DOCUMENT RESUME

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THE MARBROOK SCHOOL--AN ELEMENTARY SCHOOL. PILOT PROJECT OF THE STATE OF DELAWARE.

Dollar, Bonner, Blake, and Manning, Architects, Wilmington, Del.; Marshallton Consolidated School District Number 77, Del.

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Descriptors-BUILDING EQUIPMENT, *BUILDING INNOVATION, BUILDING MATERIALS, CONTROLLED ENVIRONMENT, *DESIGN NEEDS, EDUCATIONAL NEEDS, *ELEMENTARY SCHOOLS, *FLEXIBLE FACILITIES, MOVABLE PARTITIONS, SCHEDULING, *SCHOOL DESIGN, SCHOOL SPACE, SITE DEVELOPMENT, STUDENT GROUPING

Extensive development of criteria for a given school design is presented for an elementary school pilot project. Descriptive material includes curriculum and site considerations, cooperation with state regulatory agencies on area restrictions, work with educational laboratories, architects and teams of consultants, planning phases and techniques. Specific material is given for educational program requirements and environmental factors. Other details included are site considerations, compactness and flexibility, variable pupil grouping, visual control, windows, school cost trends and computer assisted instruction. Plans and specifications for the proposed solution are provided. A typical curriculum schedule is also included. (MM)

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This school design was based upon an "in-depth curriculum evaluation and program created by the School Planning Laboratory, University of Tennessee, Knoxville, Tennessee, under the guidance of Dr. John Gilliland. The Educational Specifications were coordinated with the College of Education, University of Delaware, Newark, Delaware. The impetus for this project comes from the community itself led imaginatively by the school board under the leadership of Mr. R. Wayne Ashbee. The Supervising Principal of the district is Mr. Robert L. Fisher, who has organized and inspired the entire project and its team.

The team of consultants to the architects for this project are as follows:

R. P. Schoenijahn Co.	- Mechanical Engineers
L. H. Doane Associates	- Structural Engineers
Bolt, Beranek & Neuman	- Acoustical Consultants
McKee, Berger & Mansueto	- Cost Consultants
A. L. Hedrick	- Food Service Consultants
McCloud & Scatchard	- Landscape Architect
Robert LeFort Design Associates	- Interior Design

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THE STATE OF DELAWARE

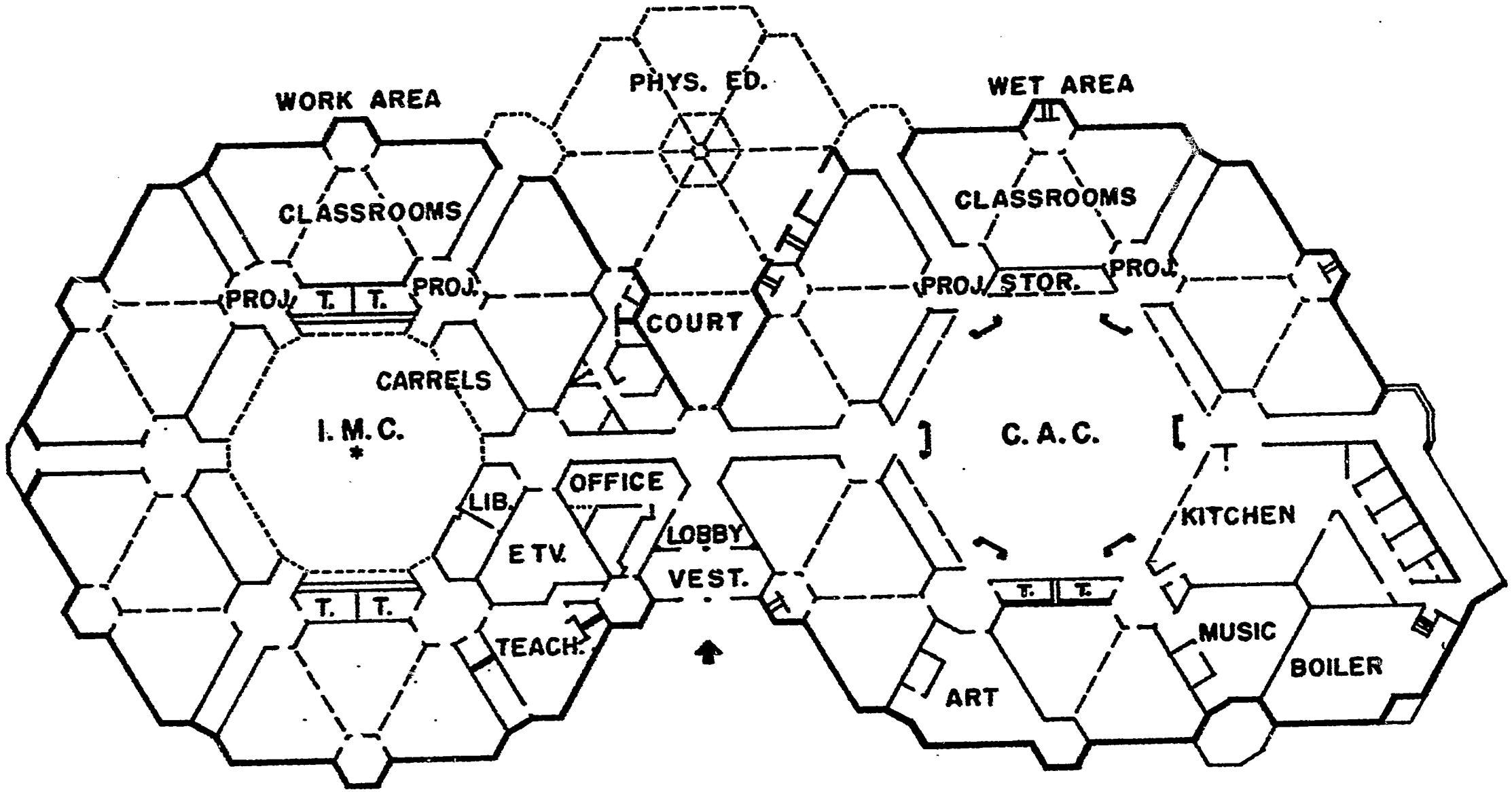
OUTLINE INDEX

Marshallton Consolidated School District #77
Marshallton, Delaware

R. Wayne Ashbee, Chairman, Building Commission
Robert L. Fisher, Supervising Principal

Outline developed by:

Dollar, Bonner, Blake, and Manning, Architects
2005 Concord Pike, Wilmington, Delaware
William F. Bonner, Jr., Partner in Charge


WORK AREA
PHYS. ED.
WET AREA
CLASSROOMS
CLASSROOMS
PROJ.
T.
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STOR.
PROJ.
COURT
CARRELS
I. M. C.
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OFFICE
LIB.
E TV.
LOBBY
VEST.
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TEACH.
KITCHEN
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MUSIC
BOILER
ART

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The unique feature of the Marbrook School is that through a series of most fortuitous circumstances it is an example of the classic architectural dictum, "Form follows function". Defining the function of an elementary school is no easy task; it literally involved hundreds of people, with inspired community and educational leadership. The problem we faced, as architects, was to transform a highly complex abstract idea, i.e., learning, in terms of a three dimensional structure, which not only must be a flexible and functional entity but also aesthetically interprets the spirit of the educational process. This is literally a school designed for basic concepts.

1. Basic Philosophy: In the "rough draft" of the Educational Specifications are three paragraphs that very clearly express the basic aim of the Marbrook School. They were written by Dr.L. Craig Wilson of the College of Education of the University of Delaware

A. A SHIFT FROM TEACHING STRATEGIES REQUIRING THE ISOLATION AND/OR SEGREGATION OF INDIVIDUALS AND GROUPS TO A REVERSE EMPHASIS ON FREE COMMUNICATION ACROSS TRADITIONAL BARRIERS OF AGE, ABILITY, AND ACHIEVEMENT

All institutions that deal with large numbers of people employ some type of grouping, and the schools are no exception. There is no inherent problem involved in this fact unless a given method-a single alternative-becomes institutionalized. This can happen by writing it into law, by simply retaining a given practice so long that it becomes an unthinking tradition, or by erecting buildings that either prohibit some types of grouping all-together or so reward one form that all others are forgotten. To a considerable degree, the schools are a prisoner of their own past assumptions about grouping which are now architectural tradition.

The controlling assumptions are easy to spot. They are, basically, that nothing worthy of architectural recognition can be done with groups of less than, or more than, thirty students; and further, that whatever is done in the name of teaching is best accomplished with both visual and auditory privacy. Result: the familiar "double-loaded corridor"; a perpetuation of the lone-wolf concept of teacher role; an artificial restriction on normal peer relationships among children; and a continuing tendency to break knowledge up into parcels that best fit the "single teacher-medium sized group" pattern.

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To free and challenge both teachers and children, a reverse trend has developed. It calls simply for much more openness, variable size grouping opportunities, the equipping of different parts of buildings to reflect their unique functions; and, in general, the creation of a group interaction atmosphere more like that afforded by World's Fair exhibition halls and hotel lobbies than traditional school facilities.

B. LOCATION - SITE

1. The Marshallton School District covers an area of about seven square miles, with a population of about 11,000, number of students 3,000. It is located in northern New Castle County, Delaware, in a rapidly growing suburban area adjoining Wilmington, Delaware

2. The district schools in 1963 were (one) junior high school, (two) elementary schools. An additional elementary school was added to the district in 1965 through integration; the school was formerly colored. The addition of the Marbrook School thus makes a total of three elementary schools, and two secondary schools in the district. A high school is presently under construction in the area, but is part of another overlapping district (Dickinson). At the present time the Marshallton School District covers grades 1 through 9.

