s.f.}} = \frac{\quad}{\text{percent compliant}}$
<i>Functional:</i> Program Compliance	5	Lacks most program spaces; has only main resource center, workroom, office/storage.
<i>Functional Relationships:</i> Intra (Internal)	2	
<i>Functional Relationships:</i> Inter (External)	2	Good location central to classrooms. Open plan lacks acoustic privacy, security. (Media center in process of being enclosed 4-3-97).
<i>Environment (Quality):</i> Current Needs	3	
Fixtures / Furniture / Equipment	3	Minimal amount of fixtures/furniture. Worn, yet functional.
Composite Space / Functional Deficiency	5	5 Critical 3 - 4 Significant 0 - 2 Fair to Good

SPACE / FUNCTIONAL ASSESSMENT SUMMARY

2/11/97

Building: **Karns Middle**Function: **Music (Band, Choral)**

Classrooms

Item	Deficiency Rating	Notes / Remarks
Space (Quantity) Current Needs: Department <i>* Department assessment is based on departmental gross square footage</i>	5	Includes band and choral (no strings). $\begin{array}{rcccl} 4400 & / & 14550 & = & 30 \\ \text{current s.f.} & & \text{program s.f.} & & \text{percent compliant} \end{array}$
Space (Quantity) Current Needs: Classroom <i>* Classroom assessment based on individual classroom averages</i>	NA	$\begin{array}{rcccl} & / & & = & \\ \text{current s.f.} & & \text{program s.f.} & & \text{percent compliant} \end{array}$
Functional: Program Compliance	5	Lacks the following program spaces: storage for music, costumes, general, keyboard lab, practice rooms, second instrumental rehearsal, ensemble room, teach, work
Functional Relationships: Intra (Internal)	3	Cramped due to lack of program area.
Functional Relationships: Inter (External)	1	Separated from academic classrooms; adjacent to gymnasium.
Environment (Quality): Current Needs	3	Acoustic dampening inadequate.
Fixtures / Furniture / Equipment	2	
Composite Space / Functional Deficiency	5	5 Critical 3 - 4 Significant 0 - 2 Fair to Good

SPACE / FUNCTIONAL ASSESSMENT SUMMARY

2/11/97

Building: **Karns Middle**Function: **Physical Education**

Physical Education

Item	Deficiency Rating	Notes / Remarks
Space (Quantity) Current Needs: Department <i>* Department assessment is based on departmental gross square footage</i>	5	$\frac{7694 \text{ current s.f.}}{27054 \text{ program s.f.}} = 28 \text{ percent compliant}$
Space (Quantity) Current Needs: Classroom <i>* Classroom assessment based on individual classroom averages</i>	NA	$\frac{\text{current s.f.}}{\text{program s.f.}} = \text{percent compliant}$
Functional: Program Compliance	4	Gym seating capacity (bleachers): 340 (+). No auxiliary teaching area, no laundry, (1) office, (1) small storage room.
Functional Relationships: Intra (Internal)	3	Cramped due to lack of program area.
Functional Relationships: Inter (External)	2	
Environment (Quality): Current Needs	2	
Fixtures / Furniture / Equipment	3	Worn, yet functional. Bleachers in disrepair.
Composite Space / Functional Deficiency	5	5 Critical 3 - 4 Significant 0 - 2 Fair to Good

SPACE / FUNCTIONAL ASSESSMENT SUMMARY

2/11/97

Building: **Karns Middle**Function: **Special Education**

Classrooms

Item	Deficiency Rating	Notes / Remarks
Space (Quantity) Current Needs: Department <i>* Department assessment is based on departmental gross square footage</i>	5	$\frac{4145}{\text{current s.f.}} \div \frac{11961}{\text{program s.f.}} = 35 \text{ percent compliant}$
Space (Quantity) Current Needs: Classroom <i>* Classroom assessment based on individual classroom averages</i>	NA	$\frac{\text{current s.f.}}{\text{program s.f.}} = \text{percent compliant}$
Functional: Program Compliance	5	Lacks many program spaces: LRE, CDC, Laundry, rooms for vision, hearing, speech, storage, meeting rooms, offices, toilets.
Functional Relationships: Intra (Internal)	3	Connecting classrooms are distraction to resource students.
Functional Relationships: Inter (External)	3	Extended resource is in portables - outside main building.
Environment (Quality): Current Needs	2	
Fixtures / Furniture / Equipment	3	Some outdated furnishings.
Composite Space / Functional Deficiency	5	5 Critical 3 - 4 Significant 0 - 2 Fair to Good