3. The area served directly by the Marbrook School consists of three "developments" within a radius of one mile. The area is quite "built-up" with single houses for families in the "lower-middle" to middle income brackets. All children can walk to school. Access is provided from Centerville Road, heavily travelled, as well as a neighboring development, Faulkland Heights, where there is little traffic.

4. The site is relatively level, approximately 15 acres, acquired by the district in 1954. Originally, the site was partially covered by very poor second growth. It is completely surrounded by Brookland Terrace, Albertson Park, and Faulkland Heights, the developments that serve the school.

C. BACKGROUND AND DEVELOPMENT

The development of the Marbrook School was a very complex process, involving literally thousands of people. The easiest way we can describe it is in chronological sequence.

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1. Delaware State Board of Education - Area Designations

In 1962, the Delaware School Auxiliary Association started a study of area designations for Delaware schools. "Delaware School" is an endowed and rather unique organization. It was founded by Mr. Pierre S. DuPont, a former president of the DuPont Company, when he realized that in 1922, Delaware was 47th in school evaluation, not too far above Mississippi. He set out to do something about it. Using his own monies, he hired the then experts in school design in this area, Guilbert and Betelle, Architects, of Newark, New Jersey. The Delaware School Auxiliary was formed to coordinate the work of the architects with the local school boards and the State Board of Education, as well as to provide "clerk-of-the-works" supervision of construction and in effect teach local inexperienced contractors how to build schools. Estimates of Mr. DuPont's contribution to school construction in this state vary, but conceivably they are in the $60,000,000-$80,000,000 range. Needless to say, he revolutionized school construction in the state to say nothing of the educational process. To finance the educational facilities of the schools he had donated to the state, he had himself appointed State Treasurer. In this capacity he sponsored a liberalized and far-sighted corporation in corporation plan. As a result, many of our national corporations are presently incorporated in Delaware. The taxes derived helped support the schools he had built. Since Mr. DuPont's death in 1962, the Auxiliary has concerned itself less with coordination of architects and supervision of contractors, presuming local architects are increasingly capable of designing schools and local contractors building them. Their major concern recently has been problems in relation to school construction and design on a state-wide basis.

In this context, Delaware School Auxiliary developed an area designation for Delaware schools for each given pupil load, based on an average of schools previously designed. The prime purpose was to equalize discrepancies between upper New Castle County, highly industrialized, and the balance of the state. The area designation was adopted by the State Board of Education as primarily a guide. Unfortunately the State Legislature made it not a guide, but law. Thus an elementary classroom could be 899.9 or 900.1 square feet net area, but <u>not</u> 898 or 902.

A copy of the State Area Designation for Elementary Schools, April 18, 1963, is part of this outline and is worth careful scrutiny. A new elementary school for 840 students has certain restrictions including:

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Gymnasium	2,904 sq. ft.
Library (8% of enrollment)	1,700 sq. ft.
Teachers Room	360 sq. ft.
Art Activities	300 sq. ft.
Music (Instrumental)	500 sq. ft.
Corridors	6,720 sq. ft.
Walls and Partitions	4,411 sq. ft.
Total Area	59,549 sq. ft.

AREA DESIGNATIONS FOR ELEMENTARY SCHOOLS

Number of Square Feet Allocated to Each Area

APPROVED BY STATE BOARD OF EDUCATION
April 18, 1963

No. of Classrooms	12 *	16	20	24	28
Classroom 900 sq.ft. 30 Pupils	10,800	14,400	18,000	21,600	25,200
Multi-purpose	2,400	2,400	1,763	1,763	1,763
Stage	800	800	-	-	-
Gymnasium	-	-	2,904	2,904	2,904
Storage	-	-	250	250	250
Locker Room	360	360	700	700	728
Shower Room	-	-	165	165	165
Toweling Room	-	-	88	88	88
Toilet	-	-	100	100	100
Office	-	-	100	100	100
Kitchen (a min.of 2 sq.ft. of floor area per meal served daily should be reserved for with-in-wall space)	600	800	-	-	-
Kitchen-Cafeteria with stage	-	-	4,600	5,300	6,200
Library (8% of enrollment)	725	1,000	1,250	1,500	1,700
Administration	375	420	720	800	1,000
Health Nurse Unit	300	400	500	600	750
Conference Room	200	300	300	300	360
Teachers' Work Room	-	150	180	180	180
Teachers' Room	250	300	300	300	360
Art Activities	-	300	300	300	300
Music (Instrumental)	-	500	500	500	500
Pupil Work Area 25 sq.ft. per CR	300	400	500	600	700
Storage 70 sq.ft. per CR	840	1,120	1,400	1,680	1,960
Lavatories 45 sq.ft. per CR	540	720	900	1,080	1,260
Service System & Utilities	800	1,060	1,320	1,600	1,850
Corridors 8'x30' per CR	2,880	3,840	4,800	5,760	6,720

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No. of Classrooms	12 *	16	20	24	28
Total Square Feet	22,170	29,270	41,640	48,170	55,13[illegible]
Add 8% Walls & Partitions	1,774	2,342	3,331	3,854	4,411
Gross Total Area	23,944	31,612	44,971	52,024	59,549
Pupil Capacity	360	480	600	720	840
Square Feet Per Pupil	66.5	65.8	74.9	72.2	70.9

* When it is necessary to build elementary schools with less than 20 classrooms, we recommend that schools with 12 rooms and above should provide the major facilities as though they were future buildings of 24 or 28 rooms, and the additional square footage necessary for this purpose should be provided. This is the present policy.

State Department of Public Instruction - Dover, Delaware - (4/19/63)

2. An evaluation of the Area Designation Formula would disclose that areas for the cultural arts and library are inadequate for an advanced educational program of any sort. In addition, the allowances for construction and corridors (11,131 sq.ft.) seem disproportionate if they are at the expense of space that is available for educational purposes.

3. With this background, Mr. J. Ohrum Small, President of the Delaware State Board of Education, wondered if this was the final answer. A fortuitous chain of circumstances developed. Mr. Small talked to a former neighbor of his in Louisville, Kentucky, Mr. Donald Strause of the Herman-Nelson Division of the American Air Filter Company. More to the point, Mr. Strause at the time was President of the School Facilities Council, an organization devoted to the development of advanced school design. In this connection, he worked closely with the Educational Facilities Laboratory of New York, New York, a Ford Foundation involved with research in school construction, and most particularly with Dr. John Gilliland, Director, School Planning Laboratory, University of Tennessee, Southeastern Regional Center for E.F.C. Mr. Robert L. Fisher, Supervising Principal of the Marshallton School District, attended a class given by the University of Delaware in the summer of 1963. He was most impressed. In addition, Mrs. Martha Bachman, Chairman, Marshallton Board of Trustees, had been in contact with Mr. Small. As a result, a meeting was held with Mr. William A. Carter, Chairman of the Governor's Advisory Committee on School Construction. They all agreed that a solution must be found for not only better school design, but obtaining more educational space per dollar expended than the area formula allowed. As a result, they met with the then Governor Elbert N. Carvel, who was most concerned with education. As a result, the Marbrook School was declared a "prototype" school. Statement from the State Board Minutes is as follows:

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"Re: Marshallton School District, Certificate of Necessity January 1964, Board Meeting, Delaware State Board of Education.

STATEMENT:

"In approving the Certificate of Necessity for the Marshallton School District Building Program, a discussion followed concerning a proto-type school of a different design than called for in the Certificate of Necessity. It was explained that although the school would be designed for the same number of pupils, the design may be different and become a model for other schools in the State. The Board agreed unanimously that if the present Certificate of Necessity were not flexible enough to cover such conditions re design, it would be amended to cover this change."

4. Our firm, Dollar, Bonner, Blake, and Manning, had been selected previously as architects for the new school. Based on visits to experimental schools throughout the country, it was equally our feeling that school design in this area could be improved, and that the proper climate had been reached for a "break-through" in this direction.

5. Under the guidance of Mr. Small, Dr. Gilliland, the School District Building Commission, and the School Administration, a "team" was formed to formulate the Educational Specifications for the new school. In order to properly develop these specifications "in-depth" evaluation of educational curriculum concepts was of prime importance. To this end, the School Planning Laboratory was appointed as consultants by the School Building Commission and they, in turn, agreed to assist us. Dr. John Gilliland contacted Dean Roy M. Hall, Dean of the College of Education of the University of Delaware. As a result a "team" of consultants was organized to assist with the Educational Specifications headed by Dr. Craig Wilson, School Administration Professor at the University of Delaware. (Members of Team, University of Delaware, School Administration, etc., listed under H-Addendum) The team was further expanded to include the Marshallton District Board of School Trustees, the Marshallton District Administration, the teaching staff, teachers from adjoining school districts, and many parents. The "team" was then divided into five major study groups:

A. Communications (Including Instructional Materials Center)
B. Social Studies
C. Math-Science
D. Mental and Physical Health
E. Cultural Arts

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Since our architectural firm has five partners, one partner was involved in each group, and attended each meeting. The mechanical engineers were also included. (Listed under H-Addendum)

Before meetings were started, a group representing each of the various factors visited several schools in Kansas that had been developed by the School Planning Laboratory under the direction of Dr. John Gilliland, and designed by architect John Shaver, Salina, Kansas. Of particular interest was the McPherson High School, McPherson, Kansas. This trip was particularly instructive, as Dr. Gilliland explained the guiding principles of E.F.L. in terms of actual buildings. Subsequent trips were also made to Knoxville, Tennessee to visit the School Planning Laboratory, as well as schools in the vicinity developed by Dr. Gilliland. Of particular interest were the additions to the Alcoa High School, Alcoa, Tennessee, designed by architect George Galloway of Knoxville, Tennessee. Other trips involving smaller groups were made to Syracuse, New York (windowless schools) and Pinellas County, Florida (climate control).

6. Development of Educational Specifications

In December 1963 and January 1964, a series of three two-hour meetings were held by each of the groups involved. Meetings were held concurrently. After each meeting an evaluation meeting was held by a committee consisting of the University of Delaware consultants, school board, school administration, committee chairmen, and the architect in charge. At this time a comparison of findings was made and general trends and common similarities discussed.

A final meeting was held of all concerned to define goals and objectives. These are summarized under D-Educational Program Requirements.

The University of Delaware consultants also held many meetings to not only discuss details but also to evolve a three-dimensional conceptual model. This was finally defined as a sloping helix defining education as a continuum, descending about a central vertical core representing the Instructional Materials Center. The model thus stressed the interaction between phased students on a spatial basis, and most particularly the educational interdependence at all levels with the Instructional Materials Center.

A rough draft was prepared in February 1964, and after editing and coordination by Dr. Gilliland and his staff, the final Educational Specifications were published in April 1964.

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7. Space-Area Diagrams

Based on the Educational Specifications and the conceptual model space-area diagrams were developed by the architects by June 1964. In evaluating the program, the architects had to point out that the budget they had to work with was 60,000 square feet, while the educational needs were evaluated at 81,000 square feet or 35% above the budget. It was finally agreed that needs would be scaled down proportionately throughout, and that every effort would be made to use the state designation for construction (9,400 square feet) for usable educational space.

The space area diagrams were based on both a one-story and a two-story scheme. In essence, flexible teaching areas were grouped about a central core (the Instructional Materials Center) with a subsidiary center for cultural arts, and a smaller sub-center separated from the central core for physical education.

The diagrams were approved by the Building Commission in May 1964, with preference given to the two-story scheme. Mr. Fisher and the writer also gave a program explaining the educational concepts and the proposed solution to an educational administration course conducted by Dr. J. Frank Brown, Principal of the Melbourne High School. The administrators involved (about 50) were enthusiastic and receptive.

8. Preliminary Drawings

Based on the area diagrams, preliminary drawings were completed in August 1964. The solution was essentially a two-story building, with the central Instructional Materials Center in a "split-level" core. The building was designed on rectangular lines.

This scheme was not acceptable to the Building Commission, the school administration, and Dr. Gilliland, because it was too conservative in approach and did not fully express the educational concepts expressed in the Specifications, particularly in regard to increased emphasis on the cultural arts and physical education.

As a result a new and acceptable one-story scheme was developed, placing equal emphasis on three central cores, the Instructional Materials Center, Cultural Arts, each equal in area. In addition, the environmental and structural concepts of the Educational Facilities Laboratories were more effectively and completely implemented. These are developed in more detail in Section F-Architectural Planning.

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Preliminary drawings were completed in November 1964, and received Building Commission and State Board approval at that time. The architects had been working with the members of the staff of the State Department of Public Instruction during the preliminary design period, so that they were aware of the reasoning and concepts involved in the final solution. Of particular help was Dr. G. Kent Stewart, School Planning Director, as he was familiar with and enthused about the E.F.L. concepts in planning.

9. Working Drawings and Specifications

The contract documents were completed for State Board of Education approval in April 1965. Working out the details for an experimental school is an involved process, particularly in an area that is primarily conservative in approach.

Of great value was a bidders' meeting held during the bidding period in which all details were thoroughly explained to the general contractors and sub-contractors bidding on the job, in an effort to eliminate any future questions or misunderstanding during construction. This was well received. The contractors were most cooperative.

10. Construction

Bidding on this project occurred during a most difficult time. Three or four major projects (over $1,000,000) were being bid each week. Since this is a small state with a limited labor supply, the bidders were swamped. While the ultimate unit price of $21.35 a square foot may seem high compared with other states, it does compare favorably with other unit costs obtained in this state at the same time for educational work.

It was our feeling that the use of metal panel walls and metal partitions would expedite speed of erection during the winter months, as compared with masonry. This proved to be true. However, an unforeseeable jurisdictional dispute between the pipefitters and sheetmetal men delayed completion of construction by about two months.

This was unfortunate, as it was hoped to have in-service training for teachers in the new school for one month before the school opened. This had to be reduced to one week.

However, school opened September 6, 1966, and even though the building and curriculum are experimental, classes are proceeding smoothly.

Clerk-of-the-Works service, as previously outlined, was provided by the Delaware School Auxiliary Association.

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A dedication ceremony will be held October 16, 1966, hopefully to be attended by not only those who attend the school, their parents, and others in the community, but all those who had a part in the planning and construction of the building and contributed to its success.

11. SUMMARY

Architectural planning in the past was a combination of one architect and one client. Organizationally this has developed into a committee concept for both client (School Board and Administration) and architect (many consultants). This project would appear to be an extension of this process. Actively involved in the educational planning and development of this building were at least 400 people of differing interests and backgrounds. Through them the local community of several thousands was also informed and involved.

It might be of interest to note that of the original Marshallton District Board there remains only one member (out of five) that was involved in the original planning. Mr. R. Wayne Ashbee, Chairman of the Building Commission, has provided not only continuity, but leadership of a high order. Mr. Robert Fisher has provided the same continuity and leadership on the School Administrative level. However, the active and continued support of the school community for an imaginative and experimental approach was the greatest single factor in the success of the building.

It would appear that active community involvement with building programs should be fostered and encouraged by architects. It is a hopeful sign to us that we can increase and enlarge the service we can give to the people as a whole.

D. EDUCATIONAL PROGRAM REQUIREMENTS

1. Purpose

Historically, the elementary school was conceived as a skill-centered institution. Students were taught how to read; what they read was a concern of higher levels. The same was true of the other so-called "fundamentals". Out of this idea grew a hierachy of skill mastery no better illustrated than by the controlled vocabulary underlying most textbook reading series. All other things taught were secondary; the skills came first.

These same skills are still important, but they are, in a relative sense, much easier to master. For example, it is now easily possible for a child's pre-school, television inspired, vocabulary to exceed the controlled list of words systematically spelled out in a typical second reader. Similarly, concepts and content formerly introduced in high school are now common-place in the lower grades.

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The extent of this transition has been so great that the purpose of the elementary school has perceptibly shifted. The over-riding concern now is growth in the child's capacity for making wise choices. Skills are needed in decision-making but concepts are even more essential--and they come from a wide variety of academic fields. This is, no doubt, related to the growing enthusiasm for increasing the diversity of experiences encountered early in the child's life--especially in the cultural arts where artistic expression can gain a foothold before normal social inhibitions crowd them out for good.

Stated another way, the shift is from content, neatly packaged, to an unbroken process aimed at increasing the child's ability to educate himself. The stepping stones to self-education are the root concepts in three large academic areas--the social studies, the cultural arts, and math-science--supported by the more pervasive and diffused area of communications and mental and physical health.

This implies a type of curriculum organization which should be reflected in school building design in several rather distinct ways, including the following:

(a) Designated Academic Centers for social studies, science-math, and the cultural arts serving the upper elementary (age) levels directly, and supporting the younger children as resource centers for special projects and individual counseling.

(b) A centralized communications and Instructional Materials Center serving the entire school and providing, in addition, specialized sub-center services for each of the three academic centers.

(c) General-Purpose Classrooms for the younger children--flexible, contiguous to each other and to the main communications and resource center.

(d) A general openness and relatedness of all of the above facilities and close proximity of each to appropriate faculty planning and counseling offices.

(e) Appropriate physical education facilities for the needs of pre-teenage children (only) with special attention being given to dramatic and expressive arts in preference to spectator sports.

For increasingly obvious reasons, the school of the future will need to make specific provision for the various dimensions of the

teacher role--academic, clinical, technical, counseling, and clerical. This will be done by abandoning the current practice of simply providing a teacher's desk for each classroom. The needed approach is the creation of professional planning and service centers. The change is so deceptively easy to effect that its importance could be overlooked. The fact is that the competence of the elementary school staff will remain on its present plateau until the average community stops expecting the teacher to do everything, and what is worse, to do it alone.

2. Environmental Factors

The building becomes an important educational facility which maximizes effectiveness only when a complex of environmental factors are placed in a harmonious arrangement. The following factors must be placed into a "balanced relationship" so that one does not over-shadow another and imbalance occurs; but rather placed in a related framework in order that the instructional program of the elementary school may be enhanced.

(a) Psychological Environment. Recognition of the effect of the disregard for psychological factors on a pupils mental health and consequent effect on academic success in school is to see a child who fails, does not see himself as a worthy person and continuously unhappy.

(b) Thermal Environment. Thermal environment is very important to students and teachers alike. The learning process can be retarded by such things as high and low temperature, too much draft, too much humidity, and stale air. Heat gains through glass, varying occupancy loads and changes in the outside temperature are some important factors which cause unfavorable conditions in the classroom.