PHYSICAL CONDITIONS ASSESSMENT SUMMARY

2/12/97

Discipline: **SITE**School: **Karns Middle**

Item	Deficiency Rating	Notes / Remarks
Walks	3	Cracks in limited locations at concrete walk / entrance. Paved walkways around building have some cracks, alligating, rough
Paving	2	Minor cracks in limited locations. Some wearing of surface at service drive.
Drainage	3	Flat areas around building typically poor, some ponding.
Signage	2	Minimal, yet adequate. No directional signage. No identification signage available to eastbound traffic on Oak Ridge Highway.
Transport / Movement	4	Many conflicts with bus/auto/ped. Circulation service access enters at same driveway, then segregated.
Vehicular Access / Vicinity Circulation	4	Access via Oak Ridge Highway and Gray Hendrix, which is narrow two lane without shoulders or turn lane. Poor visibility.
Accessibility (by disabled)	3	No designated parking. No accessible route to play court, front entrance, etc.
Parking	3	Separate from drop-off. Inadequate number of spaces.
Recreation / Sports	3	Paved track, paved play court, grassy open areas.
Landscaping	2	
Aesthetics	2	
Expansion Capabilities / Buildable Area	2	Relatively flat site on both sides of building. Recreation areas would need to be relocated to expand facility.
Composite Building / Space Deficiency Rating	3	5 Critical 3 - 4 Significant 0 - 2 Fair to Good

PHYSICAL CONDITIONS ASSESSMENT SUMMARY

2/11/9

Discipline: **ARCHITECTURE**School: **Karns Middle**Building / Space: **1974**

Item	Deficiency Rating	Notes / Remarks
Roof	4	Built-up roof at end of serviceable life. Recent history of leak problems. Some flashing repairs needed. Metal standing seam
Walls (exterior)	2	Brick veneer generally good condition. Some stains at limited locations, especially front walkway piers. Some
Windows	1	Aluminum single pane. Some panels of acrylic glazing (etched over time).
Exterior Doors	2	Normal wear - aluminum/glass. Hollow metal in hollow metal frame.
Interior Doors	2	HC/SC wood - normal wear.
Partitions (interior)	2	Block in good condition. Gypsum board in classrooms has significant wear in limited locations. Folding partition in
Floors	1	Vinyl tile, carpet, mosaic tile - good condition. Wood flooring in gym in disrepair. Parquet wood flooring in dining is poor.
Ceilings	1	Acoustic ceiling tiles.
Finishes (general)	2	
Codes	3	Exterior egress doors from classroom suites are hidden from view, no exit markings. Divided with smoke partitions; doors on
Accessibility	3	Non-compliant elements: ramp, handrails, door hardware and maneuvering clearance.
Energy Conservation	2	
Hazardous Materials	0	No ACBM.
Fixtures / Furniture / Equipment	2	Some worn/outdated.
Aesthetics	2	
Composite Building / Space Deficiency Rating	2	5 Critical 3 - 4 Significant 0 - 2 Fair to Good

PHYSICAL CONDITIONS ASSESSMENT SUMMARY

2/11/97

Discipline: **STRUCTURAL**School: **Karns Middle**Building / Space: **1974**

Item	Deficiency Rating	Notes / Remarks
Foundation	u	u = unable to assess
Slabs	1	Minor cracks at limited locations.
Roof Structure	0	
Exterior Walls	1	Block with brick veneer.
Interior Walls	0	Block.
Elevated Floor Structure	0	Span-deck for storage/mechanical area above faculty work area.
Retaining Structures	NA	
Equipment Supports	1	
Seismic Compliance	5	This structure does not satisfy seismic requirements of current codes.
Miscellaneous Structures	NA	
Elevator	NA	
Hoisting Equipment and Structure	NA	
Composite Building / Space Deficiency Rating	1	5 Critical 3 - 4 Significant 0 - 2 Fair to Good

PHYSICAL CONDITIONS ASSESSMENT SUMMARY

2/12/97

Discipline: **MECHANICAL**School: **Karns Middle**Building / Space: **1974**

Item	Deficiency Rating	Notes / Remarks
HVAC Equipment	1	New rooftop package heat pumps throughout locker room heat and ventilation original.
Steam / Water Distribution Systems	NA	
Controls	1	New thermostats installed with HVAC upgrade, not connected to EMS.
Plumbing, Piping, Fixtures	4	Fixtures not handicap accessible. Fixtures show signs of age and use.
Fire Protection	NA	Not sprinklered. Exterior protection provided by two fire hydrants in front of building.
Special Equipment	2	Hood for dishwasher.
Utilities - Water, Storm Sewer, Sanitary	4	No backflow preventer on incoming water supply.
Energy Conservation	2	
Codes		
Composite Building / Space Deficiency Rating	3	5 Critical 3 - 4 Significant 0 - 2 Fair to Good