(c) Sonic Environment. It should be recognized that uncontrolled sounds in schools are serious barriers to the learning process. The interference with proper communication in the learning process is but a part of the problem of sound control. The effects of noise on mental and emotional health is of great importance to teachers and pupils. Noise may be annoying or distracting; it may cause fear or anxiety; it may lead to irritation, frustration, and fatigue. The educational opportunities lost when sound control is ignored may be reasonably quiet climate for study, apparent disorder, and poor behavior patterns.

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(d) Visual Environment. It is generally conceded that over 80% of learning is acquired through ocular perception. It is important that the eyes be safeguarded against injury improper balance of the visual environment. Providing proper lighting balance and decorating through the use of colors will have remarkable effects on children.

(e) Color. Color affects and influences all human beings of all ages physically and psychologically. It has been shown that some colors stimulate and excite while others soothe and relax. Still others create fatigue, depression, and irritation. This is but one factor-complex. Geographical location, nearby structures, outside details, orientation, size and shape of rooms, interior architectural problems, types of lighting fixtures, color, temperature of lamps, age of occupants, and type of activity are other considerations in choosing colors. Decorating classrooms and other spaces, therefore, should be a tailor-made job.

E. COMMUNITY FACTORS

1. Within a ten-year period, the school enrollment of the Marshallton District increased 233 percent (1952 to 1962). This increase in population has changed the entire philosophy of the district. New residents have brought with them a variety of economic, educational and ethnic backgrounds. The majority of these new residents are strong proponents of public school education and look upon their schools as community centers.

   The new school should be geared to the elementary child with enough flexibility to allow adult usage in non-school hours. This building is located in an area which will utilize the facilities at hours when school is not in session. Some examples of this could be adult education, children and adult theatre groups, and summer programs.

   Since the neighborhood in which the new school is to be located does not provide a community center, the new building should be designated to accommodate this type of activity.

   NOTE: The preceding sections D and E on Educational Program Requirements are a direct quotation from the Education Specifications prepared by School Planning Laboratory, University of Tennessee in cooperation with the College of Education, University of Delaware.

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2. Site Considerations

There were three (3) major factors that had to be considered in the landscape design of this project.

(a) New Castle County Owned Parkland. For the first time in the history of the county a school district requested cooperative useability of their respective properties. The county owns two (2) acres of undeveloped land to the rear of the school site which contains fifteen (15) acres. The county parkland had limited potential use because of its small size and drainage swale, so that the joint development of the parkland with the adjacent open ground of school property would provide substantially recreational facilities for the public as well as the children in the new school.

As a part of a separate contract, the school district will provide for removal of topsoil, rough grading, finish grading and replacement of topsoil, seeding and planting for the county owned land. The county will provide a baseball field, football field, waterways, tot lot with play equipment and a paved adult sitting area. The county will be responsible for maintaining the grounds. During the regular school year the school district will schedule use of activities. The New Castle County Park and Recreation Commission will schedule activities during the summer months.

(b) Special Terrace Areas. There will be two (2) raised amphitheatre type terrace areas, an art terrace and a science terrace. Each will be located just outside of their respective classrooms. They will have concrete risers and wood seats for sixty (60) pupils each. They are well buffered from adjoining play areas and the parking lot, so that such activities as reading, painting, sculpture, gardening and birdwatching can take place.

(c) Community Access

Via a secondary access road along the north boundary line and two (2) additional pathways along the west and south boundary lines, the surrounding community will have direct walking access to the school grounds. These pathways are in addition to the main entrance to the school along Centerville Road, and make this school a truly "Community School".

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F. ARCHITECTURAL PLANNING

The architectural planning of the Marbrook School was dictated largely by two prime considerations:

1. Function

The architectural maxim that "form follows function" is based on antiquity; its recent proponents have been Marvel Breuer of the new Bauhaus, and Mies van der Rohe. In order to define the function of a school, the curriculum must be fully evaluated, explored and explained. This was done, in unusual depth, for this project.

2. Educational Facilities Laboratories

This organization, a Ford Foundation, was deliberately formed to provide an innovative and experimental approach to the design of school buildings. Some of their precepts approach the limitations of dogma, conversely, if their precepts are not carried out completely, the end educational result is a compromise, and is not fully effective. In order to fully understand the Marbrook School, we must very carefully examine the recommendations of E.F.L. and their implications. Please remember that E.F.L. is experimental and extremely progressive. The Marbrook School is in an area that is most conservative architecturally. To have a school district in this state receptive to contemporary architectural ideas is a major achievement. However, unless a "climate" for change exists, very little in the way of innovation can be done. The major stress of E.F.L. design is two-fold: Compactness and flexibility.

3. Compactness

Following E.F.L. precepts, a compact school building is far easier to administer and operate efficiently than an extended building. It should also cost less for initial construction and maintenance and give more educationally usable space for the construction dollar. The following premise may be oversimplified, but E.F.L. in considering the effective use of space or area in terms of perimeter says the following:

(a) Rectangle - Perimeter/area ratio - poor. The typical "finger" type plan - E, H, or L for schools is in their opinion, most costly and inefficient.

(b) Square - Perimeter/area ratio - better.

(c) Circle - Perimeter/area ratio - ideal.

(d) Unfortunately, most building products produced on a quantity basis are not manufactured to conform to a circular module. As a result a most effective compromise is a hexagon or octagon, using linear shapes, that most closely approximate a circle.

(e) In this project a group of three hexagons forms the basic design.

4. Reduction in Space for Circulation

This is an extension of the compactness premise. A typical "double-loaded corridor" school, with classrooms stretched row on row on each side of a corridor, produces not only a rather grim, institutionalized academic regimen but wastes space for circulation, i.e., pupil traffic that could conceivably be used for educational purposes. In terms of education, the modular schedule, based on individual or small group instruction, could partically eliminate the hazards of the 6-7, or 8 period day with two (2) minutes between classes, with resulting noise and confusion. Thus, modular scheduling, by reducing traffic flow and congestion, could possibly create a building that eliminated corridors, and the interior space in a compact design could be more effectively used educationally.

(a) In this project there are only two (2) corridors, as such, each 28 feet long.

5. Flexibility

E.F.L. emphasizes this. From our own experience we would echo their thoughts. In our opinion there is only one type of building built thirty years ago that is currently up-to-date. This is the office building that is designed initially for change. If a client wishes to change the layout of a portion of a building, this has been pre-designed with movable partitions and utilities. Schools should be designed the same way. With the tremendous advance in knowledge and technology, I would venture that not one of us knows what subjects will be taught in any given school five years from now, let alone fifty years, the average life of a school bond issue. Subjects taught in college five years ago are now taught in high school; subjects taught formerly in high school, in junior high; junior high, in elementary, etc. A cursory view of the Philadelphia Inquirer, this date, states that in Russia the normal graduate of grade 10, comparable to our junior high school, has had ten (10) years of mathematics, six (6) years of geography, six (6) years of biology, five (5) years of physics, four (4) years of chemistry, and one (1) year

of astronomy. We are not really competing with the Russians (or are we?) and we don't have this, but in terms of our own culture and technology schools must be designed to be "with it" and subject to innovation and change.

6. E.F.L. Suggestions for Flexibility

(a) Movable Walls. These have been developed for at least a 48 average decibel rating by several manufacturers.

(b) Demountable Partitions. Based on standard office building design these can be moved overnight.

(c) Movable Exterior Walls. This has been standard for factories for years. Heavily insulated metal panel exterior walls are far more flexible than other permanent masonry.

(d) Movable Utilities. Goodness knows what kind of utilities we are going to need in schools ten years hence, electronic or otherwise. Present design of T-bar removable acoustical ceilings makes future rearrangement possible.

(e) All of these suggestions were followed in the Marbrook design.

7. Variable Pupil Grouping

Present standards of 30 pupils per classroom are going "by the boards" due to the tremendous advance in educational psychology. This advance is presently almost equal to other advances in scientific technology. It proves conclusively that not all pupils advance at the same rate of speed for any given levels of skill, concept, or attitude. A school must also be flexible in terms of grouping which may range from one (1) student to the entire school population.

An adjunct to the flexibility concept is the "pod" idea, as developed by E.F.L. The pod, or group of three instructional areas developed for this school, is based on a normal pupil load of thirty (30) per section or ninety (90) total. The fact that one hundred twenty (120) pupils can be accommodated in this space for the current curriculum concept proves the space is flexible.

To enable various size grouping in the teaching areas a fundamental concept is the use of movable furniture on wheels. All classroom furniture should be light enough to be easily moved, yet sturdy. In the development of this concept we were greatly aided by Robert LeFort Design Associates of Philadelphia, Pennsylvania..

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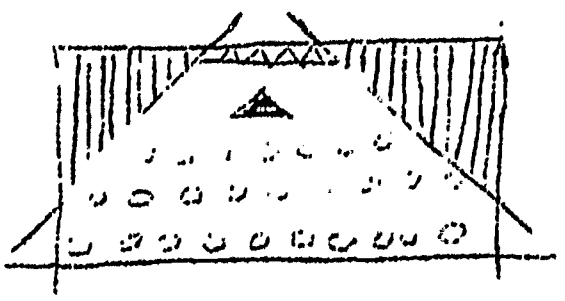
All storage cabinets, teachers wardrobes and files, and wardrobes are on wheels, enabling visual space divisions immediately adaptable to various size groups.

8. Visual Control

The shape of the teaching areas evolved as a truncated triangle on the basis of another of E.F.L.'s concept. In a normal rectangular school classroom much of the area is wasted usually due to sight lines.



The wasted area is shaded. As a result the teaching area is designed for concentration of visual presentation on two sides of the area. On one is concentrated the audio visual media, including overhead projection over the teachers' head. We had planned E.T.V. likewise, suspended from the ceiling. However, the state E.T.V. allotment is based on one receiver per three (3) classrooms so that these are necessarily on carts to serve each of the areas as needed.

An added bonus we have found is that the particular shape selected actually provides more chalkboard and tackboard space per area than a conventional classroom. The demountable walls can serve as tackboards with the use of magnets. One wall in each teaching area is a chalkwall from floor to ceiling (also magnetic for use as tackboard). This saves an estimated 50% over normal chalkboards due to elimination of time. Also, more usable space is available.

Color coordination of carpet, chalkwalls, movable and demountable partitions and classroom furniture was designed by LeFort Design Associates, Inc. of Philadelphia, Pennsylvania. The color photographs should speak for themselves.

9. Windows

As used on the additions to the Alcoa High School, Alcoa, Tenn., the window design is not common to this area. Basically, it is a series of two jalousie windows. The jalousies or windows on the exterior are aluminum. They can be closed to give positive light control for audio-visual purposes. The interior jalousies are

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glass to give fresh air or ventilation in the event of malfunction of the air-conditioning system. Screens are on the inside. In addition, the entire unit can swing "out" to conform with fire code requirements.

Actually, the windows are a compromise. E.F.L. feels windows are a luxury; they add unnecessarily to maintenance costs in terms of heat loss and solar gain. However, our firm is somewhat predjudiced. We work in an office where all of the window sash is fixed. Every summer the air-conditioning goes hay-wire for a period of from one day to four. Mechanical systems are cussed, fresh air is a great help when you need it. Also, it helps to use fresh air at times; air-conditioned air can get stale and musty. In addition, we feel after considerable investigation there is a certain psychological value in knowing what is going on outside. So, while there are large areas in the building that are "self-contained" we still feel there is a certain positive value in having windows; albeit on the minimum side.

The windows in both the Instructional Materials Center and Cultural Arts Center are glazed with plastic, glare reducing treatment. This is clerestory lighting, and most clerestories we have seen have been painted black, have curtains or venetian blinds. Due to continued effort and sufficient roof overhangs, we are most fortunate perhaps due to good luck, light distribution is uniform and there is no glare.

10. Sound Control

This has been obtained in a number of different ways through the use of acoustical treatment on walls and ceilings. The most effective help in this regard is the use of carpet throughout the building except for the Cultural Arts Center, Physical Education Shelter, the art room and the kitchen. At the present time there may be as many as six different groups in the I.M.C. engaged in different types of activities, all verbal. They do not interfere with each other, audibly. This is what we had hoped for, but we are still amazed. There is also amazingly little interference in the "pods" designed for 90 maximum, that currently have up to 120. The whole school is "quiet", except for Cultural Arts, which is necessarily "live".

11. Climate Control

The entire building is necessarily heated, ventilated, and air-conditioned. Elementary students are small "furnaces"; research has shown that cooling is needed at least 60% of the time in our area during the winter months.

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12. Lighting

Indirect lighting has been used throughout wherever practicable. Light intensity is approximately 70 foot candles on desk surfaces, everywhere.

13. Summary

Every effort has been made throughout to follow E.F.L. premises everywhere in the building. If the school is successful, and we feel it is, this is a vindication of their theories.

14. Technical Data

1. Type of Construction

(a) Floor

Concrete slab on grade. Carpeting throughout instructional areas and circulation areas. Resident tile at cultural arts center, health suite and storage rooms. Quarry tile at kitchen.

(b) Framing

Steel tubular columns - Classroom area
Steel wide-flange beams - "
Open web long span joints - "
Steel Trusswork - Cultural Arts Center
Laminated Wood Arches - Instructional Materials Center
P. E. Shelter

(c) Roofing

Built-up Roof - Classroom Areas and Instructional Materials Center
Asphalt Shingles - Cultural Arts Center and Physical Educational Shelter

(d) Insulation

Urethane (.15 U Factor) - Exterior Walls and Roofs

(e) Exterior Siding

Ribbed aluminum siding and fascia.

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(f) Windows

Double jalousie aluminum and glass louvers
(glass-inside) (aluminum-outside)

(g) Partition Work

Movable metal clad gypsum panels and operable walls.

(h) Furniture and Equipment

Everything movable

2. Mechanical Equipment

(a) Plumbing - Separate storm and sanitary systems

(b) Heating and ventilating - Air conditioning throughout
(3) Three classrooms per unit.
Reheat per classroom.
Forced hot water and chilled water return system.
Gas Fired Boiler.
Centrifugal Chiller.
Roof air intake and exhaust.
Gas fired infra-red heaters at open P.E. Shelter.

(c) Electrical

Underground primary service unit substation at boiler room.
Fluorescent lighting with 2' x 4' return air trouffers (125 foot candles at classrooms).
Mercury-vapor security lighting from ground at exterior.
State Educational Television network throughout.
Clock and program, public address, fire alarm, emergency lighting.

15. School Cost Trends

The following resume is from School Cost Trends Case History 91, as published by the American Air Filter Company. While repetitious of other parts of the outline, it does give a brief synopsis.

(a) General Interest. The Marbrook Elementary School is a uniquely designed school, constructed to meet the specific educational requirements of the community. Prior to actual designing, committees composed of Faculty, Lay Committee, University of Delaware; School Planning Laboratory, University of Tennessee, first decided upon an educational concept and program, then had the school designed to meet these needs. Features of the School include:

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1. Designed Academic Centers for social studies, science-math, and the cultural arts serving the upper elementary (age) levels directly, and supporting the younger children as resource centers for special projects and individual counseling.

2. A centralized communications and instructional materials center serving the entire school and providing, in addition, specialized sub-center services for each of the three academic centers.

3. General purpose classrooms for the younger children located near the main communications and resource center.

4. All classrooms and instructional areas located near the appropriate faculty planning and counseling offices.

5. Appropriate physical educational facilities for the needs of pre-teenage children (only) with special attention being given to dramatic and expressive arts in preference to spectator sports.

The school utilizes a design resembling three hexagons joined together; two of the hexagons being used for instructional area and one for physical education. It is reported that the school will have between 8,000 to 10,000 more square feet of usable instruction space than would be available in a school of equivalent size. The school contains 60,140 sq. ft. and has a capacity of 840 students.

Classrooms within each of the two instructional areas are arranged in groups of three, separated by movable partitions. The size of the classrooms can be varied to meet specific teaching needs. The only stationary items within these clusters are toilets, sinks and cabinets.

Located in the center of one hexagon is an instructional materials center, housing all teaching materials including audio-visual material, and in the center of another is a cultural arts center. The instructional materials center is about four times as large as conventional school libraries.

The third hexagon, the physical education shelter, is constructed without walls. It is protected by a roof and by part of the buildings it adjoins. Heat will be provided from the plastic ceiling through the use of infra-red rays and sunlight. It is estimated that this area will be available for gym classes 95 per cent of the school year.

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Additional features of the school are:

Carpeting wherever possible for sound control.
Limited number of windows. Only 5 percent of wall space will be windows.
Teachers centers which provide facilities for planning, conferences, etc.
Year round air-conditioning.
Master communications center serving as the central receiving area for the State of Delaware Educational Television Network.
Carrels near the centers of the two institutional hexagons.
No stairs and limited amount of corridors.

(b) Construction. Marbrook Elementary School is a one-story building containing approximately 60,140 sq. ft. Steel framework is used throughout with ribbed aluminum siding and fascia. The floor is concrete slab on grade with carpeting throughout the instructional and circulation areas. Resilient tile covering is used in the cultural arts center, health suite and storage rooms. Quarry tile is used in the kitchen.

Roofing consists of built-up roof in the classroom areas and asphalt shingles in the Cultural Arts Center and Physical Education Center. Exterior wall and roof is insulated with Urethane and windows are double jalousie aluminum glass louvres inside and aluminum louvres outside. All partitions are movable metal clad gypsum panels-openable walls.

(c) Heating and Ventilating. The Marbrook Elementary School utilizes a hot water central station system providing heating, ventilating and full air-conditioning. Seventeen AAF air handling units handle several "zones" each for proper thermostatic control. Each zone can be individually temperature controlled "automatically" throughout the day, regardless of outdoor temperatures or classroom load. AAF air handling units mix outdoor air with heated air to properly cool the rooms. Up to 100% outdoor air can be introduced into the room for cooling, when desirable and possible.

AAF has a full range of products to meet the heating, ventilating, and air-conditioning requirements of all schools. In addition to air handling units for central systems, a complete line of unit ventilators, for steam, hot water/chilled water, and electric heating are available. In addition to regular unit ventilator products, complete self-

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contained units are available. These units connect to all existing heating systems and contain their own refrigeration system for air-conditioning.

Cabinet heaters are available for small areas, offices, lobbies, etc. Sink Bubbler units and a complete selection of matching utility cabinets are also available.

(d) Building Cost.

Total Cost	$1,307,516
Plumbing, Heating & Ventilating	310,900
Electrical	150,000
Excludes fees and kitchen equipment @ $50,000	
Total Cu. Ft.	806,286
Total Area, sq. ft.	60,140
Total Number of Pupils	840
Cost per Sq. Ft.	$ 21.74
Cost per Cu. Ft.	1.62
Cost per Pupil	$1,726.00

G. UNUSUAL ARCHITECTURAL FEATURES

1. We have dwelt at length on the development of E.F.L. standards and suggestions. They have been followed with success in other parts of the country. Perhaps we should be more specific and state that the final architectural design, under their direction, has resulted in the following unusual architectural features for this area.