PHYSICAL CONDITIONS ASSESSMENT SUMMARY

2/12/97

Discipline: **ELECTRICAL**School: **Karns Middle**Building / Space: **1974**

Item	Deficiency Rating	Notes / Remarks
Primary Service	3	Underground primary and secondary. Pad-mount utility transformer.
Secondary Service	3	200A, 277/480v/3 phase/4w
Emergency Power	5	Emergency generator disconnected from fuel source.
Electrical Distribution	3	Original equipment, fair condition.
Branch Circuit Wiring	3	Ground fault insulation (GFI) protection needed at sinks and water fountains.
Lighting	3	Poor condition, needs work.
Fire Alarm	4	Manufacturer: Edward's. No visual alarm devices.
Telecom / Auxiliary System	3	Manufacturer: Rauland. Original equipment, except switchback.
Codes	4	Work space violations, lack of ground fault insulation (GFI).
Accessibility	5	Device mounting heights, alarm system coverage.
Energy Management System	NA	Available, but, not used.
Capacity for Growth	3	System appears near capacity.
Computer Accommodations	4	Virtually none, except lab.
Multimedia Retrieval Accommodations	4	System appears capable, but, no accommodations provided.
Composite Building / Space Deficiency Rating	4	5 Critical 3 - 4 Significant 0 - 2 Fair to Good

Appendix K

November 14, 1997

Middle School Ratings

Per BEP Reqt.			TOTAL CAPACITY	CURRENT ENROLL.	% CAP	MATURE	GROWING	DECLINING
6TH	7TH	8TH						
					112%			
200	210	240	650	726			X	
					117%			
250	270	240	760	886			X	
					127%			
325	240	240	805	1019			X	
					108%			
300	330	330	960	1036			X	
					103%			
225	240	270	735	756		X		
					114%			
175	175	175	525	596			X	
					73%			
475	510	510	1495	1096		X		
					99%			
175	210	210	595	587		X		
					102%			
275	300	300	875	896		X		

Appendix L

Syste

Composite School Ratings

35. SPRING HILL ELEMENTARY	3	3	2		2	3	3	2	4	2	3	4	4
36. SUNNYVIEW PRIMARY	3	3	4		3	4	3	4	4	2	3	4	3
38. BEARDEN MIDDLE	4	4	2		0	3	1	4	2	3	4	1	2
39. WHITTLE SPRINGS MIDDLE	2	2	1		2	2	3	2	1	2	2	1	2
40. GIBBS HIGH													
41. BONNY KATE ELEMENTARY													
42. CARTER ELEMENTARY													
43. FARRAGUT PRIMARY													
44. FARRAGUT INTERMEDIATE													
45. GAP CREEK ELEMENTARY													
46. INSKIP ELEMENTARY													

81. LINCOLN PARK (Evening Trade Extension)													
82. OADWOOD SCHOOL (Teacher Center)													
83. ANDERSON (Head Start/Storage)													
84. OLD SOUTH MIDDLE (Voc/Tech Labs)													
85. MAINTENANCE FAC. 5TH AVENUE													
86. OLD RUIE HIGH (Vacant/Storage)													
87. EASTPORT (OT/PT)													
88. AUSTIN-EAST HIGH (renovation)													
89. FULTON HIGH (renovation)													
90. VINE MIDDLE (renovation)													
91. RITTA ELEMENTARY (renovation)													

Appendix M

Preliminary Planning Issues

Issue I. Karns Middle School

Capital project necessary to address deficiencies regarding:

- Enrollment growth potential
- Current over-capacity status
- Space/functional deficiencies

Action/Solution:

- A. Programming in progress to define Capital Project to address Karns Middle School deficiencies.
- B. R.O.M. (rough order of magnitude) Project Cost **\$22.1M**
1. Construction **\$17M**

(Includes construction contingency; does not include program contingency or an inflationary factor)

New 140,000 G.S.F. x \$80.00 = 11.2M
 Renovation 80,000 G.S.F. = 5M
 Site = 0.8M

2. Non-Construction **\$5.1M**

Budgeted at 30% of Construction to address F.F.E., educational equipment (network technology, library collection, technology/vocational learning aids, etc.) design fees, etc. exclusive of land cost.

3. Project Duration 38 months
- a. Design 8 months
- b. Construction (Phase I – 18 months, Phase II – 12 months) 30 months

Option: In lieu of above Action/Solution consider option(s) as follows:

- A. Convert Karns Middle School to elementary school to address identified deficiencies; construct new Middle School on Northwest site (Hardin Valley).
1. R.O.M. Project Cost **\$27.4M**
 (resulting in a savings of approximately \$8.46M)
- a. Modification of Middle School to elementary school estimated at approximately **\$5M**
- b. New Middle School R.O.M. Project Cost **\$22.4M**

1,200 Enrollment Program Standard indicates 202,790 G.S.F. x \$85.00 x 1.3 (multiplier to provide budget for F.F.E., design fees, etc. exclusive of land cost and technology installation) equals \$22.4M.

- c. Total **\$27.4M**

VITA

Scott W. Medlyn was born on October 16, 1971 in Fayetteville, North Carolina. He attended schools in Germany, Ohio, Alabama and North Carolina. He graduated from Northern Durham (NC) High school spring of 1990. The following fall he began his four year career at Furman University where in the spring of 1994 he completed his requirements for the Bachelor of Arts degree in Political Science. In 1995, he began his Master's work in the University of Tennessee's college of Architecture and Planning. He officially received his Master's of City and Regional Planning degree in May of 1998 while-and-after working for the architectural and engineering firm of Kaatz, Binkley, Jones and Morris architects.