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(a) Basic Plan. Three central cores, each over 6,000 square feet in area for Instructional Materials Center, Physical Education Shelter, and Cultural Arts. In other words, mind, heart and body. These areas are very much in excess of those devoted to these pursuits in this area.

(b) Circulation Study. By the elimination of nearly all walls and corridors, we feel the educational use of the building has been increased by 20% or $10,000 square feet, in comparison with other, more traditional schools in this area. We cannot claim it has cost any less, or would we. We do feel that the design, as suggested by E.F.L., gives for more.

(c) Physical Education Shelter. This is an open-air facility as suggested by E.F.L., with a wood roof and plastic sky light. Such a shelter appeared ideal for an elementary school, as organized activities such as basketball are not used; emphasis is placed on games and rhythms. The flooring material is macadam with a coating of "walk-top" manufactured by the American Bitumuls Company. Heat is furnished by infra-red gas fired lamps suspended from the roof.

The orientation of the building was adjusted to protect the shelter from prevailing winter winds. In addition, a wind screen of trees has been planted. The shelter has been in use for a short time, and is being observed carefully to see if any additional screening is needed. It is available for community use.

(d) Cultural Arts Center. Divisible into six areas for large group instruction, the total area can accommodate the entire school population and is also available for community use.

(e) E.F.L. Please refer also to Section F, Architectural Planning.

H. SPECIAL EDUCATION FEATURES, INCLUDING IN-SERVICE TRAINING

1. Curriculum

From June 1965 to the opening of the Marbrook School, in-service training was given to all of the teachers in the district by the original consulting team that prepared the Education Specifications from the College of Education of the University of Delaware. (See Section C-Background and Development) It should be obvious that an extended and thorough curriculum evaluation cannot be limited to one school in a district with four other schools and a projected fifth. This resulted in an "in-depth" study which

developed the proposed schedule summarized on Pages 29 through 35. The school is basically phased, rather than graded.

The schedule is necessarily flexible and provides concentrated work and extended periods by each "one-room school" for a six-week period on the natural sciences, social studies, and cultural arts. It was found that the "traditional" subjects of mathematics and physical education are not necessarily subject to extended periods on an elementary level. Hence, these subjects are taught every day to each child for shorter periods of time.

Of interest in the schedule is the emphasis on the use of para-professionals on a team basis. The University of Delaware is co-operating to the extent that all of its "student teachers" in the senior year at the College of Education are assigned to the school on a full-time basis.

While the original educational design of the school was based on approximately 90 children per pod, the 116 to 120 students using this area (35% more than planned) does not appear to strain unduly the use of space.

Mr. Fred Boyer, Principal of the School, was formerly Assistant Superintendent for the East Plainfield, New Jersey School District. It is preferable to designate the principal of a school at the very start of planning and most particularly if it is experimental in nature. Mr. Boyer was named principal in July 1966, and moved into the school shortly before it opened. Mr. Boyer's comments in regard to an innovative approach are thus unusually valid. He feels that the school is working smoothly as far as both children and teachers are concerned. The only adverse comment (if it is that) was from his son, who goes to Marbrook, who wanted to know who his teacher was.

One unforeseen development is that the children come to school early and leave late. One of Mr. Boyer's more unhappy duties is to chase away children from other schools that hang around outside the school because they want to go to Marbrook instead. If we can continue to design schools that are so rewarding academically and aesthetically that children want to go to them, we are fulfilling a need that has challenged educators for centuries and is a bright ray on the educational horizon.

2. Computer Assisted Instruction

The Instructional Material Center, with the adjoining Communications Center, was designed initially to serve the following additional functions:

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(a) E.T.V. Broadcasting Studio for district, as part of a "head-end" station, for the State of Delaware E.T.V. network, reaching every school in the state.

(b) Storage of audio-visual tapes for E.T.V., for use by the school or the district.

(c) Memory retrieval system from audio-visual carrels in the I.M.C. Telephone Dial System for retrieval of data in audio-visual carrels.

(d) Computer-assisted instruction in audio-visual carrels using E.T.V. projection, light screen, light pencil, also typewriter consoles.

Lack of funds prevented full implementation of this program. However, the Marshallton District, in combination with the Dover, Newark, Stanton, Dickinson and Wilmington Districts, the Catholic Diocese of Delaware, and the University of Delaware are presently involved in a Federal Title III program to plan a Data Processing and Computer Assisted Instruction program for this area. Since the Marshallton District has had Data Processing for the last two years, their prime interest is in the field of Computer Assisted Instruction. Both Mr. Fisher, Supervising Principal, and Mr. James McJunkin, Administrative Assistant, have spent years of research on the subject. Hopefully an experimental program can be initiated for the Marbrook School. At any rate, the building is designed for it.

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A PROPOSED SCHEDULE FOR THE MARBROOK SCHOOL

ORGANIZATION:

Plant:

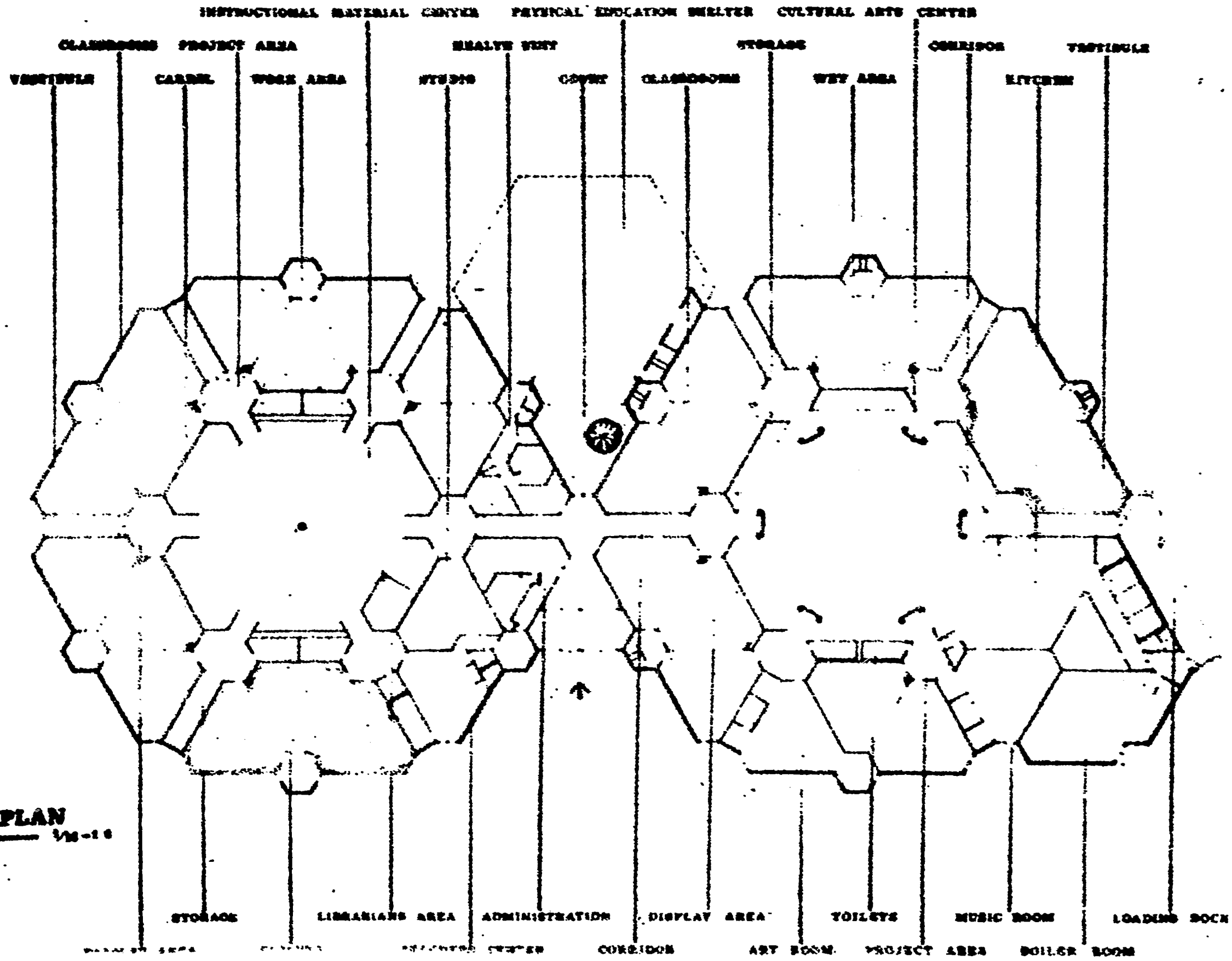
The Marshallton Elementary School houses six one-room schools. Each of the sub-schools is assigned to one three-room contiguous group. See page 2 for the allocation of sub-schools to the plant. The sub-schools are named by color; the Red, Orange, Yellow, Green, Blue and Violet Schools. There are five other areas of the plant with special designations for instructional purposes (see page 2). There are three-room groups for science, mathematics, and the equivalent of a three-room group for physical education. Also, there is a music room and three rooms for art.

Staff:

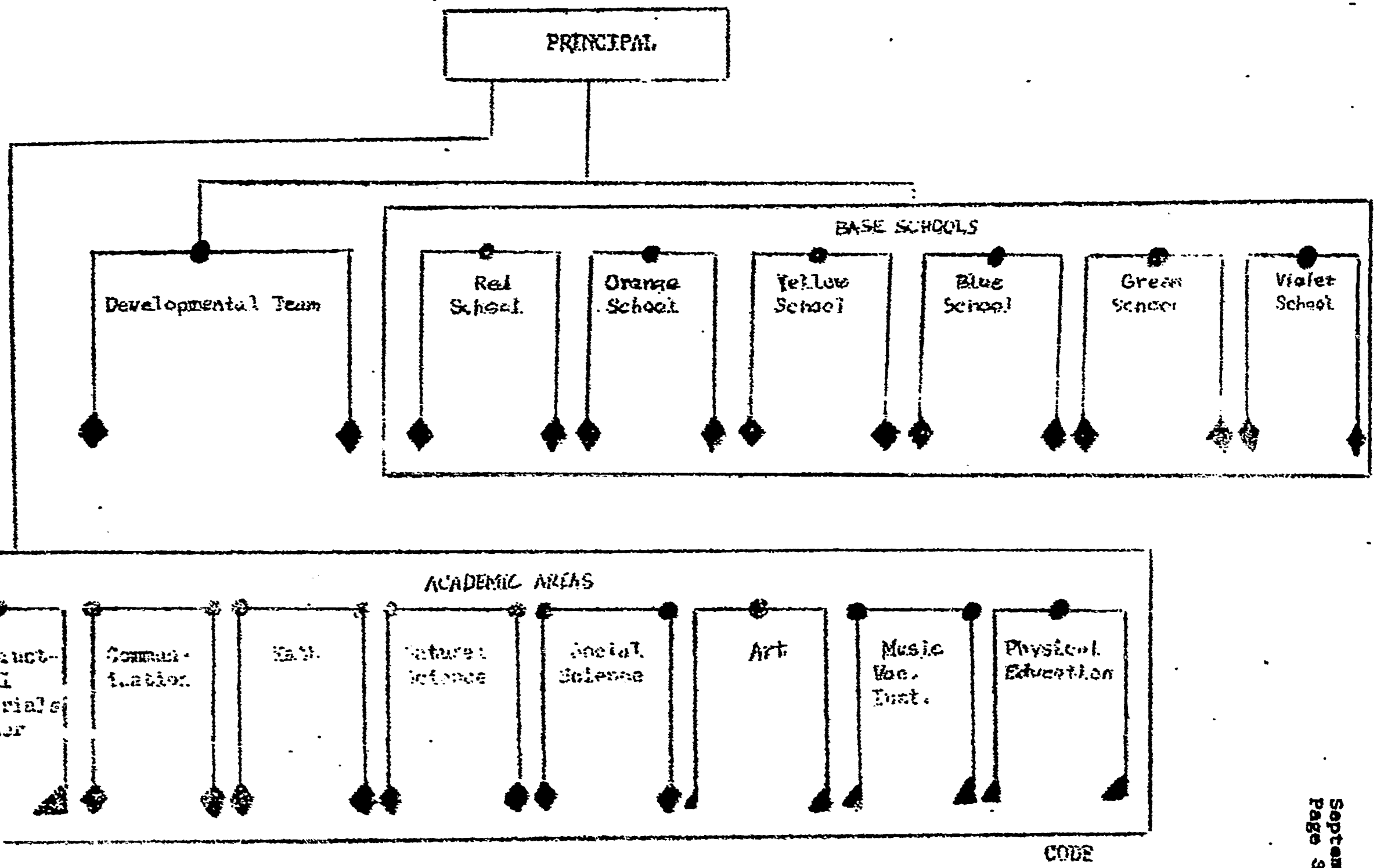
Staff allocation is shown on page 3. Each colored school is assigned one teacher and two teacher interns. This team is assigned to the colored school for the entire year. Eight academic areas are defined with their associated assignment of teachers, teacher interns and para-professionals. Each academic area is associated with a particular station within the plant. There is a developmental team that handles special problem areas. A principal is assigned to administer the school.

Students:

The student body is divided six ways and assigned to the six colored schools. This means approximately 116 students per school.


INSTRUCTIONAL MATERIAL CENTER
PHYSICAL EDUCATION SHELTER
CULTURAL ARTS CENTER
CLASSROOMS
PROJECT AREA
HEALTH UNIT
STORAGE
CORRIDOR
VESTIBULE
CARREL
WORK AREA
STUDIO
COURT
CLASSROOMS
WET AREA
KITCHEN
VESTIBULE
STORAGE
LIBRARIANS AREA
ADMINISTRATION
DISPLAY AREA
TOILETS
MUSIC ROOM
LOADING DOCK
CORRIDOR
ART ROOM
PROJECT AREA
BOILER ROOM

FLOOR PLAN


PRINCIPAL
Developmental Team
BASE SCHOOLS
Red School
Orange School
Yellow School
Blue School
Green School
Violet School
ACADEMIC AREAS
Instructional Materials Center
Communication
Math
Natural Science
Social Science
Art
Music Voc. Inst.
Physical Education
CODE
1 Principal
20 Teachers
22 Teacher Interns
8 Para Professionals

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CURRICULUM:

Each colored school follows the same schedule during the year, except that the schedule is staggered to allow for maximum utilization of plant and staff. For example, a description of the schedule for any colored school would typify the schedule for all other colored schools.

The academic year is broken into six six-week periods for instruction. Each six-week period is broken into two blocks - one called "innovative" and the other "traditional". In any day, a single colored school will meet with the innovative block in the morning and the traditional block in the afternoon, or vise versa. Page 5 shows the assignment of colored schools to instructional periods. Note that the innovative block includes language arts, natural sciences , social sciences and art, and the traditional block includes mathematics, physical education and an open period.

Whenever the Red School, for example, is working in an academic area (mathematics or science), six classrooms become available for instruction of the 116 students. Also, seven teachers are available (exceptions are physical education and art where six teachers are available), three from the colored school and four from the academic area.. This means a student teacher ratio of 17:1.

During the traditional block the Red School students have a schedule as shown on page 6. Notice that each class is scheduled five times a week. This type schedule will hold true for all other colored schools. This block may be staggered so that no student meets the same class any period of the day for more than one-sixth of the year.

↓	I						II						III						IV						V						VI					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
RED	1	N	N	N	N	N	S	A	A	A	A	A	S	S	S	S	S	S	S	TRAD						TRAD.						TRAD				
	2	L	L	N	N	N	Y	L	L	A	A	A	Y	L	L	S	S	S	Y																	
	3	L	L	N	N	N	N	L	L	A	A	A	N	L	L	S	S	S	N																	
	5	TRAD						TRAD						TRAD						N	N	N	N	N	S	A	A	A	A	A	S	S	S	S	S	S	S
	6																			L	L	N	N	N	Y	L	L	A	A	A	Y	L	L	S	S	S	Y
	7																			L	L	N	N	N	N	L	L	A	A	A	N	L	L	S	S	S	N
ORANGE	1	TRAD						TRAD						TRAD						N	N	N	N	N	S	A	A	A	A	A	S	S	S	S	S	S	S
	2																			L	L	N	N	N	Y	L	L	A	A	A	Y	L	L	S	S	S	Y
	3																			L	L	N	N	N	N	L	L	A	A	A	N	L	L	S	S	S	N
	5	N	N	N	N	N	S	A	A	A	A	A	S	S	S	S	S	S	S	TRAD						TRAD						TRAD					
	6	L	L	N	N	N	Y	L	L	A	A	A	Y	L	L	S	S	S	Y																	
	7	L	L	N	N	N	N	L	L	A	A	A	N	L	L	S	S	S	N																	
YELLOW	1	A	A	A	A	A	S	S	S	S	S	S	S	N	N	N	N	N	S	TRAD						TRAD						TRAD					
	2	L	L	A	A	A	Y	L	L	S	S	S	Y	L	L	N	N	N	Y																	
	3	L	L	A	A	A	N	L	L	S	S	S	N	L	L	N	N	N	N																	
	5	TRAD						TRAD						TRAD						A	A	A	A	A	S	S	S	S	S	S	S	N	N	N	N	N	S
	6																			L	L	A	A	A	Y	L	L	S	S	S	Y	L	L	N	N	N	Y
	7																			L	L	A	A	A	N	L	L	S	S	S	N	L	L	N	N	N	N
GREEN	1	TRAD						TRAD						TRAD						A	A	A	A	A	S	S	S	S	S	S	S	N	N	N	N	N	S
	2																			L	L	A	A	A	Y	L	L	S	S	S	Y	L	L	N	N	N	Y
	3																			L	L	A	A	A	N	L	L	S	S	S	N	L	L	N	N	N	N
	5	A	A	A	A	A	S	S	S	S	S	S	S	N	N	N	N	N	S	TRAD						TRAD						TRAD					
	6	L	L	A	A	A	Y	L	L	S	S	S	Y	L	L	N	N	N	Y																	
	7	L	L	A	A	A	N	L	L	S	S	S	N	L	L	N	N	N	N																	
BLUE	1	S	S	S	S	S	S	N	N	N	N	N	S	A	A	A	A	A	S	TRAD						TRAD						TRAD					
	2	L	L	S	S	S	Y	L	L	N	N	N	Y	L	L	A	A	A	Y																	
	3	L	L	S	S	S	N	L	L	N	N	N	N	L	L	A	A	A	N																	
	5	TRAD						TRAD						TRAD						S	S	S	S	S	S	N	N	N	N	N	S	A	A	A	A	A	S
	6																			L	L	S	S	S	Y	L	L	N	N	N	Y	L	L	A	A	A	Y
	7																			L	L	S	S	S	N	L	L	N	N	N	N	L	L	A	A	A	N
VIOLET	1	TRAD						TRAD						TRAD						S	S	S	S	S	S	N	N	N	N	N	S	A	A	A	A	A	S
	2																			L	L	S	S	S	Y	L	L	N	N	N	Y	L	L	A	A	A	Y
	3																			L	L	S	S	S	N	L	L	N	N	N	N	L	L	A	A	A	N
	5	S	S	S	S	S	S	N	N	N	N	N	S	A	A	A	A	A	S	TRAD						TRAD						TRAD					
	6	L	L	S	S	S	Y	L	L	N	N	N	Y	L	L	A	A	A	Y																	
	7	L	L	S	S	S	N	L	L	N	N	N	N	L	L	A	A	A	N																	

CODE: N - Natural Science S - Social Science A - Art L - Language Arts SYN - Synthesis

THE MARBROOK SCHOOL
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SCHOOL	BASE TEACHER
Red	Mrs. Johnston
Blue	Mrs. Powell
Yellow	Miss Groves
Green	Mrs. Paris
Violet	Mrs. Insinga
Orange	Mrs. Hawkins

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Traditional Block:

The Red, Yellow and Blue Schools receive the traditional block of instruction the same time (morning or afternoon) during the day. The same situation holds for the Orange, Green and Violet Schools. One traditional block demonstrates the assignment of colored schools to the block. This assignment remains fixed for the entire year - there are five periods of instruction in each subject each week.

ONE WEEK

	M			T			W			Th			F		
1/5	M	O	P	M	O	P	M	O	P	M	O	P	M	O	P
2/6	P	M	O	P	M	O	P	M	O	P	M	O	P	M	O
3/7	O	P	M	O	P	M	O	P	M	O	P	M	O	P	M
	RED	YELLOW	BLUE	RED	YELLOW	BLUE	RED	YELLOW	BLUE	RED	YELLOW	BLUE	RED	YELLOW	BLUE

CODE:
M - MATHEMATICS
P - PHYSICAL EDUCATION
O - OPEN

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H. ADDENDUM

For reference purposes, a list is given of people who were influential and helpful in the development or design of the school.

1. The Honorable Elbert N. Carvel, Governor, State of Delaware (1963) Laurel, Delaware.

2. Mr. William A. Carter, Chairman, Governor's Advisory Committee on Education (1963), Millsboro, Delaware.

3. Mr. J. Ohrum Small, President, Delaware State Board of Education (1963) Wilmington, Delaware.

4. Mr. Donald Strause, President, School Facilities Council, (1963), Wynnewood, Pa.

5. Dr. Harold Gores, President, Educational Facilities Laboratory, Inc. (a Ford Foundation), New York, N.Y.

6. Dr. John Gilliland, Director, School Planning Laboratory, University of Tennessee, Southeastern Regional Center for Educational Facilities Laboratory, Inc., Knoxville, Tennessee.

   Dr. Norman Boyles
   Dr. Orin B. Graff

7. Dr. Richard P. Gousha, Superintendent, Delaware State Department of Public Instruction.

8. Board of School Trustees, Marshallton Consolidated District #77, Marshallton, Delaware.

   Mrs. Martha Bachman, President, 1963
   Mr. R. Wayne Ashbee, President
   Mr. Nelson Cooper, Chairman, Building Commission, 1963
   Dr. William Jobling, Chairman, Building Commission 1963
   Mr. Graydon Hopkins
   Mr. Ned Brown
   Mrs. Mary DiVirgilio
   Mr. Andrew P. Cope

9. Administration Marshallton School District, Marshallton, Delaware.

   Mr. Robert L. Fisher, Supervising Principal
   Mr. James McJunkin, Administrative Assistant
   Mr. Edward James, Elementary Principal
   Mr. Malcolm Kemp, Elementary Principal
   Mr. Frederick Boyer, Elementary Principal
   Mr. W. Ross Wise, Junior High Principal

THE MARBROOK SCHOOL
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Mr. Rudy Sauer, Junior High Vice Principal
Mr. John Taliaferro, Secondary Principal

10. University of Delaware, Newark, Delaware.

Dr. John Perkins, President
Dr. Roy M. Hall, Dean, College of Education

Consultants

Dr. Craig Wilson, School Administration
Dr. Ralph Duke, Mental and Physical Health
Dr. Richard Barbe, Communications
Dr. Charles Adair, Social Studies
Dr. Howard Lamb, Cultural Arts
Dr. Robert Stegner, Science - Math
Dr. Robert Uffelman, Science - Math

11. Dollar, Bonner, Blake and Manning - Architects, Wilmington, Delaware

William F. Bonner, Jr., A.I.A., Partner-in-charge
Weston Holt Blake, A.I.A.
Erling G. Dollar, A.I.A.
W. Harley Funk, A.I.A.
William R. Manning, A.I.A.
William Pelham, A.I.A. Designer
Joseph Demkin, A.I.A. Designer

12. Robert P. Schoenijahn Co., Wilmington, Delaware; Consulting, Mechanical and Electrical Engineers
Mr. Hugh Mahaffy, Mechanical
Mr. Richard Foelmer, Electrical

13. Louis H. Doane Associates - Structural Engineers, Wilmington, Del.

Mr. William Orr, Partner-in-charge

14. McCloud and Scatchard, Landscape Architects, Lititz, Pa.

Mr. William Scatchard, Site Development and Landscape Design

15. Bolt, Beranek, and Newman, Inc., Acoustical Engineers, Cambridge, Mass.

Mr. John Curtis, Associate-in-charge

16. McKee, Berger, and Mansueto, Construction Cost Consultants, New York, N.Y.

Mr. Seymour Berger, Partner-in-charge

17. LeForte Design Associates, Inc., Interior Design, Philadelphia, Pa.

Mr. John LeForte
Mr. Michael Sklar
Mrs. Doris McCormick

18. Lighting Design and Consultants

LAM Associates

19. Program Study Committees (Parents, students, teachers)

A. Communications

Mr. Mark Peery, Chairman
Mr. Roy Hancock, Assistant Chairman
Mrs. Margaret Stetler, Assistant Chairman

B. Social Studies

Mr. John Burchfield, Chairman
Mrs. Mildred Insigna, Assistant Chairman
Mr. Warren Camburn, Assistant Chairman

C. Math Science

Mr. William Duff, Chairman
Mrs. Jean Parker, Assistant Chairman
Mrs. Ethel Chalker, Assistant Chairman

D. Mental and Physical Health

Mrs. Delphia Mitchell, Chairman
Mrs. Mozelle Pyle, Assistant Chairman

C. Cultural Arts

Mr. Karl Forssmark, Chairman
Mr. Herbert B. Windle, Assistant Chairman

20. New Castle County Park Commission, Wilmington, Delaware

Mr. John Moody, Director

21. Delaware State Fire Protection Division, Dover, Delaware

Mr. John Favinger, Director

22. Delaware State Health Department, Dover, Del.

Mr. Paul Harmeson, Director

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23. Delaware State ETV Commission, Dover, Delaware

Dr. William Hanford, Director
Dr. Robert Van Abel
Mr. William Lewis
Mr. Robert Fox

24. Delaware School Auxiliary Association, Wilmington, Delaware

Mr. A.J. Taylor, Chief Engineer

25. General Contractor

Ernest DiSabatino & Sons, Inc., Wilmington, Delaware

Subcontractors

Excavation & Paving Owensby Brothers, Wilmington, Del.
Concrete Work, Ernest DiSabatino & Sons, Inc. Wilm., Del.
Masonry, Ernest DiSabatino & Sons, Inc., Wilm., Del.
Structural Steel, Belmont Iron, Inc., Eddystone, Pa.
Steel Joists, Fred Boschan, Phila., Pa.
Metal Roof Deck, James Cullen Co., Wilm., Del.
Misc. Metals, Paneltrol, Inc., Wilm., Del.
Carpentry, Ernest DiSabatino & Sons, Inc.
Millwork, T.W. Hammond & Bro., Bryn Mawr, Penna.
Roofing & Sheet Metal, James Cullen Co., Wilm., Del.
Metal Siding & Panels, Elwin G. Smith Co., Pittsburgh, Penna.
Aluminum Doors and Frames, Pittsburgh Plate Glass Co., Wilm., Del.
Aluminum Windows, West T. & Robert W. Lamborn, Wilm., Del.
Folding Doors, Modern Doors, Inc., Wilm., Del.
Glass & Glazing, Pittsburgh Plate Glass Co., Wilm., Del.
Lathing & Plastering, Lowe Bros., Inc., Wilm., Del.
Tile Work, Marble Craft Co., Wilm., Del.
Resilient Flooring, Resilient Floors, Inc., Wilm., Del.
Acoustical Ceilings, Berger Acoustical, Bala Cynwyd, Pa.
Painting, Charles Shaid, Philadelphia, Pa.
Movable Metal Partitions, E.F. Hauserman Co., Phila., Pa.
Movable Gypsum Partitions, E.F. Hauserman Co., Phila., Pa.
Wood Cabinets, Wood Metal Industriesm, Inc.
Plumbing, Drainage, H-V. & AC, Evans & Evans, Inc., Wilm., Del.
Electrical Work, E.F. Higgins, Inc., Wilm., Del.
Landscaping, Millcreek Nurseries, Corner Ketch, Del.
Food Service, Essbar Equipment Co., Wilmington, Delaware